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CORRECTIVE MEASURES STUDY/FEASIBILITY STUDY FOR SOUTHERN AREA GROUNDWATER PLUME NWIRP CALVERTON NY

03/01/2011

TETRA TECH NUS

Corrective Measures Study (CMS)/ Feasibility Study (FS)

Southern Area Groundwater Plume

Naval Weapons Industrial Reserve Plant Calverton, New York

Mid-Atlantic Division
Naval Facilities Engineering Command

Contract Number N62470-08-D-1001
Contract Task Order WE08

March 2011

TETRA TECH

CORRECTIVE MEASURES STUDY (CMS)/ FEASIBILITY STUDY (FS)

SOUTHERN AREA GROUNDWATER PLUME

NAVAL WEAPONS INDUSTRIAL RESERVE PLANT (NWIRP)
CALVERTON, NEW YORK

Submitted to:
Naval Facilities Engineering Command
Mid-Atlantic
9742 Maryland Avenue
Norfolk, Virginia 23511-3095

Submitted by:
Tetra Tech NUS, Inc.
234 Mall Boulevard, Suite 260
King of Prussia, Pennsylvania 19406-1433

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY (CLEAN)
Contract No. N62470-08-D-1001
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PREPARED UNDER THE DIRECTION OF:

David Brayack, P.E.
Project Manager
Tetra Tech NUS, Inc.
Norfolk, Virginia

APPROVED FOR SUBMITTAL BY:

John Trepanowski, P.E.
Program Manager
Tetra Tech NUS, Inc.
King of Prussia, Pennsylvania

TABLE OF CONTENTS

SECTION **PAGE**

TABLE OF CONTENTS ..... **i**

ACRONYMS AND ABBREVIATIONS ..... **v**

1.0 INTRODUCTION **1-1**
1.1 REGULATORY BACKGROUND 1-1
1.1.1 NWIRP Calverton 1-1
1.1.2 Regulatory Framework 1-2
1.2 OBJECTIVES AND APPROACH 1-4
1.3 REPORT ORGANIZATION 1-5

2.0 SITE HISTORY and CHARACTERIZATION **2-1**
2.1 FACILITY INFORMATION 2-1
2.1.1 Facility Location 2-1
2.1.2 Facility History 2-1
2.1.3 Facility Setting 2-2
2.1.4 Previous Facility Investigations 2-6
2.2 SITE INFORMATION 2-7
2.2.1 Site Description and History 2-7
2.2.2 Site Geology 2-8
2.2.3 Site Hydrogeology 2-8
2.2.4 Previous Site Investigations and Actions 2-9
2.2.5 Current Site Conditions 2-17
2.2.6 Summary of Risk 2-22
2.2.7 Chemicals of Concern (COCs) 2-23

3.0 REMEDIAL ACTION OBJECTIVES **3-1**
3.1 NCP REQUIREMENTS 3-1
3.2 Applicable or Relevant and Appropriate Requirements (ARARs) 3-2
3.2.1 Determination of ARARs and TBCs 3-3
3.2.2 Chemical-Specific ARARs 3-3
3.2.3 Location-Specific ARARs 3-3
3.2.4 Action-Specific ARARs 3-3
3.3 REMEDIAL ACTION OBJECTIVES (RAOS) 3-4
3.4 PERFORMANCE CRITERIA 3-4
3.4.1 Groundwater 3-4
3.4.2 Surface Water and Sediment 3-5
3.4.3 Soil Vapor Intrusion - Indoor Air Quality 3-5
3.5 GROUNDWATER PRG ATTAINMENT AREA 3-6

4.0 IDENTIFICATION and SCREENING OF REMEDIAL TECHNOLOGIES **4-1**
4.1 GENERAL RESPONSE ACTIONS (graS) 4-1
4.2 SUSTAINABILITY 4-2
4.2.1 Green Remediation 4-2
4.2.2 Beyond Green Remediation 4-2
4.2.3 Lifecycle Analysis 4-3
4.3 SCREENING OF TECHNOLOGIES AND PROCESS OPTIONS FOR GROUNDWATER 4-3
4.3.1 No Action 4-3
4.3.2 Land Use Controls (LUCs) 4-3
4.3.3 Summary of Retained Technologies 4-4

5.0 DEVELOPMENT AND EVALUATION OF CORRECTIVE MEASURES 5-1
5.1 EVALUATION CRITERIA 5-1
5.2 DEVELOPMENT AND EVALUATION OF REMEDIAL ALTERNATIVES FOR GROUNDWATER 5-4
5.2.1 Alternative 1—No Action 5-4
5.2.2 Alternative 2—Land Use Controls 5-6
5.2.3 Alternative 3—Monitored Natural Attenuation and Land Use Controls 5-9
5.2.4 Alternative 4—Air Sparge, Monitored Natural Attenuation, and Land Use Controls 5-13
5.2.5 Alternative 5—Anaerobic Enhanced Insitu Biodegradation (EISB), Monitored Natural Attenuation, and Land Use Controls 5-20
5.2.6 Alternative 6— Anaerobic Enhanced Insitu Biodegradation (EISB), Air Sparge, Monitored Natural Attenuation, and Land Use Controls 5-29
5.2.7 Alternative 7— Groundwater Extraction, Treatment, and Injection, Monitored Natural Attenuation, and Land Use Controls 5-34

6.0 COMPARATIVE ANALYSIS OF ALTERNATIVES 6-1
6.1 COMPARITIVE ANALYSIS OF ALTERNATIVES 6-1
6.2 LIFECYCLE ANALYSIS AND OPTIMIZATION 6-1
6.2.1 Objective 6-1
6.2.2 Sustainability Evaluation Policy Background 6-1
6.2.3 Evaluation Tools 6-2
6.2.4 Sustainability Evaluation Framework and Limitations 6-3
6.2.5 Sustainability Evaluation Results 6-4
6.2.6 Sustainability Evaluation Conclusions 6-10
6.3 PATH FORWARD 6-11

REFERENCES R-1

APPENDICES

A Pump Test Technical Memorandum
B Analytical Data
C Pilot Study Report
D ARAR Evaluation
E Calculations
F Cost Estimates
G Lifecycle Analysis

TABLES
(presented at the end of the document)

NUMBER

2-1 Previous Investigations and Actions at NWIRP Calverton and Southern Area
2-2 Microcosm Data – Site 6A and Southern Area
2-3 Maximum Groundwater Detections – Southern Area
2-4 Maximum Groundwater Detections – Offsite Southern Area, Only
2-5 Surface Water and Sediment Detections
2-6 Summary of Calculated Risks – 1995 Baseline HHRA for Site 6A
2-7 Summary of CMS Groundwater COCs

3-1 Selection of Groundwater PRGs

4-1 General Response Actions for Groundwater
4-2a Primary Screening of Groundwater Remediation Technologies and Process Options

4-2b Secondary Screening of Groundwater Remediation Technologies and Process Options
4-3 Summary of Technologies and Process Options Retained for Development and Evaluation

5-1 Criteria Analysis Factors and Considerations
5-2 Monitored Natural Attenuation Performance Monitoring Objectives

6-1 Comparative Analysis of Southern Area Groundwater CMS
6-2a Summary of Cost Analysis
6-2b Summary of Costs
6-3a Sustainability Evaluation Qualitative Summary
6-3b Sustainability Evaluation Summary of Results

FIGURES

(presented at the end of the document)

NUMBER

1-1 General Location Map
1-2 Site Layout
1-3 Parcels and Site Location Map

2-1 Southern Area Groundwater DCA Isoconcentration Contour Map
2-2 Potentiometric Map for Shallow Wells April 2010
2-3 Potentiometric Map for Shallow Wells September 2010
2-4 Plan View MapTransect A-A'
2-5 1,1-Dichloroethane Isoconcentration Contour Map for Geologic Cross-Section A – A'
2-6 Peconic River Surface Water and Sediment Locations Analytical Result Exceedances
2-7 Conceptual Site Model
2-8 Conceptual Site Model Exposure Pathways

5-1a Alternative 4 – Air Sparge Conceptual Layout
5-1b Alternative 4 – Air Sparge Cross-Section View
5-1c Alternative 4 – Source Area Air Sparge Process Diagram
5-1d Alternative 4 – River Area Sparge Process Diagram
5-2a Alternative 5 – Anaerobic EISB Conceptual Layout
5-2b Alternative 5 – Anaerobic EISB Cross-Section View
5-2c Alternative 5 – Anaerobic EISB Process Diagram
5-3a Alternative 6 – Anaerobic EISB and Air Sparge Conceptual Layout
5-3b Alternative 6 – Anaerobic EISB and Air Sparge Cross-Section View
5-4a Alternative 7 – Extraction, Treatment, and Infiltration Conceptual Layout
5-4b Alternative 7 – Extraction, Treatment, and Infiltration Cross-Section View
5-4c Alternative 7 – Extraction, Treatment, and Infiltration Process Diagram

ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
°F	degrees Fahrenheit
ARAR	Applicable or Relevant and Appropriate Requirement
AS	air sparge / sparging
AST	aboveground storage tank
bgs	below ground surface
BTU	British Thermal Units
CA	chloroethane
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
cells/ml	microbial cells per milliliter
cfm	cubic feet per minute
CFR	Code of Federal Regulations (e.g., CFR Title 40, Section 300 [40 CFR 300])
CH_4	methane
CLEAN	Comprehensive Long-Term Environmental Action Navy
CMI	Corrective Measures Implementation
CMS	Corrective Measures Study
COC	chemical of concern
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
CWA	Clean Water Act of 1972
DCA	1,1-dichloroethane
DCB	1,4-dichlorobenzene
DCE	1,1-dichloroethene
Dhb	dehalobacter
Dhc	dehalococcides
DO	dissolved oxygen
DoD	Department of Defense
DPT	direct-push technology
EE/CA	Engineering Evaluation/Cost Analysis
EISB	enhanced insitu biodegradation
ERP	Environmental Restoration Program (formerly known as Installation Restoration Program [IRP])
Fe^{+2}	ferrous iron
Fe^{+3}	ferric iron
FOSL	Finding of Suitability to Lease
FOST	Finding of Suitability to Transfer
FP	free product
FS	Feasibility Study
ft/day	feet per day
Foster Wheeler	Foster Wheeler Corporation
GAC	granular activated carbon
GHG	greenhouse gas
GOCO	Government-Owned and Contractor-Operated [facility]
GRA	general response action

H_2S	hydrogen sulfide
HDPE	high density polyethylene
HI	hazard index
HHRA	human health risk assessment
HNUS	Halliburton NUS, Inc.
HRS	hazardous ranking system
HSWA	Hazardous and Solid Waste Amendments of 1984
IAS	Initial Assessment Study
IDW	investigative derived waste
ISCO	insitu chemical oxidation
J	estimated value
k	thousand
LTM	long-term monitoring
LUCs	land use controls
MCL	maximum contaminant level
MCLB	Marine Corps Logistics Base
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
$\mu g/m^3$	micrograms per cubic meter
µS/cm	microsiemens per cm
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MMBTU	million British Thermal Units
MNA	monitored natural attenuation
Mn	manganese
msl	[above] mean sea level
mV	millivolts
N_2O	nitrous oxide
NAVFAC	Naval Facilities Engineering Command
Navy	U.S. Navy
NCP	National Oil and Hazardous Substances Contingency Plan
ND	Non detect
NEBA	Net Environmental Benefit Analysis
NOAA	National Oceanic and Atmospheric Administration
NO_x	nitrogen oxides
NGC	Northrop Grumman Corporation
NTCRA	non-time-critical removal action
NTU	nephelomrtric turbidity units
NWIRP	Naval Weapons Industrial Reserve Plant
NYS	New York State
NYCRR	New York Codes, Rules, and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
O&M	operation and maintenance
ORC	oxygen-release compound
ORP	oxidation-reduction potential
ORNL	Oak Ridge National Laboratory
OSWER	Office of Solid Waste and Emergency Response
OU	Operable Unit

PA	Preliminary Assessment
PCB	polychlorinated biphenyl
PCE	Tetrachloroethene
PM_{10}	particulate matter
PRAP	Proposed Remedial Action Plan
PRB	permeable reactive barriers
PRGs	preliminary remediation goals
PRSC	Peconic River Sportsman's Club
psi	pounds per square inch
PV	Present Value
RAB	Restoration Advisory Board
RAO	Remedial Action Objective
RA-O	remedial action operation
RCRA	Resource Conservation and Recovery Act of 1976
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
RI	Remedial Investigation
ROD	Record of Decision
RSL	Regional Screening Value
SARA	Superfund Amendments and Reauthorization Act of 1986
SC	Specific conductivity
SCDHS	Suffolk County Department of Health Services
SI	Site Investigation
SOB	Statement of Basis
SO_x	sulfur oxides
SRE	Sustainable Remediation Evaluation
SVE	soil vapor extraction
S.U.	standard units
SVOC	semi-volatile organic compound
SWMU	Solid Waste Management Unit
TBC	To Be Considered
TCA	1,1,1-trichloroethane
TCB	1,2,4-trichlorobenzene
TCRA	time-critical removal action
TCE	Trichloroethene
Tetra Tech	Tetra Tech NUS
TOC	total organic carbon
USEPA	United States Environmental Protection Agency
USC	United States. Code (e.g., USC Title 10, Section 2701 [10 USC 2701])
UST	underground storage tank
VC	vinyl chloride
VOC	volatile organic compound
ZVI	zero valance iron

1.0 INTRODUCTION

This Corrective Measures Study (CMS)/Feasibility Study (FS) for the Southern Area groundwater plume at Naval Weapons Industrial Reserve Plant (NWIRP) Calverton, Suffolk County, Long Island, New York (Figures 1-1, 1-2, and 1-3), was prepared by Tetra Tech NUS Inc. (Tetra Tech) for Naval Facilities Engineering Command (NAVFAC) – Mid-Atlantic under the U.S. Navy's Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract No. N62470-08-D-1001, Contract Task Order (CTO) WE08.

The Southern Area groundwater plume originates from the vicinity of Site 6A on NWIRP Calverton property and extends offsite southeast towards the Peconic River. Previous CMS/FS Reports were developed separately for the on-site and offsite portions of the Southern Area plume (Tetra Tech, 2006a and b). The Onsite CMS/FS was finalized and remedial actions were implemented at the source areas in 2008 to 2010. The Offsite FC/CMS was not finalized. This CMS/FS addresses the Southern Area plume as a whole and considers several investigations and actions that occurred since the previous CMS/FS Reports and replaces the Offsite CMS/FS.

NWIRP Calverton was a government-owned, contractor-operated (GOCO) facility owned by the Navy and operated by Northrop Grumman Corporation (NGC). The operations at NWIRP Calverton ceased in 1996 and the land was returned to Navy control. The work for the offsite CMS/FS is part of the Navy's Environmental Restoration Program (ERP), which is designed to identify contamination resulting from historical operations or releases at Navy lands and facilities, and to institute removal or remedial actions as necessary.

1.1 REGULATORY BACKGROUND

1.1.1 NWIRP Calverton

The Navy is conducting this environmental investigation and cleanup in accordance with the terms of a New York State Department of Environmental Conservation (NYSDEC)-issued New York State Resource, Conservation and Recovery Act (RCRA) permit, as well as under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980. NYSDEC is the lead oversight agency in accordance with the requirements of the New York State Resource Conservation and Recovery Act (RCRA) Hazardous Waste Permit for the facility (NYSDEC 1-4730-00013/00001-0) dated March 25, 1992. The Navy is lead federal agency under the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Part 300, and Executive Order 12580, as amended by Executive Order 13016, for CERCLA response activities at Calverton and under the Defense Environmental Restoration Program amendments of 10 U.S.C. §2701, *et seq.*. The U.S. Environmental Protection Agency (USEPA)

supports NYSDEC in its oversight activities in accordance with the requirements of the previous USEPA facility permit (USEPA ID Number NYD003995198) dated May 11, 1992. NWIRP Calverton is also listed as a New York State Superfund site and, as such, the Navy also addresses the requirements of Title 6 of the New York Codes, Rules, and Regulations (NYCRR), Part 375 through the Applicable or Relevant and Appropriate Requirements (ARARs) process of CERCLA..

In accordance with the requirements of the NYSDEC Division of Solid & Hazardous Materials, a 6 NYCRR Part 373 ("Part 373") Permit was issued to the Navy on April 18, 2000, under the NYSDEC regulations (6 NYCRR Part 621) governing the procedures for administration of permit applications. This permit superseded and replaced the original Part 373 Permit to Operate a Hazardous Waste Storage Facility that was issued to then Grumman Aerospace Corporation on March 25, 1992. The new permit, issued only to the Navy, dealt exclusively with those Solid Waste Management Units (SWMUs) that remained on the former NWIRP Calverton property and any corrective actions that may have been required to address each site.

Currently, there are no operational activities or process-type operations being conducted at the Calverton facility that could generate hazardous waste nor are there any requirements for storage of hazardous materials on the Navy's property. Similarly, there will be no hazardous materials brought onto the property that is retained by the Navy to be used as part of any process-type operations. Also, the Navy will not be operating a hazardous waste storage area that would require permitting pursuant to 6 NYCRR Part 373.

A RCRA Permit Modification was issued February 14, 2007, to remove Sites 1, 9, and 10A from the permit. These parcels were then transferred to the Town of Riverhead. A RCRA Permit Modification was issued July 28, 2008, to select excavation and offsite disposal of source areas at Sites 6A and 10B.

1.1.2 Regulatory Framework

The stages for Navy ERP site investigations and actions are managed under (1) the Resource Conservation and Recovery Act of 1976 (RCRA)[1] and/or (2) CERCLA[2]. A comparison of steps for each program are presented on the next page (Navy, 2006). At federal facilities, cleanup of contaminated sites

[1] RCRA as amended by the Hazardous and Solid Waste Amendments of 1984 (HSWA), the Federal Facility Compliance Act of 1992, and the Land Disposal Program Flexibility Act of 1996. U.S. Code (USC) Title 42, Section 6901 (42 USC 6901) et seq. RCRA Subtitle C (Hazardous Waste Regulations; Code of Federal Regulations [CFR] Title 40, Parts 260 through 279 [40 CFR 260-279]) establishes a system for controlling hazardous waste from the time it is generated until its ultimate disposal (from "cradle to grave").

[2] CERCLA as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and implemented by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The NCP (40 CFR 300) was originally established to respond to oil spills. However, following issuance of the Clean Water Act of 1972 (CWA), the NCP was broadened to include actual and potential hazardous substance releases.

are often governed by RCRA in addition to CERCLA whether the installation has sought or is seeking a RCRA permit for managing hazardous wastes. Depending upon the regulatory status of waste management units at a facility, like NWIRP Calverton, cleanup for some sites may proceed under one program, but are implemented to meet the requirements of both programs.

CERCLA Response Actions and RCRA Corrective Actions at Federal Facilities (Navy, 2006)	
CERCLA Response Action	**RCRA Corrective Action**
Preliminary Assessment/Site Inspection (PA/SI) • Preliminary Assessment (PA), formerly known as the Initial Assessment Study (IAS). • Hazard Ranking System (HRS) Scoring. • Site Inspection (SI).	**RCRA Facility Assessment (RFA)** • Preliminary Review. • Visual Site Inspection. • Sampling Visit.
*** Removal Action** • Emergency Removal Actions • Time-Critical Removal Actions (TCRAs) • Non-Time-Critical Removal Actions (NTCRAs)	*** Interim Measures** • Interim Remediation. • Temporary Fixes. • Alternate Water Supplies.
Remedial Investigation (RI) • Site-Specific Data Collection. • Source Characterization. • Contamination Characterization. • Waste Mixtures, Media Interface Zones. • Hydrogeological and Climate Factors. • Risk Assessment. • Potential Routes of Exposure. • Extent of Migration.	**RCRA Facility Investigation (RFI)** • Background Data Review. • Environmental Setting Investigation. • Sources Characterization. • Contamination Characterization. • Potential Receptors Characterization.
Feasibility Study (FS) • Define Objectives and Nature of Response. • Develop Alternatives. • Conduct Detailed Analysis of Alternatives.	**Corrective Measures Study (CMS)** • Identify and Develop Alternatives. • Evaluate Alternatives. • Justify & Recommend Corrective Measure.
Remedy Selection • Select Remedy Which Meets Nine NCP Criteria. • Proposed Remedial Action Plan (PRAP). • Record of Decision (ROD).	**Remedy Selection** • Select Remedy that Abates Threat to Human Health and the Environment.
Remedial Design/Remedial Action • Design Remedy. • Perform Remedial Action. • Perform Operations and Maintenance and Monitoring.	**Corrective Measures Implementation (CMI)** • Develop Implementation Plan, Program, and Community Relations Plan. • Corrective Measures Design. • Construction and Implementation.

* Removal Actions and Interim Measures may be implemented at any point during the Response Action or Corrective Action

Both CERCLA and RCRA share the goal of protecting human health and the environment, and any procedural differences between CERCLA and RCRA should not substantially affect the outcome of cleanup.

1.2 OBJECTIVES AND APPROACH

This document is developed to serve as a CMS under RCRA and an FS under CERCLA in accordance with CERCLA and NCP requirement; USEPA FS guidance; and other relevant USEPA guidance (USEPA, 1998). Consistent with the RCRA and CERCLA processes, this CMS/FS includes a comparative analysis of remedial alternatives that will support the selection of a preferred remedy. Subsequently, the Navy will work with the State to select a preferred remedy and pursuant to CERCLA, will provide the public the opportunity for comment on a RCRA Statement of Basis and a CERCLA Proposed Remedial Action Plan (PRAP). After considering the public comments, the State will prepare the RCRA Permit modification and the Navy will prepare its CERCLA Record of Decision (ROD).

The CMS uses the conceptual site model (CSM) generated during the RI/RFI and subsequent investigations to develop remedial action objectives (RAOs), preliminary remediation goals (PRGs) (remediation goals, or cleanup levels, are finalized in the ROD), and an evaluation of remedial alternatives. A list of chemicals of concern (COCs) compiled for groundwater (Section 2.2.7) is based on exceedances of applicable federal and/or state criteria. This report discusses criteria used to evaluate remedial alternatives and to determine the benefits of implementing them.

Under the RCRA CMS process, the remedial alternatives are evaluated according to their ability to meet the following criteria:

Performance Standards

1. Attain media cleanup standards
2. Control the sources of releases
3. Protect human health and the environment

Balancing Factors

1. Long-term reliability and effectiveness
2. Reduction of toxicity, mobility, or volume of wastes
3. Short-term effectiveness
4. Implementability
5. Cost
6. State and community acceptance

Pursuant to the NCP and the 1988 USEPA FS guidance, the remedial alternatives are evaluated according to their ability to meet the following nine NCP criteria:

Threshold Criteria

1. Overall protection of human health and the environment
2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

Primary Balancing Criteria

3. Long-term effectiveness and permanence
4. Reduction of toxicity, mobility, or volume through treatment
5. Short-term effectiveness
6. Implementability
7. Cost

Modifying Criteria

8. State acceptance
9. Community acceptance

State acceptance and community acceptance are evaluated after regulatory and public comment on the CMS/FS and the PRAP. Sustainability elements (e.g., green remediation) may also be considered during evaluation of the remedial alternatives (refer to Sections 4.2 and 6.2).

The information presented herein will be used by the Navy, as federal lead agency, in cooperation with State and local officials pursuant to CERCLA §120(f) and §121 (42 U.S.C. §9620(f) and §9621) and 10 U.S.C. §2705(f), to select remedial alternative(s) that comply with the requirements of the NCP. This CMS/FS report is not intended to serve as a design document; rather, it gives a conceptual overview of remedial alternatives and an assessment of their feasibility.

The Navy maintains a public repository, which includes supporting technical documents and correspondence related to the site and NWIRP Calverton, at the following location:

Riverhead Free Library
330 Court Street
Riverhead, New York 11901-2885
(631) 727-3228

1.3 REPORT ORGANIZATION

This report is organized as shown in the Table of Contents. Tables and figures are provided at the end of the document. Appendices are provided electronically on the enclosed CD-ROM.

2.0 SITE HISTORY AND CHARACTERIZATION

This section provides a summary of background information for NWIRP Calverton, Sites 6A and 10B, and the Southern Area. This section also summarizes previous environmental investigations and actions that occurred at the Southern Area. Additional information may be found in the various reports referenced throughout this section, which are available in the Administrative Record.

2.1 FACILITY INFORMATION

2.1.1 Facility Location

NWIRP Calverton is located in the Town of Riverhead in Suffolk County on Long Island, New York, approximately 70 miles east of New York City (Figure 1-1). Since 1998, the majority of the property contained within the perimeter fence has been conveyed to the Town of Riverhead; however, the Navy retains three non-contiguous parcels (Parcels A and B [Figure 1-3] and Parcel C (not shown) totaling approximately 209 acres to continue ERP activities at Sites 2, 6A, 7, 10B, and the Southern Area.

2.1.2 Facility History

NWIRP Calverton has been owned by the Navy since the early 1950s when it purchased the land to allow construction use by Grumman Aircraft (now NGC). At that time, the property was purchased from a number of private owners. The facility was expanded in 1958 through additional purchases of privately owned land. NGC (previously Grumman Corporation) has operated the facility since its construction (Navy, 1986).

Grumman constructed the facility in the early 1950s for use in the development, assembly, testing, refitting, and retrofitting of Naval combat aircraft. Construction was completed in 1954. The facility supported aircraft design and production at NGC-operated NWIRP Bethpage, also on Long Island in New York. NGC was the sole operator of the GOCO facility until it ceased operation in February 1996.

The majority of industrial activities at the facility were confined to the developed area in the center and south-central portion of the facility, between the two runways. Industrial activities at the facility were related to the manufacturing and assembly of aircraft and aircraft components. Hazardous waste generation at the facility was related to metal finishing processes such as metal cleaning and electroplating. The painting of aircraft and components resulted in additional waste generation (Navy, 1986; HNUS, 1992).

NGC operations at the facility ended in February 1996. In September 1998, the majority of the land within the developed section of the facility was transferred to the Town of Riverhead for redevelopment. In

September 1999, almost 3,000 acres of undeveloped land outside of the fenced areas were transferred to NYSDEC, which continues to manage the property for resource conservation and recreational uses. An additional 140 acres of the northwestern buffer zone was transferred to the U.S. Department of Veterans Affairs and is being used for expansion of the Calverton National Cemetery.

2.1.3 Facility Setting

Climate and Meteorology

NWIRP Calverton is located in an area classified as a humid-continental climate. Its proximity to the Atlantic Ocean and Long Island Sound add maritime influences to the classification (NOAA, 1982). The average yearly temperature at the National Oceanic and Atmospheric Administration (NOAA) Riverhead Research Station, located 4.5 miles northeast of the site, is 52 degrees Fahrenheit (°F), with a maximum average monthly temperature of 73°F in July and a minimum average monthly temperature of 31°F in January. Annual precipitation at the Riverhead Station averages 45 inches. The highest monthly average precipitation is 4.5 inches occurring in December, and the lowest is 2.9 inches occurring in July. The average yearly evapotranspiration rate is 29 inches, resulting in a net annual precipitation rate of 16.3 inches. A 2-year, 24-hour rainfall can be expected to bring 3.4 inches of precipitation (NOAA, 1982; U.S. Department of Commerce, 1961).

Surface Features

The NWIRP Calverton is located in an area underlain by permeable glacial material and characterized by limited surface water drainage features. Normal precipitation at the facility is expected to infiltrate rapidly into the soil. The majority of the facility is located within the Peconic River drainage basin. Extensive wetland areas and glacially formed lakes and ponds are located southwest and south of the facility. NWIRP Calverton occupies a relatively flat, inter-morainal area. The topographic relief at the facility is 54 feet; elevations range from approximately 30 to 84 feet above mean sea level (msl) (McClymonds and Franke, 1972).

Ecological Setting

According to the U.S. Department of the Interior, Fish and Wildlife Service, no federally listed endangered or threatened species reside within a 4-mile radius of the study area. Transient species such as the bald eagle (*Haliaeetus leucocephalus*)[3] may occur within the study area.

[3] The bald eagle has been federally de-listed as endangered, but still is federally and NYS-listed as threatened, and is protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

Information provided by NYSDEC and the New York Natural Heritage program indicates several New York State endangered and threatened animal species exist within the study area. The most notable species, tiger salamander (*Ambystoma tigrinum*), may occupy onsite ponds adjacent to Site 6A, and possibly the Northeast Pond Disposal Area. Other species include the northern cricket frog (*Acris crepitans*) and the least tern (*Sterna antillarum*). Additional endangered and threatened plant species reside within the facility boundary and may be present in the Southern Area. According to the information supplied by NYSDEC, the wetland areas surrounding the Peconic River, including Swan Pond, include significant habitat for many New York State endangered and threatened animals and plants. Portions of these wetland areas are within the offsite portion of the Southern Area.

Surface Water Hydrology

The majority of the facility is located within the Peconic River drainage basin. The north-eastward flowing Peconic River is located approximately 1,300 feet south of the facility at its closest point to the current facility boundary (Figure 2-1). The surface water in the Peconic River is classified by New York as Class C, which is suitable for fish propagation and survival, and for primary and secondary human contact recreation. New York State designated the upper 10.5-mile reach of the Peconic River as a scenic river and the lower 5.5-mile reach as a recreational river. Surface water and groundwater from NWIRP Calverton flows into the upper portion of the River.

Based on topography, surface drainage is expected to flow southward to the ponds and wetland areas, and ultimately be received by the Peconic River via overland flow. The Peconic River flows into Peconic Lake, located 3.2 stream miles downstream from the facility, and then discharges to Peconic Bay, which is 8.5 stream miles downstream from the facility.

Major surface water features near the facility include McKay Lake and Northeast Pond. McKay Lake is a man-made groundwater recharge basin located north of River Road, midway along the southern site border. The Northeast Pond is located at the northeastern corner of the facility. Several small drainage basins exist near Site 6A (Runway Ponds). All of these surface water features are land locked, with the exception of McKay Lake, which has an intermittent discharge to Swan Pond located 1,500 feet to the south. Swan Pond, approximately 55 acres in size, discharges to the Peconic River 1.6 stream miles south of McKay Lake via a series of cranberry bogs (USGS, 1967; Navy, 1986).

Overland flow from the drainage basins may also occur periodically. Surface water runoff from Site 6A is collected by drainage ditches paralleling the southern and eastern edges of the paved area. The ditches enter a southward-flowing culvert at the southeastern corner of Site 6A; the culvert ends approximately 250 feet west of Site 10B, south of the road. A drainage ditch flows southward 500 feet from the outfall and enters a depression containing two small ponds. These ponds are located approximately 1,500 feet south of Site 6A.

A number of small wetlands exist on the facility. The drainage basins at Site 6A and the Southern Area are classified as palustrine, scrub/shrub/emergent wetland (U.S. Department of Interior, 1980).

Geology and Soils

NWIRP Calverton lies within the Atlantic Coastal Plain Physiographic Province. Generally, this region can be characterized as an area of relatively undissected, low-lying plains. The Atlantic Coastal Plain is underlain by a thick sequence of unconsolidated deposits. The surface topography has been created or modified by Pleistocene glaciation (Isbister, 1966).

Ground surface elevations on Long Island range from sea level to approximately 400 feet msl. The two most prominent topographic features in the Long Island area are the Ronkonkoma terminal moraine and the Harbor Hill end moraine. These east-west trending highlands mark the southern terminus or maximum extent of two glacial advances. The older Harbor Hill moraine lies along the northern shore of Long Island, the younger Ronkonkoma moraine essentially bisects the island. NWIRP Calverton occupies a relatively flat, inter-morainal area between these two features. The topographic relief at the facility is 54 feet; elevations range from approximately 30 to 84 feet msl (McClymonds and Franke, 1972).

NWIRP Calverton is underlain by approximately 1,300 feet of unconsolidated sediments consisting of four distinct geologic units. These units, in descending order, are the Upper Glacial Formation, the Magothy Formation, the Raritan Clay Member of the Raritan Formation, and the Lloyd Sand Member of the Raritan Formation (McClymonds and Franke, 1972). The glacial sediments beneath the facility have a maximum thickness of approximately 250 feet and consist of both glacial till and outwash deposits. Till was deposited directly by the ice, while outwash deposits were laid down by meltwater-supplied glaciofluvial systems. The till in Suffolk County ranges from 0 to 150 feet in thickness and generally consists of poorly sorted to unstratified sediments. The outwash deposits consist chiefly of well-sorted and stratified sand and gravel. One important characteristic of outwash deposits is their high degree of heterogeneity. Lithologies may vary widely over relatively short vertical and horizontal distances.

The Cretaceous-age Magothy Formation underlies the Upper Glacial Formation and is approximately 520 feet thick. The Magothy Formation chiefly consists of stratified, fine to coarse sand and gravel. The Cretaceous-age Raritan Clay Member of the Raritan Formation underlies the Magothy Formation and is approximately 170 feet thick. The Raritan Clay consists of clay and silty clay. The Lloyd Sand Member of the Raritan Formation underlies the Raritan Clay and is approximately 400 feet thick. The Lloyd Sand consists chiefly of fine to coarse sand and gravel.

The unconsolidated sediments beneath the site unconformably overlie crystalline bedrock consisting of schist, gneiss, and granite. The regional dip is to the south and southeast. All of the geologic units dip in these directions, although to varying degrees (McClymonds and Franke, 1972).

Refer to Section 2.2.2 for site-specific geology discussion and a cross-section through the Southern Area plume.

Hydrogeology

The unconsolidated sediments that underlie the facility are generally coarse grained with high porosities and permeabilities. These factors create aquifers with high yields and high transmissivities.

The Upper Glacial Formation, the Magothy Formation, and the Lloyd Sand are the major regional aquifers. The Upper Glacial and Magothy aquifers are of principal importance in Suffolk County because of their proximity to the land surface. The Lloyd Sand is not widely exploited because of its depth (McClymonds and Franke, 1972).

The Upper Glacial aquifer is widely used as a source of potable water in Suffolk County. The water table beneath the NWIRP lies within this aquifer. Porosities in excess of 30 percent have been calculated for the Upper Glacial aquifer in adjoining Nassau County, Long Island. Pumping tests were performed at two locations in the Southern Area in July 2010. For the area near River Road (Fence Line), the average horizontal hydraulic conductivity (K_h) was 221 feet per day (ft/day) and the average vertical hydraulic conductivity (K_v) was 102 ft/day. For the area near the Peconic River (Connecticut Avenue), the average horizontal hydraulic conductivity was 41.8 ft/day and the average vertical hydraulic conductivity (K_v) of 3.8 ft/day (Tetra Tech, 2010b; provided as Appendix A).

The Magothy aquifer is widely used as a source of potable water in Suffolk County. The most productive units are the coarser sands and gravels. The permeability of the Magothy is high; hydraulic conductivities have been calculated in excess of 70 ft/day.

The Upper Glacial and Magothy aquifers are believed to be hydraulically interconnected and to function as a single unconfined aquifer. Previous hydrogeological investigations and geologic mapping indicate that, although clay lenses are present in both aquifers that may create locally confining and/or perched conditions, these lenses are not widespread and do not function as regional aquitards (McClymonds and Franke, 1972; Fetter, 1976).

The Raritan Clay has a very low permeability (approximately 3×10^{-5} ft/day) and hydrologically acts as a regional confining layer. The confining nature of this unit is believed to minimize potential contamination migration to the underlying Lloyd Sand aquifer (McClymonds and Franke, 1972).

The Lloyd Sand is a potential aquifer that has not been extensively developed due to its depth and the abundant water available in the overlying aquifers. Estimated hydraulic conductivities for the Lloyd Sand range from 20 to 70 ft/day.

NWIRP Calverton saddles a regional groundwater divide, with groundwater in the northern half of the facility flowing to the northeast and groundwater in the southern half of the facility flowing to the southeast. Water level gauging during the RFI determined flow at Sites 2 and 6A was toward the southeast. Potentiometric surface (water level) maps, provided as Figure 2-2 (July 2010) and Figure 2-3 (September 2010), confirm this finding. The Peconic River basin is the likely discharge point for groundwater in the shallow aquifer zones in the southern portion of NWIRP Calverton. Long Island Sound is the likely discharge point for groundwater in the shallow aquifer zones in the northern portions of the facility.

Water Supply

Groundwater serves as the source of drinking water for the population residing within a 4-mile radius of the facility. Private wells, wells on two government-owned facilities (Town of Riverhead and Brookhaven National Laboratory), and three municipal water systems (Riverhead Water District, Shorewood Water Company, and Suffolk Water Company) supply the drinking water needs of the study area. The nearest public water supply well is located approximately 1.5 miles northwest of Site 6A. Two of five active supply wells at the Peconic River Sportsman's Club (PRSC) have been impacted by the Southern Area plume (Tetra Tech, 2009a). One well was shut down because of VOC detections, and groundwater from another well is treated with liquid-phase granular activated carbon (GAC) prior to use. A water line is being constructed by the Navy in 2011 to extend potable city water to the PRSC (Tetra Tech, 2009a; Navy, 2010). Another private well is located approximately one mile east of the NWIRP in Calverton. There was no evidence of groundwater contamination in that area.

Surrounding Land Use

The land surrounding the Calverton facility in all directions is primarily agricultural or wooded, with scattered residences and commercial establishments. Wildwood State Park and Long Island Sound are located 2.3 miles and 2.75 miles north, respectively. The Town of Riverhead is located 4.25 miles to the east. A golf course, Swan Pond, and a large area of wetlands, and cranberry bogs are located immediately south of the facility. The Long Island Railroad passes within 1,000 feet of the southeastern corner of the facility. Brookhaven National Laboratory is located 2 miles southwest of the facility.

2.1.4 Previous Facility Investigations

Several facility-wide studies and investigations, including preliminary studies and detailed investigations, have been completed at NWIRP Calverton since 1986 in response to the Navy's ERP (summarized chronologically in Table 2-1).

2.2 SITE INFORMATION

2.2.1 Site Description and History

The Southern Area plume begins within NWIRP boundaries at Sites 6A and 10B and extends off property to the southeast with the downgradient edge ending at the Peconic River (Figure 2-1). The offsite area was investigated because both Navy and Suffolk County monitoring wells indicated the presence of chlorinated volatile organic compounds (VOCs) in groundwater downgradient of the facility. There are no known or suspected VOC sources within this offsite area; however, this area is hydraulically downgradient of Sites 6A and 10B. Groundwater flow through this area is to the southeast discharging to the Peconic River.

The Southern Area is mostly wooded, and includes two shallow ponds near the northern edge. The ponds receive runoff through a drainage swale and culvert from Site 6A. From the late 1980s to the early 1990s, untreated groundwater (extracted during free product [FP] recovery efforts by NGC) from Site 6A was discharged into this drainage swale and culvert and into the western pond.

Site 6A-Fuel Calibration Area

Site 6A is located in Parcel B1 near the south-central portion of NWIRP Calverton, approximately 2,000 feet north of River Road and 1,500 feet west of the southern gate (Figure 1-2). Site 6A and related facilities were used in the testing of aircraft fuel and engine systems, which may have resulted in frequent, small fuel spills onto the area's pavement. Minor maintenance and repairs to the fuel and engine systems were also conducted at the site, and solvents were used during these activities and were likely spilled during their use.

Site 6A consists of new and old fuel calibration pads (Figure 1-2). The old fuel calibration pad was located in what is now an open, grass-covered field in an area now partially covered by a wastewater treatment facility. No physical evidence exists of the old calibration area. The new fuel calibration pad is located north and east of the old calibration pad on a concrete apron. The concrete apron between the two fuel calibration pads was also used for the same activities. A shed, piping and fuel-filtering devices were located in the area in the 1980s. The equipment was likely removed in the 1980's (Tetra Tech, 2007b). Former underground storage tanks (USTs) located near the old fuel calibration pad (south of Building 231) were removed in the early 1990s by NGC.

Site 10B – Engine Test House

Site 10B is located approximately 1,000 feet south of Site 6A in Parcel B1. The area consisted of a building and surrounding pad. To the north, east and south are sparse woods and to the west are open grassy areas. A drainage swale and culvert from Site 6A runs adjacent to and hydraulically upgradient of

Site 10B. Groundwater from Site 6A can enter this swale and flow past Site 10B. Also, from the late 1980s to the early 1990s, groundwater from Site 6A was discharged into this drainage swale and culvert (Tetra Tech, 2007a). Fuel-type contamination was found in the area of a former UST that was removed in the mid-1990s. Approximately 80 cubic yards of fuel-contaminated soil were excavated during removal of the UST. The excavation did not continue under the concrete pad at Site 10B. The building and a portion of the pad were removed during a remedial action in 2009 (AGVIQ, 2009a).

2.2.2 Site Geology

The geology at NWIRP Calverton consists of a mixture of sandy and clayey deposits. Figure 2-4 shows transect A-A' and Figure 2-5 shows corresponding cross section A-A' through the Southern Area. Based on cross section A-A', there is fine to medium-grained sand down to approximately 50 feet below ground surface (bgs) where a silty clay unit (aquitard) is encountered. This aquitard is about 25 feet thick at Site 6A and thins to the southeast, eventually pinching out between SA-PZ-145 and SA-MW-131. Beneath this silty clay unit is a thin silty fine to medium-grained sand with trace gravel followed by another thin silty clay unit that appears to be discontinuous across the area. Fine to medium-grained sand is then encountered and extends down to a deeper, basal silty clay unit at 130 feet bgs, which is interpreted to be continuous across the study area. Boring and gamma logs from the southeastern portion of the offsite Southern Area (wells SA-PZ-123 and SA-PZ-118) show that there is 100 feet of fine to medium-grained sand overlying a 10-feet thick silty clay layer.

The geologic units encountered within the study area appear to be generally flat-lying, consistent with what would be expected for the glacial deposits on Long Island. The upper contact of the Magothy Formation, being an erosional surface, is expected to be flat lying to undulating, reflecting the former topography, even though the formation itself is known to dip to the south.

2.2.3 Site Hydrogeology

During the Phase 2 RI, a focused groundwater investigation was performed in the Southern Area to determine whether the Peconic River was the discharge point for shallow groundwater migrating from the facility, or conversely whether some groundwater bypassed the river and migrated to areas further south (Tetra Tech, 2001). The study involved the installation of several well clusters on both sides and in the immediate vicinity of the river, the installation of two staff gauges in the river, and the collection of four rounds of water level data from the wells and staff gauges. Wells were screened to a maximum depth of approximately 80 feet bgs. Potentiometric surface interpretations based on water level data from the well clusters indicated that the river is the ultimate discharge point for groundwater to a depth of up to 80 feet bgs in this area. Groundwater in the study area was found to be migrating east-southeast towards the river.

Figures 2-2 and 2-3 show the potentiometric surface in the Southern Area in April and September 2010, respectively. Across the study area to the Peconic River, the water table was generally encountered at 5 to 20 feet bgs. Near the Peconic River, the depth to groundwater decreased to less than 5 feet bgs.

In 1997, the Long Island Chapter of the Nature Conservancy prepared several water table contour maps for the general Calverton area. These maps indicate groundwater flow within the Southern Area is generally to the east-southeast, towards the Peconic River. An overall groundwater flow gradient across the study area of approximately 0.0012 foot/foot was calculated based on the water table contour maps. This overall flow gradient was slightly lower than site-specific groundwater flow gradients observed during groundwater investigations in 2010. Considering the water level data collected during 2010, the representative average hydraulic gradient across the Southern Area is 0.002 foot/foot. The hydraulic gradient near the River is approximately 0.003 to 0.004 foot/foot.

The hydraulic characteristics of the Upper Glacial aquifer at the facility were evaluated during two pumping tests conducted in 2010 (Tetra Tech, 2010b; provided as Appendix A). Based on testing, the average horizontal conductivity of the aquifer near and on NWIRP Calverton is 221 feet per day and the average horizontal conductivity of the aquifer formation near the Peconic River is 42 feet per day. The effective porosity of the aquifer was assumed to be 0.25 (fine to medium sand). Considering the hydraulic gradient of 0.002 to 0.003 foot/foot and assuming the porosity is 25 percent, the groundwater seepage velocities through the Southern Area near the facility and near the Peconic River are estimated to be 640 feet per year and 180 feet per year, respectively.

2.2.4 Previous Site Investigations and Actions

Various facility-wide investigations addressed Sites 6A, 10B, and the Southern Area, as summarized in Table 2-1. Previous site-specific investigations and actions also are summarized in Table 2-1. Pertinent analytical data is provided in Appendix B and referenced tables.

Groundwater Investigations (1997 through 2010)

Several in depth groundwater investigations have occurred at Sites 6A, 10B, and the Southern Area (on- and offsite). The most recent report is the Data Summary Report for 2010 Groundwater Investigation Activities at Site 2, Site 6A, Site 10B, and the Southern Area (Tetra Tech 2011a) and are used to support the understanding of current site conditions and the CSM (see Section 2.2.5). Conclusions based on the 2010 groundwater investigative activities are as follows:

- Based on the data collected from the vertical profiling of groundwater from temporary monitoring well locations, the Southern Area groundwater plume is reasonably well defined and Site 6A is the probable primary source of groundwater contamination in the Southern Area.

- Primary VOCs detected in most monitoring wells in the Southern Area consist of 1,1,1-trichloroethane (TCA); 1,1-dichloroethane (DCA); 1,1-dichloroethene (DCE); and chloroethane. Other VOCs detected periodically above New York State Maximum Contaminant Levels (MCLs) include isopropyl benzene (cumene); benzene; ethylbenzene; 1,4-dichlorobenzene (DCB); 1,2,4-trichlorobenzene (TCB); naphthalene; xylenes; and vinyl chloride.

- Groundwater flow data supports the shifting of the downgradient edge of the Southern Area plume to the east due to influence from Donahue Lake.

- Order-of-magnitude fluctuations in VOC concentrations have been observed in Southern Area monitoring wells. These fluctuations appear to be the result of variable groundwater flow patterns that are impacted by precipitation events and influence from Donahue Lake and the Peconic River.

- The Southern Area groundwater plume is narrow and thin north of River Road (approximately 2,700 feet long, 100 to 200 feet wide, and 5 to 10 feet thick). Predominant flow is to the southeast and the flow pathway is relatively constant.

- The Southern Area groundwater plume south of River Road is approximately 3,500 feet long, 2,000 feet wide, and 10 to 40 feet thick. Predominant flow is to the east-southeast; but near the PRSC pond, flow is also to the northeast and east.

- PRSC Pond and the Northwest tributary (which discharges to the pond) affect the groundwater flow path locally and these affects are influenced by precipitation events. After the major rain event observed in March 2010 (i.e. 10 inches in 48 hours), flow in this area changed to the south-southeast. By June 2010, groundwater flow had reverted to its prior pattern.

- Concentrations of the primary VOCs in the Southern Area plume decrease with distance south of River Road.

- Concentrations of DCA observed in piezometers placed on the north side of the Peconic River have ranged from non-detect to 38 micrograms per liter (µg/L). These concentrations have fluctuated as the footprint of the groundwater plume appears to shift northeast and southwest near the river based on precipitation events.

- Annual groundwater sampling conducted from January 2008 through September 2010 at Site 10B has indicated low concentrations of VOCs below MCLs at all three monitoring wells.

Source Area Remedial Actions (2008 through 2010)

Remedial Actions were conducted at Sites 10B and 6A in 2009 and 2010, respectively. The remedial action at Site 10B occurred in 2009 per the removal action work plan (AGVIQ, 2009b), including the following activities (AGVIQ, 2009c):

- Removed hazardous materials (asbestos, lead-based paint chips, mercury switches, polychlorinated biphenyls (PCBs) contaminated components, fluorescent bulbs).
- Demolished the Engine Test Building and Fuel Pump House.
- Excavated petroleum-contaminated soil from an approximate 13,500 square foot area. Soil excavation proceeded to approximately 8 feet bgs.
- Collected confirmation samples from the sidewalls of the excavation. Sample results were below cleanup goals.
- Applied 1,900 pounds of PermeOX Plus™, an oxygen-release compound (ORC), to the excavation base.
- Backfilled the excavation with excavated soil that was determined suitable for onsite reuse. Additional material was imported from an offsite borrow pit, which was analyzed and determined suitable for use as backfill material at the site. Disturbed areas were re-vegetated.

The remedial action at Site 6A occurred in 2010 per the removal action work plan (AGVIQ, 2009b). The remedial actions included the following activities (AGVIQ, 2010):

- Removed hazardous materials (lead-based paint, asbestos, PCB ballasts, and mercury-containing switches).
- Abandoned 24 monitoring wells (4-inch diameter).
- Demolished the Fuel Calibration Building.
- Excavated 2,888.54 tons of nonhazardous PCB-contaminated soil (PCBs less than 50 milligrams per kilogram [mg/kg]).
- Excavated 17,690.18 tons of nonhazardous petroleum-contaminated soil.
- Collected confirmation samples from the sidewalls of the excavation. Samples results were below cleanup goals.
- Applied 5,200 lbs of PermeOX Plus™, an ORC, to the excavation base.
- Backfilled the excavation with excavated soil that was determined suitable for onsite reuse. Additional material was imported from an offsite borrow pit, which was analyzed and determined suitable for use as backfill material at the site. Disturbed areas were re-vegetated.
- Installed three new groundwater monitoring wells within the excavation footprint.

Microcosm Study (2009)

A "microcosm study" sampling event was performed in November 2009 to determine if aquifer conditions are conducive to biodegradation of chlorinated VOCs i.e., anaerobic reductive dechlorination via natural biodegradation or enhancement of conditions to promote biodegradation. Three general reactions that may degrade chlorinated VOCs by anaerobic reductive dechlorination include the following (AFCEE, 2004):

- **Direct Anaerobic Reductive Dechlorination** is a biological reaction in which bacteria gain energy and grow as one or more chlorine atoms on a VOC are replaced with hydrogen in an anaerobic environment. In this reaction, the VOC serves as the electron acceptor and hydrogen serves as the direct electron donor. Hydrogen used in this reaction is typically supplied by fermentation of organic substrates (present or introduced to the aquifer). This reaction may also be referred to as *halorespiration* or *dehalorespiration* (USEPA, 2000a).

- **Cometabolic Anaerobic Reductive Dechlorination** is a reaction in which a VOC is reduced by a non-specific enzyme or co-factor produced during microbial metabolism of another compound (i.e., the primary substrate) in an anaerobic environment. By definition, cometabolism of the VOC does not yield any energy or growth benefit for the microbe mediating the reaction (USEPA, 2000a). For the cometabolic process to be sustained, sufficient primary substrate is required to support growth of the transforming microorganisms.

- **Abiotic Reductive Dechlorination** is a chemical degradation reaction not associated with biological activity where a VOC is reduced by a reactive compound (Vogel et al., 1987).[4] For example, abiotic transformation of carbon tetrachloride (CT), TCA, tetrachloroethene (PCE), trichloroethene (TCE), and cis-1,2-dichloroethene (1,2-DCE) by metal sulfides has been investigated using pyrite (Weerasooriya and Dharmasena, 2001; Kriegman-King and Reinhard, 1994), troilite (Sivavec and Horney, 1997), mackinawite (Butler and Hayes, 1999 and 2000), and magnetite (Ferrey et al. 2004). In this case, substrate addition may indirectly cause and sustain abiotic reductive dechlorination.

Typically, three different reactions cannot be distinguished under field conditions. Therefore, anaerobic dechlorination shall herein refer to the biotic processes of direct and cometabolic anaerobic reductive dechlorination, as well as abiotic reductive dechlorination.

[4] A number of abiotic processes may degrade chlorinated VOCs under aerobic and/or anaerobic conditions: hydrolysis, elimination, dehydrohalogenation, hydrogenolysis, dichloroelimination, and abiotic reductive dechlorination.

Groundwater samples from Site 6A (former source area), the onsite portion of the Southern Area, and the offsite portion of the Southern Area (including the area near the Peconic River) were tested for chlorinated VOCs, electron acceptors (e.g., oxygen, nitrate, sulfate, manganese, and iron), dehalogenating bacteria (i.e., *Dehalococcoides spp. and Dehalobacter spp.*), and several other geochemical and water quality parameters (Table 2-2). Except for the lack of organic carbon (i.e., total organic carbon [TOC] values were between 1 and 2.4 milligrams per liter [mg/L]), the data generally show favorable conditions throughout the aquifer and in particular on NWIRP Calverton for natural biodegradation. Indigenous bacteria known to dechlorinate VOCs are present throughout the aquifer and pH levels are conducive to bacterial growth / reductive dechlorination (pH between 5 and 8). Levels of competing electron acceptors are low (e.g., dissolved oxygen less than [<] 1 mg/L, nitrate < 1 mg/L, and sulfate < 20 mg/L). Negative oxidation-reduction potential (ORP) values throughout the plume (except near the Peconic River) along with the appropriate pH and low levels of competing electron acceptors indicate reducing conditions. This data is further discussed below.

Natural Attenuation Indicator and Other Wet Chemistry Parameters in Groundwater

The groundwater data for the Southern Area indicate that the VOC plume in the surficial aquifer can be characterized as a TCA plume that has undergone significant biodegradation, and in particular in the Site 6A source area. The primary evidence for this conclusion is the relatively low concentrations of TCA remaining in groundwater and the widespread presence of “daughter products” (i.e., less-chlorinated VOCs resulting from the biodegradation of TCA via reductive dechlorination, such as DCA, DCE, and chloroethane). Following the source area remedial actions at Sites 6A and 10B in 2009 through 2010 (AGVIQ, 2009c and 2010), it is expected that known or continuing sources of VOCs have been reduced or eliminated.

Changing electron acceptors, pH, and electron donors can define the reductive dechlorination bacterial community (Suthersan and Payne, 2005). Within the chemically and microbially complex aquifer, there is no one biochemical mechanism or any one single bacterium that is completely responsible for the entire transformation and degradation process. Instead, it is a consortium of microorganisms and a variety of mechanisms that bring about the desired transformation pathways of the target VOCs. The microbial community is considered to function as a super-organism—metabolizes collectively, shares biodegradative genes, and evolves collectively to biodegrade new compounds that enter the environmental niche (Suthersan; Wackett and Hershberger, 2001).

A variety of metabolic processes have been identified in anaerobic dechlorinating bacteria. Chlorinated compounds can serve three different metabolic functions in anaerobic bacteria (Suthersan and Payne, 2005): (1) as carbon and/or energy sources; (2) as substrates of cometabolic activity; and (3) as terminal electron acceptors in an anaerobic process (e.g., dehalorespiration). The main reductive dechlorination processes are cometabolism and dehalorespiration. The sequence of the metabolic pathway, ranked in

approximate order of decreasing energy yield per reaction, is oxygen (aerobic respiration), nitrate (denitrification), ferric iron (ferric iron reduction), sulfate (sulfate reduction or sulfanogenesis), and carbon dioxide or carbonate (methanogenesis) (Suthersan and Payne, 2005). Manganese with a plus 4 oxidation state can also be an electron acceptor between ferric iron and sulfate. VOCs can be used as electron acceptors generally after nitrate and ferric iron are exhausted. An evaluation of concentrations of these terminal electron acceptors (presence or lack thereof) and other data can help determine the prevalent pathway throughout the aquifer microbial continuum—a succession of microbial community structures and changing oxidation-reduction conditions, aligned along the flow path of the plume—which provide another line of evidence of natural attenuation.

Direct utilization of VOCs (both aliphatic hydrocarbons [e.g., TCA] and chlorinated aromatic hydrocarbons [e.g., chlorobenzene]) as alternative electron acceptors have been observed in bacterial species in several genera, including *Desulfuromonas, Dehalospirillum, Dehalococcoides, Dehalobacter,* and *Desulfomonile* (Suthersan and Payne, 2005 and Loeffler et al., 2003). Further, reductive dechlorination / dehalorespiration of TCA and DCA has been specifically demonstrated by *Dehalococcoides sp.*, *Dehlobacter restrictus* (strain "TCA1"), and *Desulfovibrio sp.* in various studies (Sun et al., 2002; Grostern and Edwards, 2006a and 2006b).

pH, Carbon Source, and Microbes. The pH of ground water has an effect on the presence and activity of microbial populations in ground water. The optimal pH range for reductive dechlorination is 5 to 8 standard units (USEPA, 1998). Values of pH throughout the Southern Area during the November 2009 microcosm study ranged from 5.7 to 6.3 (average was 6 and median was 6.1). These pH values are sufficient for reductive dechlorination.

The 1988 USEPA report concluded that TOC values greater than 20 mg/L are optimal to drive dechlorination (USEPA, 1998). TOC values in the Southern Area during the November 2009 microcosm study were well below 20 mg/L, ranging from 1 to 2.4 mg/L. These values represent both natural particulate and dissolved organic carbon in the aquifer (as well as anthropogenic carbon from dissolved-phase petroleum compounds in the former source area). These values suggest that additional carbon substrate is needed in the aquifer to enhance reductive dechlorination.

Both *Dehalococcoides sp.* and *Dehalobacter sp.* have been measured in the Southern Area aquifer during the 2009 microcosm study and 2010 through 2011 pilot study, indicating that the bacteria needed for anaerobic reductive dechlorination are present.

Dissolved Oxygen. Oxygen concentrations ranged from 0 to 1 mg/L during the November 2009 microcosm study. Oxygen concentrations below 0.5 to 1 mg/L are indicative of anaerobic conditions (USEPA, 1998). VOCs can be readily degraded by indigenous microbes via the reductive dechlorination pathway under anaerobic conditions. After depletion of oxygen by aerobic microbes using natural or

anthropogenic (e.g., petroleum compounds) organic matter in the aquifer, anaerobic microbes will use nitrate as an electron acceptor (followed by ferric iron, sulfate, and finally carbon dioxide). Each sequential reaction drives the ORP of the groundwater downward into the range within which reductive dechlorination can occur (USEPA, 1998).

Oxygen concentrations recorded during other groundwater sampling events in the Southern Area measured above 1 mg/L (maximum 5.3 mg/L), indicating that both aerobic and anaerobic conditions exist in the Southern Area depending on location. Some VOCs can biodegrade under aerobic aquifer conditions via direct oxidation and/or cometabolic processes by aerobic bacteria (USEPA, 1998 and Suthersan and Payne, 2005). Aerobic conditions can occur downgradient from anaerobic zones where water from aerated portions of the aquifer blend with the groundwater from anaerobic zones. Biodegradation of less-chlorinated daughter products (e.g., DCA and chloroethane) can occur readily under these aerobic conditions.

Oxidation-Reduction Potential (ORP). The ORP of groundwater is a measure of the type of reactions that may occur in a solution. Biological processes generally occur within a prescribed ORP range. Reductive dechlorination is most effective in the ORP range corresponding to sulfate reduction and methanogenesis, but dechlorination of TCA and DCA also may occur in the ORP range associated with denitrification or iron III reduction. Dehalogenation of DCA and chloroethane generally are restricted to sulfate-reducing and methanogenic conditions (lower ORP readings).

As microbial activity depletes available electron acceptors, ORP decreases. ORP less than +50 millivolts (mV) is one indicator of conditions favorable to reductive dechlorination; however, an ORP less than -100 mV is considered better (USEPA, 1998). Negative ORP generally indicates reducing conditions; however, the groundwater pH and the specific available electron acceptors are also factors that determine the magnitude of reducing conditions. During the November 2009 microcosm study, ORP ranged from -111 mV (SA-MW-128D) to +108 mV (SA-PZ-123I1). The negative ORPs generally corresponds to onsite areas and in wetlands near the Peconic River. The positive ORP was recorded in groundwater north of the wetlands, along Connecticut Avenue.

Nitrate/Nitrite. After dissolved oxygen has been depleted, nitrate may be used as an electron acceptor for anaerobic biodegradation of organic carbon via denitrification. In order for reductive dechlorination to occur most effectively (i.e., in order for VOCs to be used as electron acceptors with little competition from nitrate), nitrate concentrations in the contaminated portion of the aquifer should be less than 1 mg/L (USEPA, 1998). Nitrite concentrations would be expected to increase in areas where denitrification is occurring. During the November 2009 microcosm study, nitrate concentrations ranged from 0.45 to 2.6, averaging at 1.5 mg/L. No nitrite was detected. The absence or minimal presence of the higher energy electron acceptors (oxygen and nitrate) suggests favorable conditions for natural anaerobic biodegradation of VOCs.

Ferrous (Fe^{+2}) and Ferric (Fe^{+3}) Iron. In some cases, ferric iron is used as an electron acceptor during anaerobic biodegradation of organic carbon. During this process, ferric iron is reduced to ferrous iron. Subsequently, ferrous iron concentrations can be used as an indicator of anaerobic degradation of less-chlorinated VOCs such as chloroethane or vinyl chloride (USEPA, 1998). The 1998 USEPA report suggests using caution when interpreting ferrous iron concentrations because they may be biased low by re-precipitation as sulfides (see below) or carbonates (USEPA, 1998). During the November 2009 microcosm study, total iron concentrations ranged from 0.062 to over 17 mg/L and ferrous iron concentrations ranged from 0.2 to 3.8 mg/L and provide evidence of anaerobic conditions.

Sulfate/Sulfide. After oxygen and nitrate have been depleted and reduction of ferric iron has been initiated, sulfate may be used as an electron acceptor for anaerobic biodegradation. Reductive dechlorination is generally most effective in the ORP range corresponding to sulfanogenesis and methanogenesis, but dechlorination of TCA and DCA also may occur in the ORP range associated with denitrification or ferric iron reduction (USEPA, 1998). Dechlorination of DCA and chloroethane generally occurs under sulfate-reducing and methanogenic conditions. Dechlorinating bacteria such as *Dehalobacter sp.* are flanked by iron- and sulfate-reducing bacteria at the positive and negative ends of their ORP range, respectively (Suthersan; Nyer et al., 2001).

Sulfate reduction produces sulfide (sulfide concentrations greater than 1 mg/L suggests sulfate-reducing conditions [sulfanogenesis]). Concentrations of sulfate greater than 20 mg/L can potentially cause competitive electron acceptor exclusion of VOCs (USEPA, 1998). However, the 2004 AFCEE reports that there is ample evidence of dechlorination at sites containing elevated sulfate levels (AFCEE, 2004, ITRC, 1999; and Devlin and Muller, 1999). Sulfide concentrations greater than 1 mg/L indicate potential reductive dechlorination (USEPA, 1998). Sulfate concentrations during November 2009 ranged from 6.4 to 19 mg/L (average and median were 13). No sulfide was detected. These low to nondetect concentrations indicate a lack of sulfanogenesis in the aquifer.

Enhanced Insitu Biodegradation Pilot-Scale Study (2010 through 2011)

An enhanced in situ biodegradation (EISB) pilot-scale test was conducted in the Southern Area VOC plume in 2010 through 2011. Electron donor substrate (ethyl lactate) was injected into the aquifer in late July and early August 2010 and in December 2010 to enhance conditions for indigenous dehalogenating microbes to dechlorinate VOCs. Performance monitoring data was collected in July 2010 (baseline), October 2010 (3 months), and December 2010 (5 months). Another injection and sampling event is being conducted in March 2011. The Tetra Tech (2011c) pilot-scale test report is provided as Appendix D. Based on data collected through December 2010, the pilot-scale test results indicate that the addition of excess electron donor promotes biodegradation (i.e., anaerobic reductive dechlorination) of VOCs in the Southern Area.

2.2.5 Current Site Conditions

Nature and Extent of Contamination

The Southern Area is a general region of VOC-impacted groundwater located within and downgradient of Sites 6A and 10B. The VOCs are primarily DCA or other chlorinated VOCs. The VOC-impacted groundwater is believed to have resulted from one or more releases of chlorinated solvents at Site 6A and directly impacted groundwater from a waste solvent tank, intermittent smaller releases at Sites 6A and 10B, and/or from potential overland migration through a series of ditches and ponds in the area. In addition, a free product recovery system discharged VOC-impacted groundwater into an unlined ditch and culvert that ultimately discharged to a pond located between Site 6A and the facility property line. The Southern Area groundwater VOC plume extends southeasterly from Sites 6A and 10B with the downgradient edge limited by the Peconic River (Figure 2-1).

In addition to investigations conducted by the Navy, Suffolk County Department of Health Services (SCDHS) conducted groundwater investigations in the offsite portion of the Southern Area in 2008 and 2009. These data are summarized in the Data Summary Report for 2010 Groundwater Investigation Activities (Tetra Tech, 2011a). The isoconcentration contours presented in Figure 2-1 generally include the SCDHS data. However, SCDHS also reported DCA in 2 of approximately 30 samples collected just south of River Road near the entrance road to the PRSC at concentrations greater than 500 µg/L (644 µg/L and 545 µg/L). Because of infrequent detection, a separate 500 µg/L isoconcentration contour was not developed in that area.

Groundwater: The maximum groundwater VOC concentrations are provided in Table 2-3 (Southern Area – onsite or offsite Southern Area) and Table 2-4 (offsite Southern Area only). New York State MCLs[5] and New York State Surface Water Standards[6] are included in the tables for comparison purposes. Groundwater contamination in the Southern Area plume consists mainly of TCA and associated breakdown products: DCA; DCE,[7] and chloroethane. Similar VOCs were detected in groundwater at the former source area (Site 6A) at higher concentrations in the mid-1990s.

Seventeen VOCs were identified as chemical of concern because the maximum detected concentration was in excess of either MCLs or surface water standards. For the onsite groundwater, the maximum

[5] 10 NYCRR, Part 5, Subpart 5-1 Public Water Systems, Tables 1 through 3. http://www.health.ny.gov/regulations/nycrr/title_10/part_5/subpart_5-1_tables.htm#table1.

[6] 6 NYCRR Part 703, Section 703.5, Table 1. http://www.dec.ny.gov/regs/4590.html.

[7] DCE is present as a result of dehydrohalogenation (an elimination reaction) of TCA, versus the chlorinated alkane breakdown products which result from reductive dechlorination. That is, DCE is not present as a result of reductive dechlorination of trichloroethene (TCE) (TCE is not a prevalent contaminant in the Southern Area). DCE will biodegrade via reductive dechlorination to vinyl chloride (VC) and ethene.

concentration of 16 VOCs consisting of TCA; DCA; DCE; vinyl chloride; methylene chloride (dichloromethane); PCE; benzene; ethylbenzene; isopropyl benzene (cumene); chloroethane; DCBs (i.e., 1,2-; 1,3-; and 1,4-DCB); 1,2,4-trichlorobenzene; naphthalene; and total xylenes exceed New York State Department of Health MCLs. The maximum concentration of 4 VOCs exceed National Ambient Water Quality Criteria, 11 VOCs exceed the NYSDEC Water Quality Criteria, and 5 VOCs exceed the NYSDEC Class “C” Surface Water Quality Criteria.

For the offsite groundwater, the maximum concentration of 6 VOCs consisting of TCA, DCA, DCE, chloroethane, TCB, and vinyl chloride exceed NYSDOH MCLs. The maximum concentration of 2 VOCs exceed National Ambient Water Quality Criteria, 1 VOC exceeds NYSDEC Water Quality Criteria, and no VOCs exceed NYSDEC Class “C” Surface Water Quality Criteria.

DCA is the prevalent VOC in the plume with a maximum detection of 2,100 µg/L (SA-TW335 at 35 feet bgs). Other than TCA (maximum concentration of 1,200 µg/L), DCE (maximum concentration of 110 µg/L), and chloroethane (with a maximum concentration of 970 µg/L), the maximum concentrations of the other VOCs are less than 200 µg/L in the onsite groundwater and 7.1 µg/L in the offsite groundwater. Most of the VOCs detected at concentrations greater than MCLs were detected in samples collected at Site 6A and to the southeast of Site 6A (SA-TW-348, SA-TW-349, SA-TW-343, SA-TW-331, SA-TW-335, SA-PZ138I, and SA-PZ-143).

Figure 2-1 shows the estimated horizontal extent of DCA in the Southern Area plume, which is considered representative of the extent of all VOC-impacted groundwater (i.e., the DCA isoconcentration contour encompasses the entire plume). The plume area measures approximately 118 acres, with approximately 25 acres onsite (north of the fence line) and 93 acres off site (south of the fence line). The width, thickness, and depth of the VOC-impacted groundwater varies based on location. The width ranges from approximately 150 to 2,000 feet, the thickness ranges from approximately 9 to 50 feet, and the depth ranges from approximately 2 to 90 feet bgs.

From Site 6A to the southeast, and along approximately 75 percent of the plume length, there is a silty clay unit at a depth of approximately 50 to 60 feet bgs. Where present, most of the VOC-impacted groundwater is found above this unit and the thickness of the VOC-impacted groundwater is approximately 5 to 15 feet. Groundwater VOC concentrations within 5 to 10 vertical feet of VOC-impacted groundwater are generally less than 10 µg/L. For the remaining length of the plume to the Peconic River, the shallow silty clay unit ends and initially the VOC-impacted groundwater migrates downward. The downward migration appears to result from a hydraulic balancing of groundwater above and below the shallow silty clay unit. VOC-impacted groundwater in this downgradient area is approximately 40 to 50 feet thick and present at a depth of 40 to 90 feet bgs. Another silty clay unit is present at a depth of approximately 130 feet bgs in this area and VOC-impacted groundwater has not

been detected at this depth or below the lower silty clay unit. Near the Peconic River, groundwater flows upward and the VOC-impacted groundwater is generally found near the water table.

From Site 6A to the fence line, the width of the groundwater plume is approximately 150 to 200 feet. Within this area, the concentration of VOCs is relatively constant (i.e., DCA concentrations of 2,100 µg/L near Site 6A and 1,100 µg/L near the fence line). However, south of the fence line, the width of the plume expands to approximately 2,000 feet. Groundwater mounding effects from Donahue Lake are suspected to interact with groundwater flow south of the fence line. Based on potentiometric surface maps developed using quarterly water level measurements, groundwater flow near Donahue Lake varies from southeasterly under high precipitation rates to easterly, and even northeasterly under lower precipitation rates. These effects from the groundwater mounding may also occur as far north as River Road. This variation in groundwater flow directions may account for the apparent widening of the plume in the offsite area.

Using the estimated thickness of VOC-impacted groundwater throughout the plume, the area of the plume (118 acres), and the estimated porosity (0.25), the volume of VOC-impacted groundwater is estimated to be 340 million gallons. The total mass of chlorinated VOCs in the Southern Area Plume is estimated to be 375 pounds (see Appendix E). For the mass of chlorinated VOCs, approximately 25 percent (93 pounds) is located onsite (north of the fence line) and 75 percent (282 pounds) is located offsite (south of the fence line).

Surface Water: Surface water samples are being collected along the Peconic River from Connecticut Avenue to a location approximately 2,100 feet down river (Figure 2-6). Within this portion of the river is the probable discharge point for VOC-impacted groundwater from the Southern Area. In 2010, two additional wells were installed along the river (SA-PZ147 and SA-PZ148) and were used in combination with two existing wells (SA-PZ124 and –PZ125) to provide representative concentrations of VOCs discharging to the river. These wells are sampled during the biannual sampling events. Sample concentrations of VOCs in the near-river wells and the surface water did not exceed New York State Surface Water Quality Standards, USEPA National Recommended Water Quality Criteria, or Oak Ridge National Laboratory (ORNL) surface water benchmarks, indicating that surface water is not being adversely impacted by contaminated groundwater (Table 2-5).

In 2009, SCDHS collected 19 surface water samples and 19 samples referred to as “pore water” samples along the same portion of the Peconic River. DCA was detected in one surface water samples at a concentration of 1.3 ug/L. This detection occurred in a stagnant portion of the river, west of Connecticut Avenue. DCA was detected in 11 “pore water” samples at a maximum concentration of 57 µg/L. This maximum concentration slightly exceeds the ORNL surface water bench mark of 47 µg/L. The highest pore water detections occurred in the area of SA-PZ124, in which DCA is detected in groundwater samples on a regular basis.

Sediment: Peconic River sediment samples, co-located with surface water sample locations, were collected in July and September 2010 (Figure 2-6). Two VOCs (acetone and carbon disulfide) were detected above ORNL sediment quality benchmarks (Table 2-5). These chemicals are present at low concentrations (below applicable criteria) in the Southern Area plume. Acetone is a common lab contaminant and a breakdown product (ketone) of acetic acid, a common natural organic compound. Carbon disulfide is often found naturally in gases released to the surface over marshes and wetlands and is found naturally in coastal areas. DCA has also been detected in sediments near SA-PZ124.

Conceptual Site Model (CSM) and Contaminant Fate and Transport

A CSM conveys what is known or suspected about contamination sources, release mechanisms, and the transport and fate of those contaminants. It provides the basis for understanding contaminant fate and transport issues and assessing potential remedial technologies at the site. The CSM for the Southern Area is derived from available data and accepted principles of groundwater flow and contaminant transport. Figure 2-5 presents an interpretive cross-section of the surficial aquifer through the VOC plume showing the distribution of DCA. Figure 2-7 shows a three-dimensional interpretation of the site, and Figure 2-8 provides potential exposure routes.

Based on the results of previous investigations and the accumulated chemical and physical data, the former VOC-source area has been identified as Site 6A, with potential contribution from Site 10B (see Section 2.2.1 for historical site practices). The primary mechanisms for VOC transport from the former source area are believed to be as follows:

- Discharge and overland flow through drainage swale(s) originating at Sites 6A and 10B.
- Previous leaching of VOCs from residual soil contamination at Sites 6A and 10B to groundwater following precipitation events. Note that the majority of the source area material was removed during the 2008 to 2010 remedial actions (AGVIQ, 2009c and 2010).
- Downgradient migration of groundwater containing dissolved VOCs.
- Volatilization from groundwater and/or surface water.

Precipitation travels via sheet flow over the minimal concrete/asphalt paved areas and natural terrain in the former source area to drainage swales that discharge to various ponds and wetlands, or is evaporated or transpired into the air. Significant infiltration occurs throughout both the former source areas and the distal plume areas. Water that does infiltrate to the soil moves by gravity downward through the unsaturated soil. At some depth (generally on the order of 1 to 10 feet bgs near the source area and 2 to 20 feet bgs throughout the Southern Area), the infiltrating water reaches the water table and enters the shallow groundwater system.

The water table and shallow water-bearing unit are located in a predominantly sandy material. A clay aquitard is found at a depth of approximately 50 feet bgs throughout the onsite area and a portion of the offsite area (see Section 2.2.2), and is an extensive barrier (approximately 25 feet thick) to vertical groundwater flow. This aquitard thins out and ends northwest of the Peconic River. A deeper, 10-foot thick silty clay unit occurs at 130 feet bgs across the study area.

The groundwater flow direction in the Southern Area is generally to the southeast. Under varying precipitation events, the groundwater flow direction is also to the east and northeast near Donahue Lake. The VOC transport migration pathway is in accordance with the predominant flow direction of groundwater. Groundwater eventually discharges into the Peconic River.

Based on the site data, the rates of migration for TCA and DCA do not appear to be affected by retardation in the aquifer (retardation coefficients are just over 1), but are affected by natural attenuation mechanisms (degradation, advection-dispersion, dilution, etc.) prior to reaching the Peconic River. The presence of dissolved-phase petroleum compounds at the former source areas (Site 6A) likely facilitated the natural biodegradation of VOCs by acting as a carbon source for reductive dechlorination. However, downgradient of the source area, residual petroleum compounds are absent, and biodegradation rates of the VOCs decreased.

The current orientation of the plume, spatial variations in VOC concentrations and geochemistry, decreasing concentrations in downgradient monitoring wells, and infrequent and low detections of VOCs in the Peconic River sediments and surface water suggest the VOC plume may be relatively stable. However, because of the presence of relatively high VOC concentrations between the fence line and the Peconic River, potential migration of higher VOC concentrations to the River cannot be discounted.

Volatilization of VOCs is a prevalent transport mechanism. Chemicals in soil can migrate into ambient air either as vapors or by adhering to particulate matter (dusts). Chemicals that have a significant volatility are likely to volatilize from groundwater to the unsaturated soil zone, and potentially enter ambient air as vapors. Studies have shown that the vapors can move either horizontally or vertically in the subsurface. The vapors may also enter buildings through cracks in building foundations or walls. Upon entering ambient air, the vapors are not expected to persist for long periods of time because their half-lives in the atmosphere are typically measured in hours or a few days.

The vapor intrusion pathway is being investigated in the Southern Area, as there are limited occupied buildings and structures. Buildings have been demolished in the former source area and removal actions have decreased chlorinated VOC concentrations in the former source area and will subsequently decrease concentrations in the distal plume. A soil vapor intrusion investigation will be completed in 2011 for the PRSC area (Tetra Tech, 2011b).

2.2.6 Summary of Risk

Human Health

A baseline human health risk assessment (HHRA) was completed for Site 6A during the 1995 RFI (HNUS 1995b) that evaluated exposure to contaminated soil and groundwater. Because Site 10B was not identified until later, a baseline HHRA was not conducted for Site 10B. However, because the contaminants detected at Site 10B were the same as detected at Site 6A, concentrations were similar to or less than those detected at Site 6A, and the exposure scenarios were similar, the risks associated with exposure to Site 10B contaminants would be similar to or less than those at Site 6A. The source area remedial actions in 2008 to 2009 (Site 10B; AGVIQ, 2009c) and 2009 to 2010 (Site 6A; AGVIQ, 2010) eliminated site risks associated with soils and reduced or eliminated a continuing source of groundwater contamination.

The VOCs detected in the groundwater of the Southern Area plume are similar to those found in the groundwater at Sites 6A, but concentrations are generally a factor of 5 to 10 less than used during the baseline HHRA. For example, in 1994, the maximum total VOC concentration in Site 6A groundwater was approximately 22,000 µg/L, and in 2010, the maximum total VOC in the Southern Area groundwater was approximately 3,200 µg/L. The risks from exposure to the groundwater in the Southern Area plume would be comparable to, but likely lower than, the risks from exposure to groundwater at Site 6A calculated during the 1995 baseline HHRA (HNUS, 1995b). From the baseline HHRA, the following conclusion were developed (Table 2-6):

- There is no unacceptable risk to current site workers.
- There is no unacceptable risks from exposure to soils.
- There are unacceptable carcinogenic and non-carcinogenic risk associated with residential exposure to groundwater, due to both ingestion and inhalation of VOCs.

A qualitative risk assessment was conducted for the Southern Area plume using risk-based groundwater and surface water quality values. Table 2-3 provides a comparison of maximum detected concentrations in Southern Area groundwater to New York State MCLs (exceedances are shaded). Chemicals with concentrations exceeding the MCLs are considered COCs for evaluation in the CMS. Table 2-5 provides a comparison of surface water data to New York State surface water criteria, there were no exceedances.

Ecological Risk

No unacceptable ecological risks are identified with the Southern Area plume. Although the plume discharges to the Peconic River, concentrations of site-related VOCs are attenuated prior to discharge and then further diluted upon discharge. Surface water and sediment data are compared to ecological

screening benchmarks in Table 2-5. There are no surface water exceedances. Two VOC concentrations exceed ecological sediment values (acetone and carbon disulfide), but are not considered site-related. The only potential concern for ecological receptors would occur if the higher concentrations of VOCs identified in the Southern Area groundwater migrate without attenuation and enter the Peconic River. Because of dilution and volatilization, this discharge would not adversely affect the surface water quality, but short term, localized adverse impacts to the benthic community may result.

2.2.7 Chemicals of Concern (COCs)

The existing Southern Area Plume data was used to identify COCs that should be carried forward and evaluated in the CMS. A chemical was selected as a COC if it exceeded the NYSDOH MCLs (see Table 2-3) or federal or State surface water criteria. The COCs to be evaluated in the CMS are summarized in Table 2-7.

For soil vapor intrusion concerns, there are no current onsite structures located above or near VOC-impacted groundwater, and as a result, this pathway is not complete. Several structures are located on PRSC property that are near or above VOC-impacted groundwater. In 2011, a soil vapor intrusion investigation was conducted for these structures and based on preliminary results adverse effects are not anticipated. COCs for soil vapor intrusion would be same as for groundwater.

3.0 REMEDIAL ACTION OBJECTIVES

This section describes the initial steps to develop alternatives for the remediation of groundwater in the Southern Area, including the presentation of ARARs and the development of Remedial Action Objectives (RAOs).

3.1 NCP REQUIREMENTS

The NCP requires that the selected remedy meet the following objectives:

- Each remedial action selected shall be protective of human health and the environment.
- Onsite remedial actions that are selected must attain those ARARs that are identified at the time of the ROD signature.
- Each remedial action selected shall be cost-effective, provided that it first satisfies the threshold criteria above. A remedy shall be cost-effective if its costs are proportional to its overall effectiveness.
- Each remedial action shall use permanent solutions and alternative treatment technologies or resource-recovery technology to the maximum extent practicable.

The statutory scope of CERCLA was amended by SARA to include the following general objectives for remedial action at all CERCLA sites:

- Remedial actions "…shall attain a degree of cleanup of hazardous substances, pollutants, and contaminants released into the environment and of control of further releases at a minimum which assures protection of human health and the environment".
- Remedial actions "…in which treatment that permanently and significantly reduces the volume, toxicity, or mobility of the hazardous substances, pollutants, and contaminants is a principal element" are preferred. If the treatment or recovery technologies selected are not a permanent solution, an explanation must be published.
- The least-favored remedial actions are those that include "off-site transport and disposal of hazardous substances or contaminated materials without treatment where practicable treatment technologies are available".
- The selected remedy must comply with or attain the level of any "standard, requirement, criteria, or limitation under any federal environmental law or any promulgated standard, requirement, criteria, or limitation under a state environmental or facility siting law that is more stringent than any Federal standard, requirement, criteria, or limitation".

3.2 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS)

As required by Section 121 of CERCLA, remedial actions carried out under Section 104 or secured under Section 106 by the President must attain the levels of standards of control for hazardous substances, pollutants, or contaminants specified by the ARARs of federal and state environmental laws and state facility-siting laws, unless waivers are obtained. Only promulgated federal and state laws and regulations can be considered ARARs. If the ARARs are neither applicable nor relevant and appropriate, the federal lead agency's remedial actions may be based on the "to be considered" (TBC) criteria or guidelines. These distinctions are critical to understanding how the federal lead agency integrates environmental requirements from other federal and state laws into its cleanup decision. The definitions of ARARs and TBCs below are from the NCP (40CFR 300.5) and USEPA (USEPA, 1991).

- Applicable requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site.

- Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that, while not "applicable," address problems or situations sufficiently similar (relevant) to those encountered at a CERCLA site, that their use is well-suited (appropriate) to the particular site.

- TBC information are non-promulgated criteria, advisories, guidance, and proposed standards that have been issued by the federal or state government that are not legally binding and do not have the status of potential ARARs. However, the TBC information may be useful for developing an interim remedial action or for determining the necessary level of cleanup for the protection of human health and/or the environment. Examples of TBC information include USEPA Drinking Water Health Advisories, Reference Doses, and Cancer Slope Factors.

Another factor in determining which response or remedial requirements must be met is whether the requirement is substantive or administrative. CERCLA response actions must meet substantive requirements but not administrative requirements. Substantive requirements are those dealing directly with actions or with conditions in the environment. Administrative requirements implement the substantive requirements by prescribing procedures such as fees, permitting, and inspection that make substantive requirements effective. This distinction applies to onsite actions only.

3.2.1 Determination of ARARs and TBCs

Federal and New York State ARARs are summarized in Appendix D. The tables summarize the ARARs by classification (and TBC criteria as appropriate for each classification): chemical-specific, location-specific, and action-specific (see below).

The remedial action alternatives developed in this CMS report were analyzed for compliance with federal and New York State ARARs. The analyses involved identifying potential requirements for each of the alternatives, evaluating their applicability or relevance, and determining if the alternative(s) can achieve the ARARs. Results of that analysis are presented in Section 4.0. Any remedial action at the site must meet standards as defined by the federal and state ARARs unless waived by the federal lead agency. If the ARARs do not address a particular situation, remedial actions may be based on the TBC criteria or guidelines as determined by the federal lead agency. TBCs are not enforceable unless and until incorporated into the Record of Decision (ROD).

3.2.2 Chemical-Specific ARARs

Chemical-specific ARARs set health-based concentration limits or discharge limits in various environmental media for specific hazardous substances, pollutants, or contaminants. Examples of chemical-specific ARARs for the Southern Area are the New York State MCLs that are enforceable for drinking water sources (sole source aquifer) and as an antidegradation / beneficial use standard and the New York State Surface Water Quality Standards. Chemical-specific ARARs and TBCs for the Southern Area are presented in Table D-1 in Appendix D.

The primary chemical-specific ARAR for establishing groundwater cleanup levels at the Southern Area is the New York State MCLs. The New York State MCLs are equal to or are more conservative than federal MCLs (Table 3-1).

3.2.3 Location-Specific ARARs

Location-specific ARARs are design requirements or activity restrictions that are based on the geographical position of a site. Location-specific ARARs for the Southern Area are presented in Table D-2 in Appendix D. A primary location-specific ARAR applicable to any of the Southern Area's remedial alternatives is the water classification of the Peconic River as Class C, affecting the corresponding applicable chemical-specific ARAR for this surface water.

3.2.4 Action-Specific ARARs

Action-specific ARARs set performance, design, or other standards for particular activities in managing hazardous substances or pollutants. Action-specific ARARs for the Southern Area are identified specific

to each remedial alternative in the remaining tables of Appendix D. An example of a primary action-specific ARAR is for underground injection control associated with the anaerobic EISB system or groundwater extraction, treatment and discharge remedies.

3.3 REMEDIAL ACTION OBJECTIVES (RAOS)

The RAOs are statements that define the extent to which sites require cleanup to protect human health and the environment and comply with ARARs. The RAOs reflect the COCs, exposure routes and receptors, and acceptable chemical concentrations (or range of acceptable chemical concentrations) for groundwater at the Southern Area. The RAOs for the Southern Area are as follows:

Groundwater

- Prevent human exposure to groundwater containing COCs above cleanup levels.
- Achieve suitability of groundwater for unlimited use (cleanup levels) within a reasonable timeframe.
- Prevent migration or discharge of COCs in groundwater to sediment and surface water at levels that would cause unacceptable risks to human or ecological receptors.

Soil Vapor Intrusion Indoor Air

- Prevent unacceptable risks to human receptors from exposure to vapors resulting from subsurface site-related COCs.

3.4 PERFORMANCE CRITERIA

Performance criteria are established in this section for purposes of evaluating remedial alternatives and for use in the conceptual design and cost estimates. Performance criteria provide a basis for further delineating the extent and volume of impacted media that require remediation and provide the design performance of the remedial alternatives. The performance criteria described here represent the levels of performance necessary to meet the RAOs. They also provide benchmarks for achieving compliance with ARARs (or when applicable, complying with ARAR waiver criteria).

A monitoring program capable of demonstrating conformance with the performance criteria (as described below and will be finalized in the ROD) would be an element of each remedial alternative.

3.4.1 Groundwater

The performance criteria for groundwater will be the PRGs, which are equal to New York State MCLs as shown in Table 3-1. The PRGs will be finalized as cleanup levels in the ROD.

3.4.2 Surface Water and Sediment

Under current conditions, there would be no adverse impacts to human health or ecological risks from exposure to site-related contaminants in surface water or sediment in the Peconic River. Additionally, there are no COC exceedances of the chemical-specific ARARs or TBCs for these media (Table 2-5). Therefore, remedial alternatives directly addressing surface water and sediment were not necessary. Remedial alternatives for groundwater will further reduce groundwater concentrations potentially discharging to surface water and sediment. The cleanup levels for groundwater are more stringent than New York State regulatory standards for surface water.

The human health performance criteria evaluated for surface water are the New York State Surface Water Quality Standards (more stringent of the human health or aquatic values) and the Federal Ambient Water Quality Criteria (AWQC) for Human Health Freshwater Ingestion of Organisms and Water (Clean Water Act, Section 304[a]; USEPA, 2006). Ecological surface water performance criteria evaluated were the ORNL surface water benchmarks (aquatic biota secondary chronic values and a TBC). These values do not represent PRGs, but are conservatively established screening levels. Chemicals detected at less than these values would not be expected to have any adverse affects on ecological receptors. Generally, adverse impacts do not occur until ecological receptors are exposed to significantly higher concentrations of these chemicals.

There are no chemical-specific ARARs for sediment concentrations. However, the performance criteria for sediment were evaluated based on the following TBCs. For human health, the performance criteria was evaluated by using the residential soil RSLs from the USEPA RSLs and then multiplied by a factor of 10 (a TBC). This factor results from reduced exposure to sediments compared to residential soil. The ecological performance criteria for sediment were evaluated using ORNL sediment benchmarks (aquatic biota secondary chronic values and a TBC), which is, a conservative established screening value.

3.4.3 Soil Vapor Intrusion - Indoor Air Quality

Potential soil vapor intrusion impacts on indoor air quality are addressed in this CMS for existing offsite structures (PRSC) and potential new onsite structures. In February 2011, a soil vapor intrusion investigation was conducted at the PRSC. Based on preliminary results, adverse impacts to potential receptors via this pathway are not anticipated. Because of the presence of wetlands and pine barrens, new structures throughout much of the onsite and all of the offsite Southern Area plume is unlikely. Currently, there are no buildings currently onsite or being planned for construction by the Navy or the Town of Riverhead that may be impacted by Southern Area Soil Vapor Intrusion issues. In the future buildings may be constructed in the area of shallow VOC-impacted groundwater contamination and soil vapor intrusion may become a concern.

3.5 GROUNDWATER PRG ATTAINMENT AREA

Current site conditions are summarized in Section 2.2.5. This section narrows the description of contamination to those media and areas that will be addressed by the remedial alternatives to achieve RAOs and comply with ARARs.

The Attainment Area is defined as the area over which RAOs, and therefore, the PRGs, are to be met for groundwater. The Attainment Area is not necessarily the area of remediation depending on the effectiveness, implementability, cost, and net benefit for a particular alternative.

The Attainment Area was determined based on the former source area locations and spatial grouping of PRG exceedances for each of the CMS COCs. For the Southern Area, the Attainment Area corresponds to the 5 µg/L isconcentration contour for DCA shown on Figure 2-1. The Attainment Area measures approximately 118 acres. Although contamination is currently understood as stratified in the aquifer, the Attainment Area applies to the entire saturated thickness of the surficial aquifer. The estimated volume of VOC-impacted groundwater is approximately 340 million gallons. Considering the estimated groundwater velocity of 180 to 640 feet per year, the estimated groundwater traveling through the Attainment Area from Site 6A to the Peconic River (approximately 6,400 feet) is estimated at approximately 16 to 20 years.

4.0 IDENTIFICATION AND SCREENING OF REMEDIAL TECHNOLOGIES

This section provides the identification of general response actions (GRAs) and the initial identification and screening of potential technologies.

4.1 GENERAL RESPONSE ACTIONS (GRAS)

The GRAs describe the broad range of actions that will satisfy the RAOs at the site. The GRAs for groundwater may include no action, institutional controls, containment, groundwater extraction /treatment/discharge, insitu treatment, or combination of these GRAs. Consideration of the No Action GRA is required by CERCLA.

With the exception of the No Action alternative, each GRA can be achieved through the implementation of site-specific remedial technologies. In this context, the following definitions apply:

- Remedial technologies are defined as the general categories of remedies under a GRA. For example, in situ chemical treatment is one of the remedial technologies under the GRA of treatment.
- Process options are specific categories of remedies within each remedial technology. The process options are used to implement each remedial technology. For example, the chemical treatment remedial technology could be implemented using one of several types of treatment options, such as in situ chemical oxidation or chemical reduction.

The Remediation Technologies Screening Matrix and Reference Guide, Version 4.0, was used as a reference for several of the remedial technologies and process options (FRTR, 2007).

Table 4-1 lists the GRAs for groundwater contamination and their effectiveness for meeting the RAOs. Tables 4-2a and 4-2b identify potentially applicable technologies and process options for addressing COC-contaminated groundwater at the Southern Area. Representative process options were selected to simplify the development and evaluation of alternatives. The technologies and process options retained following a primary (Table 4-2a) and secondary (Table 4-2b) screening for effectiveness, implementability, and cost are combined into remedial alternatives and evaluated in Section 5. In Section 6, a comparative analysis of alternatives is conducted.

Several technologies were excluded from further consideration because of impracticality, site conditions, or COC characteristics.[8] The specific process option used to implement a remedial action may not be

[8] The municipal water supply process option was rejected because it is being implemented via an NTCRA by the Navy in 2011 for the PRSC and vicinity. Therefore, it is not evaluated in this FS.

selected until the remedial design phase has been completed. Selection of a representative process option does not preclude the application of other similar process options that are potentially applicable for the site.

4.2 SUSTAINABILITY

Executive Order 13423, Strengthening Federal Environmental, Energy, and Transportation Management, requires Federal agencies to implement sustainable practices. Sustainability is a process focused on energy conservation, reduction of green house gases, waste minimization, and re-use and recycling of materials. However, a more comprehensive view of sustainable remediation considers stakeholders input and concerns, optimizing the use of land to benefit society, and focusing on developing remedies that provide the best net sustainability benefit. These considerations are not NCP requirements for remedial alternatives, but may be considered during the technology and alternative selection process.

4.2.1 Green Remediation

Green remediation results in effective cleanups minimizing the environmental and energy footprints of site remediation and revitalization. Sustainable practices emphasize the need to more closely evaluate core elements of a cleanup project, compare the site-specific value of conservation benefits gained by different strategies of green remediation, and weigh the environmental trade-offs of potential strategies. Green remediation addresses the following six core elements (USEPA, 2008a):

- Energy requirements of the treatment system
- Air emissions
- Water requirements and impacts on water resources
- Land and ecosystem impacts
- Material consumption and waste generation
- Long-term stewardship actions

4.2.2 Beyond Green Remediation

In addition to the core elements addressed by green remediation, and expanding on long-term stewardship, the following can also be considered:

- Integrating Stakeholders (e.g., regulators, nongovernmental organizations, neighbors) into the decision-making process, especially in considering the impact of the remedy on the local community
- Land Revitalization and Re-Use
- Lifecycle Analysis (which includes elements of Net Environmental Benefit Analysis [NEBA])

Net impact analyses (e.g., a NEBA[9] or carbon footprint calculations) can be conducted to aid in the selection of a remedy that provides the best net environmental and sustainable benefit. The energy consumption and carbon footprint of the remedial implementation (obtaining raw materials and manufacturing, transportation of materials and travel, implementation emissions, etc.) were quantified in this CMS (see below), but a NEBA was not conducted for the Southern Area.

4.2.3 Lifecycle Analysis

Lifecycle analyses were performed using the Navy's SiteWise tool for developed alternatives in Section 6.2.

4.3 SCREENING OF TECHNOLOGIES AND PROCESS OPTIONS FOR GROUNDWATER

Results of the initial technology screening process are presented in Tables 4-2a and 4-2b. A brief discussion of two alternatives that are not considered technologies, No Action and LUCs, is provided below.

4.3.1 No Action

No Action means no remedial actions or process options are implemented. No attempt is made to satisfy the RAOs. The No Action alternative is evaluated to determine the risks to human health and the environment if no additional actions were taken, and is the baseline against which other options/alternatives are compared. Therefore, No Action is retained as a possible response action. The retention of the No Action alternative satisfies CERCLA requirements, but will not mitigate risk from the contaminated groundwater.

4.3.2 Land Use Controls (LUCs)

LUCs are used to restrict access to or the use of land (or underlying aquifer resources). LUCs relevant to the Southern Area would limit human exposure to contaminated groundwater (and potential indoor air vapor). In addition to being a stand-alone remedy, LUCs are applicable for any remedy where contaminated groundwater is left in place or during the treatment phase of the selected remedy until cleanup levels are met. Implementation of these process options alone would not necessarily attain the RAOs.

Administrative control options include groundwater use restrictions and other restrictions on land use. Groundwater use restrictions would prohibit groundwater use in areas where VOC concentrations exceed

[9] http://www.esd.ornl.gov/programs/ecorisk/net_environmental.html (Oak Ridge National Laboratory [ORNL], 2008).

cleanup levels. While the Navy could internally restrict and control onsite groundwater use, the Navy may not be able to control offsite property effectively.

The effectiveness of LUCs to limit exposure to COCs in groundwater depends on successful implementation and long-term program maintenance. LUCs are retained as a stand-alone remedy and for use with other remedial alternatives as necessary to maintain protectiveness and effectiveness of the remedial alternative. LUCs are developed further in Section 5.2.2. In addition, potential future soil vapor intrusion issues will be addressed indirectly by the selected groundwater alternative.

4.3.3 Summary of Retained Technologies

The remedial technologies were evaluated using a screening process for applicability to the Southern Area. Table 4-3 presents a summary of the retained remedial technology type and process options after the primary and secondary screening processes. These will be developed into alternatives and discussed in Section 5.0.

5.0 DEVELOPMENT AND EVALUATION OF CORRECTIVE MEASURES

This section presents a development and description of remedial alternatives developed for management or treatment of COCs in the surficial aquifer groundwater in the Southern Area. In addition, the alternatives are evaluated using the RCRA guidance and the additional criteria as identified under CERCLA. The corrective measures alternatives are developed by assembling remedial technologies and representative process options after the initial screening process (Section 4.0) and consider the nature of the COCs, concentrations, and site hydrogeologic conditions. These alternatives are not intended to represent final remedial alternatives, but are assembled to evaluate interactions between components. During the remedy selection process, individual components can be selected as part of the final remedy. Table 5-1 provides additional details on the analysis factors and considerations during the analysis of each alternative.

5.1 EVALUATION CRITERIA

Criterion 1—Overall Protection of Human Health and the Environment

This threshold evaluation criterion describes how each alternative provides and maintains adequate protection of human health and the environment. Alternatives are assessed to determine whether they can adequately protect human health and the environment from unacceptable risks posed by VOCs present at the site, in both the short and long-term. This criterion is also used to evaluate how risks would be eliminated, reduced, or controlled through treatment, engineering, institutional controls, or other remedial activities. The considerations evaluated during the analysis of each alternative for overall protection of human health and the environment are presented in Table 5-1.

Criterion 2 – Media Cleanup Standards

This criterion identifies whether the PRGs would be obtained and provides estimates for the time to achieve the PRGs. This criterion also evaluates steps that would be taken to control risks until the PRGs are obtained.

Criterion 3 – Source Control

This criterion provides a discussion of measures that would be taken to control or eliminate continuing sources of contamination and steps that would be taken to control migration.

Criterion 4 – Waste Management Standards

This criterion identifies wastes that would be generated during the implementation of alternatives.

Other NCP Factors

Other factors, including Compliance with ARARs, Long-Term Reliability and Effectiveness, Reduction in Toxicity, Mobility, and Volume, Short-Term Effectiveness, Implementability, and Cost are presented in this CMS to comply with CERCLA Feasibility Study guidance. Two additional criteria - State and Community Acceptance will be considered in the ROD based on comments received during review of the draft CMS, Statement of Basis, and the Proposed Remedial Action Plan.

Compliance with ARARs

This threshold evaluation criterion is used to determine if each alternative would comply with Federal and State ARARs. Other information, such as advisories, criteria, or guidance, is considered where appropriate during the ARARs analysis. The considerations evaluated during the analysis of the ARARs applicable to each alternative are presented in Table 5-1. Potential action-, location-, and chemical-specific ARARs for the alternatives presented in this CMS are identified in Appendix D and summarized in Section 3.2.

Long-term Effectiveness and Permanence

This primary balancing evaluation criterion addresses the long-term effectiveness and permanence of maintaining the protection of human health and the environment after implementing the remedial action imposed by the alternative. The primary components of this criterion are the magnitude of residual risk remaining at the site after remedial objectives have been met, and the extent and effectiveness of controls that might be required to manage the risk posed by treatment residuals and/or untreated wastes. The considerations evaluated during the analysis of each alternative for long-term effectiveness and permanence are presented in Table 5-1.

Reduction of Toxicity, Mobility, or Volume through Treatment

This primary balancing evaluation criterion addresses the anticipated performance of the alternative's treatment technologies in permanently and significantly reducing toxicity, mobility, and/or volume of hazardous materials at the site. The NCP prefers remedial actions where treatment is used to reduce the principal threats at a site through destruction of toxic contaminants, irreversible reduction in contaminant mobility, or reduction of total volume of contaminated media. The considerations evaluated during the analysis of each alternative for reduction of toxicity, mobility, or volume of contaminants present at a given site are presented in Table 5-1.

Short-term Effectiveness

This primary balancing evaluation criterion considers the effect of each alternative on the protection of human health and the environment during the construction and implementation process. The short-term effectiveness evaluation only addresses protection prior to meeting the RAO. The considerations evaluated during the analysis of each alternative for short-term effectiveness are presented in Table 5-1.

Implementability

This primary balancing criterion evaluates the technical feasibility and administrative feasibility (i.e., the ease or difficulty) of implementing each alternative and the availability of required services and materials during its implementation. Considerations evaluated during the analysis of each alternative for implementability are presented in Table 5-1.

Cost

This primary balancing criterion evaluates the cost of implementing each alternative. The cost of an alternative encompasses all engineering, construction, and long-term future (e.g., O&M) costs incurred over the life of the project. The cost of each alternative is to be developed with an expected accuracy range of minus 30 to plus 50 percent (USEPA, 1988).

These estimates were based on similar project experience, industry knowledge, and cost estimating references, as well as information provided by vendors, subcontractors, and regulators. However, these cost estimates were used to compare the alternatives. The costs of the remedial alternatives are compared using the estimated present value (PV) of the capital and long-term costs (e.g., O&M) of the alternative in current year (2011) dollars. The PV allows costs for remedial alternatives to be compared by discounting all costs to the year that the alternative is implemented.

State Acceptance

This modifying criteria addresses the acceptability of the remedial alternatives to the state regulatory agencies. NYSDEC will review this CMS and provide comments and input as appropriate for incorporation into the final CMS.

Community Acceptance

This modifying criteria addresses the acceptability of the remedial alternatives to the community. As with regulatory acceptance, community concerns will be used to evaluate each remedy in this CMS. Consistent with RCRA and the NCP, public comments will be solicited on the selected alternative

presented in the Proposed Remedial Action Plan and Statement of Basis. Comments will be addressed in the ROD and Permit Modification, and will be considered in the selection of the remedy.

The remedial alternatives developed and discussed in this section are as follows:

- Alternative 1—No Further Action
- Alternative 2—Land Use Controls
- Alternative 3—Monitored Natural Attenuation and Land Use Controls
- Alternative 4—Air Sparge, Monitored Natural Attenuation, and Land Use Controls
- Alternative 5—Anaerobic Enhanced In Situ Biodegradation (EISB), Monitored Natural Attenuation, and Land Use Controls
- Alternative 6—Anaerobic Enhanced In Situ Biodegradation (EISB), Air Sparge, Monitored Natural Attenuation, and Land Use Controls
- Alternative 7—Groundwater Extraction, Treatment, and Infiltration Gallery, Monitored Natural Attenuation, and Land Use Controls

5.2 DEVELOPMENT AND EVALUATION OF REMEDIAL ALTERNATIVES FOR GROUNDWATER

5.2.1 Alternative 1—No Action

Development

The No Action alternative is required under CERCLA to be evaluated as a baseline for other alternatives.

Description

The No Action alternative does not include institutional controls or remedial activities to minimize risk to public health or the environment. Additionally, the No Action alternative does not include monitoring the contaminant plume in groundwater or five-year reviews.

Detailed Analysis of Alternatives

Detailed analysis of Alternative 1 is discussed below.

Overall Protection of Human Health and the Environment: Alternative 1 would not be protective of human health or the environment since no action is being taken to reduce site contamination or exposure routes. Over time, the VOC concentrations in groundwater would decrease through degradation, dilution, and flushing. However, in the short-term VOC-impacted groundwater could be extracted for private or public potable water use. There would be no notice or other actions in place to preclude this scenario.

Under the current conditions, adverse impacts to ecological receptors are not anticipated. In the future, higher concentration VOC-impacted groundwater can migrate and discharge to the Peconic River. Based on the concentration of VOCs in groundwater onsite, localized adverse impacts to ecological receptors (macroinvertebrates) may result if the VOCs migrate without attenuation. Because the site-related VOCs do not bioaccumulate or biomagnify, adverse impacts to upper food chain receptors would not be anticipated.

In addition, even though the VOC-impacted groundwater is mostly stratified at ten or more feet below the water table, there is still a possibility that VOCs can enter the soil vapor. In the future, if residential or commercial structures are constructed in the area of the VOC-impacted groundwater, human health can be affected through soil vapor intrusion. Monitoring or notices would not be in place to evaluate or mitigate potential exposures.

Media Cleanup Standards: Alternative 1 would not achieve the PRGs, which were established to be protective of human health and the environment.

Source Control: Alternative 1 would not address source control.

Waste Management Standards: There are no actions to be implemented under this alternative, therefore no wastes would be generated.

Compliance with ARARs: Alternative 1 would not comply with the chemical-specific ARAR - MCLs in site groundwater (10NYCRR5, Subpart 5-1.51 to 5-1.52) for the sole source aquifer in Suffolk County, New York. There are no action- or location-specific ARARs.

Long-Term Effectiveness and Permanence: Alternative 1 would not be effective in the long term. VOC-impacted groundwater could be extracted and used as a potable water supply in the future. Residual VOC concentrations in groundwater exceed PRGs and therefore result in excessive risk to human health. In addition, potential soil vapor intrusion into future planned structures could result in adverse affects to occupants. There would be no controls in place to monitor any potential effects to human health or the environment.

Based on current estimates, the migration of VOC-impacted groundwater to the River is not expected to have an adverse effect on ecological receptors or current recreational users. However, there would be no monitoring conducted to confirm these estimates. Higher concentration VOC-impacted groundwater can migrate and discharge to the Peconic River and localized adverse impacts to ecological receptors (macroinvertebrates) may result.

Reduction of Toxicity, Mobility, or Volume through Treatment: There would be no reduction of toxicity, mobility, or volume through treatment under this alternative. The VOCs in groundwater would

degrade through natural insitu biological activities, or once in surface water (Peconic River or tributaries), the VOCs would volatilize and be subjected to photodegradation in the atmosphere.

Short-Term Effectiveness: There would be no risk to human health or the community during implementation of this alternative. Although no actions are being taken to accelerate cleanup of the aquifer, the RAOs would ultimately be achieved, although the timing of this compliance would be uncertain. Current estimates indicate that with the source area removed, the RAOs would be achieved in the aquifer between 10 years (assuming effective natural attenuation via biodegradation) and 40 years assuming simple flushing of the VOC-impacted groundwater into the Peconic River. The estimated geometric mean time for achieving the RAOs is 20 years.

Implementability: Because no actions are being conducted, this alterative would be technically easy to implement.

Cost: There are no costs associated with Alternative 1.

5.2.2 Alternative 2—Land Use Controls

Development

LUCs are evaluated in this CMS both as a stand-alone alternative (Alternative 2) and as a part of Alternatives 3 through 7. The objectives, implementation, and maintenance activities associated with the LUCs apply to each action alternative until cleanup levels are met. LUCs would be implemented at the Southern Area to (1) control human contact with VOC-impacted groundwater and (2) require monitoring and/or mitigation to address the potential for soil vapor intrusion issues. The extent of the LUCs would correspond to the limits of the Attainment Area until cleanup levels are met (the LUC boundary will change as portions of the plume meet cleanup levels). The LUCs would be implemented and maintained by the Navy until the VOCs meet the cleanup goals.

Description

The following supplemental measures would be implemented:

- Identify groundwater use restrictions in the ROD.
- Define LUCs in property transfer documents to identify the areal extent of VOC-impacted groundwater and identify monitoring and/or construction requirements to address soil vapor issues.
- Conduct annual site inspections to ensure that groundwater use restrictions are maintained and identify buildings that may be affected by potential soil vapor intrusion issues.
- Review the integrity and effectiveness of the LUCs during the 5-Year Reviews.

Detailed Analysis of Alternatives

Detailed analysis of Alternative 2 is discussed below.

Overall Protection of Human Health and the Environment: Alternative 2 would be partially protective of human health and the environment. Over time, the VOC concentrations in groundwater would decrease through degradation, dilution, and flushing. LUCs would be used to provide notice and restrict use of VOC-impacted groundwater for potable water applications until cleanup goals are met. Annual inspections would be conducted to determine if new water supply wells are present and use of the water (e.g., potable or irrigation).

LUCs would also be used to provide notice of VOC-impacted groundwater and identify the need for monitoring of soil vapor and/or mitigation of new structures to protect human health. Annual inspections would be conducted to identify new existing structures that may be impacted by soil vapor intrusion.

Under the current conditions, adverse impacts to ecological receptors are not anticipated. In the future, higher concentration VOC-impacted groundwater can migrate and discharge to the Peconic River and localized adverse impacts to ecological receptors (macroinvertebrates) may result. Because the site-related VOCs do not bioaccumulate or biomagnify, adverse impacts to upper food chain receptors would not be anticipated.

Media Cleanup Standards: Alternative 2 would not achieve the PRGs, which were established to be protective of human health and the environment.

Source Control: Alternative 2 would not involve additional source control.

Waste Management Standards: There are no actions to be implemented under this alternative that would involve contaminated media, therefore no wastes would be generated.

Compliance with ARARs: Alternative 2 would not comply with New York State groundwater quality classification (GA) (6NYCRR 701.15) and associated MCLs (10NYCRR5, Subpart 5-1.51 to 5-1.52) for the sole source aquifer in Suffolk County, New York.

Long-Term Effectiveness and Permanence: Alternative 2 would be partially effective in the long term. LUCs would be used to restrict groundwater extraction for potable water use and provide notice of the need for monitoring and/or mitigation of potential soil vapor intrusion issues. These controls would be effective on Navy-controlled property, but would be less reliable off site where the Navy does not have direct control. Groundwater is shallow and can be accessed via manual or mechanical well installation techniques.

The Navy is planning on transferring its property to the Town of Riverhead for economic redevelopment and the transfer documents restrict groundwater use and identify areas of residual contamination. Once the property is no longer under Navy control, groundwater monitoring and annual inspections would identify potential wells that could result in adverse impacts to human health.

Based on current estimates, the migration of VOC-impacted groundwater to the River is not expected to have an adverse effect on ecological receptors or current recreational users. However, there would be no monitoring conducted to confirm these estimates. Higher concentration VOC-impacted groundwater can migrate and discharge to the Peconic River and localized adverse impacts to ecological receptors (macroinvertebrates) may result.

Reduction of Toxicity, Mobility, or Volume through Treatment: There would be no reduction of toxicity, mobility, or volume through treatment under this alternative. The VOCs in groundwater would degrade through natural insitu biological activities, or once in surface water (Peconic River or tributaries), the VOCs would volatilize and be subjected to photodegradation in the atmosphere.

Short-Term Effectiveness: Because activities are limited to administrative actions, there would be no risk to human health or the community during implementation of this alternative. Although no actions are being taken to accelerate cleanup of the aquifer, the Remedial Action Objections would ultimately be achieved, although the timing of this compliance would be uncertain. Current estimates indicate that with the source area removed, the RAOs would be achieved in the aquifer between 10 years (assuming effective natural attenuation via biodegradation) and 40 years assuming simple flushing of the VOC-impacted groundwater into the Peconic River, with a geometric mean estimate of 20 years.

Implementability: LUCs are technically feasible and could be implemented within one year after the signing of the ROD. The onsite LUCs would be implemented by the Navy in consultation with the Town of Riverhead. The offsite LUCs would require access agreements, cooperation, and coordination with Suffolk County and the PRSC. Services and materials are readily available to implement this remedy.

Cost: The estimated cost associated with Alternative 2 is as follows.

Capital Cost:	$8,000
O&M:	$14,000 every five years (Five-Year Review)
	$7,000 annual (LUC)
Present Value (PV):	$207,000 (20 years)

5.2.3 Alternative 3—Monitored Natural Attenuation and Land Use Controls

Development

MNA and LUCs are included in this alternative as a stand-alone remedial action, but are also a component of Alternatives 4 through 7. Natural attenuation is the remedial process for this remedy, and MNA is the implementation of that remedy in conjunction with groundwater performance monitoring (e.g., monitoring the decrease of COC concentrations over time). USEPA objectives for performance monitoring of an MNA remedy are summarized below and evaluated in Table 5-2 (USEPA 1999b and 2004).

1. Demonstrate that natural attenuation is occurring according to expectations.
2. Detect changes in environmental conditions (e.g., hydrogeologic, geochemical, microbiological, or other changes) that may reduce the efficacy of any of the natural attenuation processes.
3. Identify any potentially toxic and/or mobile transformation products.
4. Verify that the plume is not expanding downgradient, laterally or vertically.
5. Verify no unacceptable impact to downgradient receptors.
6. Detect new releases of contaminants to the environment that could impact the effectiveness of the natural attenuation remedy.
7. Demonstrate the efficacy of institutional controls put in place to protect potential receptors.
8. Verify attainment of remediation objectives.

These performance monitoring objectives will be evaluated on an annual basis. USEPA considers MNA to be a means of achieving remediation objectives for specific, well-documented sites where its use meets the applicable statutory and regulatory requirements.

MNA and LUCs are considered and evaluated within this CMS as a remedy in itself, and also as a viable component of one or more treatment-based remedial alternatives. Source control and long-term performance monitoring are fundamental components of any MNA remedy (USEPA, 1999b). The source control action (2008 to 2010) remedial actions are complete. The use of MNA differs from the No Action alternative because performance monitoring continues until the RAOs are achieved.

Natural attenuation is the name given to the combination of natural processes occurring at a site that result in a decrease in concentration of a COC with time or distance from a source. Natural attenuation mechanisms are classified as either destructive or nondestructive. Destructive mechanisms remove the parent compound from the environment by breaking it down into one or more simpler compounds. Nondestructive mechanisms transfer the parent compound from one environmental medium into another, or spread the parent compound over a greater volume of the same environmental medium. The most

common destructive natural attenuation mechanism is biodegradation. Nondestructive mechanisms include dilution, dispersion, advection, sorption, and volatilization.

Anaerobic biodegradation of higher-chlorinated aliphatic compounds generally proceeds in reducing, oxygen-deficient environments (USEPA, 1999b). Compounds such as TCA will not be readily biodegraded under aerobic conditions, whereas less chlorinated compounds such as chloroethane will biodegrade under aerobic conditions.

The presence of DCA, DCE, and chloroethane, the daughter products of TCA degradation, along with oxygen-deficient conditions and a negative ORP provide evidence that natural attenuation processes have been degrading the VOCs in groundwater. These conditions are more favorable in onsite and near site groundwater, but are less favorable in portions of the offsite plume. Petroleum compounds from the former source area commingled with the VOCs in the onsite portion of the Southern Area have likely facilitated biodegradation of the VOCs in this area. These petroleum compounds are largely absent in further downgradient groundwater.

Description

MNA consists of the installation of monitoring wells and groundwater sampling and analysis needed to monitor plume migration and degradation. The majority of the network needed to implement this alternative is currently in place, and additional investigation and well installation are planned for 2011. In addition, the US Navy is currently conducting annual groundwater sampling events (two events are being conducted in 2011) and biannual surface water and sediment sampling events.

For this alternative, approximately 10 new monitoring wells would be installed and sampled along with 40 existing monitoring wells. Unneeded monitoring wells and piezometers at the site would be abandoned. The groundwater sampling frequency would be every nine months for the first three years (to provide seasonal variation) and then annually for an additional 17 years (20 years total). Groundwater from each well will be analyzed for VOCs and other MNA parameters (see Appendix F).

Additional elements of Alternative 3 include LUCs for groundwater use restrictions and notification and monitoring/mitigation requirements for new building construction to address soil vapor intrusion issues, annual inspections and five-year reviews, including the potential need to implement a more aggressive contingent remedy.

Detailed Analysis of Alternatives

Detailed analysis of Alternative 3 is discussed below.

Overall Protection of Human Health and the Environment: Alternative 3 is expected to be mostly protective of human health and the environment. Over time, VOC concentrations in groundwater would decrease through degradation, dilution, and flushing. LUCs would be used to provide notice and restrict use of VOC-impacted groundwater for potable water applications until cleanup goals are met. Annual inspections would be conducted to determine if new water supply wells are present and use of the water (e.g., potable or irrigation).

LUCs would also be used to provide notice of VOC-impacted groundwater and identify the need for monitoring of soil vapor and/or mitigation of new structures to protect human health. Annual inspections would be conducted to identify new existing structures that may be impacted by soil vapor intrusion.

Under the current conditions, adverse impacts to ecological receptors are not anticipated. In the future, higher concentration VOC-impacted groundwater can migrate and discharge to the Peconic River and localized adverse impacts to ecological receptors (macroinvertebrates) may result. Monitoring of groundwater, surface water, and sediments would be conducted to identify the migration and degradation of the VOC-impacted groundwater and determine the need for additional action. Because the site-related VOCs do not bioaccumulate or biomagnify, adverse impacts to upper food chain receptors would not be anticipated.

Media Cleanup Standards: In the short term, Alternative 3 would not achieve the PRGs, which were established to be protective of human health and the environment. In the long term, attenuation of VOCs would occur and migration of VOC-impacted groundwater would be monitored. Monitoring would be used to identify areas that would require LUCs to provide notice and restrict activities (e.g., potable groundwater use and building construction criteria to address soil vapor intrusion) and identify potential migration of VOC-impacted groundwater that could adversely affect ecological receptors.

Source Control: Alternative 3 would not involve additional source control.

Waste Management Standards: During well installation and groundwater sampling, wastes would be generated. These materials would be containerized, characterized, and disposed offsite. Based on recent investigation-derived waste (IDW) management activity, none of these materials would be classified as RCRA hazardous wastes.

Compliance with ARARs: In the short term, Alternative 3 would not comply with New York State groundwater quality classification (GA) (6NYCRR 701.15) and associated MCLs (10NYCRR5, Subpart 5-1.51 to 5-1.52) for the sole source aquifer in Suffolk County, New York. During this time, monitoring would be used to identify areas of residual VOC-impacted groundwater, LUCs would be implemented, and annual inspections would be conducted to identify potential groundwater extraction wells for potable water use and/or installation of structures that may be subjected to soil vapor intrusion concerns. If

required, mitigation measures such as the need for well abandonment and sub slab depressurization units would be identified. In the long term, Alternative 3 would achieve ARARs.

During implementation of this alternative, several location- and action-specific ARARs would be triggered. Some monitoring wells would be installed near or in wetlands and similarly groundwater sampling would be conducted in these same areas. Wetland- and surface water-type ARARs consisting of the New York Freshwater Wetlands Act (6 NYCRR 662 to 664), New York Wild, Scenic, and Recreational Rivers System Act (6NYCRR 666), and New York Endangered and Threatened Species of Fish and Wildlife; Species of Special Concern (6 NYCRR 182) would be triggered. These ARARs regulate activities conducted in wetlands and surface water bodies that are present within the Southern Area groundwater plume. These ARARs would be achieved through consultation with associated regulatory organizations to minimize short term impacts to sensitive areas and ecological receptors and eliminate long-term impacts.

Action-specific ARARs are limited to management of IDW (6 NYCRR 372.2 and 373.1-1).

Long-Term Effectiveness and Permanence: Alternative 3 would be effective in the long term. LUCs would be used to restrict groundwater extraction for potable water use and provide notice of the need for monitoring and/or mitigation of potential soil vapor intrusion issues. These controls would be effective on Navy-controlled property, but would be less reliable off site where the Navy does not have direct control. Groundwater is shallow and can be accessed via manual or mechanical well installation techniques. Groundwater monitoring and annual inspections would be conducted to identify potential water supply wells or structures that may be impacted by soil vapor intrusion.

The Navy is planning on transferring its property to the Town of Riverhead for economic redevelopment and the transfer documents restrict groundwater use and identify areas of residual contamination. Once the property is no longer under Navy control, groundwater monitoring and annual inspections would be conducted to identify potential wells that could result in adverse impacts to human health.

Based on current estimates, the migration of VOC-impacted groundwater to the River is not expected to have an adverse effect on ecological receptors or current recreational users. Monitoring would be conducted to evaluate migration and potential impacts to the River (including macroinvertebrates) and identify the need for additional action.

Reduction of Toxicity, Mobility, or Volume through Treatment: There would be no reduction of toxicity, mobility, or volume through treatment under this alternative. The VOCs in groundwater would degrade through natural insitu biological activities, or once in surface water (Peconic River or tributaries), the VOCs would volatilize and be subjected to photodegradation in the atmosphere. Non-hazardous soil

and groundwater purge water wastes would be generated during implementation of this remedy. Facilities are readily available to transport and dispose of these materials.

Short-Term Effectiveness: Because activities are limited to administrative actions, simple monitoring well construction, and groundwater monitoring activities, there would be no risk to human health or the community during implementation of this alternative. Although no actions are being taken to accelerate cleanup of the aquifer, the RAOs would ultimately be achieved, although the timing of this compliance would be uncertain. Current estimates indicate that with the source area removed, the RAOs would be achieved in the aquifer between 10 years (assuming effective natural attenuation via biodegradation) and 40 years assuming simple flushing of the VOC-impacted groundwater into the Peconic River, with a geometric mean estimate of 20 years.

Implementability: LUCs and MNA are technically feasible and could be implemented within two years after signing of the ROD. The onsite LUCs and monitoring would be implemented by the Navy in consultation with the Town of Riverhead. The offsite LUCs and monitoring would require access agreements, cooperation, and coordination with Suffolk County and the PRSC. These agreements have been obtained in the past and long-term agreements should be obtainable. Services and materials are readily available to implement this remedy.

Cost: The estimated cost associated with Alternative 3 is as follows.

Capital Cost:	$314,000
O&M:	$106,000 per event, 21 events over 20 years (Monitoring)
	$14,000 every five years (Five-Year Review)
	$7,000 per year (LUC)
PV:	$2,400,000 (20 years)

The capital cost is for planning documents and monitoring well installation. In addition to monitoring, Five-Year Reviews, and LUCs, well maintenance (re-development or replacement) and well abandonment are included under O&M costs.

5.2.4 Alternative 4—Air Sparge, Monitored Natural Attenuation, and Land Use Controls

Development

This alternative consists of implementing LUCs, MNA, and installing and operating an air sparge treatment system in (1) the former source area and/or (2) near the Peconic River area. The LUCs would target areas that require notifications and inspections during implementation of this alternative, until clean up goals are achieved. MNA would target areas between treatment zones and portions of the groundwater plume with lower VOC concentrations (less than 50 µg/L) and/or where treatment cannot be

effectively implemented because of site features (e.g., wetlands). These components of this alternative are detailed in Alternative 3 (Section 5.2.3).

Air sparging is an in situ technology that injects compressed air into the aquifer at 10 to 20 feet below the bottom of contamination. Sparged air can be delivered through horizontal or vertical wells. For this CMS, vertical injection wells will be evaluated. Horizontal injection wells will also be considered during the Remedial Design. The treatment zone obtained for each air injection point varies based on the depth of air injection. The most effective treatment occurs near the injection well (i.e., within 10 feet of the well), but treatment zones will also extend outward. For air injection at greater depths, the maximum extent of the aeration zone is approximately equal to the injection depth. In the source area, groundwater contamination is stratified at a depth of 20 to 40 feet bgs and air would be injected approximately 50 feet bgs. Near the Peconic River, the groundwater contamination is present at depths up to 90 feet bgs and the air would be injected approximately 10 to 20 feet below this depth (assumed to be 100 feet). Two or more offsetting lines of air injection wells are commonly installed perpendicular to groundwater flow, and air injection rates typically vary from 3 to 10 cubic feet per minute (CFM) per well.

An air compressor is used to provide the air and pressure needed for sparging. The pressure is based primarily on the depth below groundwater that the air is to be injected. At depths of 50 to 100 feet below the groundwater table, a minimum of 22 and 43 pounds per square inch (psi) is required, respectively. The compressor must also provide additional pressure to account for losses in piping and in the injection well. During compression, depending on pressure, the air temperature rises to 200 to 350°F. To protect discharge piping, the air must first be cooled. Excess heat is discharged to the atmosphere through a radiator or heat pump. During the compression, depending on the humidity of makeup air and the pressure to be achieved, moisture from the air is condensed in the piping system and must be managed. The compressed air is conveyed to the discharge points through distribution piping and will include valves and meters to regulate and control air distribution.

Within the injection wells, screens are used to disburse the air, which forms bubbles within the aquifer. The air bubbles then rise through the saturated zone. For chlorinated VOCs air sparging is used to induce mass transfer (stripping, or volatilization) of VOCs from groundwater to the air stream. The air stream then carries the VOCs to the surface. Because air is used, it can convert the low organic carbon aquifers to aerobic biological conditions. In the long-term, dependent on the quantity of organics (natural or petroleum-based) aeration of groundwater would inhibit the current natural anaerobic biodegradation of VOCs. If high concentrations of iron are present in the groundwater, well maintenance costs would increase.

Air sparge systems are sometimes installed in conjunction with soil vapor extraction systems to control fugitive vapor migration. However, the anticipated location of air sparge wells is not in areas with

occupied buildings or structures that could accumulate VOCs and therefore soil vapor extraction wells are not included with the air sparge system(s).

The purpose of the source area air sparge system would be to remove VOCs that may remain in the Site 6A and 10B source areas, to enhance biodegradation of petroleum products that may remain, and to shorten the time that downgradient VOC-impacted groundwater would remain. The VOC and residual petroleum contamination would be treated insitu, and cleanup is estimated to take approximately 2 to 4 years. Monitoring of source area groundwater is currently being conducted, but since the source area remedial activities were completed approximately one year ago (2010), the effectiveness of the source area remediation cannot be determined at this time. Approximately two additional years of monitoring are required to make this determination.

The purpose of the air sparge system near the Peconic River would be to remove VOCs from groundwater prior to the groundwater entering the Peconic River. This system would operate to remove VOCs from groundwater as VOC-impacted groundwater flows through this area, currently estimated to 10 to 40 years, with a geometric mean estimate of 20 years. Treatment of VOC-impacted groundwater upgradient of this area would reduce operating times.

An air sparge treatment system near the fence line (property line) north of River Road was considered. However, the VOC-impacted groundwater is near a silty clay unit, and air injection points cannot be installed below the contamination. As a result, an air sparge system in this area would not be effective.

Description

Conceptual layouts of the Source Area and River Area Air Sparge Systems are shown on Figure 5-1A and a cross-section view is provided in Figure 5-1B. Process schematics of the Source Area Air Sparge System and River Area Air Sparge System are presented in Figures 5-1C and 5-1D, respectively. Calculations for this alternative are presented in Appendix E.

The Source Area Air Sparge System would consist of one to four treatment lines (four lines are shown in the figures and are used as the basis for the cost estimate). The final setup and number of treatment lines would be based on the ongoing source area groundwater monitoring and would be finalized during the Remedial Design to optimize performance in this area. The estimated masses of VOCs to be addressed by each line are summarized as follows:

Air Sparge 1:	3.2 pounds of VOCs
Air Sparge 2:	3.2 pounds of VOCs
Air Sparge 3:	3.2 pounds of VOCs
Air Sparge 4:	11 pounds of VOCs

For the Source Area Air Sparge System, the compressor would provide 240 CFM of air at a pressure of 30 PSI. Approximately 48 injection wells, each screened 50 feet bgs would be used. Each treatment line would consist of 10 to 14 injection wells that would form treatment zones of 155 to 205 feet long (perpendicular to groundwater flow), 55 feet wide, and 50 feet deep. The length of the treatment lines corresponds to the edges of the 50 µg/L DCA plume to account for potential variation in plume foot print. A Blower Building to house the compressor, electrical controls, and condensate tanks would be constructed in the Source Area. The final building location would be selected during the Remedial Design based on the final piping network and the availability of power in the area. If less than four treatment lines are selected during the Remedial Design optimization phase, costs associated with each line would be approximately 20 to 30 percent of the total estimated total capital and O&M costs.

For the River Area Air Sparge system, one 1,000-foot long, 55-foot wide, and 100-foot deep treatment line would be installed. The length of the treatment line corresponds to areas where current or historic data indicates that groundwater with greater than 50 µg/L of DCA have been flowing through the area. Because groundwater flow through this area is believed to be variable and the footprint of the plume appears to shift northeast to southwest, the treatment line also includes the edge of the current 5 µg/L DCA plume boundary. Although one single line of treatment wells is shown, because of the presence of private property (east of Connecticut Avenue), an active railroad (along Connecticut Avenue), and wetlands to the south and north, the final orientation of the treatment zone developed during Remedial Design may be different. Other factors to be considered during this evaluation would be potential effects of air injection on the structural stability of Donahue Lake dam and the railroad, and on wetlands.

A compressor would provide 320 CFM of air at a pressure of 50 PSI. Approximately 80 injection wells, each screened 100 feet bgs would be used. The Blower Building to house the compressor, electrical controls, and condensate tanks would be constructed near the intersection of River Road and Connecticut Avenue, either on current or former Navy property. The final building location would be selected based on the piping network and the availability of power in the area. In addition, if a compressed air line cannot be installed across the railroad, two Blower Buildings may be constructed, one on either side of the railroad tracks.

The estimated time to reach cleanup levels in the River Area Air Sparge System is dependent on the implementation of source area treatment and the effectiveness of MNA in groundwater upgradient of this area. The cleanup time is estimated to range from 8 to 36 years, with a geometric mean estimate of 16 years. Implementation, O&M, monitoring, reporting, and other alternative cost assumptions are provided in Appendix F.

Detailed Analysis of Alternatives

Detailed analysis of Alternative 4 is discussed below.

Overall Protection of Human Health and the Environment: Alternative 4 is expected to be protective of human health and the environment. Air sparging in the source areas would rapidly reduce residual VOCs in the source area. Over time, VOC concentrations in groundwater in other areas would decrease through degradation, dilution, and flushing. LUCs would be used to provide notice and restrict use of VOC-impacted groundwater for potable water applications until cleanup goals are met. Annual inspections would be conducted to determine if new water supply wells are present and use of the water (e.g., potable or irrigation).

LUCs would also be used to provide notice of VOC-impacted groundwater and identify the need for monitoring of soil vapor and/or mitigation of new structures to protect human health. Annual inspections would be conducted to identify new existing structures that may be impacted by soil vapor intrusion. The air sparge remedies would first cause VOC-impacted vapors to migrate into soil gas. Monitoring and evaluation of potential migration of VOC-impacted soil vapors into occupied existing structures would be evaluated.

Under the current conditions, adverse impacts to ecological receptors are not anticipated. In the future, higher concentration VOC-impacted groundwater can migrate and discharge to the Peconic River. The use of air sparging near the Peconic River would reduce or eliminate the potential for localized adverse impacts to ecological receptors (macroinvertebrates). Monitoring of groundwater, surface water, and sediments would continue to evaluate the effectiveness of the air sparge systems, allow optimization of the operation, and determine when the treatment systems can be discontinued or if addition action is needed.

Media Cleanup Standards: In the short term, Alternative 4 would not achieve the PRGs, which were established to be protective of human health and the environment. Within approximately 2 to 4 years, PRGs should be obtained in the source area. Between the source areas and the Peconic River, attenuation of VOCs would occur. The River Area Air Sparge System would be used to treat VOC-impacted groundwater prior to entering the River. Monitoring would be used to identify areas that would require LUCs to provide notice and restrict activities (e.g., potable groundwater use and building construction criteria to address soil vapor intrusion), the effectiveness of the air sparge systems, and identify potential migration of VOC-impacted groundwater that could adversely affect ecological receptors.

Source Control: The need for additional source area control measures is currently being evaluated. If needed, Alternative 4 would include additional source area control. Residual VOCs in the source area would be treated with the air sparge system.

Waste Management Standards: During well installation, well redevelopment, and groundwater sampling, wastes would be generated. These materials would be containerized, characterized, and disposed offsite. Based on recent IDW management activity, none of these materials would be classified

as RCRA hazardous. In addition, the compressor and associated cooling system would generate condensate. The water would be characterized and disposed offsite.

Compliance with ARARs: In the short term, Alternative 4 would not comply with New York State groundwater quality classification (GA) (6NYCRR 701.15) and associated MCLs (10NYCRR5, Subpart 5-1.51 to 5-1.52) for the sole source aquifer in Suffolk County, New York. During this time, monitoring would be used to identify areas of residual VOC-impacted groundwater, LUCs would be implemented, and annual inspections would be conducted to identify potential groundwater extraction wells for potable water use and/or installation of structures that may be subjected to soil vapor intrusion concerns. If required, mitigation measures such as the need for well abandonment and sub slab depressurization units would be identified. In the long term, Alternative 4 would achieve ARARs.

During implementation of this alternative, several location- and action-specific ARARs would be triggered. Some air sparge wells and monitoring wells would be installed near or in wetlands and groundwater sampling would be conducted in these same areas. Wetland- and surface water-type ARARs consisting of the New York Freshwater Wetlands Act (6 NYCRR 662 to 664), New York Wild, Scenic, and Recreational Rivers System Act (6NYCRR 666), and New York Endangered and Threatened Species of Fish and Wildlife; Species of Special Concern (6 NYCRR 182) would be triggered. These ARARs regulate activities conducted in wetlands and surface water bodies that are present within the Southern Area groundwater plume. These ARARs would be achieved through consultation with associated regulatory organizations to minimize short term impacts to sensitive areas and ecological receptors and eliminate long-term impacts.

Action-specific ARARs are limited to management of IDW (6 NYCRR 372.2 and 373.1-1).

Long-Term Effectiveness and Permanence: Alternative 4 would be effective in the long term. LUCs would be used to restrict groundwater extraction for potable water use and provide notice of the need for monitoring and/or mitigation of potential soil vapor intrusion issues. These controls would be effective on Navy-controlled property, but would be less reliable off site where the Navy does not have direct control. Groundwater is shallow and can be accessed via manual or mechanical well installation techniques. Groundwater monitoring and annual inspections would be conducted to identify potential water supply wells or structures that may be impacted by soil vapor intrusion.

The Navy is planning on transferring its property to the Town of Riverhead for economic redevelopment and the transfer documents restrict groundwater use and identify areas of residual contamination. Once the property is no longer under Navy control, groundwater monitoring and annual inspections would be conducted to identify potential wells that could result in adverse impacts to human health.

Based on current estimates, the migration of VOC-impacted groundwater to the River is not expected to have an adverse effect on ecological receptors or current recreational users. The River Area Air Sparge System would further reduce or eliminate VOCs from entering the River and monitoring would be used to evaluate migration and potential impacts to the River and identify the need for additional action.

Reduction of Toxicity, Mobility, or Volume through Treatment: This alternative would result in the volatilization and photodegradation of approximately 21 pounds of VOCs from the source area and up to 354 pounds of VOCs at the Peconic River. These treatment estimates would be reduced by the degree of natural biodegradation of VOCs in the aquifer. There would be no reduction of mobility or volume through treatment under this alternative. Non-hazardous soil, groundwater and condensate water would be generated during implementation of this remedy. Facilities are readily available to transport and dispose of these materials.

Short-Term Effectiveness: Activities would consist of administrative actions, simple monitoring well construction, and groundwater monitoring activities; and installation of air injection wells and piping near or in wetlands. There would be no risk to human health or the community during implementation of this alternative. The injection of air near wetlands is not expected to adversely affect them. However, adverse affects (or potential benefits from reducing natural iron migration to river) have not been studied extensively. Current estimates indicate that with the initial source areas removed and supplemental treatment in the source area, the RAOs would be achieved in the aquifer between 8 years (assuming additional source and near source treatment and effective natural attenuation via biodegradation) and 36 years assuming simple flushing of the VOC-impacted groundwater into the Peconic River, with a geometric mean estimate of 16 years.

Implementability: LUCs and MNA are technically feasible and could be implemented within two years after signing of the ROD. The onsite LUCs and monitoring would be implemented by the Navy in consultation with the Town of Riverhead. The offsite LUCs and monitoring would require access agreements, cooperation, and coordination with Suffolk County and the PRSC. These agreements have been obtained in the past and long-term agreements should be obtainable. Services and materials are readily available to implement this remedy.

Implementation of the Source Area Air Sparge System is expected to be easy to implement and could be implemented within two years. All of these activities are conducted on Navy property and outside of sensitive ecological areas.

Implementation of the River Area Air Sparge System would be more challenging to implement. The air sparge system would be installed in or near wetlands, in endangered species habitat, and within the Wild, Scenic, and Recreational Rivers Act buffer zone. Actions would require limited clearing of vegetation and placement of temporary and long-term access roadways. Several government agencies would need to

review and approve construction activities, and timely approval of this action is uncertain. Also, portions of the air sparge system would be installed on state, county, and private property, and would require approval from the property owners for access. The ability to obtain this access is uncertain at this time. In addition, a railroad bisects the treatment zone. The ability to install a pressurized airline under the railroad can be difficult. Any disturbance of soils underneath the railroad tracks would have to be approved by the railroad. During the Remedial Design, alternative treatment zones could be evaluated, but may not be as effective at treating the VOC plume.

Cost: The estimated cost associated with Alternative 4 is as follows.

Capital Cost:	$3,400,000
O&M:	$230,000 (Year 5 to 16) to $430,000 per year (Year 1 to 4)(Power and operator)
	$106,000 per event, 20 events over 16 years (Monitoring)
	$14,000 every five years (Five-Year Review)
	$7,000 per year (LUC)
PV:	$9,600,000 (16 years)

The capital cost is for planning documents, monitoring and air injection well installation, compressors, piping, and associated buildings. In addition to monitoring, Five-Year Reviews, power, and LUCs, well maintenance (re-development or replacement) and well abandonment are included under O&M costs. Approximately 40 percent of the capital and O&M costs are for the Source Area Air Sparge System and approximately 60 percent of the capital and O&M costs are for the River Area Air Sparge System. O&M costs are primarily associated with power for the compressors and monitoring for the entire plume.

5.2.5 Alternative 5—Anaerobic Enhanced Insitu Biodegradation (EISB), Monitored Natural Attenuation, and Land Use Controls

Development

This alternative consists of implementing LUCs, MNA, and installing and operating an anaerobic EISB system in several lines between the source area and downgradent portions of the Southern Area. The LUCs would target areas that require notifications and inspections during implementation of this alternative, until clean up goals are achieved. MNA would target areas between treatment zones and portions of the groundwater plume with lower VOC concentrations and/or where treatment cannot be effectively implemented because of site features (e.g., wetlands). These components of this alternative are detailed in Alternative 3 (Section 5.2.3).

Anaerobic EISB promotes the natural degradation of VOCs by indigenous anaerobic microorganisms in the aquifer through the addition of carbon sources (electron donor substrates). The organic substrate

degrades to form hydrogen and low molecular weight organic acids to promote anaerobic reductive dechlorination as the primary process for degrading chlorinated VOCs in groundwater.

During reductive dechlorination, the hydrogen substitutes for the chlorine atom on the VOC and releases chloride.

$$C_2HCl_3(TCA) + H_2 \text{ (hydrogen)} \rightarrow C_2H_2Cl_2 \text{ (DCA)} + HCl$$

This process results in sequential dechlorination of a VOC. The general, reductive dechlorination process results in the formation of degradation ("daughter") products, in the following order:

$$TCA \rightarrow DCA \rightarrow \text{chloroethane} \rightarrow \text{ethane}$$

The transformation rates for each step vary, but tend to become slower with progress along the breakdown sequence, which can result in a temporary accumulation of DCA.

In some natural systems, including the Southern Area, organic electron donors are in short supply. By adding such donors, natural anaerobic biodegradation via reductive dechlorination is enhanced. Different organic electron donor substrates have been used to stimulate reductive dechlorination. The substrates can be broadly categorized into four types (AFCEE, 2007): soluble substrates (e.g., sodium lactate, ethyl lactate, and molasses), slow-release substrates (e.g., food-grade vegetable oil), solid substrates (e.g., mulch), and miscellaneous experimental substrates (e.g., hydrogen gas).

Electron donor substrates are typically introduced to the aquifer via injections, trenching and filling to create a biomulch wall, and/or placing in excavations or mixing with the soil or backfill. Soluble and slow-release substrates are often injected in a grid pattern in a source area, or in a linear 'biowall' configuration perpendicular to groundwater flow in a dissolved-phase plume. Biomulch walls are also typically installed perpendicular to groundwater flow in a dissolved-phase plume.

Because of the depth and stratified nature of the VOC-impacted groundwater, these physical conditions for the Southern Area groundwater preclude trenching applications. Therefore, the injection point methodology has been carried forward as the preferred option in this CMS. Permanent injection points (constructed injection wells) or temporary injection points (using direct push technology-type equipment) may be utilized for substrate delivery. Permanent injection points are generally preferable if multiple injections will be required at a site. This alternative assumes that two substrate injections would be required to treat the VOC plume (one initially and one after five years), making temporary injection points less cost-effective. Therefore, the injection process considered in this alternative is assumed to use permanent injection wells. During the Remedial Design, a combination of permanent and temporary injection points may be considered.

For large and low- to moderate-concentration plumes, such as with the Southern Area groundwater, it is not economically feasible to remediate the entire plume at one time. A more effective approach at some sites is to install biowalls at several different transects perpendicular to groundwater flow along the axis of the plume (AFCEE, 2007).

Biowalls generally extend across the width of the plume plus approximately 20 percent to allow for uncertainties in the actual plume dimensions, variations in groundwater flow directions, and to allow for some permeability loss. Groundwater residence time within the biowall reaction zone is controlled by the groundwater flow velocity and biowall width along the direction of groundwater flow. The biowall spacing along the plume axis and substrate injection frequency take into account the rate of groundwater flow, substrate longevity, and the travel time between the biowalls (AFCEE, 2007).

The appropriate type of electron donor substrate for a given site involves the ability to effectively distribute the substrate throughout the treatment zone and the ability to sustain the reactive zone with that substrate over the treatment timeframe in a cost-effective manner (AFCEE, 2007). In general, the more soluble the substrate, the easier it is to mix and distribute throughout the aquifer matrix. However, many soluble substrates (e.g., lactate) can be degraded quickly and need frequent reinjections and thereby affects cost-effectiveness. The longevity of ethyl lactate is being evaluated in the Southern Area Bio Study (Tetra Tech, 2011c). Testing has demonstrated that biodegradation rates can be accelerated, however, the rate of groundwater flow and rapid flush out of the treatment zone indicates that a longer-lasting organic substrate should be considered for the Southern Area.

The longevity of an organic substrate in the subsurface can be manipulated by choosing materials based upon viscosity, chemical structure, solubility, or physical structure (AFCEE, 2007). Emulsified vegetable oils can be used for anaerobic EISB applications because of its ease of injection and distribution (the emulsions are miscible during injection) in conjunction with their lower solubility and viscosity. When the emulsion is properly prepared and injected, the vegetable oil would remain in place due to sorption or entrapment within the aquifer matrix. Due to its low solubility, the vegetable oil has greater longevity. Substrate mixtures of emulsified oils and more soluble, faster-acting electron donors (e.g., lactate) are commonly used for anaerobic EISB. Additional mixture ingredients can include micronutrients such as amino acids, yeast, and vitamin B12, which have been found to accelerate the biodegradation of the chlorinated VOCs (EOS Remediation, 2011).

Initially, VOCs will partition into the vegetable oil, and reduce aqueous phase concentrations and/or VOC mobility (AFCEE, 2007; EOS Remediation, 2011). In this process, known as absorption, the vegetable oil essentially acts as a “sponge” to quickly reduce concentrations of VOCs in groundwater. As the vegetable oil and VOCs in the aqueous phase are degraded, additional VOCs are released into the groundwater because of equilibrium partitioning. Over time, continued degradation of VOCs in the aqueous phase will lower the amount of VOC mass residing in the vegetable oil-phase.

For cost-estimating purposes, the EOS® brand emulsified oil product (EOS® 598B42) was assumed in this evaluation based on its success rates in both bench test studies and field applications for other Navy facilities. EOS® 598B42 is a mixture of micro-emulsified soybean oil and sodium lactate (with micronutrient yeast and vitamin B12 as additives to support microbial growth).

EOS® 598B42 Ingredients / Composition	**Percent by Weight**
Emulsified Oil (food grade soybean oil)	59.8 ± 2
Fast Release Soluble Substrate (sodium lactate)	4 ± 0.2
Food Additives/Emulsifiers/Preservatives	10.1 ± 0.2
Extracts	2 ± 0.2
Water	Balance
Percent Organic, by weight	74 ± 2
EOS® Vitamin B12 Supplement	Yes

The lactate is consumed quickly due to its effect on microbial growth rate (increased biomass growth), resulting in a brief period of relatively high levels of hydrogen. The soybean oil degrades slower, providing a source of electron donor for an extended period of time. Other emulsified oil products similar to the EOS® brand are available (e.g., SRS™ and Newmans Zone®).

Appendix E provides the EOS® dosage assumptions based on EOS® Remediation's empirical aquifer sorption capacity values, which range from 0.001 to 0.002 lb EOS® per pound soil for fine sands with some clay. Based on the site-specific geology at the Southern Area, the sorption capacity value of 0.0015 was selected to determine dosages and costs for this alternative. The determination of final design parameters would be made during the Remedial Design and be based on bench- and pilot-scale testing.

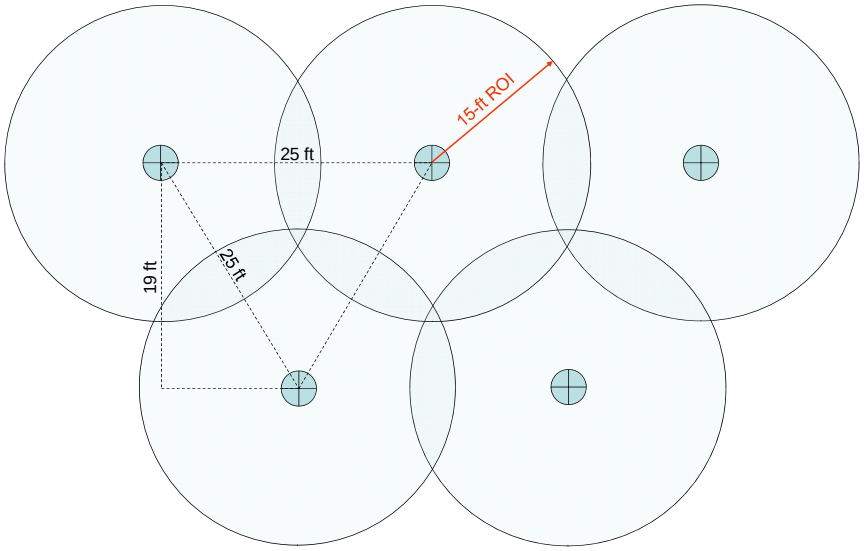
A pH close to neutral (i.e., 6.0 to 8.0) is the most conducive to the proliferation of healthy, diverse microbial populations. The pH of site groundwater was measured to range from 5.7 to 6.3 during the November 2009 microcosm study in the Southern Area. Aquifer pH buffering via injection of sodium bicarbonate with the electron donor substrate or periodically between injections may be considered during the remedial design or action if the pH of the groundwater decreases. The use of sodium carbonate or similar alkalis must be considered with caution, because higher pH will also precipitate iron which could affect the permeability of local soils and the injection wells.

An emulsified vegetable oil biowall may remain effective for 3 to 4 years, depending on VOC concentrations and other geochemical conditions, after each substrate injection. Biowalls ideally would be installed throughout the plume at groundwater travel times of 1 to 2 years. However, given the plume length and the areal extent, the number of EISB injection wells and biowalls that would be required to achieve the fastest possible cleanup would not be feasible. In addition, "secondary water quality

parameters" including the release of iron, sulfide, or biodegradable organics associated with EISB preclude the placement of a biowall too close to the Peconic River.

Therefore, the conceptual approach for EISB biowall placement for this alternative focuses on the plume areas with the highest VOC concentrations (greater than 500 µg/L). Based on the proximity of the 50 and 500 µg/L in onsite areas, the biowall would also address most of the onsite groundwater with VOC concentrations greater than 50 µg/L. In offsite areas, the areal extent of the 50 µg/L is much larger than the 500 µg/L and therefore only a portion of the 50 µg/L plume would be addressed.

The estimated effective radius-of-influence of the emulsified vegetable oil mixture at the Southern Area would be 15 feet. Therefore, for cost estimating purposes, it is assumed that permanent injection wells would be installed on 25 feet centers along each biowall line to provide an estimated 5 feet overlap of substrate during each injection. Each biowall line would consist of two lines of wells offset to maximize coverage and effectiveness as shown below.



Description

Conceptual layout of the Anaerobic EISB Systems are shown on Figure 5-2A and cross-section view is provided in Figure 5-2B. The process schematic is presented in Figures 5-2C. Calculations for this alternative are presented in Appendix E. A pilot study would be conducted to determine the effectiveness of EISB and distribution characteristics.

As currently developed, the Anaerobic EISB Systems would consist of one to five Biobarriers (Nos. 1 to 5). The final setup and number of treatment lines would be based on the ongoing groundwater monitoring and would be finalized during the Remedial Design to optimize performance in the source area and the rest of the onsite area. Estimated VOCs within each of these treatment lines are as follows:

Biobarrier 1:	6 pounds of VOCs
Biobarrier 2:	10 pounds of VOCs
Biobarrier 3:	22 pounds of VOCs
Biobarrier 4:	37 pounds of VOCs
Biobarrier 5:	75 pounds of VOCs

Each line would consist of approximately 20 to 25 permanent 4-inch polyvinyl chloride injection wells. Injection screens are anticipated to be approximately 30 feet long. For Biobarriers Nos. 1 to 4, the treatment zone would target the 50 to 500 µg/L DCA contours. For Biobarrier No. 5, the treatment zone would target the 500 µg/L DCA contour. The length of the biobarriers would be dependent on the plume in each area and vary from approximately 125 feet long (perpendicular to groundwater flow) to 600 feet long in the offsite area near SA-PZ-143. The width of each treatment zone (in line with groundwater flow) would be approximately 50 feet. Depending on the depth of contamination, screen depths would range from 15 to 45 feet bgs, near Site 6A and 25 to 55 feet in the offsite area near SA-PZ-143.

A temporary mixing tank, transfer pump, and conveyance piping would be used to blend the emulsified vegetable oil and makeup water and inject the mixture. This equipment would be moved between treatment zones. Approximately 350 gallons of emulsified vegetable oil and 16,000 gallons of potable water would be injected into each well. If all 113 injection wells are required, a total of 40,000 gallons of emulsified vegetable oil and 1,800,000 gallons of potable water would be required. A second injection is assumed to be required five years after the first injection.

The cleanup time is estimated to be approximately 4 to 8 years in areas where the biobarriers are being installed. Other areas that are not subjected to this aggressive treatment may require a total of 5 to 20 years, with a mean of 10 years.

Detailed Analysis of Alternatives

Detailed analysis of Alternative 5 is discussed below.

Overall Protection of Human Health and the Environment: Alternative 5 is expected to be protective of human health and the environment. Existing source area remedial actions and extension of the water line to the PRSC have significantly reduced potential impacts to human health through potable use of VOC-impacted groundwater. Anaerobic EISB treatment would be used to biodegrade the higher concentration VOCs in groundwater (DCA greater than 50 to 500 µg/L). This treatment would also

accelerate biodegradation in nearby VOC-impacted side-gradient groundwater and natural attenuation in downgradient areas. Other side-gradient and downgradient groundwater would not be treated, but over time, the VOCs in groundwater in those areas would decrease through natural biodegradation, dilution, and flushing. LUCs would be used to provide notice and restrict use of VOC-impacted groundwater for potable water applications until cleanup goals are met. Annual inspections would be conducted to determine if new water supply wells are present and use of the water (e.g., potable or irrigation).

LUCs would also be used to provide notice of VOC-impacted groundwater and identify the need for monitoring of soil vapor and/or mitigation of new structures to protect human health. Annual inspections would be conducted to identify new existing structures that may be impacted by soil vapor intrusion.

Under the current conditions, adverse impacts to ecological receptors are not anticipated. The higher concentration VOC-impacted groundwater that could migrate and discharge to the Peconic River and potentially impact ecological receptors would be treated via the Anaerobic EISB System. Monitoring of groundwater, surface water, and sediments would continue to evaluate the effectiveness of the Anaerobic EISB, allow optimization of the operation, and determine when the treatment systems can be discontinued or if additional action is needed.

Media Cleanup Standards: In the short term, Alternative 5 would not achieve the PRGs, which were established to be protective of human health and the environment. Within approximately 4 to 8 years, PRGs should be obtained in the areas treated by the Anaerobic EISB. Between the treatment zone and the Peconic River, attenuation of VOCs would also occur. Monitoring would be used to identify areas that would require LUCs to provide notice and restrict activities (e.g., potable groundwater use and building construction criteria to address soil vapor intrusion), the effectiveness of the Anaerobic EISB system, and identify potential migration of VOC-impacted groundwater that could adversely affect ecological receptors.

Source Control: The need for additional source control measures is currently being evaluated. If needed, Alternative 5 would include additional source control. Residual VOCs migrating from the source area would be treated with the Anaerobic EISB system. The source area monitoring and evaluation would continue under this alternative.

Waste Management Standards: During well installation and groundwater sampling, wastes would be generated. These materials would be containerized, characterized, and disposed offsite. Based on recent IDW management activity, none of these materials would be classified as RCRA hazardous. Equipment decontamination waters would be generated during the injection operation. This water would be characterized and disposed offsite.

Compliance with ARARs: In the short term, Alternative 5 would not comply with New York State groundwater quality classification (GA) (6NYCRR 701.15) and associated MCLs (10NYCRR5, Subpart 5-

1.51 to 5-1.52) for the sole source aquifer in Suffolk County, New York. During this time, monitoring would be used to identify areas of residual VOC-impacted groundwater, LUCs would be implemented, and annual inspections would be conducted to identify potential groundwater extraction wells for potable water use and/or installation of structures that may be subjected to soil vapor intrusion concerns. If required, mitigation measures such as the need for well abandonment and sub slab depressurization units would be identified. In the long term, Alternative 5 would achieve ARARs.

During implementation of this alternative, several location- and action-specific ARARs would be triggered. Some injection wells and monitoring wells would be installed near or in wetlands and groundwater sampling would be conducted in these same areas. In addition, the emulsified vegetable oil would be stored and mixed in areas adjacent to surface water and wetlands and injected under or near wetland areas. Wetland- and surface water-type ARARs consisting of the New York Freshwater Wetlands Act (6 NYCRR 662 to 664), New York Wild, Scenic, and Recreational Rivers System Act (6NYCRR 666), and New York Endangered and Threatened Species of Fish and Wildlife; Species of Special Concern (6 NYCRR 182) would be triggered. These ARARs regulate activities conducted in wetlands and surface water bodies that are present within the Southern Area groundwater plume. These ARARs would be achieved through consultation with associated regulatory organizations to minimize short term impacts to sensitive areas and ecological receptors and eliminate long-term impacts. In addition, secondary containment would be required for storage and mixing areas and injection rates would need to be controlled to ensure that the emulsified vegetable oil does not enter wetlands or surface water.

Action-specific ARARs are limited to management of IDW (6 NYCRR 372.2 and 373.1-1) and underground injection activities (40 CFR 144.81 and .82).

Long-Term Effectiveness and Permanence: Alternative 5 would be effective in the long term. Under current conditions, risks to human health are controlled via remediation of the source areas and installation of a water line extension to PRSC. LUCs would be used to restrict groundwater extraction for potable water use and provide notice of the need for monitoring and/or mitigation of potential soil vapor intrusion issues. These controls would be effective on Navy-controlled property, but would be less reliable off site where the Navy does not have direct control. Groundwater is shallow and can be accessed via manual or mechanical well installation techniques. Groundwater monitoring and annual inspections would be conducted to identify potential water supply wells or structures that may be impacted by soil vapor intrusion.

The Navy is planning on transferring its property to the Town of Riverhead for economic redevelopment and the transfer documents restrict groundwater use and identify areas of residual contamination. Once the property is no longer under Navy control, groundwater monitoring and annual inspections would be conducted to identify potential wells that could result in adverse impacts to human health.

Based on current estimates, the migration of VOC-impacted groundwater to the River is not expected to have an adverse effect on ecological receptors or current recreational users. Monitoring would be used to evaluate migration and potential impacts to the River from VOCs, residual soluble organics from the emulsified vegetable oil and iron, and identify the need for additional action.

Reduction of Toxicity, Mobility, or Volume through Treatment: This alternative would result in the biodegradation of approximately 150 pounds of VOCs. Treatment estimates would be reduced by the degree of natural biodegradation of VOCs in the aquifer. There would be no reduction of mobility or volume through treatment under this alternative. The VOCs in groundwater would degrade through enhanced and natural biodegradation, and the VOCs that migrate toward the River would be destroyed through volatilization and photodegradation in the atmosphere. Non-hazardous soil, equipment decontamination and groundwater purge water would be generated during implementation of this remedy. Facilities are readily available to transport and dispose of these materials.

Short-Term Effectiveness: Activities would consist of administrative actions, simple monitoring well construction, and groundwater monitoring activities; and installation of air injection wells and piping near or in wetlands. There would be no risk to human health or the community during implementation of this alternative. The injection of emulsified vegetable oil under the wetlands is not expected to adversely affect these media. However, adverse affects have not be extensively studied and migration of residual soluble organics and iron to the Peconic River is possible. Current estimates indicate that with the initial source area removed and supplemental treatment in that area, the RAOs would be achieved in the aquifer between 8 years (assuming effective natural attenuation via biodegradation) and 36 years assuming simple flushing of the VOC-impacted groundwater into the Peconic River, with a geometric mean estimate of 16 years.

Implementability: LUCs and MNA are technically feasible and could be implemented within two years after signing of the ROD. The onsite LUCs and monitoring would be implemented by the Navy in consultation with the Town of Riverhead. The offsite LUCs and monitoring would require access agreements, cooperation, and coordination with Suffolk County and the PRSC. These agreements have been obtained in the past and long-term agreements should be obtainable. Services and materials are readily available to implement this remedy.

Implementation of the onsite Biobarriers (Nos. 1 to 4) is expected to be easy to implement and could be implemented within two years. All of these activities are conducted on Navy property and outside of sensitive areas.

Implementation of Biobarrier No. 5 located off site on Suffolk County property would require approval of the County. Biobarrier No. 5 would be installed near wetlands, in endangered species habitat, and within the Wild, Scenic, and Recreational Rivers Act buffer zone. Actions would require limited clearing of

vegetation and placement of temporary and long-term access roadways. Several government agencies would need to review and approve construction activities, and timely approval of this action is uncertain.

Cost: The estimated cost associated with Alternative 5 is as follows.

Capital Cost:	$3,700,000
O&M:	$1,100,000 (Year 5 injections)
	$119,000 per event, 16 events over 10 years (Monitoring)
	$14,000 every five years (Five-Year Review)
	$7,000 per year (LUC)
PV:	$6,700,000 (10 years)

The capital cost is for planning documents, monitoring, and the initial injection event including well installation and emulsified vegetable oil. In addition to monitoring, Five-Year Reviews, a second injection event (Year 5), and LUCs, well maintenance (re-development or replacement) and well abandonment are included under O&M costs. Approximately 10 to 15 percent of the capital and O&M costs are associated with each of the Biobarriers No. 1 through 4, and approximately 30 percent of the capital and O&M costs is associated with Biobarrier No. 5.

5.2.6 Alternative 6— Anaerobic Enhanced Insitu Biodegradation (EISB), Air Sparge, Monitored Natural Attenuation, and Land Use Controls

Development

This Alternative is a combination of Alternatives 4 and 5, and consists of Anaerobic EISB, Air Sparge, MNA, and LUCs. Development of Air Sparge and Anaerobic EISB systems are presented in Sections 5.3.4 and 5.3.5, respectively. Development of MNA and LUCs are presented in Section 5.2.3. The primary difference between Alternative 6 and a combination of Alternatives 4 and 5 is that the Source Area Air Sparge System would not be implemented. Instead, Biobarriers Nos. 1 and 2 would be used to treat VOC-impacted groundwater in that area. This alternative includes aggressive treatment of all VOC-impacted groundwater with DCA concentrations greater than 500 µg/L (onsite and offsite), and the majority of the onsite plume with DCA concentrations greater than 50 µg/L. The River Area Air Sparge would be used to treat VOCs that have migrated beyond the Biobarriers and also residual soluble organics and iron.

Description

Conceptual layout of the River Area Air Sparge Systems and Biobarriers is shown on Figure 5-3A and cross-section view is provided in Figure 5-3B. Process schematics of the River Area Air Sparge System

and Anaerobic EISB System are presented in Figures 5-1D and 5-2C, respectively. Calculations for this alternative are presented in Appendix E.

The estimated time to reach cleanup levels in the River Area Air Sparge System is dependent on the implementation of source area treatment and the effectiveness of MNA in groundwater upgradient of this area. The cleanup time is estimated to range from 5 to 20 years, with a geometric mean estimate of 10 years.

Detailed Analysis of Alternatives

Detailed analysis of Alternative 6 is discussed below.

Overall Protection of Human Health and the Environment: Alternative 6 is expected to be protective of human health and the environment. Anaerobic EISB in the higher VOC-impacted groundwater (DCA concentrations greater than 50 or 500 µg/L) would rapidly reduce residual VOCs in those areas. The VOC concentrations in further downgradient groundwater would decrease through degradation, dilution, and flushing. Near the Peconic River, the River Area Air Sparge System would treat VOCs that flow through this area. LUCs would be used to provide notice and restrict use of VOC-impacted groundwater for potable water applications until cleanup goals are met. Annual inspections would be conducted to determine if new water supply wells are present and use of the water (e.g., potable or irrigation).

LUCs would also be used to provide notice of VOC-impacted groundwater and identify the need for monitoring of soil vapor and/or mitigation of new structures to protect human health. Annual inspections would be conducted to identify new existing structures that may be impacted by soil vapor intrusion. Also, the air sparge remedy would first cause VOC-impacted vapors to migrate into soil gas. Monitoring and evaluation of potential migration of VOC-impacted soil vapors into occupied structures would be evaluated.

Under the current conditions, adverse impacts to ecological receptors are not anticipated. In the future, higher concentration VOC-impacted groundwater can migrate and discharge to the Peconic River. The use of air sparging near the River would reduce or eliminate the potential for localized adverse impacts to ecological receptors. Monitoring of groundwater, surface water, and sediments would continue to evaluate the effectiveness of the air sparge system, the anaerobic EISB, and allow optimization of the system operations to determine when the treatment systems can be discontinued or if addition action is needed.

Media Cleanup Standards: In the short term, Alternative 6 would not achieve the PRGs, which were established to be protective of human health and the environment. Within approximately 4 to 8 years, PRGs should be obtained in onsite areas. Between the Biobarrier areas and the Peconic River, attenuation of VOCs would occur. The River Area Air Sparge System would then treat VOC-impacted

groundwater prior to entering the River. Monitoring would be used to identify areas that would require LUCs to provide notice and restrict activities (e.g., potable groundwater use and building construction criteria to address soil vapor intrusion), the effectiveness of the anaerobic EISB and air sparge systems, and identify potential migration of VOC-impacted groundwater that could adversely affect ecological receptors.

Source Control: The need for additional source control measures is currently being evaluated. If needed, Alternative 6 would include additional source control activities (Biobarriers Nos. 1 and 2). Residual VOCs in the source area would be treated with the Anaerobic EISB Systems. The source area monitoring and evaluation would continue under the existing source area remedy.

Waste Management Standards: During well installation, groundwater sampling, and injections of emulsified vegetable oil, wastes would be generated. These materials would be containerized, characterized, and disposed offsite. Based on recent IDW management activity, none of these materials would be classified as RCRA hazardous. In addition, the compressor and associated cooling system would generate condensate. The water would be characterized and disposed offsite.

Compliance with ARARs: In the short term, Alternative 6 would not comply with New York State groundwater quality classification (GA) (6NYCRR 701.15) and associated MCLs (10NYCRR5, Subpart 5-1.51 to 5-1.52) for the sole source aquifer in Suffolk County, New York. During this time, monitoring would be used to identify areas of residual VOC-impacted groundwater, LUCs would be implemented, and annual inspections would be conducted to identify potential groundwater extraction wells for potable water use and/or installation of structures that may be subjected to soil vapor intrusion concerns. If required, mitigation measures such as the need for well abandonment and sub slab depressurization units would be identified. In the long term, Alternative 6 would achieve ARARs.

During implementation of this alternative, several location- and action-specific ARARs would be triggered. Some air sparge, emulsified vegetable oil, and monitoring wells would be installed near or in wetlands and groundwater sampling would be conducted in these same areas. Wetland- and surface water-type ARARs consisting of the New York Freshwater Wetlands Act (6 NYCRR 662 to 664), New York Wild, Scenic, and Recreational Rivers System Act (6NYCRR 666), and New York Endangered and Threatened Species of Fish and Wildlife; Species of Special Concern (6 NYCRR 182) would be triggered. These ARARs regulate activities conducted in wetlands and surface water bodies that are present within the Southern Area groundwater plume. These ARARs would be achieved through consultation with associated regulatory organizations to minimize short term impacts to sensitive areas and ecological receptors and eliminate long-term impacts. In addition, secondary containment would be required for storage and mixing areas and injection rates would need to be controlled to ensure that emulsified vegetable oil does not enter wetlands or surface water.

Action-specific ARARs are limited to management of IDW (6 NYCRR 372.2 and 373.1-1) and underground injection activities (40 CFR 144.81 and 0.82). These ARARs would be achieved through planning documents to protect site workers (Health and Safety Plan), onsite waste management practices (Remedial Action Work Plan), and monitoring of discharges.

Long-Term Effectiveness and Permanence: Alternative 6 would be effective in the long term. LUCs would be used to restrict groundwater extraction for potable water use and provide notice of the need for monitoring and/or mitigation of potential soil vapor intrusion issues. These controls would be effective on Navy-controlled property, but would be less reliable off site where the Navy does not have direct control. Groundwater is shallow and can be accessed via manual or mechanical well installation techniques. Groundwater monitoring and annual inspections would be conducted to identify potential water supply wells or structures that may be impacted by soil vapor intrusion.

The Navy is planning on transferring its property to the Town of Riverhead for economic redevelopment and the transfer documents restrict groundwater use and identify areas of residual contamination. Once the property is no longer under Navy control, groundwater monitoring and annual inspections would be conducted to identify potential wells that could result in adverse impacts to human health.

Based on current estimates, the migration of VOC-impacted groundwater to the River is not expected to have an adverse effect on ecological receptors or current recreational users. The River Area Air Sparge System would further reduce or eliminate VOCs from entering the River and monitoring would be used to evaluate migration and potential impacts to the River and identify the need for additional action.

Reduction of Toxicity, Mobility, or Volume through Treatment: This alternative would result in the biodegradation of approximately 150 pounds of VOCs, and volatilization and photodegradation of approximately 225 pounds of VOCs that migrate toward the Peconic River. Treatment estimates would be reduced by the degree of natural biodegradation of VOCs in the aquifer. There would be no reduction of mobility or volume through treatment under this alternative. Non-hazardous soil, groundwater, decontamination, and condensate wastes would be generated during implementation of this remedy. Facilities are readily available to transport and dispose of these materials.

Short-Term Effectiveness: Activities would consist of administrative actions, simple monitoring well construction, and groundwater monitoring activities; and injection of emulsified vegetable oil, installation of air injection wells and piping near or in wetlands. There would be no risk to human health or the community during implementation of this alternative. The injection of air in or near wetlands is not expected to adversely affect them; however, adverse affects (or potential benefits from reducing iron migration to the River) have not been extensively studied. The injection of emulsified vegetable oil under the wetlands is not expected to adversely affect these media. However, potential adverse affects have not be extensively studied and migration of residual soluble organics and iron is possible. Current

estimates indicate that with the initial source area removed and supplemental treatment in that area, the RAOs would be achieved in the aquifer between 5 years (assuming effective enhanced and natural attenuation via biodegradation) and 20 years assuming simple flushing of the VOC-impacted groundwater into the River Area Air Sparge System, with a geometric mean estimate of 10 years.

Implementability: LUCs and MNA are technically feasible and could be implemented within two years after signing of the ROD. The onsite LUCs and monitoring would be implemented by the Navy in consultation with the Town of Riverhead. The offsite LUCs and monitoring would require access agreements, cooperation, and coordination with Suffolk County and the PRSC. These agreements have been obtained in the past and long-term agreements should be obtainable. Services and materials are readily available to implement this remedy.

Implementation of the onsite Biobarriers (Nos. 1 to 4) are expected to be easy to implement and could be implemented within two years. All of these activities are conducted on Navy property and outside of sensitive areas.

Implementation of offsite Biobarrier (No. 5) and the River Area Air Sparge System would be more challenging to implement. The offsite biobarrier and air sparge systems would be installed in or near wetlands, in endangered species habitat, and within the Wild, Scenic, and Recreational Rivers Act buffer zone. Actions would require limited clearing of vegetation and placement of temporary and long-term access roadways. Several government agencies would need to review and approve construction activities, and timely approval of this action is uncertain. Also, portions of the biobarrier and air sparge systems would be installed on state, county, and/or private property, and would require approval from the property owners for access. The ability to obtain this access is uncertain at this time. In addition, a railroad bisects the treatment zone. The ability to install a pressurized airline under the railroad can be difficult. Any disturbance of soils underneath the railroad tracks would have to be approved by the railroad. During the Remedial Design, alternative treatment zones could be evaluated, but may not be as effective at treating the VOC plume.

Cost: The estimated cost associated with Alternative 6 is as follows.

Capital Cost:	$5,600,000
O&M:	$1,100,000 (Year 5 injections)
	$230,000 (Year 1 to 10) (Power and operator)
	$119,000 per event, 16 events over 10 years (Monitoring)
	$14,000 every five years (Five-Year Review)
	$7,000 per year (LUC)
PV:	$11,700,000 (16 years)

The capital cost is for planning documents, monitoring, and emulsified vegetable oil and air injection well installation, injections, compressors, piping, and associated buildings. In addition to monitoring, Five-Year Reviews, power, and LUC, well maintenance (re-development or replacement) and well abandonment are included under O&M costs.

5.2.7 Alternative 7— Groundwater Extraction, Treatment, and Injection, Monitored Natural Attenuation, and Land Use Controls

Development

This alternative consists of implementing LUCs, MNA, and installing and operating a groundwater extraction, treatment, and injection (1) at the Navy fence line (property line) north of River Road and/or (2) near the Peconic River area. The LUCs would target areas that require notifications and inspections during the operation of this alternative, until clean up goals are achieved. MNA would target areas between treatment zones and portions of the groundwater plume with lower VOC concentrations and/or where treatment cannot be effectively implemented because of site features (e.g., wetlands). The components of this alternative are detailed in Alternative 3 (Section 5.2.3).

Groundwater extraction, treatment, and discharge is a technology that is used to manage migration of contaminated groundwater. Pumps installed in wells below the ground surface intercept groundwater as it flows through the capture zone. The extracted water is then treated in a system designed to remove primary COCs (i.e., VOCs), as well as other parameters that may interfere with treatment of the primary COCs or trigger additional requirements for discharge (e.g., iron and suspended solids). Discharge (infiltration gallery) is a means of handling the treated groundwater, without adversely affecting the surrounding environment.

The design of the groundwater extraction and treatment system is based on aquifer characteristics obtained during the 2010 pumping tests conducted in the targeted treatment zones, the boundaries of the VOC-impacted groundwater, and estimates of mass flow of VOCs through the treatment area. The design criteria for the Fence Line Area and River Area groundwater extraction systems are detailed in Appendix E and summarized as follows:

Parameter	Fence Line Area	River Area
Plume Width (feet)	400	1,000
Plume Depth (feet bgs)	35 to 50	10 to 90
Aquifer Thickness (feet)	40	105
Hydraulic Conductivity (feet per day)	186	56
Porosity (percent)	25	25
Gradient (feet vertical/feet horizontal)	0.003	0.003

Based on these criteria, one extraction well, pumping at 100 gallons per minute would be installed in the Fence Line Area and two wells, each pumping at 100 gallons per minute, would be installed in the River Area. These flow rates are based on twice the average calculated flow rate of VOC-impacted groundwater through each area. The wells were located to minimize drawdown of the water table near wetlands. The pump discharges from these three wells would be conveyed to a common treatment system located on Navy property, north of River Road.

Anticipated system flow rates and water quality entering the treatment system at the start of operation are summarized as follows.

Parameter	Fence Line Area	River Area	Treatment Plant
Flow rate (gallons per minute)	100	200	300
VOC Concentration (Initial - µg/L)	50	40	43
VOC Loading (initial - pounds per year)	20	32	52
Iron/Manganese Concentration (µg/L)	2,000	14,000	10,000
Iron/Manganese Loading (pounds per year)	880	12,300	13,180
Solids for Disposal (20 percent solids – tons per year)	5	71	76

For the treatment system, the initial VOC loading is anticipated to be approximately 52 pounds per year. VOC concentrations would decrease over time because of biodegradation and other natural attenuation processes that occur upgradient of the extraction wells. A low profile air stripper unit would be used to remove VOCs from the water to achieve an anticipated discharge limit of less than 5 µg/L for individual chemicals (greater than 90 percent reduction). Based on the anticipated initial loading of VOCs (52 pounds per year), off gas treatment is not anticipated.

The iron/manganese concentrations are considered in the treatment plant design because these metals will precipitate as suspended solids in the low profile air stripper unit and result in reduced efficiency and eventual shut down of the unit. Therefore, pre-treatment of these metals is required, and would consist of a mixed 20,000 gallon Equalization Tank for addition of sodium hydroxide - caustic (26 tons per year) and air to oxidize and precipitate the metals. A polymer will be added to flocculate the metals into larger particles and a clarifier will be used to separate the suspended solids from the water containing VOCs. In the clarifier, suspended solids will accumulate in the bottom of the unit and then be removed for dewatering and then offsite disposal. An estimated 65 tons per year of solids (20 percent solids content) will be disposed offsite as non-hazardous waste. The presence of high concentrations of iron in the River Area groundwater will also require high well maintenance and transmission piping costs.

The treated effluent water will be discharged to an infiltration gallery located on Navy property. The gallery is designed to infiltrate 300 gallons per minute of water at a depth of approximately 4 feet bgs.

The location of the infiltration gallery was established to avoid interactions with the VOC-impacted groundwater and wetlands.

Description

Conceptual layout of the Fence Line Area and River Area Groundwater Extraction, Treatment, and Injection Systems is shown on Figure 5-4A and a cross-section view of the extraction wells is provided in Figure 5-4B. The process schematic of the system is presented in Figure 5-4C. Calculations for this alternative are presented in Appendix E.

Estimated VOCs to be removed during the operation of these systems are as follows.

Fence Line Area:	93 pounds of VOCs
River Area:	282 pounds of VOCs

One groundwater extraction well removing 100 gallons per minute of groundwater would be installed near the intersection of River Road and Grumman Boulevard (Fence Line Area) and two groundwater wells removing a total of 200 gallons per minute would be installed near Connecticut Avenue (River Area). These wells would capture the estimated width of the VOC-impacted groundwater at these areas, as follows.

Fence Line Area:	400 feet wide
River Area:	1,000 feet wide

The extracted groundwater would be conveyed to a common treatment plant located on Navy property, approximately 1,300 feet from the Fence Line Area well and 2,000 feet from the River Area wells. Groundwater would be treated using precipitation, neutralization, flocculation, clarification, and air stripping, prior to discharge to an infiltration gallery located north of the treatment plant. The infiltration gallery is anticipated to be approximately 1,000 feet long and 80 feet wide. Sludge handling will consist of a sludge thickening tank and a sludge dewatering filter press. An operator will be required for approximately 40 hours per week.

The estimated time to reach cleanup levels in the Southern Area Plume is dependent on the effectiveness of MNA in groundwater upgradient of these areas. The cleanup time is estimated to range from 10 to 25 years, with a geometric mean estimate of 16 years.

Detailed Analysis of Alternatives

Detailed analysis of Alternative 7 is discussed below.

Overall Protection of Human Health and the Environment: Alternative 7 is expected to be protective of human health and the environment. The groundwater extraction, treatment, and discharge systems would intercept VOC-impacted groundwater as it flows through the Fence Line Area and the River Area. In addition, VOC concentrations in other portions of the Southern Area would decrease through biodegradation. LUCs would be used to provide notice and restrict use of VOC-impacted groundwater for potable water applications until cleanup goals are met. Annual inspections would be conducted to determine if new water supply wells are present and use of the water (e.g., potable or irrigation).

LUCs would also be used to provide notice of VOC-impacted groundwater and identify the need for monitoring of soil vapor and/or mitigation of new structures to protect human health. Annual inspections would be conducted to identify new existing structures that may be impacted by soil vapor intrusion.

Under the current conditions, adverse impacts to ecological receptors are not anticipated. In the future, higher concentration VOC-impacted groundwater can migrate and discharge to the Peconic River. The use of groundwater extraction near the River would reduce or eliminate the potential for localized adverse impacts to ecological receptors. Monitoring of groundwater, surface water, and sediments would continue to evaluate the effectiveness of the groundwater extraction systems, allow optimization of the operation, and determine when the treatment systems can be discontinue or if addition action is needed.

Media Cleanup Standards: In the short term, Alternative 7 would not achieve the PRGs, which were established to be protective of human health and the environment. The Fence Line Area groundwater extraction system would be used to control VOCs migrating off of Navy property and the River Area groundwater extraction system would then be used to control VOCs entering the River. Monitoring would be used to identify areas that would require LUCs to provide notice and restrict activities (e.g., potable groundwater use and building construction criteria to address soil vapor intrusion), the effectiveness of the groundwater extraction and treatment systems, and identify potential migration of VOC-impacted groundwater that could adversely affect ecological receptors.

Source Control: The need for additional source area control measures is currently being evaluated. The groundwater extraction systems under Alternative 7 would not address residual VOCs in the source area. Source area monitoring and evaluation would continue under the existing source area remedy.

Waste Management Standards: During well installation and groundwater sampling, wastes would be generated. These materials would be containerized, characterized, and disposed offsite. Based on recent IDW management activity, none of these materials would be classified as RCRA hazardous. The treatment plant would generate approximately 75 tons per year of dewatered sludge. The sludge would be characterized and disposed offsite. In addition, the treatment plant would discharge 160 million gallons of water per year to an infiltration gallery. This water would be treated to achieve MCLs.

Compliance with ARARs: In the short term, Alternative 7 would not comply with New York State groundwater quality classification (GA) (6NYCRR 701.15) and associated MCLs (10NYCRR5, Subpart 5-1.51 to 5-1.52) for the sole source aquifer in Suffolk County, New York. During this time, monitoring would be used to identify areas of residual VOC-impacted groundwater, LUCs would be implemented, and annual inspections would be conducted to identify potential groundwater extraction wells for potable water use and/or installation of structures that may be subjected to soil vapor intrusion concerns. If required, mitigation measures such as the need for well abandonment and sub slab depressurization units would be identified. In the long term, Alternative 7 would achieve ARARs.

During implementation of this alternative, several location- and action-specific ARARs would be triggered. Some groundwater extraction wells and monitoring wells would be installed near or in wetlands and groundwater sampling would be conducted in these same areas. Wetland- and surface water-type ARARs consisting of the New York Freshwater Wetlands Act (6 NYCRR 662 to 664), New York Wild, Scenic, and Recreational Rivers System Act (6NYCRR 666), and New York Endangered and Threatened Species of Fish and Wildlife; Species of Special Concern (6 NYCRR 182) would be triggered. These ARARs regulate activities conducted in wetlands and surface water bodies that are present within the Southern Area groundwater plume. These ARARs would be achieved through consultation with associated regulatory organizations to minimize short term impacts to sensitive areas and ecological receptors and eliminate long-term impacts.

Action-specific ARARs are limited to management of IDW (6 NYCRR 372.2 and 373-1.1), and underground injection of treated groundwater (40 CFR 144.81 and .82). These ARARs would be achieved through planning documents to protect site workers (Health and Safety Plan), onsite waste management practices (Remedial Action Work Plan), and monitoring of discharges.

Long-Term Effectiveness and Permanence: Alternative 7 would be effective in the long term. LUCs would be used to restrict groundwater extraction for potable water use and provide notice of the need for monitoring and/or mitigation of potential soil vapor intrusion issues. These controls would be effective on Navy-controlled property, but would be less reliable off site where the Navy does not have direct control. Groundwater is shallow and can be accessed via manual or mechanical well installation techniques. Groundwater monitoring and annual inspections would be conducted to identify potential water supply wells or structures that may be impacted by soil vapor intrusion.

The Navy is planning on transferring its property to the Town of Riverhead for economic redevelopment and the transfer documents restrict groundwater use and identify areas of residual contamination. Once the property is no longer under Navy control, groundwater monitoring and annual inspections would be conducted to identify potential wells that could result in adverse impacts to human health.

Based on current estimates, the migration of VOC-impacted groundwater to the River is not expected to have an adverse effect on ecological receptors or current recreational users. The River Area Groundwater Extraction, Treatment, and Injection System would further reduce or eliminate VOCs from entering the River and monitoring would be used to evaluate migration and potential impacts to the River and identify the need for additional action.

Reduction of Toxicity, Mobility, or Volume through Treatment: This alternative would result in the volatilization and photodegradation of approximately 93 pound of VOCs from the Fence Line Area and up to 282 pounds of VOCs at the River Area. Treatment estimates would be reduced by the degree of natural biodegradation of VOCs in the aquifer. There would be no reduction of mobility or volume through treatment under this alternative. The VOCs in groundwater would degrade be through insitu natural biodegradation and volatilization and photodegradation in the atmosphere. Non-hazardous soil, groundwater, and sludge wastes would be generated during implementation of this remedy. Facilities are readily available to transport and dispose of these materials.

Short-Term Effectiveness: Activities would consist of administrative actions, monitoring well construction, groundwater monitoring activities; and installation of groundwater extraction wells and piping near or in wetlands. There would be no risk to human health or the community during implementation of this alternative.

The extraction of groundwater near wetlands may temporarily (16 years) cause localized dewatering of wetlands, particularly during dry seasons. Current estimates indicate that with the initial source area removed, the RAOs would be achieved in the aquifer between 8 years (assuming effective natural attenuation via biodegradation) and 25 years assuming simple flushing of the VOC-impacted groundwater into the Peconic River, with a geometric mean estimate of 16 years.

Implementability: LUCs and MNA are technically feasible and could be implemented within two years after the signing of the ROD. The onsite LUCs and monitoring would be implemented by the Navy in consultation with the Town of Riverhead. The offsite LUCs and monitoring would require access agreements, cooperation, and coordination with Suffolk County and the PRSC. These agreements have been obtained in the past and long-term agreements should be obtainable. Services and materials are readily available to implement this remedy.

Implementation of the Fence Line Area Groundwater Extraction, Treatment, and Infiltration Gallery System is expected to be easy and could be implemented within three years. All of these activities are conducted on Navy property and outside of sensitive areas.

Implementation of the River Area Groundwater Extraction, Treatment, and Infiltration Gallery System would be more challenging to implement. The groundwater extraction wells would be installed in or near

wetlands, in endangered species habitat, and within the Wild, Scenic, and Recreational Rivers Act buffer zone. Actions would require limited clearing of vegetation and placement of temporary and long-term access roadways. Several government agencies would need to review and approve construction activities, and timely approval of this action is uncertain. Also, portions of the groundwater extraction system would be installed on state, county, and private property, and would require approval from the property owners for access. The ability to obtain this access is uncertain at this time. In addition, a railroad bisects the treatment zone. The ability to install a water line under the railroad can be difficult. Any disturbance underneath the railroad tracks would have to be approved by the railroad. During the Remedial Design, alternative treatment zones could be evaluated, but avoidance of one concern would worsen other concerns.

Cost: The estimated cost associated with Alternative 4 is as follows.

Capital Cost:	$4,700,000
O&M:	$ 999,000 per year (16)(Power and operator)
	$81,000 per event, 20 events over 16 years (Monitoring)
	$14,000 every five years (Five-Year Review)
	$7,000 per year (LUC)
PV:	$20,000,000 (16 years)

The capital cost is for planning documents, monitoring and groundwater extraction well installation, treatment equipment and associated building. In addition to monitoring, Five-Year Reviews, power, and LUCs, well maintenance (re-development or replacement) and well abandonment are included under O&M costs. Approximately 20 percent of the capital and O&M costs are for the Fence Line Area and approximately 80 percent of the capita and O&M costs are for the River Area System. O&M costs are primarily associated with chemical addition, sludge disposal, and operator requirements, and monitoring.

6.0 COMPARATIVE ANALYSIS OF ALTERNATIVES

In this section, a comparative analysis of alternatives is performed by on criteria detailed in Section 5.0 and the alternatives are further evaluated using a lifecycle analysis.

6.1 COMPARITIVE ANALYSIS OF ALTERNATIVES

The comparative analysis of alternatives and a summary of cost estimates are presented in Tables 6-1 and 6-2, respectively.

6.2 LIFECYCLE ANALYSIS AND OPTIMIZATION

Optimization fundamentally is a practice of systematically employing sound engineering and decision making processes to enhance the effectiveness and efficiency of a remedial project. These are commonly conducted throughout the lifecycle of a remedial project, from remedy selection through decommissioning. Project efficiencies can be gained in each phase, thereby shortening remedial implementation cost, time span, material usage intensity, energy dependency, etc. Sustainable remediation is a relatively new aspect of optimization. Periodic optimization and sustainability evaluations throughout the project lifecycle is an effective means of continually improving remedy effectiveness, controlling lifecycle costs, and reducing the overall environmental footprint, such as greenhouse gas emissions, energy usage, and other resource consumption. The results of the sustainability evaluations illustrate the benefits of continued optimization reviews and sustainability evaluations at each phase.

6.2.1 Objective

This Sustainable Remediation Evaluation (SRE) inputs and results are provided in Appendix G. The purpose of the SRE is to assess the sustainability of the proposed remedial alternatives using the metrics of greenhouse gas (GHG) and criteria pollutant emissions, energy use, water consumption, and worker safety. The results of the SRE are intended to provide additional information for consideration during remedy selection and to enhance the understanding of the net environmental benefit and optimization of the selected remedy.

6.2.2 Sustainability Evaluation Policy Background

Department of Defense (DoD) and Navy policies require continual optimization of remedies in every phase from remedy selection through site closeout (NAVFAC, 2010a).

In January 2007, Executive Order 13423 set targets for sustainable practices for (i) energy efficiency, greenhouse gas emissions avoidance or reduction, and petroleum products use reduction, (ii) renewable energy, including bioenergy, (iii) water conservation, (iv) acquisition, (v) pollution and waste prevention

and recycling, etc. In October 2009, Executive Order 13514 was issued, which reinforced these sustainability requirements and established specific goals for federal agencies to meet by 2020.

In August 2009, DoD issued the policy entitled *Consideration of Green and Sustainable Remediation Practices in the Defense Environmental Restoration Program*. The DoD policy and related Navy guidance state that opportunities to increase sustainability should be considered throughout all phases of remediation (i.e., site investigation, remedy selection, remedy design and construction, operation, monitoring, and site closeout). In response to this policy, the Navy issued an updated *Navy Guidance for Optimizing Remedy Evaluation, Selection, and Design* (NAVFAC, 2010a), which includes sustainability evaluations as part of the traditional Navy optimization review process for remedy selection, design, and remedial action operation. Applying the Navy optimization concepts with a sustainability review within the FS process helps to ensure the most appropriate remedies are screened and evaluated so future remedial actions are selected, designed, and properly operated/maintained for the protection of human health and the environment. The Naval Facilities Engineering Command (NAVFAC) issued a policy requiring use of the SiteWise™ tool to perform sustainability reviews as part of all FSes (NAVFAC, 2010b). Performing a combined optimization and sustainability evaluation of the remedial alternatives as part of the FS may result in the following benefits:

- Reveal certain obstacles or issues that need to be addressed or efficiencies that may be gained by leveraging experience from similar sites.
- Implement a more robust remedy while balancing the impact to the environment.
- Achieve long-term cost avoidance and savings resulting from more optimal use of available technologies.
- Ensure efficient, cost-effective, and sustainable site closeout.

Thus, the sustainability evaluation of remedial alternatives presented in this document considers and incorporates optimization and sustainability concepts to estimate the environmental footprint associated with each alternative in accordance with the requirements of Executive Order 13423 and the DoD/Navy optimization policies. The goal is to increase the sustainability of the selected remedial action at NWIRP Calverton.

6.2.3 Evaluation Tools

This evaluation was performed using a hybrid model consisting of the Navy's SiteWise tool supplemented with Tetra Tech's GSRx model as appropriate for some site-specific items.

SiteWise is a lifecycle assessment tool developed jointly by the U.S. Navy, U.S. Army Corps of Engineers, and Battelle, which assesses the environmental footprint of a remedial alternative/technology using a consistent set of metrics. The assessment is conducted using a building block approach where

every remedial alternative is first broken down into modules that represent the remedial phases in most remedial actions, including the RI, remedial action, remedial action operation (RA-O), and long-term monitoring (LTM). Once broken down by remedial phase, the footprint of each phase is calculated. The phase-specific footprints are then combined to estimate the overall footprint of the remedial alternative. This building block approach reduces redundancy in the sustainability evaluation and facilitates the identification of specific impact drivers that contribute to the environmental footprint.

GSRx builds off of SiteWise and allows for a flexible, site-specific analysis, particularly for materials and equipment use. For this site, GSRx was used to account for some materials not readily input into SiteWise and for some equipment with site-specific operational requirements that differ from the usage assumptions built into SiteWise.

6.2.4 Sustainability Evaluation Framework and Limitations

The sustainability evaluation performed for the remedial alternatives considered lifecycle metrics for GHG emissions, criteria pollutant emissions, energy consumption, water usage, and worker safety. The no action alternative (Alternative 1) was not evaluated because no emissions or resource consumption are assumed to be involved in implementing a no action alternative. The remaining six remedial alternatives were evaluated for sustainability.

Lifecycle environmental footprint impacts were calculated for energy consumption, emissions of GHG (carbon dioxide [CO_2], methane [CH_4], and nitrous oxide [N_2O]) and criteria pollutants (nitrogen oxides [NO_x], sulfur oxides [SO_x] and particulate matter [PM_{10}]), water usage, energy consumption, and worker safety. Lifecycle costs generated in the FS were also compared to the lifecycle impacts.

Lifecycle analysis inventory inputs (Appendix G) in SiteWise are divided into four categories: consumable materials production; transportation of personnel, materials, and equipment; equipment use and miscellaneous; and residual handling. Cost estimates from the FS and design calculations for each alternative were used as a basis for inventory quantities and related assumptions. Emission factor, energy consumption, and water usage data were correlated to material quantities, equipment, transportation distances, and installation timeframes to calculate lifecycle emissions, energy consumption, water usage, and worker safety. Default SiteWise emission, energy usage, water consumption, and worker fatality and accident risk factors were used.

Although SiteWise was supplemented with GSRx to provide more site-specific inventory inputs, some limitations remain. For example, several materials and construction equipment inventoried were input into GSRx and the resulting footprint impacts are incorporated in the SiteWise output results under the “Equipment Use and Miscellaneous” category. Therefore, the output results of the Equipment Use and Miscellaneous category includes the impacts of material production for those materials input in GSRx, as

well as impacts resulting from equipment use. The impacts of other materials input directly in SiteWise are summarized under the Materials category. However, an examination of the SiteWise and GSRx input and output sheets helps differentiate the impacts associated with equipment usage and materials production. Impact drivers for items input in GSRx are identified and evaluated directly within the respective GSRx evaluation sheet (Appendix G). Additionally, worker safety impacts were not calculated for heavy equipment inputs in GSRx. However, although real, the impacts to worker safety from the limited heavy equipment use is expected to be a minor contributor to overall worker risk, considering the large risk contribution of transportation in each of the alternatives.

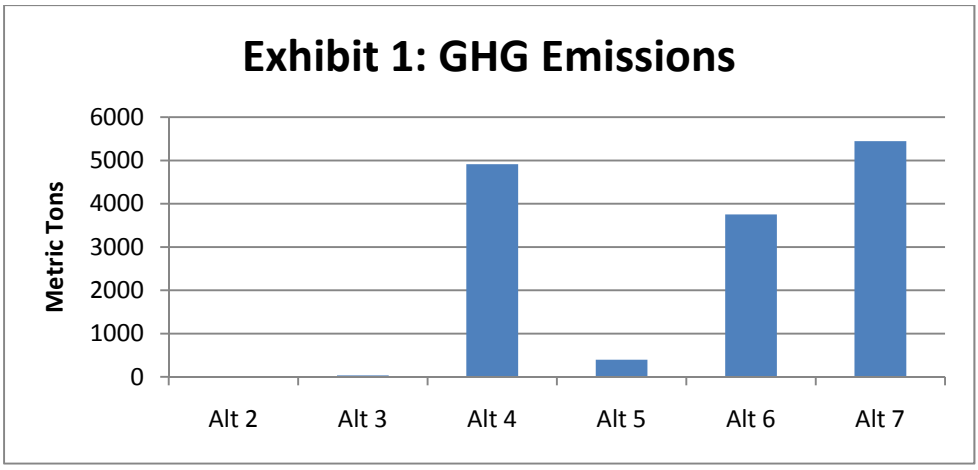
6.2.5 Sustainability Evaluation Results

A qualitative impact analysis was performed and is provided as Table 6-3a. The qualitative impact analysis was developed to provide an illustrative summary of the relative impacts of each alternative and the respective primary impact drivers. The qualitative impact analysis is based on the quantitative SiteWise/GSRx evaluation results for each alternative. The quantitative SiteWise/GSRx results are summarized in Table 6-3b and further described below.

The following summarizes the relative impact and primary impact drivers for each alternative and respective metrics. In addition, Appendix G provides the input and output sheets that were used for the SiteWise/GSRx hybrid model. The following sections summarize the results of the evaluation.

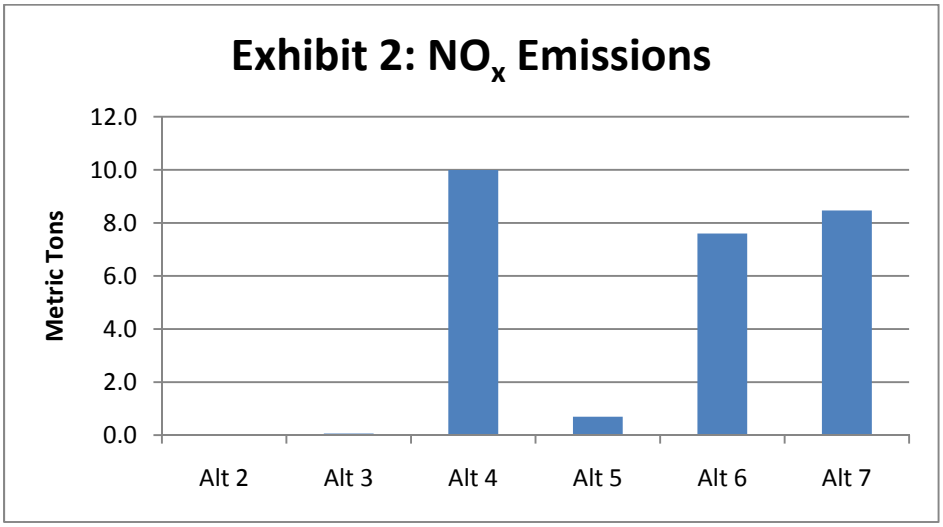
Greenhouse Gas Emissions

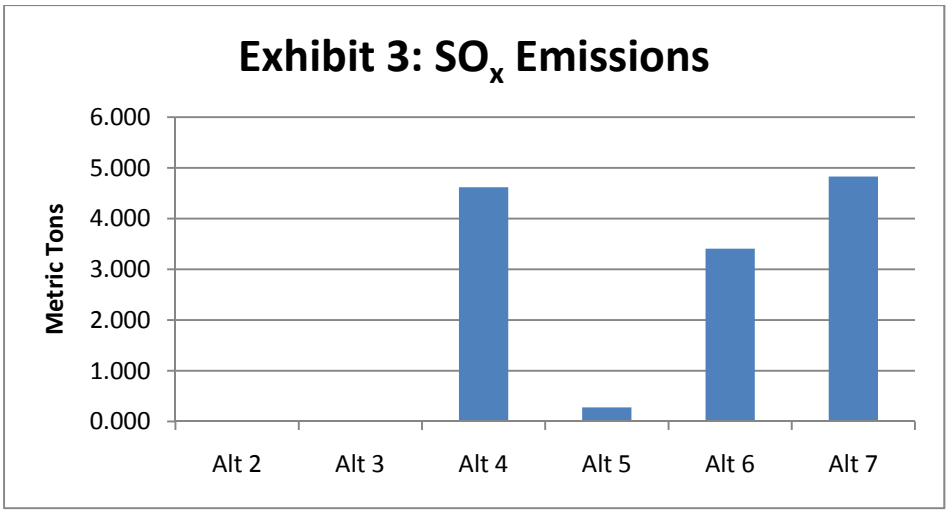
Emissions of CO_2, CH_4, and N_2O were calculated and normalized to CO_2 equivalents (CO_2e), which is a cumulative method of weighing GHG emissions relative to global warming potential. The largest contributor of GHG emissions is Alternative 7 due to GHG generated during production of electricity required for operating the extraction system during the RA-O phase. Alternatives 4 and 6 are the next highest contributors of GHG emissions. Production of electricity for operating the air sparge system is the primary GHG impact driver for Alternatives 4 and 6. GHG emissions for Alternative 3 are driven by production of steel for bollards and Alternative 5 is driven by the production of emulsified oil injected as part of the EISB remedy component. Transportation is the only driver for Alternative 2. GHG emissions for Alternatives 2, 3, and 5 are minimal compared to the Alternatives 4, 5, 6, and as shown in Exhibit 1.

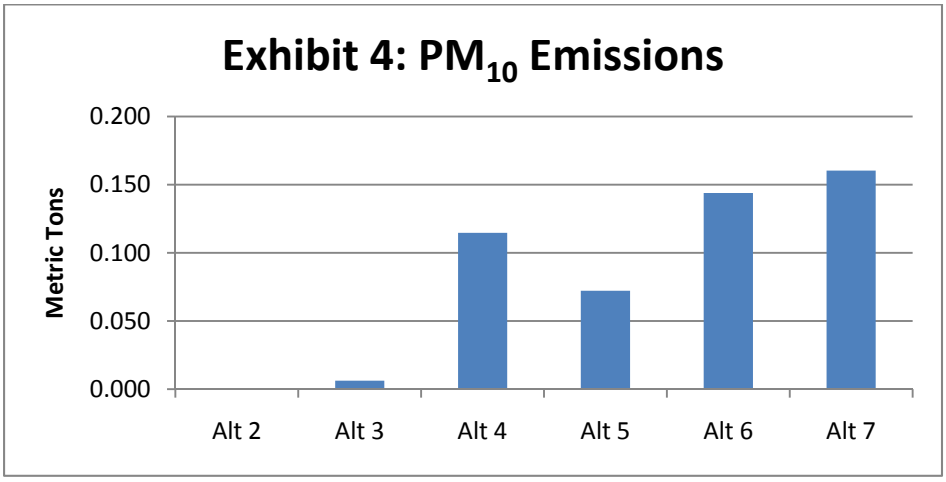


Criteria Pollutant Emissions

Criteria pollutant emissions for NO_x, SO_x, and PM_{10} were estimated for each remedial alternative. Results from the evaluation of NO_x, SO_x, and PM_{10} are summarized in Exhibits 2, 3, and 4, respectively. The highest NO_x emissions (10 metric tons) are associated with Alternative 4 due to production of electricity required for operating the air sparge system compressor during the RA-O phase. Alternative 7 results in the highest emissions of SO_x and PM_{10} emissions (4.83 and 0.16 tons, respectively). The SO_x emissions for Alternative 7 are primarily during the RA-O phase from extraction and treatment system operation and PM_{10} emissions are driven by manufacture of the high density polyethylene (HDPE) material for the system's tanks.

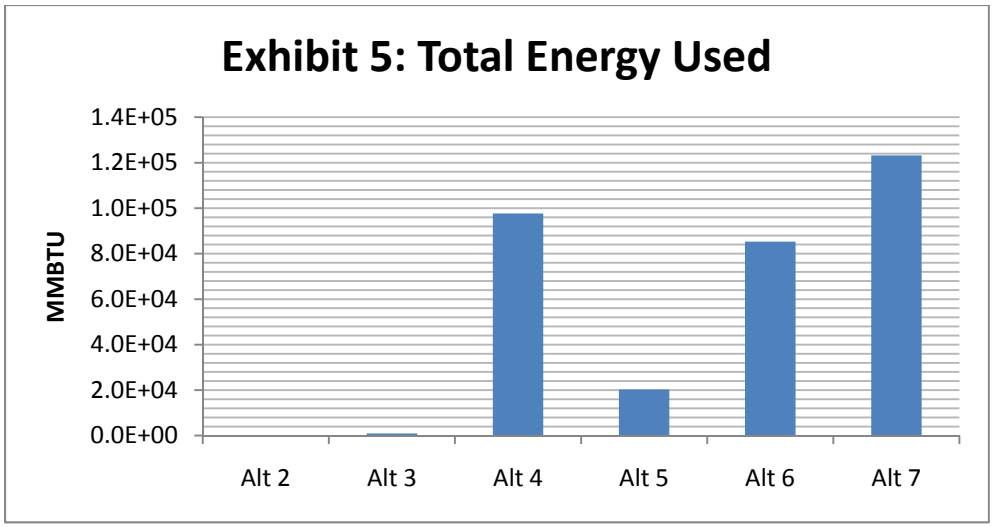






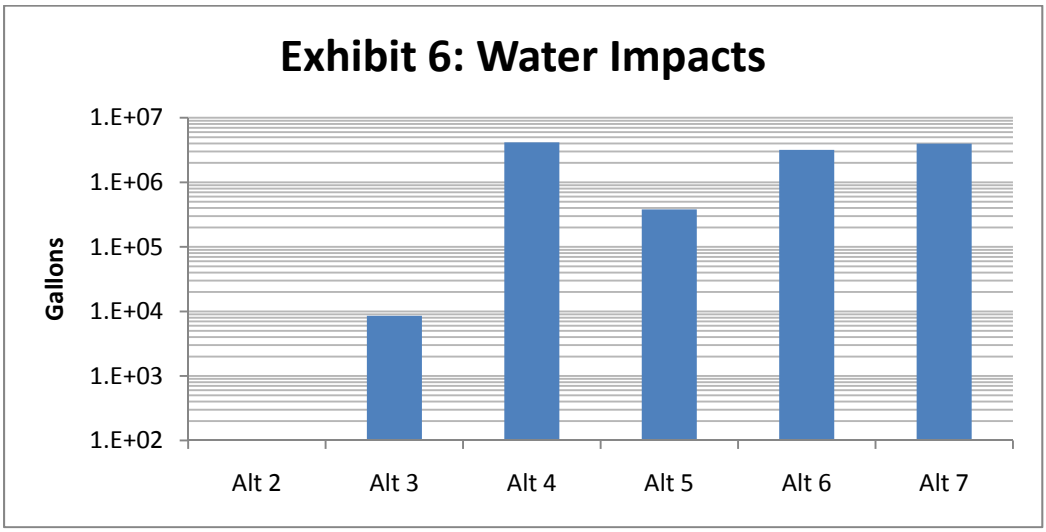
Energy Consumption

The largest amount of energy is consumed during implementation of Alternative 7 (123,000 million British Thermal Units [MMBTU]) due to the electricity demand required during the RA-O phase (Exhibit 5). Alternatives 4 and 6 are less but comparable in magnitude of energy usage (97,600 and 85,000 MMBTU, respectively) due to electricity demand of mechanical equipment during the RA-O phase. Energy Use for Alternative 5 is driven by manufacture of emulsified oil product.



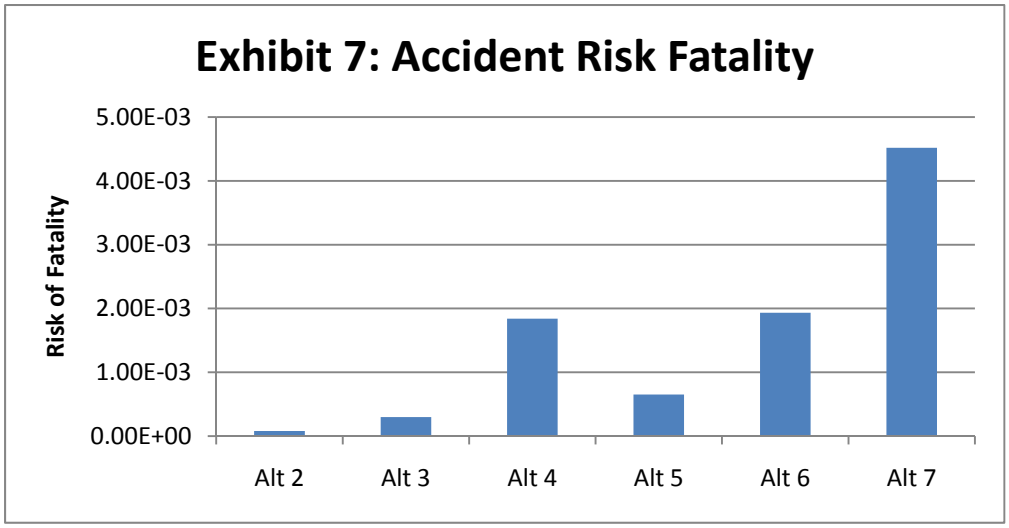
Water Usage

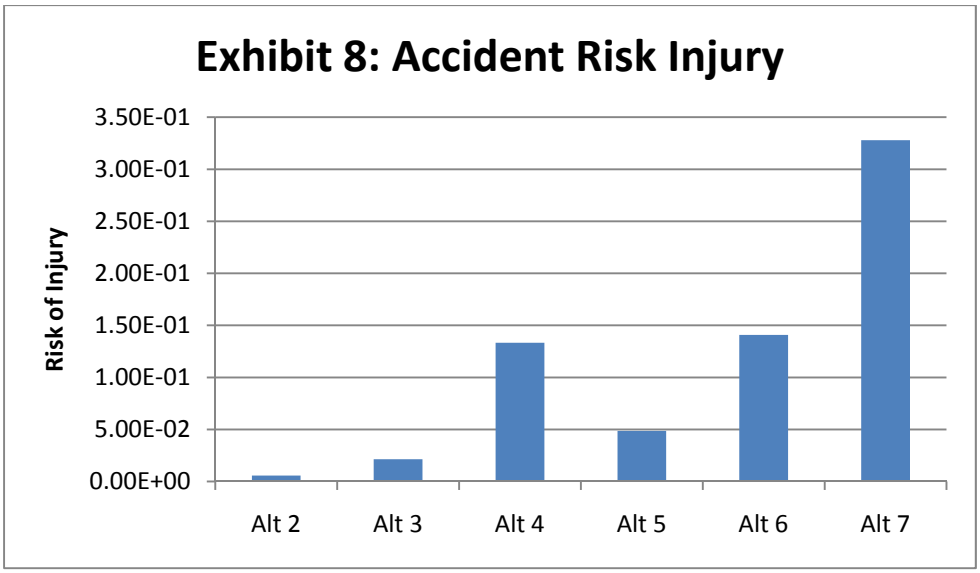
No direct water usage resulted from Alternative 2, as the only inputs are related to personnel transportation. The highest level of water usage is associated with Alternative 4. Alternative 4 water usage is driven by water demand associated with producing electricity that is required for operating the air sparge equipment during the RA-O phase. Alternatives 6 and 7 consume less but comparable amounts of water related to production of electricity required for operating mechanical systems during the RA-O phase (3.2 and 4 million gallons, respectively). Water usage for Alternative 5 was less than Alternatives 4, 6, and 7 and the primary contributor to Alternative 5 water usage is EISB substrate dilution. Water usage for each alternative is illustrated in Exhibit 6.



Accident Risk

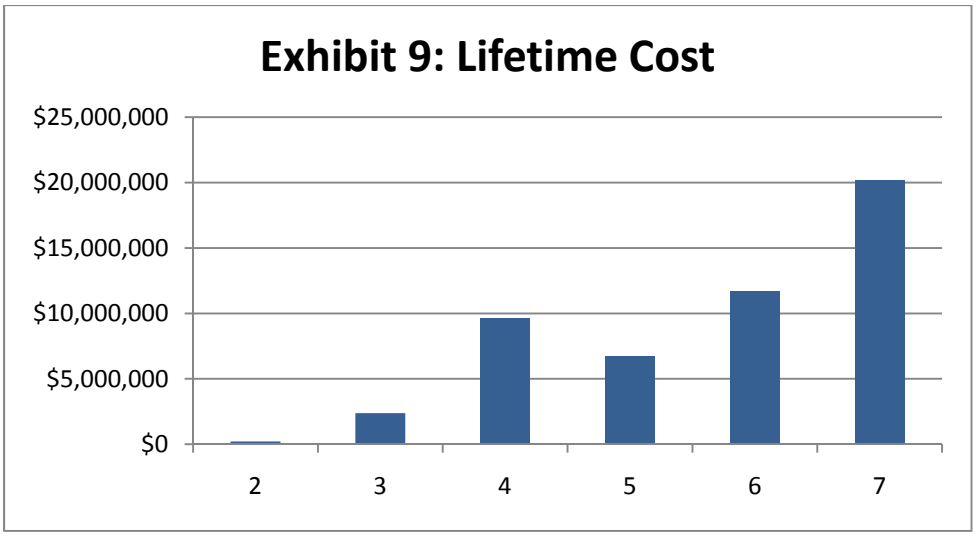
Personnel transport to and from the site contributes to the highest percentage of worker risk. Alternative 7 has the greatest worker risk because of the large amount of travel needed for frequent O&M of the treatment system and to regularly manage and dispose of wastes, such as generated treatment sludge. Alternatives 6, 4, and 5 require successively less travel for O&M during the RA-O phase and LTM sampling travel.. There is a 1 in 7 and 1 in 3 risk of injury to workers if Alternatives 6 or 7 are implemented, respectively, while the same alternatives have a fatality risk for the same two tasks of 1 in 222 and 1 in 526. All are calculated using Bureau of Labor statistics based on the man-hours worked and miles driven. For all remedial alternatives, worker risk is primarily linked to transportation of personnel. In order to minimize risk to workers, transportation distances and frequency should be minimized. All travel distances are conservatively estimated as 50 miles for worker travel, 100 miles for materials and equipment transport, and 50 miles for residual handling, so there is potential for a reduction in worker risk when the chosen remedial action is implemented. See Exhibits 7 and 8.





Cost of Remedial Alternatives

The estimated lifecycle costs are summarized in Exhibit 9. An examination of Exhibit 9 and the above exhibits for environmental metrics indicates the lifecycle costs of alternatives are correlated with the environmental footprints of the alternatives. The lifecycle cost for Alternative 7 is the highest ($20.2 million [2011 present value]) and this alternative also presents the highest environmental impact, followed by Alternatives 6 ($11.7 million) and 4 ($9.6 million), respectively. For perspective, if Alternative 6 is chosen over Alternative 7, this offers a 30 perecent reduction in GHG and a 42 percent reduction in cost. If Alternative 4 is chosen over Alternative 7, GHG emissions would be reduced by 10 percent with a 52 percent decrease in cost. If Alternative 5 is chosen, when compared to Alternative 4, Alternative 5 will emit 92 percent less GHG emissions if implemented and cost 30 percent less. GHGs are not the sole criteria being studied, but because all other criteria follow a similar trend, it provides insight for this evaluation.



6.2.6 Sustainability Evaluation Conclusions

In general, optimization of the selected remedy to decrease the primary components of GHG emissions could potentially increase the net environmental benefit of remedy implementation. During selection and design of the remedy, a sensitivity analysis considering elements of the remedy that have the greatest impact on remedy effectiveness, lifecycle cost, and sustainability metrics may provide additional insight into appropriate optimization. To aid in the sensitivity analysis, an impact analysis summary was created to identify the primary drivers of emissions, energy consumption, and water usage for each alternative (Table 6-3a).

All stakeholders should be aware that the NY City and Long Island area is in an USEPA-designated non-attainment area (http://www.epa.gov/oaqps001/greenbk/ancl.html) for $PM_{2.5}$ and 8-hour ozone. Active remedial actions, such as Alternatives 4, 6, and 7, could negatively contribute to the degradation of existing atmospheric conditions.

Measures identified in the evaluation that may reduce the environmental footprint of the alternatives are listed below for consideration.

- All Alternatives: Optimize routine site activities such that travel requirements are minimized. Similarly, encourage site workers to carpool to the site to reduce total vehicle mileage and related energy use and emissions.

- Alternatives 3 through 7: Some reduction of the environmental footprint, particularly GHG emissions, could be realized for all alternatives during implementation through the possible use of emission control measures such as alternate fuel sources (e.g. biodiesel), equipment exhaust controls (e.g. diesel), and equipment idle reduction.

- Alternatives 3 through 7: As part of periodic optimization, reduce the monitoring frequency from annual to biannual or every five years as warranted by periodic optimization reviews of monitoring results. Likewise, periodically reduce the number of monitoring wells and analyses as warranted by monitoring results.

- All Alternatives: Worker risk can be minimized if travel distances are minimized.

- All Alternatives: Any opportunity for material minimization or substitution should be taken. Steel is a large contributor to energy use and GHG emissions for all alternatives. If an alternative to steel is available it should be utilized.

- Alternatives 4 through 7: Consider using fly ash in all concrete mixtures for well pads.

- Alternatives 4, 6, and 7: Optimize mechanical components and treatment components (e.g., variable speed motors and pulse operation of the air sparge system) to reduce overall electricity usage and treatment residuals/additives.

- All Alternatives: Perform an evaluation for waste and material minimization.

- Alternatives 4, 5, 6, and 7: As part of periodic optimization, continually assess RAOs and the results of treatment. Reduce the footprint of target treatment zones and the frequency and/or duration of treatment as warranted by monitoring results. Transition to MNA as soon as conditions are favorable to effectively remediate residual contaminants.

Continual optimization of the selected remedy and related monitoring plan throughout the project lifecycle (FS, remedial design, remedial action, RA-O/Long-Term Monitoring phases) in accordance with Navy policy and guidance will continually reduce the lifecycle environmental footprint, as well as costs, of the project.

6.3 PATH FORWARD

This CMS provides to the Navy and other stakeholders information necessary to select the most appropriate remedial action for the Southern Area. The Navy will select the preferred alternative(s) for the Southern Area and document the selection in a RCRA Statement of Basis (SOB) and CERCLA PRAP. The SOB and PRAP will be subject to public review and comment. Following consideration of public comments, the final remedy for the site will be documented in a RCRA permit modification and ROD. The remedial design and remedial action for the Southern Area will be performed in accordance with the requirements contained in the ROD.

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TABLES

TABLE 2-1
PREVIOUS INVESTIGATIONS AND ACTIONS AT NWIRP CALVERTON AND SOUTHERN AREA
SOUTHERN AREA CORRECTIVE MEASURES STUDY
NWIRP CALVERTON, NEW YORKI

Date	Activity/Document	Findings/Comments
NWIRP Calverton Facility		
1986	Initial Assessment Study (IAS) (Navy, 1986)	The purpose of the IAS was to identify and assess sites posing a potential threat to human health or to the environment due to contamination from past hazardous materials operations. Based on information from historical records, aerial photographs, field inspections, and personnel interviews, a total of six potentially contaminated sites were identified at NWIRP Calverton. Each of the sites was evaluated with respect to contamination characteristics, migration pathways, and pollutant receptors. The IAS concluded that none of the sites posed an immediate threat to human health or to the environment; however, four sites warranted further investigation via a Confirmation Study or equivalent, including Site 6 - Fuel Calibration Area
1992	Site Investigation (SI) (HNUS, 1992)	The objective of the SI was to obtain environmental information in order to eliminate from further investigation those sites that posed no definable threat to the environment or to public health under CERCLA, collect data to develop a valid Preliminary Assessment score for the sites, document the release or potential release of hazardous substances at each site and determine if additional action was required. Additional areas were considered for investigation since the 1986 IAS, because of fuel spills in the fuel depot area, including Site 6A - Old Fuel Calibration Area.
1993	RCRA Facility Investigation (RFI), Task 2 Report - Pre-Investigation Evaluation of Corrective Measures Technologies (HNUS, 1993)	This report was prepared to aid in the development of the RFI Work Plan for the facility. It would identify potential corrective measures technologies, and the corresponding field data would be collected during the Facility Investigation. Technologies that were considered included onsite or offsite for containment, treatment, remediation, and/or disposal of contamination. The data collected was to be used to support the evaluation and selection of these technologies.
1994-1995	RCRA Facility Assessment (RFA) - Sampling Visit (HNUS, 1995a)	The purpose of the RFA was to gather environmental information at four sites, including Site 10 - Cesspool/Leach field Areas in order to eliminate those sites that posed no definable threat to the environment or to human health under RCRA, document the release or potential release of hazardous substances, and determine if additional action was necessary. Additional investigation was recommended for several sites including Site 10B - Engine Test House.
1994-1995	RFI for Sites 1, 2, 6A, and 7 (HNUS, 1995b)	The primary objectives of the RFI were to gather environmental information regarding each of the sites in order to delineate the nature and extent of contamination at each site, evaluate potential risks to human health and/or the environment posed by the contaminants found at each site, and collect data necessary to conduct a Corrective Measures Study (CMS). The RFI recommended for Site 6A additional groundwater investigation and that containment and/or remediation of contaminated groundwater be addressed during a CMS. Contaminated soils was also to be addressed during a CMS.
1995	RFI Addendum (HNUS, 1995c)	This addendum was prepared to present the results additional groundwater sampling (March 1995) at RFI sites, including Site 6A (the first round was in August 1994). There was no overall significant difference in the results for the two rounds. Therefore, no modifications to the conclusions of the RFI were proposed.
1996	RFA - Sampling Visit Addendum (C.F. Braun, 1997b)	This addendum concluded that additional testing was necessary to confirm the presence or absence of contamination at several sites, including Site 10B and the Southern Area. The nature and extent petroleum contamination at Site 10B was better defined. No action was recommended for the Southern Area based on limited contamination findings.

TABLE 2-1
PREVIOUS INVESTIGATIONS AND ACTIONS AT NWIRP CALVERTON AND SOUTHERN AREA
SOUTHERN AREA CORRECTIVE MEASURES STUDY
NWIRP CALVERTON, NEW YORKI

Date	Activity/Document	Findings/Comments
1997	Finding of Suitability Lease (FOSL) (Navy, 1997)	The purpose of the FOSL was to assess the environmental condition of property for all buildings, structures, and land areas within Zone I of the facility. Zone I was defined as consisting of all land encompassed by the boundary fence and a 7-acre strip along Connecticut Avenue. Findings were that this land was suitable for interim leasing to the Riverhead Community Development Agency to initiate their preferred land re-use plan.
Southern Area (Sites 2A, 10B, and On- & Offsite Southern Area)		
1980s-1990s	Free product removal at Site 6A by NGC.	Groundwater table depression and free product removal efforts occurred at Site 6A throughout the 1980s and 1990s by NGC (until 1996). Untreated, extracted groundwater was discharged into the drainage swale, culvert, and western pond at Site 6A.
1998	Engineering Evaluation/Cost Analysis (EE/CA) for Sites 2, 6A, 7, and 10B (Tetra Tech, 1998)	The EE/CA was conducted to evaluate removal alternatives for several sites, including Sites 6A and 10B. Free product skimming with groundwater depression was recommended for Sites 6A. No removal actions were recommended for Site 10B at the time.
1998	Phase 2 RFI for Sites 6A,10A, 10B, and Southern Area (C.F. Braun, 1998a)	This RFI served as a supplemental report to the RFI and RFI Addendum, addressing Sites 6A, 10B, and the Southern Area. A small area of fuel-type contaminated groundwater was present at Site 6A. The free product at Site 6A still was being addressed by NGC. The Navy would proceed with an interim removal action to re-initiate free product recovery at Site 6A and 10B. Due to a large area of low-level detections in the Southern Area, the remediation process proceeded to the CMS step.
2000-2001	FP removal pilot study at Site 6A. Close-Out Report, Hydrocarbon Removal (Foster Wheeler, 2001)	In 2000, Foster Wheeler implemented a pilot study for the recommended removal action at Site 6A per the EE/CA. Variable water table conditions, low volume of free product, VOC detections, and premature breakthrough of contaminants through carbon treatment stopped the pilot test. Subsequently, the removal action was not implemented. Passive free product removal, consisting of free product absorbent pillows, was implemented at the site.
2001	Phase 2 Remedial Investigation (RI) for Sites 6A, 10B, and Southern Area (Tetra Tech, 2001)	The purpose of the Phase 2 RI was to install additional on- and offsite monitoring wells to fill remaining gaps in data used to delineate the plume. Results of the investigation were that the nature and extent of groundwater contamination had been defined, and no data gaps remained. The Phase 2 RI recommended proceeding to an FS. Chlorinated volatile organic compounds (VOCs) were the primary site contaminants. Additional data would be collected during the FS and remedial action (RA) stages as necessary.
2001	Test Pitting at Site 6A. Technical Memorandum for Site 2 and Site 6A Test Pitting Activities (Tetra Tech, 2002)	Test pitting was conducted at Site 6A in June 2001. The technical memorandum presented the findings of test pit excavations, sample collection, and laboratory analysis. The test pitting and data collection were performed to better define the existing subsurface soil conditions at these sites. In 2001, petroleum free product. The petroleum free product also contained VOCs. Historical free product remediation systems reduced the thickness of the remaining free product to a level that was no longer recoverable via conventional methods. Floating free product near the water table and groundwater contamination remained at the site.
2003	Final Evaluation Report - Review of RI for Sites 6A, 10B, and Off-Site Southern Area (SCA Associates, 2003)	SCA Associates were asked to review the Navy's investigation of groundwater contamination associated with former jet engine testing operations at the plant. The purpose of the review was to help the Restoration Advisory Board (RAB) community members understand the results of the investigation and conclusions about the nature and extent of contamination. Additional groundwater sampling was recommended to collect additional information on contaminant transport through deep strata.

TABLE 2-1
PREVIOUS INVESTIGATIONS AND ACTIONS AT NWIRP CALVERTON AND SOUTHERN AREA
SOUTHERN AREA CORRECTIVE MEASURES STUDY
NWIRP CALVERTON, NEW YORKI

Date	Activity/Document	Findings/Comments
2004-2005	Groundwater and surface water sampling. Data Summary Report for Site 6A and the Southern Area (Tetra Tech, 2005)	Groundwater and surface water samples were collected at Site 6A and the Southern Area from September 2004 through March 2005. The summary report concluded the following: • VOC- and petroleum-contaminated groundwater was delineated at Site 6A. The contamination did not extend to the nearest downgradient monitoring wells at the site. The contamination was limited vertically to approximately 60 feet (ft) below ground surface (bgs), where an silty clay aquitard unit is present, preventing downward migration. Concentrations had decreased significantly since 1994. Limited quantities of free product were also present. • The offsite contamination was not fully delineated, and further sampling was recommended. The horizontal extent was found to be limited by the Peconic River (receiving water body). Sampling in the river found no impact from site-related contaminants. • The nature and extent of contamination was defined enough to proceed to a CMS.
2006	FS/CMS for Site 6A, Site 10B, and On-Site Southern Area Plume (Tetra Tech, 2006a)	This CMS addressed contaminated soil and groundwater at Sites 6A and 10B and the onsite portion of the Southern Area plume. The recommended corrective action / remedial alternative for soil at Sites 6A and 10B was excavation and offsite treatment and disposal. The recommendation for the onsite groundwater was land use controls (LUCs) and monitored natural attenuation (MNA).
2006	Draft FS/CMS for Off-Site Southern Area Plume (Tetra Tech, 2006b)	This CMS addressed the offsite portion of the Southern Area plume. Several corrective measure alternatives were evaluated, including LUCs, groundwater extraction and treatment, in situ biological treatment, MNA and LUCs. No alternative was recommended, deferring to future discussion with and decision by NYSDEC.
2006	Soil Sampling. Site 6A Data Gap Investigation (Tetra Tech, 2006c)	Surface and subsurface soil sampling was performed in January 2006 at Site 6A to delineate the extent of petroleum-contaminated and polychlorinated biphenyl (PCB)-contaminated soil northwest of and in the vicinity of the concrete pad. Sufficient data was collected for the delineation; however, the horizontal extent of PCB contamination in the subsurface soil within the groundwater smear zone (6 to 7 feet bgs) required further investigation prior to implementation of remedial action.
2006	Groundwater, surface water, and sediment sampling. Results of October 2006 Groundwater, Surface Water, and Sediment Testing - Southern Area (Tetra Tech, 2007a)	This October 2006 investigation was performed to define the extent of the groundwater plume, determine whether site-related contamination enters the Peconic River, and determine potential adverse effects on ecological receptors in the river. Trichloroethane (TCA) and associated daughter products (e.g., dichloroethane [DCA] and chloroethane) were detected throughout the plume. DCA was detected in one surface water sample but at concentrations less than the surface water quality standard. No site-related contaminants were detected in sediment samples.
2007	Statement of Basis (SOB) for Site 6A, 10B, and the On-Site Southern Area Plume (Tetra Tech, 2007b)	This SOB documented the proposed corrective measures for Sites 6A and 10B. The onsite portion of the Southern Area plume was included. The recommended remedial action for soil at Sites 6A and 10B was excavation and offsite transportation and disposal. The recommended remedial action for groundwater at these sites was MNA and LUCs.

TABLE 2-1
PREVIOUS INVESTIGATIONS AND ACTIONS AT NWIRP CALVERTON AND SOUTHERN AREA
SOUTHERN AREA CORRECTIVE MEASURES STUDY
NWIRP CALVERTON, NEW YORKI

Date	Activity/Document	Findings/Comments
2008	Groundwater and surface water sampling. Data Summary Report for Pre-Design Groundwater Investigation at Site 6A, Site 10B and the Southern Area (Tetra Tech, 2008a)	The primary objectives of this January through February 2008 investigation were to develop a better understanding of the current site characteristics, presence of contamination, and to identify potential exposure pathways and receptors. Additional monitoring wells were installed in the Southern Area. Groundwater samples were collected at Sites 6A, 10B, and the Southern Area, and surface water samples were collected from the Peconic River. 1,1-DCA was found at Site 6A and the Southern Area with exceedances of NYS MCLs in several wells. This distribution linked Site 6A, through the Southern Area and the PRSC, to a monitoring well adjacent to the Peconic River. The report recommended the installation of additional monitoring wells and recurring groundwater monitoring to establish temporal contaminant data.
2008	Groundwater, surface water, and sediment sampling. Data Summary Report for Groundwater Investigation at Site 6A, Site 10B, and Southern Area (Tetra Tech, 2008b)	The August 2008 groundwater, surface water, and sediment sampling activities were summarized and the data were evaluated in this report. The report recommended locations for additional temporary and permanent monitoring wells, as well as continued groundwater sampling.
2008-2010	Groundwater sampling. Quarterly Sampling Reports for PRSC Water Supply (Tetra Tech, 2008-2010)	These letter reports included the sample results for water testing conducted at the PRSC in December 2008 and March, June, September, and November 2009. Several VOCs were detected above drinking water standards in pre-treatment samples. Quarterly reports were submitted for sampling efforts conducted in December 2008 and March, June, September, and November 2009.
2009	Soil and concrete pad sampling at Site 10B. Data Summary Letter Report - July 2009 Concrete Pad/Surface Soil Sampling at Site 10B (Tetra Tech, 2009a)	Concrete chip and surface soil samples were collected from a concrete pad that formerly contained a transformer at Site 10B in July 2009. Results indicated that a release of PCBs occurred at this pad and PCBs migrated into the surrounding soil. NYSDEC's soil clean up objective for PCBs in soil in a restricted residential or commercial use is 1,000 µg/kg. The extent of PCBs in soil was not defined and additional delineation was recommended to determine the horizontal and vertical extent of PCB-contaminated soils.
2009	EE/CA for Site 6A-Southern Area Off-Site Water Supply (Tetra Tech, 2009b)	This EE/CA developed and evaluated removal action alternatives for an offsite potable water supply for the PSRC and vicinity. Alternatives evaluated included an extension of municipal water line and water well treatment. The EE/CA concluded that extending a municipal water line would be a permanent remedy that eliminates exposure with no long-term annual costs. This alternative provides the best balance of trade-offs based on evaluation criteria. The water line extension is expected to occur in 2011.
2009	Microcosm study (groundwater sampling). Letter Work Plan Southern Area Biodegradation Study (Tetra Tech, 2009c) and the 2011 Southern Area FS/CMS described herein.	The objective of the November 2009 microcosm study was to investigate specific subsurface conditions and gauge its favorability for biodegradation of chlorinated VOCs. Six groundwater wells were sampled for geochemical parameters, VOCs, and bacterial species. TCA and daughter products, various electron acceptors, and dechlorinating bacteria were identified. The data indicated that natural biodegradation was occurring and, more importantly, conditions can be enhanced to promote anaerobic reductive dechlorination.

TABLE 2-1
PREVIOUS INVESTIGATIONS AND ACTIONS AT NWIRP CALVERTON AND SOUTHERN AREA
SOUTHERN AREA CORRECTIVE MEASURES STUDY
NWIRP CALVERTON, NEW YORKI

Date	Activity/Document	Findings/Comments
2009	Additional PCB soil sampling at Site 10B. Letter Work Plan Supplemental PCB Soil Sampling, Concrete Pad Area at Site 10B-Engine Test House (Tetra Tech, 2009)	Additional soil sampling for PCBs at Site 10B was performed using field test kits and an offsite analytical laboratory in preparation for the remedial action at Site 10B.
2009-2010	Remedial Action at Sites 6A and 10B. Remedial Work Plans (AGVIQ, 2008 and 2009a) and Construction Completion Reports (AGVIQ, 2009b and 2010).	The Remedial Work Plans outlined the activities for the soil and free product free product remedial actions at Sites 6A and 10B. Remedial action activities included abandonment of several monitoring wells, removal of hazardous materials, demolition of the Engine Test building and Fuel Pump House, excavation of contaminated soils and free product, collection of confirmation samples, transportation and off site disposal of PCB- and petroleum-contaminated soils, application of oxygen release compound (ORC), and installation of three monitoring wells.
2009-2010	Groundwater Sampling. Data Summary Report for 2009 Groundwater Investigation Activities Site 2, 6A, 10B, and Southern Area (Tetra Tech, 2010a)	This document details the 2009 groundwater investigation activities conducted at the Southern Area to address data gaps, supplement the groundwater monitoring network, and develop an understanding of the current site characteristics, including the presence of contamination. Comparable concentrations and/or general decreasing contaminant concentrations were observed in Southern Area monitoring wells. The November 2009 microcosm/biodegradation study showed that conditions in most of the study area are suitable for anaerobic biodegradation of CVOCs. Recommendations included continuing annual groundwater monitoring, installing additional temporary monitoring wells to further delineate contamination, conduct pumping tests to support an FS/CMS, and conduct an enhanced reductive dechlorination pilot study in the Southern Area to support an FS/CMS.
2010	Action Memorandum, Water Supply Line for the Off-Site Southern Area (Navy, 2010)	This Action Memorandum documents the decision by the Navy to extend a municipal potable water supply to the PRSC. This non-time-critical removal action will eliminate human health risks associated with exposure to VOCs in groundwater. The action is expected to take place in 2011.
2010	Aquifer Pump Tests. Technical Memorandum: Aquifer Test Analysis for Site 6A - Southern Area (Tetra Tech, 2010b)	This technical memorandum presents the analysis of the aquifer testing performed in July 2010 at two locations in the Southern Area. The testing was performed to estimate aquifer hydraulic parameters to evaluate the feasibility of groundwater extraction for VOC-contaminated groundwater in the Southern Area and to evaluate potential impacts to wetlands from groundwater extraction. Based on aquifer testing, pumping rates of 120 gallons per minute (gpm) for the near-facility area and 100 gpm for the Connecticut Avenue area would likely be sustainable. Drawdowns observed within the wetlands at the water table/wetland surface indicate that long-term pumping in the area would impact water levels in nearby wetlands
2011	Data Summary Report for 2010 Groundwater Investigation Activities at Site 2, Site 6A, Site 10B, and Southern Area (Tetra Tech, 2011a)	This document details the 2010 groundwater investigation activities conducted several sites, including Sites 6A, 10B, and the Southern Area to address data gaps, supplement the groundwater monitoring network, and further develop the conceptual site model (CSM) for the Southern Area groundwater plume. Based on collected data, the groundwater plume is adequately defined. Concentrations of VOCs decrease with distance from River Road. This data is the principle information used in the 2011 CMS/FS.

TABLE 2-1
PREVIOUS INVESTIGATIONS AND ACTIONS AT NWIRP CALVERTON AND SOUTHERN AREA
SOUTHERN AREA CORRECTIVE MEASURES STUDY
NWIRP CALVERTON, NEW YORKI

Date	Activity/Document	Findings/Comments
2011	PRSC vapor intrusion study. Soil Vapor Intrusion Investigation Work Plan (Tetra Tech, 2011b)	A soil vapor intrusion evaluation is being performed at the PRSC.

TABLE 2-2
MICROCOSM DATA
SOUTHERN AREA CORRECTIVE MEASURES STUDY
NWIRP CALVERTON, NY

Location	Screen Interval (ft bgs)	Sample Date	Chlorinated Volatile Organic Compounds					Dissolved Gas	Dechlorinating Bacteria & Enzymes					Geochemical & Biodegradation Parameters Analytical Values				
			1,1,1-TCA (µg/L)	1,1-DCA (µg/L)	CA (µg/L)	1,1-DCE (µg/L)	VC (µg/L)	Ethane (µg/L)	Dhc (cells/mL)	Dhb (cells/mL)	tceA Reductase (cells/mL)	bvcA Reductase (cells/mL)	Vinyl Chloride Reductase (cells/mL)	Fe (µg/L)	Mn (µg/L)	Chloride (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)
Site 6A-Fuel Calibration Area																		
FC-MW-07-S	5 - 15	01/15/08	ND	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--
		07/28/08	ND	ND	1 J	ND	ND	--	--	--	--	--	--	--	--	--	--	--
		09/09/09	ND	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--
	Microcosm Study	11/09/09	ND	ND	ND	ND	ND	ND	20.2	9,840	ND	ND	ND	4,260	22.2	6	ND	ND
Onsite Southern Area																		
SA-MW-127I	36 - 46	01/31/08	94	410	51	30	ND	--	--	--	--	--	--	--	--	--	--	--
		07/30/08	94	470	63	30	ND	--	--	--	--	--	--	--	--	--	--	--
		09/03/09	61	270	29	20	ND	ND	--	--	--	--	--	--	--	--	--	--
	Microcosm Study	11/09/09	41	200	23	9	ND	ND	5.6	50,800	ND	ND	ND	61.8	1,920	9.2	0.45	ND
SA-MW-128D	58 - 68	01/31/08	ND	5	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--
		07/30/08	ND	7	ND	0.4 J	ND	--	--	--	--	--	--	--	--	--	--	--
		09/03/09	ND	2.9 J	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--
	Microcosm Study	11/09/09	ND	2.5 J	ND	ND	ND	ND	0.2	135	ND	ND	ND	3,780	181	6.4	ND	ND
Offsite Southern Area																		
SA-MW-131D	60 - 70	01/17/08	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		07/29/08	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		09/14/09	ND	15	ND	1.5 J	ND	ND	--	--	--	--	--	--	--	--	--	--
	Microcosm Study	11/09/09	ND	12	ND	1.2 J	ND	ND	0.3	3,180	ND	0.2 J	ND	17,400	229	8.5	2.6	ND
SA-PZ-123I1	22 - 32	01/17/08	4 J	23	ND	3 J	ND	--	--	--	--	--	--	--	--	--	--	--
		07/31/08	2	13	ND	2	ND	--	--	--	--	--	--	--	--	--	--	--
		09/02/09	ND	6.3	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--
	Microcosm Study	11/09/09	ND	11	ND	ND	ND	ND	0.3	3,350	ND	ND	ND	629	476	11	ND	ND
Along Peconic River																		
SA-PZ-118S	6 - 16	01/16/08	ND	4 J	ND	1 J	ND	--	--	--	--	--	--	--	--	--	--	--
		07/31/08	ND	17	ND	4	ND	--	--	--	--	--	--	--	--	--	--	--
		09/02/09	ND	2.5 J	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--
	Microcosm Study	11/09/09	ND	5.5	ND	0.98 J	ND	ND	0.9	517	ND	ND	ND	2,510	122	12	ND	ND
		Minimum	--	5.5	--	0.98	--	--	0.2	135	--	--	--	61.8	22.2	6	0.45	--
		Maximum	--	200	--	9	--	--	20.2	50800	--	--	--	17400	1920	12	2.6	--
		Mean	--	57.1	--	3.7	--	--	4.6	11303.7	--	--	--	4773.5	491.7	8.9	1.5	--
		Median	--	11.5	--	1.2	--	--	0.6	3265	--	--	--	3145	205	8.85	1.525	--

ft bgs - feet below ground surface
µg/L - Micrograms per liter
cells/mL- microbial cells per millilter
-- - Not analyzed / No value
J - Estimated Value
1,1,1-TCA - 1,1,1-Trichloroethane
1,1-DCA - 1,1-Dichloroethane
1,1-DCE - 1,1-Dichloroethene
VC - Vinyl Chloride
CA - Chloroethane
Dhc - Dehalococcoides
Fe2+ - Ferrous Iron
TOC - Total Organic Carbon
Mn - Manganese

S.U. - Standard units
µS/cm - Microsiemens per centimeter
°C - Degrees celsius
NTU - Nephelometric Turbidity Units
mg/L - miligrams per liter
mV - milivolts
SC - Specific Conductivity
mg/L - Miligrams per liter

DO - Dissolved Oxygen
CO2 - Carbon Dioxide
Fe2+ - Ferrous Iron
H2S - Hydrogen Sulfide
ND - Non-Detect
Dhb - Dehalobacter

TABLE 2-2
MICROCOSM DATA
SOUTHERN AREA CORRECTIVE MEASURES STUDY
NWIRP CALVERTON, NY

Location	Screen Interval (ft bgs)	Sample Date	Geochemical & Biodegradation Parameters					Geochemical & Biodegradation Parameters										
			Analytical Values					Water Quality Meter Values						Field Test Kit Values				
			Sulfate (mg/L)	Alkalinity (mg/L)	Ammonia (mg/L)	Sulfide (mg/L)	TOC (mg/L)	pH (S.U.)	SC (µS/cm)	Temp. (°C)	Turb. (NTU)	DO (mg/L)	ORP (mV)	DO (mg/L)	CO_2 (mg/L)	Alkalinity (mg/L)	Fe^{2+} (mg/L)	H_2S (mg/L)
Site 6A-Fuel Calibration Area																		
FC-MW-07-S	5 - 15	01/15/08	--	--	--	--	--	6.14	78	11.17	3.39	2.22	-120.8	--	--	--	--	--
		07/28/08	--	--	--	--	--	6.3	61	17.5	5.53	0.54	-101	--	--	--	--	--
		09/09/09	--	--	--	--	--	5.58	80	20.81	0.78	0.37	-20	--	--	--	--	--
Microcosm Study		11/09/09	13	26.7	0.1	ND	1.59	6.07	80	16.94	3.1	0	-91	1	30	34	3	0
Onsite Southern Area																		
SA-MW-127I	36 - 46	01/31/08	--	--	--	--	--	6.12	169	11.31	4.44	0.56	38	--	--	--	--	--
		07/30/08	--	--	--	--	--	6.36	113	13.6	1.35	0.44	82	--	--	--	--	--
		09/03/09	--	--	--	--	--	5.16	83	13.07	0	0.19	42	--	--	--	--	--
Microcosm Study		11/09/09	12	33.7	ND	ND	1	6.13	118	12.9	1.6	0	106	0.8	25	35	0.2	0
SA-MW-128D	58 - 68	01/31/08	--	--	--	--	--	6.17	289	10.88	10	0.36	-133	--	--	--	--	--
		07/30/08	--	--	--	--	--	6.32	77	14.2	8.26	0.27	-93	--	--	--	--	--
		09/03/09	--	--	--	--	--	5.52	75	16.22	128	0.52	-12	--	--	--	--	--
Microcosm Study		11/09/09	12	13.6	0.11	ND	1.9	5.87	67	14.37	14	0	-111	0.5	31	14	3	0
Offsite Southern Area																		
SA-MW-131D	60 - 70	01/17/08	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		07/29/08	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		09/14/09	--	--	--	--	--	6.02	292	15.17	29.2	0.39	-82	--	--	--	--	--
Microcosm Study		11/09/09	19	40.3	0.1	ND	1.6	6.04	108	13	2.2	0	-104	0	36	40	3.8	0
SA-PZ-123I1	22 - 32	01/17/08	--	--	--	--	--	5.64	86	10.11	0.52	1.72	54	--	--	--	--	--
		07/31/08	--	--	--	--	--	5.67	128	13.46	0	5.28	189	--	--	--	--	--
		09/02/09	--	--	--	--	--	5.18	76	14.04	0	0.19	31	--	--	--	--	--
Microcosm Study		11/09/09	14	16.8	0.21	ND	1.52	5.68	118	11.55	0.52	0	108	0.9	25	14	0.8	0
Along Peconic River																		
SA-PZ-118S	6 - 16	01/16/08	--	--	--	--	--	6.33	129	9.84	1.55	2.72	-93.2	--	--	--	--	--
		07/31/08	--	--	--	--	--	6.66	107	17.3	0.67	0.3	-128	--	--	--	--	--
		09/02/09	--	--	--	--	--	5.68	139	19.02	6.45	0.45	-61	--	--	--	--	--
Microcosm Study		11/09/09	6.4	31	0.63	ND	2.37	6.34	95	15.82	1.8	0	-80	0.8	25	30	2.8	0
		Minimum	6.4	13.6	0.1	--	1	5.68	67	11.55	0.52	0	-111	0	25	14	0.2	0
		Maximum	19	40.3	0.63	--	2.37	6.34	118	16.94	14	0	108	1	36	40	3.8	0
		Mean	12.7	27.0	0.2	--	1.7	6.0	97.7	14.1	3.9	0.0	-28.7	0.7	28.7	27.8	2.3	0.0
		Median	12.5	28.85	0.11	--	1.595	6.055	101.5	13.685	2	0	-85.5	0.8	27.5	32	2.9	0

TABLE 2-3
MAXIMUM GROUNDWATER DETECTIONS
SOUTHERN AREA CORRECTIVE MEASURES STUDY
NWIRP CALVERTON, NEW YORK

Chemical	NYSDOH MCL [1]	National Ambient Water Quality Criteria[2]	NYS DEC Water Quality Criteria[3]	NYS "Class C" Surface Water Quality Standard [4]	Mamimum Result			Overall Maximum		
					2008	2009	2010	Overall	Sample ID	Sample Date
Volatile Organic Compounds (µg/L)										
2-Butanone	50	--	--	--	1 J	ND	33 J	33 J [6]	FC-MW02S-515	09/10/10
Acetone	50	--	--	--	ND	ND	24	24 [6]	SA-TW335-3135	06/10/10
Benzene	5	2.2 †	6 ♦ 210 ♦♦	10 *	1	ND	17	17	SA-TW349-3135	09/10/10
Carbon Disulfide	50	--	--	--	2 J	ND	1 J	2 J	FC-MW126D-7484	01/08/08
Chlorobenzene	5	130 †	5.0 ♦♦	400 * 5 **	1	ND	1.3 J	1.3 J	SA-PZ149I1-3237	07/10/10
Chloroethane	5	--	--	--	63	29	970 J	970 J	SA-TW343-3135	06/10/10
Chloroform	50	5.7 †	--	--	1.3 J	2.9 J	1.3 J	2.9 J	SA-MW132S-414	09/10/09
Chloromethane	5	--	--	--	3	ND	ND	3	SA-PZ-123I1-3242	08/08/08
Cyclohexane	50	--	--	--	ND	ND	5.6	5.6	SA-TW348-2125	09/10/10
Dichlorobenzene, 1,2- (ortho)	5	420 †	5.0 ♦♦ [5]	5 ** [5]	ND	ND	6.4	6.4	SA-PZ-138I1-3742	07/10/10
Dichlorobenzene, 1,3- (meta)	5	320 †	5.0 ♦♦ [5]	5 ** [5]	3 J	ND	3.1 J	3.1 J	SA-PZ-138I1-3742	07/10/10
Dichlorobenzene, 1,4- (para)	5	63 †	5.0 ♦♦ [5]	5 ** [5]	13	3.8 J	13	13	SA-PZ-138I1-3742	07/10/10
Dichloroethane, 1,1-	5	--	--	--	470	270 J	2,100	2,100	SA-TW335-3135	06/10/10
Dichloroethane, 1,2-	5	0.38 †	24 ♦	--	0.6 J	ND	0.83 J	0.83 J	SA-PZ143-4146	06/10/10
Dichloroethene, 1,1-	5	330 †	0.8 ♦	--	30	20	110	110	SA-TW335-3135	06/10/10
Dichloroethene, cis-1,2-	5	--	--	--	0.3 J	ND	1.1 J	1.1 J	SA-TW343-3135	06/10/10
Ethylbenzene	5	530 †	17 ♦♦	--	0.5 J	ND	120	120	SA-TW348-2125	09/10/10
Freon 113	50	--	--	--	1 J	ND	1.1 J	1.1 J	SA-TW320-5155	03/10/10
Hexanone, 2-	50	--	--	--	ND	6.9 J	2.6 J	6.9 J [6]	SA-MW129I-5060	09/10/09
Isopropyl Benzene / Cumene	5	--	2.6 ♦♦	--	ND	ND	35	35	SA-TW348-2125	09/10/10
Methyl Cyclohexane	50	--	--	--	1 J	ND	2.5 J	2.5 J	SA-TW343-3135	06/10/10
Methyl tert-butyl ether	10	--	--	--	ND	ND	1.3 J	1.3 J	SA-TW340-4145	06/10/10
Methylene Chloride	5	4.6 †	--	200 *	ND	ND	17	17 [6]	FC-MW07I-4858	09/10/10
Naphthalene	50	--	13 ♦♦	--	ND	ND	190	190	SA-TW348-2125	09/10/10
Tetrachloroethene	5	0.69 †	1.0 ♦	--	12	ND	190	190 [7]	SA-TW331-2125	06/10/10
Toluene	5	1,300 †	100 ♦♦	6,000 *	3 J	ND	2.3 J	3 J	FC-MW02S-515	01/08/08
Trichlorobenzene, 1,2,4-	5	35 †	5 ♦♦	5 ** [4]	4	2.7 J	7.1 J	7.1 J	SA-PZ143-4146	09/10/10
Trichloroethane, 1,1,1-	5	--	--	--	94	61	1,200	1,200	SA-TW349-3135	09/10/10
Trichloroethene	5	2.5 †	11 ♦	40 *	ND	ND	1.3 J	1.3 J	SA-TW343-3135	06/10/10
Vinyl Chloride	2	0.025 †	18 ♦	--	3	ND	8.1 J	8.1 J	SA-TW335-3135	06/10/10
Xylenes (total)	5	--	65 ♦♦	--	10 J	ND	120	120	SA-TW349-1115	09/10/10

Shading indicates exceedance of criteria or standards

µg/L - micrograms per liter J - Estimated Value -- Not available

1. New York State (NYS) Department of Health (NYSDOH) Maximum Contaminant Level (MCL). 10 NYCRR, Part 5, Subpart 5-1 Public Water Systems, Tables 1 through 3. http://www.health.ny.gov/regulations/nycrr/title_10/part_5/subpart_5-1_tables.htm#table1.
2. National Ambient Water Quality Criteria. http://water.epa.gov/scitech/swguidance/waterquality/standards/current/upload/nrwqc-2009.pdf.
   † Criteria associated with human health through
   ‡ Criteria associated with aquatic (chronic).
3. NYS Department of Environmental Conservation Division of Fish, Wildlife, and Marine Services. "Technical Guidance for Screening Contaminated Sediments." (Table 1. Sediment Criteria for non-polar organic contaminants.)
   ♦ Criteria associated with human health through water usage and fish consumption.
   ♦♦ Criteria associated with aquatic (chronic).
4. NYS Surface Water and Groundwater Quality Standards (6 NYCRR Part 703, Section 703.5[f], Table 1). Peconic River is *Class C Surface Water*. http://www.dec.ny.gov/regs/4590.html.
   * Criteria associated with human health via fish consumption.
   ** Criteria associated with aquatic (chronic).
5. Applies to the sum of 1,2-; 1,3-; and 1,4-dichlorobenzene; or applies to the sum of 1,2,3-; 1,2,4-; and 1,3,5-trichlorobenzene.
6. Suspected laboratory blank contaminant.
7. This detection of tetrachloroethene may not be site-related.

TABLE 2-4
MAXIMUM GROUNDWATER DETECTIONS - OFFSITE ONLY
SOUTHERN AREA CORRECTIVE MEASURES STUDY
NWIRP CALVERTON, NY

Chemical	NYSDOH MCL [1]	National Ambient Water Quality Criteria[2]	NYS DEC Water Quality Criteria[3]	NYS "Class C" Surface Water Quality Standard [4]	Mamimum Result			Overall Maximum		
					2008	2009	2010	Overall	Location	Sample Date
Volatile Organic Compounds (µg/L)										
Acetone	50	--	--	--	ND	ND	6.3 J	6.3 J	SA-TW325	06/10/10
Benzene	5	2.2 †	6 ♦ 210 ♦♦	10 *	0.3 J	ND	1.9 J	1.9 J	SA-TW329	06/10/10
Butanone, 2-	50	--	--	--	ND	ND	2.1 J	2.1 J	SA-PZ140	06/10/10
Carbon Disulfide	50	--	--	--	0.5 J	ND	ND	0.5 J	SA-PZ125	08/08/08
Chlorobenzene	5	130 †	5.0 ♦♦	400 * 5 **	ND	ND	0.58 J	0.58 J	SA-PZ140	06/10/10
Chloroethane	5	--	--	--	0.7 J	ND	44	44	SA-PZ143	06/10/10
Chloroform	50	5.7 †	--	--	ND	2.9 J	1.3 J	2.9 J	SA-MW132S	09/09/09
Chloromethane	5	--	--	--	3	ND	ND	3	SA-PZ123I1	08/08/08
Dichlorobenzene, 1,2-	5	420 †	5.0 ♦♦ [5]	5 ** [5]	0.3 J	ND	1.6 J	1.6 J	SA-PZ143	06/10/10
Dichlorobenzene, 1,3-	5	320 †	5.0 ♦♦ [5]	5 ** [5]	ND	ND	1.2 J	1.2 J	SA-PZ140	06/10/10
Dichlorobenzene, 1,4-	5	63 †	5.0 ♦♦ [5]	5 ** [5]	0.6 J	ND	4.1 J	4.1 J	SA-PZ140	06/10/10
Dichloroethane, 1,1-	5	--	--	--	63	54	900	900	SA-TW329	06/10/10
Dichloroethane, 1,2-	5	0.38 †	24 ♦	--	0.6 J	ND	0.83 J	0.83 J	SA-PZ143	06/10/10
Dichloroethene, 1,1-	5	330 †	0.8 ♦	--	10	6.9	69	69	SA-TW329	06/10/10
Dichloroethene, cis-1,2-	5	--	--	--	2 J	1.4 J	ND	2 J	CA-PRSC-0201	01/08/08
Isopropyl Benzene / Cumene	5	--	2.6 ♦♦	--	2 J	ND	1.7 J	2 J	CA-PRSC-0202	01/08/08
Methyl tert-butyl ether	10	--	--	--	0.7 J	ND	ND	0.7 J	CA-PRSC-0203	01/08/08
Methylene Chloride	5	4.6 †	--	200 *	ND	ND	2.7 J	2.7 J	SA-PZ166I	09/10/10
Naphthalene	50	--	13 ♦♦	--	ND	3.4 J	7.9	7.9	SA-TW329	06/10/10
Toluene	5	1,300 †	100 ♦♦	6,000 *	ND	ND	2.3 J	2.3 J	SA-PZ143	09/10/10
Trichlorobenzene, 1,2,4-	5	35 †	5 ♦♦	5 ** [5]	1 J	ND	7.1 J	7.1 J	SA-PZ143	09/10/10
Trichloroethane, 1,1,1-	5	--	--	--	2	ND	170	170	SA-TW329	06/10/10
Trichloroethene	5	2.5 †	11 ♦	40 *	0.9 J	ND	0.75 J	0.9 J	CA-PRSC-0201	12/08/08
Vinyl Chloride	2	0.025 †	18 ♦	--	3	ND	2.4 J	3	SA-PZ123I	08/08/08
Xylenes (total)	5	--	65 ♦♦	--	ND	ND	0.42 J	0.42 J	SA-TW345	06/10/10

Shading indicates exceedance of criteria or standards

µg/L - micrograms per liter J - Estimated Value ND - nondetect -- Not available

1. New York State (NYS) Department of Health (NYSDOH) Maximum Contaminant Level (MCL). 10 NYCRR, Part 5, Subpart 5-1 Public Water Systems, Tables 1 through 3. http://www.health.ny.gov/regulations/nycrr/title_10/part_5/subpart_5-1_tables.htm#table1.
2. National Ambient Water Quality Criteria. http://water.epa.gov/scitech/swguidance/waterquality/standards/current/upload/nrwqc-2009.pdf.

† Criteria associated with human health through water usage and fish consumption.

‡ Criteria associated with aquatic (chronic).

3. NYS Department of Environmental Conservation (DEC) Division of Fish, Wildlife, and Marine Services. "Technical Guidance for Screening Contaminated Sediments." (Table 1. Sediment Criteria for non-polar organic

♦ Criteria associated with human health through water usage and fish consumption.

♦♦ Criteria associated with aquatic (chronic).

4. NYS Surface Water and Groundwater Quality Standards (6 NYCRR Part 703, Section 703.5[f], Table 1). Peconic River is *Class C Surface Water*. http://www.dec.ny.gov/regs/4590.html.

* Criteria associated with human health via fish consumption.

** Criteria associated with aquatic (chronic).

5. Applies to the sum of 1,2-; 1,3-; and 1,4-dichlorobenzene; or applies to the sum of 1,2,3-; 1,2,4-; and 1,3,5-trichlorobenzene.

TABLE 2-5
SURFACE WATER AND SEDIMENT DETECTIONS
SOUTHERN AREA CORRECTIVE MEASURES STUDY
NWIRP CALVERTON, NEW YORK

Chemical	Surface Water						Sediment		
	NYS "Class C" Surface Water Quality Standard (1)	National Ambient Water Quality Criteria(2)	NYS DEC Water Quality Criteria(3)	ORNL Surface Water Benchmark (4)	Maximum Detection	Location of Maximum Detection	ORNL Sediment Benchmark (5)	Maximum Detection	Location of Maximum Detection
Volatile Organic Compounds (µg/L for surface water) (µg/kg for sediment)									
Acetone	--	--	--	1,500	4.2 J (7)	SA-SW-201	8.7	130 J (7) (8)	SA-SD-124
Butanone, 2-	--	--	--	14,000	--	--	270	23 J (7)	SA-SD-124
Carbon Disulfide	--	--	--	0.92	--	--	0.85	3.4 J (8)	SA-SD-124
Dichlorobenzene, 1,4-	5 ** (6)	63 †	5.0 ♦♦ (6)	15	--	--	340	4.1 J	SA-SD-124
Dichloroethane, 1,1-	--	--	--	47	0.56 J	SA-SW-124	27	7.6 J	SA-SD-124
Hexanone, 2-	--	--	--	99	--	--	22	11 J (7)	SA-SD-125
Naphthalene	--	--	13 ♦♦	12	--	--	240	3.7 J (9)	SA-SD-125
Toluene	6,000 *	1,300 †	100 ♦♦	9.8	--	--	50	2.5 J (9)	SA-SD-125
Trichlorobenzene, 1,2,4-	5 ** (6)	35 †	5 ♦♦	110	4.9 J	SA-SW-124	9,600	9.7 J	SA-SD-124

Shading indicates exceedance of screening level.

NYSDEC = New York State Department of Environmental Conservation

µg/L - micrograms per liter µg/kg - micrograms per kilogram -- Not available J - estimated value

1. New York State (NYS) Surface Water Standards (6 NYCRR Part 703, Section 703.5[f], Table 1). Peconic River is *Class C Surface Water*. http://www.dec.ny.gov/regs/4590.html. There were no exceedances of NYS criteria.

   * Criteria associated with human health via fish consumption.

   ** Criteria associated with aquatic (chronic).

2. National Ambient Water Quality Criteria. http://water.epa.gov/scitech/swguidance/waterquality/standards/current/upload/nrwqc-2009.pdf.

† Criteria associated with human health through water usage and fish consumption.

‡ Criteria associated with aquatic (chronic).

3. NYS Department of Environmental Conservation (DEC) Division of Fish, Wildlife, and Marine Services. "Technical Guidance for Screening Contaminated Sediments." (Table 1. Sediment Criteria for non-polar organic contaminants.)

♦ Criteria associated with human health through water usage and fish consumption.

♦♦ Criteria associated with aquatic (chronic).

4. Oak Ridge National Laboratory (ORNL) surface water values - Table 1 (secondary chronic values), Toxilogical Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota: 1996 Revision (Suter and Tsao, 1996). http://www.esd.ornl.gov/programs/ecorisk/documents/tm96r2.pdf.

5. ORNL sediment quality benchmarks - Table 3 (secondary chronic values), Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota: 1997 Revision (Hull, Jones, and Suter II, 1997). http://www.esd.ornl.gov/programs/ecorisk/documents/tm95r4.pdf.

6. Applies to the sum of 1,2-; 1,3-; and 1,4-dichlorobenzene; or applies to the sum of 1,2,3-; 1,2,4-; and 1,3,5-trichlorobenzene.

7. Suspected laboratory blank contaminant.

8. Acetone and carbon disulfide were detected above the ORNL sediment quality standard, but are not considered site-related (based on plume concentrations near the river, surface water concentrations in the river, potential laboratory blank contamination [acetone], and infrequent detection in the sediment).

9. Potential anthropogenic chemical.

TABLE 2-6
SUMMARY OF CALCULATED RISKS
1995 BASELINE HHRA FOR SITE 6A - FUEL CALIBRATION AREA
SOUTHERN AREA CORRECTIVE MEASURES STUDY
NWIRP CALVERTON, NY

Medium	Exposure Route	Hazard Index			Incremental Cancer Risk		
		Current Maintenance Worker	Future Adult Resident	Future Child Resident	Current Maintenance Worker	Future Adult Resident	Future Child Resident
Soil	Incidental Ingestion	2.1×10^{-6}	8.8×10^{-3}	8.2×10^{-2}	3.6×10^{-8}	1.7×10^{-6}	NA
	Dermal Contact	1.4×10^{-5}	3.2×10^{-2}	5.4×10^{-2}	7.5×10^{-7}	6.4×10^{-6}	NA
Groundwater	Ingestion	NA	7.3	17	NA	2.1×10^{-3}	NA
	Dermal Contact	NA	0.49	0.85	NA	8.0×10^{-5}	NA
	Inhalation of Volatiles	NA	1.1	4.9	NA	2.8×10^{-4}	NA
Total		**1.6×10^{-5}**	**8.9**	**23.6**	**7.9×10^{-7}**	**2.5×10^{-3}**	**NA**

HHRA - human health risk assessment
NA - Exposure route not applicable for receptor, as noted
Baseline HHRA was performed during the RCRA Facility Investigation (Tetra Tech, 1995b).

TABLE 2-7
CHEMICALS OF CONCERN
SOUTHERN AREA CORRECTIVE MEASURES STUDY
NWIRP CALVERTON, NEW YORK

Benzene
Chloroethane
Dichlorobenzene, 1,2-
Dichlorobenzene, 1,3-
Dichlorobenzene, 1,4-
Dichloroethane, 1,1-
Dichloroethene, 1,1-
Ethylbenzene
Isopropylbenzene
Methylene Chloride
Naphthalene
Tetrachloroethene
Trichlorobenzene, 1,2,4-
Trichloroethane, 1,1,1-
Vinyl Chloride
Xylenes (total)

Chemical of Concern selected based on exceedance of New York State Department of Health Maximum Contaminant Level (see Table 2-3).

TABLE 3-1
SELECTION OF GROUNDWATER PRGS
SOUTHERN AREA CORRECTIVE MEASURES STUDY
NWIRP CALVERTON, NEW YORK

Groundwater Chemical of Concern	Southern Area Maximum Concentration (µg/L)	NYS MCL [1] (µg/L)	NYS "Class C" Surface Water Quality Standard [2] (µg/L)	Federal MCL (µg/L)	Selected Groundwater PRG [6] (µg/L)
Benzene	17	5	10 *	5	5
Chloroethane	970	5	--	--	5
Dichlorobenzene, 1,2- (ortho)	6.4	5	5 ** [3]	600	5
Dichlorobenzene, 1,3- (meta)	3	5	5 ** [3]	--	5
Dichlorobenzene, 1,4- (para)	13	5	5 ** [3]	75	5
Dichloroethane, 1,1-	2,100	5	--	--	5
Dichloroethene, 1,1-	110	5	--	7	5
Ethylbenzene	120	5	--	700	5
Isopropyl Benzene	35	5	--	--	5
Methylene Chloride	17 [4]	5	200 *	5	5
Naphthalene	190	50	--	--	50
Tetrachloroethene	190 [5]	5	--	5	5
Trichlorobenzene, 1,2,4-	7.1 J	5	5 ** [3]	70	5
Trichloroethane, 1,1,1-	1,200	5	--	200	5
Vinyl Chloride	8.1 J	2	--	2	2
Xylene	120	5	--	10,000	5

µg/L - micrograms per liter J - Estimated Value -- Not applicable

1. New York State (NYS) Maximum Contaminant Level (MCL). 10 NYCRR, Part 5, Subpart 5-1 Public Water Systems, Tables 1 through 3. http://www.health.ny.gov/regulations/nycrr/title_10/part_5/subpart_5-1_tables.htm#table1.
2. NYS Surface Water Quality Standards (6 NYCRR Part 703, Section 703.5[f], Table 1). http://www.dec.ny.gov/regs/4590.html.

   * Criteria associated with human health via fish consumption.
   ** Criteria associated with aquatic (chronic).
3. Applies to the sum of 1,2-; 1,3-; and 1,4-dichlorobenzene; or applies to the sum of 1,2,3-; 1,2,4-; and 1,3,5-trichlorobenzene.
4. Suspected laboratory blank contaminant.
5. This detection of tetrachloroethene may not be site-related.
6. Preliminary Remediation Goal (PRG) is selected based on most conservative criteria.

TABLE 4-1
GENERAL RESPONSE ACTIONS FOR GROUNDWATER
SOUTHERN AREA CORRECTIVE MEASURES STUDY
NWIRP CALVERTON, NEW YORK

General Response Action (GRA)	Effect Associated with Remedial Actions Objectives (RAOs)
No Action	None. Serves as a baseline to compare other response actions.
Institutional Controls	Reduces human exposure to groundwater by placing restrictions on aquifer use and activities that may result in exposure. Monitoring may be performed in conjunction with other alternatives to determine if RAOs are being met or if/when cleanup goals are met.
Containment	Minimizes or prevents the migration of contaminants in the groundwater to receptors.
Extraction/Treatment/ Discharge	Removes contaminants from the saturated zone by physical extraction of groundwater. Minimizes the likelihood of exposure to contaminants by extracting them from groundwater and placing them in a controlled environment.
In Situ Treatment	Treats contaminants in place via chemical, biological, and/or physical processes.

TABLE 4-2A
PRIMARY SCREENING OF GROUNDWATER REMEDIATION TECHNOLOGIES AND PROCESS OPTIONS
SOUTHERN AREA CORRECTIVE MEASURES STUDY
NWIRP CALVERTON, NEW YORK

General Response Action	Remedial Technology	Process Options	Description	Chemical Class				Comments	Advantages	Disadvantages	Primary Screening	
				SVOCs	VOCs**	Nutrients	Metals				Retain	Reject
No Action	None	Not applicable	No action provided. This process option is retained to provide the basis for comparing active process options and technologies.	✓	✓	✓	✓	This process option is retained to provide the basis for comparing active process options and technologies.	Low Cost.	Not protective.	X	
Institutional Controls	Administrative restrictions	Land-Use Controls (LUCs) / Deed Restrictions and Notices	LUCs issued for property within potentially contaminated areas to restrict property use and well installation.	✓	✓	✓	✓	Aids in preventing human activities that may increase impacts or exposure to contaminants (i.e., helps to prevent human exposure to COCs in groundwater and indoor air vapor issues resulting from COCs in groundwater). Current Navy property transfer documents limits use of onsite groundwater.	Normally combined with other technologies to enhance performance. Can be used for short-term or long-term remedies, and can be easily removed. Can be cost-effective.	Does not meet PRGs. Can limit short-term and possibly long-term site use. Requires legal documentation and administration of controls. Difficult to implement off site.	X	
	Access restrictions	Fences	Security fences installed around potentially contaminated areas to limit access.	✓	✓	✓	✓	Prevents public from entering site, and provides site security.	Effective restrictions and controls associated with the property/land.	Does not meet PRGs. May limit property transactions. Not relevant to groundwater restrictions (versus soil restrictions).		X
	Alternative Drinking Water Source	Cisterns or Tanks	Drinking water is dispensed to users from a central point.	✓	✓	✓	✓	Provides potable water supply to public in affected area.	Provides a drinking water source not impacted by COCs.	Does not meet PRGs. Space required to store tank. Cost associated with maintenance and distribution.		X
		Bottled Water	Drinking water is obtained from a commercial vendor.	✓	✓	✓	✓	Provides potable water supply to public in affected area.	Provides a drinking water source not impacted by COCs.	Does not meet PRGs. Cost of purchasing water. Inconvenient for public and does not provide for all potable water use.		X
		Deeper or Upgradient Wells	Wells are installed deep or upgradient if these areas are isolated from contamination.	✓✓	✓✓	✓✓	✓✓	Provides alternative water source from different area of same aquifer or deeper, unaffected aquifer.	Provides a drinking water and potable water source not impacted by COCs.	Does not meet PRGs. Installation and permitting of new wells. Subsequent pipelines required for distribution.		X
		Municipal Water Supply	Additional water sources are established.	✓✓	✓✓	✓✓	✓✓	Provides municipal water supply to public in affected area. **Note this is an action being taken by the Navy in 2011 for the PRSC area.**	Provides drinking water source not impacted by COCs.	Does not meet PRGs. Requires new construction and distribution of pipelines.		X
	Monitoring / Sampling	Performance and Compliance Monitoring	Sample media containing COCs and/or media at points of compliance.	✓✓	✓✓	✓✓	✓✓	Common component of groundwater remedies. Determine if remedy is working as intended: concentration trends, compliance with objectives and efficiency of remedy.	Minimal infrastructure and O&M required.	Labor intensive and long term monitoring may be required.	X	
	Monitored Natural Attenuation (MNA)	Intrinsic process and Performance Monitoring	Natural attenuation (all mechanisms including biodegradation, advection-dispersion, dilution, etc.) coupled with regular monitoring for the COCs as well as for other indicators of biodegradation.	✓✓	✓✓	✓✓	✓✓	Common component of groundwater remedies for lower concentration portion of plume. Determine if remedy is working as intended: concentration trends, compliance with objectives and efficiency of remedy. Evaluation of contaminant concentration and migration trends.	Minimal infrastructure and O&M required.	Labor intensive and long term monitoring may be required. MNA is limited by naturally existing physical, biological, and geochemical processes. Native geochemical and biological conditions may not be sufficient to completely reduce the contaminant source, so MNA relies on the slower diffusion and dispersion and additional actions may be required.	X	

TABLE 4-2A
PRIMARY SCREENING OF GROUNDWATER REMEDIATION TECHNOLOGIES AND PROCESS OPTIONS
SOUTHERN AREA CORRECTIVE MEASURES STUDY
NWIRP CALVERTON, NEW YORK

General Response Action	Remedial Technology	Process Options	Description	Chemical Class				Comments	Advantages	Disadvantages	Primary Screening	
				SVOCs	VOCs**	Nutrients	Metals				Retain	Reject
Containment	Vertical barriers	Slurry wall, sheet piling, vibrating barrier wall, etc.	Physical subsurface barrier (potentially involving a chemical treatment option) to contain/prevent contaminated groundwater flow.	✓✓	✓✓	✓✓	✓✓	Isolates and/or contains contamination; therefore effective for [preventing migration of] most contaminants. Extraction and air sparge technologies can also provide a barrier type action.	Effective for limiting migration and impacted media volume through containment. Effective technology when combined with in situ or ex situ remediation process options.	Technically impracticable to install wall deep and wide enough to contain impacted groundwater plume in a permeable aquifer.		X
Collection / Treatment / Discharge	Extraction	Vertical or horizontal extraction wells	Series of wells to extract contaminated groundwater. Drilling techniques are used to position wells vertical or horizontally (or at an angle as applicable).	✓✓	✓✓	✓✓	✓✓	Effective for managing migration of soluble contaminants such as VOCs.	This is a conventional and well-established technology to provide hydraulic control of plumes. It can be combined with a wide range of different technologies specific to the contaminants present in the groundwater.	This is not always effective for the removal of contaminants, contaminants must migrate to area of extraction. It may require long-term operation at some sites, especially if it is a stand-alone remedy.	X	
		Collection trenches	Perforated pipe in trenches backfilled with porous media to collect water.	✓✓	✓✓	✓✓	✓✓	Same as vertical or horizontal extraction wells.	Same as vertical or horizontal extraction wells.	Same as vertical or horizontal extraction wells. Physical environmental conditions (forest and wetlands habitats) preclude trenching technologies at the Southern Area.		X
	Chemical treatment	Chemical oxidation	Extracted contaminated water mixed with an oxidant, such as hydrogen peroxide, permanganate, ozone, to destroy the organic compounds.	✓	✓			Direct conversion of VOCs to carbon dioxide and water, or less toxic organic alcohols and ketones.	Good control of dosing and treatment efficacy. Destroys or alters organic contaminants to less toxic or non-toxic forms.	Requires groundwater capture and recovery. Requires significant O&M to ensure desired results. Cost usually higher than other more common ex situ treatment methods (such as activated carbon). Lower sustainability ranking.		X
		Chemical Reduction	Reduction agents added to extracted wastes for reduction of metals to more stable forms.		✓		✓	Typically used for metals that are more toxic in a highly oxidized state (e.g., hexavalent chromium).	Effective for metals and some concentrated organic wastes.	No applicable to chlorinated VOCs in low concentration plumes.		X
	Physical Treatment	Ion exchange, Precipitation and Filtration	Physical removal and a change chemical equilibrium to reduce solubility of contaminants, usually metals. Precipitates are separated from water by an applied pressure which forces water through the filter while retaining solids.			✓	✓✓	Typically used for inorganic chemicals in water. A wide range of ion exchange resins and chemicals can be used to treat a wide range of contaminants.	Well-established technologies that can treat a variety of ionizable metals and some nutrients. Effective for both cationic and anionic compounds.	No applicable to chlorinated VOCs in low concentration plumes.		X
		Air stripping	Large volumes of air mixed with water in a packed column to promote transfer of VOCs to air.		✓✓			Common technology for removing CVOCs.	Well-established technology for treating CVOCs.	Requires groundwater capture and recovery. May require treatment of air discharge.	X	
		Carbon adsorption	Contaminants adsorbed onto activated carbon by passing contaminated water or air through a carbon column.	✓✓	✓			Common technology for removing CVOCs from water.	Well-established technology for treating CVOCs.	Requires groundwater capture and recovery. Carbon requires offsite treatment or disposal. Not as cost effective for poorly adsorbed CVOCs such at DCA.	X	
	Discharge of treated groundwater	Wastewater treatment system/plant	Treated groundwater discharged to municipal or onsite wastewater treatment plant system.					Common technology for treating biodegradable organics.	Can be convenient method of water discharge with pretreatment or directly.	On-site wastewater treatment plant will not be able to treat high volumes of low BOD water.		X
		Reuse	Use treated groundwater for facility or offsite use.					Common technology in water deficient area.	Effective water reuse method.	Water is relatively abundent in eastern Long Island and not required.		X

TABLE 4-2A
PRIMARY SCREENING OF GROUNDWATER REMEDIATION TECHNOLOGIES AND PROCESS OPTIONS
SOUTHERN AREA CORRECTIVE MEASURES STUDY
NWIRP CALVERTON, NEW YORK

General Response Action	Remedial Technology	Process Options	Description	Chemical Class				Comments	Advantages	Disadvantages	Primary Screening	
				SVOCs	VOCs**	Nutrients	Metals				Retain	Reject
Treatment (In situ)	Discharge of treated groundwater	Recharge	Recharge of treated groundwater to the contaminated aquifer via injection wells or infiltration trench.					Common technology where large areas of permeable soil are present.	Effective water discharge option for this area.	When suspended solids or biodegradable organics are present, infiltration galleries are subject to fouling over time.	X	
		Surface water	Treated groundwater discharged into a nearby Peconic River.					Common technology where surface water bodies are present.	Common method and permitting needs are well-established. Potential portion of an extraction alternative.	Requires permitting for direct or indirect discharge to McKay Lake.		X
	Chemical	In Situ Chemical Oxidation (ISCO)	Oxidant such as permanganate, hydrogen peroxide, persulfate, Fenton's reagent, or ozone is injected, which chemically oxidizes organic contaminants to less harmful or totally harmless compounds such as carbon dioxide and water depending on the oxidant and the pH in the treatment zone.	✓✓	✓✓			ISCO is normally used for high strengh organic plumes.	ISCO rapidly lowers high concentrations of dissolved organic compounds. Treats both chlorinated and nonchlorinated VOCs.	The effective placement of the oxidant is often difficult, and uniform distribution is more complex. Subsurface fouling may occur due to deposition of oxides during reactions that can reduce ISCO effectiveness over time. Can significantly affect the properties of the aquifer.		X
		Permeable Reactive Barrier (PRB)	Treats groundwater plume as it passes through a permeable reactive zone (natural or induced gradient). Reactive zone may be a combination of physical, chemical, and biological processes. May also include measures, such as low-permeability barriers, to channel groundwater towards treatment zone. Chemical reductants such as zero valence iron are typical PRB applications to treat CVOCs.	✓✓	✓✓	✓✓	✓✓	Several type of reactive media such as zero valence iron, lime, organic mulches, phosphate materials have been used to remove a wide range of contaminants. Chemical reductants such as zero valence iron are typical PRB applications to treat CVOCs.	PRB walls generally provide an effective method of isolating contaminants and preventing further downgradient migration beyond the wall. No O&M is required other than periodic replacement/recharge of spent material.	Thick, deep or long barriers can be very expensive. Deep barriers may be logistically difficult/impossible. Structures, property access, and utility conflicts can make continuous barriers difficult. Naturally occurring sulfates in the aquifer may consume the chemical reductant media at a greater rate than the contaminants, reducing the effectiveness over time. Physical environmental conditions preclude trenching technologies at the Southern Area.		X
		In Situ Chemical Reduction (ISCR)	Reduction agents (zero valence iron, polysulfide, dithionate, ferrous sulfate, etc.) to alter state, promote precipitate or form less soluble, more stable compounds.		✓✓	✓✓	✓✓	ISCR technology is similar to in situ bioremediation where reagents are injected into the subsurface using wells to treat CVOCs. ISCR is also used for treatment of metals.	There are no long-term O&M costs after installation (other than potentially having to reapply material periodically).	ZVI can be difficult to distribute uniformly in the subsurface. Not effective for large distal plumes. Installation of many injection wells.		X
	Physical treatment	Air Sparging	Air injected into groundwater through a system of vertical wells or horizontal perforated pipes to remove VOCs.	✓✓	✓✓			Mainly designed for VOCs this technology has proven effective. Can be used as a cutoff / prevention of migration process option.	Air sparging can be implemented with standard well constructions (vertical or horizontal), and doesn't require specialized tools for installation or operation. Air is the only amendment introduced to the subsurface. No waste stream is generated.	Long term O&M may be required if operated as a containment current. Multiple injection wells are typically required.	X	
		Biosparging	Similar to air sparging: air or oxygen is introduced to stimulate aerobic degradation of hydrocarbons and VOCs.	✓✓	✓			For stimulating or enhancing aerobic biodegradation and inherently removing VOCs just like AS process option.	Primarily used for hydrocarbons. AS systems can be converted to biosparging systems.	Only partially effective for CVOCs.		X

TABLE 4-2A
PRIMARY SCREENING OF GROUNDWATER REMEDIATION TECHNOLOGIES AND PROCESS OPTIONS
SOUTHERN AREA CORRECTIVE MEASURES STUDY
NWIRP CALVERTON, NEW YORK

General Response Action	Remedial Technology	Process Options	Description	Chemical Class				Comments	Advantages	Disadvantages	Primary Screening	
				SVOCs	VOCs**	Nutrients	Metals				Retain	Reject
Treatment (In situ)	Physical treatment	Electrical Resistive Heating	Involves installation of electrodes in hexagonal or three point arrays and application of high voltage electrical power to cause boiling of volatile compounds in groundwater.		✓✓			High energy and health and safety issues during implementation. But applicable for both chlorinated and nonchlorinated VOCs.	Effectively removes volatiles quickly.	Cost prohibitive and technically challenging due to depth and extent of contamination. Requires follow-on ex situ treatment. Extensive network of heating points and electrical wiring would be required. Very high power consumption.		X
		Dual-Phase Extraction	Use of groundwater collection system to lower water table to expose soil. Soil vapor extraction is then used to removed absorbed or trapped contaminants.	✓✓	✓✓			Not appliable to deep groundwater contaminant plumes.	Not appliable to deep groundwater contaminant plumes.	Not appliable to deep groundwater contaminant plumes.		X
		Hydraulic Fracturing	High-pressure injection of fluids, followed by granular slurry or *proppant* , to create subsurface fracture patterns that enhance injection material distribution, increase probability of COC contact and increase contact time.	✓✓	✓✓	✓✓	✓✓	Not applicable to sandy aquifers.	Not applicable to sandy aquifers.	Not applicable to sandy aquifers.		X
		Pneumatic Fracturing	High-pressure injection of air or nitrogen to create self-propped subsurface fracture patterns that enhance injection material distribution, increase probability of COC contact and increase contact time. Also can complement vapor and fluid extraction technologies The fracturing extends and enlarges existing fissures and introduces new fractures, primarily in the horizontal direction.	✓✓	✓✓	✓✓	✓✓	Not applicable to sandy aquifers.	Not applicable to sandy aquifers.	Not applicable to sandy aquifers.		X
	Biological treatment	Enhanced In Situ Aerobic Bioremediation	Stimulation of indigenous microorganisms to degrade the chemical by injecting oxygen, nutrients, and/or oxygen-releasing substrates.	✓✓				Used primarily for hydrocarbons, oxygen generating compounds can be used, but additional nutrients such as nitrogen/phosphorus are added.	Supply of oxygen to increase aerobic degradation of less oxidized, less chlorinated compounds such as chloroethane.	Requires frequent injections/replacement of oxygen compounds and nutrients. Would be less effective for anaerobic environments. Highly oxidized and highly chlorinated VOCs (TCA and DCA) will not be readily biodegraded under aerobic conditions.		X
		Enhanced In Situ Anaerobic Bioremediation	Use of an organic substrate such as lactate, molasses, or vegetable oil to promote anaerobic biodegradation of CVOCs via reductive dechlorination pathway. Applied via injection, in excavation, or biomulch barrier wall.		✓✓	✓	✓	Effective for low to moderate concentrations of dissolved-phase CVOCs, especially where natural degradation is limited by biodegradable organics.	Provides long term remediation with limited O&M. Works well on low concentration plumes.	Intermediate degradation products are generated which may adversely impact secondary water quality or vapor intrusion.	X	

TABLE 4-2A
PRIMARY SCREENING OF GROUNDWATER REMEDIATION TECHNOLOGIES AND PROCESS OPTIONS
SOUTHERN AREA CORRECTIVE MEASURES STUDY
NWIRP CALVERTON, NEW YORK

General Response Action	Remedial Technology	Process Options	Description	Chemical Class				Comments	Advantages	Disadvantages	Primary Screening	
				SVOCs	VOCs**	Nutrients	Metals				Retain	Reject
Treatment (In situ)	Biological treatment	Bioaugmentation	Typically only conducted if initial enhancement alone does not meet PRGs. Bioaugmentation is the injection of contaminant-specific nonindigenous native or engineered microorganisms to the subsurface to promote biodegradation.		✓✓			Commonly used for CVOCs. Cultures are available for chlorinated ethenes, ethanes, and methanes. Typically not necessary on the East Coast of the U.S. (indigenous dehalogenating bacteria are typically present throughout). Appropriate bacteria already identified in the Southern Area.	Effective for sites that lack capability of complete dechlorination.	Usually requires a two step process to evaluate and implement. Cultures require specific geochemical conditions before injection of cultures can be conducted.		X
		MNA	Natural attenuation (all mechanisms including biodegradation, advection-dispersion, dilution, etc.) coupled with regular monitoring for the COCs as well as for other indicators of biodegradation.	✓✓	✓✓	✓	✓	Physical, biological and geochemical conditions must be suitable for attenuation without adjustments to the natural conditions. Potential approach for use with other active remedial alternatives, especially in situ biodegrdation. Will likely be a component of any remedial alternative.	MNA does not require infrastructure installation except for a network of monitoring points. It does not rely on delivery of amendments to subsurface. There is no O&M, other than monitoring well maintenance.	MNA alone takes a longer time to achieve PRGs than other more aggressive remedies. MNA is limited by naturally existing physical, biological, and geochemical processes. Native geochemical and biological conditions may not be sufficient to completely reduce the contaminant source, so MNA relies on the slower diffusion and dispersion.	X	
		Phytoremediation	Use of plants, grasses, and trees to remove and transform or evapotranspire contaminants. Also for hydraulic control in arid regions.	✓✓	✓✓	✓✓	✓✓	Water table (and entire depth of contamination) needs to be within reach of plant roots. Geologic confining layer must be within influence of plant groundwater extraction for hydraulic control or contaminant sequestration.	Phytoremediation and wetland systems are self-sustaining.	This technology cannot be applied at the Southern Area, because the contamination is too deep and there is a net infiltration of precipitation.		X

** Volatile organic compounds (VOCs) (mostly chlorinated) are the Chemicals of Concern (COCs) in groundwater at the Southern Area.
✓ - indicates that the technology has been proven effective for at least a portion of the chemical class at a number of sites

✓✓ - indicates technology is commonly used
CVOCs - chlorinated volatile organic compounds
DCA - 1,1-dichloroethane
ISCO - Insitu Chemical Oxidation
LUCs - Land Use Controls
MNA - Monitored Natural Attenuation
O&M - Operation and Maintenance
PRB - Permeable Reactive Barrier
PRGs - Preliminary Remediation Goals
VOC - volatile organic compounds
SVOCs - semivolatile organic compounds
ZVI - Zero Valence Iron

TABLE 4-2B
SEDONDARY SCREENING OF GROUNDWATER REMEDIATION TECHNOLOGIES AND PROCESS OPTIONS
SOUTHERN AREA CORRECTIVE MEASURES STUDY
NWIRP CALVERTON, NEW YORK

General Response Action	Remedial Technology	Process Options	Description	Secondary Screening			
				Effectiveness	Implementability	Relative Cost	Screening comments
No Action	None	Not applicable	No action provided. This process option is retained to provide the basis for comparing active process options and technologies.	Not effective, does not achieve PRGs and there is no evaluation of potential impacts to human health and the environment.	Readily implementable, no actions required.	Very low.	**Retained.** Provides basis of comparison to other process options and remediation technologies.
Institutional Controls	Administrative restrictions	Land-Use Controls (LUCs) / Deed Restrictions and notices	LUCs issued for property within potentially contaminated areas to restrict property use and well installation.	Effective in controlling groundwater use for onsite areas, less effective in controlling groundwater use in offsite areas.	Easy to implement on the facility. Would be difficult in offsite areas.	Very low.	**Retained.** Will be implemented with other alternatives.
	Monitoring / Sampling	Performance and Compliance Monitoring	Sample media containing COCs and/or media at points of compliance.	Provides performance and compliance monitoring data.	Easily implemented. Generate monitoring plan and sample on established schedule.	Low annual costs, but long-term costs are moderate because of extended period of operation.	**Retained.** Necessary component of any action alternative.
	Monitored Natural Attenuation (MNA)	Intrinsic process and Performance Monitoring	Natural attenuation, including biodegradation, advection-dispersion, dilution, etc.) coupled with regular monitoring for the COCs as well as for other indicators of	Effective for sites such as this where there are no unacceptable current risks (no exposure) and future risks are minimal.	Easily implemented, only monitoring well installation and sampling would be required to monitor the progress. Because of access agreements, offsite monitoring locations would be more difficult to implement.	Low annual costs, but long-term cost are moderate because of extended period of operation.	**Retained.** Other alternatives may include MNA as a component.
Collection / Treatment / Discharge	Extraction	Vertical or horizontal extraction wells	Series of wells to extract contaminated groundwater. Drilling techniques are used to position wells vertical or horizontally, or at an angle.	Extraction wells may serve two purposes: containment by hydraulic control and removal of contaminated groundwater.	Easily implemented in areas with permeability soils. Long-term O&M and water treatment or disposal. Because of access agreements, offsite extraction locations would be more difficult to implement.	Moderate	**Retained**.
		Air stripping	Large volumes of air mixed with water in a packed column to promote transfer of VOCs to air.	Very effective. Generally over 95% removal of VOCs.	Evaluation of air discharge quality to determine treatment requirements.	Moderate.	**Retained.** Potentially necessary component of extraction.
		Carbon adsorption	Contaminants adsorbed onto activated carbon by passing contaminated water or air through a carbon column.	Very effective for treatment of most VOCs. Carbon demand is dependent on groundwater flow rate and concentration of VOCs.	Forms a waste stream that requires offsite disposal.	Moderate to high. There are costs to regenerate and replace GAC.	**Not selected.** Use air stripping technology for treatment.
	Discharge of treated groundwater	Recharge	Recharge of treated groundwater to the contaminated aquifer via injection wells or infiltration trench.	Effective means of discharge treated water at site.	Easy to implement. Facility has a large area of open space available.	Moderate.	**Retained.** Potentially necessary component of extraction.
Treatment (In situ)	Biological Treatment	Enhanced In Situ Anaerobic Bioremediation	Use of an organic substrate such as lactate, molasses, or vegetable oil to promote anaerobic biodegradation of VOCs via reductive dechlorination pathway. Applied via injection, excavation, or biomulch barrier wall.	Technology is expected to be relatively effective under site conditions. Injection well 'biowall' configuration works well on dissolved-phase plume.	Relatively straight forward, well-established, but would require many injection well installations. Biomulch walls will not be considered because of depth of contamination. Because of access agreements, offsite injection locations would be more difficult to implement.	Medium-High considering size of plume. Considered cost-effective in general for sites, and is cheaper than chemical treatment technologies and conventional pump and treat systems.	**Retained.**
		MNA	Natural attenuation (all mechanisms including biodegradation, advection-dispersion, dilution, etc.) coupled with regular monitoring for the COCs as well as for other indicators of biodegradation.	Effective for sites such as this where there are no unacceptable current risks (no exposure) and future risks are minimal.	Easily implemented. Only monitoring would be required to monitor the progress. Because of access agreements, offsite monitoring locations would be more difficult to implement.	Moderate.	**Retained.**
	Physical Treatment	Air Sparge	Air injected into groundwater through a system of vertical wells or horizontal perforated pipes to remove VOCs.	Effective in treating VOCs by stripping.	Easy to implement. Because of access agreements, offsite locations would be more difficult to implement.	Moderate.	**Retained.**

LUC - Land use controls

PRG - Preliminary remediation goals

TABLE 4-2B
SEDONDARY SCREENING OF GROUNDWATER REMEDIATION TECHNOLOGIES AND PROCESS OPTIONS
SOUTHERN AREA CORRECTIVE MEASURES STUDY
NWIRP CALVERTON, NEW YORK

General Response Action	Remedial Technology	Process Options	Description	Secondary Screening			
				Effectiveness	Implementability	Relative Cost	Screening comments

MNA - Monitored Natural Attenuation
COCs - Chemical of concern
VOC - Volatile organic compound
** Volatile organic compounds (VOCs) are the CERCLA Chemicals of Concern (COCs) in groundwater at the Southern Area.
Effectiveness is the ability to perform as part of an overall alternative that can meet the objective under conditions and limitations that exist onsite
Implementability is the likelihood that the process could be implemented as part of the remedial action plan under the physical, regulatory, technical, and schedule constraints.
Relative cost is for comparative purposes only and it is judged relative to the other processes and technologies that perform similar functions.

TABLE 4-3
SUMMARY OF TECHNOLOGIES AND PROCESS OPTIONS RETAINED FOR DEVELOPMENT AND EVALUATION
SOUTHERN AREA CORRECTIVE MEASURES STUDY
NWIRP CALVERTON, NEW YORK

General Response Action (GRA)	Remedial Technology Type	Process Option	Description	Area of Consideration
No Action	None	Not Applicable.	No action provided. This process option is retained to provide the basis for comparing active process options and technologies.	This will provide a basis of comparison to other process options and remediation technologies.
Institutional Controls	Administrative restrictions	Land-Use Controls (LUCs) (or Deed Restrictions and notices)	LUCs issued for property within potentially contaminated areas to restrict property use and well installation. Navy does not deed-restrict federal property; however, if property is transferred to non-Federal entity in the future before cleanup levels are met, a notice would be necessary. Deed restrictions may be necessary for offsite property. The Navy developed and deployed a Web-based management tool, *LUC Tracker* , as part of the Naval Installation Restoration Information System.	Groundwater PRG Attainment Area boundary. Applies to exposure to COCs in groundwater and potential indoor air vapor in any new or modified buildings resulting from COCs in groundwater.
	Sampling	Performance and Compliance Monitoring	Sample media containing COCs and/or media at points of compliance.	Groundwater PRG Attainment Area boundary (performance groundwater monitoring). Possible monitoring in the Peconic River (sediment and surface water) during remedy. Performed with any process option until RAOs are achieved.
	Monitored Natural Attenuation (MNA)	Intrinsic process and Performance Monitoring	Natural attenuation (all mechanisms including biodegradation, advection-dispersion, dilution, etc.) coupled with regular monitoring for the COCs as well as for other indicators of biodegradation.	Sample network throughout the Groundwater PRG Attainment Area boundary, upgradient, and downgradient. Standalone alternative or in combination with another technology. Also considered a process option of the Biological Treatment technology type.
Collection / Treatment / Discharge	Extraction	Vertical or horizontal extraction wells	Series of wells to extract contaminated groundwater. Drilling techniques are used to position wells vertical or horizontally, or at an angle.	Vertical extraction wells in a barrier orientation at facility property line and at Peconic River.
	Physical Treatment	Air stripping	Large volumes of air mixed with water in a packed column to promote transfer of VOCs to air.	Potential component of extraction.
		Carbon adsorption	Contaminants adsorbed onto activated carbon by passing contaminated water or air through a carbon column.	Potential component of extraction.
	Discharge of treated groundwater	Wastewater treatment plant	Treated groundwater discharged to municipal or onsite wastewater treatment plant system.	Potential component of extraction.
		Recharge	Treated groundwater re-injected into the aquifer upgradient of extraction zones.	Potential component of extraction.
		Surface water	Treated groundwater discharged into a nearby River.	Potential component of extraction.

TABLE 4-3
SUMMARY OF TECHNOLOGIES AND PROCESS OPTIONS RETAINED FOR DEVELOPMENT AND EVALUATION
SOUTHERN AREA CORRECTIVE MEASURES STUDY
NWIRP CALVERTON, NEW YORK

General Response Action (GRA)	Remedial Technology Type	Process Option	Description	Area of Consideration
Treatment (In Situ)	Physical Treatment	Air sparging	Air injected into groundwater through a system of vertical wells or horizontal perforated pipes to remove VOCs. May be combined with soil vapor extraction to collect VOCs.	Air sparge wells in horizontal orientation throughout the former source area and potentially in vertical orientation for cutoff before the Peconic River.
	Biological Treatment	Enhanced In Situ Anearobic Bioremediation	Use of an organic substrate such as lactate, molasses, or vegetable oil to promote anaerobic biodegradation of VOCs via reductive dechlorination pathway.	Injection wells in grid-like pattern for any 'hot spot'' application and injection well barrier wall configuration throughout dissolved-phase plumes (based on groundwater travel time and contaminant contact time).
		Monitored Natural Attenuation (MNA)	Natural attenuation (all mechanisms including biodegradation, advection-dispersion, dilution, etc.) coupled with regular monitoring for the COCs as well as for other indicators of biodegradation.	Sample network throughout the Groundwater PRG Attainment Area boundary, upgradient, and downgradient. Standalone alternative or in combination with another technology.

TABLE 5-1
CRITERIA ANALYSIS FACTORS AND CONSIDERATIONS
SOUTHERN AREA CORRECTIVE MEASURES STUDY
NWIRP CALVERTON, NEW YORK

Analysis Factors	Considerations
Criterion 1 – Overall Protection of Human Health and the Environment	
Human Health Protection	Describes how the alternative reduces risk to human health through exposure to contaminants in soil by direct contact, ingestion, or inhalation.
Environmental Protection	Describes how the alternative reduces the threat to unaffected groundwater, soil, surface water, and sediment.
	Likelihood that the alternative reduces risk to ecological receptors.
Criterion 2 – Media Cleanup Standards	
	Discusses achievement of preliminary remediation goals and estimated time required to achieve compliance.
Criterion 3 - Source Control	
	Discusses the steps taken in order to control or eliminate source areas.
Criterion 4 - Waste Management Standards	
	Evaluates the type of wastes that would be generated, RCRA status as hazardous or non-hazardous.
Other NCP Factors - Compliance with ARARs	
Chemical-specific ARARs	Likelihood that the alternative will achieve compliance with chemical-specific ARARs within a reasonable time.
	If it appears that compliance with chemical-specific ARARs will not be achieved, then evaluation of whether a waiver is appropriate must be completed.
Location-specific ARARs	Determination of whether any location-specific ARARs (e.g., preservation of wetlands) apply to the alternative.
	Likelihood that the alternative will achieve compliance with the location-specific ARAR.
	If the location-specific ARAR cannot be met, evaluation of whether a waiver is appropriate must be completed.
Action-specific ARARs	Likelihood that the alternative will achieve compliance with action-specific ARARs (e.g., hazardous waste treatment regulations).
Other Criteria and Guidance	Likelihood that the alternative will achieve compliance with other criteria, such as risk-based criteria.
Other NCP Factors - Long-term Effectiveness and Permanence	
Magnitude of Residual Risks	Identification of remaining risks (risks from treatment residuals) as well as risks from untreated residual contamination.
	Magnitude of the remaining risks.
Adequacy and Reliability of Controls	Likelihood that the technologies will meet required process efficiencies or performance specifications.
	Type and degree of long-term management required.
	Long-term monitoring requirements.
	O&M functions that must be performed.
	Difficulties and uncertainties associated with LTO&M functions.
	Potential need for technical components replacement.
	Magnitude of threats or risks should the remedial action need replacement.
	Degree of confidence that controls can adequately handle potential problems.
	Uncertainties associated with land disposal of residuals and untreated wastes.

TABLE 5-1
CRITERIA ANALYSIS FACTORS AND CONSIDERATIONS
SOUTHERN AREA CORRECTIVE MEASURES STUDY
NWIRP CALVERTON, NEW YORK

Analysis Factors	Considerations
Other NCP Factors - Reduction of Toxicity, Mobility, or Volume through Treatment	
Treatment Process and Remedy	Likelihood that the treatment process addresses the principal threat.
	Special requirements for the treatment process.
Amount of Hazardous Material Destroyed or Treated	Portion (mass) of contaminant that is destroyed.
	Portion (mass) of contaminant that is treated.
Reduction in Toxicity, Mobility, or Volume	Extent that the total mass of contaminants is reduced.
	Extent that the mobility of contaminants is reduced.
	Extent that the volume of contaminants is reduced.
Irreversibility of Treatment	Extent that the effects of the treatment are irreversible.
Type and Quantity of Treatment Residual	Residuals that will remain.
	Quantities and characteristics of the residuals.
	Risk posed by the treatment.
Statutory Preference for Treatment as a Principal Element	Extent to which the scope of the action covers the principal threats.
	Extent to which the scope of the action reduces the inherent hazards posed by the principal threats at the site.
Other NCP Factors - Short-term Effectiveness	
Protection of the Community during the Remedial Action	Risks to the community that must be addressed.
	How the risks will be addressed and mitigated.
	Remaining risks that cannot be readily controlled.
Protection of Workers during Remedial Actions	Risks to the workers that must be addressed.
	How the risks will be addressed and mitigated.
	Remaining risks that cannot be readily controlled.
Environmental Impacts	Environmental impacts that are expected with the construction and implementation of the alternative.
	Mitigation measures that are available and their reliability to minimize potential impacts.
	Impacts that cannot be avoided, should the alternative be implemented.
Time until RAOs Are Achieved	Time to achieve protection against the threats being addressed.
	Time until any remaining threats are addressed.
	Time until RAOs are achieved.
Other NCP Factors - Implementability	
Technical Feasibility	
Ability to Construct and Operate the Technology	Difficulties associated with the construction.
	Uncertainties associated with the construction.
Reliability of the Technology	Likelihood that technical problems will lead to schedule delays.
Ease of Undertaking Additional Remedial Action	Likely future remedial actions that might be anticipated.
	Difficulty implementing additional remedial actions.
Monitoring Considerations	Migration or exposure pathways that cannot be monitored adequately.
	Risks of exposure, should the monitoring be insufficient to detect failure.
Administrative Feasibility	
Coordination with Other Agencies	Steps required to coordinate with regulatory agencies.
	Steps required to establish long-term or future coordination among agencies.
	Ease of obtaining permits for offsite activities, if required.

TABLE 5-1
CRITERIA ANALYSIS FACTORS AND CONSIDERATIONS
SOUTHERN AREA CORRECTIVE MEASURES STUDY
NWIRP CALVERTON, NEW YORK

Analysis Factors	Considerations
Availability of Services and Materials	
Availability of Treatment, Storage Capacity, and Disposal Services	Availability of adequate treatment, storage capacity, and disposal services.
	Additional capacity that is necessary.
	Whether lack of capacity prevents implementation.
	Additional provisions required to ensure that additional capacity is available.
Availability of Necessary Equipment and Specialists	Availability of adequate equipment and specialists.
	Additional equipment or specialists that are required.
	Whether there is a lack of equipment or specialists.
	Additional provisions required to ensure that equipment and specialists are available.
Availability of Prospective Technologies	Whether technologies under consideration are generally available and sufficiently demonstrated.
	Further field applications needed to demonstrate that the technologies could be used full scale to treat the waste at the site.
	When technology should be available for full-scale use.
	Whether more than one vendor will be available to provide a competitive bid.

TABLE 5-2
MONITORED NATURAL ATTENUATION PERFORMANCE MONITORING OBJECTIVES
SOUTHERN AREA CORRECTIVE MEASURES STUDY
NWIRP CALVERTON, NEW YORK

MNA Objective	Evaluation for Southern Area
1 Demonstrate that natural attenuation is occurring according to expectations.	Section 2.2 provides a discussion of the plume throughout the Southern Area. The plume appears to have stabilized because of natural attenuation processes and is expected to start shrinking as a result of the source area remedial actions in 2008 through 2010. Further spatial and temporal data will be collected and evaluated during baseline sampling and performance monitoring.
2 Detect changes in environmental conditions (e.g., hydrogeologic, geochemical, or microbiological) that may reduce the efficacy of any of the natural attenuation processes.	None detected during recent investigations. Additional spatial and temporal data is currently being collected during annual sampling and performance monitoring.
3 Identify any potentially toxic and/or mobile transformation products.	CVOC breakdown products were identified and delineated during various groundwater investigations. Breakdown products of the COCs will continue to be monitored along with the COCs (some of the COCs are breakdown products of TCA) during remedy implementation.
4 Verify that the plume is not expanding downgradient, laterally or vertically.	The plume has stabilized due to natural attenuation processes and is limited by the discharge to the Peconic River. Further spatial and temporal data will be collected and evaluated during annual sampling and performance monitoring.
5 Verify no unacceptable impact to downgradient receptors.	The concentrations of COCs in groundwater have attenuated to concentrations below surface water standards by the time groundwater has reached and discharges into the Peconic River and the Navy is implementing an action to provide potable water to PRSC. However, the groundwater within the Attainment Area (AA) would need to be restricted from use by the LUC component of the MNA alternative.
6 Detect new releases of contaminants to the environment that could impact the effectiveness of the natural attenuation remedy.	There are no known continuing-source areas.
7 Demonstrate the efficacy of institutional controls that were put in place to protect potential receptors.	LUCs will be implemented and enforced as part of remedy implementation.
8 Verify attainment of remediation objectives.	Attainment of RAOs will be evaluated throughout MNA. The remedy will be considered complete when the data show cleanup levels have been met within the AA.

Notes:

The eight EPA (1999b and 2004) objectives for performance monitoring of the Monitored Natural Attenuation (MNA) portion of Alternative 3 are discussed in Section 5.

USEPA. 1999b. *Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites*. Office of Solid Waste and Emergency Response (OSWER) Directive 9200.4-17P. April 21.

USEPA. 2004. *Performance Monitoring of MNA Remedies for VOCs in Ground Water*. EPA/600/R-04/027. April.

TABLE 6-1
COMPARATIVE ANALYSIS OF SOUTHERN AREA GROUNDWATER CMS
NWIRP CALVERTON, NEW YORK

Criteria	Alternative 1 No Action	Alternative 2 Land-Use Controls (LUCs)	Alternative 3 Monitored Natural Attenuation (MNA) & LUCs	Alternative 4 Air Sparge, MNA, & LUCs	Alternative 5 Anaerobic Enhanced In Situ Bioremediation (EISB), MNA, & LUCs	Alternative 6 Air Sparge, Anaerobic EISB, MNA, & LUCs	Alternative 7 Extraction, Treatment, Infiltration, MNA, & LUCs
Overall Protection of Human Health and the Environment	Not protective of human health or the evnironment. Does not meet RAO.	Limited protections of human health through restrictions on land and groundwater use, and building construction.	This alternative is expected to meet RAOs through LUCs, inspections, and monitoring. VOC degradation and migration will be monitored, may require additional actions.	Will meet RAOs for groundwater through LUCs, inspections, monitoring, and removal of VOCs from source area groundwater and groundwater entering the Peconic River through volatilzation. VOC degradation through natural processess will also be monitored and the need for additional actions will be evaluated.	Will meet RAOs for groundwater through LUCs, inspections, monitoring, and enhanced biodegradation of VOCs from higher concentration areas (DCA greater than 50 to 500 µg/L). VOC degradation through natural processess will also be monitored in the lower VOC concentration area and need for additional actions will be evaluated.	Will meet RAOs for groundwater through LUCs, inspections, monitoring, and enhanced biodegradation of VOCs from higher concentration areas (DCA greater than 50 to 500 µg/L). Lower concentration areas will be addressed through natural processess and volatilization of VOCs near the Peconic River.	Will meet RAOs through LUCs, inspections, monitoring and extracting and treating groundwater at the property line and near the Peconic River.
Media Cleanup Standards	Does not achieve PRGs.	Does not achieve PRGs.	In short term, does not achieve PRGs. PRGs will be achieved in long term through natural attenuation.	In short term, does not achieve PRGs. PRGs will be achieved in long term through volatilization, photodegradation, and natural attenuation.	In short term, does not achieve PRGs. PRGs will be achieved in long term through biodegradation, volatilization, photodegradation, and natural attenuation.	In short term, does not achieve PRGs. PRGs will be achieved in long term through biodegradation, volatilization, photodegradation, and natural attenuation.	In short term, does not achieve PRGs. PRGs will be achieved in long term through groundwater extraction, volatilization, photodegradation, and natural attenuation.
Source Control	No source area control.	No additional source area control.	Additional source area treatment to be evaluated and if necessary implemented under existing remedy.	Same as Alternative 3.	Same as Alternative 3.	Same as Alternative 3.	Same as Alternative 3.
Waste Management Standards	No wastes generated.	No wastes generated.	Non-hazardous IDW wastes generated.	Non-hazardous IDW and condensate water wastes generated.	Same as Alternative 3.	Same as Alternative 4.	Non-hazardous IDW wastes generated. 65 Tons per year of non-hazardous sludge and 160,000,000 gallons of treated water for discharge.
Compliance with ARARs	Does not meet applicable groundwater ARARs for sole source drinking water aquifer. No location or action specific ARARs.	Same as Alternative 1.	Does not comply with chemical specific ARARs in the short term (sole source drinking water aquifer). Will comply with chemical specific ARARs in the long term. Location specific ARARs (New York State wetland, endangered species, and Wild, Scenic, and Recreational Rivers Act) will require consultation and coordination to minimize short term impacts, no long-term impacts anticipated. Non-hazardous waste management ARARs will be complied with.	Same as Alternative 3.	Same as Alternative 3, except that the Underground Injection Control ARAR will also be triggered.	Same as Alternative 5.	Same as Alternative 5.

TABLE 6-1
COMPARATIVE ANALYSIS OF SOUTHERN AREA GROUNDWATER CMS
NWIRP CALVERTON, NEW YORK

Criteria	Alternative 1 No Action	Alternative 2 Land-Use Controls (LUCs)	Alternative 3 Monitored Natural Attenuation (MNA) & LUCs	Alternative 4 Air Sparge, MNA, & LUCs	Alternative 5 Anaerobic Enhanced In Situ Bioremediation (EISB), MNA, & LUCs	Alternative 6 Air Sparge, Anaerobic EISB, MNA, & LUCs	Alternative 7 Extraction, Treatment, Infiltration, MNA, & LUCs
Long-term Effectiveness and Permanence	Not effective in long-term, potential for human exposure to VOC-impacted groundwater through ingestion and inhalation and localized impacts to ecological receptors. Unmonitoried natural attenuation will occur.	Potentially effective in long-term, but potential risks would not be evaluated. Potential for human exposure to VOC-impacted groundwater through ingestion and inhalation would be reduced through LUCs and inspections. Potential for localized impacts to ecological receptors. Unmonitored migration and natural attenuation will occur.	Same as Alternative 2.	Effective in long-term. Potential for human exposure to VOC-impacted groundwater through ingestion and inhalation would be reduced through LUCs, inspections, and monitoring of groundwater. Potential for localized impacts to ecological receptors would be controlled through treatment near the River.	Effective in long-term. Potential for human exposure to VOC-impacted groundwater through ingestion and inhalation would be reduced through LUCs, inspections, and monitoring of groundwater. Potential for localized impacts to ecological receptors would be reduced or eliminated through treatment of higher concentration VOC-impacted groundwater. Monitoring would be used to identify the potential need for additional action.	Same as Alternative 4.	Same as Alternative 4, except that potential localized impacts to ecological receptors would be controlled through groundwater extraction of groundwater near the River.
Reduction of Toxicity, Mobility or Volume Through Treatment	No reduction of toxicity, mobility, or volume through treatment.	Same as Alternative 1.	No reduction of toxicity, mobility, or volume through treatment. Low volume, non-hazardous IDW wastes generated.	375 Pounds of VOCs treated though volitilization and photochemical oxidation. Low volume, non-hazardous IDW and water condensate wastes generated.	150 Pounds of VOCs treated though biodegradation. Low volume, non-hazardous IDW wastes generated.	150 Pounds of VOCs treated though biodegradation and 225 pounds of VOC treated through volatilization and photochemical oxidation. Low volume, non-hazardous IDW and water condensate wastes generated.	375 Pounds of VOCs treated though groundwater extraction, volitilization, and photochemical oxidation. 65 tons per year of non-hazardous sludge and 160 million gallons of treated water discharged on site. Low volume, non-hazardous IDW wastes generated.
Short-term Effectiveness	Not effective in the short term.	Not effective in the short term. RAOs would be achieved in 10 to 40 years, with a geometric mean estimate of 20 years.	Partially effective in the short term. Well installation and sampling to be conducted in wetland area, with potential minor effects. RAOs would be achieved in 10 to 40 years, with a geometric mean estimate of 20 years.	Effective in the short term. Well installation, conveyance piping, aeration, and sampling to be conducted in or near wetland area with potential minor effects. RAOs would be achieved in 8 to 36 years, with a geometric mean estimate of 16 years.	Effective in the short term. Well installation, conveyance piping, emulsified vegetable oil injection, and sampling to be conducted in or near wetland area with potential minor effects. RAOs would be achieved in 5 to 10 years, with a geometric mean estimate of 10 years.	Same as Alternative 5.	Minimal short term effects. Well installation, conveyance piping, groundwater extraction, and sampling to be conducted in or near wetland area with potential minor effects. RAOs would be achieved in 8 to 36 years, with a geometric mean estimate of 16 years. Potential for localized dewatering of wetlands.
Implementability	Easy to implement.	Easy to implement onsite. Offsite implementation requires agreement with property owners.	Easy to implement onsite. Services and materials are available. Offsite implementation requires agreement with property owners.	Easy to implement onsite. Services and materials are available. Implementation in the offsite areas may be difficult and require several years. Offsite activities require agreement with property owners and will require multiple party review and approval for work in and near wetlands and Peconic River. Active railroad bisects treatment zone, and will require special consideration.	Same as Alternative 3.	Same as Alternative 4.	Same as Alternative 4.
Cost	$0	Capital: $8k O&M: $7k to $21k/ear PV: $207k	Capital: $314k O&M: $127k to $219k/year PV: $2,400k	Capital: $3,400k O&M: $357k to $861k/year PV: $9,600k	Capital: $3,700k O&M: $140k to $1,359k/year PV: $6,700k	Capital: $5,600k O&M: $370k to $1,463k/year PV: $9,600k	Capital: $4,700k O&M: $1,087k to $1,330/year PV: $20,000k

TABLE 6-1
COMPARATIVE ANALYSIS OF SOUTHERN AREA GROUNDWATER CMS
NWIRP CALVERTON, NEW YORK

Criteria	Alternative 1 No Action	Alternative 2 Land-Use Controls (LUCs)	Alternative 3 Monitored Natural Attenuation (MNA) & LUCs	Alternative 4 Air Sparge, MNA, & LUCs	Alternative 5 Anaerobic Enhanced In Situ Bioremediation (EISB), MNA, & LUCs	Alternative 6 Air Sparge, Anaerobic EISB, MNA, & LUCs	Alternative 7 Extraction, Treatment, Infiltration, MNA, & LUCs
State Acceptance	To be determined based on a review of CMS and development of Proposed Remedial Action Plan and Statement of Basis	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Community Acceptance	To be determined based on a review of CMS and development of Proposed Remedial Action Plan and Statement of Basis	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.

LUC - Land use controls.
MNA - Monitored natural attenuation.
EISB - Enhanced insitu bioremediation.
O&M - Operation and maintanence.
ARARs - Applicable or Relevant and Relevant.

PRGs - Preliminary remediation goals
RAOs - Remediation action objectives.
CMS - Corrective Measures Study.
VOC - Volatile organic compound.
PV - present value (2011 dollars).

k - thousand.
µg/L - mircrogram per liter.
IDW - Investigation derived waste.

TABLE 6-2
SUMMARY OF COSTS
SOUTHERN AREA PLUME CORRECTIVE MEASURES STUDY
NWIRP CALVERTON, NEW YORK

Alternative	Cost			
		Future Costs		
	Implementation Cost	O&M, Monitoring, and/or Periodic Future Costs	Present Value (2011) Future Costs	Total Cost of Alternative *(2011 Dollars)*
Alternative 1				
No Action	$0	None	$0	$0
Alternative 2				
Land-Use Controls (LUCs)	$8K	O&M and Monitoring: None Periodic Costs: Years 1-30 - $7K for LUCs Years 5, 10, 15, 20 - $14K for 5YRs	$200K (30-Year Timeframe)	$207K
Alternative 3				
Monitored Natural Attenuation (MNA) & LUCs	$314K	O&M and Monitoring: Years 1 & 2 - $106K for Monitoring Year 3 - $212K for Monitoring Years 4-20 - $106K for Monitoring Years 5, 10, 15 - $23K for Well Maintenance Periodic Costs: Years 1-20 - $7K for LUCs Years 5, 10, 15, 20 - $14K for 5YRs Year 20 - $69K for Well Abandonment	$2.1M (20-Year Timeframe)	$2.4M
Alternative 4				
Air Sparge, MNA, & LUCs	$3.4M	O&M and Monitoring: Years 1-4 - $202K for Source Area Air Sparge O&M Years 1-16 - $231K for River Area Air Sparge O&M Year 1 - $424K for Monitoring Years 2-16 - $106K for Monitoring Years 5, 10, 15 - $37K for Well Maintenance Periodic Costs: Years 1-16 - $7K for LUCs Years 5, 10, 15 - $14K for 5YRs Year 16 - $127K for Well Abandonment Year 16 - $67K for Demo of Air Sparge Systems	$6.1M (16-Year Timeframe)	$9.6M
Alternative 5				
Anaerobic Enhanced In Situ Bioremediation (EISB), MNA, & LUCs	$3.7M	O&M and Monitoring: Years 1 & 5 - $477K for Monitoring Years 2-4 & 6-10 - $119K for Monitoring Year 5 - $1.1M for Re-Injection Year 5 - $33K for Well Maintenance Periodic Costs: Years 1-10 - $7K for LUCs Years 5 & 10 - $14K for 5YRs Year 10 - $148K for Well Abandonment	$3.1M (10-Year Timeframe)	$6.7M
Alternative 6				
Air Sparge, Anaerobic EISB, MNA, & LUCs	$5.6M	O&M and Monitoring: Years 1-4 - $202K for Source Area Air Sparge O&M Years 1-16 - $231K for River Area Air Sparge O&M Years 1 & 5 - $477K for Monitoring Years 2-4 & 6-10 - $119K for Monitoring Year 5 - $1.1M for Re-Injection Year 5 - $44K for Well Maintenance Periodic Costs: Years 1-10 - $7K for LUCs Years 5 & 10 - $14K for 5YRs Year 10 - $192K for Well Abandonment Year 10 - $67K for Demo of Air Sparge Systems	$6.1M (10-Year Timeframe)	$11.7M
Alternative 7				
Extraction, Treatment, Infiltration, MNA, & LUCs	$4.7M	O&M and Monitoring: Years 1-16 - $999K for Extraction/Treatment System O&M Year 1 - $323K for Monitoring Years 2-16 - $81K for Monitoring Years 5, 10, 15 - $22K for Well Maintenance Periodic Costs: Years 1-16 - $7K for LUCs Years 5, 10, 15 - $14K for 5YRs Year 16 - $74K for Well Abandonment Year 16 - $78K for Demo of Extraction/Treatment Systems	$15.5M (16-Year Timeframe)	$20.2M

Notes

Implementation Cost - Direct and indirect capital costs (when applicable, includes Year 0 startup and operating cost)
Future Costs - Operation and Maintenance (O&M), Monitoring, Periodic Costs (e.g., Five-Year Reviews), etc.
Present Value - Future costs reverted to current year (2011) dollars using OMB (2010) real discount rates.

TABLE 6-3A
SUSTAINABILITY EVALUATION QUALITATIVE SUMMARY
SOUTHERN AREA PLUME CORRECTIVE MEASURES STUDY
NWIRP CALVERTON, NEW YORK

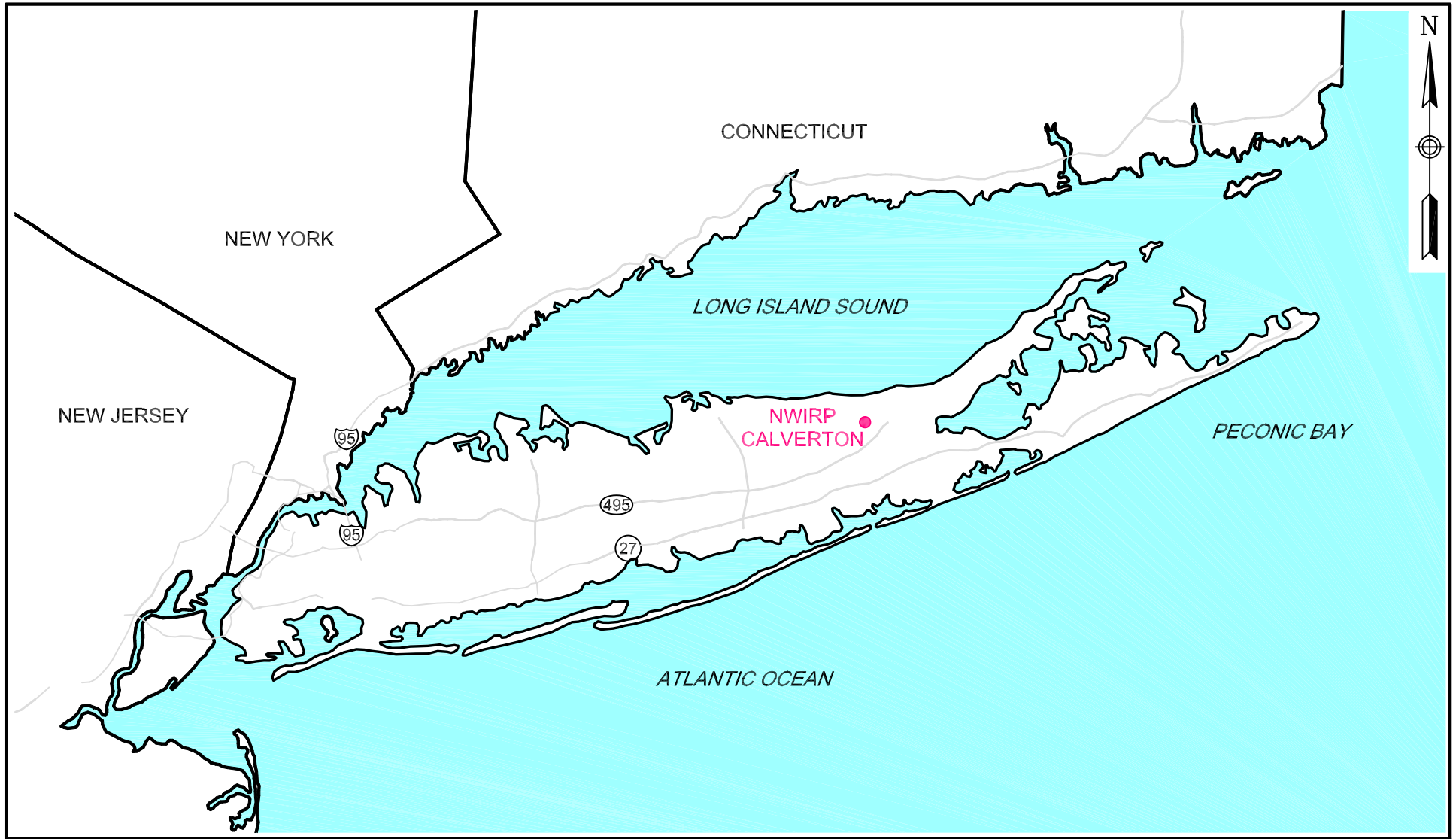
Remedial Alternative	Impact Assessment	Greenhouse Gas Emissions	Criteria Pollutant Emissions	Energy Usage	Water Consumption
Alternative 2					
Land-Use Controls (LUCs)	**Relative Impact**	Low	Low	Low	Low
	Primary Impact Drivers	Transportation (Personnel)	Transportation (Personnel)	Transportation (Personnel)	--
Alternative 3					
Monitored Natural Attenuation (MNA) & LUCs	**Relative Impact**	Low	Low	Low	Low to Moderate
	Primary Impact Drivers	Materials (Steel)	Equipment Use	Materials (Steel)	Materials (Steel)
Alternative 4					
Air Sparge, MNA, & LUCs	**Relative Impact**	High	Moderate to High	Moderate to High	High
	Primary Impact Drivers	Electricity Consumption (Air Sparge)	Electricity Consumption (Air Sparge)	Electricity Consumption (Air Sparge)	Electricity Consumption (Air Sparge)
Alternative 5					
Anaerobic Enhanced In Situ Bioremediation (EISB), MNA, & LUCs	**Relative Impact**	Low to Moderate	Moderate	Moderate	Moderate to High
	Primary Impact Drivers	Materials, Equipment Use	Materials, Equipment Use	Materials (Emulsified Oil), Generators for EISB	Electricity Consumption (EISB)
Alternative 6					
Air Sparge, Anaerobic EISB, MNA, & LUCs	**Relative Impact**	Moderate to High	Moderate to High	Moderate to High	High
	Primary Impact Drivers	Electricity Consumption (Air Sparge)	Electricity Consumption (Air Sparge)	Electricity Consumption (Air Sparge)	Electricity Consumption (Air Sparge, EISB)
Alternative 7					
Extraction, Treatment, Infiltration, MNA, & LUCs	**Relative Impact**	High	Moderate to High	High	High
	Primary Impact Drivers	Electricity Consumption (Extraction System)	Electricity Consumption (Extraction System)	Electricity Consumption (Extraction System)	Electricity Consumption (Extraction System)

TABLE 6-3B
SUSTAINABILITY EVALUATION SUMMARY OF RESULTS
SOUTHERN AREA PLUME CORRECTIVE MEASURES STUDY
NWIRP CALVERTON, NEW YORK

Remedial Alternative	GHG Emissions (metric ton)	Total Energy Used (MMBTU)	Water Consumption (gallons)	NO_x Emissions (metric ton)	SO_x Emissions (metric ton)	PM_{10} Emisssions (metric ton)	Accident Risk Fatality	Accident Risk Injury
Alternative 2								
Land-Use Controls (LUCs)	3.51	38.44	0	3.78E-03	9.07E-04	5.67E-04	7.91E-05	5.67E-03
Alternative 3								
Monitored Natural Attenuation (MNA) & LUCs	35.85	982.97	8.53E+05	6.57E-02	1.46E-02	6.26E-03	2.96E-04	2.14E-02
Alternative 4								
Air Sparge, MNA, & LUCs	4,915.91	97,643.91	4.15E+06	9.99E+00	4.62E+00	1.15E-01	1.84E-03	1.33E-01
Alternative 5								
Anaerobic Enhanced In Situ Bioremediation (EISB), MNA, & LUCs	395.60	20,318.92	3.81E+05	6.97E-01	2.78E-01	7.22E-02	6.51E-04	4.85E-02
Alternative 6								
Air Sparge, Anaerobic EISB, MNA, & LUCs	3,754.94	8.53E+04	3.18E+06	7.60E+00	3.41E+00	1.44E-01	1.93E-03	1.41E-01
Alternative 7								
Extraction, Treatment, Infiltration, MNA, & LUCs	5,447.78	1.23E+05	3.97E+06	8.47E+00	4.83E+00	1.60E-01	4.52E-03	3.28E-01

FIGURES

112G02045\0510\112G02045CM05.DWG 03/10/10 MKB



0 15 30
SCALE IN MILES

TETRA TECH NUS, INC.

GENERAL LOCATION MAP
NWIRP CALVERTON
CALVERTON, NEW YORK

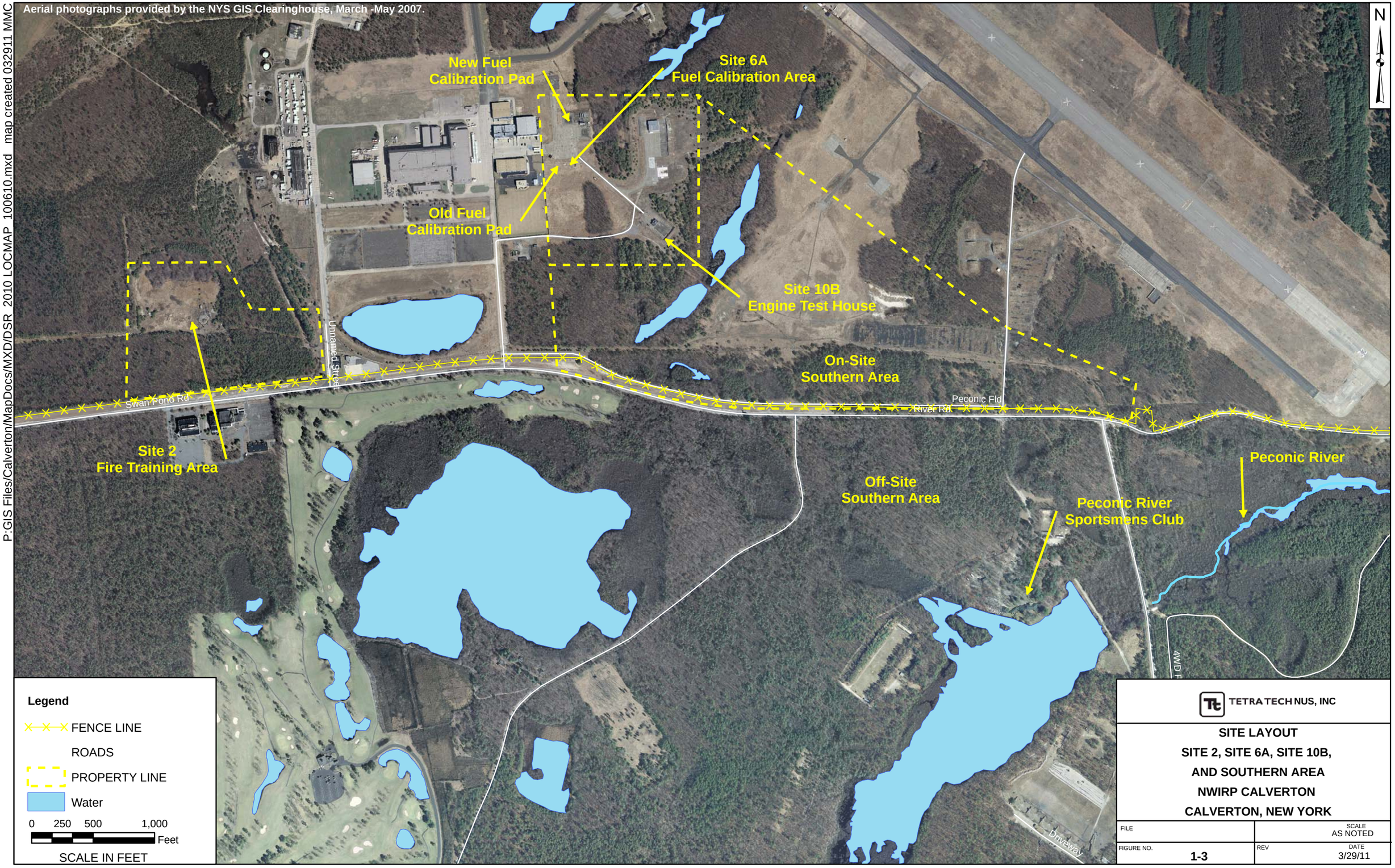
SCALE	NOT TO SCALE
FILE	112G02045CM05
REV 0	DATE 03/10/11
FIGURE NUMBER	FIGURE 1–1

P:\GIS_files\Calverton parcels.mxd mmc 03292011

DRAWN BY M. CUSHING	DATE 3/29/11	TETRA TECH	CONTRACT NUMBER 112G02045
CHECKED BY ___	DATE ___		APPROVED BY ___ DATE 3/29/11
REVISED BY ___	DATE ___		APPROVED BY ___ DATE ___
SCALE AS NOTED			FIGURE NO. 1-2 REV 0

PARCELS AND SITE LOCATION MAP
NWIRP Calverton, New York

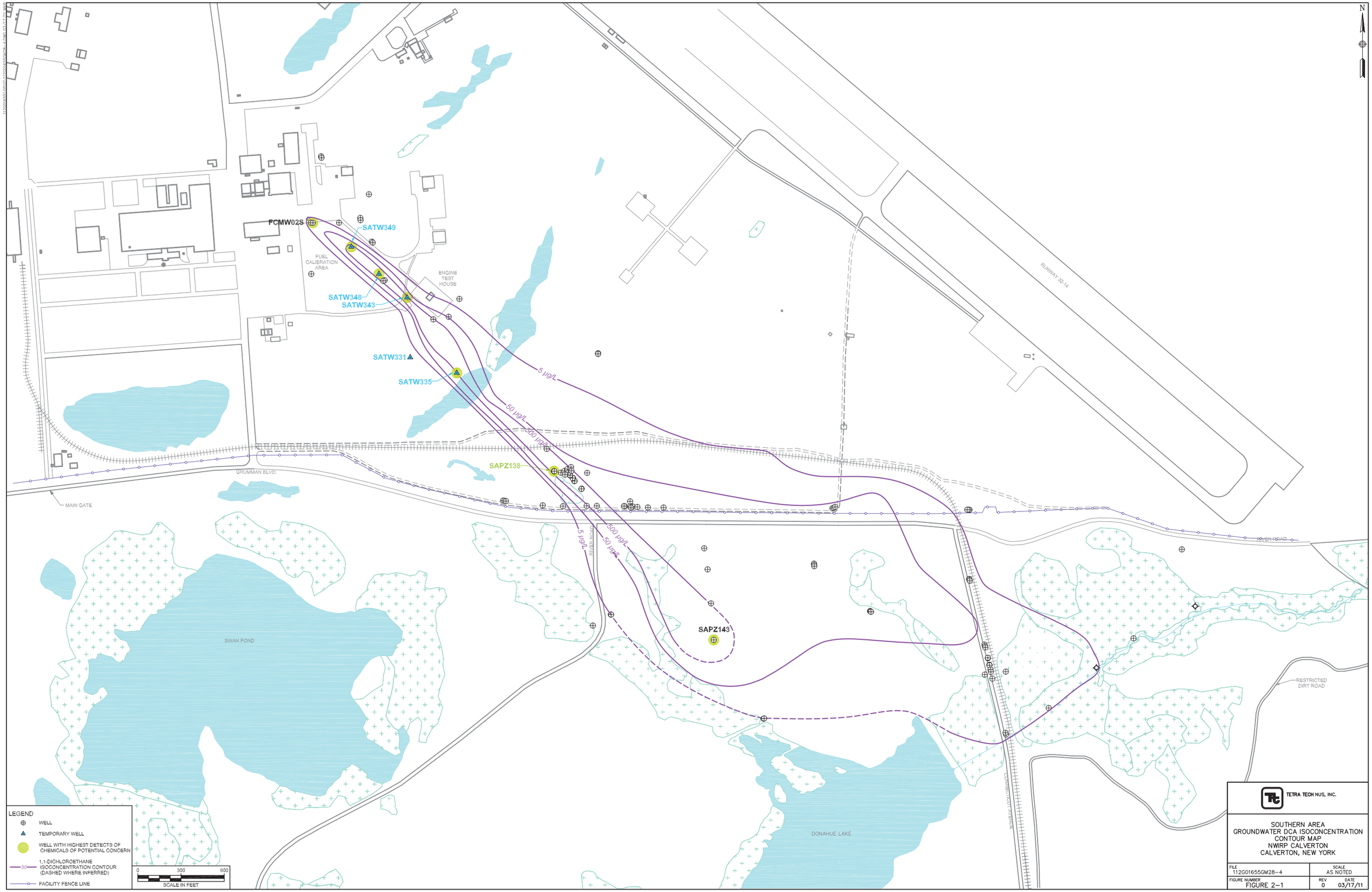
P:GIS Files/Calverton/MapDocs/MXD/DSR_2010 LOCMAP_100610.mxd map created 032911 MMC



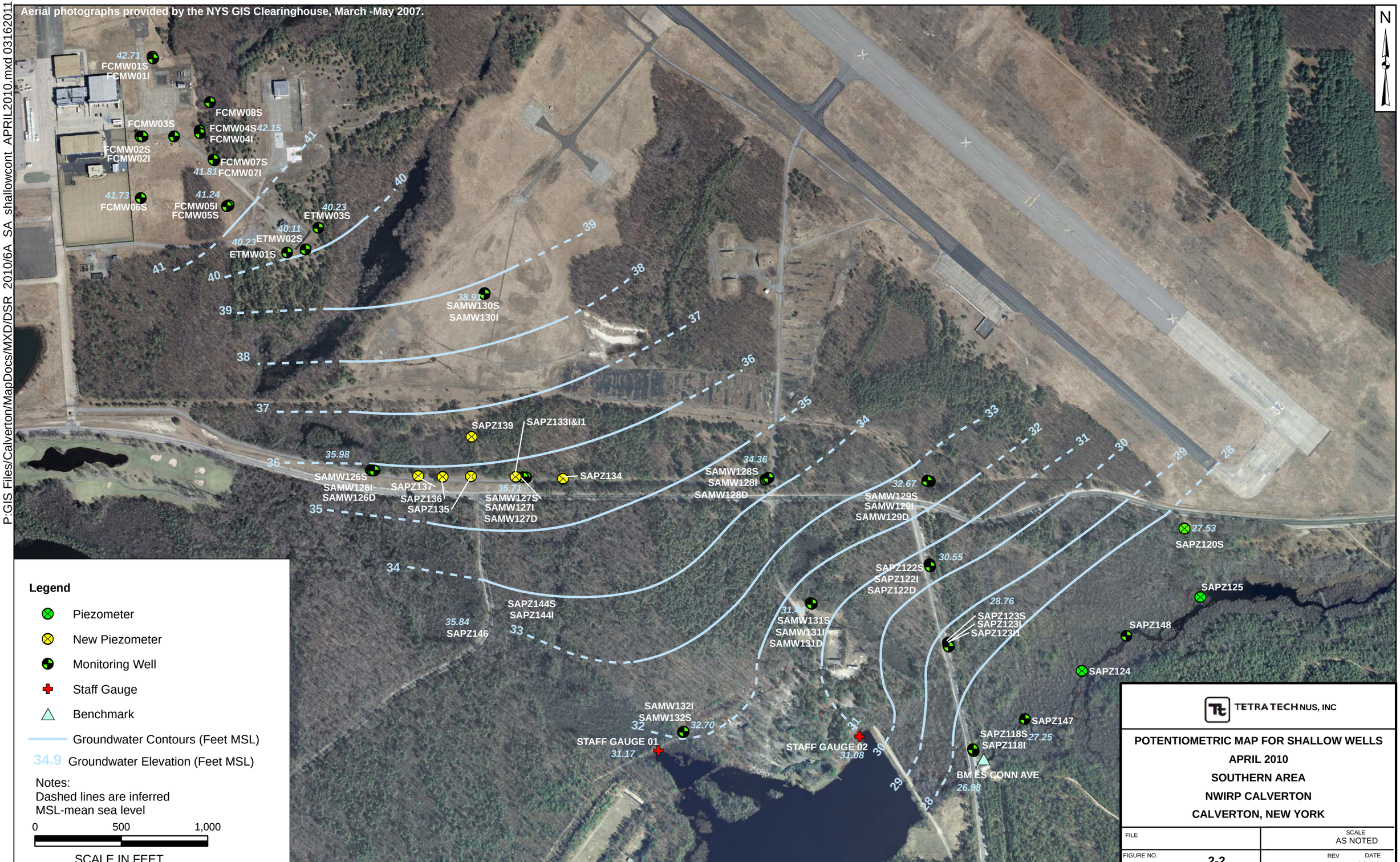
TETRA TECH NUS, INC

SITE LAYOUT
SITE 2, SITE 6A, SITE 10B,
AND SOUTHERN AREA
NWIRP CALVERTON
CALVERTON, NEW YORK

FILE	SCALE AS NOTED
FIGURE NO. 1-3	REV / DATE 3/29/11


N
FCMW02S
SATW349
SATW348
SATW343
SATW331
SATW335
SAPZ138
SAPZ143
FUEL CALIBRATION AREA
ENGINE TEST HOUSE
RUNWAY 32-14
GRUMMAN BLVD.
MAIN GATE
RIVER ROAD
SWAN POND
DONAHUE LAKE
CONRAIL MAIN AVENUE
RESTRICTED DIRT ROAD
5 µg/L
50 µg/L
500 µg/L
LEGEND
WELL
TEMPORARY WELL
WELL WITH HIGHEST DETECTS OF CHEMICALS OF POTENTIAL CONCERN
1,1-DICHLOROETHANE ISOCONCENTRATION CONTOUR (DASHED WHERE INFERRED)
FACILITY FENCE LINE
0 300 600
SCALE IN FEET
TETRA TECH NUS, INC.
SOUTHERN AREA
GROUNDWATER DCA ISOCONCENTRATION
CONTOUR MAP
NWIRP CALVERTON
CALVERTON, NEW YORK
FILE 112G01655GM28-4
SCALE AS NOTED
FIGURE NUMBER FIGURE 2-1
REV 0
DATE 03/17/11

P:GIS Files/Calverton/MapDocs/MXD/DSR 2010/6A SA shallowcont APRIL2010.mxd 03162011



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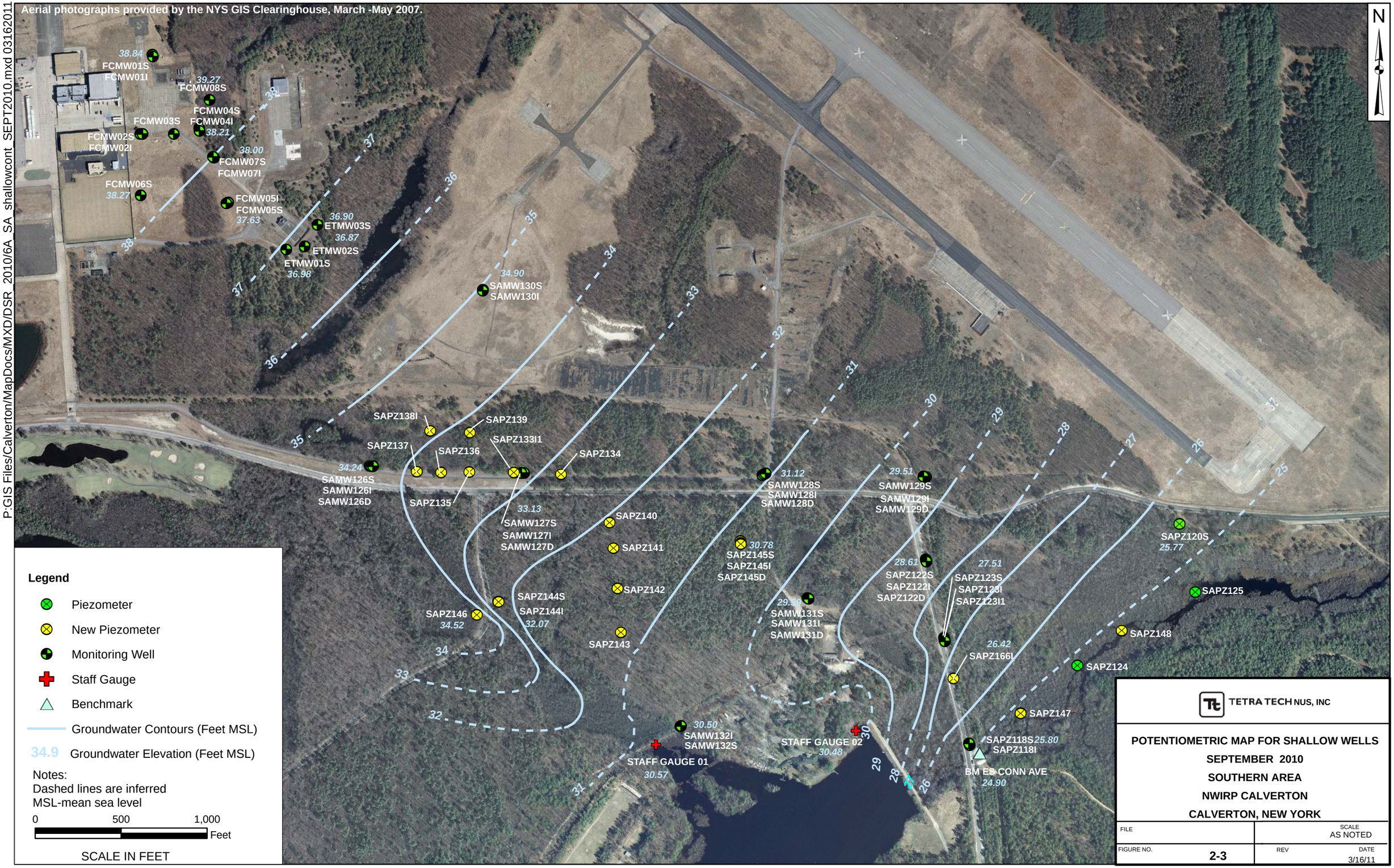

TETRA TECH NUS, INC

POTENTIOMETRIC MAP FOR SHALLOW WELLS
SEPTEMBER 2010
SOUTHERN AREA
NWIRP CALVERTON
CALVERTON, NEW YORK

FILE	SCALE AS NOTED
FIGURE NO. 2-3	REV / DATE 3/16/11

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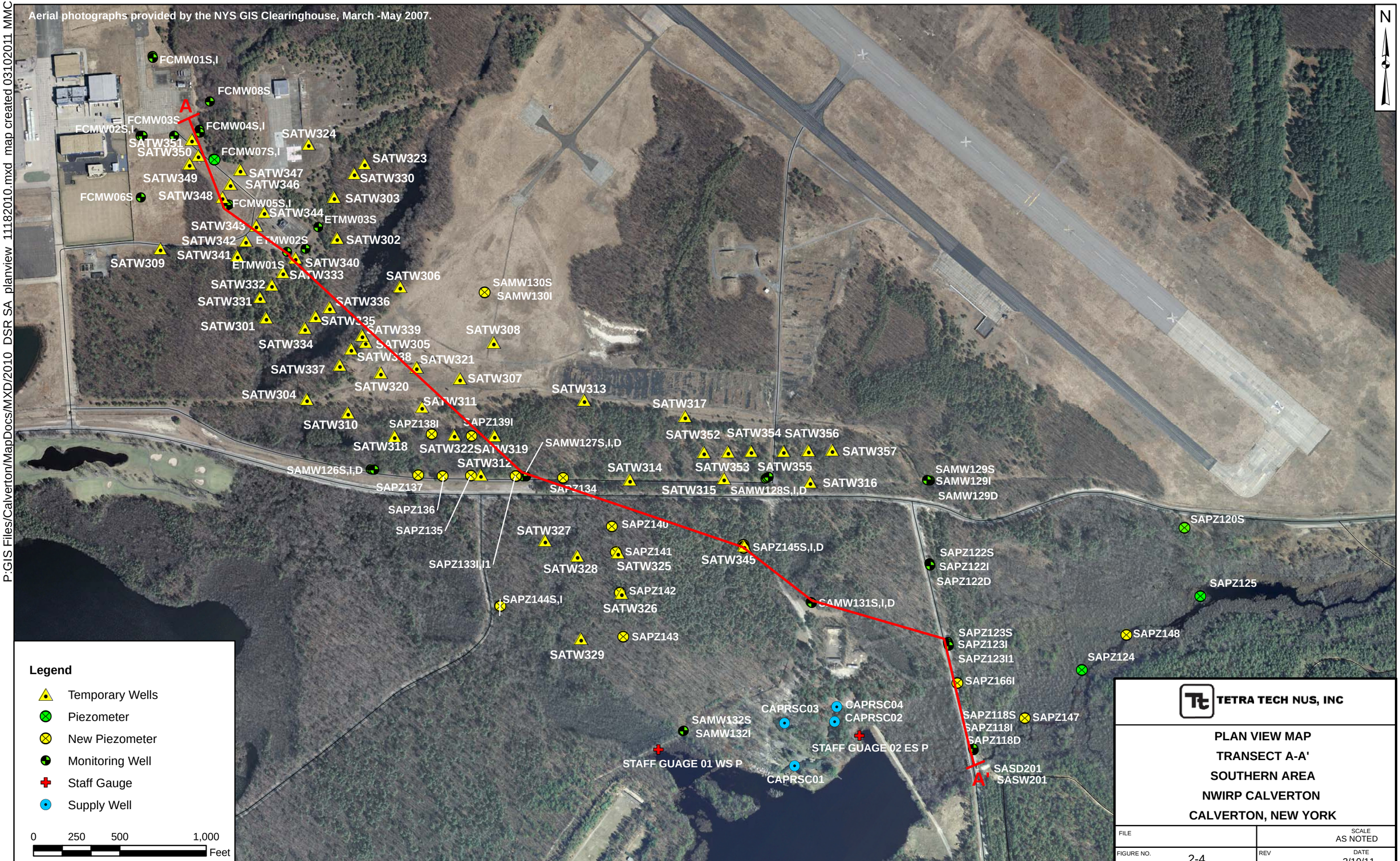
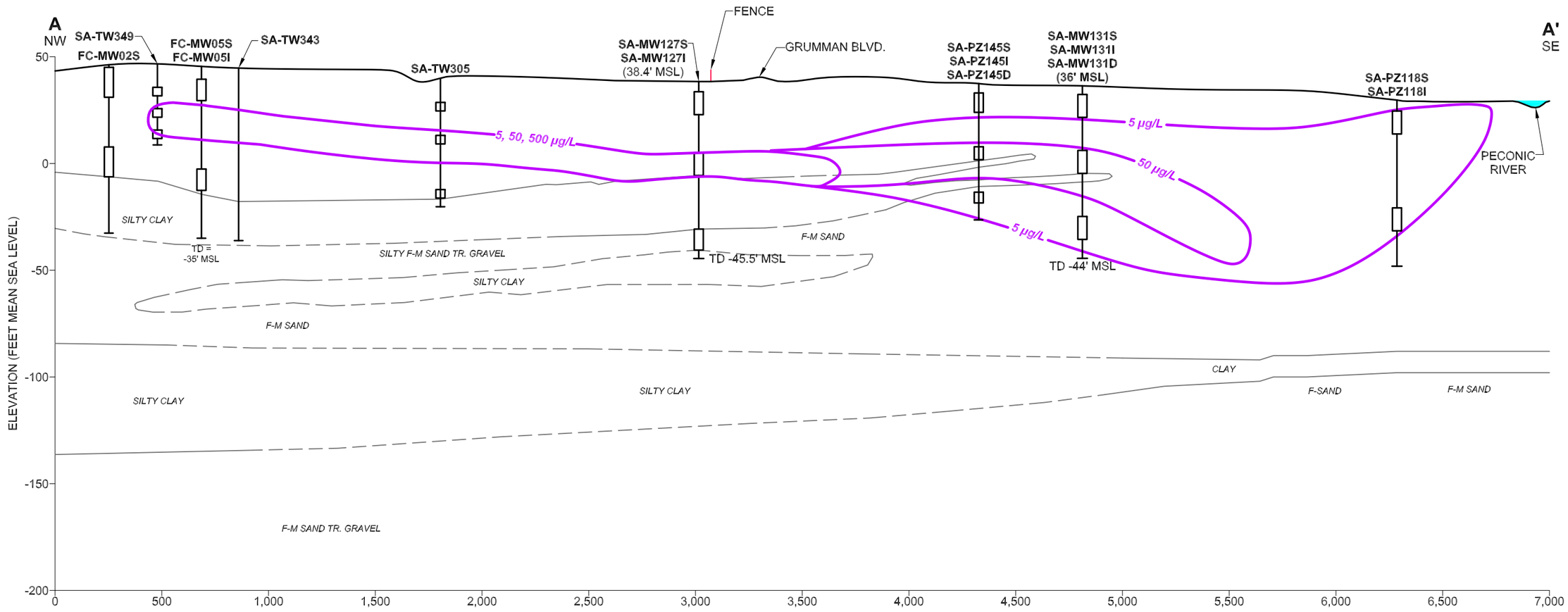


TETRA TECH NUS, INC

PLAN VIEW MAP
TRANSECT A-A'
SOUTHERN AREA
NWIRP CALVERTON
CALVERTON, NEW YORK

FILE	SCALE AS NOTED
FIGURE NO. 2-4	REV / DATE 3/10/11

112G01655\0510\112G01655GX04.DWG 03/17/11 MKB



LEGEND

(45.5' MSL)	GROUND SURFACE ELEVATION (FEET MEAN SEA LEVEL)
	GROUND SURFACE
SA-MW131S	MONITORING WELL SCREEN
F SAND	LITHOLOGY
5 µg/L	1,1-DICHLOROETHANE ISOCONCENTRATION CONTOURS (5, 50, 500 µg/L)
	CONFINING UNIT
TD -35' MSL	TOTAL DEPTH (FEET MEAN SEA LEVEL)
µg/L	MICROGRAMS PER LITER

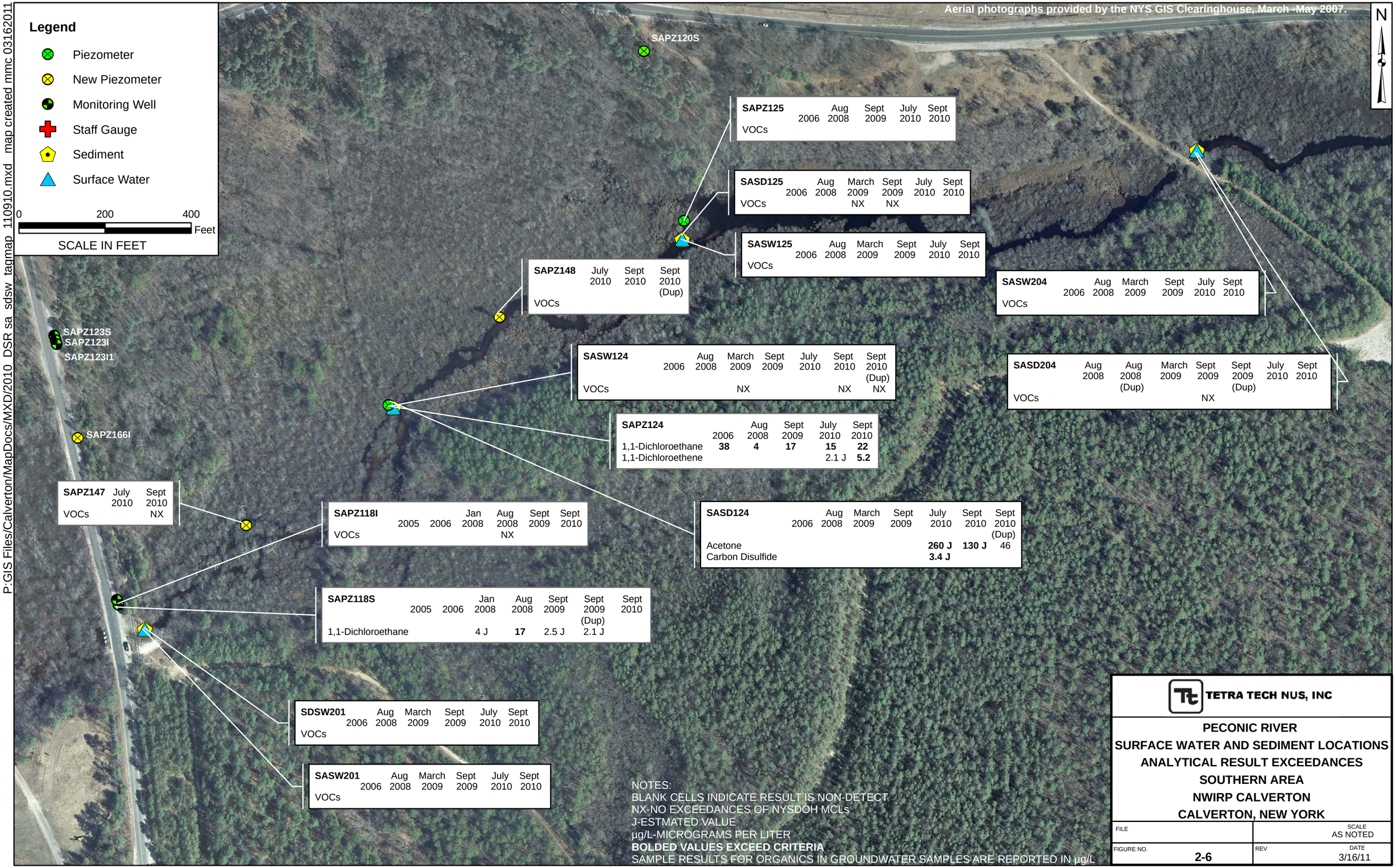
0 500 1,000
SCALE IN FEET

TETRA TECHNUS, INC.

1,1–DICHLOROETHANE
ISOCONCENTRATION CONTOUR MAP FOR
GEOLOGIC CROSS–SECTION A – A'
NWIRP CALVERTON
CALVERTON, NEW YORK

FILE	SCALE
112G01655GX04	AS NOTED
FIGURE NUMBER	REV / DATE
FIGURE 2–5	0 / 03/17/11

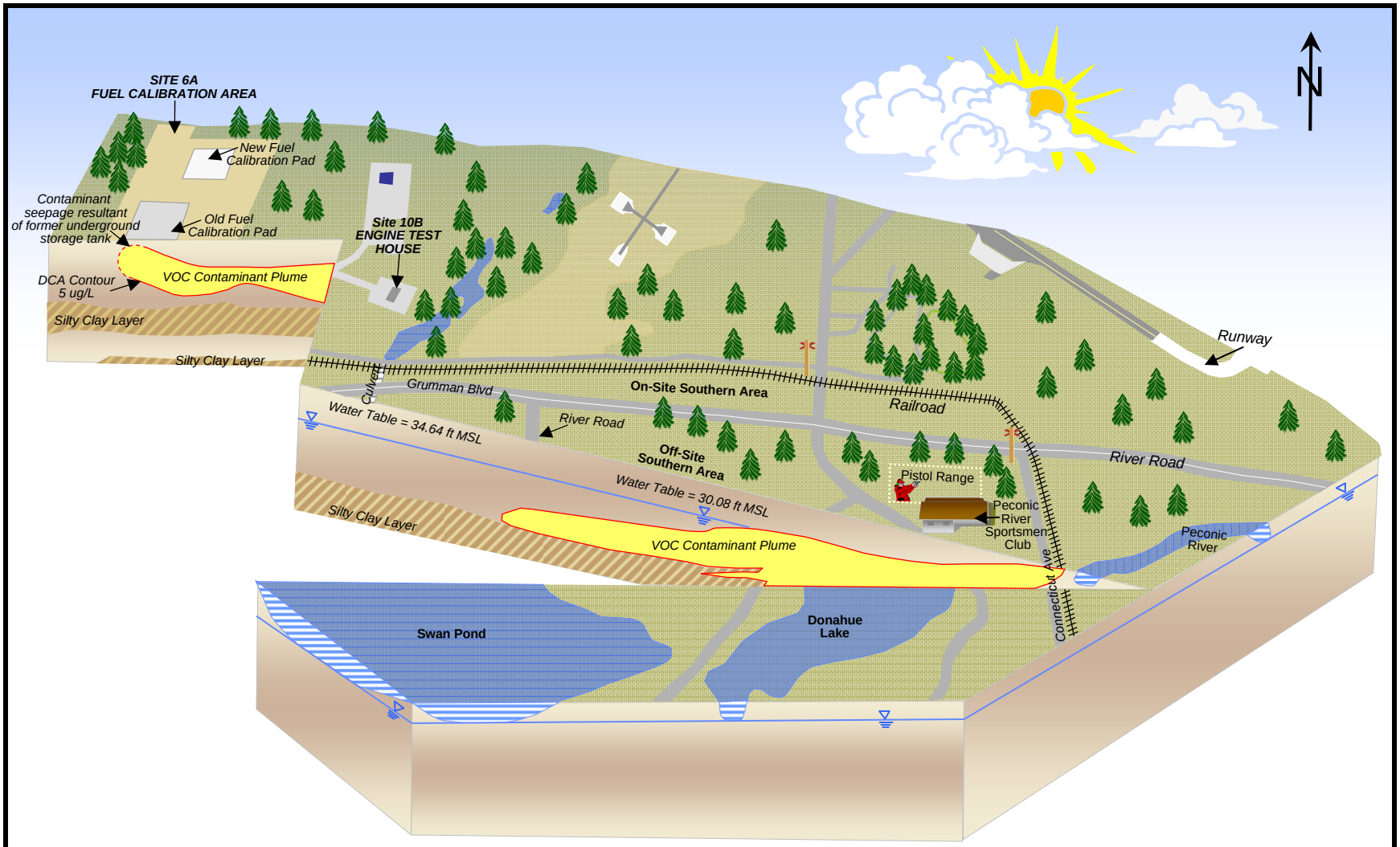
P:GIS Files/Calverton/MapDocs/MXD/2010 DSR sa sdsw tagmap 110910.mxd map created mmc 03162011



TETRA TECH NUS, INC

PECONIC RIVER
SURFACE WATER AND SEDIMENT LOCATIONS
ANALYTICAL RESULT EXCEEDANCES
SOUTHERN AREA
NWIRP CALVERTON
CALVERTON, NEW YORK

FILE	SCALE AS NOTED
FIGURE NO. 2-6	REV / DATE 3/16/11

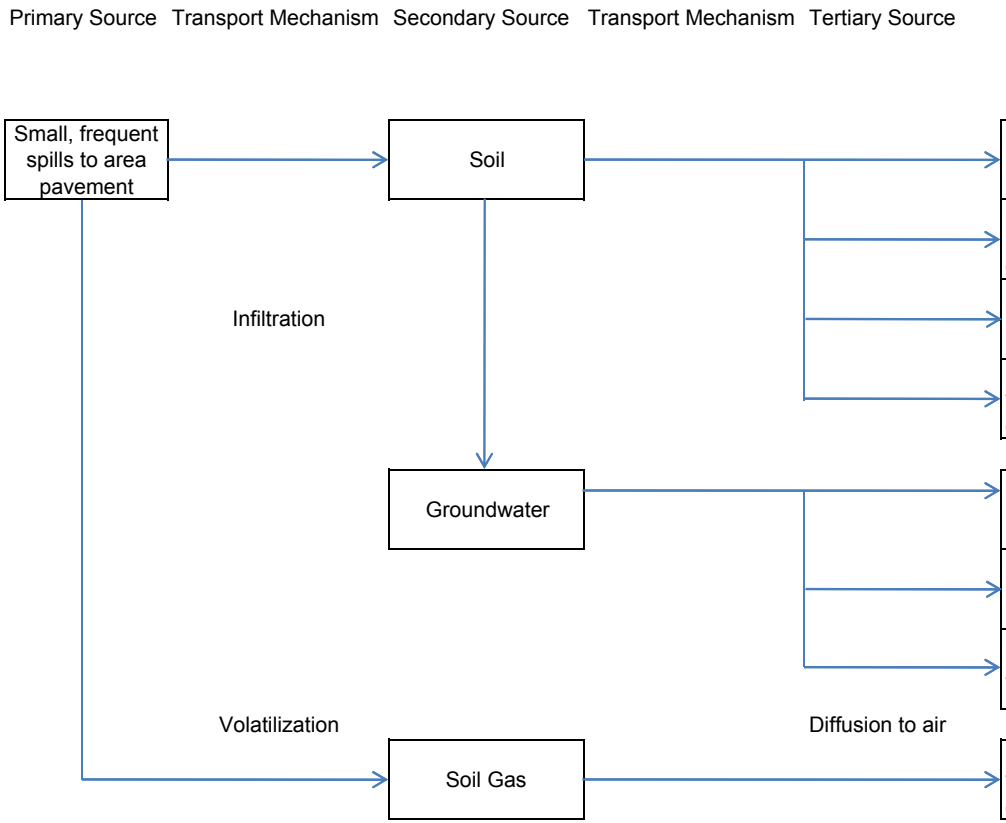


DRAWN BY C. Pennington DATE 01-04-11	NAVFAC	CONCEPTUAL SITE MODEL SITE 6A, SITE 10B, AND SOUTHERN AREA NWIRP CALVERTON CALVERTON, NEW YORK	CONTRACT NO.
CHECKED BY DATE			OWNER NO.
REVISED BY DATE			APPROVED BY DATE
SCALE NOT TO SCALE			DRAWING NO. FIGURE 2-7 REV.

LEGEND

- Water Table
- Surface Water
- Contaminant Plume

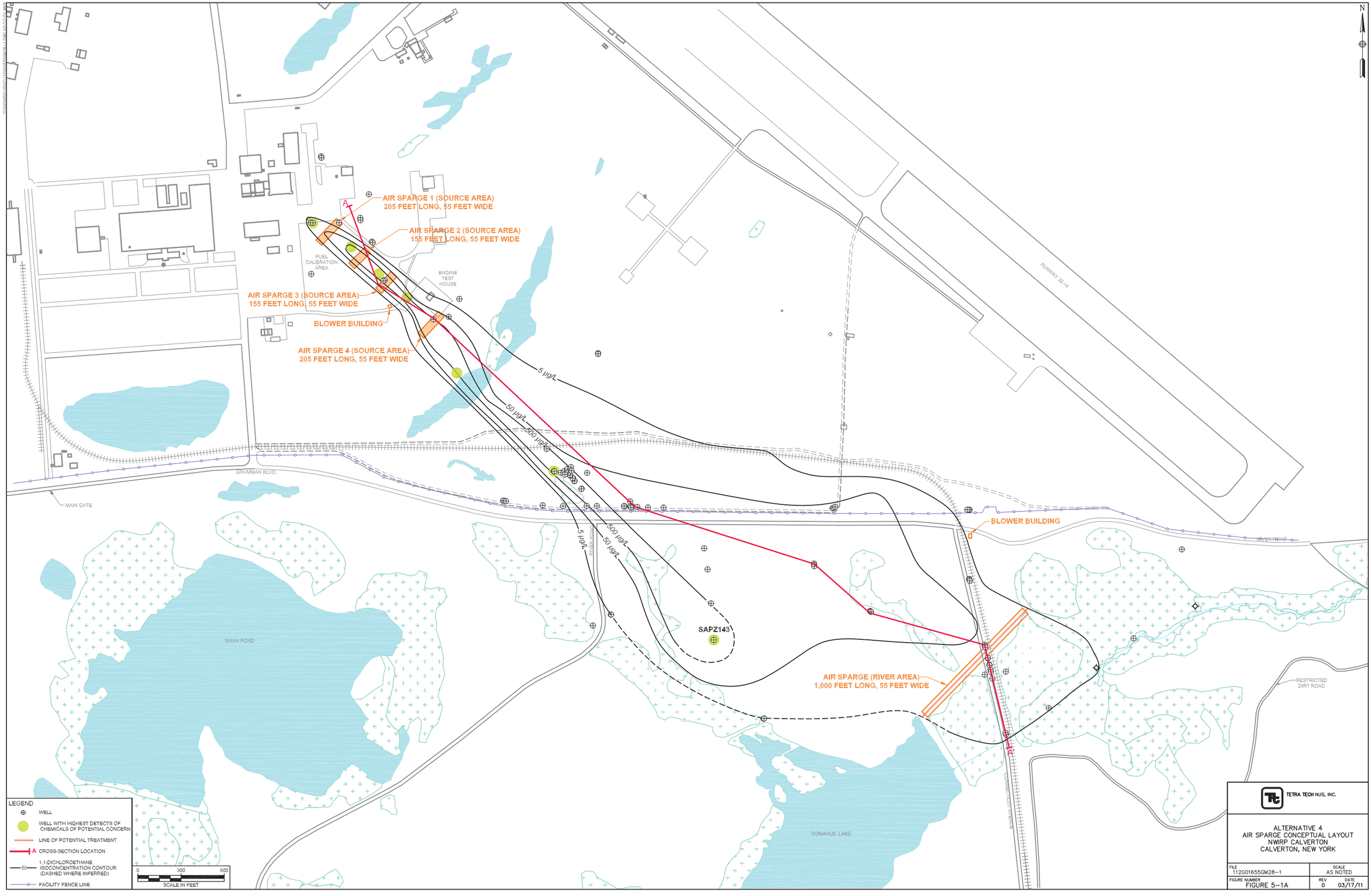
FIGURE 2-8
CONCEPTUAL SITE MODEL EXPOSURE PATHWAYS
SOUTHERN AREA CORRECTIVE MEASURES STUDY
NWIRP CALVERTON, NEW YORK



Exposure Route	Exposure Scenarios				
	Residential	Future Occupational	Current Occupational	Construction	Ecological
Ingestion	X	O	O	O	O
Inhalation of particulates in outdoor air	X	O	O	O	O
Dermal contact	X	O	O	O	O
Inhalation of vapors in outdoor air	X	O	O	O	O
Ingestion	●	●	X	●	●
Dermal contact	●	●	X	●	●
Inhalation of vapors	●	●	●	O	O
Inhalation of vapors in outdoor air	X	X	X	X	O

LEGEND:

- ● Potentially complete exposure pathway
- O Not considered a significant source of exposure
- X Incomplete exposure pathway


N
AIR SPARGE 1 (SOURCE AREA)
205 FEET LONG, 55 FEET WIDE
AIR SPARGE 2 (SOURCE AREA)
155 FEET LONG, 55 FEET WIDE
AIR SPARGE 3 (SOURCE AREA)
155 FEET LONG, 55 FEET WIDE
AIR SPARGE 4 (SOURCE AREA)
205 FEET LONG, 55 FEET WIDE
BLOWER BUILDING
FUEL CALIBRATION AREA
ENGINE TEST HOUSE
A
5 µg/L
50 µg/L
500 µg/L
RUNWAY 32-14
GRUMMAN BLVD.
MAIN GATE
RIVER ROAD
SWAN POND
SAPZ143
AIR SPARGE (RIVER AREA)
1,000 FEET LONG, 55 FEET WIDE
RESTRICTED DIRT ROAD
DONAHUE LAKE
CONNECTICUT AVENUE
LEGEND
WELL
WELL WITH HIGHEST DETECTS OF CHEMICALS OF POTENTIAL CONCERN
LINE OF POTENTIAL TREATMENT
CROSS-SECTION LOCATION
1,1-DICHLOROETHANE ISOCONCENTRATION CONTOUR (DASHED WHERE INFERRED)
FACILITY FENCE LINE
0 300 600
SCALE IN FEET
TETRA TECH NUS, INC.
ALTERNATIVE 4
AIR SPARGE CONCEPTUAL LAYOUT
NWIRP CALVERTON
CALVERTON, NEW YORK
FILE 112G01655GM28-1
SCALE AS NOTED
FIGURE NUMBER FIGURE 5-1A
REV 0
DATE 03/17/11

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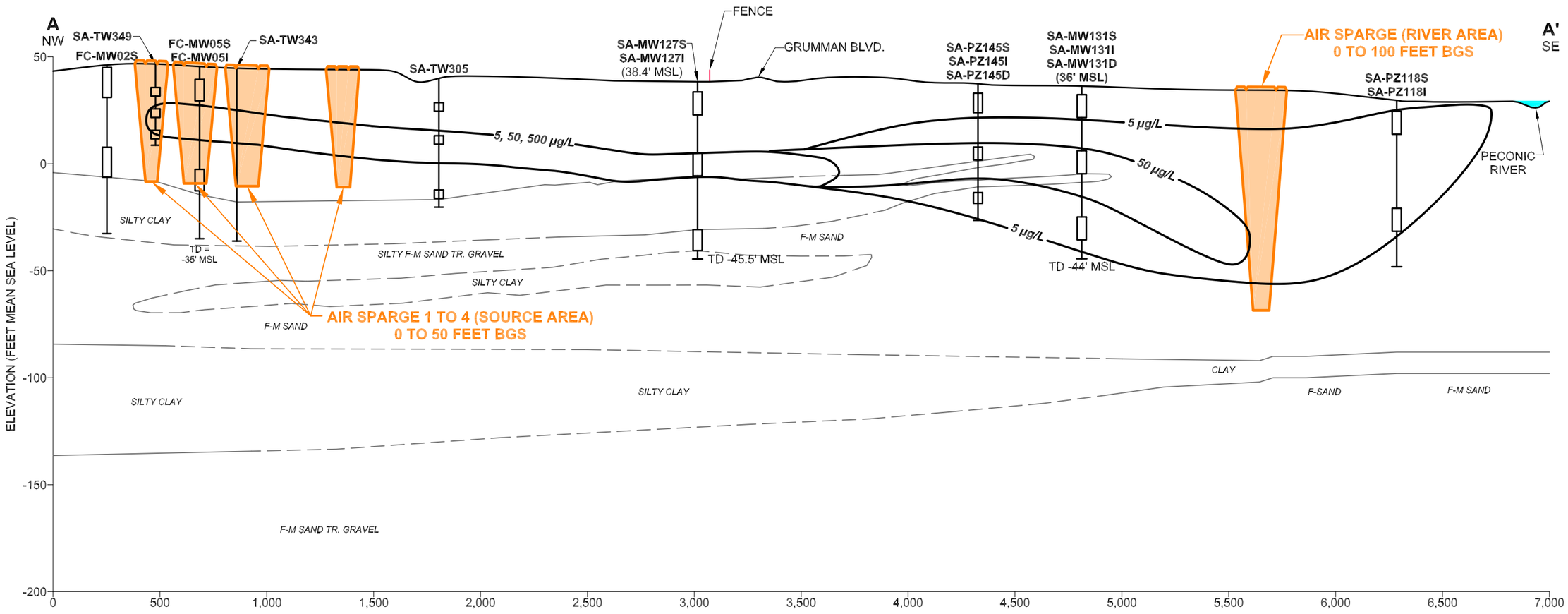


LEGEND

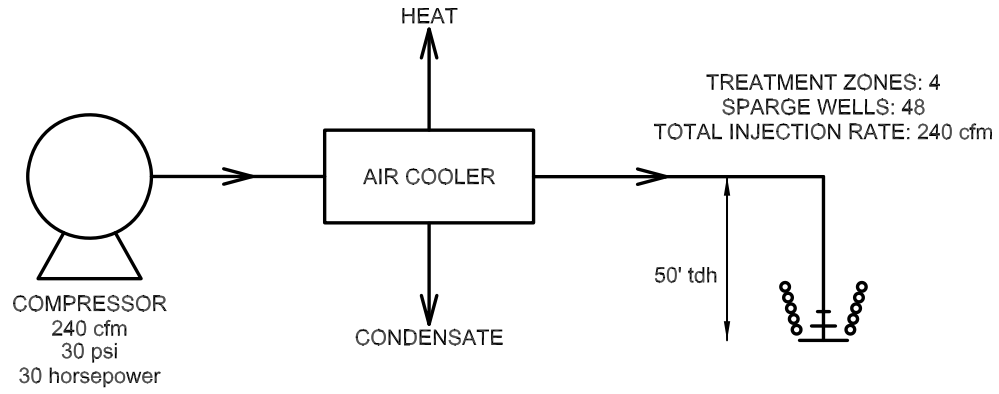
(45.5' MSL)	GROUND SURFACE ELEVATION (FEET MEAN SEA LEVEL)
	GROUND SURFACE
SA-MW131S	MONITORING WELL SCREEN
F SAND	LITHOLOGY
5 µg/L	1,1-DICHLOROETHANE ISOCONCENTRATION CONTOURS (5, 50, 500 µg/L)
	CONFINING UNIT
TD -35' MSL	TOTAL DEPTH (FEET MEAN SEA LEVEL)
µg/L	MICROGRAMS PER LITER
BGS	BELOW GROUND SURFACE

0 500 1,000
SCALE IN FEET

TETRA TECHNUS, INC.

ALTERNATIVE 4
AIR SPARGE CROSS-SECTION VIEW
NWIRP CALVERTON
CALVERTON, NEW YORK

FILE	SCALE
112G01655GX04-1	AS NOTED
FIGURE NUMBER	REV / DATE
FIGURE 5-1B	0 / 03/17/11

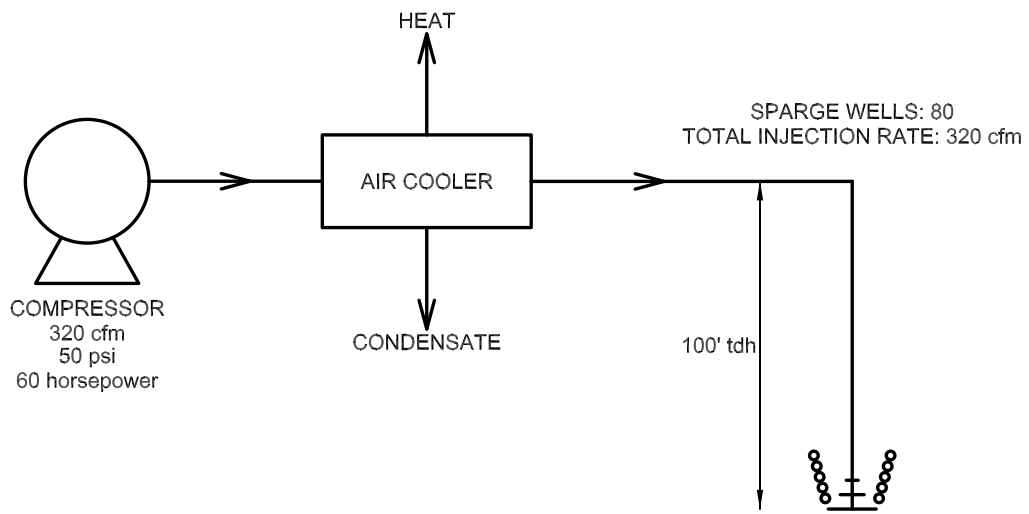


SCHEMATIC: NOT TO SCALE

TETRA TECH NUS, INC.

ALTERNATIVE 4
SOURCE AREA AIR SPARGE PROCESS DIAGRAM
NWIRP CALVERTON
CALVERTON, NEW YORK

SCALE	AS NOTED
FILE	112G01655FP01
REV	0
DATE	03/30/11
FIGURE NUMBER	FIGURE 5–1C

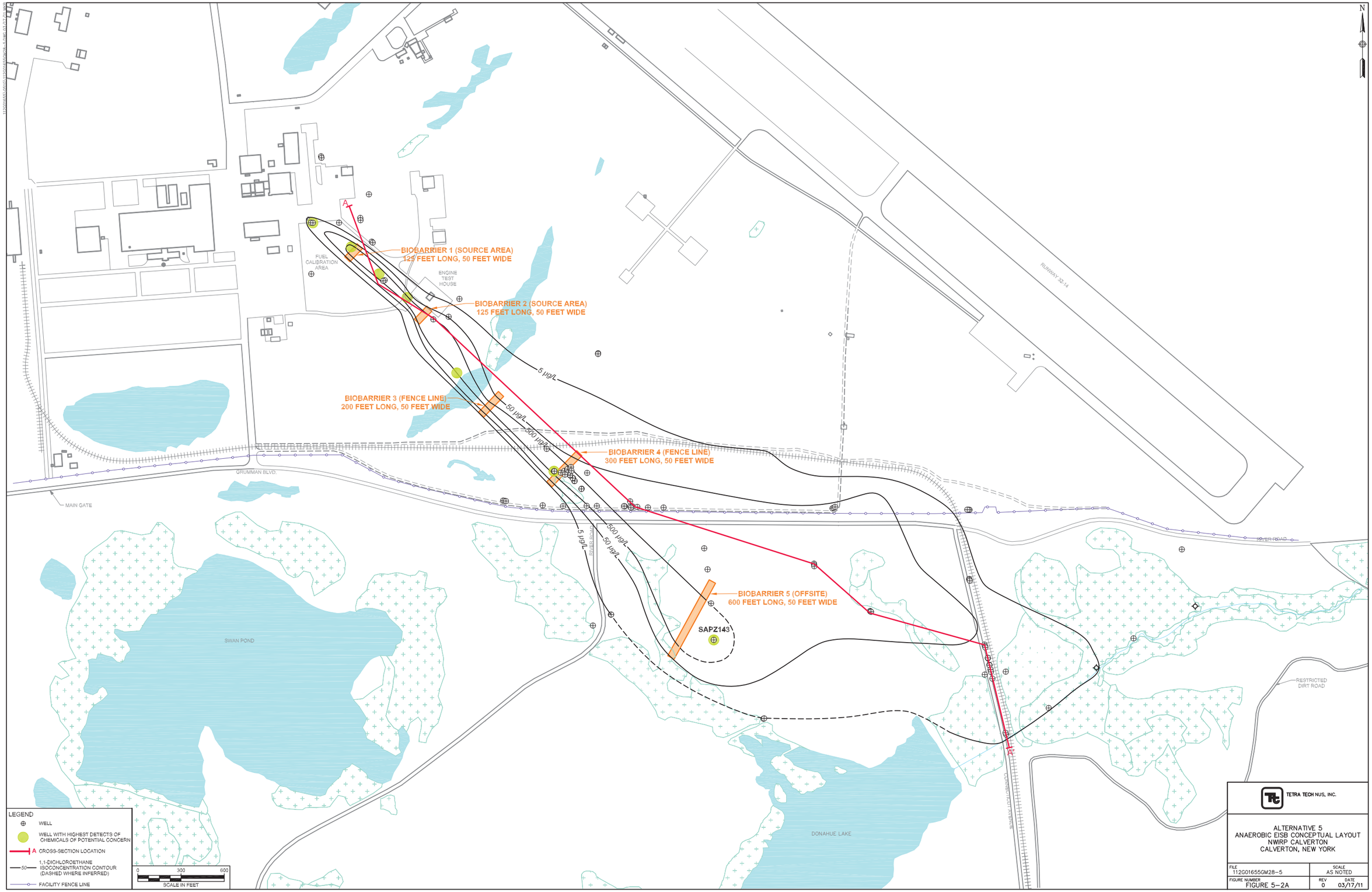


SCHEMATIC: NOT TO SCALE

TETRA TECH NUS, INC.

ALTERNATIVE 4
RIVER AREA AIR SPARGE PROCESS DIAGRAM
NWIRP CALVERTON
CALVERTON, NEW YORK

SCALE	AS NOTED
FILE	112G01655FP01
REV	0
DATE	03/17/11
FIGURE NUMBER	FIGURE 5–1D


N
A
BIOBARRIER 1 (SOURCE AREA)
125 FEET LONG, 50 FEET WIDE
BIOBARRIER 2 (SOURCE AREA)
125 FEET LONG, 50 FEET WIDE
BIOBARRIER 3 (FENCE LINE)
200 FEET LONG, 50 FEET WIDE
BIOBARRIER 4 (FENCE LINE)
300 FEET LONG, 50 FEET WIDE
BIOBARRIER 5 (OFFSITE)
600 FEET LONG, 50 FEET WIDE
SAPZ143
5 µg/L
50 µg/L
500 µg/L
FUEL CALIBRATION AREA
ENGINE TEST HOUSE
RUNWAY 32-14
GRUMMAN BLVD.
MAIN GATE
RIVER ROAD
SWAN POND
DONAHUE LAKE
CONRAIL RAILROAD
RESTRICTED DIRT ROAD
LEGEND
WELL
WELL WITH HIGHEST DETECTS OF CHEMICALS OF POTENTIAL CONCERN
A CROSS-SECTION LOCATION
50 1,1-DICHLOROETHANE ISOCONCENTRATION CONTOUR (DASHED WHERE INFERRED)
FACILITY FENCE LINE
0 300 600
SCALE IN FEET
TETRA TECH NUS, INC.
ALTERNATIVE 5
ANAEROBIC EISB CONCEPTUAL LAYOUT
NWIRP CALVERTON
CALVERTON, NEW YORK
FILE 112G01655GM28-5
SCALE AS NOTED
FIGURE NUMBER FIGURE 5-2A
REV 0
DATE 03/17/11

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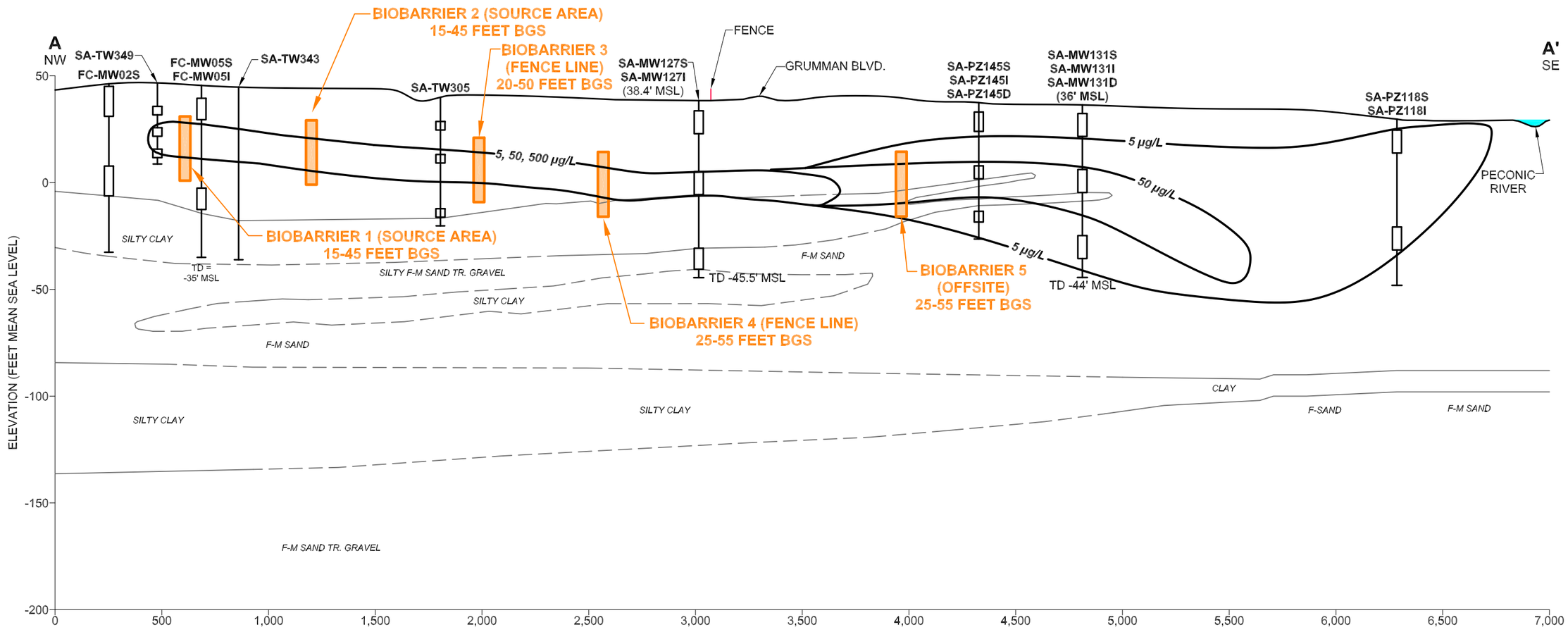


LEGEND

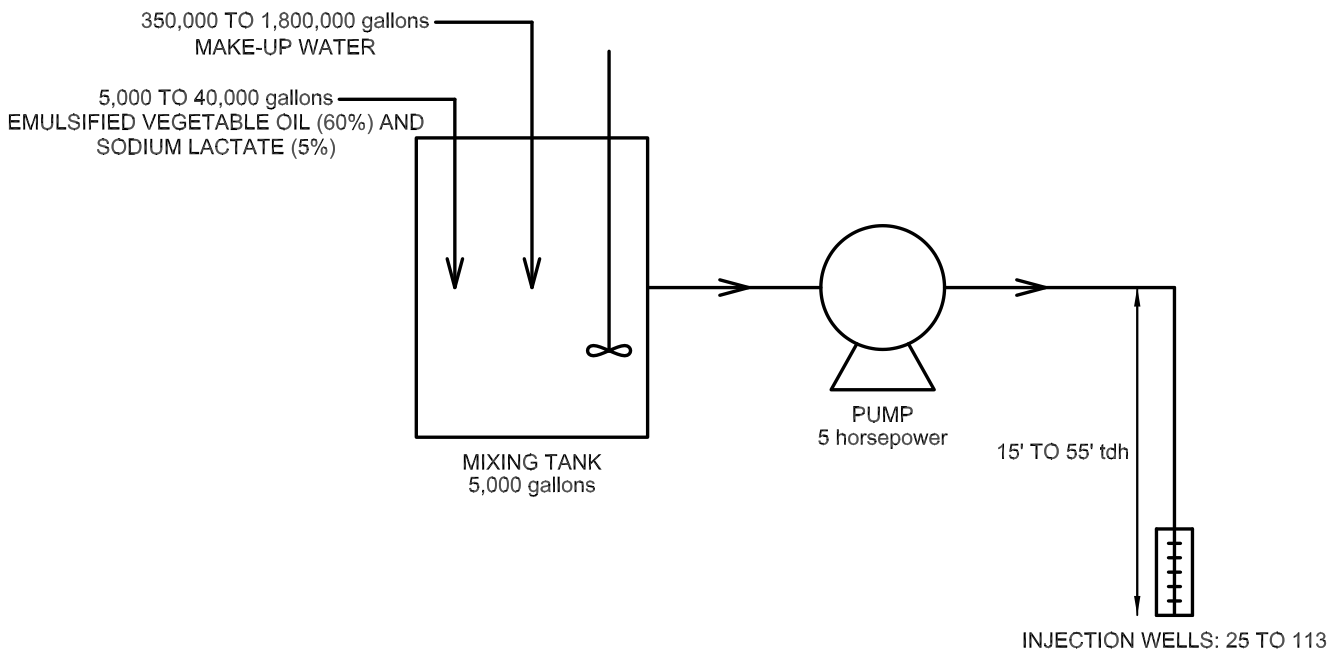
(45.5' MSL)	GROUND SURFACE ELEVATION (FEET MEAN SEA LEVEL)
	GROUND SURFACE
SA-MW131S	MONITORING WELL SCREEN
F SAND	LITHOLOGY
5 µg/L	1,1-DICHLOROETHANE ISOCONCENTRATION CONTOURS (5, 50, 500 µg/L)
	TEMPORARY WELL SCREEN
	CONFINING UNIT
TD -35' MSL	TOTAL DEPTH (FEET MEAN SEA LEVEL)
µg/L	MICROGRAMS PER LITER
BGS	BELOW GROUND SURFACE

0 500 1,000
SCALE IN FEET

TETRA TECHNUS, INC.

ALTERNATIVE 5
ANAEROBIC EISB
CROSS-SECTION VIEW
NWIRP CALVERTON
CALVERTON, NEW YORK

FILE	SCALE
112G01655GX04-2	AS NOTED
FIGURE NUMBER	REV / DATE
FIGURE 5-2B	0 / 03/17/11

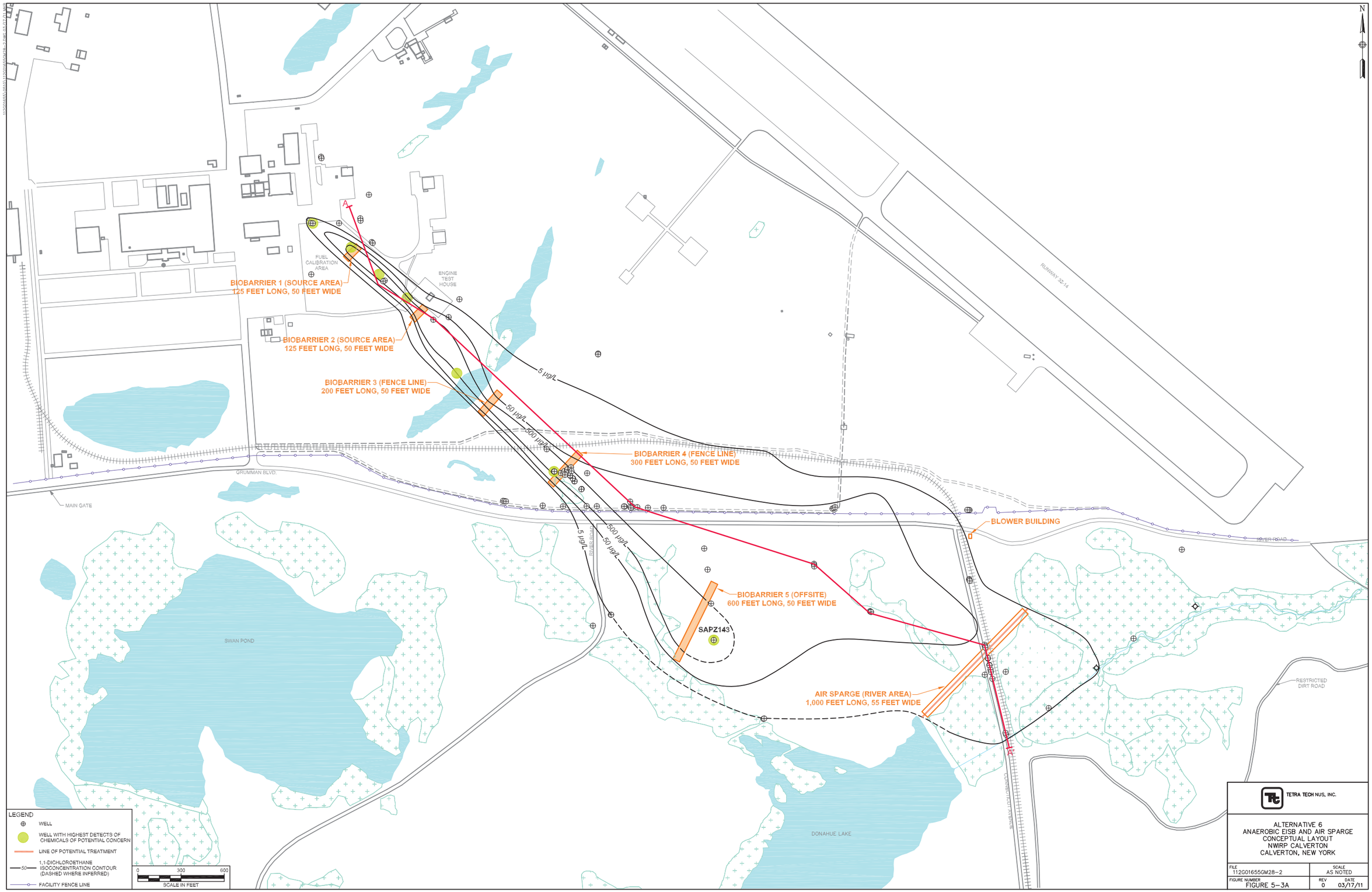


SCHEMATIC: NOT TO SCALE

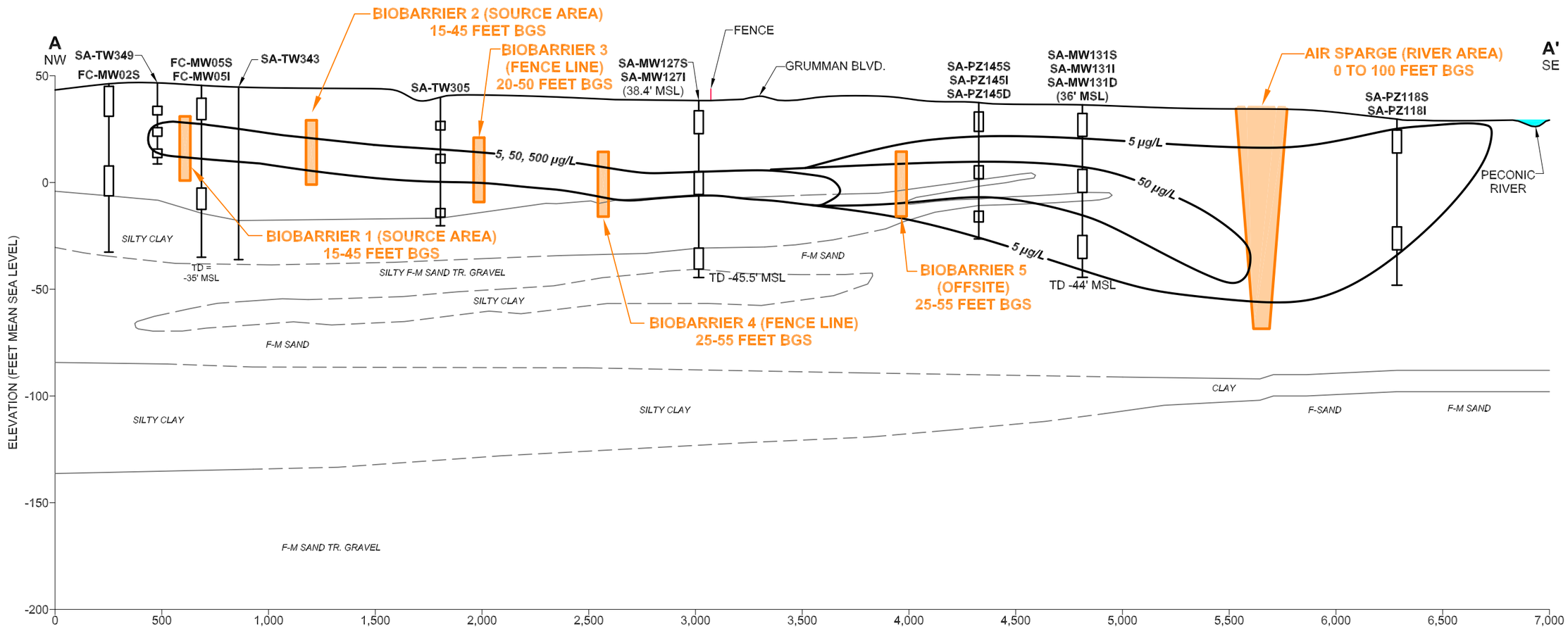
TETRA TECH NUS, INC.

ALTERNATIVE 5
ANAEROBIC EISB PROCESS DIAGRAM
NWIRP CALVERTON
CALVERTON, NEW YORK

SCALE	AS NOTED
FILE	112G01655FP01
REV	0
DATE	03/17/11
FIGURE NUMBER	FIGURE 5–2C


N
A
FUEL CALIBRATION AREA
ENGINE TEST HOUSE
BIOBARRIER 1 (SOURCE AREA)
125 FEET LONG, 50 FEET WIDE
BIOBARRIER 2 (SOURCE AREA)
125 FEET LONG, 50 FEET WIDE
BIOBARRIER 3 (FENCE LINE)
200 FEET LONG, 50 FEET WIDE
BIOBARRIER 4 (FENCE LINE)
300 FEET LONG, 50 FEET WIDE
BIOBARRIER 5 (OFFSITE)
600 FEET LONG, 50 FEET WIDE
SAPZ143
BLOWER BUILDING
AIR SPARGE (RIVER AREA)
1,000 FEET LONG, 55 FEET WIDE
5 µg/L
50 µg/L
500 µg/L
RUNWAY 32-14
GRUMMAN BLVD.
MAIN GATE
RIVER ROAD
SWAN POND
DONAHUE LAKE
CONVERT NOT AVENUE
RESTRICTED DIRT ROAD
LEGEND
WELL
WELL WITH HIGHEST DETECTS OF CHEMICALS OF POTENTIAL CONCERN
LINE OF POTENTIAL TREATMENT
50 1,1-DICHLOROETHANE ISOCONCENTRATION CONTOUR (DASHED WHERE INFERRED)
FACILITY FENCE LINE
0 300 600
SCALE IN FEET
TETRA TECH NUS, INC.
ALTERNATIVE 6
ANAEROBIC EISB AND AIR SPARGE
CONCEPTUAL LAYOUT
NWIRP CALVERTON
CALVERTON, NEW YORK
FILE 112G01655GM28-2
SCALE AS NOTED
FIGURE NUMBER FIGURE 5-3A
REV 0
DATE 03/17/11

112G01655\0510\112G01655GX04-2.DWG 03/17/11 MKB



LEGEND

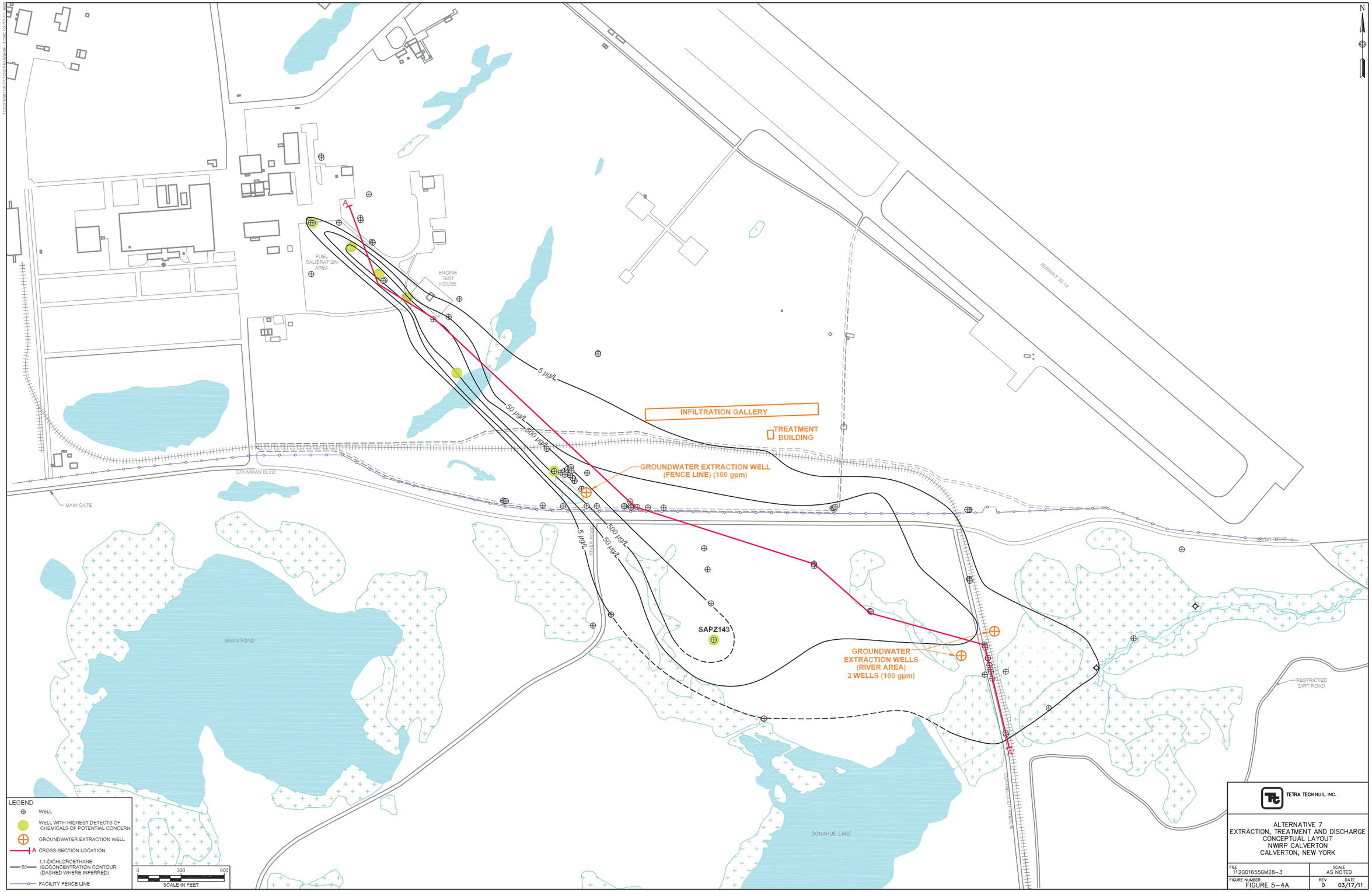
(45.5' MSL)	GROUND SURFACE ELEVATION (FEET MEAN SEA LEVEL)
	GROUND SURFACE
SA-MW131S	MONITORING WELL SCREEN
F SAND	LITHOLOGY
5 µg/L	1,1-DICHLOROETHANE ISOCONCENTRATION CONTOURS (5, 50, 500 µg/L)
	CONFINING UNIT
TD -35' MSL	TOTAL DEPTH (FEET MEAN SEA LEVEL)
µg/L	MICROGRAMS PER LITER
BGS	BELOW GROUND SURFACE

0 500 1,000
SCALE IN FEET

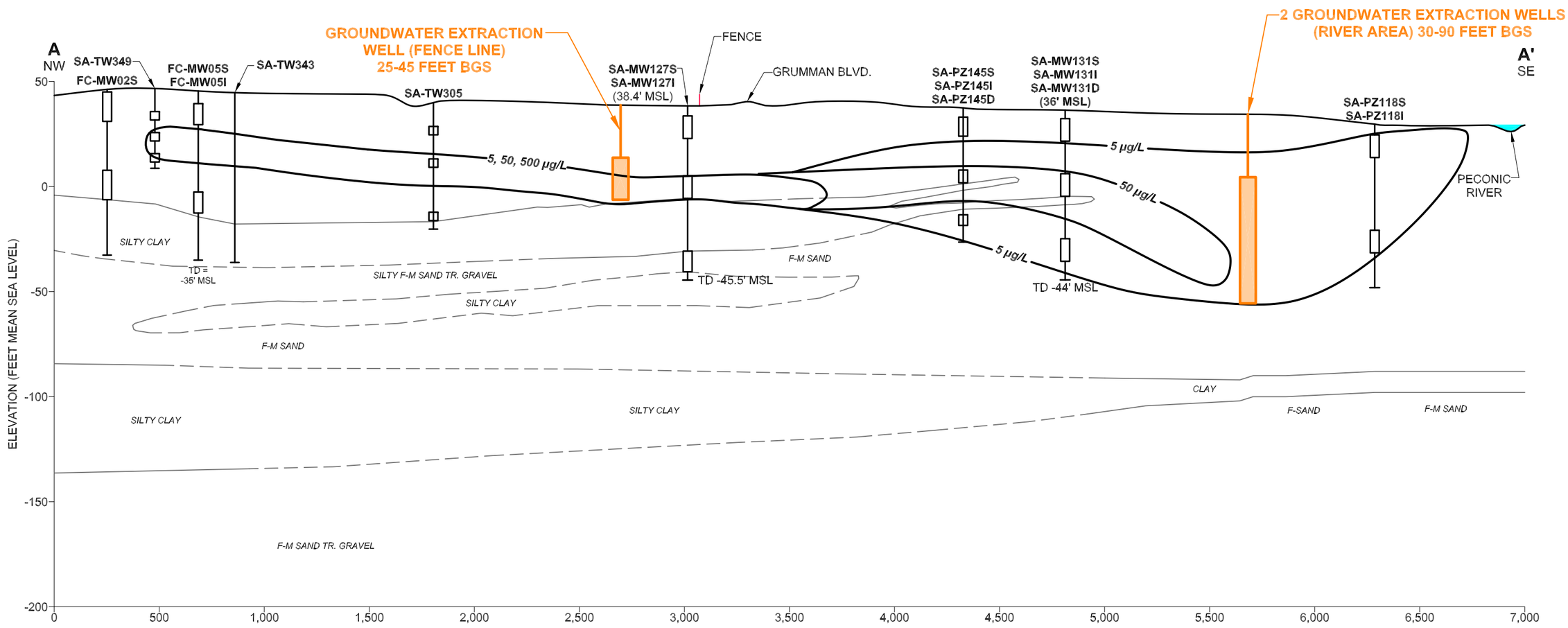
TETRA TECHNUS, INC.

ALTERNATIVE 6
ANAEROBIC EISB AND AIR SPARGE
CROSS-SECTION VIEW
NWIRP CALVERTON
CALVERTON, NEW YORK

FILE	SCALE
112G01655GX04-2	AS NOTED
FIGURE NUMBER	REV / DATE
FIGURE 5-3B	0 / 03/17/11


N
A
FUEL CALIBRATION AREA
ENGINE TEST HOUSE
RUNWAY 32-14
5 µg/L
50 µg/L
500 µg/L
INFILTRATION GALLERY
TREATMENT BUILDING
GROUNDWATER EXTRACTION WELL (FENCE LINE) (100 gpm)
GRUMMAN BLVD.
MAIN GATE
RIVER ROAD
SAPZ143
GROUNDWATER EXTRACTION WELLS (RIVER AREA) 2 WELLS (100 gpm)
SWAN POND
DONAHUE LAKE
CONNECTICUT AVENUE
RESTRICTED DIRT ROAD
LEGEND
WELL
WELL WITH HIGHEST DETECTS OF CHEMICALS OF POTENTIAL CONCERN
GROUNDWATER EXTRACTION WELL
A CROSS-SECTION LOCATION
50 1,1-DICHLOROETHANE ISOCONCENTRATION CONTOUR (DASHED WHERE INFERRED)
FACILITY FENCE LINE
0 300 600
SCALE IN FEET
TETRA TECH NUS, INC.
ALTERNATIVE 7
EXTRACTION, TREATMENT AND DISCHARGE
CONCEPTUAL LAYOUT
NWIRP CALVERTON
CALVERTON, NEW YORK
FILE 112G01655GM28-3
SCALE AS NOTED
FIGURE NUMBER FIGURE 5-4A
REV 0
DATE 03/17/11

112G01655\0510\112G01655GX04-3.DWG 03/17/11 MKB



LEGEND

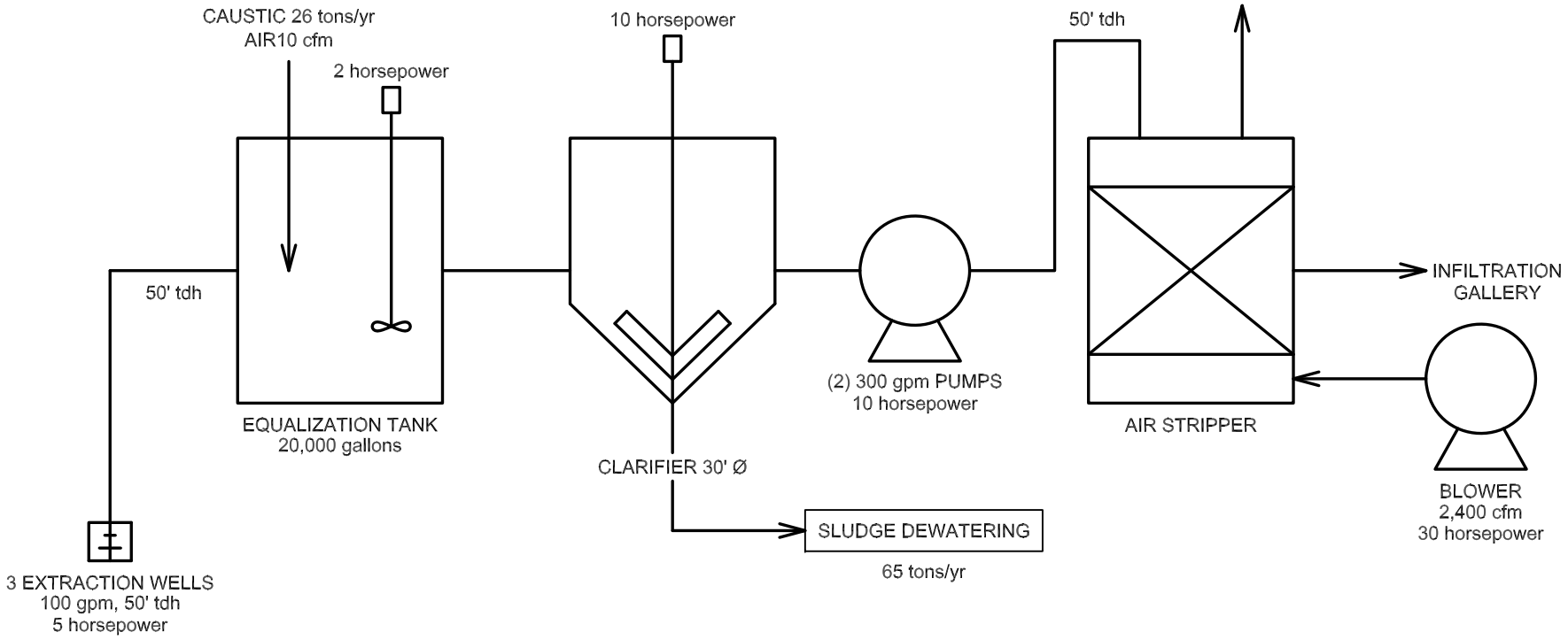
(45.5' MSL)	GROUND SURFACE ELEVATION (FEET MEAN SEA LEVEL)
	GROUND SURFACE
SA-MW131S	MONITORING WELL SCREEN
F SAND	LITHOLOGY
5 µg/L	1,1-DICHLOROETHANE ISOCONCENTRATION CONTOURS (5, 50, 500 µg/L)
	TEMPORARY WELL SCREEN
	CONFINING UNIT
TD -35' MSL	TOTAL DEPTH (FEET MEAN SEA LEVEL)
µg/L	MICROGRAMS PER LITER
BGS	BELOW GROUND SURFACE

0 500 1,000
SCALE IN FEET

TETRA TECHNUS, INC.

ALTERNATIVE 7
EXTRACTION, TREATMENT AND DISCHARGE
CROSS SECTION VIEW
NWIRP CALVERTON
CALVERTON, NEW YORK

FILE	SCALE
112G01655GX04-3	AS NOTED
FIGURE NUMBER	REV / DATE
FIGURE 5-4B	0 / 03/17/11



SCHEMATIC: NOT TO SCALE

TETRA TECH NUS, INC.

ALTERNATIVE 7
EXTRACTION, TREATMENT AND DISCHARGE
PROCESS DIAGRAM
NWIRP CALVERTON
CALVERTON, NEW YORK

SCALE	AS NOTED
FILE	112G01655FP01
REV	0
DATE	03/31/11
FIGURE NUMBER	FIGURE 5–4C

APPENDICES

APPENDIX A

PUMP TEST TECHNICAL MEMORANDUM

TECHNICAL MEMORANDUM
AQUIFER TEST ANALYSIS
SITE 6A – SOUTHERN AREA
NWIRP CALVERTON, NEW YORK

This Technical Memorandum presents the analysis of the aquifer testing performed in July 2010 at Site 6A - Southern Area at Naval Weapons Industrial Reserve Plant (NWIRP) Calverton, Suffolk County, New York. The testing was performed to estimate aquifer hydraulic parameters to evaluate the feasibility of groundwater extraction for volatile organic compound (VOC)-contaminated groundwater in the Southern Area and to evaluate potential impacts to wetlands in the Southern Area from groundwater extraction.

1.0 SCOPE

Aquifer tests were conducted at two locations in the Southern Area. One test (Pumping Test 1) was conducted on the Navy property near the intersection of River Road and Grumman Boulevard (Figure A-1). The second test (Pumping Test 2) was performed on former Navy property east of Connecticut Avenue and north of the Peconic River and the associated wetlands (Figure A-2). Pumping wells SAPTW-1 and SAPTW-2 were used as the pumping wells. For each area, the aquifer testing included a step-drawdown test, a constant-rate pumping test, and groundwater sampling during the constant-rate tests.

2.0 AQUIFER TESTING

2.1 PUMPING TEST METHODOLOGY

A 6-inch diameter Grundfos® submersible pump was used for the step-drawdown and constant-rate tests. Pumping rates were measured throughout each test to maintain specified rates. Flow rates were measured with an in-line flow meter, and rates were adjusted using a valve on the discharge line. For Pumping Test 1, discharge water from the pumping well was pumped to a 21,000 gallon capacity frac tank and then treated with a particulate filter and two 1,000-pound granular activated carbon units. The treated water was discharged via a spray irrigation system to a field approximately 600 feet north of the pumping well. For Pumping Test 2 water from the frac tank along Connecticut Ave was trucked to the frac tank and then discharged through the treatment system as per Pumping Test 1.

Water levels in the pumping and observation wells were recorded during the tests using pressure transducers and electronic data loggers, with hand measurements also collected periodically. Water

levels in wells SA-PZ-161I (Pumping Test 1) and SA-PZ-118I (Pumping Test 2) were measured by hand using an electronic water level indicator and with a pressure transducer and were used for groundwater trend information.

2.2 GROUNDWATER SAMPLING AND ANALYSIS

Groundwater samples were collected to establish initial concentrations and short-term changes in contaminant concentrations resulting from the pumping of the wells. Groundwater samples were collected at the beginning of the pumping test, at regular intervals throughout the test, and at the end of the test. Groundwater samples were also taken from the treatment system discharge during Pumping Test 1.

Samples collected during the constant-rate test were obtained directly from a sampling port installed on the discharge line from the well. The groundwater samples were analyzed for Target Compound List (TCL) VOCs, iron, and manganese.

2.3 PUMPING TEST 1

Pumping Test 1 included a step-drawdown test and constant-rate pumping test, using SAPTW-1 as the pumping well. The step-drawdown test was performed on July 13, 2010, and the pumping test was performed on July 14 and 15, 2010.

Nine observation wells were monitored during the testing: SA-PZ-133I, SA-PZ-133I1, SA-PZ-162I, SA-PZ-170I, SA-PZ-163I, SA-PZ-134I, SA-MW-127S, SA-MW-127I and SA-MW-127D. A drop tube (SA-PTW1-PZ) located adjacent to the pumping well was also monitored. The locations of the wells are shown on Figure A-1. Monitoring well SA-PZ-161I was monitored during testing to note potential background trends in water levels. Well construction information and distances from SA-PTW-1 are summarized on Table A-1.

2.3.1 <u>Step-Drawdown Test</u>

The step-drawdown test consisted of four steps, each approximately 1 to 2 hours in duration. The initial flow rate was 58 gallons per minute (gpm) with step-ups to 95, 150, and 210 gpm. A graph of the drawdown for the step-drawdown test at SA-PTW-1 is provided in Attachment A-1.

2.3.2 Constant-Rate Test

The constant-rate test was started on July 14, 2010, at 10:00 AM and ended on July 15, 2010 at 4:00 PM for a total of 30 hours. Water level recovery was monitored for approximately 16 hours after the test ended. Based on results from the step-drawdown test, a pumping rate of 120 gpm was selected for the constant-rate test. A graph of the drawdowns for the constant-rate test at SA-PTW-1 is provided in Attachment A-1.

2.3.3 Groundwater Sampling

During aquifer testing at SA-PTW-1, groundwater samples were collected as shown in the table below.

SAMPLE ID	COMMENTS	SAMPLE DATE AND TIME
SAPT1-INIT	Initial	7/14/10 @ 1045 hrs
SAPT1-07HR	Approx 7 hrs into test	7/14/10 @ 1715 hrs
SAPT1-22 HR	Approx 22 hrs into test	7/15/10 @ 0815 hrs
SAPT1-END	At the end of test	7/15/10 @ 1550 hrs

Samples were analyzed for TCL VOCs using EPA Method 8260, iron, and manganese.

2.4 PUMPING TEST 2

Pumping Test 2 included a step-drawdown test and constant-rate pumping test, using SA-PTW-2. The step-drawdown test was performed on July 20, 2010, and the pumping test was performed on July 21, 2010.

Ten observation wells were monitored during the testing: SA-PZ-123I, SA-PZ-123S, SA-PZ-164S, SA-PZ-164I, SA-PZ-168S, SA-PZ-168I, SA-PZ-169I, SA-PZ-165S, SA-PZ-166I, and SA-PZ-167S. A drop tube (SA-PTW2-PZ) located inside the pumping well, was also monitored. The locations of the wells are shown on Figure A-2. Monitoring wells SA-PZ-118I and SA-PZ-118S were monitored during testing to note potential background trends in water levels. Well construction information and distances from SAPTW-2 are summarized on Table A-1.

2.4.1 Step-Drawdown Test

The step-drawdown test consisted of three steps, each approximately 1 to 2 hours in duration. The initial flow rate was 65 gpm, with step-ups to 93 and 118 gpm. A graph of the drawdown for the step-drawdown test at SAPTW-2 is provided in Attachment A-2.

2.4.2 Constant-Rate Test

The constant-rate test was started on July 21, 2010, at 8:30 AM and ended on the same day at 7:00 PM for a total of 10.5 hours. Water level recovery was monitored for approximately 16 hours after the end of the test. Based on results from the step-drawdown test, a rate of 100 gpm was selected for the constant-rate test. A graph of the drawdowns for the constant-rate test at SA-PTW-2 is provided in Attachment A-2.

2.4.3 Groundwater Sampling

During aquifer testing at SAPTW-2, groundwater samples were collected as indicated in the table below.

SAMPLE ID	COMMENTS	SAMPLE DATE AND TIME
SAPT2-INIT	Initial	7/21/10 @ 0915 hrs
SAPT2-04HR	Approx 4 hrs into test	7/21/10 @ 1230 hrs
SAPT2-09HR	Approx 9 hrs into test	7/21/10 @ 1730 hrs

Samples were analyzed for TCL VOCs using EPA Method 8260, iron, and manganese.

2.5 BACKGROUND TREND MONITORING

Background trends were monitored during the constant-rate tests by monitoring water levels in well SA-PZ-161I during Pumping Test 1 and in well SA-PZ-118I during Pumping Test 2. The monitoring data is plotted and provided in Attachments A-1 and A-2, respectively. The plots provide precipitation data for comparison.

3.0 RESULTS

The data from the step-drawdown tests and constant-rate pumping tests were analyzed to estimate extraction well and aquifer characteristics. The step-drawdown test data were also analyzed to estimate specific capacity for the extraction wells. Specific capacity is the yield per unit of drawdown after a given time has elapsed. To estimate specific capacity, the drawdown per unit discharge was plotted against

discharge on a semi-log graph. Based on the Neuman Method, estimates for specific capacity were calculated. The semi-log graphs and calculations are provided in Attachments A-1 and A-2, respectively.

The constant rate pumping test data were analyzed to estimate the transmissivity, hydraulic conductivity, and storativity of the unconfined aquifer, based on drawdowns over time within each well and drawdown patterns with distance from the pumping wells. Time-drawdown test data was analyzed using the AquiferTest (version 4.2) data analysis package. The Neuman approach for unconfined aquifers was used, since the upper sand unit is only bounded by a lower permeability unit below (clay), and the method is applicable for partially penetrating wells. The test evaluation results are provided in Attachment A-1 for Pumping Test 1 and Attachment A-2 for Pumping Test 2.

The distance-drawdown data were analyzed using the Cooper-Jacob straight-line method. This method provides estimates of transmissivity and storativity and also provides an estimate of the radius of zero-drawdown. Although strictly applicable to confined aquifers, the method can be used for unconfined aquifers where the drawdown due to pumping is small relative to the aquifer thickness. The drawdowns in the observation wells at a time near the end of each of the tests were plotted against observation well distances from the pumping wells on semi-log graphs. The distance-drawdown plots and calculations are provided in Attachment A-1 for Pumping Test 1 and Attachment A-2 for Pumping Test 2.

3.1 PUMPING TEST 1 RESULTS

3.1.1 Aquifer Testing

Specific capacities were estimated for each step in the step-drawdown test. The specific capacities for Pumping Test 1 are summarized in Table A-2. The average specific capacity was 21 gpm/ft drawdown. There was no change in the specific capacity at higher pumping rates.

Drawdown data from ten observations wells (SA-MW-127S, SA-MW-127I, SA-MW-127D, SA-PZ-162I, SA-PZ-133I, SA-PZ-133I1, SA-PZ-170I, SA-PZ-163I, SA-PZ-134I, and SA-PZ-161I) were analyzed to estimate aquifer characteristics. Table A-3 summarizes the results of the constant-rate pumping test analysis. For the time-drawdown analysis, transmissivity values ranged from 7,900 to 9,800 feet $(ft)^2$/day, with an average of 8,790 ft^2/day. Values for the horizontal hydraulic conductivity ranged from 198 to 246 ft/day with an average of 221 ft/day. Values for the vertical component of hydraulic conductivity ranged from 16 to 215 ft/day with an average of 102 ft/day. Storativity values ranged from 0.0107 to 0.333 with an average of 0.127.

The distance-drawdown analysis yielded a transmissivity of 6,040 ft^2/day, and a storativity of 0.186. Assuming an aquifer thickness of 39.9 ft, a hydraulic conductivity of 151 ft/day is estimated from the

distance-drawdown data. The radius of influence (i.e., to the zero-drawdown level) for SA-PTW-1 was 297 feet. The drawdown for SA-PTW-1 is shown on Figure A-3.

The overall average transmissivity value for Pumping Test 1, calculated from the average time-drawdown transmissivity and the distance-drawdown transmissivity, is 7,420 ft^2/day. The overall average specific yield for Pumping Test 1, calculated from the average time-drawdown specific yield and the distance-drawdown specific yield, is 0.157.

Well efficiency for SA-PTW-1 was estimated from the theoretical drawdown compared to the actual drawdown at approximately 1.21 Days (1,738 minutes). The theoretical drawdown from the distance-drawdown graph is 3.85 feet. The actual measured drawdown at SA-PTW-1 was 6.15 ft. Therefore, the well efficiency is 63%.

3.1.2 Groundwater Analytical Results

Groundwater analytical results for Pumping Test 1 are presented in Table A-4. Several VOCs were detected in the samples collected during the constant-rate test for Pumping Test 1. 1,1,1-Trichlorethane (TCA), 1,1-dichloroethane (DCA), and 1,1-dichlorethene (DCE) were detected at consistent levels throughout the test. Similarly, iron was detected at relatively consistent concentrations throughout the test. Manganese concentrations decreased slightly as the test progressed.

3.1.3 Trend Information

The groundwater trend data collected from well SA-PZ161I during Pumping Test 1 indicated that the well was influenced by the pumping well. Therefore, the trend data could not be applied to the pumping test data.

Two other factors, as revealed by the trend graph, also indicated additional influences on the trend data. A repeating cycle of falling and rising water levels occurred through the majority of the trend data. The cycling was regular with an amplitude of approximately 0.1 foot, beginning daily at approximately 8:00 AM with falling water levels and ending at approximately 8:00 PM with rising water levels. In addition, minor precipitation events on July 13 and July 14 slightly influenced water levels. These non-episodic changes were not reflected in the pumping test data, so no corrections were made.

3.2 PUMPING TEST 2 RESULTS

3.2.1 Aquifer Testing

Specific capacities were estimated for each step in the step-drawdown test. The specific capacities for Pumping Test 2 are summarized in Table A-2.

Drawdown data from ten observation wells (SA-PZ-123S, SA-PZ-123I, SA-PZ-164S, SA-PZ-164I, SA-PZ-165S, SA-PZ-166I, SA-PZ-167S, SA-PZ-168S, SA-PZ-168I, and SA-PZ-169I) were analyzed to estimate aquifer characteristics. Table A-5 summarizes the results of the constant-rate pumping test analysis. For the time-drawdown analysis, transmissivity values ranged from 1,390 to 10,800 ft^2/day, with an average of 4,390 ft^2/day. Horizontal hydraulic conductivity values ranged from 13.3 to 103 ft/day, with an average of 41.8 ft/day. The vertical hydraulic conductivity values ranged from 0.028 to 16.1 ft/day, with an average value of 3.8 ft/day. Storativity values ranged from 0.0253 to 0.219, with an average of 0.0964.

The distance-drawdown analysis at 298 minutes (pre-rainfall) yielded a transmissivity of 7117.8 ft^2/day, and a storativity of 0.0000215. Assuming an aquifer thickness of 105 feet, a hydraulic conductivity of 67.8 ft/day is estimated from the distance-drawdown data. The distance-drawdown analysis at 558 minutes (at the end of the test) yielded similar results, with a transmissivity of 7417.5 ft^2/day, and a storativity of 0.0000394. Assuming an aquifer thickness of 105 feet, a hydraulic conductivity of 70.6 ft/day is estimated from the distance-drawdown data.

Well efficiency for SA-PTW-2 was estimated from the theoretical drawdown compared to the actual drawdown. At 0.2069 days (298 minutes), the theoretical drawdown from the distance-drawdown data plot is 4.35 feet. The actual measured drawdown at SA-PTW-2 was 4.94 feet, resulting in a calculated well efficiency of 88%. At 0.3875 days (558 minutes), the theoretical drawdown from the distance-drawdown is 4.12 feet. The actual measured drawdown at SA-PTW-2 was 5.09 feet, resulting in a calculated well efficiency of 81%.

The overall average transmissivity value for Pumping Test 2, calculated from the average time-drawdown transmissivity and the average of the distance-drawdown transmissivities, is 5,830 ft^2/day. The overall average specific yield for Pumping Test 2, calculated from the average time-drawdown specific yield and the average of the distance-drawdown specific yields, is 0.0482.

Drawdowns observed during Pumping Test 2 were strongly influenced by depth. Intermediate wells had much greater drawdowns than adjacent shallow wells, indicating that horizontal hydraulic conductivities are much greater than vertical hydraulic conductivities in the test area. This effect can be readily observed in the semi-log distance-drawdown plot and associated storativity calculation– the projected

drawdown extends out much further than would normally be expected for an unconfined aquifer, and the calculated storativity is much lower than would be expected for an unconsolidated sand aquifer (Attachment A-2). Storativities calculated for Pumping Test 2, using curve matching techniques, were much higher and were more in line with what would normally be expected. The Kv/Kh ratios calculated for Pumping Test 2, using curve matching, indicated the high degree of anisotropy in the aquifer, much more so than was calculated for Pumping Test 1.

3.2.2 Groundwater Analytical Results

Groundwater analytical results for Pumping Test 2 are presented in Table A-6. 1,1-DCA and 1,1-DCE were detected in the samples collected during Pumping Test 2. The concentrations decreased through the test. 1,1,1-TCA was not detected in the samples. Iron and manganese were detected at relatively consistent concentrations throughout the test.

3.2.3 Trend Information

The groundwater trend data collected from well SA-PZ118I during Pumping Test 2 indicated no changes in water levels until a precipitation event approximately half way through the test. This non-episodic change could not be corrected for in the pumping test data, thus the curve matching was confined to the drawdown data collected prior to the rainfall event.

4.0 CONCLUSIONS

4.1 PUMPING RATES

The two pumping tests conducted in the Southern Area yielded similar aquifer characteristics. Overall average transmissivity values were 7,420 ft^2/day for the On-Site area and 5,830 ft^2/day for the Connecticut Avenue area. Vertical anisotropy in the aquifer was observed from the analyses, with Kv/Kh ratios of 0.46 for the On-site area and 0.091 for the Connecticut Avenue area.

Based on the aquifer testing, pumping rates of 120 gpm for the On-site area and 100 gpm for the Connecticut Avenue area would likely be sustainable.

4.2 PUMPING EFFECTS ON WETLANDS (CONNECTICUT AVENUE AREA)

Water level data from piezometers SA-PZ-165S and SA-PZ-167S, both shallow well points installed in wetland areas in the Connecticut Avenue area, indicated that pumping-induced drawdowns in the shallow portion of the aquifer extended into the wetland areas. These two piezometers monitor the 0-to-3-foot

depth range, thus have a direct hydraulic connection with the wetlands. Drawdowns were observed in the piezometers beginning approximately 10 minutes after the start of pumping and gradually increased, with drawdowns reaching approximately 0.1 foot in both piezometers immediately prior to the rain event that occurred during the pumping test. Once the rain event occurred, water levels in both piezometers rose above the initial static water levels, as would be expected in a wetland due to the rain. These drawdowns observed within the wetlands at the water table/wetland surface indicate that significant long-term pumping in the area would be expected to impact water levels in the wetlands.

TABLE A-1
WELL SUMMARY
SITE 6A - SOUTHERN AREA
NWIRP CALVERTON, NEW YORK

Well	Total Depth (feet BTOC)	Screened Interval (feet bgs)	Surveyed TOC (feet MSL)	Ground Surface Elevation (feet MSL)	Northing* (feet)	Easting* (feet)
Pumping Test 1 - Onsite						
SAPTW-1 (Pumping Well)	48.87	27 - 47	40.95	38.28	271417.3	1320592.1
SAPTW1PZ (Drop Tube)	NM	42 - 47	NM	NM	NM	NM
SA-MW-127S	17.15	5 - 15	40.57	38.38	271425.8	1320603.7
SA-MW-127I	48.20	36 - 46	40.79	38.51	271425.8	1320597.2
SA-MW-127D	77.14	68 - 78	40.57	38.51	271425.2	1320587.5
SA-PZ-133I	49.25	42 - 47	41.55	39.51	271427.2	1320548.9
SA-PZ-133I1	42.52	35 - 40	41.43	39.32	271428.1	1320544.3
SA-PZ-134	46.75	39 - 44	39.62	36.96	271418.3	1320818.6
SA-PZ-162I	50.03	42 - 47	41.80	38.67	271461.1	1320586.5
SA-PZ-163I	44.49	32 - 42	40.17	37.63	271418.8	1320710.3
SA-PZ-170I	44.74	32 - 42	40.38	37.64	271422.2	1320636.6
SA-PZ-161I (Trend Well)	47.98	41 - 46	40.59	38.21	271429.2	1320355.5
Pumping Test 2 - Connecticut Avenue						
SAPTW-2 (Pumping Well)	90.00	50 - 90	33.57	31.05	270278.3	1323090.3
SAPTW2PZ (Drop Tube)	NM	85 - 90	NM	NM	NM	NM
SA-PZ-123S	19.07	7 - 17	36.96	34.50	270448.0	1323051.4
SA-PZ-123I	83.66	70 - 80	38.02	35.26	270468.0	1323045.8
SA-PZ-164S	15.00	5 - 15	36.51	32.82	270376.2	1323068.8
SA-PZ-164I	80.00	60 - 80	35.64	32.78	270373.0	1323068.9
SA-PZ-165S	3.00	0-3	30.73	37.74	270259.6	1323047.9
SA-PZ-166I	80.50	60 - 80	33.03	30.16	270231.6	1323100.4
SA-PZ-167S	3.00	0-3	30.35	26.66	270279.8	1323193.1
SA-PZ-168S	18.05	5 - 15	34.72	31.87	270327.5	1323079.6
SA-PZ-168I	82.68	60 - 80	34.40	31.56	270324.2	1323080.4
SA-PZ-169I	80.00	60 - 80	34.07	31.22	270294.7	1323087.2
SA-PZ-118S	18.48	6 - 16	31.13	*29.12*	269855.8	1323191.4
SA-PZ-118I (Trend Well)	61.24	50 - 60	31.68	*29.67*	269844.5	1323195.2

Notes:
* New York State Plane (Long Island)
Italics: Indicates estimated value

BTOC - below top of casing
bgs - below ground surface

MSL - mean sea level
NM - not measured

TABLE A-2
SPECIFIC CAPACITY ESTIMATES
SITE 6A - SOUTHERN AREA
NWIRP CALVERTON, NEW YORK

Pumping Well	Pumping Rate (gpm)	Specific Capacity (gpm/ft)
SAPTW-1	58	20.7
	95	21.2
	150	20.7
	210	20.7
SAPTW-2	65	21.8
	93	21.8
	118	21.8

Notes
gpm - gallons per minute
ft - feet

TABLE A-3
WELL HYDRAULIC CHARACTERISTICS - PUMPING TEST 1
SITE 6A - SOUTHERN AREA
NWIRP CALVERTON, NY

Observation Well	Screened Interval (feet bgs)	Distance from PTW-1 (feet)	Drawdown (feet)[1]	T (ft^2/day)	Hydraulic Conductivity			Specific Yield (unitless)
					Kh (ft/day)	Kv (ft/day)	Kv/Kh[2] (unitless)	
Time-Drawdown Analysis								
SA-MW-127 S	5-15	14.33	1.05	9.80E+03	2.46E+02	1.66E+01	6.73E-02	1.07E-02
SA-MW-127 I	36-46	9.93	2.27	7.90E+03	1.98E+02	8.49E+01	4.29E-01	3.33E-01
SA-MW-127 D	68-78	9.13	0.00	--	--	--	--	--
SA-PZ-162 I	42-47	44.11	1.03	7.95E+03	1.99E+02	7.16E+01	3.60E-01	1.20E-01
SA-PZ-133 I	42-47	44.38	1.00	8.50E+03	2.13E+02	7.46E+01	3.50E-01	1.50E-01
SA-PZ-133 I1	35-40	49.07	0.88	9.40E+03	2.36E+02	1.10E+02	4.67E-01	1.25E-01
SA-PZ-170 I	32-42	44.73	1.05	8.00E+03	2.01E+02	7.44E+01	3.70E-01	1.35E-01
SA-PZ-163 I	32-42	118.24	0.58	9.60E+03	2.41E+02	7.23E+01	3.00E-01	9.50E-02
SA-PZ-134 I	39-44	226.51	0.36[3]	9.00E+03	2.26E+02	1.95E+02	8.65E-01	6.67E-02
SA-PZ-161 I	41-46	236.88	0.14	9.00E+03	2.26E+02	2.15E+02	9.50E-01	1.10E-01
			Average	8.79E+03	2.21E+02	1.02E+02	4.62E-01	1.27E-01
Distance-Drawdown Analysis				6.04E+03	--	--	--	1.86E-01
OVERALL AVERAGE				7.42E+03	--	--	--	1.57E-01

Notes
SA-PTW-1 Pumping Rate = 120 gpm
Aquifer thickness = 39.9 feet bgs

[1] Drawdown at elapsed time of 1738 minutes
[2] Hydraulic conductivity anisotropy ratio
[3] Observation in well SA-PZ-134 I at elapsed time of 1458 minutes.

T = transmissivity
Kh = horizontal component of hydraulic conductivity
Kv = vertical component of hydraulic conductivity
S = storativity

TABLE A-4
GROUNDWATER ANALYTICAL RESULTS - PUMPING TEST 1
SITE 6A-SOUTHERN AREA
NWIRP CALVERTON, NEW YORK

Parameter (ug/L)	USEPA MCL	NYSDEC MCL	Constant Rate Test			
			7/14/2010		7/15/2010	
			Initial	7-Hour	22-Hour	Final
METALS (ug/L)						
IRON	--	300	753 J	735 J	725 J	770 J
MANGANESE	--	300	**1,270**	**1,200**	**1,150**	**1,130**
VOLATILES (ug/L)						
1,1,1-TRICHLOROETHANE	200	5	2.9 J	3.5 J	3.5 J	3.4 J
1,1-DICHLOROETHANE	NA	5	16	18	18	19
1,1-DICHLOROETHENE	7	5	1.1 J	1.1 J	1.2 J	0.99 J
1,2,4-TRICHLOROBENZENE	70	5	0.68 J	5 U	5 U	5 U
1,2-DICHLOROBENZENE	600	3	0.39 J	5 U	5 U	5 U
1,4-DICHLOROBENZENE	75	3	5 U	5 U	0.42 J	0.4 J
2-BUTANONE	--	--	13 U	13 U	13 U	13 U
TOLUENE	1000	5	5 U	5 U	5 U	5 U

Notes
ug/L - micrograms per liter
MCL - maximum contaminant level
NYSDEC - New York State Department of Environmental Conservation
USEPA - United States Environmental Protection Agency
J - Estimated Value
U - not detected above associated value

TABLE A-5
WELL HYDRAULIC CHARACTERISTICS - PUMPING TEST 2
SITE 6A - SOUTHERN AREA
NWIRP CALVERTON, NY

Observation Well	Screened Interval (feet bgs)	Distance from PTW-2 (feet)	Drawdown (Before Rain) (feet)[1]	Drawdown (End of Test) (feet)[2]	T (ft^2/day)	Hydraulic Conductivity			Specific Yield (unitless)
						Kh (ft/day)	Kv (ft/day)	Kv/Kh[3] (unitless)	
Time-Drawdown Analysis									
SAPZ123 S	7-17	174.15	0.16	0.15	7.47E+03	7.11E+01	2.84E-02	4.00E-04	2.53E-02
SAPZ123 I	70-80	194.85	0.26	0.22	1.08E+04	1.03E+02	1.30E+01	1.26E-01	5.18E-02
SAPZ164 S	5-15	100.28	0.18	0.14	4.79E+03	4.57E+01	4.57E-01	1.00E-02	1.50E-01
SAPZ164 I	60-80	97.13	2.17	2.06	2.80E+03	2.67E+01	1.59E+00	5.94E-02	1.50E-01
SAPZ165 S	0-3	46.37	0.10	-0.07	1.45E+03	1.38E+01	3.12E-02	2.26E-03	2.66E-02
SAPZ166 I	60-80	47.81	2.29	2.18	4.31E+03	4.11E+01	3.61E+00	8.78E-02	1.68E-01
SAPZ167 S	0-3	102.78	0.12	-0.03	1.39E+03	1.33E+01	4.79E-01	3.60E-02	8.55E-02
SAPZ168 S	5-15	50.35	0.31	0.24	3.54E+03	3.37E+01	9.00E-01	2.67E-02	4.74E-02
SAPZ168I	60-80	46.96	2.43	2.32	3.34E+03	3.18E+01	4.20E+00	1.32E-01	4.06E-02
SAPZ169 I	60-80	16.71	2.90	2.79	3.98E+03	3.79E+01	1.61E+01	4.25E-01	2.19E-01
				Average	4.39E+03	4.18E+01	3.79E+00	9.06E-02	9.64E-02
Distance-Drawdown Analysis			@ 298 min	(prior to rain event)	7.12E+03	--	--	--	2.15E-05
			@ 558 min	(at test end)	7.42E+03	--	--	--	3.94E-05
OVERALL AVERAGE					5.83E+03	--	--	--	4.82E-02

Notes
SA-PTW-2 Pumping Rate = 100 gpm
Aquifer thickness = 105 feet bgs

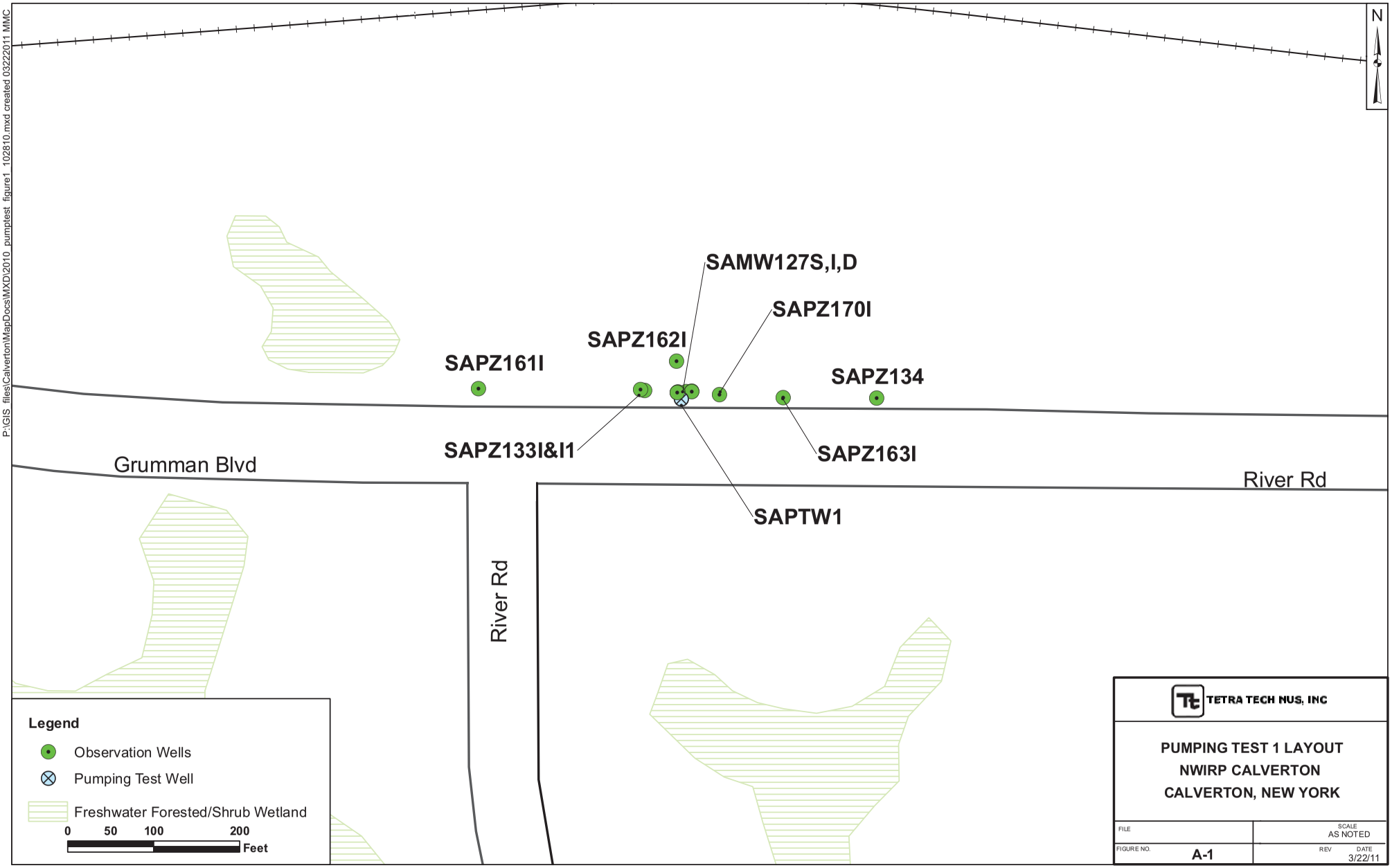
[1] Drawdown before rain event at 298 minutes
[2] Drawdown at 558 minutes
[3] Hydraulic conductivity anisotropy ratio

T = transmissivity
Kh = horizontal component of hydraulic conductivity
Kv = vertical component of hydraulic conductivity
S = storativity

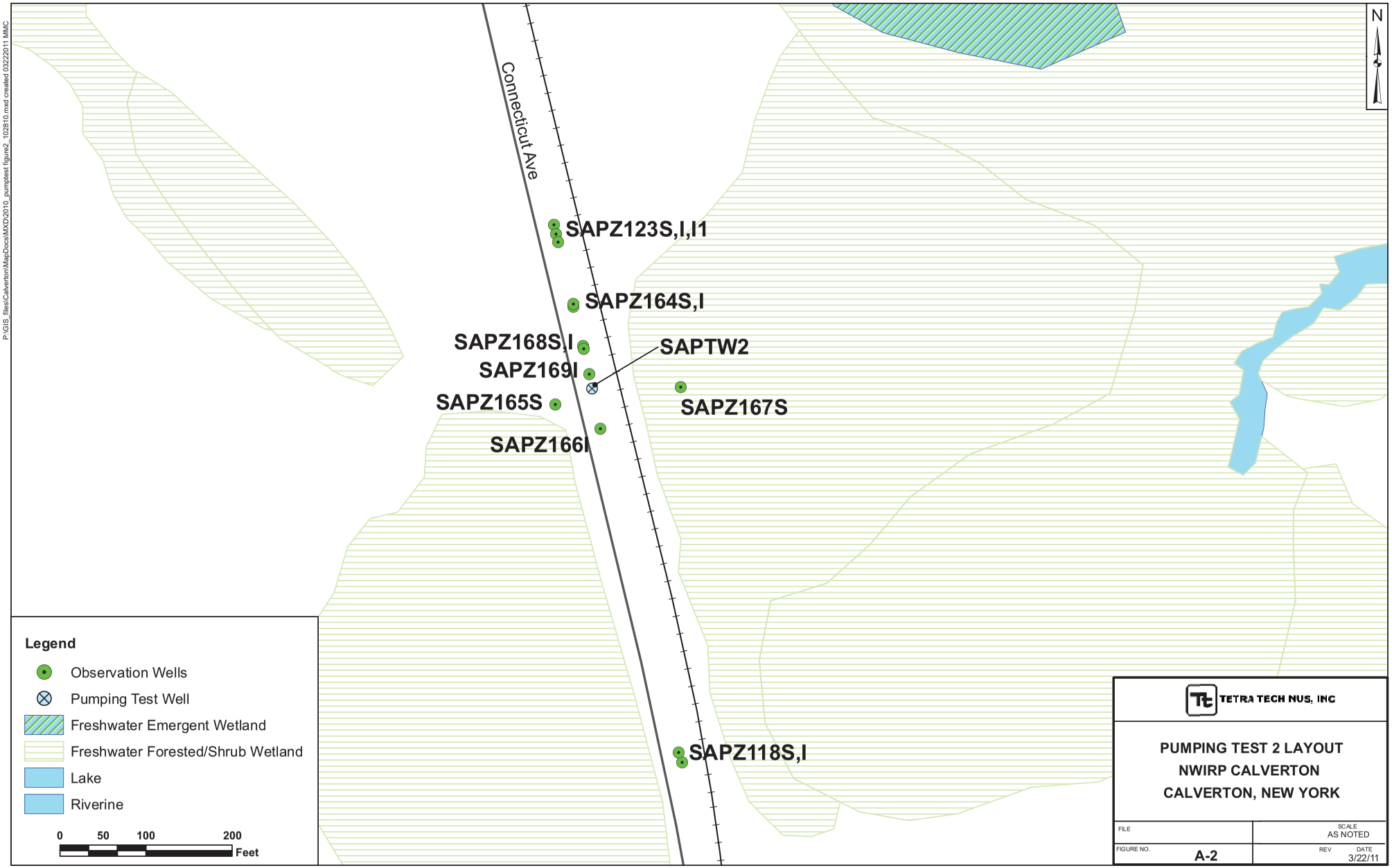
TABLE A-6
GROUNDWATER ANALYTICAL RESULTS - PUMPING TEST 2
SITE 6A-SOUTHERN AREA
NWIRP CALVERTON, NEW YORK

Parameter (ug/L)	USEPA MCL	NYSDEC MCL	Constant Rate Test 7/21/2010		
			Initial	4-Hour	9-Hour/Final
METALS (ug/L)					
IRON	--	300	13,600 J	13,800 J	13,700 J
MANGANESE	--	300	183	185	185
VOLATILES (ug/L)					
1,1,1-TRICHLOROETHANE	200	5	5 U	5 U	5 U
1,1-DICHLOROETHANE	NA	5	42	41	35
1,1-DICHLOROETHENE	7	5	10	9.9	9.2
1,2,4-TRICHLOROBENZENE	70	5	5 UJ	5 UJ	5 U
1,2-DICHLOROBENZENE	600	3	5 U	5 U	5 U
1,4-DICHLOROBENZENE	75	3	0.48 J	0.43 J	5 U
2-BUTANONE	--	--	13 U	13 U	13 U
TOLUENE	1000	5	5 U	5 U	0.39 J

Notes
ug/L - micrograms per liter
MCL - maximum contaminant level
NYSDEC - New York State Department of Environmental Conservation
USEPA - United States Environmental Protection Agency
J - Estimated Value
U - not detected above associated value


N
SAMW127S,I,D
SAPZ170I
SAPZ162I
SAPZ161I
SAPZ134
SAPZ133I&I1
SAPZ163I
SAPTW1
Grumman Blvd
River Rd
River Rd
Legend
Observation Wells
Pumping Test Well
Freshwater Forested/Shrub Wetland
0 50 100 200
Feet
TETRA TECH NUS, INC
PUMPING TEST 1 LAYOUT
NWIRP CALVERTON
CALVERTON, NEW YORK
FILE
SCALE
AS NOTED
FIGURE NO.
A-1
REV
DATE
3/22/11
P:\GIS files\Calverton\MapDocs\MXD\2010 pumptest figure1 102810.mxd created 03222011 MMC

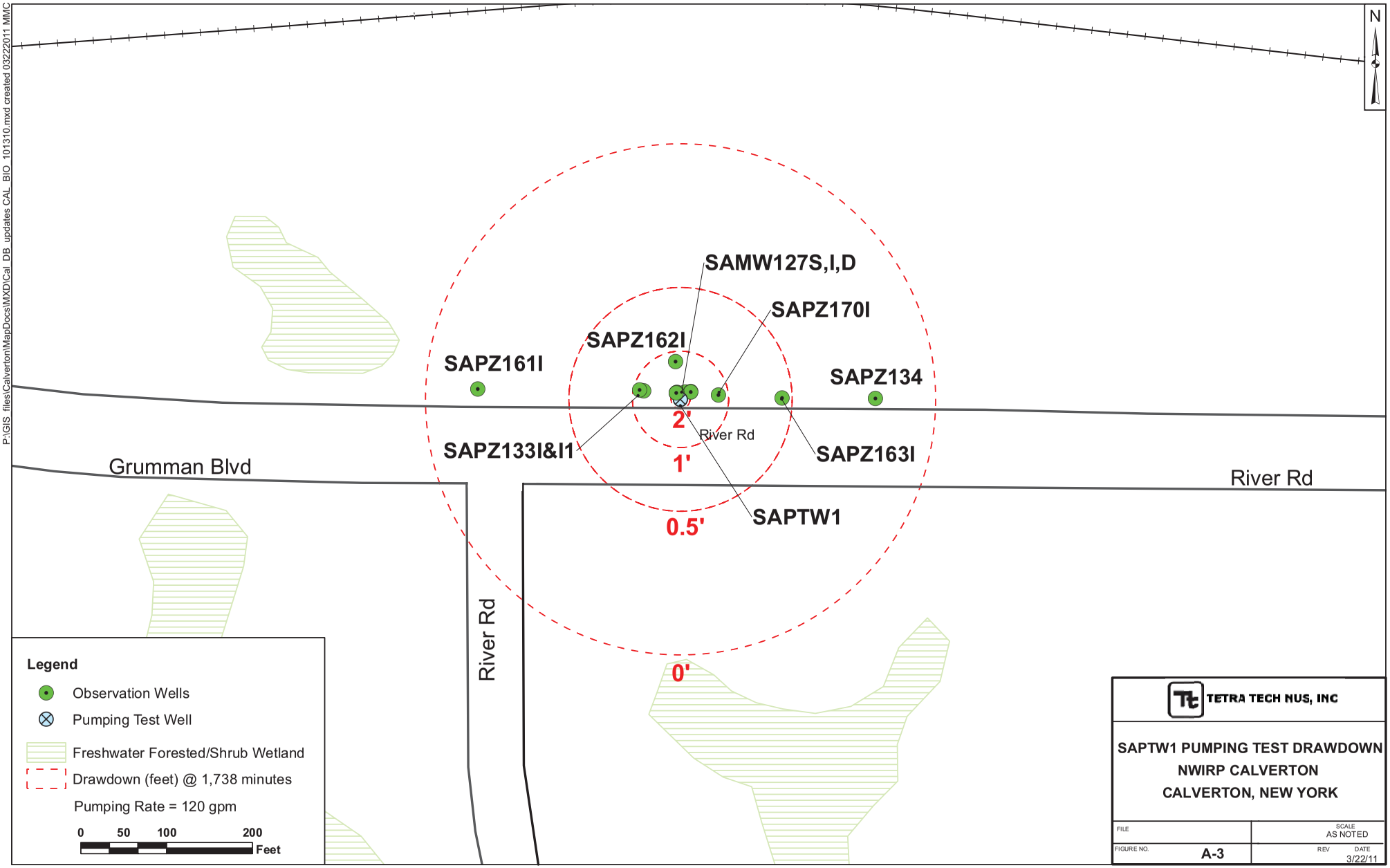
P:\GIS_files\Calverton\MapDocs\MXD\2010_pumptest figure2_102810.mxd created 03222011 MMC



TETRA TECH NUS, INC

PUMPING TEST 2 LAYOUT
NWIRP CALVERTON
CALVERTON, NEW YORK

FILE	SCALE AS NOTED
FIGURE NO. A-2	REV / DATE 3/22/11



TETRA TECH NUS, INC

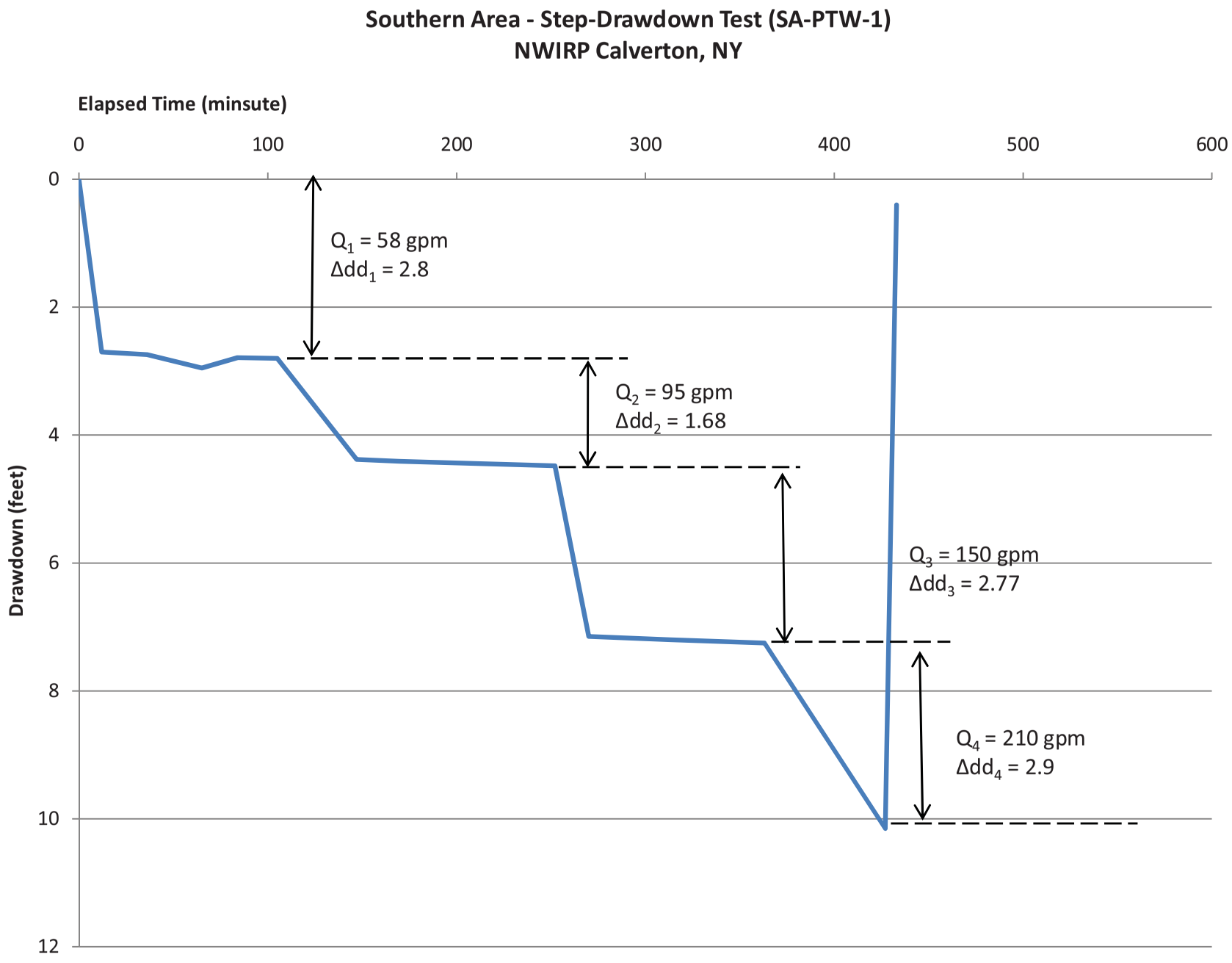
SAPTW1 PUMPING TEST DRAWDOWN
NWIRP CALVERTON
CALVERTON, NEW YORK

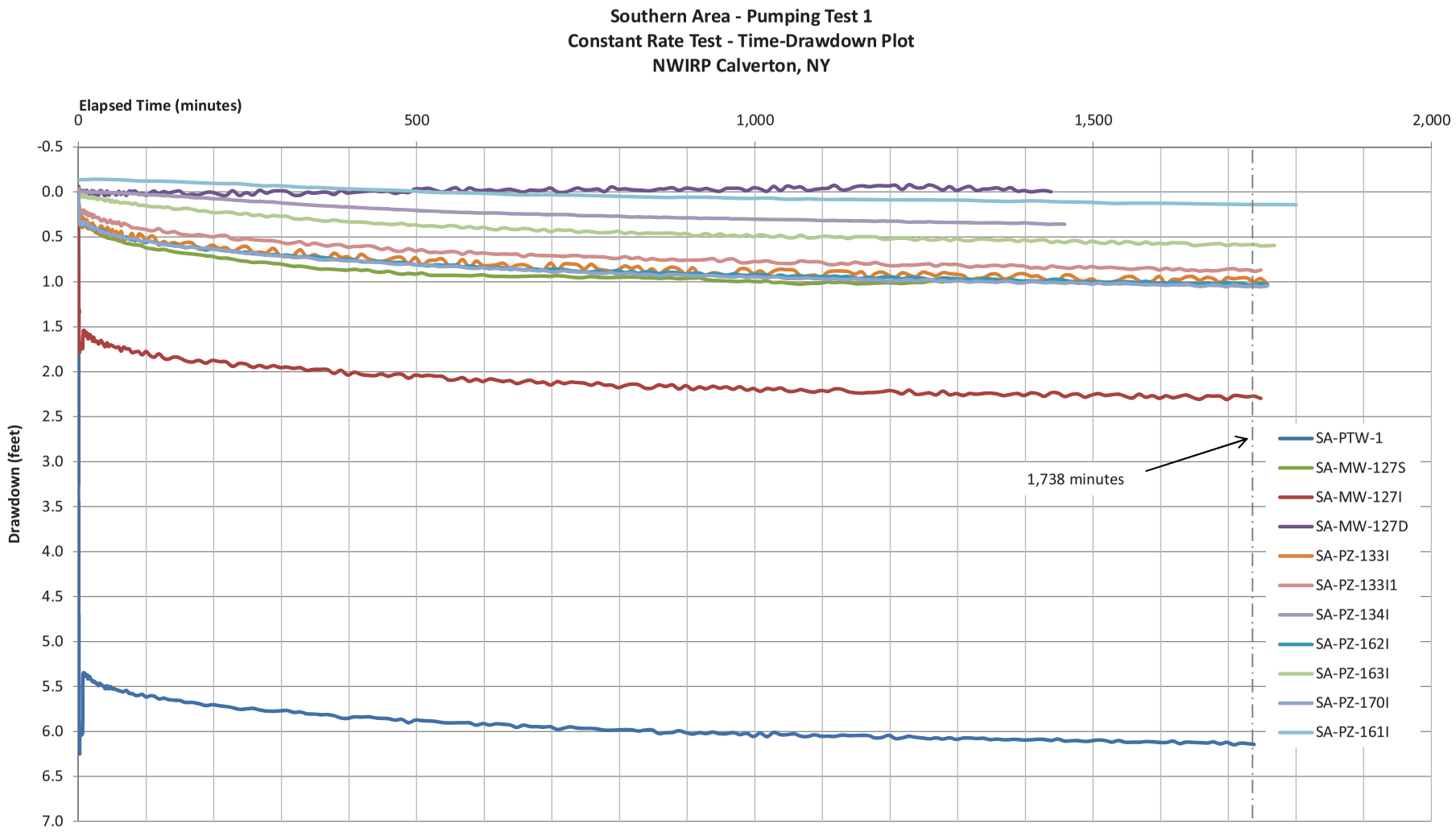
FILE	SCALE AS NOTED
FIGURE NO. A-3	REV / DATE 3/22/11

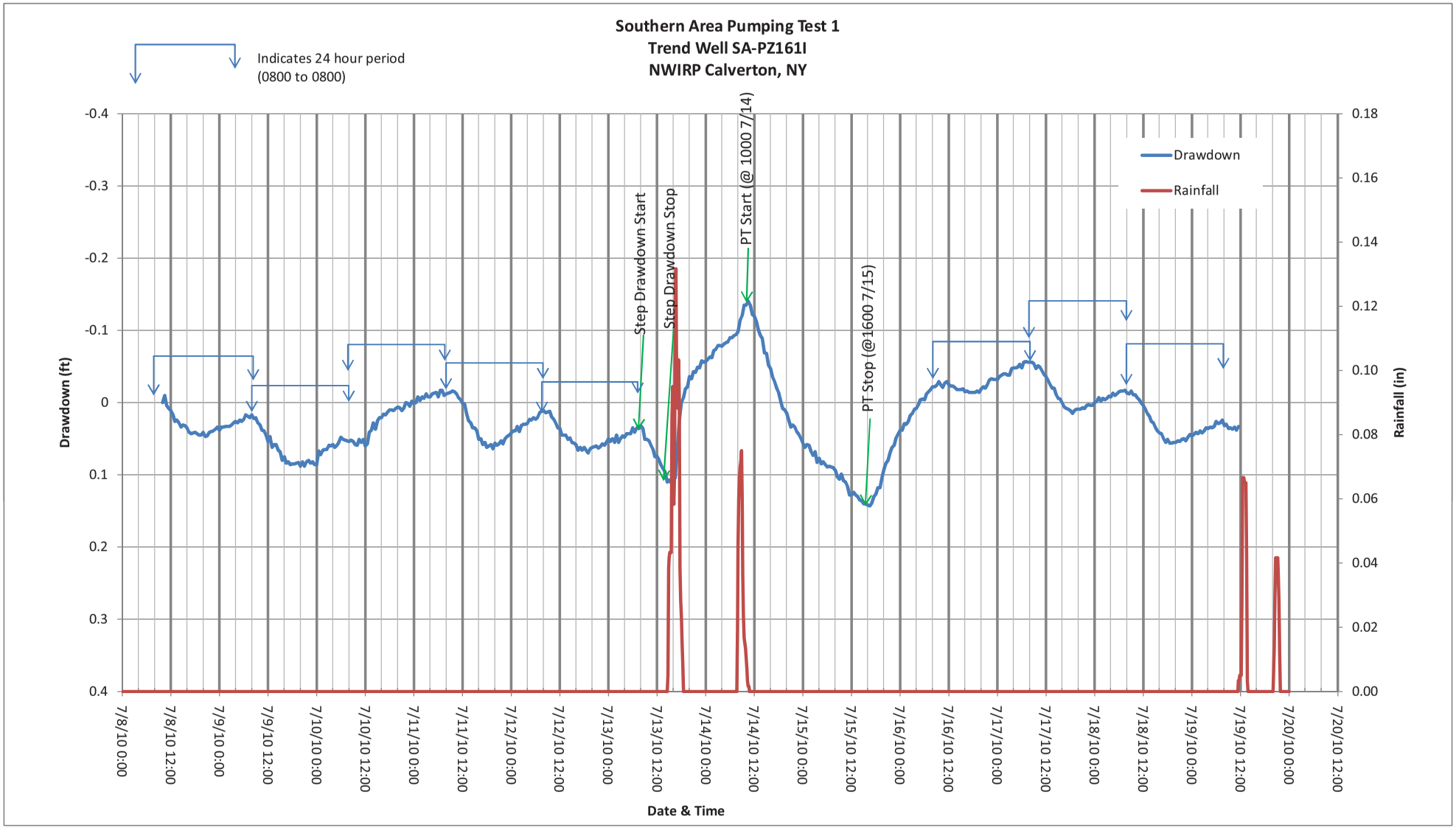
P:\GIS_files\Calverton\MapDocs\MXD\Cal_DB_updates CAL_BIO_101310.mxd created 03222011 MMC

ATTACHMENT A

PUMPING TEST 1 - SUPPORTING INFORMATION


Southern Area - Step-Drawdown Test (SA-PTW-1)
NWIRP Calverton, NY
Elapsed Time (minsute)
0
100
200
300
400
500
600
Drawdown (feet)
0
2
4
6
8
10
12
Q1 = 58 gpm
Δdd1 = 2.8
Q2 = 95 gpm
Δdd2 = 1.68
Q3 = 150 gpm
Δdd3 = 2.77
Q4 = 210 gpm
Δdd4 = 2.9


Southern Area - Pumping Test 1
Constant Rate Test - Time-Drawdown Plot
NWIRP Calverton, NY
Elapsed Time (minutes)
0
500
1,000
1,500
2,000
Drawdown (feet)
-0.5
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
6.5
7.0
1,738 minutes
SA-PTW-1
SA-MW-127S
SA-MW-127I
SA-MW-127D
SA-PZ-133I
SA-PZ-133I1
SA-PZ-134I
SA-PZ-162I
SA-PZ-163I
SA-PZ-170I
SA-PZ-161I


Southern Area Pumping Test 1
Trend Well SA-PZ161I
NWIRP Calverton, NY
Indicates 24 hour period
(0800 to 0800)
Step Drawdown Start
Step Drawdown Stop
PT Start (@ 1000 7/14)
PT Stop (@1600 7/15)
Drawdown
Rainfall
Drawdown (ft)
Rainfall (in)
Date & Time
-0.4
-0.3
-0.2
-0.1
0
0.1
0.2
0.3
0.4
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
7/8/10 0:00
7/8/10 12:00
7/9/10 0:00
7/9/10 12:00
7/10/10 0:00
7/10/10 12:00
7/11/10 0:00
7/11/10 12:00
7/12/10 0:00
7/12/10 12:00
7/13/10 0:00
7/13/10 12:00
7/14/10 0:00
7/14/10 12:00
7/15/10 0:00
7/15/10 12:00
7/16/10 0:00
7/16/10 12:00
7/17/10 0:00
7/17/10 12:00
7/18/10 0:00
7/18/10 12:00
7/19/10 0:00
7/19/10 12:00
7/20/10 0:00
7/20/10 12:00

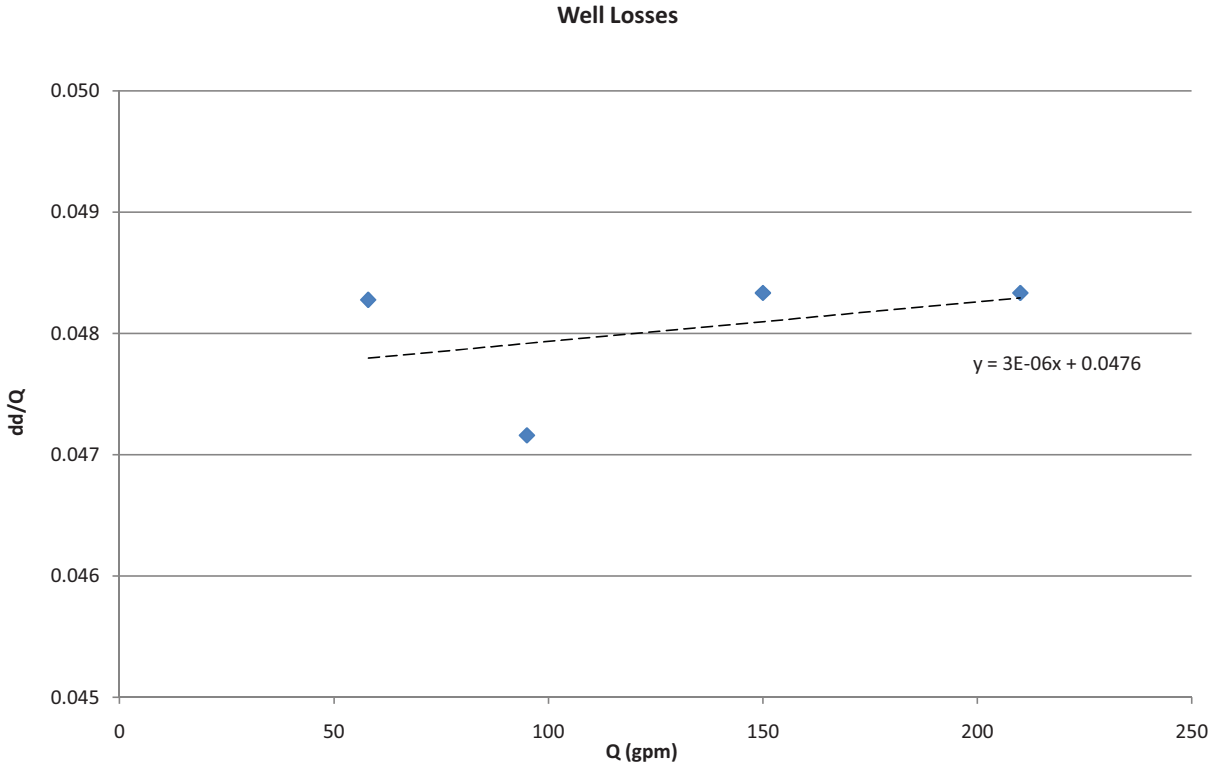
Southern Area - Step-Drawdown Test (SA-PTW-1)
Specific Capacity Calculations
NWIRP Calverton, NY

Step	Q	ΔQ	dd	dd/Q	Q/dd
	gpm	gpm	ft		gpm/ft
1	58	58	2.8	0.0483	20.7
2	95	37	4.48	0.0472	21.2
3	150	55	7.25	0.0483	20.7
4	210	60	10.15	0.0483	20.7

where,
Q = discharge rate
dd = drawdown
Q/dd = 1 / (B +CQ) (specific capacity)
and

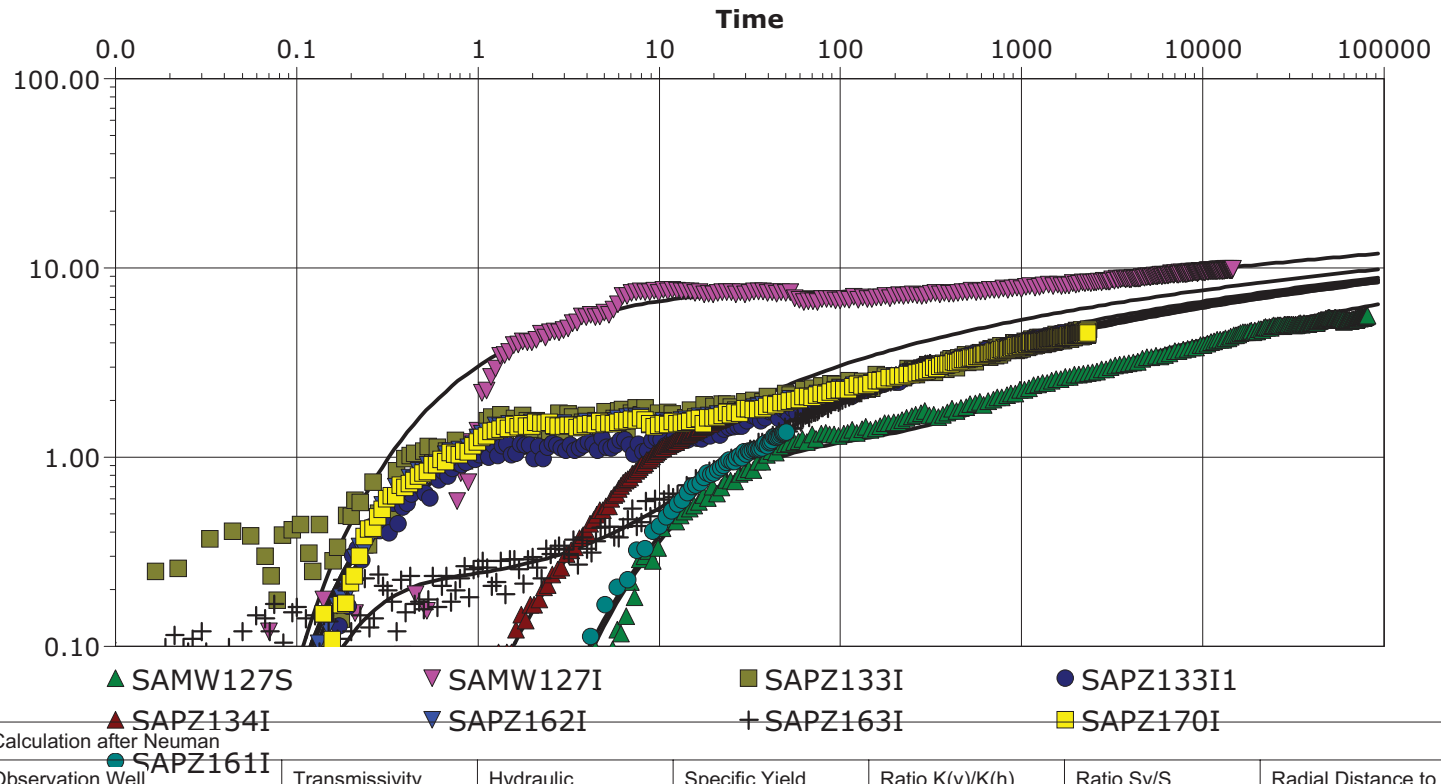
B 4.76E-02
C 3.00E-06

From well losses graph



Tetra Tech 661 Andersen Dr. Foster Plaza 7 Pittsburgh, Pennsylvania	**Pumping Test Analysis Report**
	Project: Calverton
	Number: 112G02045
	Client: NAVFAC

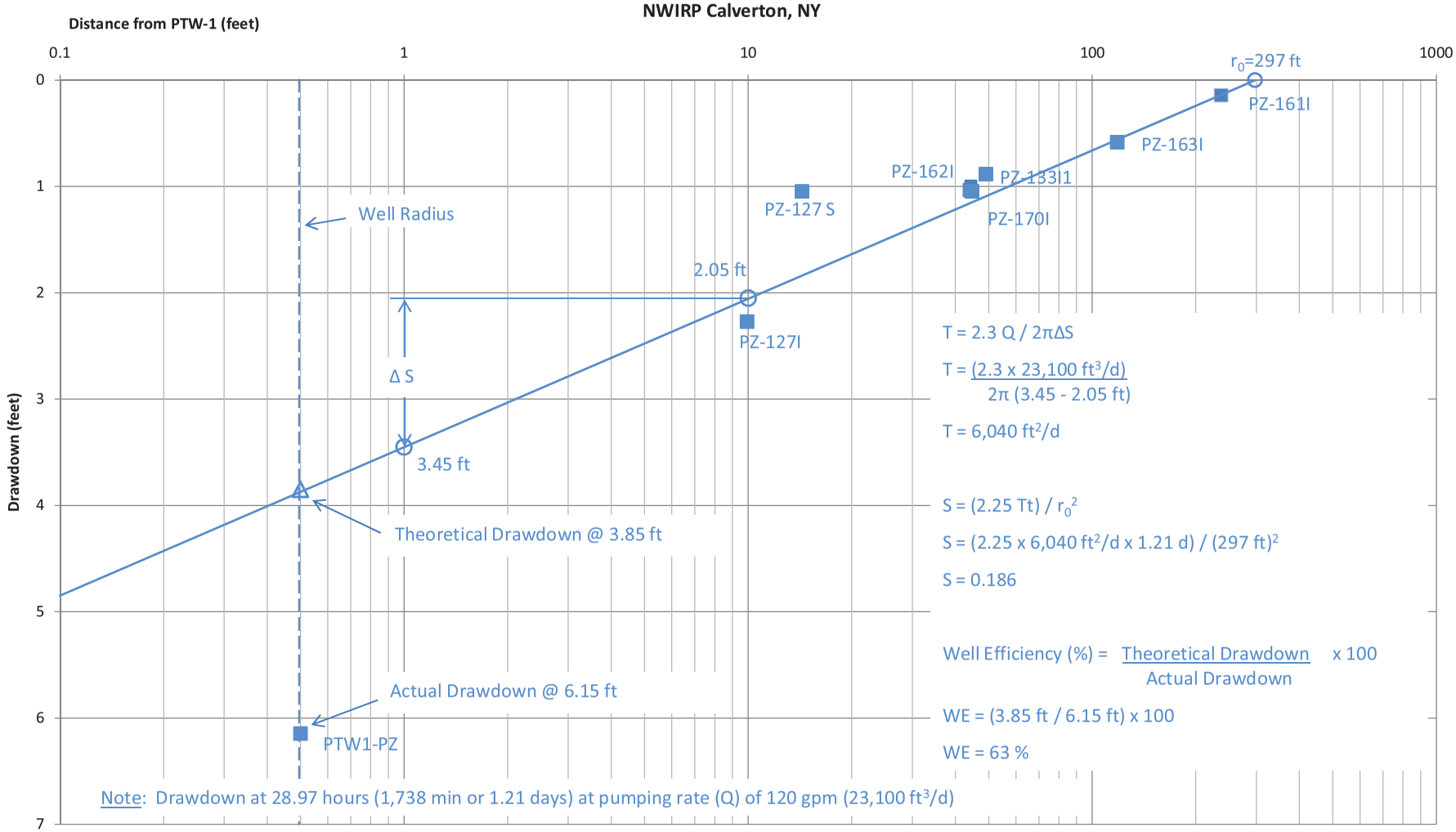
Location: Calverton, NY	Pumping Test: Southern Area - Pumping Test 1	Pumping Well: SAPTW1
Test Conducted by: SJC		Test Date: 7/14/2010
Analysis Performed by: TSE/EVG	Neuman (Partial Penetration)	Analysis Date: 9/29/2010
Aquifer Thickness: 39.85 ft	Discharge Rate: 120 [U.S. gal/min]	



Calculation after Neuman

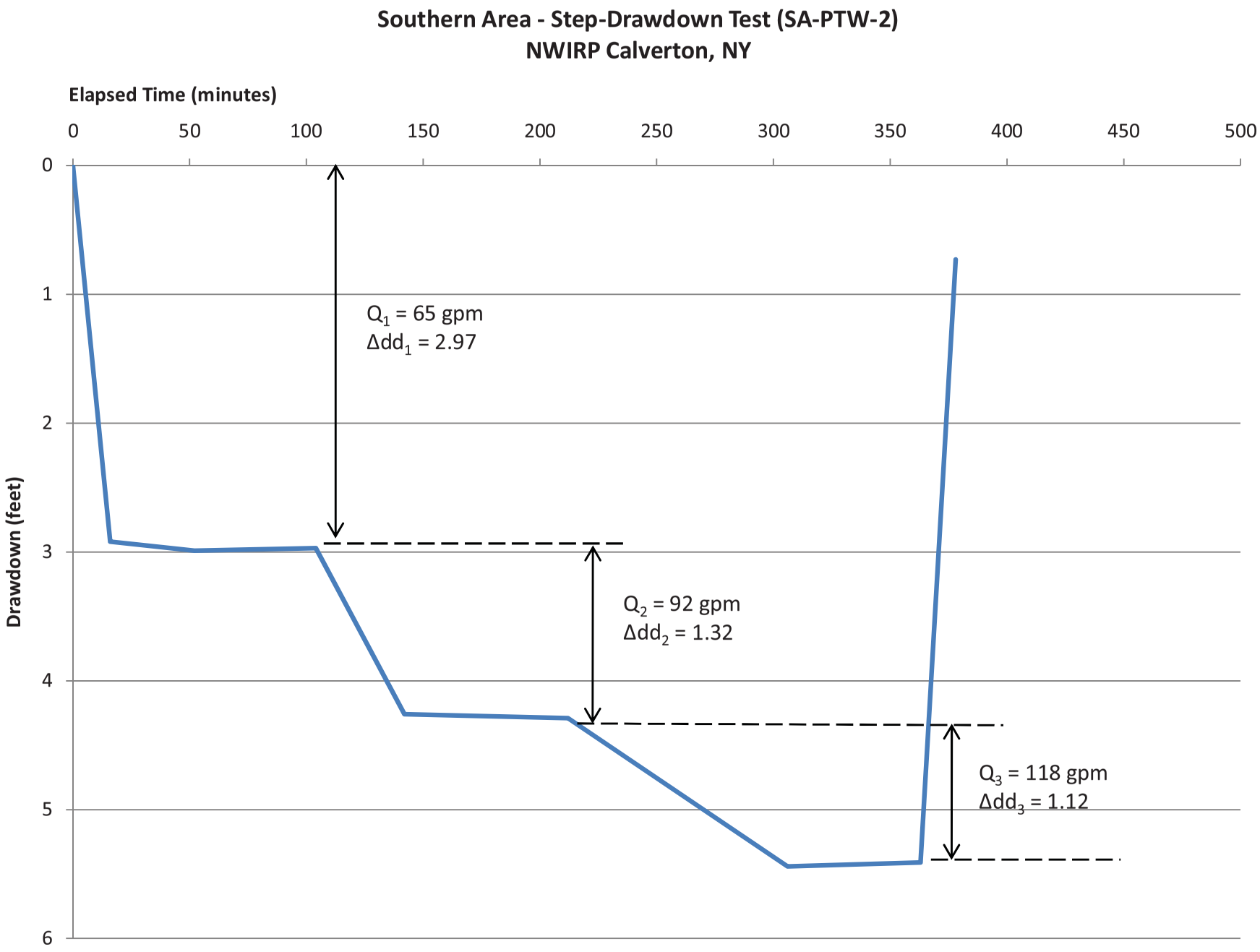
Observation Well	Transmissivity [ft²/d]	Hydraulic Conductivity [ft/d]	Specific Yield	Ratio K(v)/K(h)	Ratio Sy/S	Radial Distance to PW [ft]
SAMW127S	9.80×10^{3}	2.46×10^{2}	1.07×10^{-2}	6.73×10^{-2}	1.50×10^{1}	14.33
SAMW127I	7.90×10^{3}	1.98×10^{2}	3.33×10^{-1}	4.29×10^{-1}	5.01×10^{1}	9.93
SAPZ133I	8.50×10^{3}	2.13×10^{2}	1.50×10^{-1}	3.50×10^{-1}	6.67×10^{1}	44.38
SAPZ133I1	9.40×10^{3}	2.36×10^{2}	1.25×10^{-1}	4.67×10^{-1}	4.44×10^{1}	49.07
SAPZ134I	9.00×10^{3}	2.26×10^{2}	6.67×10^{-2}	8.65×10^{-1}	1.00×10^{1}	226.51
SAPZ162I	7.95×10^{3}	1.99×10^{2}	1.20×10^{-1}	3.60×10^{-1}	5.30×10^{1}	44.11
SAPZ163I	9.60×10^{3}	2.41×10^{2}	9.50×10^{-2}	3.00×10^{-1}	3.55×10^{1}	118.24
SAPZ170I	8.00×10^{3}	2.01×10^{2}	1.35×10^{-1}	3.70×10^{-1}	6.40×10^{1}	44.73
SAPZ161I	9.00×10^{3}	2.26×10^{2}	1.10×10^{-1}	9.50×10^{-1}	2.76×10^{1}	236.88
Average	8.79×10^{3}	2.21×10^{2}	1.27×10^{-1}	4.62×10^{-1}	4.07×10^{1}	

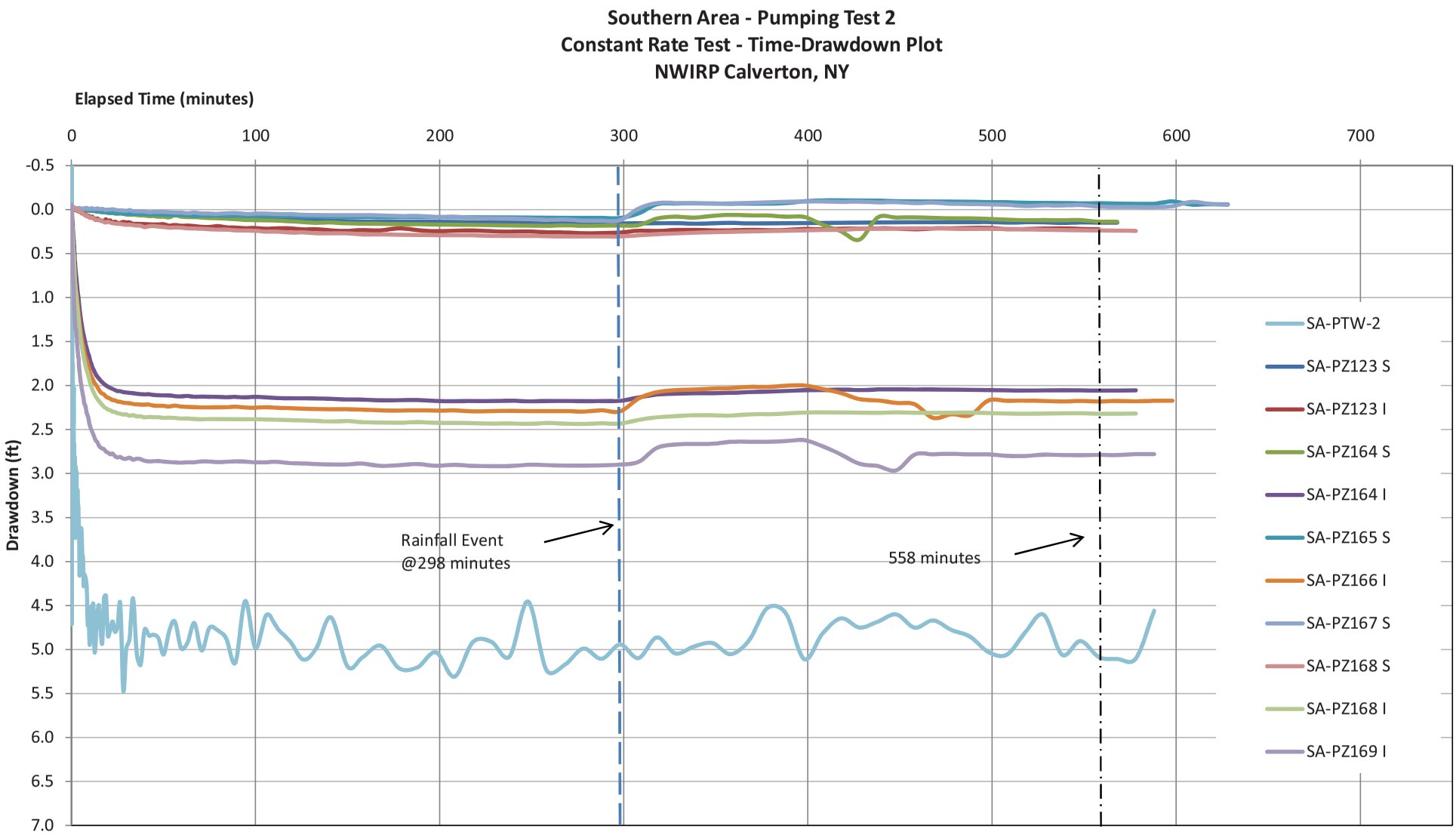
Southern Area Pumping Test 1
Constant Rate Test - Distance-Drawdown Plot
NWIRP Calverton, NY

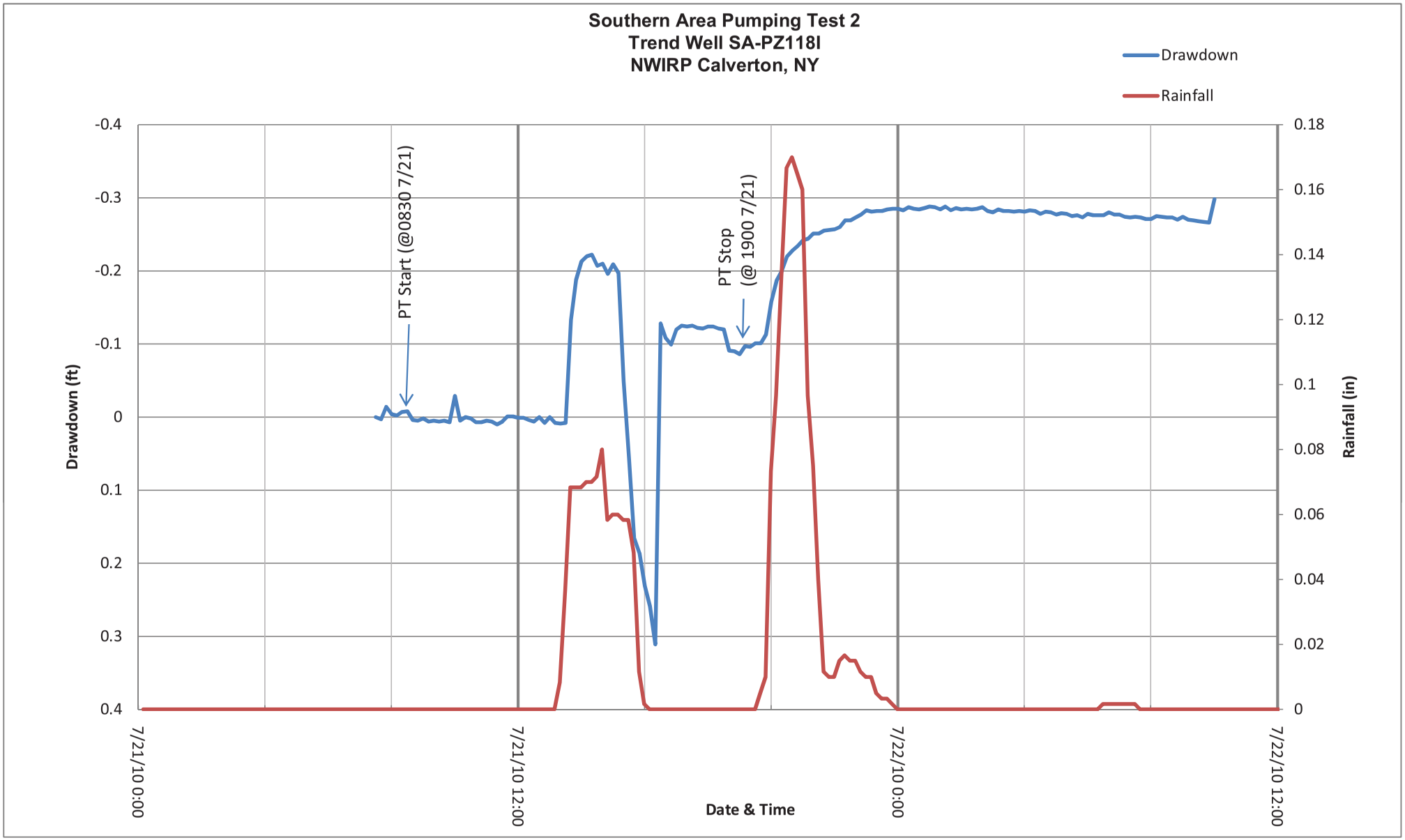


ATTACHMENT B

PUMPING TEST 2 - SUPPORTING INFORMATION


Southern Area - Step-Drawdown Test (SA-PTW-2)
NWIRP Calverton, NY
Elapsed Time (minutes)
0
50
100
150
200
250
300
350
400
450
500
Drawdown (feet)
0
1
2
3
4
5
6
Q1 = 65 gpm
Δdd1 = 2.97
Q2 = 92 gpm
Δdd2 = 1.32
Q3 = 118 gpm
Δdd3 = 1.12


Southern Area - Pumping Test 2
Constant Rate Test - Time-Drawdown Plot
NWIRP Calverton, NY
Elapsed Time (minutes)
0
100
200
300
400
500
600
700
Drawdown (ft)
-0.5
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
6.5
7.0
Rainfall Event
@298 minutes
558 minutes
SA-PTW-2
SA-PZ123 S
SA-PZ123 I
SA-PZ164 S
SA-PZ164 I
SA-PZ165 S
SA-PZ166 I
SA-PZ167 S
SA-PZ168 S
SA-PZ168 I
SA-PZ169 I

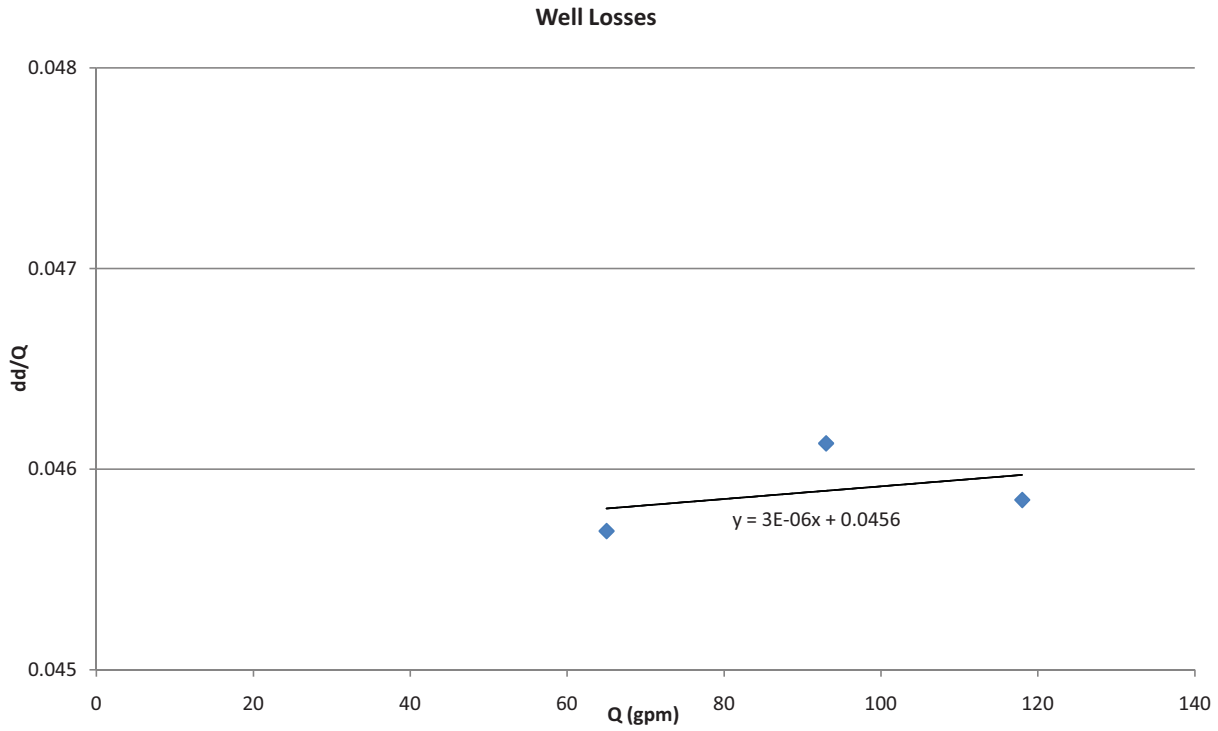

Southern Area Pumping Test 2
Trend Well SA-PZ118I
NWIRP Calverton, NY
Drawdown
Rainfall
PT Start (@0830 7/21)
PT Stop
(@ 1900 7/21)
Drawdown (ft)
-0.4
-0.3
-0.2
-0.1
0
0.1
0.2
0.3
0.4
Rainfall (in)
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
7/21/10 0:00
7/21/10 12:00
7/22/10 0:00
7/22/10 12:00
Date & Time

Southern Area - Step-Drawdown Test (SA-PTW-2)
Specific Capacity Calculations
NWIRP Calverton, NY

Step	Q	ΔQ	dd	dd/Q	Q/dd
	gpm	gpm	ft	ft/gpm	gpm/ft
1	65	65	2.97	0.0457	21.8
2	93	28	4.29	0.0461	21.8
3	118	25	5.41	0.0458	21.8

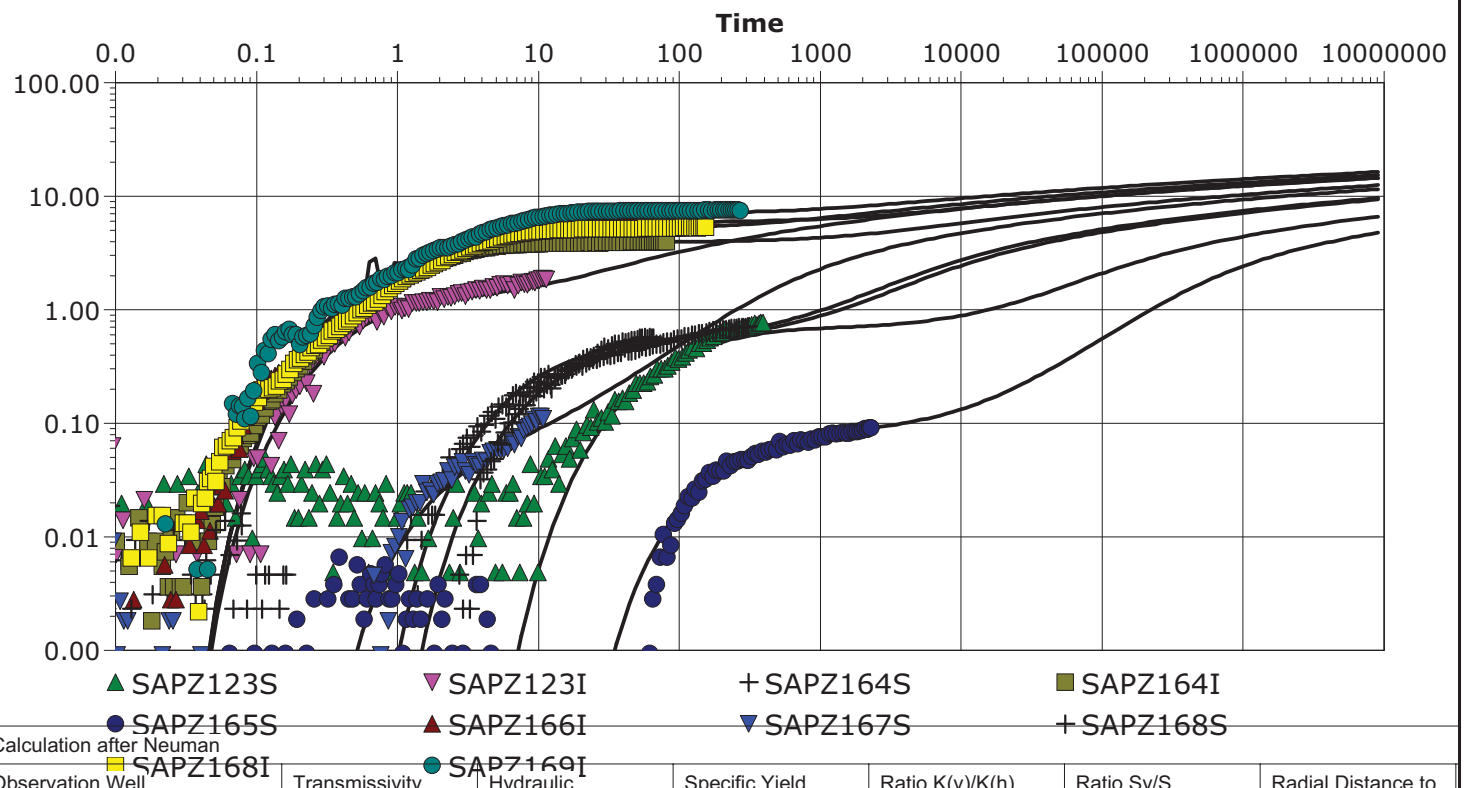
where,
Q = discharge rate
dd = drawdown
Q/dd = 1 / (B +CQ) (specific capacity)
and

B	4.56E-02	From well losses graph
C	3.00E-06	



Tetra Tech 661 Andersen Dr. Foster Plaza 7 Pittsburgh, Pennsylvania	**Pumping Test Analysis Report**
	Project: Calverton
	Number: 112G02045
	Client: NAVFAC

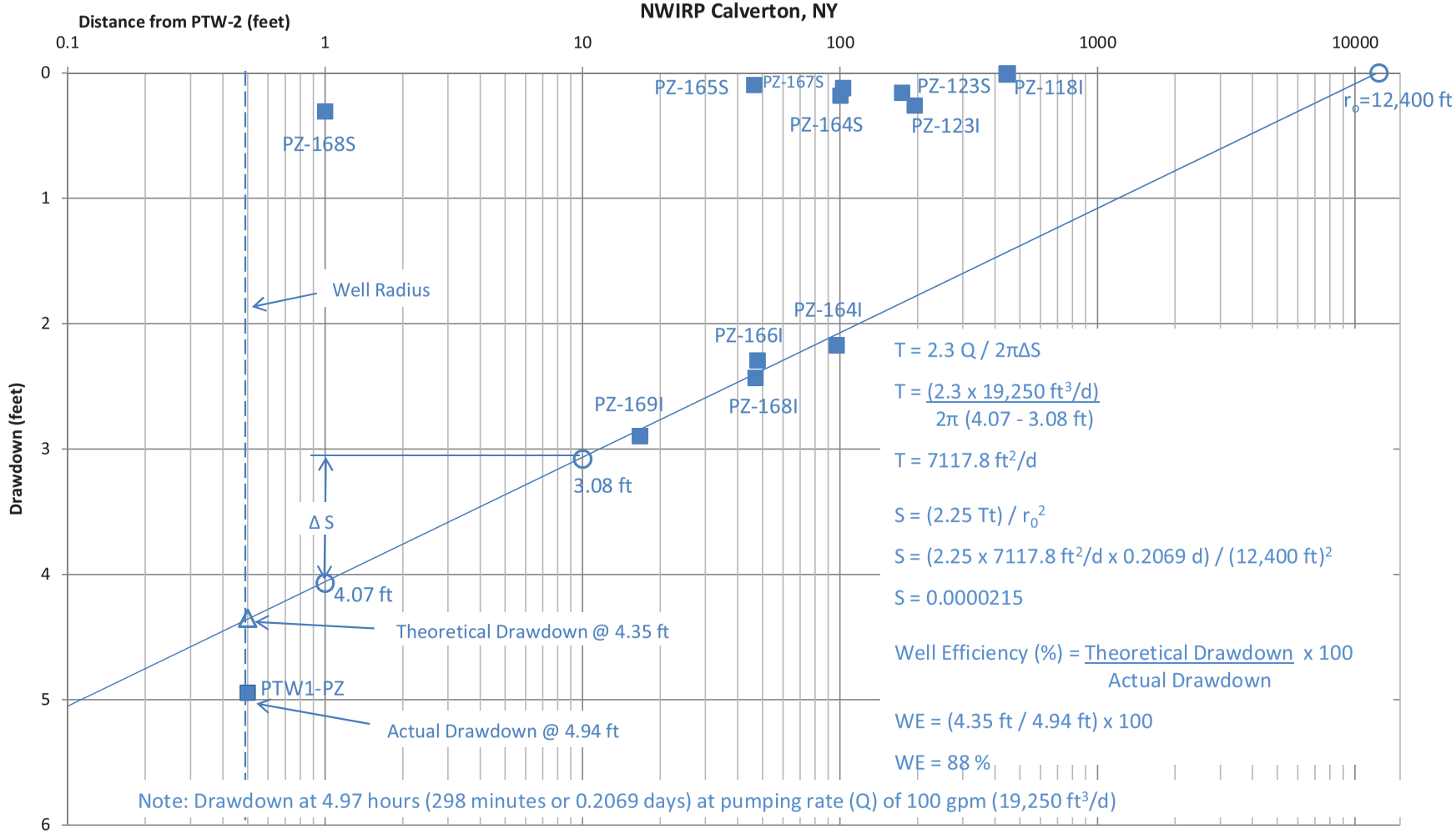
Location: Calverton, NY	Pumping Test: Pumping Test 2	Pumping Well: SAPTW2
Test Conducted by: Stan Conti		Test Date: 9/29/2010
Analysis Performed by: TSE/EVG	Neuman (Partial Penetration)	Analysis Date: 10/7/2010
Aquifer Thickness: 105.00 ft	Discharge Rate: 100 [U.S. gal/min]	



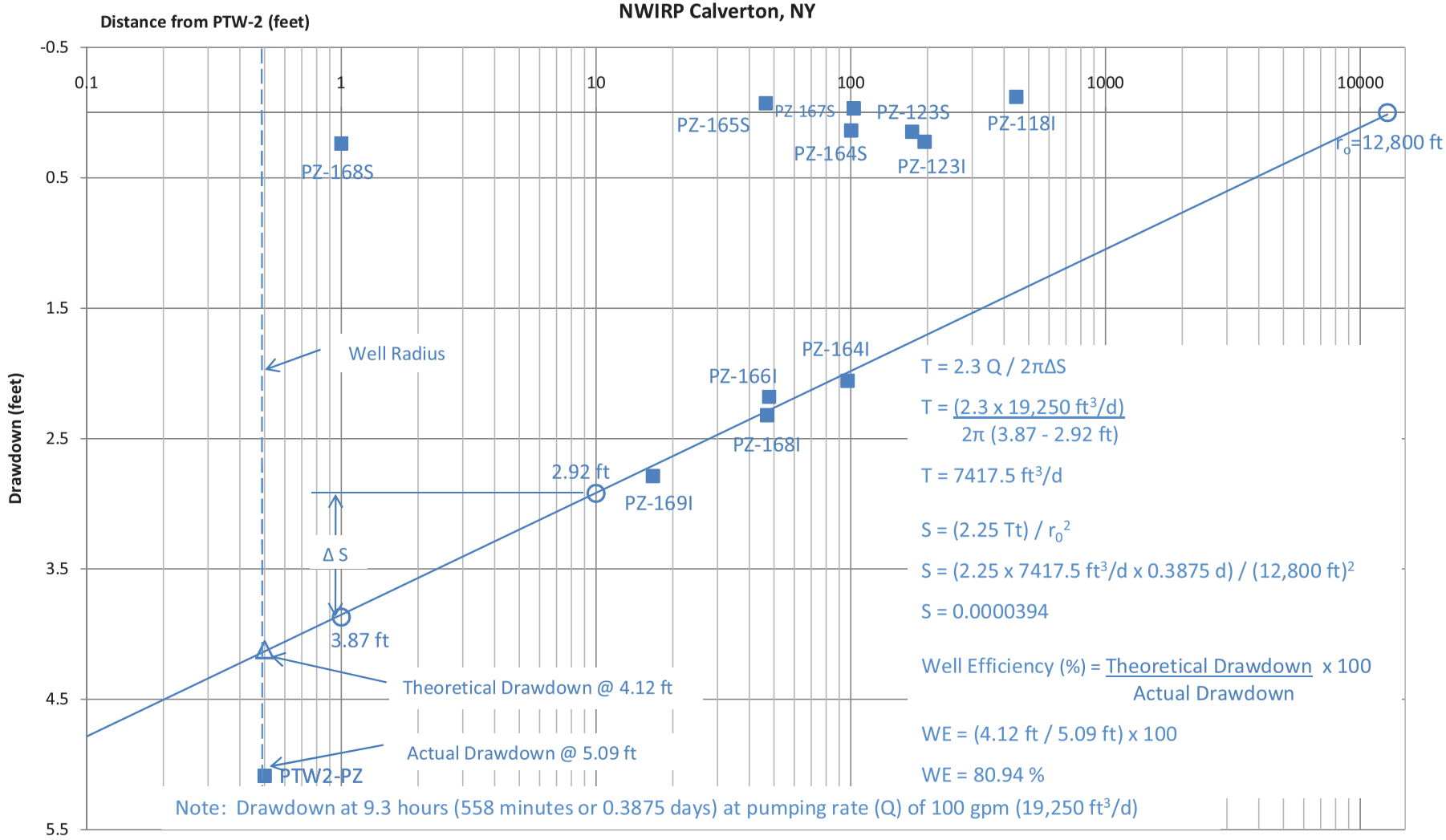
Calculation after Neuman

Observation Well	Transmissivity [ft²/d]	Hydraulic Conductivity [ft/d]	Specific Yield	Ratio K(v)/K(h)	Ratio Sy/S	Radial Distance to PW [ft]
SAPZ123S	7.47×10^{3}	7.11×10^{1}	2.53×10^{-2}	4.00×10^{-4}	1.96×10^{2}	174.15
SAPZ123I	1.08×10^{4}	1.03×10^{2}	5.18×10^{-2}	1.26×10^{-1}	1.00×10^{1}	194.85
SAPZ164S	4.79×10^{3}	4.57×10^{1}	1.50×10^{-1}	1.00×10^{-2}	1.00×10^{2}	100.28
SAPZ164I	2.80×10^{3}	2.67×10^{1}	1.50×10^{-1}	5.94×10^{-2}	1.98×10^{2}	97.13
SAPZ165S	1.45×10^{3}	1.38×10^{1}	2.66×10^{-2}	2.26×10^{-3}	4.40×10^{2}	46.37
SAPZ166I	4.31×10^{3}	4.11×10^{1}	1.68×10^{-1}	8.78×10^{-2}	6.90×10^{1}	47.81
SAPZ167S	1.39×10^{3}	1.33×10^{1}	8.55×10^{-2}	3.60×10^{-2}	3.37×10^{1}	102.78
SAPZ168S	3.54×10^{3}	3.37×10^{1}	4.74×10^{-2}	2.67×10^{-2}	5.04×10^{1}	50.35
SAPZ168I	3.34×10^{3}	3.18×10^{1}	4.06×10^{-2}	1.32×10^{-1}	2.00×10^{1}	46.96
SAPZ169I	3.98×10^{3}	3.79×10^{1}	2.19×10^{-1}	4.25×10^{-1}	2.00×10^{1}	16.71
Average	4.39×10^{3}	4.18×10^{1}	9.64×10^{-2}	9.05×10^{-2}	1.14×10^{2}	

Southern Area Pumping Test 2
Constant Rate Test - Distance-Drawdown Plot @ 298 mins
NWIRP Calverton, NY



Southern Area Pumping Test 2
Constant Rate Test - Distance-Drawdown Plot @ 558 mins
NWIRP Calverton, NY



$T = 2.3\ Q / 2\pi\Delta S$

$T = \frac{(2.3 \times 19{,}250\ ft^3/d)}{2\pi\ (3.87 - 2.92\ ft)}$

$T = 7417.5\ ft^3/d$

$S = (2.25\ Tt) / r_0^2$

$S = (2.25 \times 7417.5\ ft^3/d \times 0.3875\ d) / (12{,}800\ ft)^2$

$S = 0.0000394$

Well Efficiency (%) = $\frac{\text{Theoretical Drawdown}}{\text{Actual Drawdown}} \times 100$

WE = (4.12 ft / 5.09 ft) x 100

WE = 80.94 %

Note: Drawdown at 9.3 hours (558 minutes or 0.3875 days) at pumping rate (Q) of 100 gpm (19,250 ft^3/d)

APPENDIX B

ANALYTICAL DATA

TABLE 4-2
GROUNDWATER ANALYTICAL DETECTIONS
SITE 6A-FUEL CALIBRATION AREA
NWIRP CALVERTON, NEW YORK

Chemical	CAS No.	Federal MCLs [1]	NYSDOH MCLs [2]	FC-MW01S (Jan-08)	FC-MW01S (Aug-08)	FC-MW01S (Sept-09)	FC-MW01S (Sept-10)	FC-MW01I (Jan-08)	FC-MW01I (Aug-08)	FC-MW01I (Sept-09)	FC-MW01I (Sept-10)	FC-MW02S (Jan-08)	FC-MW02S (DUP) (Jan-08)	FC-MW02S (Aug-08)	FC-MW02S (DUP) (Aug-08)	FC-MW02S (Sept-10)	FC-MW02S (DUP) (Sept-10)	FC-MW02I (Jan-08)	FC-MW02I (Aug-08)	FC-MW02I (Sept-10)	FC-MW03S (Jan-08)	FC-MW03S (Aug-08)	FC-MW03S (Sept-10)
Volatile Organic Compounds (µg/l)																							
1,1,1-Trichloroethane	71-55-6	200	5									2 J	2 J										
1,1-Dichloroethane	75-34-3		5									**6**	**6**	3	3	**11**	**11**	0.7 J					1.3 J
1,1-Dichloroethene	75-35-4	7	5									0.7 J											
2-Butanone	78-93-3		50											1 J		18 J	33 J						
Carbon disulfide	75-15-0		50													1.0 J				0.36 J			
Chloroethane	75-00-3		5									4 J	4 J	3	3								
Chloromethane	74-87-3		5																				
Benzene	71-43-2	5	5																				
1,2-Dichlorobenzene	95-50-1	600	5													1.5 J	1.4 J						1.8 J
1,2,4-Trichlorobenzene	120-82-1	70	5																				
Ethylbenzene	100-41-4	700	5									0.4 J	0.5 J			**6.3**	4.6 J						**23**
Isopropylbenzene	98-82-8		5													4.7 J	4.0 J						13
Freon-113	76-13-1		50															1 J					
Methylcyclohexane	108-87-2		50									1 J	1 J	0.4 J			1.7 J						
Tetrachloroethene	127-18-4	5	5																				
Toluene	108-88-3	1000	5									3 J	3 J	0.5 J	0.5 J		1.2 J						
Napthalene	91-20-3		50													18	17						
Methylene Chloride	75-09-2	5	5														16 J						
m+p-xylenes	1330-20-7		5									4 J	**5 J**			**21 J**	**13 J**						**15**
o-Xylene	95-47-6		5									**5**	**5**	0.4 J	0.4 J	**17 J**	**12 J**						
Xylenes (total)	1330-20-7	10,000	50									9 J	10 J	0.4 J	0.4 J	39 J	25 J						15
Methane, Ethene, Ethane (µg/l)																							
Methane	74-82-8			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	130		NA	NA	0.32 J	NA	NA	69

NOTES:
CAS = Chemical Abstracts Service
MCL = Maximum contaminate level
NA = Not Analyzed
J = Estimated Value
µg/L = Micrograms per liter
NYSDOH- New York State Department of Health
Blank cells - No Criteria or Not Detected
[1] (USEPA, 2007) Drinking Water Contaminants National Primary Drinking Water Regulations, from the USEPA website at http://www.epa.gov/safewater/contaminants/index.html#primary
[2] (NYSDOH, 2004) New York Public Supply Regulations, 10 NYCRR Part 5, Subpart 5-1 Public Water Systems, Table 3-Organic Chemicals Maximum Contaminant Level Determination and Table 9D - Organic Chemicals - Principal Organic Contaminants, from the NYSDOH website at http://www.health.state.ny.us/environmental/water/drinking/part5/subpart5.htm
Bold - Indicates Exceedances from NYSDOH MCLs
*Acetone and Methylene Chloride were detected in some samples but are considered lab contaminants

TABLE 4-2
GROUNDWATER ANALYTICAL DETECTIONS
SITE 6A-FUEL CALIBRATION AREA
NWIRP CALVERTON, NEW YORK

Chemical	CAS No.	Federal MCLs [1]	NYSDOH MCLs [2]	FC-MW04S (Jan-08)	FC-MW04S (Aug-08)	FC-MW04S (Sept-09)	FC-MW04S (Sept-10)	FC-MW04I (Jan-08)	FC-MW04I (Aug-08)	FC-MW04I (Sept-09)	FC-MW04I (DUP) (Sept-09)	FC-MW041 (Sept-10)	FC-MW05S (Jan-08)	FC-MW05S (Aug-08)	FC-MW05S (Sept-09)	FC-MW05S (DUP) (Sept-09)	FC-MW05S (Sept-10)	FC-MW05I (Jan-08)	FC-MW05I (Aug-08)	FC-MW05I (Sept-09)	FC-MW05I (Sept-10)	FC-MW06S (Jan-08)	FC-MW06S (Aug-08)
Volatile Organic Compounds (µg/l)																							
1,1,1-Trichloroethane	71-55-6	200	5											0.3 J									
1,1-Dichloroethane	75-34-3		5											4			0.89 J	0.5 J			0.50 J		
1,1-Dichloroethene	75-35-4	7	5																				
2-Butanone	78-93-3		50																				
Carbon disulfide	75-15-0		50																				
Chloroethane	75-00-3		5											**5**									
Chloromethane	74-87-3		5															0.8 J					
Benzene	71-43-2	5	5														0.84 J						
1,2-Dichlorobenzene	95-50-1	600	5														0.98 J						
1,2,4-Trichlorobenzene	120-82-1	70	5															0.71 J			0.71 J		
Ethylbenzene	100-41-4	700	5														**6.8 J**						
Isopropylbenzene	98-82-8		5														**8.2 J**						
Freon-113	76-13-1		50					0.4 J										1 J					
Methylcyclohexane	108-87-2		50																				
Tetrachloroethene	127-18-4	5	5																			**12**	0.9 J
Toluene	108-88-3	1000	5																				
Napthalene	91-20-3		50														37 J						
Methylene Chloride	75-09-2	5	5																				
m+p-xylenes	1330-20-7		5														2.0 J						
o-Xylene	95-47-6		5														0.40 J						
Xylenes (total)	1330-20-7	10,000	50														2.4 J						
Methane, Ethene, Ethane (µg/l)																							
Methane	74-82-8			NA	NA	4	NA	NA	NA	0.3 J	NA	NA	NA	NA		NA	240	NA	NA		0.40 J	NA	NA

NOTES:
CAS = Chemical Abstracts Service
MCL = Maximum contaminate level
NA = Not Analyzed
J = Estimated Value
µg/L = Micrograms per liter
NYSDOH- New York State Department of Health
Blank cells - No Criteria or Not Detected
[1] (USEPA, 2007) Drinking Water Contaminants National Primary Drinking Water Regulations, from the USEPA website at http://www.epa.gov/safewater/contaminants/index.html#primary
[2] (NYSDOH, 2004) New York Public Supply Regulations, 10 NYCRR Part 5, Subpart 5-1 Public Water Systems, Table 3-Organic Chemicals Maximum Contaminant Level Determination and Table 9D - Organic Chemicals - Principal Organic Contaminants, from the NYSDOH website at http://www.health.state.ny.us/environmental/water/drinking/part5/subpart5.htm
Bold - Indicates Exceedances from NYSDOH MCLs
*Acetone and Methylene Chloride were detected in some samples but are considered lab contaminants

TABLE 4-2
GROUNDWATER ANALYTICAL DETECTIONS
SITE 6A-FUEL CALIBRATION AREA
NWIRP CALVERTON, NEW YORK

Chemical	CAS No.	Federal MCLs [1]	NYSDOH MCLs [2]	FC-MW06S (Sept-09)	FC-MW06S (Sept-10)	FC-MW07S (Jan-08)	FC-MW07S (Aug-08)	FC-MW07S (Sept-09)	FC-MW07S (Sept-10)	FC-MW07I (Sept-09)	FC-MW07I (Sept-10)	FC-MW08S (Jan-08)	FC-MW08S (Aug-08)	FC-MW08S (Sept-09)	FC-MW08S (Sept-10)
Volatile Organic Compounds (µg/l)															
1,1,1-Trichloroethane	71-55-6	200	5												
1,1-Dichloroethane	75-34-3		5												
1,1-Dichloroethene	75-35-4	7	5												
2-Butanone	78-93-3		50												
Carbon disulfide	75-15-0		50												
Chloroethane	75-00-3		5				1 J								
Chloromethane	74-87-3		5			0.6 J									
Benzene	71-43-2	5	5												
1,2-Dichlorobenzene	95-50-1	600	5												
1,2,4-Trichlorobenzene	120-82-1	70	5												
Ethylbenzene	100-41-4	700	5						1.4 J						
Isopropylbenzene	98-82-8		5						0.91 J						
Freon-113	76-13-1		50												
Methylcyclohexane	108-87-2		50												
Tetrachloroethene	127-18-4	5	5		2.5 J										
Toluene	108-88-3	1000	5												
Napthalene	91-20-3		50												
Methylene Chloride	75-09-2	5	5						16		17				12
m+p-xylenes	1330-20-7		5						1.5 J						
o-Xylene	95-47-6		5												
Xylenes (total)	1330-20-7	10,000	50						1.5 J						
Methane, Ethene, Ethane (µg/l)															
Methane	74-82-8			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

NOTES:
CAS = Chemical Abstracts Service
MCL = Maximum contaminate level
NA = Not Analyzed
J = Estimated Value
µg/L = Micrograms per liter
NYSDOH- New York State Department of Health
Blank cells - No Criteria or Not Detected
[1] (USEPA, 2007) Drinking Water Contaminants National Primary Drinking Water Regulations, from the USEPA website at http://www.epa.gov/safewater/contaminants/index.html#primary
[2] (NYSDOH, 2004) New York Public Supply Regulations, 10 NYCRR Part 5, Subpart 5-1 Public Water Systems, Table 3-Organic Chemicals Maximum Contaminant Level Determination and Table 9D - Organic Chemicals - Principal Organic Contaminants, from the NYSDOH website at http://www.health.state.ny.us/environmental/water/drinking/part5/subpart5.htm
Bold - Indicates Exceedances from NYSDOH MCLs
*Acetone and Methylene Chloride were detected in some samples but are considered lab contaminants

TABLE 4-3
GROUNDWATER ANALYTICAL DETECTIONS
SITE 10B-ENGINE TEST HOUSE
NWIRP CALVERTON, NEW YORK

Chemical	CAS No.	Federal MCLs (1)	NYSDOH MCLs (2)	ET-MW01S (Jan-08)	ET-MW01S (Aug-08)	ET-MW01S (Sept-09)	ET-MW01S (Sept-10)	ET-MW02S (Jan-08)	ET-MW02S (Aug-08)	ET-MW02S (Sept-09)	ET-MW02S (Sept-10)	ET-MW03S (Jan-08)	ET-MW03S (DUP) (Jan-08)	ET-MW03S (Aug-08)	ET-MW03S (Sept-09)	ET-MW03S (Sept-10)
Volatile Organic Compounds (µg/l)																
1,1,1-Trichloroethane	71-55-6	200	5					3 J	0.4 J		2.4 J					
Methylene chloride	75-09-2		5				1.4 J				1.4 J					1.1 J
Toluene	108-88-3	1,000	5				0.68 J				0.62 J					0.68 J
Isopropyl benzene	98-82-8		5				0.83 J									
Ethyl benzene	100-41-4	700	5				0.55 J									

NOTES:
CAS - Chemical Abstracts Service
MCL - Maximum contaminat level
J - Estimated Values
µg/L- micrograms per liter
NYSDOH - New York State Department of Health
Blank cells - No Criteria or Not Detected
Bold - Indicates Exceedances from NYSDOH MCLs
1- (USEPA, 2007) Drinking Water Contaminants National Primary Drinking Water Regulations, from the USEPA website at http://www.epa.gov/safewater/contaminants/index.html#primary
2- (NYSDOH, 2004) New York Public Supply Regulations, 10 NYCRR Part 5, Subpart 5-1 Public Water Systems, Table 3-Organic Chemicals Maximum Contaminant Level Determination and Table 9D - Organic Chemicals - Principal Organic Contaminants, from the NYSDOH website at http://www.health.state.ny.us/environmental/water/drinking/part5/subpart5.htm

TABLE 4-4
ANALYTICAL DETECTION SUMMARY
SOUTHERN AREA
NWIRP CALVERTON, NEW YORK

Chemical	CAS No.	Federal MCLs (1)	NYSDOH MCLs (2)	SA-MW126S (Jan-08)	SA-MW126S (Aug-08)	SA-MW126S (Sept-09)	SA-MW126S (Sept-10)	SA-MW126I (Jan-08)	SA-MW126I (Aug-08)	SA-MW126I (Sept-09)	SA-MW126I (Sept-10)	SA-MW126D (Jan-08)	SA-MW126D (Aug-08)	SA-MW126D (Sept-09)	SA-MW126D (Sept-10)	SA-MW127S (Jan-08)	SA-MW127S (DUP) (Jan-08)	SA-MW127S (Aug-08)	SA-MW127S (Sept-09)	SA-MW-127S (Sept-10)	SA-MW127I (Jan-08)
Volatile Organic Compounds (µg/l)																					
1,1,1-Trichloroethane	71-55-6	200	5	0.4 J																	**94**
1,1-Dichloroethane	75-34-3		5	1																	**410**
1,1-Dichloroethene	75-35-4	7	5																		**30**
1,2-Dichlorobenzene	95-50-1		5																		0.7 J
cis-1,2-Dichloroethene	156-59-2	70	5																		
1,2-Dichloroethane	107-06-2	5	5																		0.6 J
1,2,4-Trichlorobenzene	120-82-1	70	5																		2 J
1,3-Dichlorobenzene	541-73-1		5																		0.7 J
1,4-Dichlorobenzene	106-46-7	75	5																		3 J
2-Butanone	78-93-3		50																		
2-Hexanone	591-78-6		50																		
Acetone	67-64-1		50																		
Benzene	71-43-2	5	5																		0.9 J
Carbon disulfide	75-15-0		50									2 J									
Chlorobenzene	108-90-7	100	5																		0.5 J
Chloroethane	75-00-3		5																		**51**
Chloromethane	74-87-3		5																		
Chloroform	67-66-3	80	5																		
Isopropylbenzene	98-82-8		5																		
Toluene	108-88-3	1,000	5	0.5 J	1						0.58 J					2 J	2				
Vinyl Chloride	75-01-4	2	2																		
Methylene Chloride	75-09-2	5	5				14*				15*										
Naphthalene	91-20-3		50																		
Trichloroethene	79-01-6	5	5																		
Methane, Ethene, Ethane (µg/l)																					
Methane	74-82-8			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	0.39 J	NA
Ethane	74-84-0			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.2 J	ND	NA

NOTES:

µg/L = micrograms per liter
MW = Monitoring Well
PZ = Piezometer
ND = Not Detected
MCL = Maximum contaminat level
DUP = Duplicate
NA = Not Analyzed
NYSDOH = New York State Department of Health
J - Estmated Value
Blank cells - No criteria or not detected
CAS - Chemical Abstracts Service
MCL - Maximum contaminat level
Bold - Indicates Exceedances from NYSDOH MCLs
1- (USEPA, 2007) Drinking Water Contaminants National Primary Drinking Water Regulations,
2- (NYSDOH, 2004) New York Public Supply Regulations, 10 NYCRR Part 5, Subpart 5-1
blank contamination. Remaining detections of these compounds are also questionable and

TABLE 4-4
ANALYTICAL DETECTION SUMMARY
SOUTHERN AREA
NWIRP CALVERTON, NEW YORK

Chemical	CAS No.	Federal MCLs [1]	NYSDOH MCLs [2]	SA-MW127I (Aug-08)	SA-MW127I (Sept-09)	SA-MW127I (Sept-10)	SA-MW127I (DUP) (Sept-10)	SA-MW127D (Jan-08)	SA-MW127D (Aug-08)	SA-MW127D (Sept-09)	SA-MW127D (Sept-10)	SA-MW128S (Jan-08)	SA-MW128S (Aug-08)	SA-MW128S (Sept-09)	SA-MW128S (Sept-10)	SA-MW128I (Jan-08)	SA-MW128I (Aug-08)	SA-MW128I (Sept-09)	SA-MW128I (Sept-10)	SA-MW128D (Jan-08)	SA-MW128D (Aug-08)
Volatile Organic Compounds (µg/l)																					
1,1,1-Trichloroethane	71-55-6	200	5	**94**	**61**	1.2 J	1.1									**48**	**35**	2.4 J	1.1 J		
1,1-Dichloroethane	75-34-3		5	**470**	**270 J**	**9.1 J**	**9.3**	0.6 J								**160**	**170**	**33**	**10 J**	**5**	**7**
1,1-Dichloroethene	75-35-4	7	5	**27**	**20**											**18**	**12**	2.5 J			0.4 J
1,2-Dichlorobenzene	95-50-1		5	3																	
cis-1,2-Dichloroethene	156-59-2	70	5	0.3 J																	
1,2-Dichloroethane	107-06-2	5	5																		
1,2,4-Trichlorobenzene	120-82-1	70	5	4	2.7 J											1	1				
1,3-Dichlorobenzene	541-73-1		5	3																	
1,4-Dichlorobenzene	106-46-7	75	5	**13**	3.8 J											0.9 J	0.7 J				
2-Butanone	78-93-3		50																		
2-Hexanone	591-78-6		50																		
Acetone	67-64-1		50																		
Benzene	71-43-2	5	5	1																	
Carbon disulfide	75-15-0		50																		
Chlorobenzene	108-90-7	100	5	1																	
Chloroethane	75-00-3		5	**63**	**29**											**6**	**6**				
Chloromethane	74-87-3		5																		
Chloroform	67-66-3	80	5																	0.4 J	
Isopropylbenzene	98-82-8		5	1																	
Toluene	108-88-3	1,000	5				0.69 J												0.65 J		
Vinyl Chloride	75-01-4	2	2																		
Methylene Chloride	75-09-2	5	5				1.4 J												1.7 J		
Naphthalene	91-20-3		50																		
Trichloroethene	79-01-6	5	5																		
Methane, Ethene, Ethane (µg/l)																					
Methane	74-82-8			NA	35	15	15	NA	NA	NA	0.97	NA	NA	2	NA	NA	NA	27	NA	NA	NA
Ethane	74-84-0			NA	ND	ND	ND	NA	NA	NA	ND	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA

NOTES:

µg/L = micrograms per liter
MW = Monitoring Well
PZ = Piezometer
ND = Not Detected
MCL = Maximum contaminat level
DUP = Duplicate
NA = Not Analyzed
NYSDOH = New York State Department of Health
J - Estmated Value
Blank cells - No criteria or not detected
CAS - Chemical Abstracts Service
MCL - Maximum contaminat level
Bold - Indicates Exceedances from NYSDOH MCLs
1- (USEPA, 2007) Drinking Water Contaminants National Primary Drinking Water Regulations,
2- (NYSDOH, 2004) New York Public Supply Regulations, 10 NYCRR Part 5, Subpart 5-1
blank contamination. Remaining detections of these compounds are also questionable and

TABLE 4-4
ANALYTICAL DETECTION SUMMARY
SOUTHERN AREA
NWIRP CALVERTON, NEW YORK

Chemical	CAS No.	Federal MCLs [1]	NYSDOH MCLs [2]	SA-MW128D (Sept-09)	SA-MW128D (DUP) (Sept-09)	SA-MW128D (Sept-10)	SA-MW129S (Jan-08)	SA-MW129S (Aug-08)	SA-MW129S (DUP) (Aug-08)	SA-MW129S (Sept-09)	SA-MW129S (Sept-10)	SA-MW129I (Jan-08)	SA-MW129I (Aug-08)	SA-MW129I (Sept-09)	SA-MW129I (Sept-10)	SA-MW129D (Jan-08)	SA-MW129D (Aug-08)	SA-MW129D (Sept-09)	SA-MW129D (Sept-10)	SA-MW130S (Sept-09)	SA-MW130S (Sept-10)
Volatile Organic Compounds (µg/l)																					
1,1,1-Trichloroethane	71-55-6	200	5																		
1,1-Dichloroethane	75-34-3		5	2.9 J	3.1 J	1.6 J				1.4 J		2 J	4	2.3 J	1.4 J	0.9 J	3				
1,1-Dichloroethene	75-35-4	7	5													0.5 J	0.4 J				
1,2-Dichlorobenzene	95-50-1		5																		
cis-1,2-Dichloroethene	156-59-2	70	5																		
1,2-Dichloroethane	107-06-2	5	5																		
1,2,4-Trichlorobenzene	120-82-1	70	5																		
1,3-Dichlorobenzene	541-73-1		5																		
1,4-Dichlorobenzene	106-46-7	75	5																		
2-Butanone	78-93-3		50																		
2-Hexanone	591-78-6		50											6.9 J							
Acetone	67-64-1		50			2.8 J															
Benzene	71-43-2	5	5																		
Carbon disulfide	75-15-0		50																		
Chlorobenzene	108-90-7	100	5																		
Chloroethane	75-00-3		5													0.8 J					
Chloromethane	74-87-3		5																		
Chloroform	67-66-3	80	5																		
Isopropylbenzene	98-82-8		5																		
Toluene	108-88-3	1,000	5								0.69 J				0.61 J						
Vinyl Chloride	75-01-4	2	2																		
Methylene Chloride	75-09-2	5	5								3.2 J				2.8 J						
Naphthalene	91-20-3		50																		
Trichloroethene	79-01-6	5	5																		
Methane, Ethene, Ethane (µg/l)																					
Methane	74-82-8			13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9	NA
Ethane	74-84-0			ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	NA

NOTES:

µg/L = micrograms per liter
MW = Monitoring Well
PZ = Piezometer
ND = Not Detected
MCL = Maximum contaminat level
DUP = Duplicate
NA = Not Analyzed
NYSDOH = New York State Department of Health
J - Estmated Value
Blank cells - No criteria or not detected
CAS - Chemical Abstracts Service
MCL - Maximum contaminat level
Bold - Indicates Exceedances from NYSDOH MCLs
1- (USEPA, 2007) Drinking Water Contaminants National Primary Drinking Water Regulations,
2- (NYSDOH, 2004) New York Public Supply Regulations, 10 NYCRR Part 5, Subpart 5-1
blank contamination. Remaining detections of these compounds are also questionable and

TABLE 4-4
ANALYTICAL DETECTION SUMMARY
SOUTHERN AREA
NWIRP CALVERTON, NEW YORK

Chemical	CAS No.	Federal MCLs [1]	NYSDOH MCLs [2]	SA-MW130I (Sept-09)	SA-MW130I (Sept-10)	SA-MW131S (Sept-09)	SA-MW131S (Sept-10)	SA-MW131I (Sept-09)	SA-MW131I (Sept-10)	SA-MW131D (Sept-09)	SA-MW131D (Sept-10)	SA-MW132S (Sept-09)	SA-MW132S (Sept-10)	SA-MW132I (Sept-09)	SA-MW132I (DUP) (Sept-09)	SA-MW132I (Sept-10)	SA-PZ118S (Jan-08)	SA-PZ118S (Aug-08)	SA-PZ118S (Sept-09)	SA-PZ118S (DUP) (Sept-09)	SA-PZ118S (Sept-10)
Volatile Organic Compounds (µg/l)																					
1,1,1-Trichloroethane	71-55-6	200	5		0.62 J				**18 J**												
1,1-Dichloroethane	75-34-3		5						**130 J**	**15**	**13 J**		1.1 J	**5.4**	**5.1**	3.4 J	4 J	**17**	2.5 J	2.1 J	
1,1-Dichloroethene	75-35-4	7	5						**13 J**	1.5 J	2.3 J				1.1 J		1 J	4			
1,2-Dichlorobenzene	95-50-1		5																		
cis-1,2-Dichloroethene	156-59-2	70	5																		
1,2-Dichloroethane	107-06-2	5	5																		
1,2,4-Trichlorobenzene	120-82-1	70	5																		
1,3-Dichlorobenzene	541-73-1		5																		
1,4-Dichlorobenzene	106-46-7	75	5																		
2-Butanone	78-93-3		50																		
2-Hexanone	591-78-6		50																		
Acetone	67-64-1		50								3.1 J										
Benzene	71-43-2	5	5																		
Carbon disulfide	75-15-0		50																		
Chlorobenzene	108-90-7	100	5																		
Chloroethane	75-00-3		5																		
Chloromethane	74-87-3		5																		
Chloroform	67-66-3	80	5									2.9 J									
Isopropylbenzene	98-82-8		5																		
Toluene	108-88-3	1,000	5										0.45 J								
Vinyl Chloride	75-01-4	2	2																		
Methylene Chloride	75-09-2	5	5																		
Naphthalene	91-20-3		50																		
Trichloroethene	79-01-6	5	5																		
Methane, Ethene, Ethane (µg/l)																					
Methane	74-82-8			0.2 J	NA	7	4.2	4	54	12	29	7	NA	18	NA	NA	NA	NA	210 J	290 J	150
Ethane	74-84-0			ND	NA	ND	ND	ND	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	ND	ND	ND

NOTES:

µg/L = micrograms per liter
MW = Monitoring Well
PZ = Piezometer
ND = Not Detected
MCL = Maximum contaminat level
DUP = Duplicate
NA = Not Analyzed
NYSDOH = New York State Department of Health
J - Estmated Value
Blank cells - No criteria or not detected
CAS - Chemical Abstracts Service
MCL - Maximum contaminat level
Bold - Indicates Exceedances from NYSDOH MCLs
1- (USEPA, 2007) Drinking Water Contaminants National Primary Drinking Water Regulations,
2- (NYSDOH, 2004) New York Public Supply Regulations, 10 NYCRR Part 5, Subpart 5-1
blank contamination. Remaining detections of these compounds are also questionable and

TABLE 4-4
ANALYTICAL DETECTION SUMMARY
SOUTHERN AREA
NWIRP CALVERTON, NEW YORK

Chemical	CAS No.	Federal MCLs [1]	NYSDOH MCLs [2]	SA-PZ118I (Jan-08)	SA-PZ118I (Aug-08)	SA-PZ118I (Sept-09)	SA-PZ118I (Sept-10)	SA-PZ120S (Jan-08)	SA-PZ120S (Aug-08)	SA-PZ120S (Sept-09)	SA-PZ120S (Sept-10)	SA-PZ122S (Jan-08)	SA-PZ122S (Aug-08)	SA-PZ122S (Sept-09)	SA-PZ122S (Sept-10)	SA-PZ122I (Jan-08)	SA-PZ122I (Aug-08)	SA-PZ122I (Sept-09)	SA-PZ122I (Sept-10)	SA-PZ122D (Jan-08)	SA-PZ122D (Aug-08)
Volatile Organic Compounds (µg/l)																					
1,1,1-Trichloroethane	71-55-6	200	5																		
1,1-Dichloroethane	75-34-3		5													1 J			**9.7**		2
1,1-Dichloroethene	75-35-4	7	5																1.2 J		
1,2-Dichlorobenzene	95-50-1		5																		
cis-1,2-Dichloroethene	156-59-2	70	5																		
1,2-Dichloroethane	107-06-2	5	5																		
1,2,4-Trichlorobenzene	120-82-1	70	5																		
1,3-Dichlorobenzene	541-73-1		5																		
1,4-Dichlorobenzene	106-46-7	75	5																		
2-Butanone	78-93-3		50																		
2-Hexanone	591-78-6		50																		
Acetone	67-64-1		50																		
Benzene	71-43-2	5	5																		
Carbon disulfide	75-15-0		50																		
Chlorobenzene	108-90-7	100	5																		
Chloroethane	75-00-3		5																		
Chloromethane	74-87-3		5		3																
Chloroform	67-66-3	80	5																		
Isopropylbenzene	98-82-8		5																		
Toluene	108-88-3	1,000	5								0.49 J				0.68 J				0.51 J		
Vinyl Chloride	75-01-4	2	2																		
Methylene Chloride	75-09-2	5	5																		
Naphthalene	91-20-3		50																		
Trichloroethene	79-01-6	5	5																		
Methane, Ethene, Ethane (µg/l)																					
Methane	74-82-8			NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethane	74-84-0			NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

NOTES:

µg/L = micrograms per liter
MW = Monitoring Well
PZ = Piezometer
ND = Not Detected
MCL = Maximum contaminat level
DUP = Duplicate
NA = Not Analyzed
NYSDOH = New York State Department of Health
J - Estmated Value
Blank cells - No criteria or not detected
CAS - Chemical Abstracts Service
MCL - Maximum contaminat level
Bold - Indicates Exceedances from NYSDOH MCLs
1- (USEPA, 2007) Drinking Water Contaminants National Primary Drinking Water Regulations,
2- (NYSDOH, 2004) New York Public Supply Regulations, 10 NYCRR Part 5, Subpart 5-1
blank contamination. Remaining detections of these compounds are also questionable and

TABLE 4-4
ANALYTICAL DETECTION SUMMARY
SOUTHERN AREA
NWIRP CALVERTON, NEW YORK

Chemical	CAS No.	Federal MCLs [1]	NYSDOH MCLs [2]	SA-PZ122D (Sept-09)	SA-PZ122D (Sept-10)	SA-PZ123S (Jan-08)	SA-PZ123S (Aug-08)	SA-PZ123S (Sept-09)	SA-PZ123S (Sept-10)	SA-PZ123I1 (Jan-08)	SA-PZ123I1 (Aug-08)	SA-PZ123I1 (DUP) (Aug-08)	SA-PZ123I1 (Sept-09)	SA-PZ123I1 (Sept-10)	SA-PZ123I1 (DUP) (Sept-10)	SA-PZ123I (Jan-08)	SA-PZ123I (Aug-08)	SA-PZ123I (Sept-09)	SA-PZ123I (Sept-10)	SA-PZ124 (Aug-08)	SA-PZ124 (Sept-09)
Volatile Organic Compounds (µg/l)																					
1,1,1-Trichloroethane	71-55-6	200	5								2	2				1 J	1		0.59 J		
1,1-Dichloroethane	75-34-3		5	1.8 J	1.3 J		0.7 J			**23**	**13**	**13**	**6.3**			**55**	**63**	**54**	**42 J**	4	**17**
1,1-Dichloroethene	75-35-4	7	5							3 J	2	2				**7**	**10**	**6.9**	**6.9 J**		1.7 J
1,2-Dichlorobenzene	95-50-1		5																		
cis-1,2-Dichloroethene	156-59-2	70	5																		
1,2-Dichloroethane	107-06-2	5	5														0.3 J				
1,2,4-Trichlorobenzene	120-82-1	70	5							1 J	1	1 J				0.7 J			0.66 J		
1,3-Dichlorobenzene	541-73-1		5																		
1,4-Dichlorobenzene	106-46-7	75	5								0.5 J	0.5 J				0.6 J	0.6 J				
2-Butanone	78-93-3		50																		
2-Hexanone	591-78-6		50																		
Acetone	67-64-1		50																		
Benzene	71-43-2	5	5																		
Carbon disulfide	75-15-0		50																		
Chlorobenzene	108-90-7	100	5																		
Chloroethane	75-00-3		5													0.7 J					
Chloromethane	74-87-3		5								3	3									
Chloroform	67-66-3	80	5						1.3 J												
Isopropylbenzene	98-82-8		5																		
Toluene	108-88-3	1,000	5		0.39 J										0.45 J						
Vinyl Chloride	75-01-4	2	2														**3**				
Methylene Chloride	75-09-2	5	5																		
Naphthalene	91-20-3		50																		
Trichloroethene	79-01-6	5	5																		
Methane, Ethene, Ethane (µg/l)																					
Methane	74-82-8			NA	NA	NA	NA	5 J	50	NA	NA	NA	20 J	1.8	1.8	NA	NA	32 J	18	NA	NA
Ethane	74-84-0			NA	NA	NA	NA	ND	ND	NA	NA	NA	ND	ND	ND	NA	NA	ND	ND	NA	NA

NOTES:

µg/L = micrograms per liter
MW = Monitoring Well
PZ = Piezometer
ND = Not Detected
MCL = Maximum contaminat level
DUP = Duplicate
NA = Not Analyzed
NYSDOH = New York State Department of Health
J - Estmated Value
Blank cells - No criteria or not detected
CAS - Chemical Abstracts Service
MCL - Maximum contaminat level
Bold - Indicates Exceedances from NYSDOH MCLs
1- (USEPA, 2007) Drinking Water Contaminants National Primary Drinking Water Regulations,
2- (NYSDOH, 2004) New York Public Supply Regulations, 10 NYCRR Part 5, Subpart 5-1
blank contamination. Remaining detections of these compounds are also questionable and

TABLE 4-4
ANALYTICAL DETECTION SUMMARY
SOUTHERN AREA
NWIRP CALVERTON, NEW YORK

Chemical	CAS No.	Federal MCLs [1]	NYSDOH MCLs [2]	SA-PZ124 (July-10)	SA-PZ124 (Sept-10)	SA-PZ125 (Aug-08)	SA-PZ125 (Sept-09)	SA-PZ125 (July-10)	SA-PZ-125 (DUP) (July-10)	SA-PZ-125 (Sept-10)	SA-PZ133I (Mar-10)	SA-PZ133I (July-10)	SA-PZ133I1 (Mar-10)	SA-PZ133I1 (DUP) (Mar-10)	SA-PZ134 (Mar-10)	SA-PZ135 (Mar-10)	SA-PZ136 (Mar-10)	SA-PZ137 (Mar-10)	SA-PZ138I (April-10)	SA-PZ138I (July-10)	SA-PZ138I (July-10) (DUP)	SA-PZ139I (April-10)
Volatile Organic Compounds (µg/l)																						
1,1,1-Trichloroethane	71-55-6	200	5								**120**	**24**	2 J		**5.3**	**70**				4.4 J	4.4 J	**35**
1,1-Dichloroethane	75-34-3		5	**15**	**22**						**460**	**130**	**26**	**23**	**31**	**260**	1.5 J		**8.7**	**20**	**20**	**160**
1,1-Dichloroethene	75-35-4	7	5	2.1 J	**5.2**						**41**	**7.8**	1.6 J	0.68 J	2.6 J	**22**				1.2 J	1 J	**11**
1,2-Dichlorobenzene	95-50-1		5								0.91 J		0.36 J	0.41 J	0.43 J	0.91 J						
cis-1,2-Dichloroethene	156-59-2	70	5																			
1,2-Dichloroethane	107-06-2	5	5																			
1,2,4-Trichlorobenzene	120-82-1	70	5								3 J	0.98 J	0.75 J	0.91 J	1.5 J							0.84 J
1,3-Dichlorobenzene	541-73-1		5								0.65 J	0.7 J			0.42 J							
1,4-Dichlorobenzene	106-46-7	75	5								2.2 J		1.2 J	1.3 J	1.3 J	0.38 J						0.41 J
2-Butanone	78-93-3		50																			
2-Hexanone	591-78-6		50																			
Acetone	67-64-1		50																			
Benzene	71-43-2	5	5								1.1 J					0.35 J						0.35 J
Carbon disulfide	75-15-0		50			0.5 J																
Chlorobenzene	108-90-7	100	5																			
Chloroethane	75-00-3		5								**67**	**9.6**	4.9 J			**15 J**					1.7 J	**22 J**
Chloromethane	74-87-3		5																			
Chloroform	67-66-3	80	5																			
Isopropylbenzene	98-82-8		5																			
Toluene	108-88-3	1,000	5																			
Vinyl Chloride	75-01-4	2	2																			
Methylene Chloride	75-09-2	5	5																			
Naphthalene	91-20-3		50												1.5 J							
Trichloroethene	79-01-6	5	5								0.32 J											
Methane, Ethene, Ethane (µg/l)																						
Methane	74-82-8			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethane	74-84-0			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

NOTES:

µg/L = micrograms per liter
MW = Monitoring Well
PZ = Piezometer
ND = Not Detected
MCL = Maximum contaminat level
DUP = Duplicate
NA = Not Analyzed
NYSDOH = New York State Department of Health
J - Estmated Value
Blank cells - No criteria or not detected
CAS - Chemical Abstracts Service
MCL - Maximum contaminat level
Bold - Indicates Exceedances from NYSDOH MCLs
1- (USEPA, 2007) Drinking Water Contaminants National Primary Drinking Water Regulations,
2- (NYSDOH, 2004) New York Public Supply Regulations, 10 NYCRR Part 5, Subpart 5-1
blank contamination. Remaining detections of these compounds are also questionable and

TABLE 4-4
ANALYTICAL DETECTION SUMMARY
SOUTHERN AREA
NWIRP CALVERTON, NEW YORK

Chemical	CAS No.	Federal MCLs (1)	NYSDOH MCLs (2)	SA-PZ139I (July-10)	SA-PZ140 (June-10)	SA-PZ140 (Sept-10)	SA-PZ140 (DUP) (Sept-10)	SA-PZ141 (June-10)	SA-PZ142 (June-10)	SA-PZ143 (June-10)	SA-PZ143 (Sept-10)	SA-PZ144I (June-10)	SA-PZ144S (June-10)	SA-PZ145S (June-10)	SA-PZ145S (Sept-10)	SA-PZ145I (June-10)	SA-PZ145I (Sept-10)	SA-PZ145I (DUP) (Sept-10)	SA-PZ145D (June-10)	SA-PZ145D (DUP) (June-10)	SA-PZ145D (Sept-10)	SA-PZ147 (July-10)
Volatile Organic Compounds (µg/l)																						
1,1,1-Trichloroethane	71-55-6	200	5	2.3 J	**17**	**9.0**	**10 J**		**60**	**110**	**110**					**8.7**	**6.1**	**5.9 J**				
1,1-Dichloroethane	75-34-3		5	**17**	**140**	**93**	**100 J**	2.8 J	**410**	**590**	**600**	3.7 J				**91**	**66**	**69 J**	**18**	**19**	**19**	
1,1-Dichloroethene	75-35-4	7	5	0.94 J	**8.5**	**6.7**	**7.8 J**		**21**	**39**	**52**					**8.2**	**8.4**	**8.7 J**	1.1 J	1 J	2.0 J	
1,2-Dichlorobenzene	95-50-1		5			0.64 J	0.47 J			1.6 J												
cis-1,2-Dichloroethene	156-59-2	70	5																			
1,2-Dichloroethane	107-06-2	5	5						0.55 J	0.83 J												
1,2,4-Trichlorobenzene	120-82-1	70	5			1.9 J	1.4 J				**7.1 J**						1.1 J	1.3 J				
1,3-Dichlorobenzene	541-73-1		5		1.2 J	0.62 J	0.50 J			0.69 J												
1,4-Dichlorobenzene	106-46-7	75	5		4.1 J	2.2 J	2.1 J		1.5 J	3.1 J												
2-Butanone	78-93-3		50		2.1 J																	
2-Hexanone	591-78-6		50																			
Acetone	67-64-1		50																			
Benzene	71-43-2	5	5						0.42 J	0.87 J												
Carbon disulfide	75-15-0		50																			
Chlorobenzene	108-90-7	100	5		0.58 J				0.34 J													
Chloroethane	75-00-3		5	1.8 J	**19**	**14**	**15 J**		**36**	**44**						**6.1**	4.5 J	4.1 J	0.99 J	0.83 J		
Chloromethane	74-87-3		5																			
Chloroform	67-66-3	80	5																			
Isopropylbenzene	98-82-8		5							0.90 J												
Toluene	108-88-3	1,000	5								2.3 J											
Vinyl Chloride	75-01-4	2	2		0.60 J				1.7 J	**2.4 J**						0.53 J						
Methylene Chloride	75-09-2	5	5		0.64 J					0.56 J												
Naphthalene	91-20-3		50																			
Trichloroethene	79-01-6	5	5																			
Methane, Ethene, Ethane (µg/l)																						
Methane	74-82-8			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	7.6	NA	5.6	5.6	NA	NA	0.47 J	NA
Ethane	74-84-0			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	NA	ND	ND	NA	NA	ND	NA

NOTES:

µg/L = micrograms per liter
PZ = Piezometer
MCL = Maximum contaminat level
NA = Not Analyzed
NYSDOH = New York State Department of Health
J - Estmated Value
Blank cells - No criteria or not detected
CAS - Chemical Abstracts Service
MCL - Maximum contaminat level
Bold - Indicates Exceedances from NYSDOH MCLs
1- (USEPA, 2007) Drinking Water Contaminants National Primary Drinking Water Regulations,
2- (NYSDOH, 2004) New York Public Supply Regulations, 10 NYCRR Part 5, Subpart 5-1
blank contamination. Remaining detections of these compounds are also questionable and

MW = Monitoring Well
ND = Not Detected
DUP = Duplicate

TABLE 4-4
ANALYTICAL DETECTION SUMMARY
SOUTHERN AREA
NWIRP CALVERTON, NEW YORK

Chemical	CAS No.	Federal MCLs (1)	NYSDOH MCLs (2)	SA-PZ147 (Sept-10)	SA-PZ148 (July-10)	SA-PZ148 (Sept-10)	SA-PZ148 (DUP) (Sept-10)	SA-PZ166I (Sept-10)
Volatile Organic Compounds (µg/l)								
1,1,1-Trichloroethane	71-55-6	200	5					
1,1-Dichloroethane	75-34-3		5	4.4 J				
1,1-Dichloroethene	75-35-4	7	5					
1,2-Dichlorobenzene	95-50-1		5					
cis-1,2-Dichloroethene	156-59-2	70	5					
1,2-Dichloroethane	107-06-2	5	5					
1,2,4-Trichlorobenzene	120-82-1	70	5					
1,3-Dichlorobenzene	541-73-1		5					
1,4-Dichlorobenzene	106-46-7	75	5					
2-Butanone	78-93-3		50					
2-Hexanone	591-78-6		50					
Acetone	67-64-1		50					
Benzene	71-43-2	5	5					
Carbon disulfide	75-15-0		50					
Chlorobenzene	108-90-7	100	5					
Chloroethane	75-00-3		5					
Chloromethane	74-87-3		5					
Chloroform	67-66-3	80	5					
Isopropylbenzene	98-82-8		5					
Toluene	108-88-3	1,000	5					0.64 J
Vinyl Chloride	75-01-4	2	2					
Methylene Chloride	75-09-2	5	5					2.7 J
Naphthalene	91-20-3		50					
Trichloroethene	79-01-6	5	5					
Methane, Ethene, Ethane (µg/l)								
Methane	74-82-8			NA	NA	NA	NA	NA
Ethane	74-84-0			NA	NA	NA	NA	NA

NOTES:

µg/L = micrograms per liter
MW = Monitoring Well
PZ = Piezometer
ND = Not Detected
MCL = Maximum contaminat level
DUP = Duplicate
NA = Not Analyzed
NYSDOH = New York State Department of Health
J - Estmated Value
Blank cells - No criteria or not detected
CAS - Chemical Abstracts Service
MCL - Maximum contaminat level
Bold - Indicates Exceedances from NYSDOH MCLs
1- (USEPA, 2007) Drinking Water Contaminants National Primary Drinking Water Regulations,
2- (NYSDOH, 2004) New York Public Supply Regulations, 10 NYCRR Part 5, Subpart 5-1
blank contamination. Remaining detections of these compounds are also questionable and

TABLE 4-5
GROUNDWATER ANALYTICAL DETECTIONS TEMPORARY WELLS
SOUTHERN AREA
NWIRP CALVERTON, NEW YORK

Chemical	CAS No.	Federal MCLs [1]	NYSDOH MCLs [2]	SA-TW318-4650 (Mar-10)	SA-TW319-3842 (Mar-10)	SA-TW319-4549 (Mar-10)	SA-TW320-1115 (Mar-10)	SA-TW320-3034 (Mar-10)	SA-TW320-5155 (Mar-10)	SA-TW320-5155 (Mar-10) (DUP)	SA-TW321-1115 (Mar-10)	SA-TW321-3034 (Mar-10)	SA-TW321-4953 (Mar-10)	SA-TW322-1115 (Mar-10)	SA-TW322-2630 (Mar-10)	SA-TW322-3842 (Mar-10)	SA-TW322-4549 (Mar-10)	SA-TW322-4549 (Mar-10) (DUP)	SA-TW323-1418 (Mar-10)	SA-TW323-3034 (Mar-10)	SA-TW323-5256 (Mar-10)	SA-TW324-1216 (Mar-10)	SA-TW324-3034 (Mar-10)
Volatile Organic Compounds (µg/L)																							
1,1,1-Trichloroethane	71-55-6	200	5	0.32 J		**7.6**		**440**			0.51 J	0.45 J	0.48 J			**320**	**14**	**13 J**					
1,1-Dichloroethane	75-34-3	NE	5	0.95 J	**22**	**59**		**1200**	3.1 J	3.1 J	0.95 J	**6.9**	2.4 J		**24**	**1000**	**71**	**70**					
1,1-Dichloroethene	75-35-4	7	5		0.89 J	2.6 J		**86 J**							1.6 J	**90**	3.9 J	1.9 J					
1,2-Dichloroethane	107-06-2	5	5																				
Trichloroethene	79-01-6	5	5					0.70 J								0.64 J							
Tetrachloroethene	127-18-4	5	5																				
Vinyl Chloride	75-01-4	2	2																				
Chloroethane	75-00-3	NE	5					**270**								**140 J**	4.2 J						
cis-1,2-Dichloroethene	156-59-2	70	5																				
Chloromethane	74-87-3	NE	5																				
Benzene	71-43-2	5	5					2.2 J								2.2 J							
1,2-Dichlorobenzene	95-50-1	600	5					2.9 J								1.9 J							
1,3-Dichlorobenzene	541-73-1	NE	5																				
1,4-Dichlorobenzene	106-46-7	75	5					0.68 J								1.5 J	0.42 J						
1,2,4-Trichlorobenzene	120-82-1	70	5					0.69 J								2.7 J							
2-Butanone	78-93-3	NE	50																				
2-Hexanone	591-78-6	NE	50																				
Naphthalene	91-20-3	NE	50																				
Isopropyl Benzene	98-82-8	NE	5					**14**															
Ethyl Benzene	100-41-4	700	5																				
Chlorobenzene	108-90-7	100	5																				
Xylenes (total)	1330-20-7	10,000	50																				
Freon 113	76-13-1	NE	50						1.1 J	0.94 J													
Carbon Disulfide	75-15-0	NE	50																				
Toluene	108-88-3	1000	5																				
Chloroform	67-66-3	80	5							0.27 J									0.44 J				
Cyclohexane	110-82-7	NE	50																				
Methyl Cyclohexane	108-87-2	NE	50																				
Acetone	67-64-1	NE	50					9.3 J															
Methylene Chloride	75-09-2	5	5																				
Methyl tert-butyl ether	1634-04-4	NE	10																				

NOTES:
µg/L - micrograms per liter
MCL - Maximum contaminant level
NYSDOH - New York State Department of Health
CAS No. - Chemical Abstract Service number
NE - Not Established
DUP - Duplicate Sample
J - Estimated Value
Blank cells - No criteria or not detected
Bold - Indicates Exceedances from NYSDOH MCLs
[1] (USEPA, 2007) Drinking Water Contaminants National Primary Drinking Water Regulations, from the USEPA website at http://www.epa.gov/safewater/contaminants/index.html#primary
[2] (NYSDOH, 2004) New York Public Supply Regulations, 10 NYCRR Part 5, Subpart 5-1 Public Water Systems, Table 3-Organic Chemicals Maximum Contaminant Level Determination and Table 9D - Organic Chemicals - Principal Organic Contaminants, from the NYSDOH website at http://www.health.state.ny.us/environmental/water/drinking/part5/subpart5.htm

TABLE 4-5
GROUNDWATER ANALYTICAL DETECTIONS TEMPORARY WELLS
SOUTHERN AREA
NWIRP CALVERTON, NEW YORK

Chemical	CAS No.	Federal MCLs [1]	NYSDOH MCLs [2]	SA-TW324-4549 (Mar-10)	SA-TW325-1822 (June-10)	SA-TW325-3236 (June-10)	SA-TW325-5054 (June-10)	SA-TW326-1822 (June-10)	SA-TW326-3236 (June-10)	SA-TW326-4246 (June-10)	SA-TW327-1014 (June-10)	SA-TW327-2630 (June-10)	SA-TW327-4145 (June-10)	SA-TW327-4145 (June-10) (DUP)	SA-TW328-812 (June-10)	SA-TW328-2327 (June-10)	SA-TW328-3640 (June-10)	SA-TW329-1014 (June-10)	SA-TW329-2630 (June-10)	SA-TW329-4044 (June-10)	SA-TW330-1822 (Mar-10)	SA-TW330-3034 (Mar-10)	SA-TW330-5054 (Mar-10)
Volatile Organic Compounds (µg/L)																							
1,1,1-Trichloroethane	71-55-6	200	5							**44**			**67**	**68**		**19**	**28**		1.9 J	**170**			1.4 J
1,1-Dichloroethane	75-34-3	NE	5	0.55 J					**32**	**310**			**310**	**330**		**360**	**170**	**5.2**	**44**	**900**			
1,1-Dichloroethene	75-35-4	7	5						1.4 J	**15**			**19**	**17**		**19**	**12**		2.2 J	**69**			
1,2-Dichloroethane	107-06-2	5	5																				
Trichloroethene	79-01-6	5	5																	0.4 J			
Tetrachloroethene	127-18-4	5	5																				
Vinyl Chloride	75-01-4	2	2																				
Chloroethane	75-00-3	NE	5							**22**			**34**	**36**		**29**	**10**		4.9 J	**39 J**			
cis-1,2-Dichloroethene	156-59-2	70	5																				
Chloromethane	74-87-3	NE	5																				
Benzene	71-43-2	5	5							0.3 J			0.44 J	0.41 J		0.88 J				1.9 J			
1,2-Dichlorobenzene	95-50-1	600	5						1.1 J	0.36 J						1.4 J	0.4 J			0.94 J			
1,3-Dichlorobenzene	541-73-1	NE	5													0.89 J							
1,4-Dichlorobenzene	106-46-7	75	5			0.49 J			2.9 J	0.71 J			1.2 J	1.2 J		3.8 J	0.97 J			1 J			
1,2,4-Trichlorobenzene	120-82-1	70	5						2.1 J	1.8 J						0.81 J	1.2 J			1 J			
2-Butanone	78-93-3	NE	50																				
2-Hexanone	591-78-6	NE	50																				
Naphthalene	91-20-3	NE	50																	7.9			
Isopropyl Benzene	98-82-8	NE	5													1.7 J			0.29 J	1.3 J			
Ethyl Benzene	100-41-4	700	5																				
Chlorobenzene	108-90-7	100	5													0.54 J							
Xylenes (total)	1330-20-7	10,000	50																				
Freon 113	76-13-1	NE	50																				
Carbon Disulfide	75-15-0	NE	50	0.26 J																			
Toluene	108-88-3	1000	5																				
Chloroform	67-66-3	80	5																				
Cyclohexane	110-82-7	NE	50																				
Methyl Cyclohexane	108-87-2	NE	50																				
Acetone	67-64-1	NE	50			6.3 J																	
Methylene Chloride	75-09-2	5	5																				
Methyl tert-butyl ether	1634-04-4	NE	10																				

NOTES:
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MCL - Maximum contaminant level
NYSDOH - New York State Department of Health
CAS No. - Chemical Abstract Service number
NE - Not Established
DUP - Duplicate Sample
J - Estimated Value
Blank cells - No criteria or not detected
Bold - Indicates Exceedances from NYSDOH MCLs
[1] (USEPA, 2007) Drinking Water Contaminants National Primary Drin
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[2] (NYSDOH, 2004) New York Public Supply Regulations, 10 NYCRR
Table 3-Organic Chemicals Maximum Contaminant Level Determinati
Principal Organic Contaminants, from the NYSDOH website at
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TABLE 4-5
GROUNDWATER ANALYTICAL DETECTIONS TEMPORARY WELLS
SOUTHERN AREA
NWIRP CALVERTON, NEW YORK

Chemical	CAS No.	Federal MCLs [1]	NYSDOH MCLs [2]	SA-TW330-1822 (Mar-10)	SA-TW330-3034 (Mar-10)	SA-TW330-5054 (Mar-10)	SA-TW331-1115 (June-10)	SA-TW331-2125 (June-10)	SA-TW331-2125 (June-10) (DUP)	SA-TW331-3135 (June-10)	SA-TW332-1115 (June-10)	SA-TW332-2125 (June-10)	SA-TW332-3135 (June-10)	SA-TW333-1115 (June-10)	SA-TW333-2125 (June-10)	SA-TW333-3135 (June-10)	SA-TW334-1115 (June-10)	SA-TW334-2125 (June-10)	SA-TW334-2125 (June-10) (DUP)	SA-TW334-3135 (June-10)	SA-TW335-1115 (June-10)	SA-TW335-2125 (June-10)	SA-TW335-3135 (June-10)
Volatile Organic Compounds (µg/L)																							
1,1,1-Trichloroethane	71-55-6	200	5			1.4 J							**9.9**		0.39 J	**250**						**70**	**570**
1,1-Dichloroethane	75-34-3	NE	5										**32**		3.1 J	**740**				0.84 J		**280**	**2100**
1,1-Dichloroethene	75-35-4	7	5										1.0 J			**43**						**16**	**110**
1,2-Dichloroethane	107-06-2	5	5																				
Trichloroethene	79-01-6	5	5																				
Tetrachloroethene	127-18-4	5	5					**190**	**190**														
Vinyl Chloride	75-01-4	2	2																			1.3 J	**8.1 J**
Chloroethane	75-00-3	NE	5										**11**		1.6 J	**240**						**76**	**470**
cis-1,2-Dichloroethene	156-59-2	70	5																				
Chloromethane	74-87-3	NE	5																				
Benzene	71-43-2	5	5													**2.2 J**						**1.3 J**	**7.2 J**
1,2-Dichlorobenzene	95-50-1	600	5										1.5 J		0.88 J	3.4 J						1.8 J	
1,3-Dichlorobenzene	541-73-1	NE	5																				
1,4-Dichlorobenzene	106-46-7	75	5																				
1,2,4-Trichlorobenzene	120-82-1	70	5																				
2-Butanone	78-93-3	NE	50																				
2-Hexanone	591-78-6	NE	50																				
Naphthalene	91-20-3	NE	50																				
Isopropyl Benzene	98-82-8	NE	5												1.7 J	**8.3 J**						5.2 J	**23 J**
Ethyl Benzene	100-41-4	700	5																				
Chlorobenzene	108-90-7	100	5																				
Xylenes (total)	1330-20-7	10,000	50																				
Freon 113	76-13-1	NE	50																				
Carbon Disulfide	75-15-0	NE	50				0.32 J																
Toluene	108-88-3	1000	5																				
Chloroform	67-66-3	80	5																				
Cyclohexane	110-82-7	NE	50																				
Methyl Cyclohexane	108-87-2	NE	50																				
Acetone	67-64-1	NE	50				2.8 J	2.8 J	2.6 J							13 J	2.1 J	1.9 J			2.2 J	5.1 J	24 J
Methylene Chloride	75-09-2	5	5																				
Methyl tert-butyl ether	1634-04-4	NE	10																				

NOTES:
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NE - Not Established
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Principal Organic Contaminants, from the NYSDOH website at
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TABLE 4-5
GROUNDWATER ANALYTICAL DETECTIONS TEMPORARY WELLS
SOUTHERN AREA
NWIRP CALVERTON, NEW YORK

Chemical	CAS No.	Federal MCLs [1]	NYSDOH MCLs [2]	SA-TW335-4145 (June-10)	SA-TW335-4145 (June-10) (DUP)	SA-TW335-4145 (June-10) (DUP)	SA-TW336-1115 (June-10)	SA-TW336-2125 (June-10)	SA-TW336-3135 (June-10)	SA-TW337-1115 (June-10)	SA-TW337-2125 (June-10)	SA-TW337-3135 (June-10)	SA-TW338-1115 (June-10)	SA-TW338-2125 (June-10)	SA-TW338-2125 (June-10) (DUP)	SA-TW338-3135 (June-10)	SA-TW339-1115 (June-10)	SA-TW339-2125 (June-10)	SA-TW339-3135 (June-10)	SA-TW340-2125 (June-10)	SA-TW340-3135 (June-10)	SA-TW340-4145 (June-10)	SA-TW341-1115 (June-10)
Volatile Organic Compounds (µg/L)																							
1,1,1-Trichloroethane	71-55-6	200	5	0.6 J	0.59 J	0.59 J			**55**							**130**					**70 J**	0.99 J	
1,1-Dichloroethane	75-34-3	NE	5		1.3 J	1.3 J	1.2 J		**240**	1.4 J		1.2 J				**950**					**460 J**	3.1 J	
1,1-Dichloroethene	75-35-4	7	5						**15**							**37**					**21 J**	1.3 J	
1,2-Dichloroethane	107-06-2	5	5																		0.54 J		
Trichloroethene	79-01-6	5	5													0.34 J					0.43 J		
Tetrachloroethene	127-18-4	5	5																				
Vinyl Chloride	75-01-4	2	2						1.3 J														
Chloroethane	75-00-3	NE	5						**110**							**240**					**310 J**	**10 J**	
cis-1,2-Dichloroethene	156-59-2	70	5																				
Chloromethane	74-87-3	NE	5	0.52 J																			
Benzene	71-43-2	5	5						1 J							2.6 J					3.1 J	0.46 J	
1,2-Dichlorobenzene	95-50-1	600	5					0.71 J	1.9 J							1.8 J					2.1 J	0.66 J	
1,3-Dichlorobenzene	541-73-1	NE	5					0.51 J	1.5 J												2.1 J		
1,4-Dichlorobenzene	106-46-7	75	5					2.2 J	**6.4 J**				0.33 J			1.9 J					**8.8 J**		
1,2,4-Trichlorobenzene	120-82-1	70	5																		1.9 J	2.6 J	
2-Butanone	78-93-3	NE	50																				
2-Hexanone	591-78-6	NE	50																				
Naphthalene	91-20-3	NE	50												1.1 J						27 J		
Isopropyl Benzene	98-82-8	NE	5						**11**							4.5 J					**19 J**	2.7 J	
Ethyl Benzene	100-41-4	700	5																		**5.6 J**		
Chlorobenzene	108-90-7	100	5					0.42 J	0.8 J												1 J		
Xylenes (total)	1330-20-7	10,000	50																				
Freon 113	76-13-1	NE	50																				
Carbon Disulfide	75-15-0	NE	50														0.21 J						
Toluene	108-88-3	1000	5																				
Chloroform	67-66-3	80	5																				
Cyclohexane	110-82-7	NE	50													0.98 J							
Methyl Cyclohexane	108-87-2	NE	50																				
Acetone	67-64-1	NE	50					2.6 J	4.9 J														
Methylene Chloride	75-09-2	5	5																				
Methyl tert-butyl ether	1634-04-4	NE	10																			1.3 J	

NOTES:
µg/L - micrograms per liter
MCL - Maximum contaminant level
NYSDOH - New York State Department of Health
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NE - Not Established
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Blank cells - No criteria or not detected
Bold - Indicates Exceedances from NYSDOH MCLs
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TABLE 4-5
GROUNDWATER ANALYTICAL DETECTIONS TEMPORARY WELLS
SOUTHERN AREA
NWIRP CALVERTON, NEW YORK

Chemical	CAS No.	Federal MCLs [1]	NYSDOH MCLs [2]	SA-TW341-2125 (June-10)	SA-TW341-3135 (June-10)	SA-TW341-4145 (June-10)	SA-TW342-1115 (June-10)	SA-TW342-2125 (June-10)	SA-TW342-3135 (June-10)	SA-TW342-3135 (June-10) (DUP)	SA-TW342-4145 (June-10)	SA-TW343-1115 (June-10)	SA-TW343-2125 (June-10)	SA-TW343-3135 (June-10)	SA-TW343-4145 (June-10)	SA-TW344-1115 (June-10)	SA-TW344-2125 (June-10)	SA-TW344-3135 (June-10)	SA-TW344-4145 (June-10)	SA-TW345-4145 (June-10)	SA-TW346-1115 (Sept-10)	SA-TW346-2125 (Sept-10)	SA-TW346-3135 (Sept-10)
Volatile Organic Compounds (µg/L)																							
1,1,1-Trichloroethane	71-55-6	200	5										0.65 J	**120**	2.1 J			1.1 J					**15**
1,1-Dichloroethane	75-34-3	NE	5						2.5 J	2.5 J			**24**	**1400 J**	**14**					**5 J**		1.0 J	**38**
1,1-Dichloroethene	75-35-4	7	5										0.78 J	**60**									
1,2-Dichloroethane	107-06-2	5	5																				
Trichloroethene	79-01-6	5	5											1.3 J									
Tetrachloroethene	127-18-4	5	5		**38**																		
Vinyl Chloride	75-01-4	2	2											**3.8 J**									
Chloroethane	75-00-3	NE	5										**8.9**	**970 J**	4.1 J								
cis-1,2-Dichloroethene	156-59-2	70	5											1.1 J									
Chloromethane	74-87-3	NE	5																				
Benzene	71-43-2	5	5											3.8 J									
1,2-Dichlorobenzene	95-50-1	600	5						0.73 J	0.56 J				**6.1**			0.49 J						
1,3-Dichlorobenzene	541-73-1	NE	5																				
1,4-Dichlorobenzene	106-46-7	75	5						0.33 J					0.31 J			0.57 J						
1,2,4-Trichlorobenzene	120-82-1	70	5																				
2-Butanone	78-93-3	NE	50						1.9 J														
2-Hexanone	591-78-6	NE	50						2.6 J														
Naphthalene	91-20-3	NE	50											**98**									
Isopropyl Benzene	98-82-8	NE	5										0.67 J	**17**									
Ethyl Benzene	100-41-4	700	5										0.46 J	**19**									
Chlorobenzene	108-90-7	100	5																				
Xylenes (total)	1330-20-7	10,000	50											6.5						0.42 J			
Freon 113	76-13-1	NE	50																				
Carbon Disulfide	75-15-0	NE	50		0.16 J				0.16 J	0.19 J				0.17 J				0.16 J					
Toluene	108-88-3	1000	5																				
Chloroform	67-66-3	80	5						0.27 J														
Cyclohexane	110-82-7	NE	50											4.7 J									
Methyl Cyclohexane	108-87-2	NE	50											2.5 J									
Acetone	67-64-1	NE	50																				
Methylene Chloride	75-09-2	5	5																				
Methyl tert-butyl ether	1634-04-4	NE	10															0.28 J					

NOTES:
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Principal Organic Contaminants, from the NYSDOH website at
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TABLE 4-5
GROUNDWATER ANALYTICAL DETECTIONS TEMPORARY WELLS
SOUTHERN AREA
NWIRP CALVERTON, NEW YORK

Chemical	CAS No.	Federal MCLs [1]	NYSDOH MCLs [2]	SA-TW346-4145 (Sept-10)	SA-TW347-1115 (Sept-10)	SA-TW347-2125 (Sept-10)	SA-TW347-3135 (Sept-10)	SA-TW348-1115 (Sept-10)	SA-TW348-2125 (Sept-10)	SA-TW348-3135 (Sept-10)	SA-TW349-1115 (Sept-10)	SA-TW349-2125 (Sept-10)	SA-TW349-3135 (Sept-10)	SA-TW350-1115 (Sept-10)	SA-TW350-2125 (Sept-10)	SA-TW350-3135 (Sept-10)	SA-TW351-1115 (Sept-10)	SA-TW351-2125 (Sept-10)	SA-TW351-2125 (Sept-10) (DUP)	SA-TW351-3135 (Sept-10)	SA-TW351-4145 (Sept-10)	SA-TW352-1620 (Sept-10)	SA-TW352-2630 (Sept-10)
Volatile Organic Compounds (µg/L)																							
1,1,1-Trichloroethane	71-55-6	200	5				1.2 J		**550**			**830**	**1200**					0.92 J	1 J	1.1 J			
1,1-Dichloroethane	75-34-3	NE	5			1.3 J	0.70 J		**1500**	4.0 J	1.9 J	**1200**	**1300**										
1,1-Dichloroethene	75-35-4	7	5						**72**			**61**	**76**										
1,2-Dichloroethane	107-06-2	5	5																				
Trichloroethene	79-01-6	5	5									1.2 J	0.95 J										
Tetrachloroethene	127-18-4	5	5																				
Vinyl Chloride	75-01-4	2	2																				
Chloroethane	75-00-3	NE	5						**340**			**500**	**250**										
cis-1,2-Dichloroethene	156-59-2	70	5																				
Chloromethane	74-87-3	NE	5								0.45 J												
Benzene	71-43-2	5	5						**4.6 J**		**3.2 J**	**2.0 J**	**17**										
1,2-Dichlorobenzene	95-50-1	600	5						3.8 J			1.7 J	2.5 J										
1,3-Dichlorobenzene	541-73-1	NE	5																				
1,4-Dichlorobenzene	106-46-7	75	5																				
1,2,4-Trichlorobenzene	120-82-1	70	5																				
2-Butanone	78-93-3	NE	50																				
2-Hexanone	591-78-6	NE	50																				
Naphthalene	91-20-3	NE	50						**190**		**63**	**61**	**150**										
Isopropyl Benzene	98-82-8	NE	5					0.52 J	**35**		**15**	**6.3**	**17**	1.8 J									
Ethyl Benzene	100-41-4	700	5						**120**		**50**	3.3 J	**16**										
Chlorobenzene	108-90-7	100	5																				
Xylenes (total)	1330-20-7	10,000	50						**65**		**120**	1.3 J	17										
Freon 113	76-13-1	NE	50																				
Carbon Disulfide	75-15-0	NE	50																				
Toluene	108-88-3	1000	5																				
Chloroform	67-66-3	80	5																				
Cyclohexane	110-82-7	NE	50						5.6														
Methyl Cyclohexane	108-87-2	NE	50						7.1			2.0 J	2.4 J										
Acetone	67-64-1	NE	50							5.2 J		7.2 J	6.6 J							6.5 J			
Methylene Chloride	75-09-2	5	5																				
Methyl tert-butyl ether	1634-04-4	NE	10																				

NOTES:
µg/L - micrograms per liter
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TABLE 4-5
GROUNDWATER ANALYTICAL DETECTIONS TEMPORARY WELLS
SOUTHERN AREA
NWIRP CALVERTON, NEW YORK

Chemical	CAS No.	Federal MCLs [1]	NYSDOH MCLs [2]	SA-TW352-3640 (Sept-10)	SA-TW353-1620 (Sept-10)	SA-TW353-2630 (Sept-10)	SA-TW353-3640 (Sept-10)	SA-TW354-1620 (Sept-10)	SA-TW354-2630 (Sept-10)	SA-TW354-3640 (Sept-10)	SA-TW355-1620 (Sept-10)	SA-TW355-2630 (Sept-10)	SA-TW355-3640 (Sept-10)	SA-TW356-1620 (Sept-10)	SA-TW356-2630 (Sept-10)	SA-TW356-3640 (Sept-10)	SA-TW357-1620 (Sept-10)	SA-TW357-2630 (Sept-10)	SA-TW357-3640 (Sept-10)
Volatile Organic Compounds (µg/L)																			
1,1,1-Trichloroethane	71-55-6	200	5																
1,1-Dichloroethane	75-34-3	NE	5	1.4 J			1.5 J			2.1 J			**5.7**			**33**			**38**
1,1-Dichloroethene	75-35-4	7	5													1.6 J			3.7 J
1,2-Dichloroethane	107-06-2	5	5																
Trichloroethene	79-01-6	5	5																
Tetrachloroethene	127-18-4	5	5																
Vinyl Chloride	75-01-4	2	2																
Chloroethane	75-00-3	NE	5																
cis-1,2-Dichloroethene	156-59-2	70	5																
Chloromethane	74-87-3	NE	5																
Benzene	71-43-2	5	5																
1,2-Dichlorobenzene	95-50-1	600	5																
1,3-Dichlorobenzene	541-73-1	NE	5																
1,4-Dichlorobenzene	106-46-7	75	5																
1,2,4-Trichlorobenzene	120-82-1	70	5							1.3 J						0.84 J			1.5 J
2-Butanone	78-93-3	NE	50																
2-Hexanone	591-78-6	NE	50																
Naphthalene	91-20-3	NE	50																
Isopropyl Benzene	98-82-8	NE	5																
Ethyl Benzene	100-41-4	700	5																
Chlorobenzene	108-90-7	100	5																
Xylenes (total)	1330-20-7	10,000	50																
Freon 113	76-13-1	NE	50																
Carbon Disulfide	75-15-0	NE	50																
Toluene	108-88-3	1000	5																
Chloroform	67-66-3	80	5																
Cyclohexane	110-82-7	NE	50																
Methyl Cyclohexane	108-87-2	NE	50																
Acetone	67-64-1	NE	50					5.7 J									4.1 J		4.8 J
Methylene Chloride	75-09-2	5	5																
Methyl tert-butyl ether	1634-04-4	NE	10																

NOTES:
µg/L - micrograms per liter
MCL - Maximum contaminant level
NYSDOH - New York State Department of Health
CAS No. - Chemical Abstract Service number
NE - Not Established
DUP - Duplicate Sample
J - Estimated Value
Blank cells - No criteria or not detected
Bold - Indicates Exceedances from NYSDOH MCLs
[1] (USEPA, 2007) Drinking Water Contaminants National Primary Drin
website at http://www.epa.gov/safewater/contaminants/index.html#pri
[2] (NYSDOH, 2004) New York Public Supply Regulations, 10 NYCRR
Table 3-Organic Chemicals Maximum Contaminant Level Determinati
Principal Organic Contaminants, from the NYSDOH website at
http://www.health.state.ny.us/environmental/water/drinking/part5/subp

TABLE 4-6
ANALYTICAL DETECTION SUMMARY
SOUTHERN AREA PECONIC RIVER SURFACE WATER
NWIRP CALVERTON, NEW YORK

Chemical	CAS No.	NYSDEC SWQS (1)	ONL SWV (2)	SA-SW-124 (Aug-08)	SA-SW-124 (Mar-09)	SA-SW-124 (Sept-09)	SA-SW-124 (July-10)	SA-SW-124 (Sept-10)	SA-SW-124 (DUP) (Sept-10)	SA-SW-125 (Aug-08)	SA-SW-125 (Mar-09)	SA-SW-125 (Sept-09)	SA-SW-125 (July-10)	SA-SW-125 (Sept-10)	SA-SW-201 (Jan-08)	SA-SW-201 (Aug-08)	SA-SW-201 (Mar-09)	SA-SW-201 (Sept-09)	SA-SW-201 (July-10)	SA-SW-201 (DUP) (July-10)	SA-SW-201 (Sept-10)
Volatile Organic Compounds (µg/l)																					
1,1-Dichloroethane	75-34-3		47					0.46 J	0.56 J												
1,2,4-Trichlorobenzene	120-82-1	5	110		4.9 J																
Acetone	67-64-1								3.5 J												4.2 J
Toluene	108-88-3	6,000	9.8																		
Methylene Chloride	75-09-2																				

NOTES:

µg/L - micrograms per liter
MW - Monitoring Well
SD - Sediment
SW - Surface Water
MCL - Maximum contaminat level
J - Estmated Value
DUP - Duplicate
Blank cells - No criteria or not detected
NYSDEC- New York State Department of Environmental Cons CAS - Chemical Abstracts Service
SWQS - Surface Water Quality Standards
ONL SWV - Oakridge National Laboratory Surface Water Values
Bold - Indicates Exceedances from NYSDEC SWQS

1- Peconic River is Class C Surface Water 6 NYCRR Part 703 Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations, Section 703.5, Table 1,Water Quality Standards and Surface Waters and Groundwater. http://www.dec.ny.gov/regs/4590.html

2-Oak Ridge National Laboratory (surface water) - Table 1 (secondary chronic values), Toxilogical Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota: 1996 Revision (Suter and Tsao, 1996). http://www.hsrd.ornl.gov/ecorisk/tm96r2.pdf

TABLE 4-6
ANALYTICAL DETECTION SUMMARY
SOUTHERN AREA PECONIC RIVER SURFACE WATER
NWIRP CALVERTON, NEW YORK

Chemical	CAS No.	NYSDEC SWQS (1)	ONL SWV (2)	SA-SW-204 (Jan-08)	SA-SW-204 (Aug-08)	SA-SW-204 (DUP) (Aug-08)	SA-SW-204 (Mar-09)	SA-SW-204 (Sept-09)	SA-SW-204 (DUP) (Sept-09)	SA-SW-204 (July-10)	SA-SW-204 (Sept-10)
Volatile Organic Compounds (µg/l)											
1,1-Dichloroethane	75-34-3		47								
1,2,4-Trichlorobenzene	120-82-1	5	110								
Acetone	67-64-1										
Toluene	108-88-3	6,000	9.8								
Methylene Chloride	75-09-2										

NOTES:

µg/L - micrograms per liter
MW - Monitoring Well
SD - Sediment
SW - Surface Water
MCL - Maximum contaminat level
J - Estmated Value
DUP - Duplicate
Blank cells - No criteria or not detected
NYSDEC- New York State Department of Environmental Cons
CAS - Chemical Abstracts Servic
SWQS - Surface Water Quality Standards
ONL SWV - Oakridge National Laboratory Surface Water Values
Bold - Indicates Exceedances from NYSDEC SWQS

1- Peconic River is Class C Surface Water 6 NYCRR Part 703 Surface Water and Groundwater Standards and Groundwater Effluent Limitations, Section 703.5, Table 1,Water Quality Standard Surface Waters and Groundwater. http://www.dec.ny.gov/regs/4590.html

2-Oak Ridge National Laboratory (surface water) - Table 1 (secondary chronic values), Toxilogic Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota: 1996 (Suter and Tsao, 1996). http://www.hsrd.ornl.gov/ecorisk/tm96r2.pdf

TABLE 4-7
ANALYTICAL DETECTION SUMMARY
SOUTHERN AREA PECONIC RIVER SEDIMENT
NWIRP CALVERTON, NEW YORK

Chemical	CAS No.	ORNL Sediment Values (1)	NYSDEC Unrestricted Soil Cleanup Objectives (2)	NYSDEC Ecological Soil Cleanup Objectives (2)	SA-SD-124 (Aug-08)	SA-SD-124 (Mar-09)	SA-SD-124 (Sept-09)	SA-SD-124 (July-10)	SA-SD-124 (Sept-10)	SA-SD-124 (DUP) (Sept-10)	SA-SD-125 (Aug-08)	SA-SD-125 (Mar-09)	SA-SD-125 (DUP) (Mar-09)	SA-SD-125 (Sept-09)	SA-SD-125 (DUP) (Sept-09)	SA-SD-125 (July-10)	SA-SD-125 (Sept-10)	SA-SD-201 (Mar-09)
Volatile Organic Compounds (µg/kg)																		
1,1-Dichloroethane	75-34-3	27	270	NS		7.5		8.8 J	7.6 J									
1,2,4-Trichlorobenzene	120-82-1	9,600						9.1 J	9.7 J									
1,4-Dichlorobenzene	106-46-7	340	1,800	20,000				4.1 J										
2-Butanone	78-93-3	270						63 J	23 J	6.1 J								
2-Hexanone	591-78-6	22												11 J				
*Acetone	67-64-1	8.7	50	2,200				**260 J**	**130 J**	46								
Carbon disulfide	75-15-0	0.85						**3.4 J**										
Toluene	108-88-3	780	700	36,000									39	2.5 J				
Naphthalene	91-20-3	240	12,000	NS										3.7 J				

NOTES:

MW - Monitoring Well

µg/kg - micrograms per kilogram SW - Surface Water SD - Sediment

MCL - Maximum contaminat level DUP - Duplicate J - Estmated Value

Blank cells - No criteria or not detected

NYSDEC- New York State Department of Environmental Conservation CAS - Chemical Abstracts Service

MCL - Maximum contaminat level

ONL - Oakridge National Laboratory

Bold - Indicates Exceedances of at least one of the following criteria:

1-Oak Ridge National Laboratory (sediment) - Table 3 (secondary chronic values), Toxilogical Benchmarks for Screening Potential Contaminants of Concern for Effects on Sediment-Associated Biota: 1997 Revision (Jones et al., 1997). Benchmarks are based on protection of ecological receptors in the sediment pore water.

2- NYSDEC, Subpart 375-6: Remedial Program Soil Cleanup Objectives, October 8, 2007. If two values are presented, the second value is based on 706.1, protection of benthic organisms. http://www.dec.ny.gov/regs/15507.html

*Acetone was detected in some samples but is considered a typical lab contaminant

TABLE 4-7
ANALYTICAL DETECTION SUMMARY
SOUTHERN AREA PECONIC RIVER SEDIMENT
NWIRP CALVERTON, NEW YORK

Chemical	CAS No.	ORNL Sediment Values (1)	NYSDEC Unrestricted Soil Cleanup Objectives (2)	NYSDEC Ecological Soil Cleanup Objectives (2)	SA-SD-201 (Sept-09)	SA-SD-201 (July-10)	SA-SD-201 (Sept-10)	SA-SD-204 (Aug-08)	SA-SD-204 (DUP) (Aug-08)	SA-SD-204 (Mar-09)	SA-SD-204 (Sept-09)	SA-SD-204 (DUP) (Sept-09)	SA-SD-204 (July-10)	SA-SD-204 (Sept-10)
Volatile Organic Compounds (µg/kg)														
1,1-Dichloroethane	75-34-3	27	270	NS										
1,2,4-Trichlorobenzene	120-82-1	9,600												
1,4-Dichlorobenzene	106-46-7	340	1,800	20,000										
2-Butanone	78-93-3	270									7.1 J			
2-Hexanone	591-78-6	22												
*Acetone	67-64-1	8.7	50	2,200										
Carbon disulfide	75-15-0	0.85												
Toluene	108-88-3	780	700	36,000										
Naphthalene	91-20-3	240	12,000	NS										

NOTES:

MW - Monitoring Well

µg/kg - micrograms per kilogram SW - Surface Water SD - Sediment

MCL - Maximum contaminat level DUP - Duplicate J - Estmated Value

Blank cells - No criteria or not detected

NYSDEC- New York State Department of Environmental Conservation CAS - Chemical Abstracts Service

MCL - Maximum contaminat level

ONL - Oakridge National Laboratory

Bold - Indicates Exceedances of at least one of the following criteria:

1-Oak Ridge National Laboratory (sediment) - Table 3 (secondary chronic values), Toxilogical Benchmarks for Scre
Potential Contaminants of Concern for Effects on Sediment-Associated Biota: 1997 Revision (Jones et al., 1997). I
are based on protection of ecological receptors in the sediment pore water.

2- NYSDEC, Subpart 375-6: Remedial Program Soil Cleanup Objectives, October 8, 2007. If two values are preser
second value is based on 706.1, protection of benthic organisms. http://www.dec.ny.gov/regs/15507.html

*Acetone was detected in some samples but is considered a typical lab contaminant

TABLE 4-8
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
PECONIC RIVER SPORTSMAN'S CLUB
NWIRP CALVERTON, NEW YORK

Chemical	CAS No.	Federal MCLs [1]	NYSDOH MCLs [2]	CA-PRSC01 (Jan-08)	CA-PRSC01 (Jun-08)	CA-PRSC01 (Aug-08)	CA-PRSC01 (Dec-08)	CA-PRSC01 (Mar-09)	CA-PRSC01 (Jun-09)	CA-PRSC01 (Sept-09)	CA-PRSC01 (Nov-09)	CA-PRSC01 (Feb-10)	CA-PRSC01 (Apr-10)	CA-PRSC01 (Jul-10)	CA-PRSC0201 (Jan-08)	CA-PRSC0201 DUP (Jan-08)	CA-PRSC0201 (Jun-08)	CA-PRSC0201 (Aug-08)	CA-PRSC0201 (Dec-08)	CA-PRSC0201 DUP (Dec-08)	CA-PRSC0201 (Mar-09)	CA-PRSC0201 (Jun-09)	CA-PRSC0201 DUP (Jun-09)
Volatile Organic Compounds (µg/L)																							
1,1-Dichloroethane	75-34-3		5												**12**	**12**	**7**	**13**	**12**	**12**	**12**	**12**	**12**
1,1-Dichloroethene	75-35-4	7	5													5 J	4	4	5	5	3.3 J	3.6 J	3.5 J
1,2-Dichloroethane	107-06-2	5	5												0.5 J	0.6 J	0.6 J		0.4 J	0.4 J			
1,4-Dichlorobenzene	106-46-7	75	5																				
Chloromethane	74-87-3		5																				
cis-1,2-Dichloroethene	156-59-2	70	5												2 J	1 J	2	1 J	1	1		1.3 J	1.3 J
Isopropylbenzene	98-82-8		5																				
Methyl tert-butyl ether	1634-04-4		10																				
Trichloroethene	79-01-6	5	5												0.8 J	0.8 J	0.7 J	0.6 J	0.9 J	0.9 J			
Vinyl Chloride	75-01-4	2	2														1 J						
Benzene	71-43-2	5	5																0.3 J	0.3 J			
Napthalene	91-20-3		50						3.4 J														
Toluene	108-88-3	1,000	5																				
1,2,4-Trichlorobenzene	120-82-1	70	5																				

NOTES:
µg/L = micrograms per liter
CAS = Chemical Abstracts Service
MCL = Maximum contaminant level
NYSDOH = New York State Department of Health
J = Estimated Value
Blank cells = No criteria or not detected
Bolded values are detections above criteria

[1] (USEPA, 2007) Drinking Water Contaminants National Primary Drinking Water Regulations, from the USEPA website at http://www.epa.gov/safewater/contaminants/index.html#primary

[2] (NYSDOH, 2004) New York Public Supply Regulations, 10 NYCRR Part 5, Subpart 5-1 Public Water Systems, Table 3-Organic Chemicals Maximum Contaminant Level Determination and Table 9D - Organic Chemicals - Principal Organic Contaminants, from the NYSDOH website at http://www.health.state.ny.us/environmental/water/drinking/part5/subpart5.htm

*Acetone and Methylene Chloride was detected in some samples but is considered a typical lab contaminant

TABLE 4-8
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
PECONIC RIVER SPORTSMAN'S CLUB
NWIRP CALVERTON, NEW YORK

Chemical	CAS No.	Federal MCLs [1]	NYSDOH MCLs [2]	CA-PRSC0201 (Sept-09)	CA-PRSC0201 (Nov-09)	CA-PRSC0201 (Feb-10)	CA-PRSC0201 (Apr-10)	CA-PRSC0201 (Jul-10)	CA-PRSC0202 (Jan-08)	CA-PRSC0202 (Jun-08)	CA-PRSC0202 (Aug-08)	CA-PRSC0202 (Dec-08)	CA-PRSC0202 (Mar-09)	CA-PRSC0202 (Jun-09)	CA-PRSC0202 (Sept-09)	CA-PRSC0202 (Nov-09)	CA-PRSC0202 (Feb-10)	CA-PRSC0202 (Apr-10)	CA-PRSC0202 (Jul-10)	CA-PRSC0203 (Jan-08)	CA-PRSC0203 (Jun-08)	CA-PRSC0203 DUP (Jun-08)
Volatile Organic Compounds (µg/L)																						
1,1-Dichloroethane	75-34-3		5	**11**	**9.3**	**12**	**9.9**	**11**				0.4 J		1.1 J	1.2 J		2.1 J	2.4 J				
1,1-Dichloroethene	75-35-4	7	5	**6**	4.4 J	**5.4**	3.4 J	3.5 J														
1,2-Dichloroethane	107-06-2	5	5				0.42 J				0.8 J											
1,4-Dichlorobenzene	106-46-7	75	5																			
Chloromethane	74-87-3		5																	0.8 J		
cis-1,2-Dichloroethene	156-59-2	70	5		1.4 J	1.2 J	1.2 J	1.3 J														
Isopropylbenzene	98-82-8		5						2 J		1	0.6 J						0.47 J				0.4 J
Methyl tert-butyl ether	1634-04-4		10																	0.7 J		
Trichloroethene	79-01-6	5	5				0.64 J	0.75 J														
Vinyl Chloride	75-01-4	2	2																			
Benzene	71-43-2	5	5				0.28 J															
Napthalene	91-20-3		50		2.4 J																	
Toluene	108-88-3	1,000	5			1.2 J																
1,2,4-Trichlorobenzene	120-82-1	70	5					0.53 J														

NOTES:
µg/L = micrograms per liter
CAS = Chemical Abstracts Service
MCL = Maximum contaminant level
NYSDOH = New York State Department of Health
J = Estimated Value
Blank cells = No criteria or not detected
Bolded values are detections above criteria

[1] (USEPA, 2007) Drinking Water Contaminants National Primary Drinking Water Regulations, from the USEPA website at http://www.epa.gov/safewater/contaminants/index.html#primary

[2] (NYSDOH, 2004) New York Public Supply Regulations, 10 NYCRR Part 5, Subpart 5-1 Public Water Systems, Table 3-Organic Chemicals Maximum Contaminant Level Determination and Table 9D - Organic Chemicals - Principal Organic Contaminants, from the NYSDOH website at http://www.health.state.ny.us/environmental/water/drinking/part5/subpart5.htm

*Acetone and Methylene Chloride was detected in some samples but is considered a typical lab contaminant

TABLE 4-8
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
PECONIC RIVER SPORTSMAN'S CLUB
NWIRP CALVERTON, NEW YORK

Chemical	CAS No.	Federal MCLs [1]	NYSDOH MCLs [2]	CA-PRSC0203 (Aug-08)	CA-PRSC0203 (Dec-08)	CA-PRSC0203 (Mar-09)	CA-PRSC0203 (Jun-09)	CA-PRSC0203 (Sept-09)	CA-PRSC0203 (Nov-09)	CA-PRSC0203 (Feb-10)	CA-PRSC0203 (Apr-10)	CA-PRSC0203 (Jul-10)	CA-PRSC03 (Jan-08)	CA-PRSC03 (Jun-08)	CA-PRSC03 (Aug-08)	CA-PRSC03 (Dec-08)	CA-PRSC03 (Mar-09)	CA-PRSC03 DUP (Mar-09)	CA-PRSC03 (Jun-09)	CA-PRSC03 (Sept-09)	CA-PRSC03 DUP (Sept-09)	CA-PRSC03 (Nov-09)	CA-PRSC03 DUP (Nov-09)
Volatile Organic Compounds (µg/L)																							
1,1-Dichloroethane	75-34-3		5																				
1,1-Dichloroethene	75-35-4	7	5																				
1,2-Dichloroethane	107-06-2	5	5																				
1,4-Dichlorobenzene	106-46-7	75	5																				
Chloromethane	74-87-3		5																				
cis-1,2-Dichloroethene	156-59-2	70	5																				
Isopropylbenzene	98-82-8		5	1								0.32 J											
Methyl tert-butyl ether	1634-04-4		10																				
Trichloroethene	79-01-6	5	5																				
Vinyl Chloride	75-01-4	2	2																				
Benzene	71-43-2	5	5																				
Napthalene	91-20-3		50																				
Toluene	108-88-3	1,000	5																				
1,2,4-Trichlorobenzene	120-82-1	70	5																				

NOTES:
µg/L = micrograms per liter
CAS = Chemical Abstracts Service
MCL = Maximum contaminant level
NYSDOH = New York State Department of Health
J = Estimated Value
Blank cells = No criteria or not detected
Bolded values are detections above criteria

[1] (USEPA, 2007) Drinking Water Contaminants National Primary Drinking Water Regulations, from the USEPA website at http://www.epa.gov/safewater/contaminants/index.html#primary

[2] (NYSDOH, 2004) New York Public Supply Regulations, 10 NYCRR Part 5, Subpart 5-1 Public Water Systems, Table 3-Organic Chemicals Maximum Contaminant Level Determination and Table 9D - Organic Chemicals - Principal Organic Contaminants, from the NYSDOH website at http://www.health.state.ny.us/environmental/water/drinking/part5/subpart5.htm

*Acetone and Methylene Chloride was detected in some samples but is considered a typical lab contaminant

TABLE 4-8
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
PECONIC RIVER SPORTSMAN'S CLUB
NWIRP CALVERTON, NEW YORK

Chemical	CAS No.	Federal MCLs [1]	NYSDOH MCLs [2]	CA-PRSC03 (Feb-10)	CA-PRSC03 DUP (Feb-10)	CA-PRSC03 (Apr-10)	CA-PRSC03 DUP (Apr-10)	CA-PRSC03 (Jul-10)	CA-PRSC03 DUP (Jul-10)	CA-PRSC04 (Jan-08)	CA-PRSC04 (Jun-08)	CA-PRSC04 (Aug-08)	CA-PRSC04 (Dec-08)	CA-PRSC04 (Mar-09)	CA-PRSC04 (Jun-09)	CA-PRSC04 (Sept-09)	CA-PRSC04 (Nov-09)	CA-PRSC04 (Feb-10)	CA-PRSC04 (Apr-10)	CA-PRSC04 (Jul-10)
Volatile Organic Compounds (µg/L)																				
1,1-Dichloroethane	75-34-3		5																	
1,1-Dichloroethene	75-35-4	7	5																	
1,2-Dichloroethane	107-06-2	5	5																	
1,4-Dichlorobenzene	106-46-7	75	5				0.3 J													
Chloromethane	74-87-3		5																	
cis-1,2-Dichloroethene	156-59-2	70	5																	
Isopropylbenzene	98-82-8		5																	
Methyl tert-butyl ether	1634-04-4		10																	
Trichloroethene	79-01-6	5	5																	
Vinyl Chloride	75-01-4	2	2																	
Benzene	71-43-2	5	5																	
Napthalene	91-20-3		50																	
Toluene	108-88-3	1,000	5																	
1,2,4-Trichlorobenzene	120-82-1	70	5																	

NOTES:
µg/L = micrograms per liter
CAS = Chemical Abstracts Service
MCL = Maximum contaminant level
NYSDOH = New York State Department of Health
J = Estimated Value
Blank cells = No criteria or not detected
Bolded values are detections above criteria

[1] (USEPA, 2007) Drinking Water Contaminants National Primary Drinking Water Regulations, from the USEPA website at http://www.epa.gov/safewater/contaminants/index.html#primary

[2] (NYSDOH, 2004) New York Public Supply Regulations, 10 NYCRR Part 5, Subpart 5-1 Public Water Systems, Table 3-Organic Chemicals Maximum Contaminant Level Determination and Table 9D - Organic Chemicals - Principal Organic Contaminants, from the NYSDOH website at http://www.health.state.ny.us/environmental/water/drinking/part5/subpart5.htm

*Acetone and Methylene Chloride was detected in some samples but is considered a typical lab contaminant

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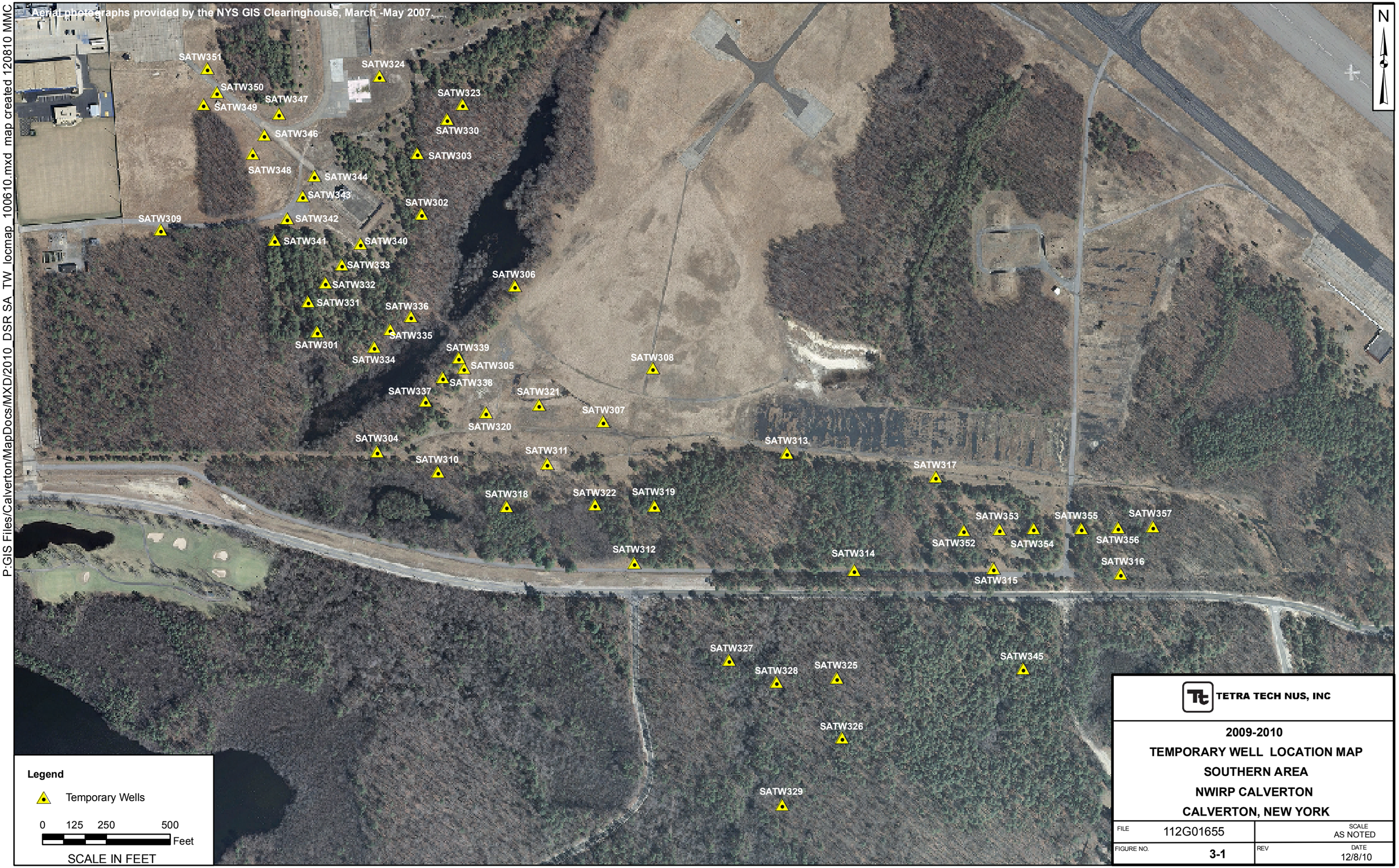

TETRA TECH NUS, INC

2009-2010
TEMPORARY WELL LOCATION MAP
SOUTHERN AREA
NWIRP CALVERTON
CALVERTON, NEW YORK

FILE	112G01655	SCALE	AS NOTED
FIGURE NO.	3-1	REV	DATE 12/8/10

P:GIS Files/Calverton/MapDocs/MXD/2010_DSR SA_locmap_100610.mxd map created 120810 MMC

TETRA TECH NUS, INC

MONITORING WELL & PIEZOMETER
LOCATION MAP
SOUTHERN AREA
NWIRP CALVERTON
CALVERTON, NEW YORK

FILE	112G01655	SCALE	AS NOTED
FIGURE NO.	3-2	REV	DATE 12/8/10

P:GIS Files/Calverton/MapDocs/MXD/2010_DSR Site6a10b_locmap_100610.mxd map created 120810 MMC

TETRA TECH NUS, INC

SITE 6A-FUEL CALIBRATION AREA
SITE 10B-ENGINE TEST HOUSE
MONITORING WELL LOCATION MAP
NWIRP CALVERTON
CALVERTON, NEW YORK

FILE	112G01655	SCALE	AS NOTED
FIGURE NO.	3-4	REV	DATE 12/8/10

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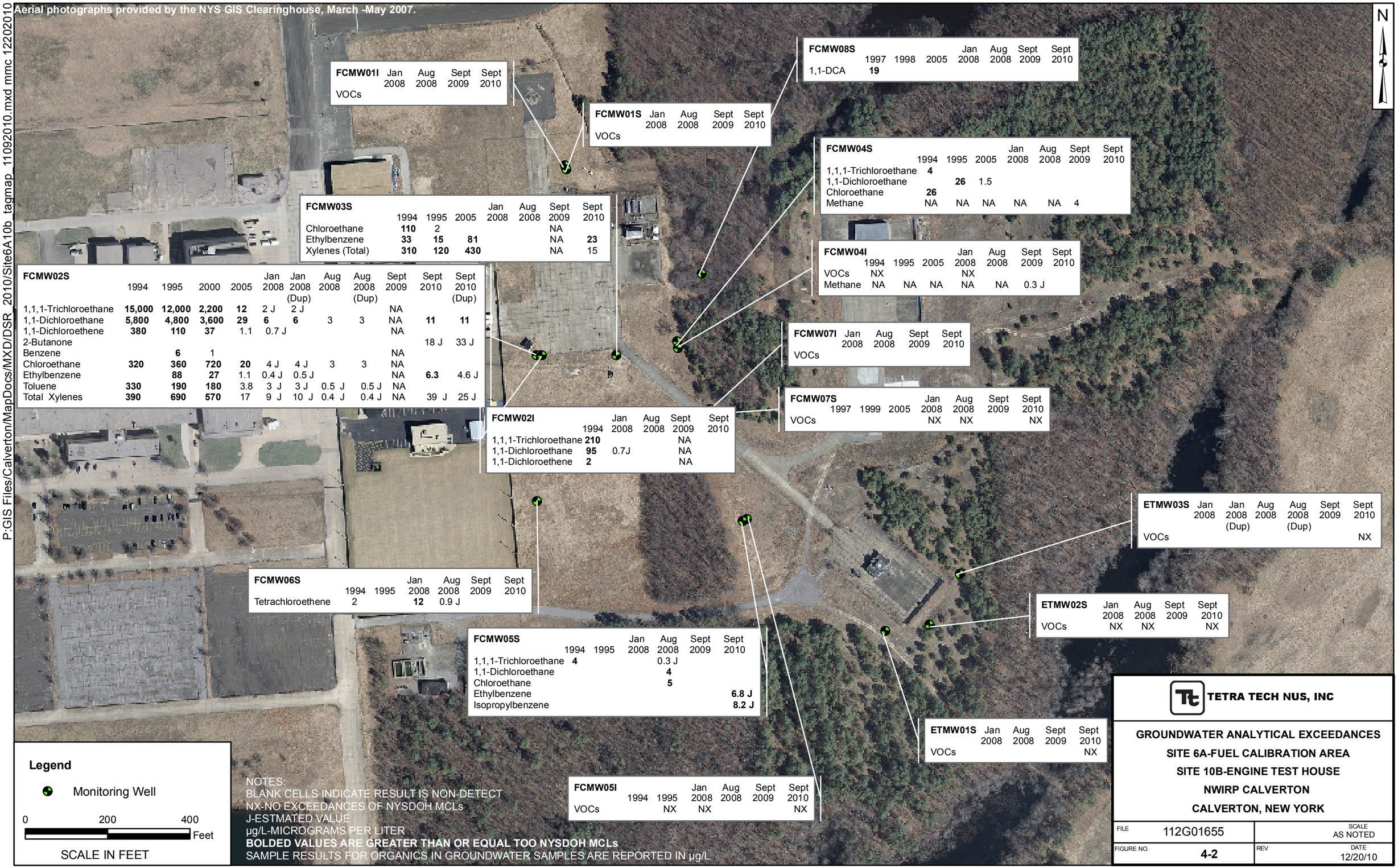

NOTES:
BLANK CELLS INDICATE RESULT IS NON-DETECT
NX-NO EXCEEDANCES OF NYSDOH MCLs
J-ESTMATED VALUE
µg/L-MICROGRAMS PER LITER
BOLDED VALUES ARE GREATER THAN OR EQUAL TOO NYSDOH MCLs
SAMPLE RESULTS FOR ORGANICS IN GROUNDWATER SAMPLES ARE REPORTED IN µg/L

TETRA TECH NUS, INC

GROUNDWATER ANALYTICAL EXCEEDANCES
SITE 6A-FUEL CALIBRATION AREA
SITE 10B-ENGINE TEST HOUSE
NWIRP CALVERTON
CALVERTON, NEW YORK

FILE	112G01655	SCALE	AS NOTED
FIGURE NO.	4-2	REV / DATE	12/20/10

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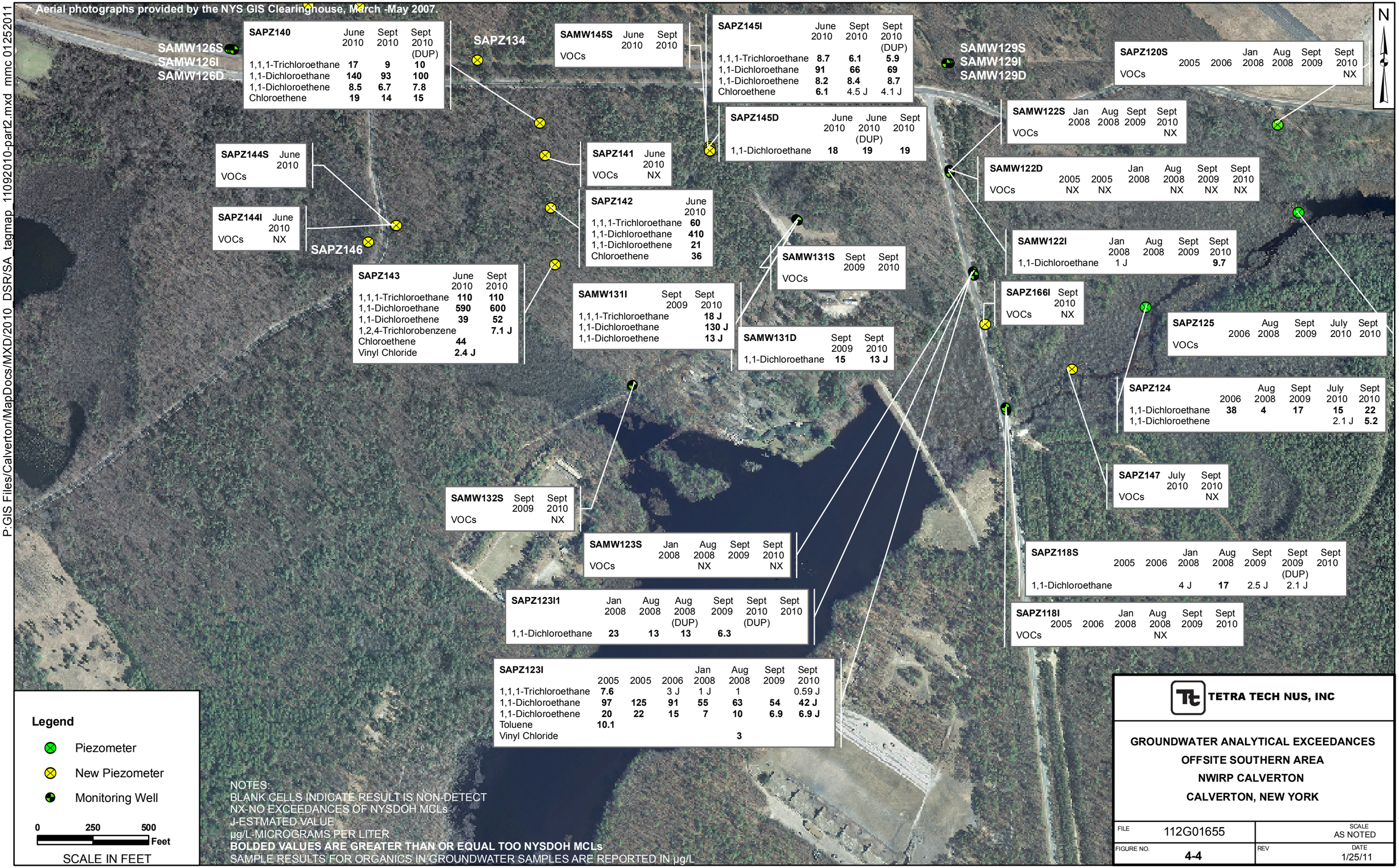


SAPZ140

	June 2010	Sept 2010	Sept 2010 (DUP)
1,1,1-Trichloroethane	**17**	**9**	**10**
1,1-Dichloroethane	**140**	**93**	**100**
1,1-Dichloroethene	**8.5**	**6.7**	**7.8**
Chloroethene	**19**	**14**	**15**

SAMW145S

	June 2010	Sept 2010
VOCs		

SAPZ145I

	June 2010	Sept 2010	Sept 2010 (DUP)
1,1,1-Trichloroethane	**8.7**	**6.1**	**5.9**
1,1-Dichloroethane	**91**	**66**	**69**
1,1-Dichloroethene	**8.2**	**8.4**	**8.7**
Chloroethene	**6.1**	4.5 J	4.1 J

SAPZ145D

	June 2010	June 2010 (DUP)	Sept 2010
1,1-Dichloroethane	**18**	**19**	**19**

SAPZ144S

	June 2010
VOCs	

SAPZ141

	June 2010
VOCs	NX

SAPZ144I

	June 2010
VOCs	NX

SAPZ142

	June 2010
1,1,1-Trichloroethane	**60**
1,1-Dichloroethane	**410**
1,1-Dichloroethene	**21**
Chloroethene	**36**

SAPZ143

	June 2010	Sept 2010
1,1,1-Trichloroethane	**110**	**110**
1,1-Dichloroethane	**590**	**600**
1,1-Dichloroethene	**39**	**52**
1,2,4-Trichlorobenzene		**7.1 J**
Chloroethene	**44**	
Vinyl Chloride	**2.4 J**	

SAMW131I

	Sept 2009	Sept 2010
1,1,1-Trichloroethane		**18 J**
1,1-Dichloroethane		**130 J**
1,1-Dichloroethene		**13 J**

SAMW131S

	Sept 2009	Sept 2010
VOCs		

SAMW131D

	Sept 2009	Sept 2010
1,1-Dichloroethane	**15**	**13 J**

SAMW132S

	Sept 2009	Sept 2010
VOCs		NX

SAMW123S

	Jan 2008	Aug 2008	Sept 2009	Sept 2010
VOCs		NX		NX

SAPZ123I1

	Jan 2008	Aug 2008	Aug 2008 (DUP)	Sept 2009	Sept 2010 (DUP)	Sept 2010
1,1-Dichloroethane	**23**	**13**	**13**	**6.3**		

SAPZ123I

	2005	2005	2006	Jan 2008	Aug 2008	Sept 2009	Sept 2010
1,1,1-Trichloroethane	**7.6**		3 J	1 J	1		0.59 J
1,1-Dichloroethane	**97**	**125**	**91**	**55**	**63**	**54**	**42 J**
1,1-Dichloroethene	**20**	**22**	**15**	**7**	**10**	**6.9**	**6.9 J**
Toluene	**10.1**						
Vinyl Chloride					**3**		

SAPZ166I

	Sept 2010
VOCs	NX

SAPZ125

	2006	Aug 2008	Sept 2009	July 2010	Sept 2010
VOCs					

SAPZ124

	2006	Aug 2008	Sept 2009	July 2010	Sept 2010
1,1-Dichloroethane	**38**	**4**	**17**	**15**	**22**
1,1-Dichloroethene				2.1 J	**5.2**

SAPZ147

	July 2010	Sept 2010
VOCs		NX

SAPZ118S

	2005	2006	Jan 2008	Aug 2008	Sept 2009	Sept 2009 (DUP)	Sept 2010
1,1-Dichloroethane			4 J	**17**	2.5 J	2.1 J	

SAPZ118I

	2005	2006	Jan 2008	Aug 2008	Sept 2009	Sept 2010
VOCs				NX		

SAMW122S

	Jan 2008	Aug 2008	Sept 2009	Sept 2010
VOCs				NX

SAMW122D

	2005	2005	Jan 2008	Aug 2008	Sept 2009	Sept 2010
VOCs	NX	NX		NX	NX	NX

SAMW122I

	Jan 2008	Aug 2008	Sept 2009	Sept 2010
1,1-Dichloroethane	1 J			**9.7**

SAPZ120S

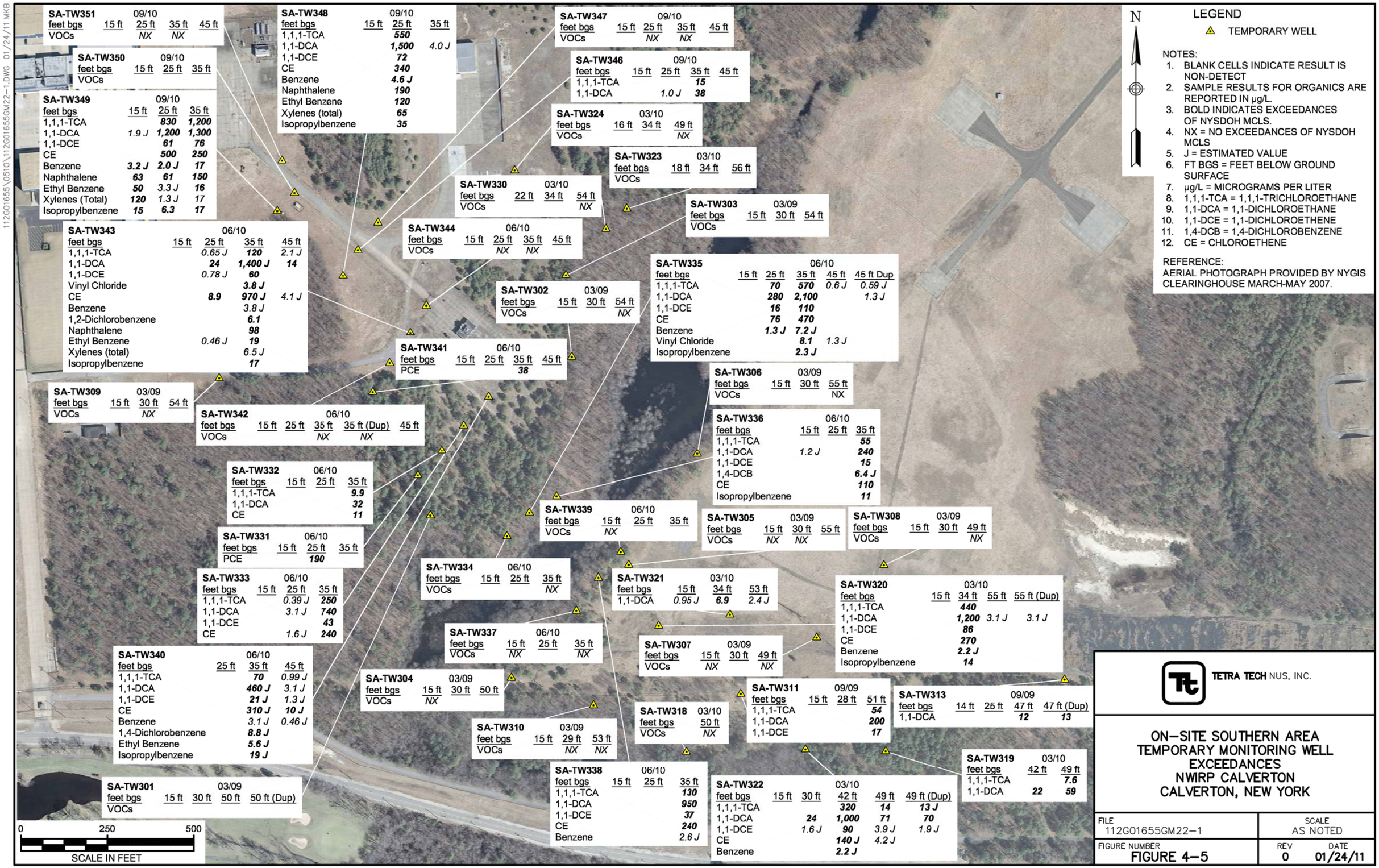
	2005	2006	Jan 2008	Aug 2008	Sept 2009	Sept 2010
VOCs						NX

TETRA TECH NUS, INC

GROUNDWATER ANALYTICAL EXCEEDANCES
OFFSITE SOUTHERN AREA
NWIRP CALVERTON
CALVERTON, NEW YORK

FILE	112G01655	SCALE	AS NOTED
FIGURE NO.	**4-4**	REV	DATE 1/25/11

112G01655\0510\112G01655GM22-1.DWG 01/24/11 MKB

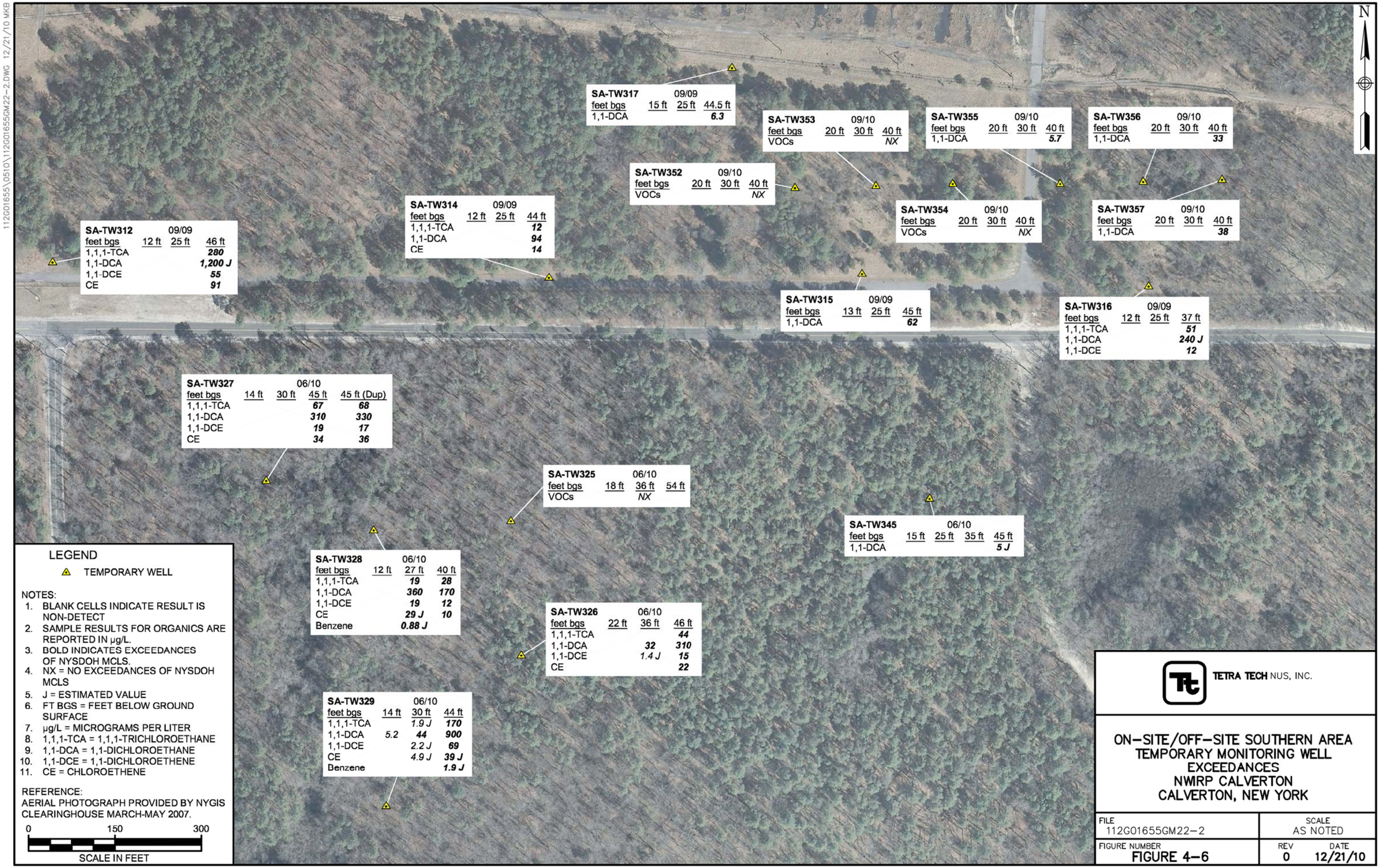


TETRA TECH NUS, INC.

ON-SITE SOUTHERN AREA
TEMPORARY MONITORING WELL
EXCEEDANCES
NWIRP CALVERTON
CALVERTON, NEW YORK

FILE	SCALE
112G01655GM22-1	AS NOTED
FIGURE NUMBER	REV / DATE
FIGURE 4-5	0 / 01/24/11

112G01655\0510\112G01655GM22-2.DWG 12/21/10 MKB



LEGEND

TEMPORARY WELL

NOTES:

1. BLANK CELLS INDICATE RESULT IS NON-DETECT
2. SAMPLE RESULTS FOR ORGANICS ARE REPORTED IN µg/L.
3. BOLD INDICATES EXCEEDANCES OF NYSDOH MCLS.
4. NX = NO EXCEEDANCES OF NYSDOH MCLS
5. J = ESTIMATED VALUE
6. FT BGS = FEET BELOW GROUND SURFACE
7. µg/L = MICROGRAMS PER LITER
8. 1,1,1-TCA = 1,1,1-TRICHLOROETHANE
9. 1,1-DCA = 1,1-DICHLOROETHANE
10. 1,1-DCE = 1,1-DICHLOROETHENE
11. CE = CHLOROETHENE

REFERENCE:
AERIAL PHOTOGRAPH PROVIDED BY NYGIS CLEARINGHOUSE MARCH-MAY 2007.

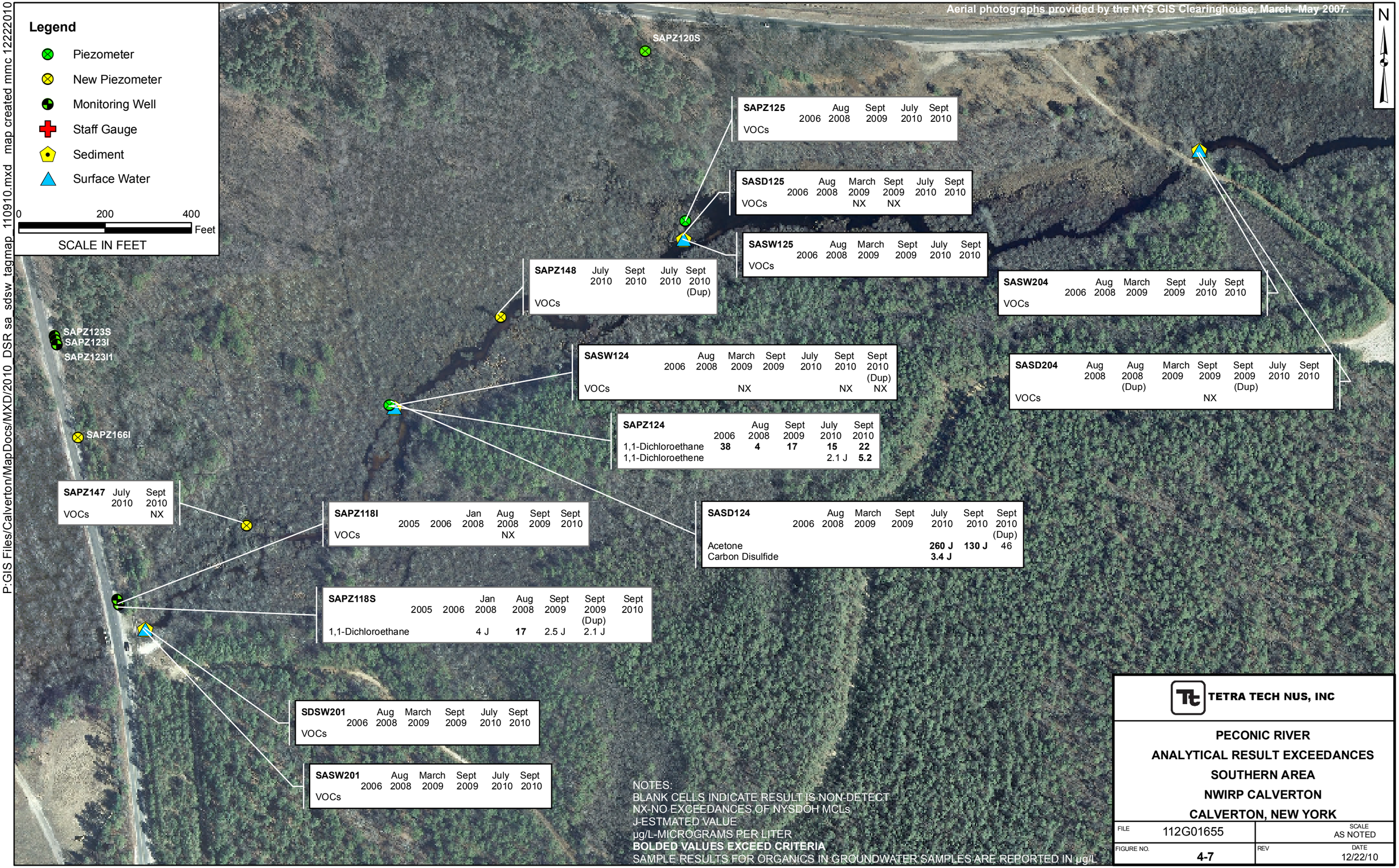
0 150 300
SCALE IN FEET

TETRA TECH NUS, INC.

ON-SITE/OFF-SITE SOUTHERN AREA
TEMPORARY MONITORING WELL
EXCEEDANCES
NWIRP CALVERTON
CALVERTON, NEW YORK

FILE	SCALE
112G01655GM22-2	AS NOTED
FIGURE NUMBER	REV / DATE
FIGURE 4-6	0 / 12/21/10

P:GIS Files/Calverton/MapDocs/MXD/2010_DSR sa_sdsw_tagmap_110910.mxd map created mmc 12222010



TETRA TECH NUS, INC

PECONIC RIVER
ANALYTICAL RESULT EXCEEDANCES
SOUTHERN AREA
NWIRP CALVERTON
CALVERTON, NEW YORK

FILE	112G01655	SCALE	AS NOTED
FIGURE NO.	4-7	REV	DATE 12/22/10

P:GIS Files/Calverton/MapDocs/MXD/DSR_2010/caprsc_tagmap_101210.mxd map created mmc 12082010

Aerial photographs provided by the NYS GIS Clearinghouse, March -May 2007.

NOTES:
BLANK CELLS INDICATE RESULT IS NON-DETECT
NX-NO EXCEEDANCES OF NYSDOH MCLs
J-ESTMATED VALUE
µg/L-MICROGRAMS PER LITER
BOLDED VALUES ARE GREATER THAN OR EQUAL TOO NYSDOH MCLs
SAMPLE RESULTS FOR ORGANICS IN GROUNDWATER SAMPLES ARE REPORTED IN µg/L

CAPRSC03	Jan 2008	June 2008	Aug 2008	Dec 2008	Mar 2009	June 2009	Sept 2009	Nov 2009	Feb 2010	April 2010	July 2010
VOCs											

CAPRSC04	Jan 2008	June 2008	Aug 2008	Dec 2008	Mar 2009	June 2009	Sept 2009	Nov 2009	Feb 2010	April 2010	July 2010
VOCs											

CAPRSC0201	Jan 2008	Jan 2008 (Dup)	June 2008	Aug 2008	Dec 2008	Dec 2008 (Dup)	Mar 2009	Jun 2009	June 2009 (Dup)	Sept 2009	Nov 2009	Feb 2010	April 2010	July 2010
1,1-Dichloroethane	**12**	**12**	**7**	**13**	**12**	**12**	**12**	**12**	**12**	**11**	**9.3**	**12**	**9.9**	**11**
1,1-Dichloroethene		5 J	4	4	5	5	3.3 J	3.6 J	3.5 J	**6**	4.4J	**5.4**	3.4 J	3.5 J

CAPRSC0202	Jan 2008	June 2008	Aug 2008	Dec 2008	Mar 2009	June 2009	Sept 2009	Nov 2009	Feb 2010	April 2010	July 2010
VOCs											

CAPRSC0203	Jan 2008	June 2008	June 2008	Aug 2008	Dec 2009	Mar 2009	June 2009	Sept 2009	Nov 2009	Feb 2010	April 2010	July 2010
VOCs												

CAPRSC01	Jan 2008	June 2008	Aug 2008	Dec 2008	Mar 2009	June 2009	Sept 2009	Nov 2009	Feb 2010	April 2010	July 2010
VOCs											

TETRA TECH NUS, INC

GROUNDWATER ANALYTICAL RESULTS
SOUTHERN AREA
PECONIC RIVER SPORTSMEN CLUB
NWIRP CALVERTON
CALVERTON, NEW YORK

FILE	112G01655	SCALE	AS NOTED
FIGURE NO.	4-8	REV	DATE 12/8/10

APPENDIX C

PILOT STUDY REPORT

Data Summary Report

Enhanced In Situ Bioremediation Pilot Test

Southern Area

Naval Weapons Industrial Reserve Plant
Calverton, New York

Mid-Atlantic Division
Naval Facilities Engineering Command

Contract Number N62470-08-D-1001
Contract Task Order WE08

March 2011

TETRA TECH

TABLE OF CONTENTS

SECTION **PAGE**

TABLE OF CONTENTS ..... **i**

ACRONYMS AND ABBREVIATIONS ..... **iii**

1.0 INTRODUCTION **1-1**
1.1 SCOPE AND OBJECTIVES 1-1
1.2 REPORT ORGANIZATION 1-2

2.0 SITE BACKGROUND **2-1**
2.1 ONSITE SOUTHERN AREA ..... **Error! Bookmark not defined.**
2.2 OFFSITE SOUTHERN AREA ..... **Error! Bookmark not defined.**

3.0 FIELD ACTIVITIES **3-1**
3.1 PILOT TEST LOCATION LAYOUT 3-1
3.2 PIEZOMETER WELL INSTALLATION 3-1
3.3 INJECTION SYSTEM CONSTRUCTION AND PROVE OUT 3-2
3.4 INJECTION SYSTEM OPERATION AND DOSING 3-2
3.5 GROUNDWATER SAMPLING 3-4

4.0 SUMMARY OF ANALYTICAL RESULTS **4-1**
4.1 ETHYL LACTATE INJECTION SYSTEM OPERATION RESULTS 4-1
4.2 GROUNDWATER SAMPLING RESULTS 4-1

5.0 CONCLUSIONS AND RECOMMENDATIONS **5-1**
5.1 CONCLUSION 5-1
5.2 RECOMMENDATION ..... **Error! Bookmark not defined.**

REFERENCES **R-1**

ATTACHMENTS (Presented on CD only)

C-1 Boring Logs
C-2 Well Construction and Development Logs
C-3 Photographic Log
C-4 Laboratory COC Forms
C-5 Groundwater Low Flow Purge Log Sheets, Groundwater Sample Log Sheets, and QA/QC Sample Log Sheets
C-6 Injection System Prove Out and Operation Form Is
C-7 Data Validation Reports
C-8 Data Graphs

TABLES
(presented at the end of the document)

NUMBER

3-1 Monitoring Well Construction Detail and Groundwater Gauging Data
3-2 Analytical Program Summary
3-3 Injection/Extraction Volumes Summary – July 2010
3-4 Injection/Extraction Volumes Summary – October 2010

4-1 Ethyl Lactate Injection System – Groundwater Sample Results
4-2 Injection Well Field Parameter Readings Step 2 Injection/Recirculation - July 2010
4-3 Injection Well Field Parameter Readings Step 2 Injection/Recirculation - October 2010
4-4 Groundwater Data
4-5 Groundwater Data - Metals

FIGURES
(presented at the end of the document)

NUMBER

1-1 General Location Map
1-2 Site Location Map

3-1 Layout – EISB Pilot Study

4-1 Chlorinated Volatile Organic Compounds
4-2 Iron, Manganese, and TOC
4-3 Cross Section A-A' – 1,1-DCA Concentrations

ACRONYMS AND ABBREVIATIONS

bgs	below ground surface
CLEAN	Comprehensive Long-Term Environmental Action Navy
COC	chain-of-custody
CTO	Contract Task Order
CVOC	chlorinated volatile organic compound
DCA	1,1-Dichloroethane
DCE	1,1-Dichloroethene
DHB	*Dehalobacter sp.*
DHC	*Dehalococcoides sp.*
DO	dissolved oxygen
DPT	direct-push technology
ERP	Environmental Restoration Program
GAC	granulated activated carbon
IDW	investigation-derived waste
MCL	Maximum Contaminant Level
µg/kg	microgram per kilogram
µg/L	microgram per liter
mg/L	milligrams per liter
MEE	methane, ethane, and ethene
MS/MSD	matrix spike/matrix spike duplicate
NAVFAC	Naval Facilities Engineering Command
NWIRP	Naval Weapons Industrial Reserve Plant
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
ORP	oxidation-reduction potential
PID	photo ionization detector
PVC	polyvinyl chloride
QA/QC	quality control/quality assurance
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
TAL	Target Analyte List
TCA	1,1,1-Trichloroethane
TOC	Total Organic Carbon
VOC	volatile organic compound

1.0 INTRODUCTION

This Data Summary Report for the Enhanced In Situ Bioremediation (EISB) Pilot Test in the Southern Area groundwater plume at Naval Weapons Industrial Reserve Plant (NWIRP) Calverton, Suffolk County, Long Island, New York (NY) (Figures 1-1 and 1-2), was prepared by Tetra Tech NUS Inc., (Tetra Tech) for Naval Facilities Engineering Command (NAVFAC) – Mid-Atlantic under the U.S. Navy's Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract No. N62470-08-D-1001, Contract Task Order (CTO) WE08. The Southern Area consists of chlorinated volatile organic compound (VOC)-impacted groundwater that originates at Site 6A on NWIRP Calverton property and extends offsite and southeast to the Peconic River. The primary chlorinated VOCs consist of 1,1,1-trichloroethane (TCA), 1,1-dichloroethane (DCA), 1,1-dichloroethene, and chloroethane. This report documents anaerobic enhanced insitu biodegradation (EISB) pilot-scale testing activities that were started in June 2010 and continued through March 2011. In addition, groundwater results from the July 2010 to December 2010 sampling events are being used to evaluate the effectiveness of the anaerobic EISB system.

Field activities conducted during the pilot study consisted of the following: monitoring well installation and development, injection well installation and development, ethyl lactate injection system construction, ethyl lactate injection/groundwater recirculation (two events), and groundwater sampling (three events). All field activities were conducted in accordance with the Work Plan for Enhanced In-Situ Anaerobic Biodegradation Pilot Study (Tetra Tech, 2010). This project is being conducted in accordance with the Navy Environmental Restoration Program (ERP) and the New York State Department of Environmental Conservation (NYSDEC) Resource Conservation and Recovery Act (RCRA) permit number 1-4730-00013/00001-0.

1.1 SCOPE AND OBJECTIVES

This pilot-scale study evaluated the effectiveness of anaerobic EISB to treat chlorinated VOCs in a portion of the onsite Southern Area plume. It was conducted in an area with the highest concentrations of VOCs (greater than 500 micrograms per liter [µg/L]). The objectives of the pilot-scale test are as follows:

- Evaluate the ability to effectively distribute ethyl lactate.
- Evaluate the effectiveness of anaerobic EISB on chlorinated VOCs.
- Collect data needed to design a full-scale system, including well spacing, injection rates, volume of ethyl lactate, frequency of subsequent injections, and CVOC degradation rates.
- Determine whether EISB affects iron, manganese, or other metal concentrations significantly in groundwater.

Optimal conditions for biodegradation of TCA, DCA, and DCE include an anaerobic environment (oxygen deficient), a chemically-reducing environment (low positive or negative oxidation-reduction potential [ORP]), and the presence of dehalogenating bacteria including *Dehalobacter sp.* [DHB] and *Dehalococcoides sp.* [DHC]), and the presence of organics and nutrients that facilitate bacterial growth.

Ethyl lactate was selected for the anaerobic EISB pilot-scale test because it has been demonstrated to accelerate dechlorination of chlorinated VOCs, has a low viscosity, is completely soluble in water, and is relatively fast-acting. In addition, ethyl lactate is allowed for use as a food additive by the U.S. Food and Drug Administration.

1.2 REPORT ORGANIZATION

This report is organized as shown in the Table of Contents. Tables and figures are presented at the end of the document (before the appendices).

2.0 SITE BACKGROUND

NWIRP Calverton was a government-owned, contractor-operated facility owned by the Navy and operated by Northrop Grumman Corporation. This work is part of the Navy's ERP, which is designed to identify contamination resulting from historical operations or releases at Navy lands and facilities, and to institute removal or remedial actions as necessary. This document is issued by the Navy, the lead agency responsible for environmental restoration activities at NWIRP Calverton, including areas of offsite contamination. The New York State Department of Environmental Conservation (NYSDEC) provides regulatory oversight.

The Southern Area is mostly wooded and includes two shallow ponds and drainage swales, including a drainage swale and culvert system originating from Site 6A (Figure 2-1). From the late 1980s to the early 1990s, chlorinated VOC-contaminated groundwater from Site 6A was discharged into this drainage swale and culvert. Also, in 2010 an approximate 15-thick and 150-foot wide stratified plume was identified leaving Site 6A. This plume appears to have been acting as a continuing source of Southern Area groundwater contamination. A source area remedy was completed in 2010 and is believed to have eliminated the continuing source, but confirmation monitoring is being conducted.

In 2009, an aquifer biota study was conducted. The study indicated that conditions are generally favorable for anaerobic biodegradation throughout much of the Southern Area. In addition, DHB and DHC were found to be naturally present in site groundwater. This study is presented and discussed in the Southern Area Corrective Measures Study/Feasibility Study for the Southern Area (Tetra Tech, 2011).

3.0 FIELD ACTIVITIES

Field activities performed during the pilot test included installation of piezometers and wells, construction and operation of an ethyl lactate injection and groundwater treatment and recirculation system, and collection of groundwater samples (baseline and two post-injection monitoring events). The following sections provide a description of the pilot test location and a summary of field activities conducted in support of the pilot test.

3.1 PILOT TEST LOCATION LAYOUT

The pilot-scale test was conducted in an area approximately 250 feet north of the Navy fence line (Figure 3-1). The injections were conducted in the Treatment Area using seven injection/extraction wells (SA-PZ-150I1 through SA-PZ-157I), spaced approximately 25 feet apart, in two offsetting lines. Groundwater flow in the pilot study area is to the southeast and the groundwater seepage velocity in this area is approximately 640 feet per year.

The width the VOC plume in the pilot test area is approximately 270 feet. To establish the pilot-scale test area, the plume was bisected and the western half of the plume was identified as the pilot-scale Treatment Area. Twenty-one wells were used during the pilot test (3 existing and 18 new). Table 3-1 provides a summary of these wells. Wells located upgradient and downgradient of the Treatment Area were used for monitoring purposes. Existing monitoring wells were used as crossgradient reference wells for untreated groundwater.

3.2 PIEZOMETER WELL INSTALLATION

Eighteen new wells were installed for the pilot test (Table 3-1 and Figure 3-1). The screen depths for these wells ranged from 37 to 53.5 feet below ground surface (bgs). The approximate depth of the VOC-impacted groundwater in this area is located within this range of screen depths. Well depths were determined based on soil and groundwater data from previous investigations or soil classification samples collected during drilling activities.

The wells were installed using a direct push technology (DPT) rig and constructed in a 3¼- inch diameter boring. In order to control running sands, limited potable water was added as needed during the drilling. Soil cuttings generated from the collection of macrocores were screened with a photoionization detector (PID) and visually inspected for signs of contamination. No elevated PID readings or visual signs of contamination were observed; therefore, soil cuttings were spread on the ground near the boring location.

The wells were constructed using 1-inch diameter Schedule 40 polyvinyl chloride (PVC) pipe, with 5-foot, 0.010-inch slot, pre-packed well screens, and a bentonite seal. Additional granular bentonite was used

during the installation to provide a thicker seal above the well screens. The remainder of the annular space up to the ground surface was filled using bentonite/cement grout. The wells were completed with a 2-foot stickup and a lockable well plug.

Each well was developed by hand using a stainless steel foot valve and disposable polyethylene tubing. The wells were developed to remove drilling fluids and any fine-grained material left in the casing from installation. Soil boring logs are provided in Attachment C-1 and well construction sheets and development records are provided in Attachment C-2.

3.3 INJECTION/RECIRCULATION SYSTEM CONSTRUCTION AND PROVE OUT

During the operation of the injection/recirculation system, groundwater was extracted from several wells in the Treatment Area, treated using liquid-phase granular activated carbon (GAC), and injected into other wells to distribute ethyl lactate throughout the Treatment Area. An ethyl lactate mixture was metered into the treated water via a peristaltic pump through an injection port prior to injection. The system was constructed and operated to minimize the introduction of air, which could counter the intended induced anaerobic conditions and cause biofouling.

The pumps, treatment equipment, and piping were located in an open area adjacent to the east of the Treatment Area. A self-priming air diaphragm pump was used to extract and circulate groundwater from the wells. Two 55-gallon liquid-phase GAC units operating in parallel were used to treat the extracted groundwater. Flow meters and valves were used to monitor and control flow rates to and from each well. Piping for the injection and extraction system was comprised of schedule 40 PVC pipe. Flexible ½-inch polyethylene tubing was used for between the injection and extraction system and wells and the wells were vented during operation. Photographs of the injection system are provided in Attachment C-3.

Prior to the initial ethyl lactate injection, a system prove out was performed to determine the performance of the GAC treatment system. Pre-carbon and post-carbon treated groundwater samples were collected from the system on July 20, 2010. Samples were analyzed for Target Compound List (TCL) VOCs, Total Organic Carbon (TOC), methane, ethane, and ethene (MEE), and metals (iron and manganese) (Table 3-2). Quality assurance and quality control (QA/QC) samples included trip blanks for VOCs. Water quality field parameters for pH, dissolved oxygen (DO), oxidation-reduction potential (ORP), and specific conductivity were recorded during collection of prove out samples. Chain-of-custody (COC) forms documenting the collection of samples is provided in Attachment C-4.

3.4 INJECTION SYSTEM OPERATION AND DOSING

The initial injection event was conducted from July 21 through August 3, 2010. A second injection event occured from October 14 through 21, 2010. During each of these events, 10 gallons of ethyl lactate solution were diluted and injected into target wells, as described below:

Step 1 - Approximately 1,500 gallons of 0.5 percent ethyl lactate solution were injected into wells SA-PZ-151I1, -152I1, and -155I (500 gallons into each well). Groundwater from wells SA-PZ-150I1, -153I1, -154I, and -156I was extracted, treated with GAC, and mixed with 7.5 gallons of ethyl lactate prior to re-injection.

Step 2 - Approximately 12,000 to 15,000 gallons of 0.01 percent ethyl lactate solution (100 milligrams per liter [mg/l]) were injected into wells SA-PZ-151I1, -152I1, and -155I. Groundwater from wells SA-PZ-150I1, -153I1, -154I, and -156I was extracted, treated with GAC, and mixed with 2 gallons of ethyl lactate prior to re-injection.

Step 3 - Approximately 1,000 gallons of 0.5 percent ethyl lactate solution were injected into wells SA-PZ-150I1, -153I1, -154I, and -156I. Groundwater was extracted from SA-PZ-138, treated with GAC, and mixed with 0.5 gallon of ethyl lactate prior to re-injection.

Tables 3-3 and 3-4 summarize the volume of groundwater extracted and ethyl lactate mixture injected during the July and October 2010 events, respectively. During the injection events groundwater samples were also collected to evaluate the distribution of the ethyl lactate through the treatment area. The following samples were collected during the “Step 2” injections in the July 2010 and October 2010 injection events:

- To evaluate connection between injected and extracted water, groundwater samples were collected from injection wells SA-PZ-150I1, SA-PZ-153I1, SA-PZ-154I, and SA-PZ-156I at approximately 10, 50, and 90 percent of the target injection volumes and analyzed for field parameters (pH, DO, ORP, and specific conductivity). This was a field test that required the ethyl lactate to rapidly affect the water quality.

- To further evaluate connection between injected and extracted water, samples were collected from the carbon inlet sample port (pre-carbon treatment) at approximately 10, 50, and 90 percent of the target injection volumes and analyzed for field parameters (pH, DO, ORP, and specific conductivity), VOCs, and TOC. Laboratory test results were required to evaluate the connection.

Samples were analyzed for VOCs and TOC. QA/QC samples collected included trip blanks for VOC samples. A summary of the project’s analytical program is provided in Table 3-2. COC forms documenting the collection of samples are provided in Attachment C-4.

Following the injections, treated groundwater was used to flush the pump and piping prior to disassembly and storage.

3.5 GROUNDWATER SAMPLING

Groundwater samples were collected to evaluate the effects of the ethyl lactate injections. Table 3-1 provides a summary of the wells sampled during the sampling events. Sixteen monitoring wells were initially included in the monitoring program; however because there was concern that the plume may have shifted to the west, two additional monitoring wells (SA-PZ-135 and SA-PZ-136) were added during the December 2010 sampling event. Groundwater samples were collected as follows:

- Baseline Sampling Event (July 2010)
- Post-Injection Sampling Events
  - Month 3 (October 2010)
  - Month 5 (December 2010)

Groundwater samples were collected from the monitoring wells using low-flow (low-stress) purging and sampling techniques. Sampling occurred after field parameters stabilized and a minimum of three well screen volumes were purged. Field parameters including turbidity, DO, pH, ORP, specific conductivity, and temperature were recorded during low-flow purging and sampling activities. Low-flow purge data and groundwater sample log sheets can be found in Attachment C-5.

Groundwater samples collected from each well were analyzed for VOCs and TOC. In addition to VOCs and TOC, samples from select wells were also analyzed for MEE, iron and manganese, nitrate/nitrite, sulfide, chloride, DHC, and DHB. In addition, during the July 2010 and December 2010 sampling events, samples were analyzed for additional metals (Table 3-2). QA/QC samples included matrix spike and matrix spike duplicates (MS/MSD), field duplicates, trip blanks and field blanks. The information was documented on QA sample log sheets, provided in Attachment C-5.

Samples collected during field sampling activities were shipped to CompuChem Environmental Testing Laboratories of Cary, North Carolina, for analysis. Laboratory analytical forms from samples collected during operation of the ethyl lactate injection system are provided in Attachment C-6. Laboratory validation reports for groundwater samples collected from monitoring wells are provided in Attachment C-7.

4.0 ANALYTICAL RESULTS

This section presents analytical results from groundwater samples collected during the pilot study for following field events:

- Baseline Groundwater Monitoring Well Sampling Event – July 2010 (16 monitoring wells)
- Ethyl Lactate Injection System Prove Out
- Ethyl Lactate Injection System Operation
- Post-Injection Sampling Events
  - Month 3 – October 2010 (16 monitoring wells)
  - Month 5 – December 2010 (18 monitoring wells)

4.1 ETHYL LACTATE INJECTION SYSTEM OPERATION RESULTS

Analytical and field parameter results from the operation of the injection system are presented in Table 4-1. During the injection system prove out on July 20, 2010, groundwater samples were collected pre- (Carbon IN) and post-GAC filter (Carbon OUT). Total VOC concentrations entering the GAC filter was 282 µg/L and VOCs were not detected exiting the filter, demonstrating that the GAC unit was performing as anticipated.

Groundwater samples were collected from the extraction piping prior to the GAC unit and analyzed for VOCs, TOC, and field parameters. These samples were collected to evaluate connectivity between the injected water/ethyl lactate and the extracted groundwater. VOC concentrations did not change significantly during the groundwater extraction. The results of TOC analysis collected on August 3, 2010 with 15,400 gallons of water recirculated did demonstrate that injected ethyl lactate was being captured in the extraction wells. Connectivity was not confirmed during the October 21, 2010 sample at 11,806 gallons of water recirculated. The field parameter results did not provide real time evidence of connectivity between the injection and extraction wells. Additional field parameters were collected from wells SA-PZ-150I1, SA-PZ-153I1, SA-PZ-154I, and SA-PZ-157I that were being used for extraction at that time. The results for July 2010 and October 2010 samples are presented in Tables 4-2 and 4-3, respectively. Again, these results did not provide real time evidence of connectivity between the injection and extraction wells.

4.2 GROUNDWATER SAMPLING RESULTS

Sixteen monitoring wells were sampled during the Baseline (July 2010) and Month 3 (October 2010) sampling events. Eighteen monitoring wells were sampled during the Month 5 (December 2010) sampling event. Figure 4-1 presents a summary of chlorinated VOC detections in the study area.

Figure 4-2 presents a summary of iron, manganese, and TOC results in the study area. Figure 4-3 provides a conceptual cross section of the study area with chlorinated VOC detections from select monitoring wells shown. Tables 4-4 and 4-5 provide a summary of the VOC and metal results.

Evaluation of the results indicates that there was a general decrease of approximately 30 to 60 percent in total VOC concentrations within wells located in and downgradient of the Treatment Zone. For comparison, the total VOC concentration did not change significantly in the one reference well nearest the Treatment Zone (SA-PZ-138I1 - VOCs increased from 1,475 µg/L to 1,743 µg/L), but the total VOC concentration did also decrease in one side gradient well (SA-PZ-139 – 22 µg/L to 10.5 µg/L). The cause of the decrease is uncertain and will require additional data to fully evaluate. Potential causes for this decrease include:

- GAC treatment of extracted groundwater and re-injection reduced the VOCs in groundwater;
- Mixing of lower and higher VOC concentration groundwater induced by the injection/extraction well interactions;
- Biodegradation; and/or
- A shift in the groundwater plume.

Evaluation of the chloroethane to DCA and TCA ratios shows that for shallower groundwater wells near and within the treatment zone (SA-PZ-151I1, -157I1, -158I1, and -159I1), the chloroethane concentrations remained the same or increased, while the total VOC concentrations decreased. This trend provides direct evidence that anaerobic biodegradation of the VOCs is occurring within this portion of the aquifer. For the deeper groundwater wells in this same area (SA-PZ-155I, -157I, --158I, and -159I), the total VOCs decreased, but the individual VOC (TCA, DCA, and chloroethane) concentrations decreased uniformly, indicating that some non-biodegradation mechanism may be occurring.

5.0 CONCLUSIONS

5.1 CONCLUSION

The objectives of the pilot study were met as detailed below.

- Evaluate the ability to effectively distribute ethyl lactate.
  - Substrate was effectively distributed using the injection/recirculation methodology; however, the substrate quickly flushed out of the injection zone.
- Evaluate the effectiveness of EISB on chlorinated VOCs.
  - Effectiveness confirmed by reduction of total VOCs, some of which are directly attributable to the enhanced biodegradation. Additional temporal data is required to confirm the findings.
- Collect data needed to design a full-scale system, including well spacing, injection rates, volume of ethyl lactate, frequency of subsequent injections, and CVOC degradation rates.
  - Appropriate data was collected to aid in the conceptual design in the Feasibility Study and potentially for a full scale design.
  - The injection methodology (well spacing and recirculation) are confirmed as appropriate. Additional ethyl lactate beyond the original dosing may be appropriate, but it is evident that this substrate flushes out quickly due to the nature of the aquifer matrix (highly permeable and porous sand) and high groundwater seepage velocity. Increasing the frequency of ethyl lactate injection or the use of an alternative substrate (e.g., emulsified vegetable oil) should be considered.
  - Degradation rates attributable to the substrate injection, alone, could not be determined.
- Determine whether EISB affects iron or manganese concentrations significantly in groundwater.
  - While no temporal changes are evident in the injection zone, the immediate downgradient wells show increases in iron and manganese (mostly iron) concentrations of 1 to 2 orders of magnitude.
  - The data show that arsenic was mobilized by the induced reducing conditions from less than 2.5 to 14 µg/L. Arsenic is expected to be readily oxidized and precipitated, but will need to be evaluated further.

Additional conclusions relate to the change in aquifer conditions after injecting the substrate and the effectiveness of substrate. Graphs of CVOC and geochemical temporal data are provided in Attachment C-8.

- VOC concentrations uniformly declined. TCA concentrations decreased while daughter products were produced. In addition, concentrations of daughter products such as DCA also decreased.
- Dehalogenating bacteria were present (both DHC and DHB) and populations increased.
- DO, nitrate, and sulfate (competing electron acceptors) concentrations remained low, and methane production was evident. Insufficient nutrients may be inhibiting growth of biomass.
- Based on limited duration of data collection, there is no particular correlation between water levels and CVOC concentrations.
- Increased TOC concentrations were not evident in the injection zone (flushing due to high seepage velocity noted above; and no retardation was apparent); however, TOC increases were clearly evident in the downgradient performance monitoring wells.

REFERENCES

Tetra Tech, 2010. *Work Plan for Enhanced In-Situ Anaerobic Biodegradation Pilot Study Site 6A - Southern Area, Naval Weapons Industrial Reserve Plant (NWIRP) Calverton, New York*. June.

Tetra Tech, 2011. *Feasibility Study / Corrective Measures Study for the Southern Area, Naval Weapons Industrial Reserve Plant (NWIRP) Calverton, New York*. March.

TABLE 3-1
MONITORING WELL CONSTRUCTION DETAILS AND GROUNDWATER GAUGING DATA
SOUTHERN AREA - EISB PILOT TEST
NWIRP CALVERTON, NEW YORK

Well ID	Existing or New Well	Purpose	Screened Interval Depth (ft bgs)	Top PVC Elevation (ft msl)	Groundwater Levels					
					July 6-8, 2010		October 11-12, 2010		December 13-15, 2010 [1]	
					Depth to Groundwater (ft below Top PVC)	Groundwater Elevation (ft msl)	Depth to Groundwater (ft below Top PVC)	Groundwater Elevation (ft msl)	Depth to Groundwater (ft below Top PVC)	Groundwater Elevation (ft msl)
SA-PZ-133I	existing	Crossgradient monitoring	42 - 47	41.55	7.78	33.8	8.33	33.2	7.85	33.7
SA-PZ-135 [1]	existing	Downgradient monitoring	41.5 - 46.5	38.75	--	--	--	--	4.69	34.1
SA-PZ-136 [1]	existing	Downgradient monitoring	44 - 49	39.55	--	--	--	--	5.26	34.3
SA-PZ-138I	new	Upgradient monitoring	48.5 - 53.5	40.03	5.03	35.0	5.71	34.3	5.25	34.8
SA-PZ-138I1	existing	Upgradient monitoring	37 - 42	39.8	4.89	34.9	5.55	34.3	5.11	34.7
SA-PZ-139I	existing	Crossgradient monitoring	42.5 - 47.5	42.28	7.91	34.4	8.64	33.6	8.14	34.1
SA-PZ-149I1	new	Upgradient monitoring	32 - 37	44.73	9.49	35.2	10.27	34.5	9.86	34.9
SA-PZ-150I1	new	Injection	35 - 40	--	--	--	--	--	--	--
SA-PZ-151I1	new	Injection / Monitoring	35 to 40	--	5.50	--	4.74	--	4.32	--
SA-PZ-152I1	new	Injection	35 - 40	--	--	--	--	--	--	--
SA-PZ-153I1	new	Injection	35 - 40	--	--	--	--	--	--	--
SA-PZ-154I	new	Injection	41 - 46	37.14	--	--	--	--	--	--
SA-PZ-155I	new	Injection / Monitoring	41 - 46	40.24	5.33	34.9	6.05	34.2	5.61	34.6
SA-PZ-156I	new	Injection	41 - 46	39.51	--	--	--	--	--	--
SA-PZ-157I	new	Downgradient monitoring	41 - 46	39.51	4.82	34.7	5.49	34.0	5.00	34.5
SA-PZ-157I1	new	Downgradient monitoring	33 - 38	39.76	5.02	34.7	5.74	34.0	5.28	34.5
SA-PZ-158I	new	Downgradient monitoring	41 - 46	39.73	5.07	34.7	5.76	34.0	5.28	34.5
SA-PZ-158I1	new	Downgradient monitoring	33 - 38	39.37	4.71	34.7	5.42	34.0	5.92	33.5
SA-PZ-159I	new	Downgradient monitoring	41 - 46	39.17	4.57	34.6	5.25	33.9	4.75	34.4
SA-PZ-159I1	new	Downgradient monitoring	33 - 38	39.37	4.81	34.6	5.45	33.9	4.94	34.4
SA-PZ-160I	new	Downgradient monitoring	41 - 46	39.29	4.92	34.4	5.46	33.8	5.00	34.3
SA-PZ-160I1	new	Downgradient monitoring	33 - 38	38.95	4.55	34.4	5.11	33.8	4.67	34.3
SA-PZ-161I	new	Downgradient monitoring	41 - 46	40.59	6.36	34.2	6.97	33.6	6.37	34.2

Shading indicates well was used as an injection well

ft - feet bgs - below ground surface msl - mean sea level Top PVC - top of polyvinyl chloride well casing

1. Monitoring wells SA-PZ-135 and SA-PZ-136 were added to the sampling list in Dec 2010 (not sampled during the July and October 2010 sampling event).

TABLE 3-2
ANALYTICAL PROGRAM SUMMARY
SOUTHERN AREA - EISB PILOT TEST
NWIRP CALVERTON, NEW YORK

Well ID	Description	Screened Interval (ft bgs)	Baseline	System Proveout	System Operation (10, 50, and 90%)	Post-Injection (Month 3, 5, 8, 11, and 14)
SA-PZ-133I	Cross-gradient Reference Well	42 - 47	FP, VOC	--	--	FP, VOC
SA-PZ-135I (1)	Cross-gradient Reference Well	41.5 - 46.5	--	--	--	FP, VOC
SA-PZ-136I (1)	Cross-gradient Reference Well	44 - 49	--	--	--	FP, VOC
SA-PZ-138I	Upgradient Well	48.5 - 53.5	FP, VOC	--	--	FP, VOC
SA-PZ-138I1	Upgradient Well	37 - 42	FP, VOC	--	--	FP, VOC
SA-PZ-139I	Cross-gradient Reference Well	42.5 - 47.5	FP, VOC	--	--	FP, VOC
SA-PZ-149I1	Upgradient Well	32 - 37	FP, VOC	--	--	FP, VOC
SA-PZ-150I1	Injection Well	34 - 39	--	--	FP	--
SA-PZ-151I1	Injection Well	34 - 39	All	--	--	All
SA-PZ-152I1	Injection Well	34 - 39	--	--	--	--
SA-PZ-153I1	Injection Well	34 - 39	--	--	FP	--
SA-PZ-154I	Injection Well	40 - 45	--	--	FP	--
SA-PZ-155I	Injection Well	40 - 45	All	--	--	--
SA-PZ-156I	Injection Well	40 - 45	--	--	--	--
SA-PZ-157I	Downgradient Well	42 - 47	All (2)	--	FP	All[2]
SA-PZ-157I1	Downgradient Well	34 - 39	All	--	--	All
SA-PZ-158I	Downgradient Well	42 - 47	FP, VOC	--	--	FP, VOC
SA-PZ-158I1	Downgradient Well	34 - 39	FP, VOC	--	--	FP, VOC
SA-PZ-159I	Downgradient Well	42 - 47	All	--	--	All
SA-PZ-159I1	Downgradient Well	34 - 39	All (2)	--	--	All (2)
SA-PZ-160I	Downgradient Well	42 - 47	All	--	--	All
SA-PZ-160I1	Downgradient Well	35 - 40	FP, VOC	--	--	FP, VOC
SA-PZ-161I	Downgradient Well	42 - 47	FP, VOC	--	--	FP, VOC
Carbon Inlet	Treatment Efficiency	NA	--	All	FP, VOCs, TOC	--
Carbon Outlet	Treatment Efficiency	NA	--	All	--	--

ft bgs - feet below ground surface
FP - field parameters - consisting of pH, specific conductivity, dissolved oxygen (DO), temperature, and oxidation-reduction potential (ORP).
VOC - Volatile organic compounds
MEE - Methane, ethane, ethene.
TOC - Total organic carbon.
Metals - iron and manganese.
DHB - *Dehalobacter sp.*
DHC - *Dehalococcoides sp.*
All - FP, VOC, TOC, MEE, and Metals. During July 2010 and December 2010 sampling events, samples were also analyzed for other metals.
1. Monitoring well added to sampling program in December 2010
2. Samples also analyzed for nitrate/nitrite, sulfide, chloride, DHC, and DHB during the July 2010 and December 2010 sampling events.

TABLE 3-3
INJECTION/EXTRACTION VOLUMES SUMMARY - JULY 2010
SOUTHERN AREA - EISB PILOT TEST
NWIRP CALVERTON, NEW YORK

STAGE	Groundwater Extraction		Groundwater Injection		
	Extraction Wells	Extraction Volume (gallons) (1)	Injection Wells	Injection Volume (gallons) (1)	Ethyl Lactate Injection Volume (gallons) (1)
1	SA-PZ-150I1	388	SA-PZ-151I	517	2.5
	SA-PZ-153I1	388	SA-PZ-152I1	517	2.5
	SA-PZ-154I	388	SA-PZ-155I	517	2.5
	SA-PZ-156I	388			
2	SA-PZ-150I1	3,880	SA-PZ-151I	5,180	0.67
	SA-PZ-153I1	3,880	SA-PZ-152I1	5,180	0.67
	SA-PZ-154I	3,880	SA-PZ-155I	5,180	0.67
	SA-PZ-156I	3,880			
3	SA-PZ-138I	400	SA-PZ-150I1	200	0.13
	SA-PZ-138I1	400	SA-PZ-153I1	200	0.13
			SA-PZ-154I	200	0.13
			SA-PZ-156I	200	0.13

1. Injection/Extraction Volumes are per well

TABLE 3-4
INJECTION/EXTRACTION VOLUMES SUMMARY - OCTOBER 2010
SOUTHERN AREA - EISB PILOT TEST
NWIRP CALVERTON, NEW YORK

STAGE	Groundwater Extraction		Groundwater Injection		
	Extraction Wells	Extraction Volume (gallons) (1)	Injection Wells	Injection Volume (gallons) (1)	Ethyl Lactate Injection Volume (gallons) (1)
1	SA-PZ-150I1	375	SA-PZ-151I	500	2.5
	SA-PZ-153I1	375	SA-PZ-152I1	500	2.5
	SA-PZ-154I	375	SA-PZ-155I	500	2.5
	SA-PZ-157I	375			
2	SA-PZ-150I1	3,117	SA-PZ-151I	4,155	0.58
	SA-PZ-153I1	3,117	SA-PZ-152I1	4,155	0.58
	SA-PZ-154I	3,117	SA-PZ-155I	4,155	0.58
	SA-PZ-157I	3,117			
3	SA-PZ-158I	585	SA-PZ-150I1	293	0.19
	SA-PZ-158I1	585	SA-PZ-153I1	293	0.19
			SA-PZ-154I	293	0.19
			SA-PZ-156I	293	0.19

1. Injection/Extraction Volumes are per well

TABLE 4-1
ETHYL LACTATE INJECTION SYSTEM - GROUNDWATER RESULTS
SOUTHERN AREA - EISB PILOT TEST
NWIRP CALVERTON, NEW YORK

Sample ID	**NYS MCLs**	**Carbon IN** [1]	**Carbon OUT** [1]	**Carbon IN10**	**Carbon IN10**	**Carbon IN50**	**Carbon IN50**	**Carbon IN90**	**Carbon IN90**
Sample Date		7/20/2010	7/20/2010	7/21/2010	10/19/2010	7/28/2010	10/20/2010	8/3/2010	10/21/2010
Volume Extracted (gallons)		0	0	2,330 [2]	4,749 [3]	9,940 [2]	8,683 [3]	15,400 [2]	11,806 [3]
Sample Type		proveout	proveout	operation	operation	operation	operation	operation	operation
Volatile Organic Compounds (µg/L)									
1,1,1-Trichloroethane	5	39	ND	50	32	45	31	41	32
1,1-Dichloroethane	5	190	ND	190	150	210	150	200	150
1,1-Dichloroethene	5	11	ND	14	10	14	10	12	11
Chloroethane	5	42	ND	50	35	33	37	36	38
Total Target VOCs	--	*282*	ND	*304*	*227*	*302*	*228*	*289*	*231*
Benzene	5	0.57 J	ND	0.66 J	ND	0.58 J	ND	0.54 J	ND
1,4-Dichlorobenzene	5	3.4 J	ND	2.8 J	4.7 J	ND	5.0 J	ND	5.3
1,2-Dichlorobenzene	5	1.3 J	ND	1.2 J	1.5 J	ND	1.6 J	ND	1.6 J
Isopropyl Benzene	5	0.39 J	ND	0.37 J	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	5	2.1 J	ND	2.1 J	ND	ND	ND	ND	ND
Total Organic Carbon (mg/L)	--	1.4	0.48 J	1.1	1.02	1.1	1.04	16	1.59
Field Parameters									
pH	--	6.9	6.8	--	6.12	--	6.25	--	6.15
Specific Conductivity (mS/cm)	--	--	--	--	0.100	--	0.097	--	0.106
DO (mg/L)	--	4.35	4	--	3.23	--	**	--	5.4
Temperature (°C)	--	--	--	--	12.1	--	12.3	--	13.5
ORP (mV)	--	268	282	--	137	--	156	--	174

Notes

µg/L - micrograms per liter
mg/L - Milligrams per liter
NYS MCL - New York State Maximum Contaminant Level
** - Instrument not function properly.
J - Estimated Value
mS/cm - Millisiemens per centime
mV - Millivolts
-- Not aplicable.
ORP - oxidation-reduction potential
°C - Degrees celsius
ND- Not detected at or above reporting limit

1. Initial system proveout sample
2. Value is the combined volume of groundwater extracted from wells SA-PZ-150I1, SA-PZ-153I1, SA-PZ-154I, and SA-PZ-156I prior to treatment in the Granular Activated Carbon (GAC) unit
3. Value is the combined volume of groundwater extracted from wells SA-PZ-150I1, SA-PZ-153I1, SA-PZ-154I, and SA-PZ-157I prior to treatment in the GAC unit

TABLE 4-2
INJECTION WELL FIELD PARAMETER READINGS
STEP 2 INJECTION/RECIRCULATION - JULY 2010
SOUTHERN AREA - EISB PILOT TEST
NWIRP CALVERTON, NEW YORK

Location	**SA-PZ-150I1**				**SA-PZ-153I1**			
Sample Date	7/21/2010	7/28/2010	8/3/2010	8/3/2010	7/21/2010	7/28/2010	8/3/2010	8/3/2010
Volume Extracted (gallons) [(1)]	2,330	9,940	15,400	15,550	2,330	9,940	15,400	15,550
Field Parameters								
pH (S.U.)	5.45	6.38	5.80	6.45	6.06	5.33	5.38	5.57
Specific Conductivity (mS/cm)	8.63	0.90	1.41	2.61	1.74	0.999	1.73	11.2
Dissolved Oxygen (mg/L)	**	1.75	1.44	2.36	2.55	1.30	1.24	1.53
Temperature (°C)	13.50	12.43	12.57	13.34	16.29	12.97	13.11	13.91
ORP (mV)	133	329	263	381	122	209	291	211

Location	**SA-PZ-154I**				**SA-PZ-156I**			
Sample Date	7/21/2010	7/28/2010	8/3/2010	8/3/2010	7/21/2010	7/28/2010	8/3/2010	8/3/2010
Volume Extracted (gallons) [(1)]	2,330	9,940	15,400	15,550	2,330	9,940	15,400	15,550
Field Parameters								
pH (S.U.)	5.17	5.57	5.38	5.93	5.05	5.37	5.32	5.62
Specific Conductivity (mS/cm)	4.06	0.999	0.9	1.70	3.15	0.90	0.90	1.82
Dissolved Oxygen (mg/L)	1.34	1.35	1.38	1.38	1.93	1.42	1.81	2.12
Temperature (°C)	14.48	12.52	12.50	12.37	14.77	12.81	13.05	12.95
ORP (mV)	160	354	289	393	180	366	310	405

Notes

mS/cm - Millisiemens per centimeter
°C - Degrees celsius
ORP - oxidation-reduction potential
mg/L - Milligrams per liter
mV - Millivolts
** - Instrument not function properly.

1. Total combined volume of groundwater extracted and treated in the Granular Activated Carbon (GAC) unit during Stage 2 Injection/Recirculation.

TABLE 4-3
INJECTION WELL FIELD PARAMETER READINGS
STEP 2 INJECTION/RECIRCULATION - OCTOBER 2010
SOUTHERN AREA - EISB PILOT TEST
NWIRP CALVERTON, NEW YORK

Location	SA-PZ-150I1			SA-PZ-153I1		
Sample Date	10/19/2010	10/20/2010	10/21/2010	10/19/2010	10/20/2010	10/21/2010
Volume Extracted (gallons) (1)	4,749	8,683	11,806	4,749	8,683	11,806
Field Parameters						
pH (S.U.)	5.88	6.22	5.96	6.05	6.19	5.77
S. Conductivity (mS/cm)	0.178	0.116	0.123	0.092	0.090	0.110
Dissolved Oxygen (mg/L)	6.39	5.10	3.09	1.88	2.90	2.90
Temperature (°C)	11.8	12.1	12.7	12.4	12.6	12.6
ORP (mV)	80	144	211	109	159	227

Location	SA-PZ-154I			SA-PZ-157I		
Sample Date	10/19/2010	10/20/2010	10/21/2010	10/19/2010	10/20/2010	10/21/2010
Volume Extracted (gallons) (1)	4,749	8,683	11,806	4,749	8,683	11,806
Field Parameters						
pH (S.U.)	6.05	6.34	6.03	5.99	6.31	5.96
S. Conductivity (mS/cm)	0.112	0.103	0.105	0.100	0.090	0.106
Dissolved Oxygen (mg/L)	3.57	5.74	2.44	2.62	3.51	5.40
Temperature (°C)	12.2	12.3	12.5	12.7	12.8	13.5
ORP (mV)	155	128	215	81	145	174

Notes

mS/cm - Millisiemens per centimeter
mg/L - Milligrams per liter
°C - Degrees celsius
mV - Millivolts
ORP - oxidation-reduction potential

1. Total combined volume of groundwater extracted and treated in the Granular Activated Carbon (GAC) unit during Stage 2 Injection/Recirculation.

TABLE 4-4
GROUNDWATER DATA
SOUTHERN AREA - EISB PILOT TEST
NWIRP CALVERTON, NEW YORK

Purpose	NYSDOH MCLs [1]	Monitoring					Monitoring	Monitoring	Monitoring		Monitoring		Monitoring
Location		**SA-PZ-133I**					**SA-PZ-133I1**	**SA-PZ-134**	**SA-PZ-135**		**SA-PZ-136**		**SA-PZ-137**
Sample Date		**3/31/2010**	**7/8/2010**	**10/12/2010**	**12/15/2010**	**12/15/2010 (duplicate)**	**3/31/2010**	**3/31/2010**	**3/31/2010**	**12/14/2010**	**3/31/2010**	**12/14/2010**	**3/31/2010**
VOCs (µg/L)													
1,1,1-Trichloroethane (TCA)	5	120	24	14	18	17	2 J	5.3	70	12	ND	ND	ND
1,1-Dichloroethane (DCA)	5	460	130	98	130	130	26	31	260	54	1.5 J	1.5 J	ND
1,1-Dichloroethene (DCE)	5	41	7.8	4.9 J	6.9	6.7	1.6 J	2.6 J	22	3.3 J	ND	ND	ND
Chloroethane (CA)	5	67	9.6	17	33	34	4.9 J	ND	15 J	5.4	ND	ND	ND
Benzene	5	1.1 J	ND	ND	0.35 J	ND	ND	ND	0.35 J	ND	ND	ND	ND
1,4-Dichlorobenzene	5	2.2 J	ND	ND	ND	ND	1.2 J	1.3 J	0.38 J	ND	ND	ND	ND
1,3-Dichlorobenzene	5	0.65 J	ND	ND	ND	ND	ND	0.42 J	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	5	0.91 J	0.70 J	ND	ND	ND	0.36 J	0.43 J	0.91 J	ND	ND	ND	ND
Isopropyl Benzene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	5	3 J	0.98 J	ND	ND	ND	0.75 J	1.5 J	ND	ND	ND	ND	ND
Chlorobenzene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Napthalene	50	ND	ND	ND	ND	ND	ND	1.5 J	ND	ND	ND	ND	ND
Total Target VOCs (TCA, DCA, DCE, CA)	--	**688**	**171**	**134**	**188**	**188**	**34.5**	**38.9**	**367**	**74.7**	**1.5**	**1.5**	**0**
DCA/TCA Ratio	--	*3.8*	*5.4*	*7.0*	*7.2*	*7.6*	*13.0*	*5.8*	*3.7*	*4.5*	--	--	--
CA/DCA Ratio	--	*0.15*	*0.07*	*0.17*	*0.25*	*0.26*	*0.19*	--	*0.06*	*0.10*	--	--	--
CA/TCA Ratio	--	*0.56*	*0.40*	*1.21*	*1.83*	*2.00*	*2.45*	--	*0.21*	*0.45*	--	--	--
Dissolved Gases (µg/L)													
Methane	--	--	--	--	--	--	--	--	--	--	--	--	--
Ethane	--	--	--	--	--	--	--	--	--	--	--	--	--
Ethene	--	--	--	--	--	--	--	--	--	--	--	--	--
Dechlorinating Bacteria (cells/mL)													
Dehalococcoides sp.	--	--	--	--	--	--	--	--	--	--	--	--	--
Dehalobacter sp.	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals (µg/L)													
Iron	300 [2]	--	--	--	--	--	--	--	--	--	--	--	--
Manganese	300 [2]	--	--	--	--	--	--	--	--	--	--	--	--
Wet Chemistry (mg/L)													
Nitrate (as N)	10	--	--	--	--	--	--	--	--	--	--	--	--
Nitrite (as N)	1	--	--	--	--	--	--	--	--	--	--	--	--
Chloride	250	--	--	--	--	--	--	--	--	--	--	--	--
Sulfide	--	--	--	--	--	--	--	--	--	--	--	--	--
TOC	--	--	--	--	--	--	--	--	--	--	--	--	--
Water Quality Parameters													
pH	--	5.98	5.87	6.41	5.62	5.62	6.27	5.85	5.75	4.75	6.10	5.64	6.27
Specific Conductivity (mS/cm)	--	0.120	0.134	0.103	0.079	0.079	0.098	0.107	0.123	0.090	0.129	0.123	0.133
Dissolved Oxygen (mg/L)	--	ND	4.69	ND	ND	ND	6.80	ND	ND	--	3.33	ND	ND
Temperature (ºC)	--	11.21	14.72	14.93	10.56	10.56	11.21	10.77	10.83	10.8	10.23	10.45	10.28
Oxygen Reduction Potential (mV)	--	104	163	156	-12	-12	2	68	109	169	-7	-56	4

NYSDOH MCL
J qualifier - Estimated Value
ND - Not detected

mS/cm - Millisiemens per centimeter
mg/L - Milligrams per liter

°C - Degrees celsius
mV - Millivolts
µg/L - micrograms per liter

ORP - oxidation-reduction potential
J - estimated
-- Not analyzed or not applicable.

1. New York State (NYS) Department of Health (NYSDOH) Maximum Contaminant Level (MCL). 10 NYCRR, Part 5, Subpart 5-1 Public Water Systems, Tables 1 through 3. http://www.health.ny.gov/regulations/nycrr/title_10/part_5/subpart_5-1_tables.htm#table1.
2. If iron and manganese are present, the total concentration of both should not exceed 500 µg/L.

TABLE 4-4
GROUNDWATER DATA
SOUTHERN AREA - EISB PILOT TEST
NWIRP CALVERTON, NEW YORK

Purpose	NYSDOH MCLs [1]	Monitoring					Monitoring			Monitoring		
Location		SA-PZ-138I					SA-PZ-138I1			SA-PZ-139		
Sample Date		7/8/2010	7/8/2010 (duplicate)	10/12/2010	10/12/2010 (duplicate)	12/15/2010	7/6/2010	10/12/2010	12/15/2010	7/8/2010	10/12/2010	12/15/2010
VOCs (µg/L)												
1,1,1-Trichloroethane (TCA)	5	4.4 J	4.4 J	8.1	8.2	5.6	220	170 J	260	2.3 J	0.92 J	1.3 J
1,1-Dichloroethane (DCA)	5	20 J	20 J	33	32	20	980	970	1,100	17	7.6	9.2
1,1-Dichloroethene (DCE)	5	1.2 J	1.0 J	1.7 J	2.0 J	1.2 J	65	60 J	63	0.94 J	ND	ND
Chloroethane (CA)	5	ND	1.7 J	ND	ND	ND	210	230	320	1.8 J	ND	ND
Benzene	5	ND	ND	ND	ND	ND	3.4 J	4.4 J	ND	ND	ND	ND
1,4-Dichlorobenzene	5	ND	ND	ND	ND	ND	13 J	16 J	ND	ND	ND	ND
1,3-Dichlorobenzene	5	ND	ND	ND	ND	ND	3.1 J	4.0 J	ND	ND	ND	ND
1,2-Dichlorobenzene	5	ND	ND	ND	ND	ND	6.4 J	6.3 J	ND	ND	ND	ND
Isopropyl Benzene	5	ND	ND	ND	ND	ND	6.5 J	11	ND	ND	ND	ND
1,2,4-Trichlorobenzene	5	ND	ND	ND	ND	ND	5.7 J	14 J	ND	ND	ND	ND
Chlorobenzene	5	ND	ND	ND	ND	ND	ND	1.1 J	ND	ND	ND	ND
Napthalene	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Target VOCs (TCA, DCA, DCE, CA)	--	**26**	**27**	**43**	**42**	**27**	**1475**	**1430**	**1743**	**22**	**9**	**10.5**
DCA/TCA Ratio	--	*4.5*	*4.5*	*4.1*	*3.9*	*3.6*	*4.5*	*4.2*	*4.2*	*7.4*	*8.3*	*7.1*
CA/DCA Ratio	--	--	*0.09*	--	--	--	*4.7*	*4.2*	*3.4*	*9.4*	--	--
CA/TCA Ratio	--	--	*0.39*	--	--	--	*0.95*	*1.35*	*1.23*	*0.78*	--	--
Dissolved Gases (µg/L)												
Methane	--	--	--	--	--	--	--	--	--	--	--	--
Ethane	--	--	--	--	--	--	--	--	--	--	--	--
Ethene	--	--	--	--	--	--	--	--	--	--	--	--
Dechlorinating Bacteria (cells/mL)												
Dehalococcoides sp.	--	--	--	--	--	--	--	--	--	--	--	--
Dehalobacter sp.	--	--	--	--	--	--	--	--	--	--	--	--
Metals (µg/L)												
Iron	300 [2]	--	--	--	--	--	--	--	--	--	--	--
Manganese	300 [2]	--	--	--	--	--	--	--	--	--	--	--
Wet Chemistry (mg/L)												
Nitrate (as N)	10	--	--	--	--	--	--	--	--	--	--	--
Nitrite (as N)	1	--	--	--	--	--	--	--	--	--	--	--
Chloride	250	--	--	--	--	--	--	--	--	--	--	--
Sulfide	--	--	--	--	--	--	--	--	--	--	--	--
TOC	--	--	--	--	--	--	--	--	--	--	--	--
Water Quality Parameters												
pH	--	5.88	5.88	5.85	5.85	6.38	6.12	5.93	5.97	5.28	6.15	5.53
Specific Conductivity (mS/cm)	--	0.134	0.134	0.099	0.099	0.089	0.190	0.146	0.139	0.099	0.101	0.087
Dissolved Oxygen (mg/L)	--	4.37	4.37	0.24	0.24	--	1.67	0.23	--	ND	ND	ND
Temperature (ºC)	--	13.67	13.67	13.0	13.0	11.2	14.27	13.1	11.0	13.67	15.84	11.07
Oxygen Reduction Potential (mV)	--	-6.0	-6.0	42	42	90	62	127	120	137	183	-1

NYSDOH MCL

J qualifier - Estimated Value

ND - Not detected

1. New York State (NYS) Department of Health (NYSDOH)
NYCRR, Part 5, Subpart 5-1 Public Water Systems, Tables
regulations/nycrr/title_10/part_5/subpart_5-1_tables.htm#ta

TABLE 4-4
GROUNDWATER DATA
SOUTHERN AREA - EISB PILOT TEST
NWIRP CALVERTON, NEW YORK

Purpose	NYSDOH MCLs [1]	Monitoring			Injection & Monitoring				Injection & Monitoring			
Location		**SA-PZ-149I1**			**SA-PZ-151I1**				**SA-PZ-155I**			
Sample Date		**7/8/2010**	**10/12/2010**	**12/15/2010**	**7/7/2010**	**10/12/2010**	**10/12/2010 (duplicate)**	**12/15/2010**	**7/7/2010**	**7/7/2010 (duplicate)**	**10/12/2010**	**12/15/2010**
VOCs (µg/L)												
1,1,1-Trichloroethane (TCA)	5	6.6	ND	ND	110	36	35	32	38	36	15	16
1,1-Dichloroethane (DCA)	5	40	3.6 J	6.7	490	180	170	190	150	150	65	70
1,1-Dichloroethene (DCE)	5	2.6 J	ND	0.82 J	33	14	13	13	12	11	3.7 J	3.4 J
Chloroethane (CA)	5	9.8	ND	10	99	91	91	140	17	19	ND	ND
Benzene	5	ND	ND	ND	1.1 J	1.3 J	1.2 J	1.6 J	0.33 J	0.31 J	ND	ND
1,4-Dichlorobenzene	5	5.4	4.7 J	13	ND	11	11	22	0.31 J	ND	ND	ND
1,3-Dichlorobenzene	5	1.1 J	1.0 J	2.7 J	ND	2.5 J	2.3 J	4.0 J	ND	ND	ND	ND
1,2-Dichlorobenzene	5	1.6 J	1.2 J	3.0 J	ND	3.6 J	3.6 J	5.8 J	ND	0.4 J	ND	ND
Isopropyl Benzene	5	0.42 J	ND	0.39 J	ND	0.49 J	0.47 J	1.1 J	ND	ND	ND	ND
1,2,4-Trichlorobenzene	5	ND	ND	ND	ND	1.8 J	1.8 J	ND	ND	ND	ND	ND
Chlorobenzene	5	1.3 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Napthalene	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Target VOCs (TCA, DCA, DCE, CA)	--	**59**	**4**	**18**	**732**	**321**	**309**	**375**	**217**	**216**	**84**	**89.4**
DCA/TCA Ratio	--	*6.1*	--	--	*4.5*	*5.0*	*4.9*	*5.9*	*3.9*	*4.2*	*4.3*	*4.4*
CA/DCA Ratio	--	*4.1*	--	*0.67*	*4.9*	*0.15*	*1.9*	*1.4*	*8.8*	*7.9*	--	--
CA/TCA Ratio	--	*1.48*	--	--	*0.90*	*2.53*	*2.60*	*4.38*	*0.45*	*0.53*	--	--
Dissolved Gases (µg/L)												
Methane	--	--	--	--	110	140 D	300 D	210 D	9	12	3.7	2.5
Ethane	--	--	--	--	ND	ND	ND	ND	ND	ND	ND	ND
Ethene	--	--	--	--	ND	ND	ND	ND	ND	ND	ND	ND
Dechlorinating Bacteria (cells/mL)												
Dehalococcoides sp.	--	--	--	--	--	--	--	--	--	--	--	--
Dehalobacter sp.	--	--	--	--	--	--	--	--	--	--	--	--
Metals (µg/L)												
Iron	300 [2]	--	--	--	1,500	1,010	1,020	1,170	4,320	4,230	128 J	2,080
Manganese	300 [2]	--	--	--	4,680	5,460	5,550	5,580	302	292	571	484
Wet Chemistry (mg/L)												
Nitrate (as N)	10	--	--	--	--	--	--	--	--	--	--	--
Nitrite (as N)	1	--	--	--	--	--	--	--	--	--	--	--
Chloride	250	--	--	--	--	--	--	--	--	--	--	--
Sulfide	--	--	--	--	--	--	--	--	--	--	--	--
TOC	--	--	--	--	1.5	1.1	1.33	1.31 J	0.83 J	0.77 J	ND	ND
Water Quality Parameters												
pH	--	5.83	5.96	6.70	6.38	6.10	6.10	5.90	5.86	5.86	6.18	5.73
Specific Conductivity (mS/cm)	--	0.103	0.09	0.079	0.174	0.127	0.127	0.123	0.118	0.118	0.110	0.090
Dissolved Oxygen (mg/L)	--	ND	0.3	--	4.10	0.39	0.39	ND	ND	ND	0.68	ND
Temperature (ºC)	--	13.78	13.5	11.3	14.65	13.2	13.2	10.78	13.47	13.47	15.62	11.07
Oxygen Reduction Potential (mV)	--	42	71	69	-124	-16	-16	-95	-32	-32	133	-51

NYSDOH MCL

J qualifier - Estimated Value

ND - Not detected

1. New York State (NYS) Department of Health (NYSDOH)
NYCRR, Part 5, Subpart 5-1 Public Water Systems, Tables
regulations/nycrr/title_10/part_5/subpart_5-1_tables.htm#ta

TABLE 4-4
GROUNDWATER DATA
SOUTHERN AREA - EISB PILOT TEST
NWIRP CALVERTON, NEW YORK

Purpose	NYSDOH MCLs [1]	Monitoring			Monitoring				Monitoring			Monitoring		
Location		**SA-PZ-157I**			**SA-PZ-157I1**				**SA-PZ-158I**			**SA-PZ-158I1**		
Sample Date		**7/8/2010**	**10/11/2010**	**12/14/2010**	**7/7/2010**	**10/11/2010**	**12/14/2010**	**12/14/2010 (duplicate)**	**7/6/2010**	**10/11/2010**	**12/13/2010**	**7/6/2010**	**10/11/2010**	**12/13/2010**
VOCs (µg/L)														
1,1,1-Trichloroethane (TCA)	5	46	15	17	73	48 J	20	21	51	7.9	9.4	66	39	49
1,1-Dichloroethane (DCA)	5	180	65	75	340	220	100	100	230	43	42	340	160	200
1,1-Dichloroethene (DCE)	5	13	4.2 J	4.1 J	23	17 J	7.6	7.9	15	2.6 J	2.1 J	19	12	15
Chloroethane (CA)	5	24	5.7	7.6	57	57 J	49	49	26	ND	ND	52	27	62
Benzene	5	0.43 J	ND	ND	0.81 J	0.84 J	ND	ND	0.52 J	ND	ND	0.77 J	0.51 J	0.77 J
1,4-Dichlorobenzene	5	ND	ND	ND	ND	6.1 J	7.3	7.4	ND	ND	ND	ND	2.8 J	6.4
1,3-Dichlorobenzene	5	ND	ND	ND	ND	1.3 J	1.4 J	1.4 J	ND	ND	ND	ND	0.69 J	1.3 J
1,2-Dichlorobenzene	5	ND	ND	ND	ND	2.3 J	2.1 J	2.2 J	ND	ND	ND	ND	1.2 J	2.1 J
Isopropyl Benzene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.4 J	2.0 J
Chlorobenzene	5	ND	ND	ND	ND	ND	0.73 J	ND	ND	ND	ND	ND	ND	0.70 J
Napthalene	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Target VOCs (TCA, DCA, DCE, CA)	--	**263**	**90**	**104**	**493**	**342**	**177**	**177.9**	**322**	**54**	**54**	**477**	**238**	**326**
DCA/TCA Ratio	--	*3.9*	*4.3*	*4.4*	*4.7*	*4.6*	*5.0*	*4.8*	*4.5*	*5.4*	*4.5*	*5.2*	*4.1*	*4.1*
CA/DCA Ratio	--	*7.5*	*11*	*9.9*	*6.0*	*3.9*	*2.0*	*2.0*	*8.8*	--	--	*6.5*	*5.9*	*3.2*
CA/TCA Ratio	--	*0.52*	*0.38*	*0.45*	*0.78*	*1.19*	*2.45*	*2.33*	*0.51*	--	--	*0.79*	*0.69*	*1.27*
Dissolved Gases (µg/L)														
Methane	--	14	2.7	12	80	66	78 D	90 D	--	--	--	--	--	--
Ethane	--	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	--	--
Ethene	--	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	--	--
Dechlorinating Bacteria (cells/mL)														
Dehalococcoides sp.	--	0.20 J	--	1.6	--	--	--	--	--	--	--	--	--	--
Dehalobacter sp.	--	50.2	--	40.4	--	--	--	--	--	--	--	--	--	--
Metals (µg/L)														
Iron	300 [2]	275	460 J	10,600	93.4 J	82.4 J	2,610	2,580	--	--	--	--	--	--
Manganese	300 [2]	293	889	1,400	4,430	5,210	5,540	5,510	--	--	--	--	--	--
Wet Chemistry (mg/L)														
Nitrate (as N)	10	0.702	--	0.074 J	--	--	ND	--	--	--	--	--	--	--
Nitrite (as N)	1	ND	--	ND	--	--	ND	--	--	--	--	--	--	--
Chloride	250	8.31	--	4.12	--	--	6.65	--	--	--	--	--	--	--
Sulfide	--	ND	--	ND	--	--	ND	--	--	--	--	--	--	--
TOC	--	0.73 J	ND	122 J	1.3	0.94 J	107 J	ND	--	--	--	--	--	--
Water Quality Parameters														
pH	--	5.57	6.20	6.05	5.92	6.53	5.86	5.86	6.27	6.17	7.62	6.45	6.14	6.08
Specific Conductivity (mS/cm)	--	0.107	0.121	0.142	0.132	0.137	0.134	0.134	0.151	0.143	0.107	0.161	0.106	0.135
Dissolved Oxygen (mg/L)	--	ND	0.89	ND	ND	0.57	0	0	1.57	0.27	--	1.59	0.24	ND
Temperature (ºC)	--	13.51	15.41	10.94	13.80	15.34	10.79	10.79	14.87	14.4	11.9	14.12	13.7	11.87
Oxygen Reduction Potential (mV)	--	73	79	-155	71	121	-116	-116	-224	-76	-55	-224	-94	-119

NYSDOH MCL

J qualifier - Estimated Value

ND - Not detected

1. New York State (NYS) Department of Health (NYSDOH)
NYCRR, Part 5, Subpart 5-1 Public Water Systems, Tables
regulations/nycrr/title_10/part_5/subpart_5-1_tables.htm#ta

TABLE 4-4
GROUNDWATER DATA
SOUTHERN AREA - EISB PILOT TEST
NWIRP CALVERTON, NEW YORK

Purpose	NYSDOH MCLs [1]	Monitoring			Monitoring				Monitoring			
Location		**SA-PZ-159I**			**SA-PZ-159I1**				**SA-PZ-160I**			
Sample Date		**7/8/2010**	**10/12/2010**	**12/14/2010**	**7/8/2010**	**10/12/2010**	**12/14/2010**	**12/16/2010**	**7/7/2010**	**10/12/2010**	**12/13/2010**	**12/16/2010**
VOCs (µg/L)												
1,1,1-Trichloroethane (TCA)	5	75	5.6	25	41	44 J	38	--	53	37	41	--
1,1-Dichloroethane (DCA)	5	300	35	100	250	200	180	--	210	150 J	160	--
1,1-Dichloroethene (DCE)	5	22	2.2 J	6.7	18	14 J	12	--	17	11	11	--
Chloroethane (CA)	5	35	3.3 J	9.7	50	39 J	50	--	26	13 J	21	--
Benzene	5	0.57 J	ND	ND	0.64 J	0.52 J	ND	--	0.48 J	ND	ND	--
1,4-Dichlorobenzene	5	ND	ND	ND	1.7 J	ND	5.4 J	--	ND	ND	ND	--
1,3-Dichlorobenzene	5	ND	ND	ND	ND	ND	ND	--	ND	ND	ND	--
1,2-Dichlorobenzene	5	ND	ND	ND	ND	ND	1.9 J	--	ND	ND	ND	--
Isopropyl Benzene	5	ND	ND	ND	0.29 J	ND	ND	--	ND	ND	ND	--
1,2,4-Trichlorobenzene	5	ND	ND	ND	ND	ND	ND	--	1.9 J	ND	ND	--
Chlorobenzene	5	ND	ND	ND	ND	ND	ND	--	ND	ND	ND	--
Napthalene	50	ND	ND	ND	ND	ND	ND	--	4.5 J	ND	ND	--
Total Target VOCs (TCA, DCA, DCE, CA)	--	**432**	**46**	**141**	**359**	**297**	**280**	--	**306**	**211**	**233**	--
DCA/TCA Ratio	--	*4.0*	*6.3*	*4.0*	*6.1*	*4.5*	*4.7*	--	*4.0*	*4.1*	*3.9*	--
CA/DCA Ratio	--	*8.6*	*11*	*10*	*5.0*	*5.1*	*3.6*	--	*8.1*	*12*	*7.6*	--
CA/TCA Ratio	--	*0.47*	*0.59*	*0.39*	*1.22*	*0.89*	*1.32*		*0.49*	*0.35*	*0.51*	
Dissolved Gases (µg/L)												
Methane	--	13	29	2.4	130 J	51 D	53 D	--	0.6	6.4	15	--
Ethane	--	ND	ND	ND	ND	ND	ND	--	ND	ND	ND	--
Ethene	--	ND	ND	ND	ND	ND	ND	--	ND	ND	ND	--
Dechlorinating Bacteria (cells/mL)												
Dehalococcoides sp.	--	--	--	--	2.70	--	12.3	--	--	--	--	--
Dehalobacter sp.	--	--	--	--	649	--	15.4	--	--	--	--	--
Metals (µg/L)												
Iron	300 [2]	ND	7,990	9,680	2,610	1,180	2,370	--	1,520	38.7 J	--	3,340
Manganese	300 [2]	388	799	1,090	4,150	6,430	6,480	--	571	516	--	662
Wet Chemistry (mg/L)												
Nitrate (as N)	10	--	--	--	ND	--	--	ND	--	--	--	--
Nitrite (as N)	1	--	--	--	ND	--	--	ND	--	--	--	--
Chloride	250	--	--	--	4.26	--	--	3.54 J	--	--	--	--
Sulfide	--	--	--	--	ND	--	--	ND	--	--	--	--
TOC	--	0.69 J	116.16	4.70 J	1.3	43.69	31.3 J	--	0.81 J	ND	16.8	--
Water Quality Parameters												
pH	--	5.79	6.58	7.96	6.67	6.54	7.37	5.85	6.05	5.78	7.42	5.88
Specific Conductivity (mS/cm)	--	0.129	0.159	0.117	0.162	0.148	0.123	0.140	0.133	0.093	0.106	0.118
Dissolved Oxygen (mg/L)	--	3.87	ND	--	4.73	0.45	--	ND	3.91	0.38	--	ND
Temperature (ºC)	--	14.03	15.57	11.1	13.78	15.72	11.2	11.31	14.10	13.0	11.8	10.87
Oxygen Reduction Potential (mV)	--	105	-32	-53	-398	22	-9	-13	-111	151	-51	-18

NYSDOH MCL

J qualifier - Estimated Value

ND - Not detected

1. New York State (NYS) Department of Health (NYSDOH)
NYCRR, Part 5, Subpart 5-1 Public Water Systems, Tables
regulations/nycrr/title_10/part_5/subpart_5-1_tables.htm#ta

TABLE 4-4
GROUNDWATER DATA
SOUTHERN AREA - EISB PILOT TEST
NWIRP CALVERTON, NEW YORK

Purpose	NYSDOH MCLs [1]	Monitoring			Monitoring		
Location		**SA-PZ-160I1**			**SA-PZ-161I**		
Sample Date		**7/6/2010**	**10/12/2010**	**12/13/2010**	**7/7/2010**	**10/12/2010**	**12/14/2010**
VOCs (µg/L)							
1,1,1-Trichloroethane (TCA)	5	43	40 J	39	100	18	16
1,1-Dichloroethane (DCA)	5	250	200	180	530	110	97
1,1-Dichloroethene (DCE)	5	17	15 J	13	31	6.9	5.9
Chloroethane (CA)	5	34	42 J	33	51	9.5	8
Benzene	5	0.5 J	0.51 J	ND	ND	ND	ND
1,4-Dichlorobenzene	5	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	5	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	5	ND	ND	ND	ND	ND	ND
Isopropyl Benzene	5	ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	5	ND	ND	ND	ND	ND	ND
Chlorobenzene	5	ND	ND	ND	ND	ND	ND
Napthalene	50	ND	ND	ND	ND	ND	ND
Total Target VOCs (TCA, DCA, DCE, CA)	--	**344**	**297**	**265**	**712**	**144**	**127**
DCA/TCA Ratio	--	*5.8*	*5.0*	*4.6*	*5.3*	*6.1*	*6.1*
CA/DCA Ratio	--	*7.4*	*4.8*	*5.5*	*10*	*12*	*12*
CA/TCA Ratio	--	*0.79*	*1.05*	*0.85*	*0.51*	*0.53*	*0.50*
Dissolved Gases (µg/L)							
Methane	--	--	--	--	--	--	--
Ethane	--	--	--	--	--	--	--
Ethene	--	--	--	--	--	--	--
Dechlorinating Bacteria (cells/mL)							
Dehalococcoides sp.	--	--	--	--	--	--	--
Dehalobacter sp.	--	--	--	--	--	--	--
Metals (µg/L)							
Iron	300 [2]	--	--	--	--	--	--
Manganese	300 [2]	--	--	--	--	--	--
Wet Chemistry (mg/L)							
Nitrate (as N)	10	--	--	--	--	--	--
Nitrite (as N)	1	--	--	--	--	--	--
Chloride	250	--	--	--	--	--	--
Sulfide	--	--	--	--	--	--	--
TOC	--	--	--	--	--	--	--
Water Quality Parameters							
pH	--	6.17	6.15	6.06	5.65	6.07	5.14
Specific Conductivity (mS/cm)	--	0.115	0.110	0.124	0.129	0.124	0.090
Dissolved Oxygen (mg/L)	--	1.71	0.24	ND	ND	ND	--
Temperature (ºC)	--	13.97	13.0	11.56	13.99	14.82	9.5
Oxygen Reduction Potential (mV)	--	64	109	-75	4	168	142

NYSDOH MCL

J qualifier - Estimated Value

ND - Not detected

1. New York State (NYS) Department of Health (NYSDOH)
NYCRR, Part 5, Subpart 5-1 Public Water Systems, Tables
regulations/nycrr/title_10/part_5/subpart_5-1_tables.htm#ta

TABLE 4-5
GROUNDWATER DATA - METALS
SOUTHERN AREA - EISB PILOT TEST
NWIRP CALVERTON, NEW YORK

Purpose / Notes	NYS MCL	NYS "Class C" Surface Water Quality Standard	ORNL Surface Water Benchmark	Injection & Monitoring				Injection & Monitoring				Monitoring (t = 6 days)		
Location				**SA-PZ-151I1**				**SA-PZ-155I**				**SA-PZ-157I**		
Sample Date				**7/7/2010**	**10/12/2010**	**10/12/2010 (duplicate)**	**12/15/2010**	**7/7/2010**	**7/7/2010 (duplicate)**	**10/12/2010**	**12/15/2010**	**7/8/2010**	**10/11/2010**	**12/14/2010**
Metals (µg/L)														
Aluminum	none	100 (ionic) **	none	ND	--	--		ND	--	--	ND	--	--	ND
Antimony	6	none	30	ND	--	--	ND	ND	--	--	ND	--	--	ND
Arsenic	10	150 (dissolved) **	3.1 (Arsenic V)	ND	--	--	7.03 J	ND	--	--	12.1	--	--	2.97 J
Barium	2,000	none	4	18 J	--	--	30.6 J	20.1 J	--	--	22.7 J	--	--	25.5 J
Beryllium	4	none	0.66	ND	--	--	ND	ND	--	--	ND	--	--	ND
Cadmium	5	none (3)	none	ND	--	--	ND	ND	--	--	ND	--	--	ND
Calcium	none	none	none	14,900	--	--	15,700	6,640	--	--	5,830	--	--	9,500
Chromium	100	11 (dissolved, hexavalent) **	none	1.9 J	--	--	0.765 J	2 J	--	--	0.868 J	--	--	ND
Cobalt	none	5	23	ND	--	--	ND	ND	--	--	ND	--	--	ND
Copper	none	none (3)	none	ND	--	--	ND	ND	--	--	ND	--	--	ND
Iron	300 (1)	none	none	1,500	1,010	1,020	1,170	4,320	4,230	128 J	2,080	275	460 J	10,600
Lead	none	none (3)	none	ND	--	--	ND	ND	--	--	ND	--	--	ND
Magnesium	none	none	none	972 J	--	--	987 J	1,730 J	--	--	1,800 J	--	--	2,730 J
Manganese	300 (1)	none	120	4,680	5,460	5,550	5,580	302	292	571	484	293	889	1,400
Mercury	2	0.0007 (dissolved)	<0.23	ND	--	--	ND	ND	--	--	ND	--	--	ND
Nickel	none	none (3)	none	3.3 J	--	--	ND	4.5 J	--	--	3.58 J	--	--	ND
Potassium	none	none	none	1,910 J	--	--	3,100 J	ND	--	--	930 J	--	--	1,170 J
Selenium	50	4.6 (dissolved)	none	ND	--	--	ND	ND	--	--	ND	--	--	ND
Silver	100	0.1 (ionic)	0.36	ND	--	--	1.42 J	ND	--	--	ND	--	--	ND
Sodium	none (2)	none	none	7,930	--	--	8,170	9,320	--	--	9,940	--	--	10,300
Thallium	2	8 **	12	ND	--	--	ND	ND	--	--	ND	--	--	ND
Vanadium	none	14 **	20	ND	--	--	ND	ND	--	--	1.77 J	--	--	ND
Zinc	5,000	none (3)	none	ND	--	--	ND	ND	--	--	ND	--	--	10.8 J

NOTES

Shading indicates exceedance of the NYSDOH MCL

J qualifier - Estimated Value

ND - Not detected at or above reporting limit

New York State (NYS) Maximum Contaminant Level (MCL). 10 NYCRR, Part 5, Subpart 5-1 Public Water Systems, Tables 1 through 3.
http://www.health.ny.gov/regulations/nycrr/title_10/part_5/subpart_5-1_tables.htm#table1.

New York State (NYS) Surface Water Standard (6 NYCRR Part 703, Section 703.5[f], Table 1). **Peconic River is *Class C Surface Water***.
http://www.dec.ny.gov/regs/4590.html.
** Standard relates to aquatic (chronic).

Oak Ridge National Laboratory (ORNL) (surface water) - Table 1 (secondary chronic values), Toxilogical Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota: 1996 Revision (Suter and Tsao, 1996). http://www.esd.ornl.gov/programs/ecorisk/documents/tm96r2.pdf.

1. If iron and manganese are present, the total concentration of both should not exceed 500µg/L.
2. Water containing more than 20 mg/L of sodium should not be used for drinking by people on severely restricted sodium diets. Water containing more than 270 mg/L of sodium should not be used for drinking by people on moderately restricted sodium diets.

3. 6 NYCRR Part 703, Section 703.5(f), Table 1 expresses values in terms of (as related to) hardness.

TABLE 4-5
GROUNDWATER DATA - METALS
SOUTHERN AREA - EISB PILOT TEST
NWIRP CALVERTON, NEW YORK

Purpose / Notes	NYS MCL	NYS "Class C" Surface Water Quality Standard	ORNL Surface Water Benchmark	Monitoring (t = 6 days)				Monitoring (t = 32 days = 1 month)			Monitoring (t = 32 days = 1 month)			
Location				**SA-PZ-157I1**				**SA-PZ-159I**			**SA-PZ-159I1**			
Sample Date				**7/7/2010**	**10/11/2010**	**12/14/2010**	**12/14/2010 (duplicate)**	**7/8/2010**	**10/12/2010**	**12/14/2010**	**7/8/2010**	**10/12/2010**	**12/14/2010**	**12/16/2010**
Metals (µg/L)														
Aluminum	none	100 (ionic) **	none	--	--	ND	ND	ND	--	ND	--	--	ND	--
Antimony	6	none	30	--	--	ND	ND	ND	--	ND	--	--	ND	--
Arsenic	10	150 (dissolved) **	3.1 (Arsenic V)	--	--	5.32 J	3.63 J	ND	--	13.9	--	--	3.43 J	--
Barium	2,000	none	4	--	--	21.4 J	21.5 J	20.8 J	--	24.7 J	--	--	21.8 J	--
Beryllium	4	none	0.66	--	--	ND	ND	ND	--	ND	--	--	ND	--
Cadmium	5	none (3)	none	--	--	ND	ND	ND	--	ND	--	--	ND	--
Calcium	none	none	none	--	--	14,800	14,800	6,810	--	7,670	--	--	16,800	--
Chromium	100	11 (dissolved, hexavalent) **	none	--	--	ND	1.08 J	ND	--	1.06 J	--	--	1.43 J	--
Cobalt	none	5	23	--	--	ND	ND	ND	--	ND	--	--	ND	--
Copper	none	none (3)	none	--	--	ND	ND	ND	--	ND	--	--	ND	--
Iron	300 (1)	none	none	93.4 J	82.4 J	2,610	2,580	ND	7,990	9,680	2,610	1,180	2,370	--
Lead	none	none (3)	none	--	--	ND	ND	ND	--	ND	--	--	ND	--
Magnesium	none	none	none	--	--	1,150 J	1,140 J	2,190 J	--	2,800 J	--	--	1,180 J	--
Manganese	300 (1)	none	120	4,430	5,210	5,540	5,510	388	799	1,090	4,150	6,430	6,480 J	--
Mercury	2	0.0007 (dissolved)	<0.23	--	--	ND	ND	ND	--	ND	--	--	ND	--
Nickel	none	none (3)	none	--	--	ND	ND	ND	--	1.1 J	--	--	0.91 J	--
Potassium	none	none	none	--	--	2,520 J	2,530 J	ND	--	972 J	--	--	2,710 J	--
Selenium	50	4.6 (dissolved)	none	--	--	2.21 J	ND	ND	--	ND	--	--	2.17 J	--
Silver	100	0.1 (ionic)	0.36	--	--	ND	ND	ND	--	ND	--	--	ND	--
Sodium	none (2)	none	none	--	--	7,920	7,740	9,980	--	10,500	--	--	7,240	--
Thallium	2	8 **	12	--	--	ND	ND	ND	--	ND	--	--	ND	--
Vanadium	none	14 **	20	--	--	ND	ND	ND	--	ND	--	--	ND	--
Zinc	5,000	none (3)	none	--	--	ND	ND	ND	--	ND	--	--	ND	--

NOTES

Shading indicates exceedance of the NYSDOH MCL

J qualifier - Estimated Value

ND - Not detected at or above reporting limit

New York State (NYS) Maximum Contaminant Level (MCL). 10 NYCRR, Part 5, Subpart
http://www.health.ny.gov/regulations/nycrr/title_10/part_5/subpart_5-1_tables.htm#table1.

New York State (NYS) Surface Water Standard (6 NYCRR Part 703, Section 703.5[f], Tat
http://www.dec.ny.gov/regs/4590.html.
** Standard relates to aquatic (chronic).

Oak Ridge National Laboratory (ORNL) (surface water) - Table 1 (secondary chronic valu
Effects on Aquatic Biota: 1996 Revision (Suter and Tsao, 1996). http://www.esd.ornl.gov

1. If iron and manganese are present, the total concentration of both should not exceed 5
2. Water containing more than 20 mg/L of sodium should not be used for drinking by peo
sodium should not be used for drinking by people on moderately restricted sodium diets.

3. 6 NYCRR Part 703, Section 703.5(f), Table 1 expresses values in terms of (as related

TABLE 4-5
GROUNDWATER DATA - METALS
SOUTHERN AREA - EISB PILOT TEST
NWIRP CALVERTON, NEW YORK

Purpose / Notes	NYS MCL	NYS "Class C" Surface Water Quality Standard	ORNL Surface Water Benchmark	Monitoring (t = 69 days = 2.3 months)			
Location				**SA-PZ-160I**			
Sample Date				**7/7/2010**	**10/12/2010**	**12/13/2010**	**12/16/2010**
Metals (µg/L)							
Aluminum	none	100 (ionic) **	none	--	--	--	ND
Antimony	6	none	30	--	--	--	ND
Arsenic	10	150 (dissolved) **	3.1 (Arsenic V)	--	--	--	7.42 J
Barium	2,000	none	4	--	--	--	28.5 J
Beryllium	4	none	0.66	--	--	--	ND
Cadmium	5	none (3)	none	--	--	--	ND
Calcium	none	none	none	--	--	--	8,360
Chromium	100	11 (dissolved, hexavalent) **	none	--	--	--	ND
Cobalt	none	5	23	--	--	--	ND
Copper	none	none (3)	none	--	--	--	12.8
Iron	300 (1)	none	none	1,520	38.7 J	--	3,340
Lead	none	none (3)	none	--	--	--	ND
Magnesium	none	none	none	--	--	--	2,220 J
Manganese	300 (1)	none	120	571	516	--	662
Mercury	2	0.0007 (dissolved)	<0.23	--	--	--	ND
Nickel	none	none (3)	none	--	--	--	ND
Potassium	none	none	none	--	--	--	1,190 J
Selenium	50	4.6 (dissolved)	none	--	--	--	ND
Silver	100	0.1 (ionic)	0.36	--	--	--	ND
Sodium	none (2)	none	none	--	--	--	9,780
Thallium	2	8 **	12	--	--	--	ND
Vanadium	none	14 **	20	--	--	--	ND
Zinc	5,000	none (3)	none	--	--	--	ND

NOTES

Shading indicates exceedance of the NYSDOH MCL

J qualifier - Estimated Value

ND - Not detected at or above reporting limit

New York State (NYS) Maximum Contaminant Level (MCL). 10 NYCRR, Part 5, Subpart
http://www.health.ny.gov/regulations/nycrr/title_10/part_5/subpart_5-1_tables.htm#table1.

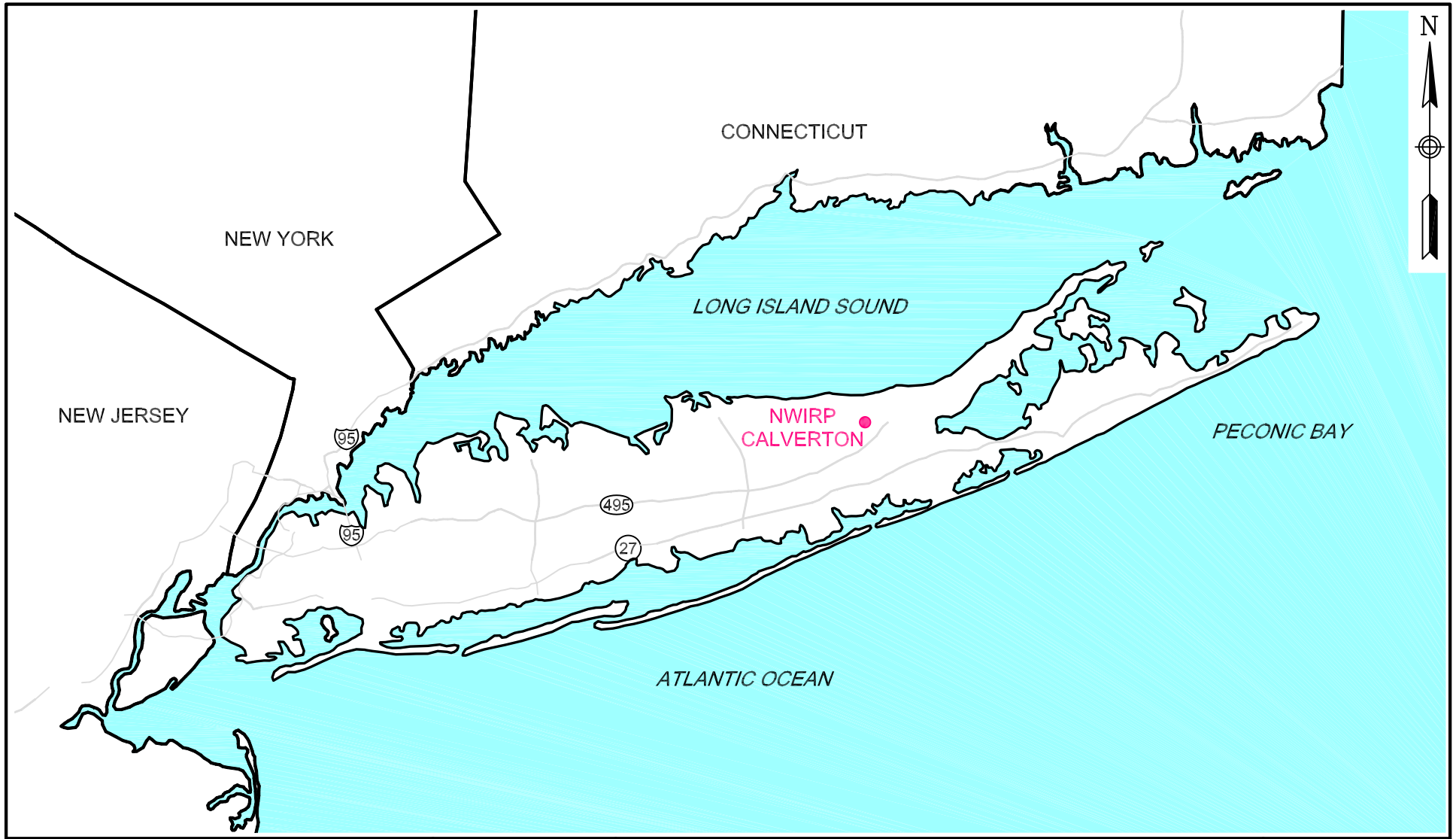
New York State (NYS) Surface Water Standard (6 NYCRR Part 703, Section 703.5[f], Tat
http://www.dec.ny.gov/regs/4590.html.
** Standard relates to aquatic (chronic).

Oak Ridge National Laboratory (ORNL) (surface water) - Table 1 (secondary chronic valu
Effects on Aquatic Biota: 1996 Revision (Suter and Tsao, 1996). http://www.esd.ornl.gov

1. If iron and manganese are present, the total concentration of both should not exceed 5
2. Water containing more than 20 mg/L of sodium should not be used for drinking by peo
sodium should not be used for drinking by people on moderately restricted sodium diets.

3. 6 NYCRR Part 703, Section 703.5(f), Table 1 expresses values in terms of (as related

112G02045\0510\112G02045CM05.DWG 03/10/10 MKB



0 15 30
SCALE IN MILES

TETRA TECH NUS, INC.

GENERAL LOCATION MAP
NWIRP CALVERTON
CALVERTON, NEW YORK

SCALE	NOT TO SCALE
FILE	112G02045CM05
REV 0	DATE 03/10/11
FIGURE NUMBER	FIGURE 1–1

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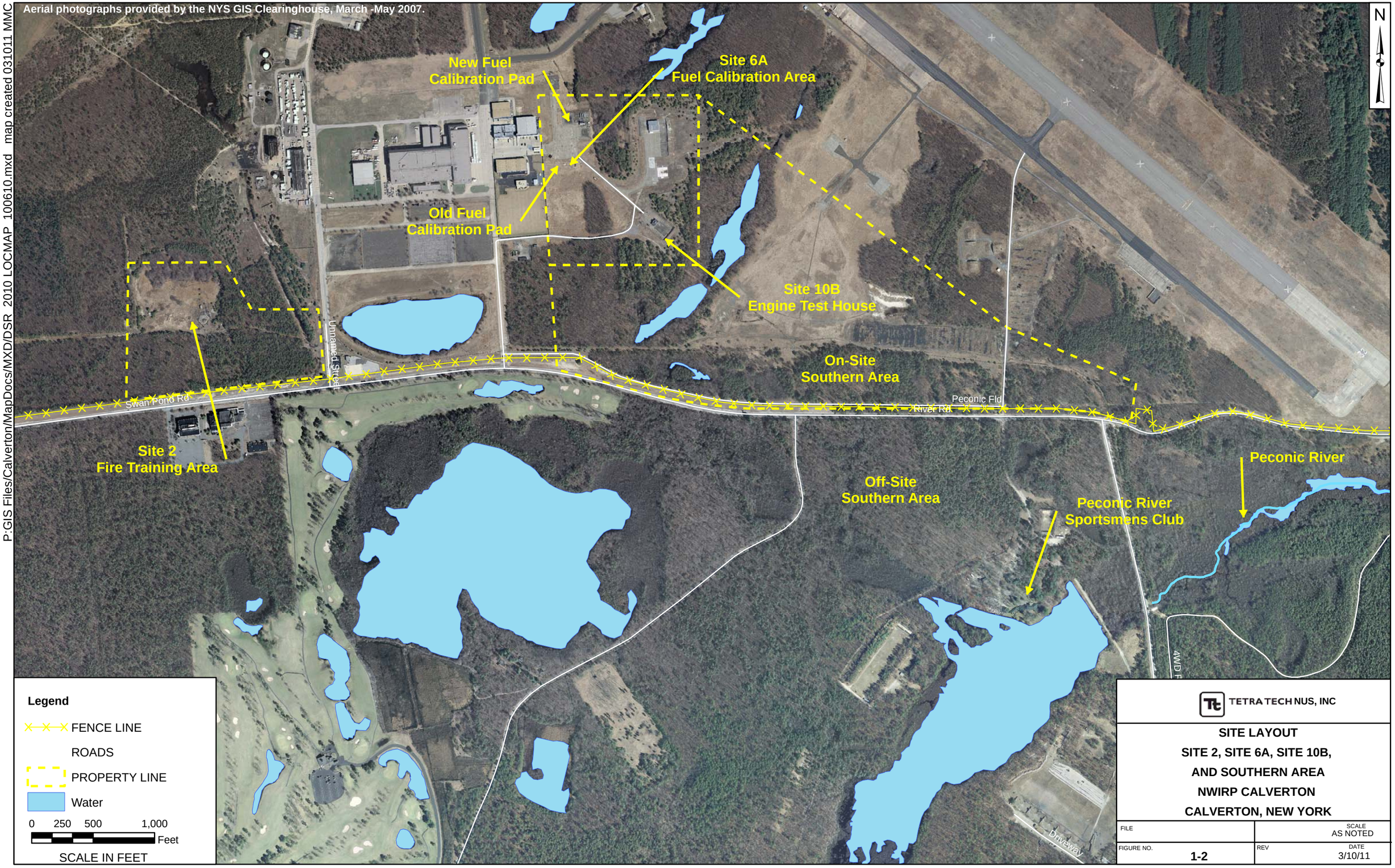

TETRA TECH NUS, INC

SITE LAYOUT
SITE 2, SITE 6A, SITE 10B,
AND SOUTHERN AREA
NWIRP CALVERTON
CALVERTON, NEW YORK

FILE	SCALE AS NOTED
FIGURE NO. 1-2	REV / DATE 3/10/11

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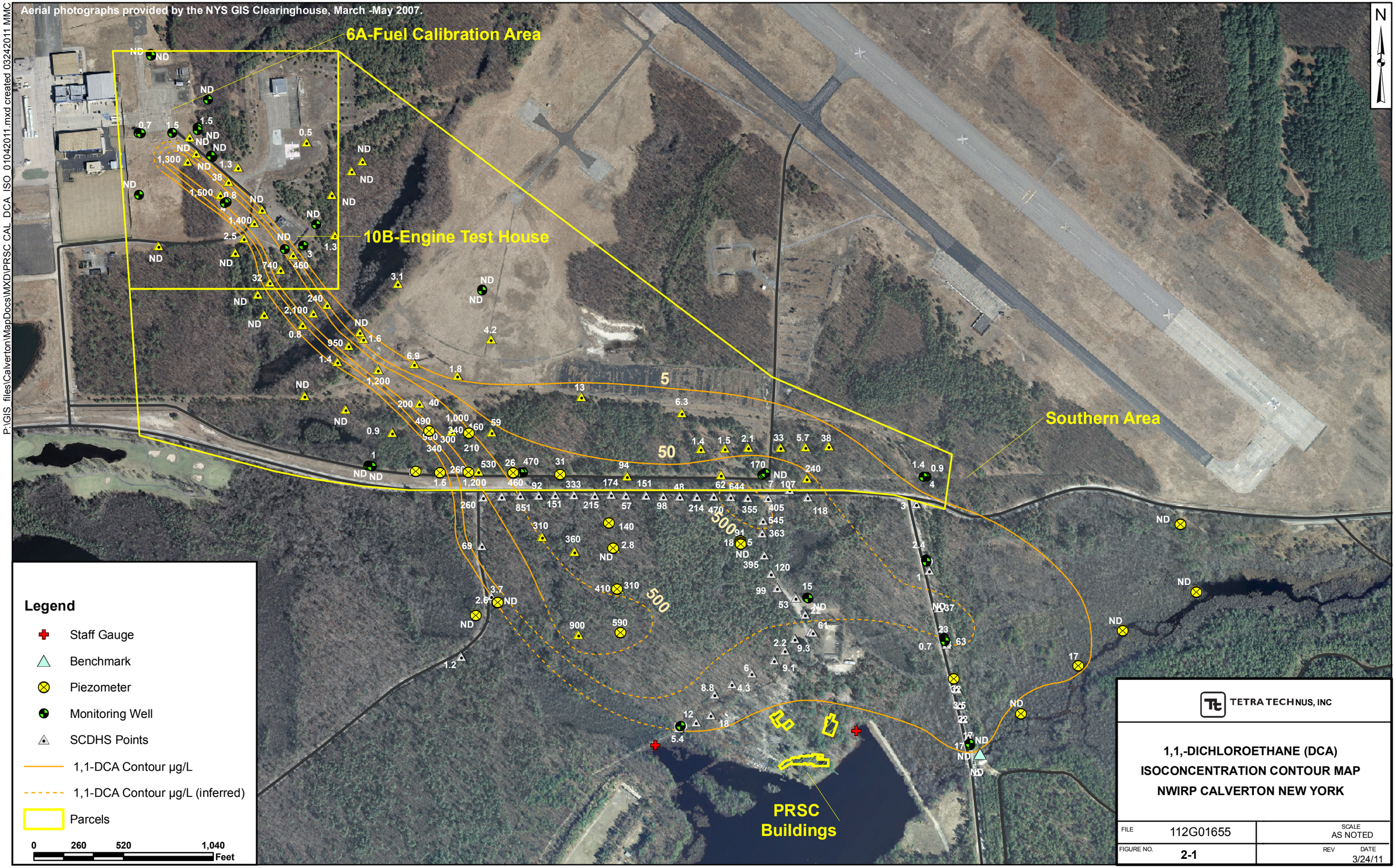
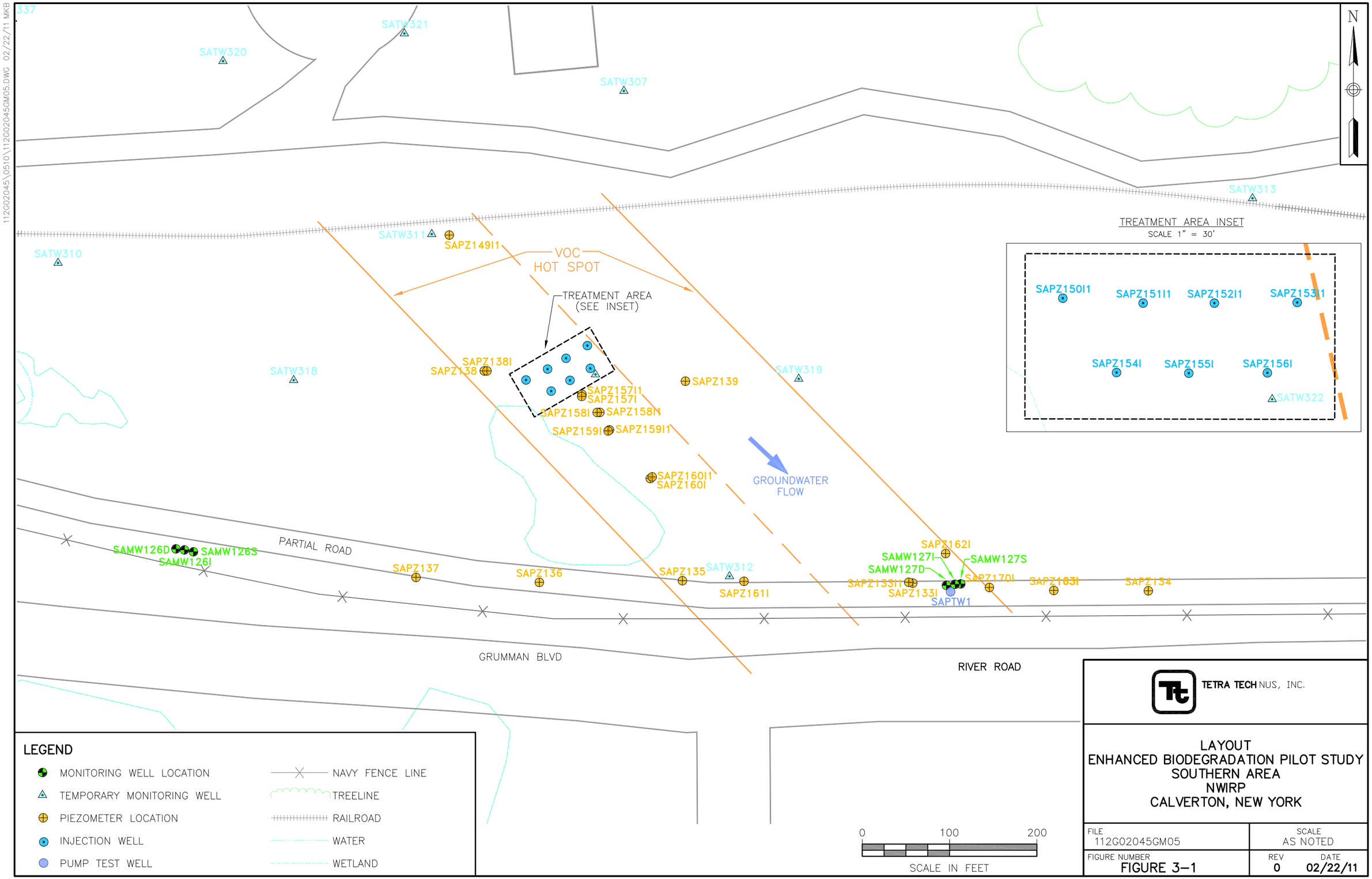


TETRA TECH NUS, INC

1,1,-DICHLOROETHANE (DCA)
ISOCONCENTRATION CONTOUR MAP
NWIRP CALVERTON NEW YORK

FILE	112G01655	SCALE	AS NOTED
FIGURE NO.	2-1	REV	DATE 3/24/11

112G02045\0510\112G02045GM05.DWG 02/22/11 MKB



TETRA TECH NUS, INC.

LAYOUT
ENHANCED BIODEGRADATION PILOT STUDY
SOUTHERN AREA
NWIRP
CALVERTON, NEW YORK

FILE	SCALE
112G02045GM05	AS NOTED
FIGURE NUMBER: FIGURE 3–1	REV: 0 / DATE: 02/22/11

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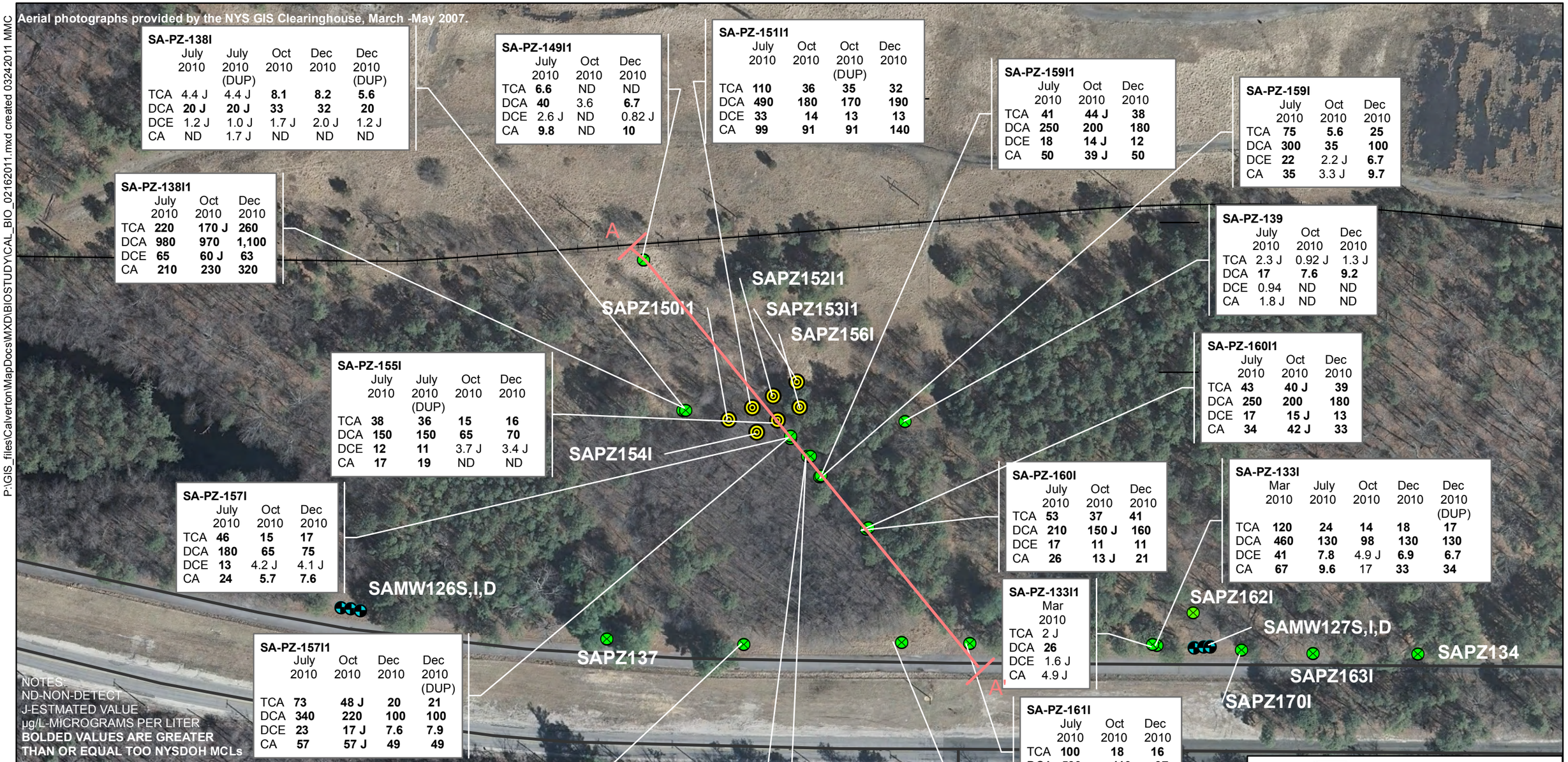


SA-PZ-138I

	July 2010	July 2010 (DUP)	Oct 2010	Dec 2010	Dec 2010 (DUP)
TCA	4.4 J	4.4 J	**8.1**	**8.2**	**5.6**
DCA	**20 J**	**20 J**	**33**	**32**	**20**
DCE	1.2 J	1.0 J	1.7 J	2.0 J	1.2 J
CA	ND	1.7 J	ND	ND	ND

SA-PZ-149I1

	July 2010	Oct 2010	Dec 2010
TCA	**6.6**	ND	ND
DCA	**40**	3.6	**6.7**
DCE	2.6 J	ND	0.82 J
CA	**9.8**	ND	**10**

SA-PZ-151I1

	July 2010	Oct 2010	Oct 2010 (DUP)	Dec 2010
TCA	**110**	**36**	**35**	**32**
DCA	**490**	**180**	**170**	**190**
DCE	**33**	**14**	**13**	**13**
CA	**99**	**91**	**91**	**140**

SA-PZ-159I1

	July 2010	Oct 2010	Dec 2010
TCA	**41**	**44 J**	**38**
DCA	**250**	**200**	**180**
DCE	**18**	**14 J**	**12**
CA	**50**	**39 J**	**50**

SA-PZ-159I

	July 2010	Oct 2010	Dec 2010
TCA	**75**	**5.6**	**25**
DCA	**300**	**35**	**100**
DCE	**22**	2.2 J	**6.7**
CA	**35**	3.3 J	**9.7**

SA-PZ-138I1

	July 2010	Oct 2010	Dec 2010
TCA	**220**	**170 J**	**260**
DCA	**980**	**970**	**1,100**
DCE	**65**	**60 J**	**63**
CA	**210**	**230**	**320**

SA-PZ-139

	July 2010	Oct 2010	Dec 2010
TCA	2.3 J	0.92 J	1.3 J
DCA	**17**	**7.6**	**9.2**
DCE	0.94	ND	ND
CA	1.8 J	ND	ND

SA-PZ-160I1

	July 2010	Oct 2010	Dec 2010
TCA	**43**	**40 J**	**39**
DCA	**250**	**200**	**180**
DCE	**17**	**15 J**	**13**
CA	**34**	**42 J**	**33**

SA-PZ-155I

	July 2010	July 2010 (DUP)	Oct 2010	Dec 2010
TCA	**38**	**36**	**15**	**16**
DCA	**150**	**150**	**65**	**70**
DCE	**12**	**11**	3.7 J	3.4 J
CA	**17**	**19**	ND	ND

SA-PZ-160I

	July 2010	Oct 2010	Dec 2010
TCA	**53**	**37**	**41**
DCA	**210**	**150 J**	**160**
DCE	**17**	**11**	**11**
CA	**26**	**13 J**	**21**

SA-PZ-133I

	Mar 2010	July 2010	Oct 2010	Dec 2010	Dec 2010 (DUP)
TCA	**120**	**24**	**14**	**18**	**17**
DCA	**460**	**130**	**98**	**130**	**130**
DCE	**41**	**7.8**	4.9 J	**6.9**	**6.7**
CA	**67**	**9.6**	17	**33**	**34**

SA-PZ-157I

	July 2010	Oct 2010	Dec 2010
TCA	**46**	**15**	**17**
DCA	**180**	**65**	**75**
DCE	**13**	4.2 J	4.1 J
CA	**24**	**5.7**	**7.6**

SA-PZ-133I1

	Mar 2010
TCA	2 J
DCA	**26**
DCE	1.6 J
CA	4.9 J

SA-PZ-157I1

	July 2010	Oct 2010	Dec 2010	Dec 2010 (DUP)
TCA	**73**	**48 J**	**20**	**21**
DCA	**340**	**220**	**100**	**100**
DCE	**23**	**17 J**	**7.6**	**7.9**
CA	**57**	**57 J**	**49**	**49**

SA-PZ-161I

	July 2010	Oct 2010	Dec 2010
TCA	**100**	**18**	**16**
DCA	**530**	**110**	**97**
DCE	**31**	**6.9**	**5.9**
CA	**51**	**9.5**	**8**

NOTES:
ND-NON-DETECT
J-ESTMATED VALUE
µg/L-MICROGRAMS PER LITER
BOLDED VALUES ARE GREATER THAN OR EQUAL TOO NYSDOH MCLs

SA-PZ-136

	Mar 2010	Dec 2010
TCA	ND	ND
DCA	1.5 J	1.5 J
DCE	ND	ND
CA	ND	ND

SA-PZ-158I

	July 2010	Oct 2010	Dec 2010
TCA	**51**	**7.9**	**9.4**
DCA	**230**	**43**	**42**
DCE	**15**	2.6 J	2.1 J
CA	**26**	ND	ND

SA-PZ-158I1

	July 2010	Oct 2010	Dec 2010
TCA	**66**	**39**	**49**
DCA	**340**	**160**	**200**
DCE	**19**	**12**	**15**
CA	**52**	**27**	**62**

SA-PZ-135

	Mar 2010	Dec 2010
TCA	**70**	**12**
DCA	**260**	**54**
DCE	**22**	3.3 J
CA	**15 J**	**5.4**

Legend

- Monitoring Well
- Piezometer
- Injection Well

0 50 100 200 Feet

TETRA TECH NUS, INC

Enhanced Biodegradation Pilot Study
Chlorinated Volatile Organic Compounds
Southern Area
NWIRP Calverton
Calverton, New York

FILE	112G02045	SCALE	AS NOTED
FIGURE NO.	**4-1**	REV	DATE 3/24/11

P:\GIS_files\Calverton\MapDocs\MXD\BIOSTUDY\CAL_BIO_02162011.mxd created 03242011 MMC

Aerial photographs provided by the NYS GIS Clearinghouse, March -May 2007.

SA-PZ-151I1

	July 2010	Oct 2010	Oct 2010 (DUP)	Dec 2010
Metals (µg/L)				
Iron	**1,500**	**1,010**	**1,020**	**1,170**
Manganese	**4,680**	**5,460**	**5,550**	**5,580**
Wet Chemistry (mg/L)				
TOC	1.5	1.1	1.33	1.31 J

SA-PZ-155I

	July 2010	July 2010 (DUP)	Oct 2010	Dec 2010
Metals (µg/L)				
Iron	**4,320**	**4,230**	**128 J**	**2,080**
Manganese	**302**	292	**571**	**484**
Wet Chemistry (mg/L)				
TOC	0.83 J	0.77 J	ND	ND

SA-PZ-159I1

	July 2010	Oct 2010	Dec 2010
Metals (µg/L)			
Iron	**2,610**	**1,180**	**2,370**
Manganese	**4,150**	**6,430**	**6,480**
Wet Chemistry (mg/L)			
TOC	1.3	43.96	31.3 J

SA-PZ-159I

	July 2010	Oct 2010	Dec 2010
Metals (µg/L)			
Iron	ND	**7,990**	**9,680**
Manganese	**388**	**799**	**1,090**
Wet Chemistry (mg/L)			
TOC	0.69 J	116	4.7 J

SA-PZ-1601

	July 2010	Oct 2010	Dec 2010
Metals (µg/L)			
Iron	**1,520**	38.7 J	**3,340**
Manganese	**571**	**615**	**662**
Wet Chemistry (mg/L)			
TOC	0.81 J	ND	16.8

SA-PZ-157I

	July 2010	Oct 2010	Dec 2010
Metals (µg/L)			
Iron	275	**460 J**	**10,600**
Manganese	293	**889**	**1,400**
Wet Chemistry (mg/L)			
TOC	0.73 J	ND	122 J

SA-PZ-157I1

	July 2010	Oct 2010	Dec 2010	Dec 2010 (DUP)
Metals (µg/L)				
Iron	93.4 J	82.4 J	**2,610**	**2,580**
Manganese	**4,430**	**5,210**	**5,540**	**5,510**
Wet Chemistry (mg/L)				
TOC	1.3	0.94 J	107 J	ND

SAPZ149I1
SAPZ152I1
SAPZ156I
SAPZ153I1
SAPZ150I1
SAPZ138I&I1
SAPZ154I
SAPZ153I1
SAPZ158I&I1
SAPZ160I1
SAMW126S,I,D
SAPZ162I
SAMW127S,I,D
SAPZ136
SAPZ137
SAPZ135
SAPZ161I
SAPZ133I&I1
SAPZ134
SAPZ163I
SAPZ170I

NOTES:
ND-NON-DETECT
J-ESTMATED VALUE
µg/L-MICROGRAMS PER LITER
BOLDED VALUES ARE GREATER THAN OR EQUAL TOO NYSDOH MCLs

Legend

- Monitoring Well
- Injection Well

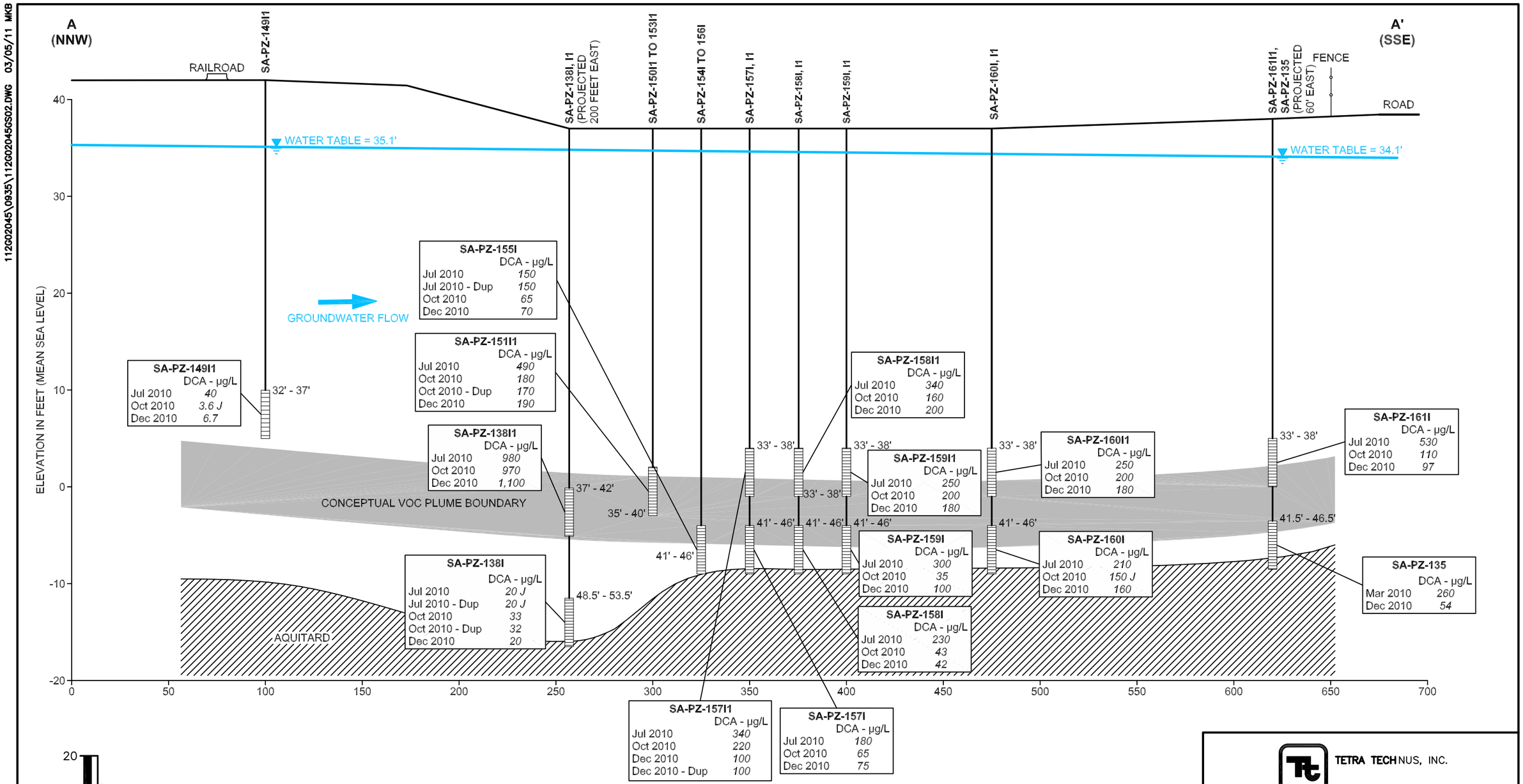
0 50 100 200 Feet

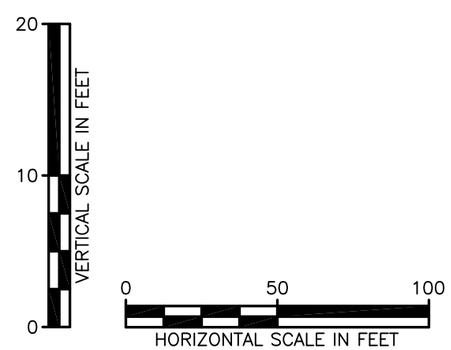
TETRA TECH NUS, INC

Enhanced Biodegradation Pilot Study
Iron, Manganese, and TOC
Southern Area
NWIRP Calverton
Calverton, New York

FILE	112G02045	SCALE	AS NOTED
FIGURE NO.	4-2	REV	DATE 3/24/11

112G02045\0935\112G02045GS02.DWG 03/05/11 MKB





NOTES:
µg/L – MICROGRAMS PER LITER
DCA – DICHLOROETHANE
J – ESTIMATED VALUE
DUP – DUPLICATE SAMPLE

TETRA TECH NUS, INC.

1,1–DICHLOROETHANE CONCENTRATIONS
ENHANCED BIODEGRADATION PILOT STUDY
SOUTHERN AREA
NWIRP
CALVERTON, NEW YORK

FILE	SCALE
112G02045GS02	AS NOTED
FIGURE NUMBER	REV / DATE
FIGURE 4–3	0 / 03/05/11

ATTACHMENT C-1

BORING LOGS

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NWIRP Calverton
PROJECT NUMBER: CTO-WE08
DRILLING COMPANY: Zebra
DRILLING RIG: Geoprobe 7720 DT

BORING No.: SA-PZ-157
DATE: 6-4-10
GEOLOGIST: Vince Shickora
DRILLER: Evan Moraitis

Time	Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
0913	S-1	1					DK Brn	Silty Sand with leaves roots, pebbles		damp	0	0	0	0
		2												
		3			▽		Brn	Silty FGR to MGR Sand - Trace pebbles and clay		wet at ~ 2' BGS	0	0	0	0
		4		49"										
		5		60"			Tan Brn	FGR to MGR Sand Trace silt + pebbles + CGR Sand		wet	0	0	0	0
0916	S-2	6												
		7									0	0	0	0
		8												
		9		59"			Brn Tan	Same as above		wet	0	0	0	0
		10		60"										
0921	S-3	11									0	0	0	0
		12												
		13									0	0	0	0
		14		59"			Brn Tan	Same as above		wet				
		15		60"							0	0	0	0
0927	S-4	16					Tan Brn	FGR Sand - little MGR Sand Trace Silt and Fine pebbles (micaceous) and CGR sand		wet				
		17									0	0	0	0
		18												
		19		60"			Tan Brn	Same as above		wet	0	0	0	0
		20		60"										
0954	S-5	21									0	0	0	0
		22												
		23									0	0	0	0
		24		60"			Tan Brn	Same as above		wet				
		25		60"							0	0	0	0

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: 2" x 5' Macrocore samples with Acetate Sleeves (discreet samples)

Drilling Area Background (ppm): 0

Converted to Well: Yes ✓ No _____ Well I.D. #: SA-PZ-157I

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NWIRP Calverton
PROJECT NUMBER: CTO-WE08
DRILLING COMPANY: Zebra
DRILLING RIG: Geoprobe 7720DT

BORING No.: SA-PZ-157
DATE: 6-4-10
GEOLOGIST: Vince Shickora
DRILLER: Evan Moraitis

Time	Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
1005	S-6	26					Brn Tan	FGR Sand - little MGR Sand Trace silt - CGR sand and fine pebbles (micaceous)		wet	0	0	0	0
		27												
		28									0	0	0	0
		29		60"			Brn Tan	Same as above		wet				
		30		60"							0	0	0	0
1025	S-7	31												
		32									0	0	0	0
		33												
		34		60"			Brn Tan	Same as above		wet	0	0	0	0
		35		60"										
1042	S-8	36												
		37									0	0	0	0
		38												
		39		59"			Brn Tan	Same as above		wet	0	0	0	0
		40		60"										
1150	S-9	41									0	0	0	0
		42												
		43									0	0	0	0
		44		60"			Brn Tan	Same as above		wet				
		45		60"							0	0	0	0
1316	S-10	46												
		47					Gry	Silty clay Trace VFGR Sand		clay at 45.5'	0	0	0	0
		48												
		49									0	0	0	0
1340		50			EoB					wet				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: (see page 1)

Drilling Area Background (ppm): 0

Converted to Well: Yes ✓ No _____ Well I.D. #: SA-PZ-157I

ATTACHMENT C-2

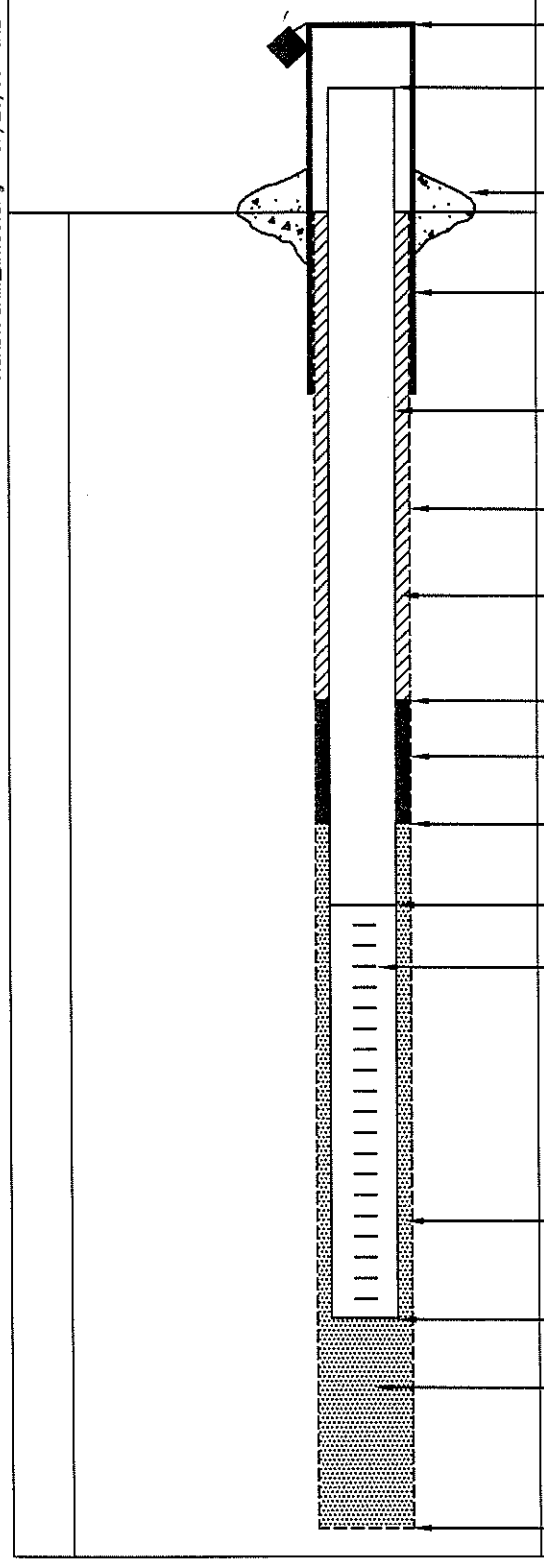
WELL CONSTRUCTION AND DEVELOPMENT LOGS

WELL NO.: SA-PZ-138I1

Tetra Tech NUS, Inc.

OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT NWIRP Colverton	LOCATION Southern Area	DRILLER Evan Moraitis
PROJECT NO. CTO-WE08	BORING PZ-138I1	DRILLING METHOD Geoprobe DPT
DATE BEGUN 6-10-10	DATE COMPLETED 6-10-10	
FIELD GEOLOGIST Vince Shickora		DEVELOPMENT METHOD
GROUND ELEVATION	DATUM	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: /

ELEVATION/HEIGHT OF TOP OF RISER PIPE: /~2.5'

TYPE OF SURFACE SEAL: Grout to surface

I.D. OF SURFACE CASING: None

TYPE OF SURFACE CASING: None

RISER PIPE I.D.: 1 inch

TYPE OF RISER PIPE: Schedule 40 PVC

BOREHOLE DIAMETER: 3 inch

TYPE OF BACKFILL: Cement/Bentonite Grout

ELEVATION/DEPTH TOP OF SEAL: /32'

TYPE OF SEAL: 3/8" Bentonite Holeplug

DEPTH TOP OF SAND PACK: 35'

ELEVATION/DEPTH TOP OF SCREEN: /37'

TYPE OF SCREEN: Schedule 40 PVC prepack

SLOT SIZE x LENGTH: 0.01" X 5'

I.D. OF SCREEN: 1 inch (prepack)

TYPE OF SAND PACK: #1 Silica Quartz

ELEVATION/DEPTH BOTTOM OF SCREEN: /42'

ELEVATION/DEPTH BOTTOM OF SAND PACK: /42'

BACKFILL MATERIAL BELOW SAND: Natural formation material

ELEVATION/DEPTH OF HOLE: /42'

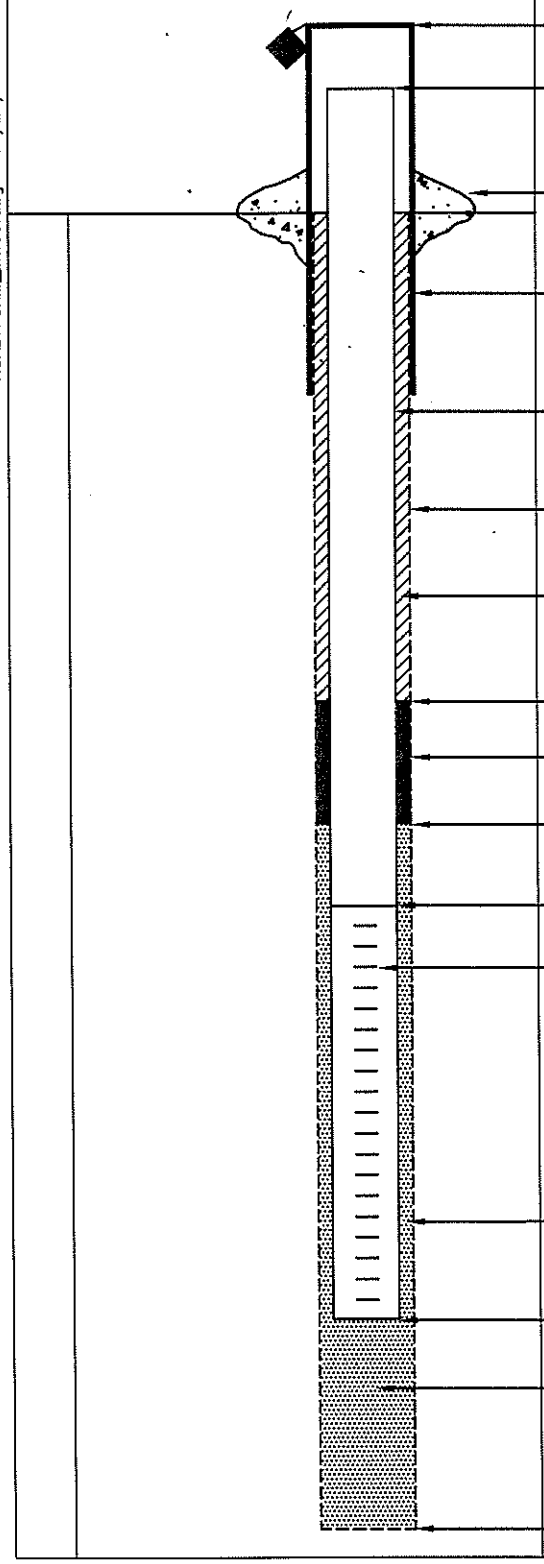
ACAD:FORM_MWSU.dwg 07/20/99 INL

WELL NO.: SA-PZ-149I1

Tetra Tech NUS, Inc.

OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT NWIRP Calverton	LOCATION Southern Area	DRILLER Even Moraitis
PROJECT NO. CTO-WE08	BORING PZ-149I1	DRILLING METHOD Geoprobe DPT
DATE BEGUN 6-9-10	DATE COMPLETED 6-10-10	
FIELD GEOLOGIST Venice Shickora		DEVELOPMENT METHOD
GROUND ELEVATION	DATUM	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: /

ELEVATION/HEIGHT OF TOP OF RISER PIPE: /~2.5'

TYPE OF SURFACE SEAL: Grout to surface

I.D. OF SURFACE CASING: None

TYPE OF SURFACE CASING: None

RISER PIPE I.D.: 1 inch

TYPE OF RISER PIPE: schedule 40 PVC

BOREHOLE DIAMETER: 3 inch

TYPE OF BACKFILL: Cement/Bentonite Grout

ELEVATION/DEPTH TOP OF SEAL: /27'

TYPE OF SEAL: 3/8" Bentonite Holeplug

DEPTH TOP OF SAND PACK: 30'

ELEVATION/DEPTH TOP OF SCREEN: /32'

TYPE OF SCREEN: schedule 40 PVC prepack

SLOT SIZE x LENGTH: 0.01" X 5'

I.D. OF SCREEN: 1 inch (prepack)

TYPE OF SAND PACK: #1 Silica Quartz

ELEVATION/DEPTH BOTTOM OF SCREEN: /37'

ELEVATION/DEPTH BOTTOM OF SAND PACK: /37'

BACKFILL MATERIAL BELOW SAND: Natural formation material

ELEVATION/DEPTH OF HOLE: /37'

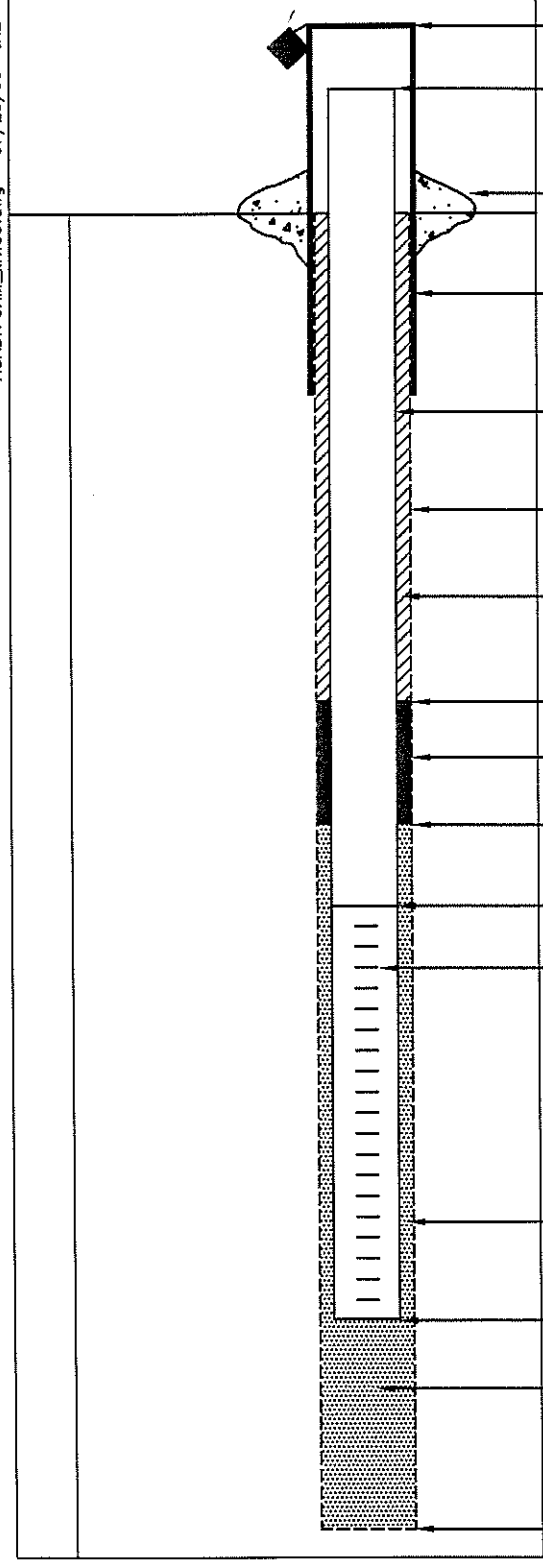
ACAD:FORM_MWSU.dwg 07/28/99 INL

WELL NO.: SA-PZ-150I1

Tetra Tech NUS, Inc.

OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT NWIRP Calverton	LOCATION Southern Area	DRILLER Evan Moratis
PROJECT NO. CTO-WE08	BORING PZ-150I1	DRILLING METHOD Geoprobe DPT
DATE BEGUN 6-10-10	DATE COMPLETED 6-10-10	
FIELD GEOLOGIST Vince Shickora		DEVELOPMENT METHOD
GROUND ELEVATION	DATUM	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 1

ELEVATION/HEIGHT OF TOP OF RISER PIPE: 1~2.5'

TYPE OF SURFACE SEAL: Grout to Surface

I.D. OF SURFACE CASING: None

TYPE OF SURFACE CASING: None

RISER PIPE I.D.: 1 inch

TYPE OF RISER PIPE: Schedule 40 PVC

BOREHOLE DIAMETER: 3 inch

TYPE OF BACKFILL: Cement/Bentonite Grout

ELEVATION/DEPTH TOP OF SEAL: 130'

TYPE OF SEAL: 3/8" Bentonite Holeplug

DEPTH TOP OF SAND PACK: 33'

ELEVATION/DEPTH TOP OF SCREEN: 135'

TYPE OF SCREEN: Schedule 40 PVC prepack

SLOT SIZE x LENGTH: 0.01" X 5'

I.D. OF SCREEN: 1 inch (prepack)

TYPE OF SAND PACK: #1 Silica Quartz

ELEVATION/DEPTH BOTTOM OF SCREEN: 140'

ELEVATION/DEPTH BOTTOM OF SAND PACK: 140'

BACKFILL MATERIAL BELOW SAND: Natural Formation Material

ELEVATION/DEPTH OF HOLE: 140'

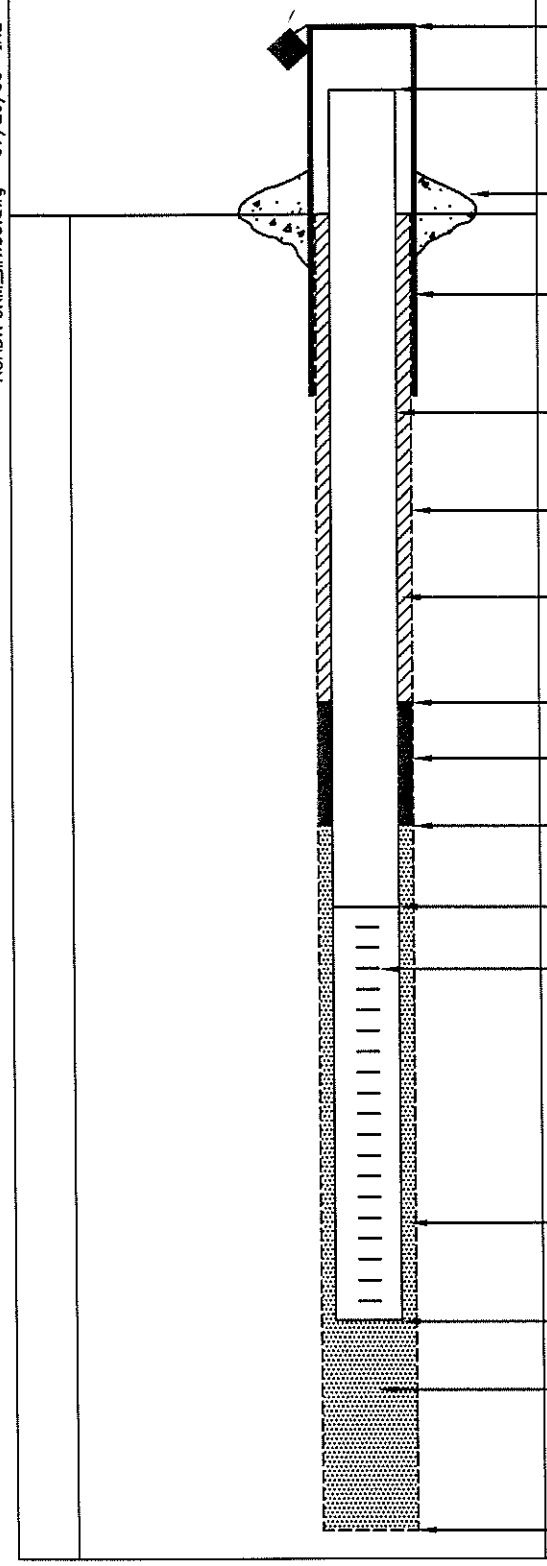
ACAD:FORM_MWSU.dwg 07/28/99 INL

WELL NO.: SA-PZ-151I1

Tetra Tech NUS, Inc.

OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT DWIRP Calverton	LOCATION Southern Area	DRILLER Evan Moraitis
PROJECT NO. CTO-WE08	BORING PZ-151I2	DRILLING METHOD Geoprobe DPT
DATE BEGUN 6-9-10	DATE COMPLETED 6-10-10	
FIELD GEOLOGIST Vince Shickora		DEVELOPMENT METHOD
GROUND ELEVATION	DATUM	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 1

ELEVATION/HEIGHT OF TOP OF RISER PIPE: 1~2.5'

TYPE OF SURFACE SEAL: Grout to surface

I.D. OF SURFACE CASING: None

TYPE OF SURFACE CASING: None

RISER PIPE I.D.: 1 inch

TYPE OF RISER PIPE: Schedule 40 PVC

BOREHOLE DIAMETER: 3 inch

TYPE OF BACKFILL: Cement/Bentonite Grout

ELEVATION/DEPTH TOP OF SEAL: 130'

TYPE OF SEAL: 3/8" Bentonite Holeplug

DEPTH TOP OF SAND PACK: 33'

ELEVATION/DEPTH TOP OF SCREEN: 135'

TYPE OF SCREEN: Schedule 40 PVC prepack

SLOT SIZE x LENGTH: 0.01" x 5'

I.D. OF SCREEN: 1 inch (prepack)

TYPE OF SAND PACK: #1 Silica Quartz

ELEVATION/DEPTH BOTTOM OF SCREEN: 140'

ELEVATION/DEPTH BOTTOM OF SAND PACK: 140'

BACKFILL MATERIAL BELOW SAND: Natural Formation Material

ELEVATION/DEPTH OF HOLE: 140'

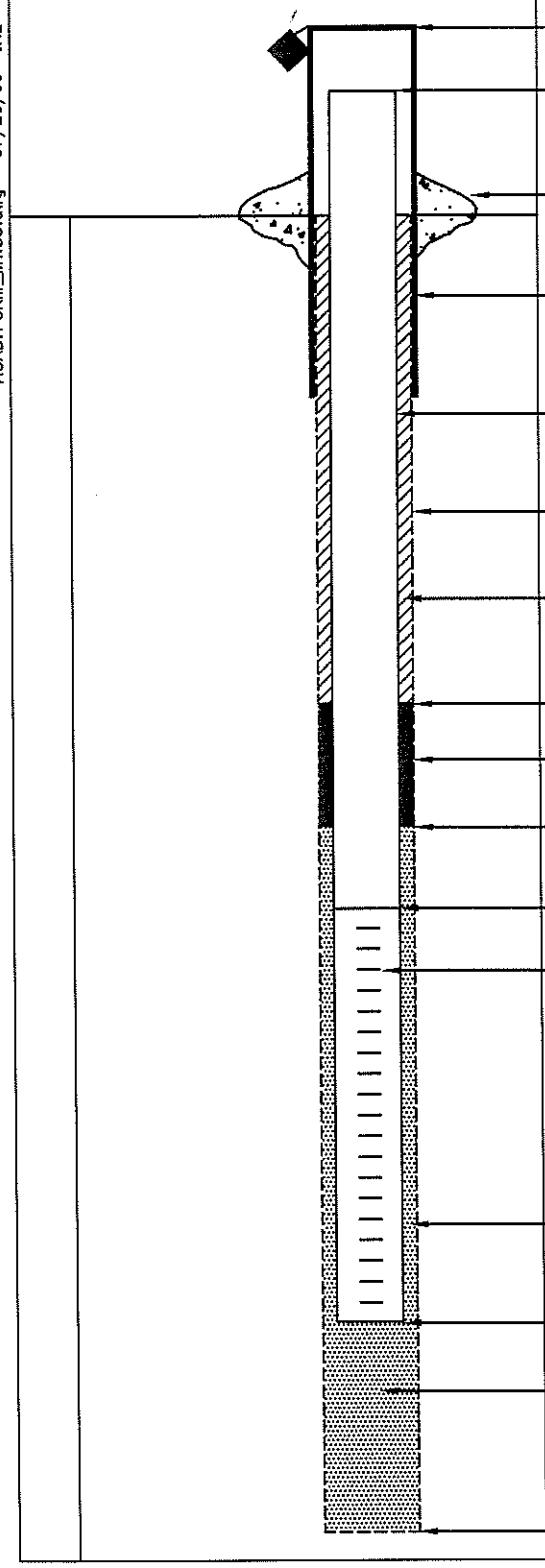
ACAD:FORM_MWSU.dwg 07/20/99 INL

WELL NO.: SA-PZ-152I1

Tetra Tech NUS, Inc.

OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT NWIRP Calverton	LOCATION Southern Area	DRILLER Even Morzitis
PROJECT NO. CTO-WE08	BORING PZ-152I1	DRILLING METHOD Geoprobe DPT
DATE BEGUN 6-9-10	DATE COMPLETED 6-9-10	
FIELD GEOLOGIST Vince Shickora		DEVELOPMENT METHOD
GROUND ELEVATION	DATUM	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: /

ELEVATION/HEIGHT OF TOP OF RISER PIPE: /+2.5'

TYPE OF SURFACE SEAL: Grout to surface

I.D. OF SURFACE CASING: None

TYPE OF SURFACE CASING: None

RISER PIPE I.D.: 1 inch

TYPE OF RISER PIPE: Schedule 40 PVC

BOREHOLE DIAMETER: 3 inch

TYPE OF BACKFILL: Cement/Bentonite Grout

ELEVATION/DEPTH TOP OF SEAL: /30'

TYPE OF SEAL: 3/8" Bentonite Holeplug

DEPTH TOP OF SAND PACK: 33'

ELEVATION/DEPTH TOP OF SCREEN: /35'

TYPE OF SCREEN: Schedule 40 PVC prepack

SLOT SIZE x LENGTH: 0.01" X 5'

I.D. OF SCREEN: 1 inch (prepack)

TYPE OF SAND PACK: #1 Silica Quartz

ELEVATION/DEPTH BOTTOM OF SCREEN: /40'

ELEVATION/DEPTH BOTTOM OF SAND PACK: /40'

BACKFILL MATERIAL BELOW SAND: Natural formation material

ELEVATION/DEPTH OF HOLE: /40'

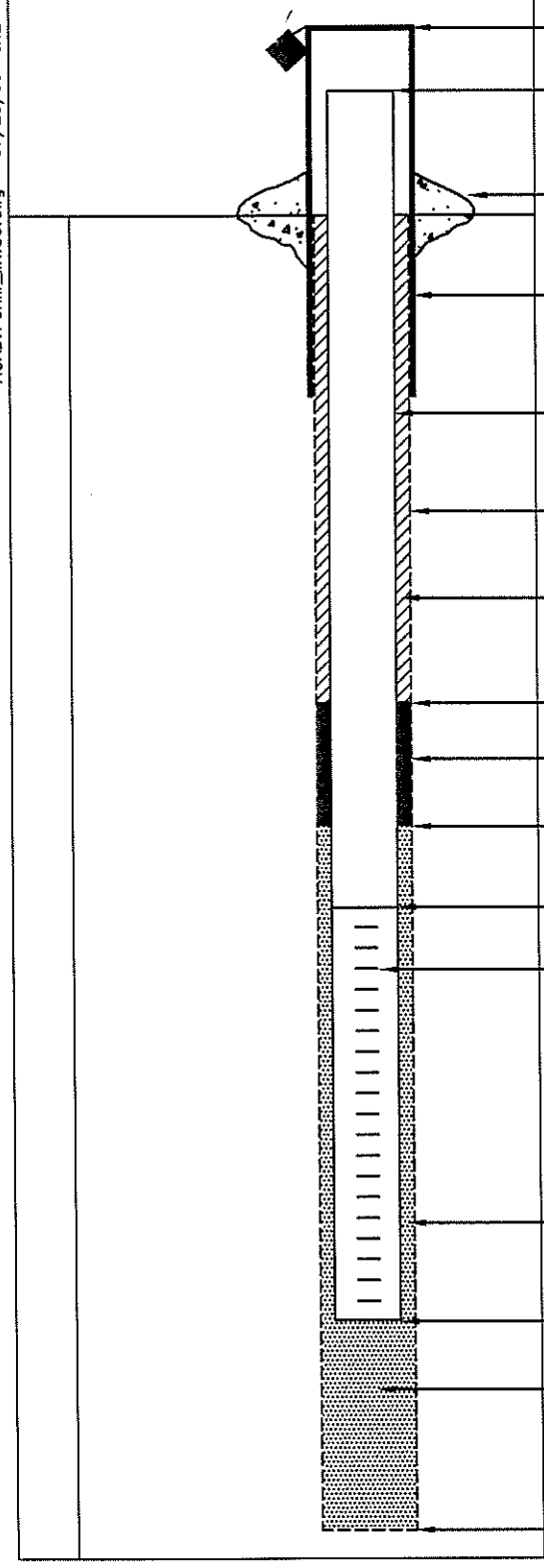
ACAD:FORM_MWSU.dwg 07/20/99 INL

WELL NO.: SA-PZ-153I1

Tetra Tech NUS, Inc.

OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT DWIRP Calverton	LOCATION Southern Area	DRILLER Evan Moraitis
PROJECT NO. CTO-WE08	BORING PZ-153I1	DRILLING METHOD Geoprobe DPT
DATE BEGUN 6-9-10	DATE COMPLETED 6-9-10	
FIELD GEOLOGIST Vince Shickosa		DEVELOPMENT METHOD
GROUND ELEVATION	DATUM	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: /

ELEVATION/HEIGHT OF TOP OF RISER PIPE: ~2.5'

TYPE OF SURFACE SEAL: Grout to surface

I.D. OF SURFACE CASING: None

TYPE OF SURFACE CASING: None

RISER PIPE I.D.: 1 inch

TYPE OF RISER PIPE: Schedule 40 PVC

BOREHOLE DIAMETER: 3 inch

TYPE OF BACKFILL: Cement/Bentonite Grout

ELEVATION/DEPTH TOP OF SEAL: 130'

TYPE OF SEAL: 3/8" Bentonite Holeplug

DEPTH TOP OF SAND PACK: 33'

ELEVATION/DEPTH TOP OF SCREEN: 135'

TYPE OF SCREEN: Schedule 40 PVC prepack

SLOT SIZE x LENGTH: 0.01" X 5'

I.D. OF SCREEN: 1 inch (prepack)

TYPE OF SAND PACK: #1 Silica Quartz

ELEVATION/DEPTH BOTTOM OF SCREEN: 140'

ELEVATION/DEPTH BOTTOM OF SAND PACK: 140'

BACKFILL MATERIAL BELOW SAND: Natural formation material

ELEVATION/DEPTH OF HOLE: 140'

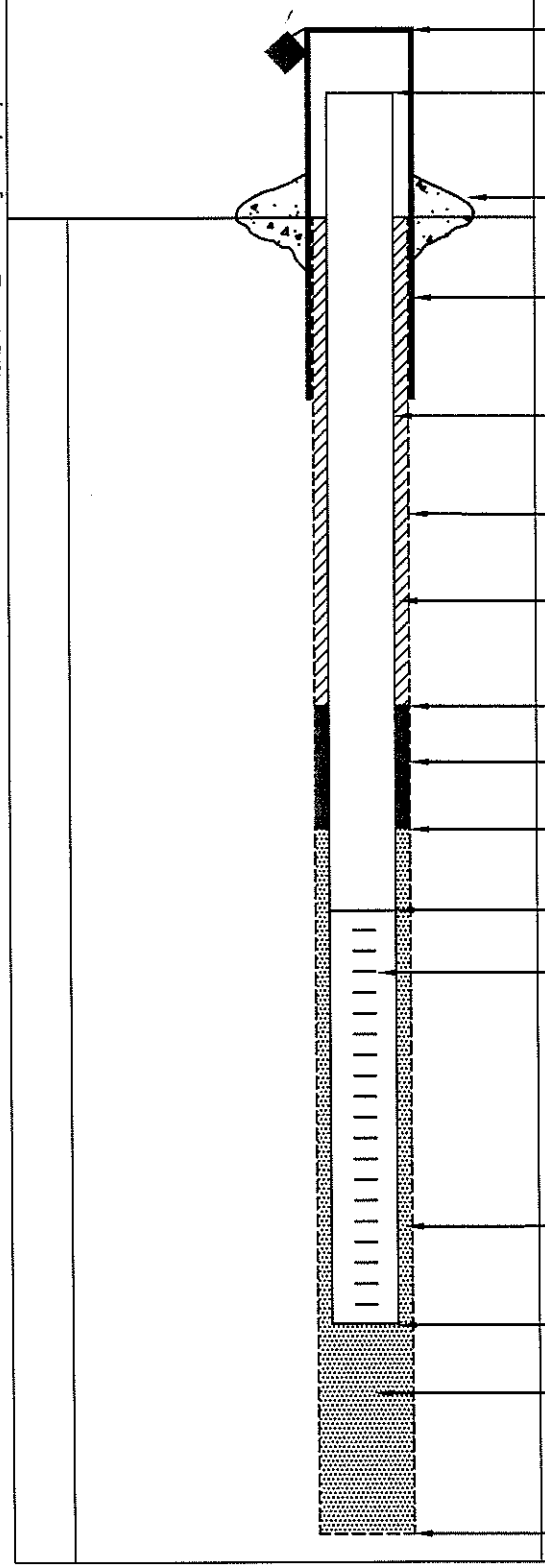
ACAD:FORM_MWSU.dwg 07/28/99 INL

WELL NO.: SA-PZ-154I

Tetra Tech NUS, Inc.

OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT NWIRP Calverton	LOCATION Southern Area	DRILLER Evan Mosaitis
PROJECT NO. CTO-WE08	BORING PZ-154I	DRILLING METHOD Geoprobe DPT
DATE BEGUN 6-8-10	DATE COMPLETED 6-8-10	
FIELD GEOLOGIST Vince Shickora		DEVELOPMENT METHOD
GROUND ELEVATION	DATUM	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 1

ELEVATION/HEIGHT OF TOP OF RISER PIPE: 1.2.5'

TYPE OF SURFACE SEAL: Grout to surface

I.D. OF SURFACE CASING: None

TYPE OF SURFACE CASING: None

RISER PIPE I.D.: 1 inch

TYPE OF RISER PIPE: Schedule 40 PVC

BOREHOLE DIAMETER: 3 inch

TYPE OF BACKFILL: Cement/Bentonite Grout

ELEVATION/DEPTH TOP OF SEAL: 136'

TYPE OF SEAL: 3/8" Bentonite Holeplug

DEPTH TOP OF SAND PACK: 39'

ELEVATION/DEPTH TOP OF SCREEN: 141'

TYPE OF SCREEN: Schedule 40 PVC prepack

SLOT SIZE x LENGTH: 0.01" x 5'

I.D. OF SCREEN: 1 inch prepack

TYPE OF SAND PACK: #1 Silica Quartz

ELEVATION/DEPTH BOTTOM OF SCREEN: 146'

ELEVATION/DEPTH BOTTOM OF SAND PACK: 146'

BACKFILL MATERIAL BELOW SAND: Natural Formation Material

ELEVATION/DEPTH OF HOLE: 146'

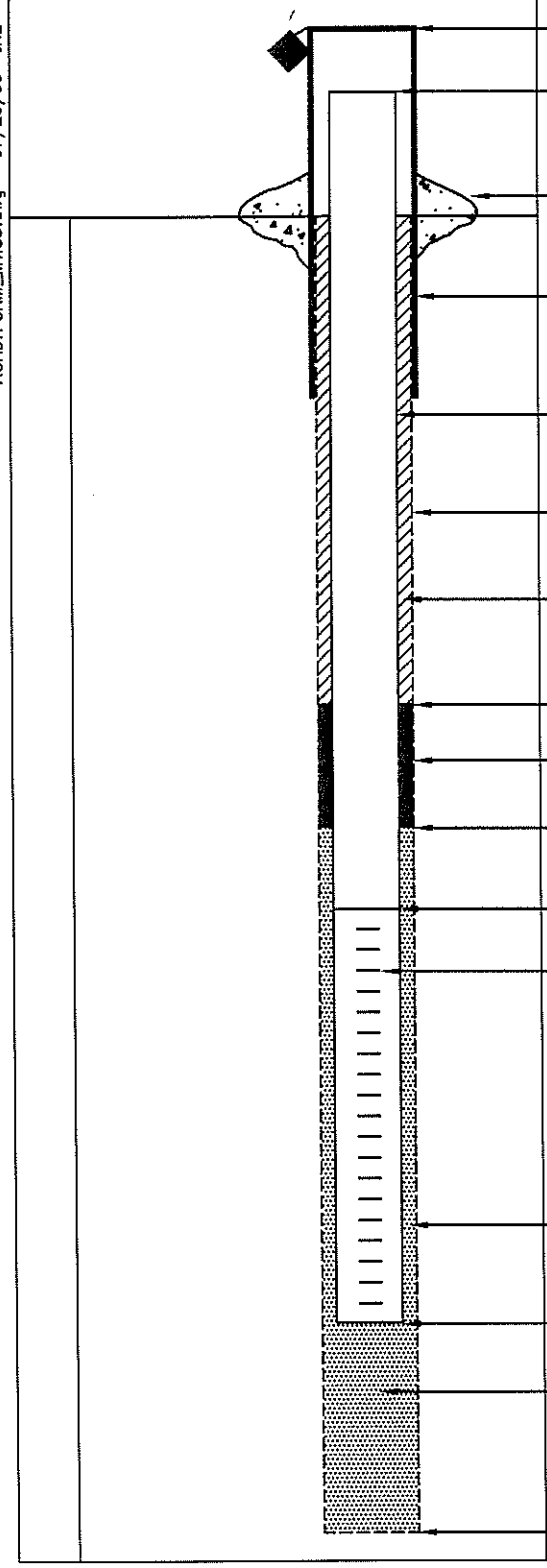
ACAD: FORM_MWSU.dwg 07/28/99 INL

WELL NO.: SA-PZ-155I

Tetra Tech NUS, Inc.

OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT NWIRP Calverton	LOCATION Southern Area	DRILLER Evan Matsatis
PROJECT NO. CTO-WE08	BORING PZ-155I	DRILLING METHOD Geoprobe DPT
DATE BEGUN 6-9-10	DATE COMPLETED 6-9-10	
FIELD GEOLOGIST Vince Shickota		DEVELOPMENT METHOD
GROUND ELEVATION	DATUM	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: /

ELEVATION/HEIGHT OF TOP OF RISER PIPE: /~2.5'

TYPE OF SURFACE SEAL: Grout to surface

I.D. OF SURFACE CASING: None

TYPE OF SURFACE CASING: None

RISER PIPE I.D.: 1 inch

TYPE OF RISER PIPE: Schedule 40 PVC

BOREHOLE DIAMETER: 3 inch

TYPE OF BACKFILL: Cement/Bentonite Grout

ELEVATION/DEPTH TOP OF SEAL: /36'

TYPE OF SEAL: 3/8" Bentonite Holeplug

DEPTH TOP OF SAND PACK: 39'

ELEVATION/DEPTH TOP OF SCREEN: /41'

TYPE OF SCREEN: Schedule 40 PVC prepack

SLOT SIZE x LENGTH: 0.01" x 5'

I.D. OF SCREEN: 1 inch (prepack)

TYPE OF SAND PACK: #1 Silica Quartz

ELEVATION/DEPTH BOTTOM OF SCREEN: /46'

ELEVATION/DEPTH BOTTOM OF SAND PACK: /46'

BACKFILL MATERIAL BELOW SAND: Natural formation material

ELEVATION/DEPTH OF HOLE: /46'

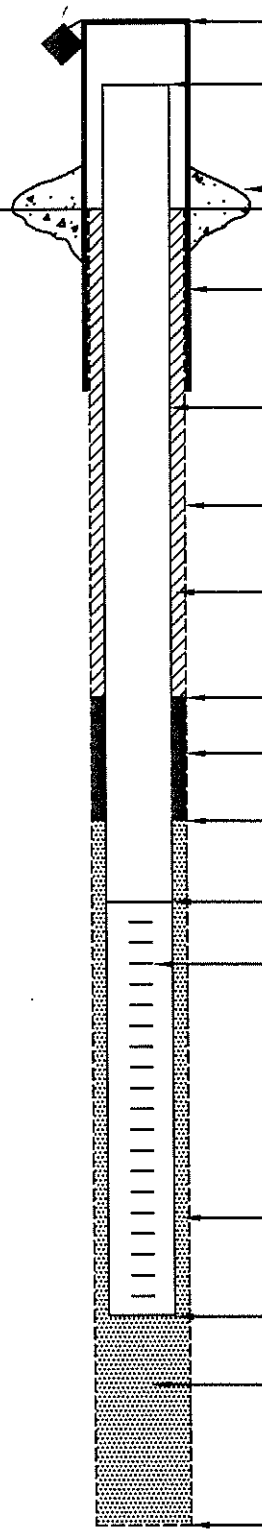
ACAD:FORM_MWSU.dwg 07/20/99 INL

WELL NO.: SA-PZ-156I

Tetra Tech NUS, Inc.

OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT NWIRP Calverton	LOCATION Southern Area	DRILLER Evan Morsitis
PROJECT NO. CTO-WE08	BORING PZ-156I	DRILLING METHOD Geoprobe DPT
DATE BEGUN 6-9-10	DATE COMPLETED 6-9-10	
FIELD GEOLOGIST Vince Shickora		DEVELOPMENT METHOD
GROUND ELEVATION	DATUM	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: /

ELEVATION/HEIGHT OF TOP OF RISER PIPE: /+2.5'

TYPE OF SURFACE SEAL: Grout to surface

I.D. OF SURFACE CASING: None

TYPE OF SURFACE CASING: None

RISER PIPE I.D.: 1 inch

TYPE OF RISER PIPE: schedule 40 PVC

BOREHOLE DIAMETER: 3 inch

TYPE OF BACKFILL: Cement/Bentonite Grout

ELEVATION/DEPTH TOP OF SEAL: /36'

TYPE OF SEAL: 3/8" Bentonite Holeplug

DEPTH TOP OF SAND PACK: 39'

ELEVATION/DEPTH TOP OF SCREEN: /41'

TYPE OF SCREEN: Schedule 40 PVC prepack

SLOT SIZE x LENGTH: 0.01" X 5'

I.D. OF SCREEN: 1 inch (prepack)

TYPE OF SAND PACK: #1 Silica Quartz

ELEVATION/DEPTH BOTTOM OF SCREEN: /46'

ELEVATION/DEPTH BOTTOM OF SAND PACK: /46'

BACKFILL MATERIAL BELOW SAND: Natural formation Material

ELEVATION/DEPTH OF HOLE: /46'

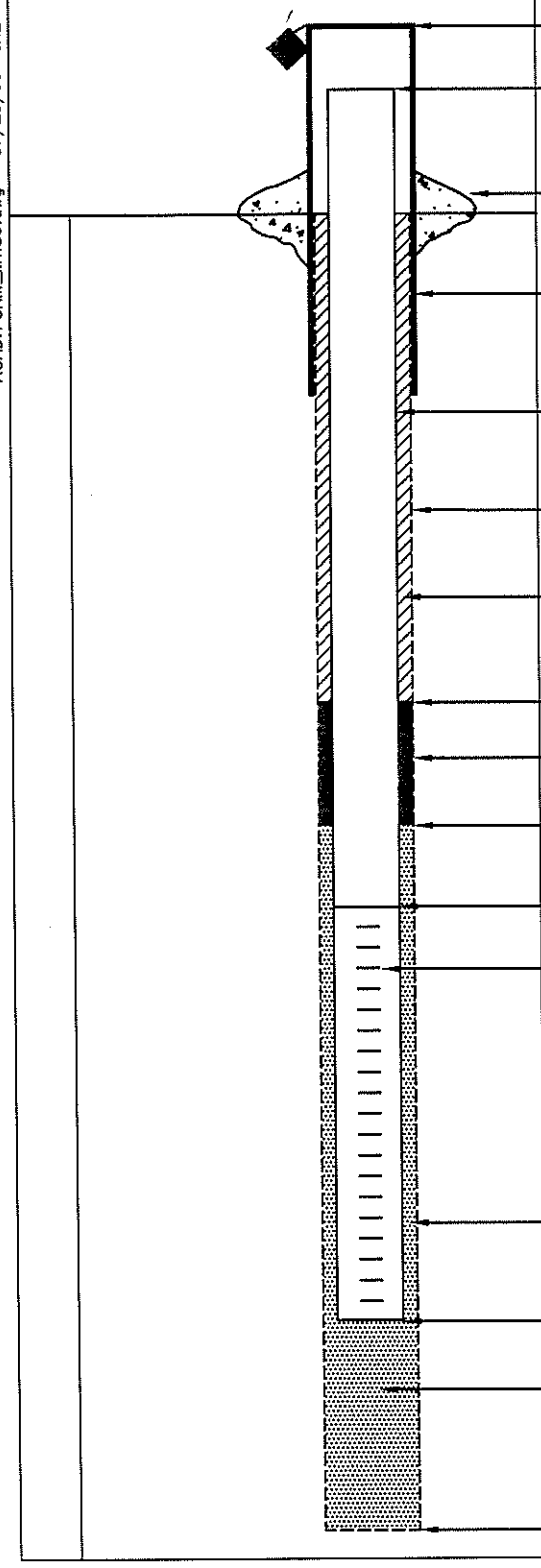
ACAD:FORM_MWSU.dwg 07/28/99 INL

WELL NO.: SA-PZ-157II

Tetra Tech NUS, Inc.

OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT HWIRP Calverton	LOCATION Southern Area	DRILLER Evan Mosaitis
PROJECT NO. 112602045	BORING PZ-157II	DRILLING METHOD Geoprobe DPT
DATE BEGUN 6-7-10	DATE COMPLETED 6-7-10	DEVELOPMENT METHOD
FIELD GEOLOGIST Vince Shickora		
GROUND ELEVATION	DATUM	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: /

ELEVATION/HEIGHT OF TOP OF RISER PIPE: /~2.5'

TYPE OF SURFACE SEAL: Grout to surface

I.D. OF SURFACE CASING: None
TYPE OF SURFACE CASING: None

RISER PIPE I.D.: 1 inch
TYPE OF RISER PIPE: Schedule 40 PVC

BOREHOLE DIAMETER: 3 inch

TYPE OF BACKFILL: Cement/Bentonite Grout

ELEVATION/DEPTH TOP OF SEAL: /28'

TYPE OF SEAL: 3/8" Bentonite Holeplug

DEPTH TOP OF SAND PACK: 31'

ELEVATION/DEPTH TOP OF SCREEN: /33'

TYPE OF SCREEN: Schedule 40 PVC (prepack)

SLOT SIZE x LENGTH: 0.01" x 5 feet

I.D. OF SCREEN: 1" ("Pre-pack")

TYPE OF SAND PACK: #1 Silica Quartz

ELEVATION/DEPTH BOTTOM OF SCREEN: /38'

ELEVATION/DEPTH BOTTOM OF SAND PACK: /38'

BACKFILL MATERIAL BELOW SAND: Natural formation

ELEVATION/DEPTH OF HOLE: /38'

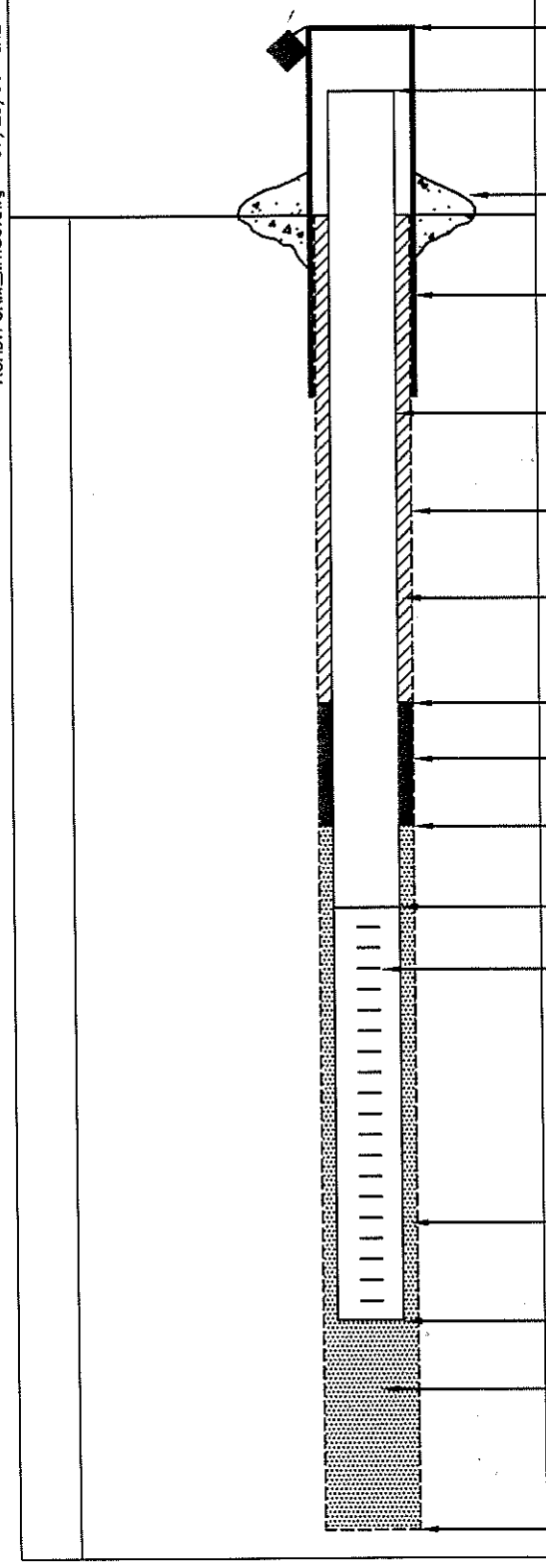
ACAD:FORM_MWSU.dwg 07/20/99 INL

WELL NO.: SA-PZ-157I

Tetra Tech NUS, Inc.

OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT NWIRP Calverton	LOCATION Southern Area	DRILLER Evan Moratis
PROJECT NO. CTO-WE08	BORING SA-PZ-157	DRILLING METHOD Geoprobe DPT
DATE BEGUN 6-4-10	DATE COMPLETED 6-7-10	
FIELD GEOLOGIST Vince Shickora		DEVELOPMENT METHOD
GROUND ELEVATION	DATUM	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 122.5'

ELEVATION/HEIGHT OF TOP OF RISER PIPE: /

TYPE OF SURFACE SEAL: None
Grout to surface

I.D. OF SURFACE CASING: None
TYPE OF SURFACE CASING: None

RISER PIPE I.D.: 1" PVC
TYPE OF RISER PIPE: Schedule 40 PVC

BOREHOLE DIAMETER: 3.25"

TYPE OF BACKFILL: Cement / Bentonite Grout

ELEVATION/DEPTH TOP OF SEAL: 136'

TYPE OF SEAL: 3/8" Bentonite Holeplug

DEPTH TOP OF SAND PACK: 39'

ELEVATION/DEPTH TOP OF SCREEN: 141'

TYPE OF SCREEN: Schedule 40 PVC (prepack)

SLOT SIZE x LENGTH: 0.01" X 5 Feet

I.D. OF SCREEN: 1 inch "Prepack"

TYPE OF SAND PACK: #1 Silica Quartz

ELEVATION/DEPTH BOTTOM OF SCREEN: 146'

ELEVATION/DEPTH BOTTOM OF SAND PACK: 146'

BACKFILL MATERIAL BELOW SAND: Natural formation material

ELEVATION/DEPTH OF HOLE: 146'

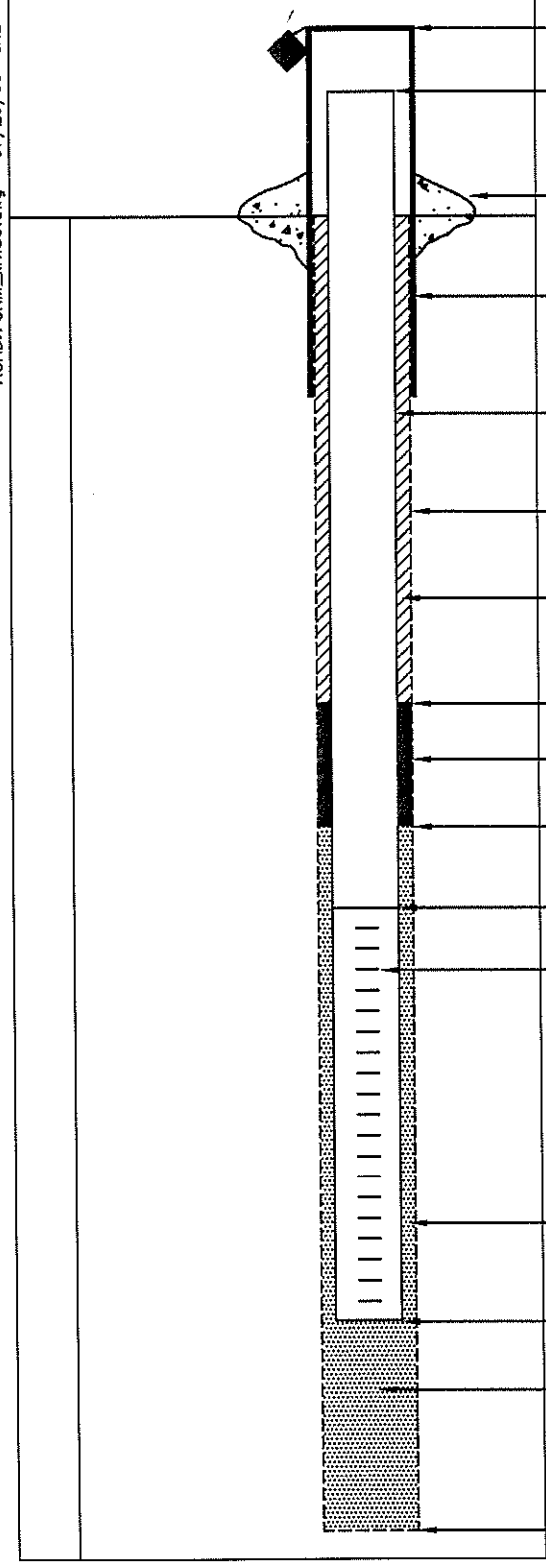
ACAD:FORM_MWSU.dwg 07/20/99 INL

WELL NO.: SA-PZ-158I1

Tetra Tech NUS, Inc.

OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT NWIRP Calverton	LOCATION Southern Area	DRILLER Evan Mosaitis
PROJECT NO. CTO-WE08	BORING PZ-158I1	DRILLING METHOD Geoprobe DPT
DATE BEGUN 6-8-10	DATE COMPLETED 6-8-10	
FIELD GEOLOGIST Vince Shickora		DEVELOPMENT METHOD
GROUND ELEVATION	DATUM	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 1

ELEVATION/HEIGHT OF TOP OF RISER PIPE: 1~2.5'

TYPE OF SURFACE SEAL: Grout to surface

I.D. OF SURFACE CASING: None

TYPE OF SURFACE CASING: None

RISER PIPE I.D.: 1 inch

TYPE OF RISER PIPE: schedule 40 PVC

BOREHOLE DIAMETER: 3 inch

TYPE OF BACKFILL: Cement/Bentonite Grout

ELEVATION/DEPTH TOP OF SEAL: 126'

TYPE OF SEAL:

DEPTH TOP OF SAND PACK: 30.5

ELEVATION/DEPTH TOP OF SCREEN: 133'

TYPE OF SCREEN: schedule 40 PVC prepack

SLOT SIZE x LENGTH: 0.01" x 5'

I.D. OF SCREEN: 1 inch prepack

TYPE OF SAND PACK: #1 Silica Quartz

ELEVATION/DEPTH BOTTOM OF SCREEN: 138'

ELEVATION/DEPTH BOTTOM OF SAND PACK: 138'

BACKFILL MATERIAL BELOW SAND: Natural formation material

ELEVATION/DEPTH OF HOLE: 138'

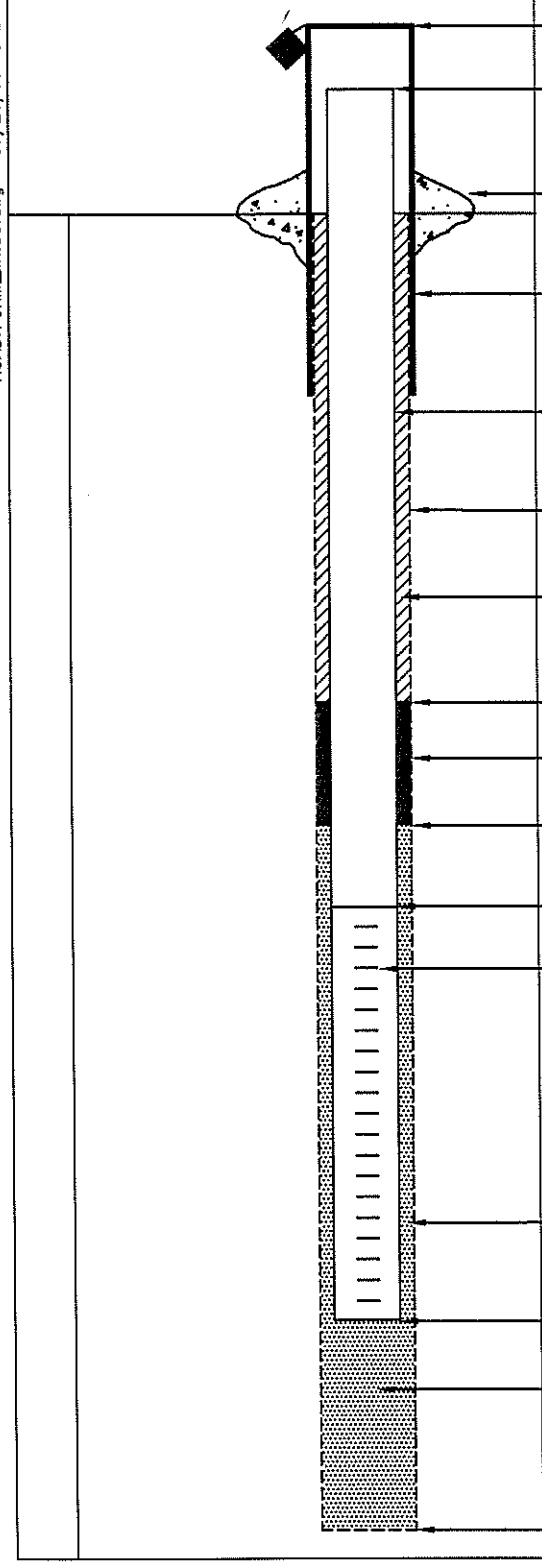
ACAD:FORM_MWSU.dwg 07/20/99 INL

WELL NO.: SA-PZ-158I

Tetra Tech NUS, Inc.

OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT NWIRP Calverton	LOCATION Southern Area	DRILLER Evan Moraitis
PROJECT NO. 16260 2045	BORING PZ-158I	DRILLING METHOD Geoprobe DPT
DATE BEGUN 6-7-10	DATE COMPLETED 6-7-10	
FIELD GEOLOGIST Vince Shickora		DEVELOPMENT METHOD
GROUND ELEVATION	DATUM	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 1

ELEVATION/HEIGHT OF TOP OF RISER PIPE: 1 ~2.5'

TYPE OF SURFACE SEAL: NA
Grout to surface

I.D. OF SURFACE CASING: None
TYPE OF SURFACE CASING: None

RISER PIPE I.D.: 1 inch
TYPE OF RISER PIPE: Schedule 40 PVC

BOREHOLE DIAMETER: 3.25"

TYPE OF BACKFILL: Cement / Bentonite Grout

ELEVATION/DEPTH TOP OF SEAL: 136'

TYPE OF SEAL: 3/8" Bentonite Holeplug

DEPTH TOP OF SAND PACK: 39'

ELEVATION/DEPTH TOP OF SCREEN: 141'

TYPE OF SCREEN: Schedule 40 PVC Prepack

SLOT SIZE x LENGTH: 0.01" X 5'

I.D. OF SCREEN: 1 inch ("prepack")

TYPE OF SAND PACK: #1 Silica Quartz

ELEVATION/DEPTH BOTTOM OF SCREEN: 146'

ELEVATION/DEPTH BOTTOM OF SAND PACK: 146'

BACKFILL MATERIAL BELOW SAND:
Natural formation Material

ELEVATION/DEPTH OF HOLE: 146'

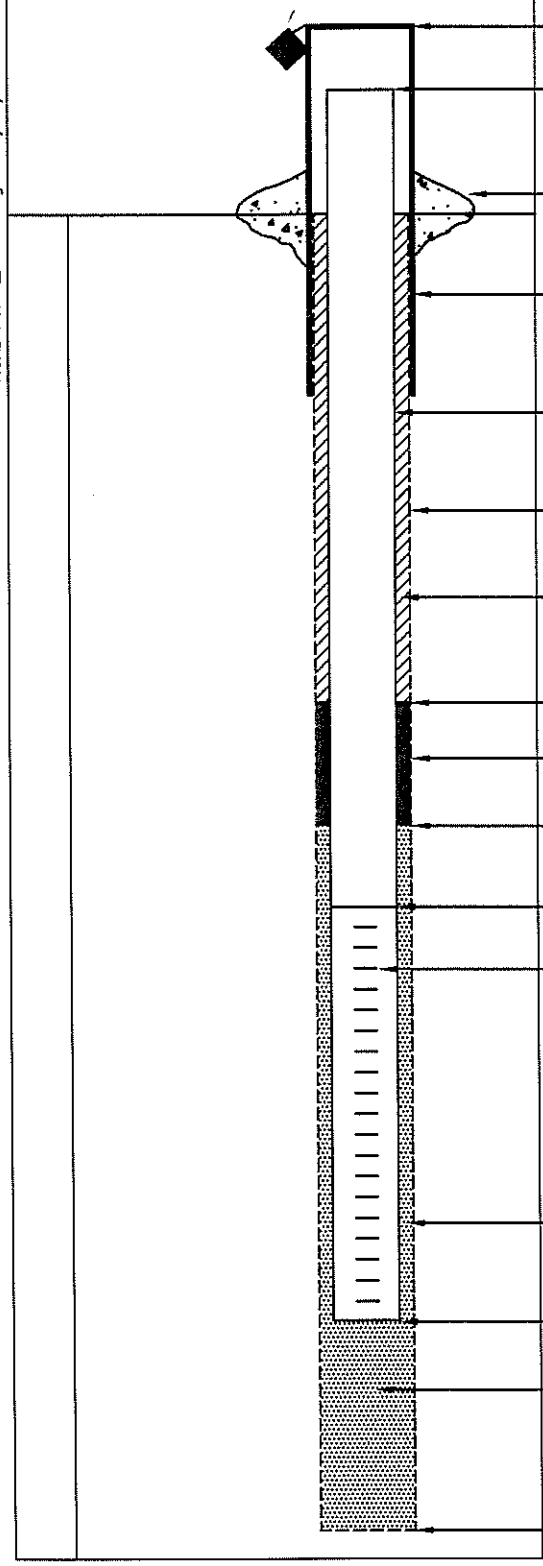
ACAD:FORM_MWSU.dwg 07/20/99 INL

WELL NO.: SA-PZ-159I1

Tetra Tech NUS, Inc.

OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT NWIRP Calverton	LOCATION Southern Area	DRILLER Evan Matarrita
PROJECT NO. CTO-WE08	BORING SA-PZ-159I1	DRILLING METHOD Geoprobe DPT
DATE BEGUN 6-7-10	DATE COMPLETED 6-8-10	
FIELD GEOLOGIST Vince Shickora		DEVELOPMENT METHOD
GROUND ELEVATION	DATUM	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 1

ELEVATION/HEIGHT OF TOP OF RISER PIPE: 1~2.5'

TYPE OF SURFACE SEAL: Grout to surface

I.D. OF SURFACE CASING: None

TYPE OF SURFACE CASING: None

RISER PIPE I.D.: 1 inch

TYPE OF RISER PIPE: Schedule 40 PVC

BOREHOLE DIAMETER: 3 inch

TYPE OF BACKFILL: Cement/Bentonite Grout

ELEVATION/DEPTH TOP OF SEAL: 128'

TYPE OF SEAL: 3/8" Bentonite Holeplug

DEPTH TOP OF SAND PACK: 31'

ELEVATION/DEPTH TOP OF SCREEN: 133'

TYPE OF SCREEN: Schedule 40 PVC prepack

SLOT SIZE x LENGTH: 0.01" X 5'

I.D. OF SCREEN: 1" Prepack

TYPE OF SAND PACK: #1 Silica Quartz

ELEVATION/DEPTH BOTTOM OF SCREEN: 138'

ELEVATION/DEPTH BOTTOM OF SAND PACK: 138'

BACKFILL MATERIAL BELOW SAND: Native formation material

ELEVATION/DEPTH OF HOLE: 138'

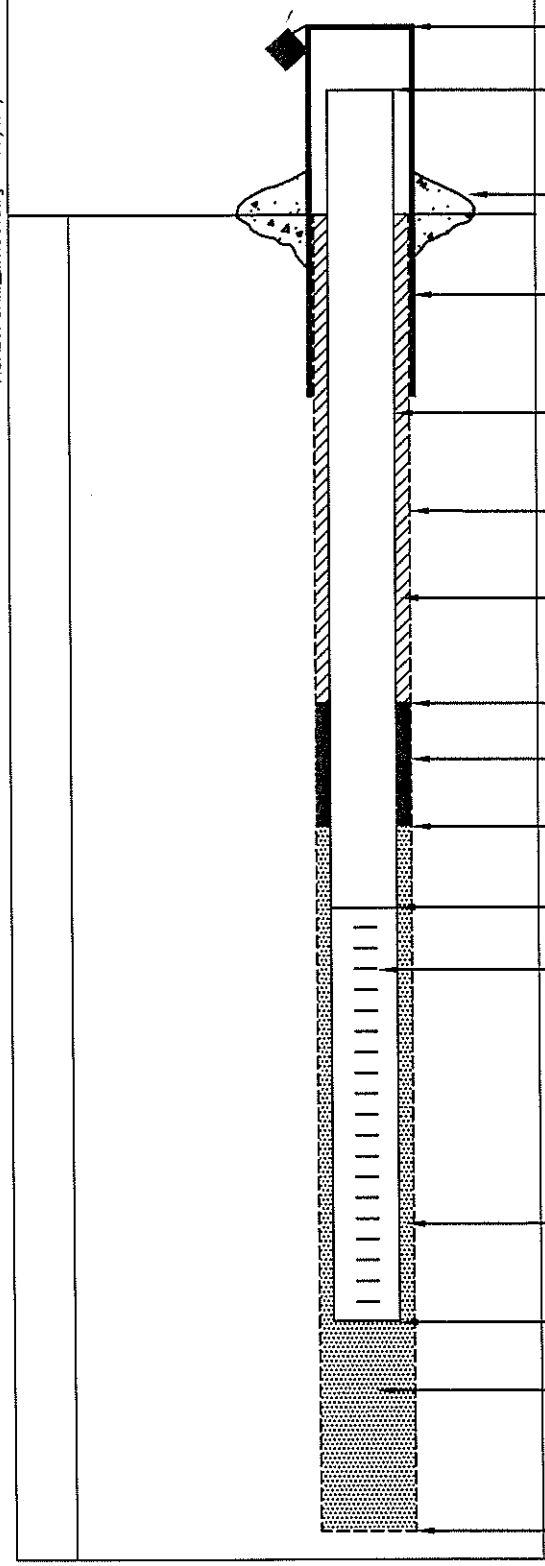
ACAD:FORM_MWSU.dwg 07/20/99 INL

WELL NO.: SA-PZ-159I

Tetra Tech NUS, Inc.

OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT NWIRP Calverton	LOCATION Southern Area	DRILLER Evan Moraites
PROJECT NO. CTO-WE08	BORING PZ-159I	DRILLING METHOD Geoprobe DPT
DATE BEGUN 6-7-10	DATE COMPLETED 6-8-10	
FIELD GEOLOGIST Vince Shickora		DEVELOPMENT METHOD
GROUND ELEVATION	DATUM	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 1

ELEVATION/HEIGHT OF TOP OF RISER PIPE: 1 ~2.5'

TYPE OF SURFACE SEAL: Grout to surface

I.D. OF SURFACE CASING: None

TYPE OF SURFACE CASING: None

RISER PIPE I.D.: 1 inch.

TYPE OF RISER PIPE: Schedule 40 PVC

BOREHOLE DIAMETER: 3 inch

TYPE OF BACKFILL: Cement/Bentonite Grout

ELEVATION/DEPTH TOP OF SEAL: 136'

TYPE OF SEAL: 3/8" Bentonite Holeplug

DEPTH TOP OF SAND PACK: 39'

ELEVATION/DEPTH TOP OF SCREEN: 141'

TYPE OF SCREEN: Schedule 40 PVC Prepack

SLOT SIZE x LENGTH: 0.01" X 5'

I.D. OF SCREEN: 1 inch prepack

TYPE OF SAND PACK: #1 Silica Quartz

ELEVATION/DEPTH BOTTOM OF SCREEN: 146'

ELEVATION/DEPTH BOTTOM OF SAND PACK: 146'

BACKFILL MATERIAL BELOW SAND: Natural formation material

ELEVATION/DEPTH OF HOLE: 146'

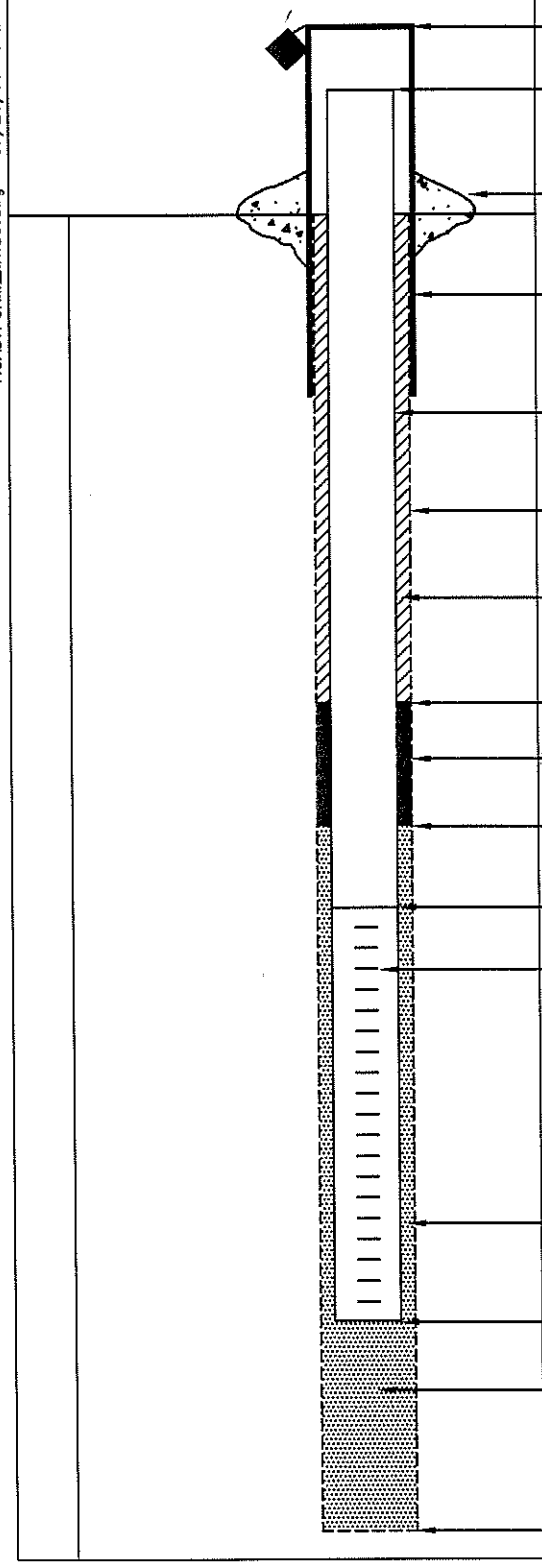
ACAD:FORM_MWSU.dwg 07/20/99 INL

WELL NO.: SA-PZ-160I

Tetra Tech NUS, Inc.

OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT NWIRP Calverton	LOCATION Southern Area	DRILLER Evan Moriartis
PROJECT NO. CTO-WE08	BORING PZ-160I	DRILLING METHOD Geoprobe DPT
DATE BEGUN 6-8-10	DATE COMPLETED 6-8-10	
FIELD GEOLOGIST Vince Shickora		DEVELOPMENT METHOD
GROUND ELEVATION	DATUM	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 1

ELEVATION/HEIGHT OF TOP OF RISER PIPE: 1 ~2.5'

TYPE OF SURFACE SEAL: Grout To Surface

I.D. OF SURFACE CASING: None

TYPE OF SURFACE CASING: None

RISER PIPE I.D.: 1 inch

TYPE OF RISER PIPE: Schedule 40 PVC

BOREHOLE DIAMETER: 3 inch

TYPE OF BACKFILL: Cement/Bentonite Grout

ELEVATION/DEPTH TOP OF SEAL: 135'

TYPE OF SEAL: 3/8" Bentonite Holeplug

DEPTH TOP OF SAND PACK: 38.5'

ELEVATION/DEPTH TOP OF SCREEN: 141'

TYPE OF SCREEN:

SLOT SIZE x LENGTH: 0.01" x 5'

I.D. OF SCREEN: 1 inch (prepack)

TYPE OF SAND PACK: #1 Silica Quartz

ELEVATION/DEPTH BOTTOM OF SCREEN: 146'

ELEVATION/DEPTH BOTTOM OF SAND PACK: 146'

BACKFILL MATERIAL BELOW SAND: Natural formation material

ELEVATION/DEPTH OF HOLE: 146'

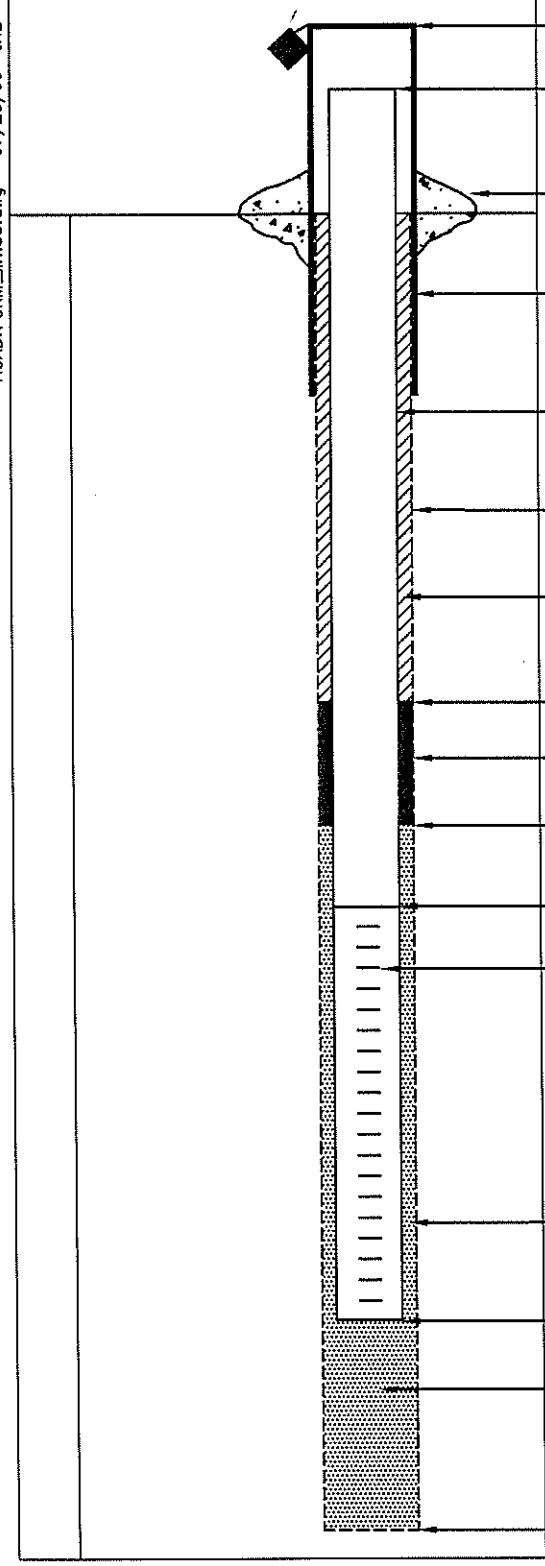
ACAD:FORM_MWSU.dwg 07/28/99 INL

WELL NO.: SA-PZ-160I1

Tetra Tech NUS, Inc.

OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT NWIRP Calverton	LOCATION Southern Area	DRILLER Evan Moraitis
PROJECT NO. CTO-WE08	BORING PZ-160I1	DRILLING METHOD Geoprobe DPT
DATE BEGUN 6-8-10	DATE COMPLETED 6-8-10	
FIELD GEOLOGIST Vince Shickora		DEVELOPMENT METHOD
GROUND ELEVATION	DATUM	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: /

ELEVATION/HEIGHT OF TOP OF RISER PIPE: /~2.0'

TYPE OF SURFACE SEAL: Grout to surface

I.D. OF SURFACE CASING: None

TYPE OF SURFACE CASING: None

RISER PIPE I.D.: 1 inch

TYPE OF RISER PIPE: Schedule 40 PVC

BOREHOLE DIAMETER: 3 inch

TYPE OF BACKFILL: Cement/Bentonite Grout

ELEVATION/DEPTH TOP OF SEAL: /28'

TYPE OF SEAL: 3/8" Bentonite Holeplug

DEPTH TOP OF SAND PACK: 31'

ELEVATION/DEPTH TOP OF SCREEN: /33'

TYPE OF SCREEN: Schedule 40 PVC prepack

SLOT SIZE x LENGTH: 0.01" X 5'

I.D. OF SCREEN: 1 inch (prepack)

TYPE OF SAND PACK: #1 Silica Quartz

ELEVATION/DEPTH BOTTOM OF SCREEN: /38'

ELEVATION/DEPTH BOTTOM OF SAND PACK: /38'

BACKFILL MATERIAL BELOW SAND: Natural formation

ELEVATION/DEPTH OF HOLE: /38'

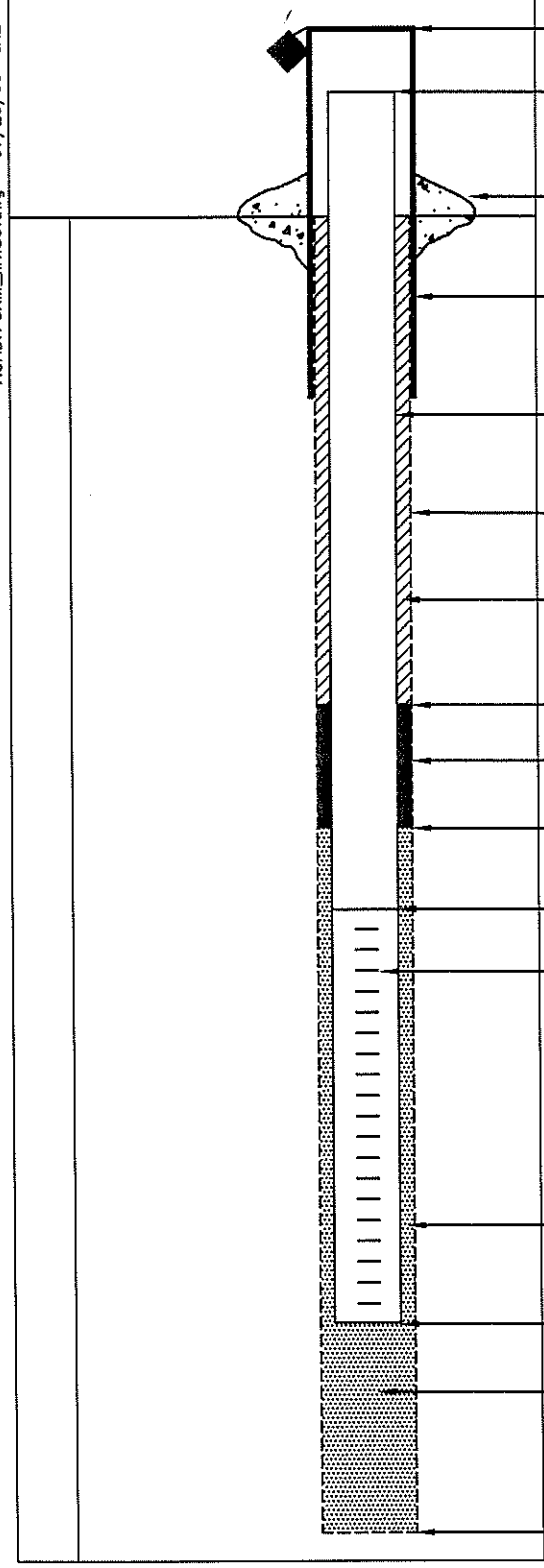
ACAD:FORM_MWSU.dwg 07/20/99 INL

WELL NO.: SA-PZ-161I (VAS)
SA-PZ-161I

Tetra Tech NUS, Inc.

OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT NWIRP Calverton	LOCATION Southern Area	DRILLER Evan Mosaitis
PROJECT NO. CTO-WE08	BORING PZ-161I	DRILLING METHOD Geoprobe & PT
DATE BEGUN 6-10-10	DATE COMPLETED 6-10-10	
FIELD GEOLOGIST Vince Shickora		DEVELOPMENT METHOD
GROUND ELEVATION	DATUM	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: /

ELEVATION/HEIGHT OF TOP OF RISER PIPE: /~2.5'

TYPE OF SURFACE SEAL: Grout to surface

I.D. OF SURFACE CASING: None
TYPE OF SURFACE CASING: None

RISER PIPE I.D.: 1 inch
TYPE OF RISER PIPE: Schedule 40 PVC

BOREHOLE DIAMETER: 3 inch

TYPE OF BACKFILL: Cement / Bentonite Grout

ELEVATION/DEPTH TOP OF SEAL: /36'

TYPE OF SEAL: 3/8" Bentonite Holeplug

DEPTH TOP OF SAND PACK: 39'

ELEVATION/DEPTH TOP OF SCREEN: /41'

TYPE OF SCREEN: Schedule 40 PVC prepack

SLOT SIZE x LENGTH: 0.01" x 5'

I.D. OF SCREEN: 1 inch (prepack)

TYPE OF SAND PACK: #1 Silica Quartz

ELEVATION/DEPTH BOTTOM OF SCREEN: /46'

ELEVATION/DEPTH BOTTOM OF SAND PACK: /46'

BACKFILL MATERIAL BELOW SAND: Natural formation material

ELEVATION/DEPTH OF HOLE: /46'

ACAD:FORM_MWSU.dwg 07/28/99 INL

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: PZ-138I1
Site: On site Southern Area
Date Installed:
Date Developed: 7-1-10
Dev. Method: Check valve
Pump Type:

Depth to Bottom (ft.): 44.62
Static Water Level Before (ft.): 4.73
Static Water Level After (ft.): 4.73
Screen Length (ft.): 5
Specific Capacity:
Casing ID (in.): 1

Responsible Personnel: Jacob Birkett
Drilling Co.: Zebra
Project Name: Calverton
Project Number: 112G02045

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1108			4.73					
1125		2.5		15.92	6.33	0.199	Out of range	
1130		5		13.61	6.41	0.200	257	
1133		7.5		13.34	6.38	0.194	244	
1135		10		13.02	6.35	0.199	502	
1137		12.5		13.55	6.35	0.197	418	
1140		15		12.93	6.35	0.200	249	

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: SA-PZ-149I1
Site: Onsite Southern Area
Date Installed:
Date Developed: 7-1-10
Dev. Method: Check valve
Pump Type:

Depth to Bottom (ft.): 39.13
Static Water Level Before (ft.): 9.27
Static Water Level After (ft.):
Screen Length (ft.): 5
Specific Capacity:
Casing ID (in.): 1

Responsible Personnel: Jacob Birkett
Drilling Co.: Zebra
Project Name: Calverton
Project Number: 112G02045

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1200			9.27					
1202		2.5		14.57	6.45	0.140	out of range	Light brown
1205		5		14.29	6.42	0.135	3176	
1210		7.5		14.84	6.45	0.134	1460	
1213		10		13.59	6.36	0.130	601	
1216		12.5		13.61	6.35	0.130	304	
1220		15	9.29	13.42	6.28	0.126	252	

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: SA-PZ-150I1
Site: NWIRP - Calverton (on site SA)
Date Installed:
Date Developed: 7/6/10
Dev. Method:
Pump Type: Check Valve

Depth to Bottom (ft.): 42.21
Static Water Level Before (ft.): 5.19
Static Water Level After (ft.): 5.20
Screen Length (ft.): 5
Specific Capacity:
Casing ID (in.): 1

Responsible Personnel: Jacob Birkett Chris Fordik
Drilling Co.: Zebra
Project Name: Calverton
Project Number: 126-02045 / 01655

* OOR = Out of Range

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1030		0	5.19	—	—	—	—	
1031		2.5	—	20.06	5.42	0.198	OOR	
1038		5	—	15.41	5.70	0.175	3,470+	
1042		7.5	—	14.83	5.73	0.180	3,706+	
1046		10	—	14.01	5.71	0.160	3,222+	
1049		12.5	—	14.07	5.73	0.155	3,275+	
1052		15	—	14.09	5.74	0.152	2,594+	
1055		17.5	—	13.98	5.76	0.153	1,850	
1058		20	—	13.90	5.77	0.153	1,506	
1102		22.5	—	13.82	5.83	0.154	2,204+	
1105		25	— 5.20	13.74	5.96	0.156	1,762	

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: SA-PZ-1SI1
Site: NWIRP- Calverton (on Site SA)
Date Installed:
Date Developed: 7/6/10
Dev. Method:
Pump Type: Check Valve

Depth to Bottom (ft.): 42.40
Static Water Level Before (ft.): 5.47
Static Water Level After (ft.): 5.50
Screen Length (ft.): 5
Specific Capacity:
Casing ID (in.): 1

Responsible Personnel: Jacob Birkett Chris Fodin
Drilling Co.: Zebra
Project Name: Calverton
Project Number: 112G02045 / 01655

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units µS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1134		0	5.47	—	—	—	—	
1135		2.5	—	16.81	6.08	0.159	12,568 +	
1139		5	—	14.74	5.40	0.150	6,099 +	
1144		7.5	—	14.85	5.68	0.146	467	could be a Fluke (pumping error)
1152		10	—	14.22	5.69	0.147	360	pumping Full screen length
1155		12.5	—	14.31	5.70	0.146	289	
1159		15	5.50	14.07	5.72	0.145	220	

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: SA-PZ-152I1
Site: NWIRP Calverton-SA
Date Installed: On Site
Date Developed: 7/6/10
Dev. Method:
Pump Type: Check Valve

Depth to Bottom (ft.): 42.74
Static Water Level Before (ft.): 6.23
Static Water Level After (ft.): 6.26
Screen Length (ft.): 5
Specific Capacity:
Casing ID (in.): 1

Responsible Personnel: Jacob Birkett Chris Fodin
Drilling Co.: Zebra
Project Name: Calverton
Project Number: 112G02045 / 01655

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1238		0	6.23	—	—	—	—	
1239		2.5	—	18.98	5.86	0.168	3,073 +	
1243		5	—	16.70	5.91	0.125	3,073 +	
1247		7.5	—	15.52	5.66	0.123	352	
1251		10	—	15.17	5.60	0.121	215	
1254		12.5	—	15.71	5.62	0.120	185	
1257		15	6.26	14.88	5.61	0.121	132	

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: SA-PZ -153I1
Site: NWIRP- Calverton -SA
Date Installed: On Site
Date Developed: 7/6/10
Dev. Method:
Pump Type: Check Valve

Depth to Bottom (ft.): 42.30
Static Water Level Before (ft.): 7.38
Static Water Level After (ft.): 7.37
Screen Length (ft.): 5
Specific Capacity:
Casing ID (in.): 1

Responsible Personnel: Jacob Birkett Chris Ferdin
Drilling Co.: Zebra
Project Name: Calverton
Project Number: 112G02045 /01655

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1420		0	7.38	—	—	—	—	
1429		2.5	—	17.12	5.92	0.145	OOR	very turbid
1433		5	—	15.71	6.09	0.116	8,791+	
1436		7.5	—	14.57	5.70	0.110	2,586+	
1439		10	—	14.72	5.63	0.105	1,198	
1443		12.5	—	15.03	5.68	0.099	435	
1446		15	7.37	14.33	5.64	0.104	400	

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: SA-PZ-154I
Site: NWIRP- Calverton-SA
Date Installed: On site
Date Developed: 7/6/10
Dev. Method:
Pump Type: Check Valve

Depth to Bottom (ft.): 48.06
Static Water Level Before (ft.): 4.42
Static Water Level After (ft.): 4.41
Screen Length (ft.): 5
Specific Capacity:
Casing ID (in.): 1

Responsible Personnel: Jacob Birkett Chris Ferdik
Drilling Co.: Zebra
Project Name: Calverton
Project Number: 112G02045 / 01655

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1520		0	4.42	—	—	—	—	
1526		2.5	—	23.06	5.51	0.123	1,275	
1539		5	—	15.43	5.53	0.116	1,470	
1543		7.5	—	14.58	5.41	0.110	535	
1546		10	—	13.88	5.34	0.112	250	
1551		12.5	—	14.55	5.37	0.110	263	
1554		15	4.41	13.80	5.38	0.109	221	

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: SA-PZ-155I
Site: NMRP- Calverton -SA
Date Installed: On Site
Date Developed: 7/6/10
Dev. Method:
Pump Type: Check valve

Depth to Bottom (ft.): 48.11
Static Water Level Before (ft.): 4.34
Static Water Level After (ft.): 5.37
Screen Length (ft.): 5
Specific Capacity:
Casing ID (in.): 1

Responsible Personnel: Jacob Birkett Chris Fodin
Drilling Co.: Zebra
Project Name: Calverton
Project Number: 112G02045/01655

★ OOR = Out of Range

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1626		0	4.34	—	—	—	—	
1630		2.5	—	16.70	6.12	0.138	OOR	
1633		5	—	14.92	5.73	0.121	10,455+	
1640		7.5	—	14.99	5.58	0.115	2,782+	
1643		10	—	14.18	5.51	0.114	1,132	
1646		12.5	—	14.04	5.50	0.113	1,078	
1649		15	—	14.08	5.47	0.114	764	
1652		17.5	—	14.07	5.46	0.113	459	
1655		20	— 5.37	13.68	5.44	0.111	699	

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: SA-PZ-156 I
Site: NWIRP- Calverton-SA
Date Installed: On Site
Date Developed: 7/6/10
Dev. Method:
Pump Type: Check Valve

Depth to Bottom (ft.): 48.12
Static Water Level Before (ft.): 6.11
Static Water Level After (ft.): 6.11
Screen Length (ft.): 5
Specific Capacity:
Casing ID (in.): 1

Responsible Personnel: Jacob Birkett Chris Fordin
Drilling Co.: Zebra
Project Name: Calverton
Project Number: 112G02045/01655

*OOR = Out of Range

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1716		0	6.11	—	—	—	—	
1723		2.5	—	18.05	6.03	0.124	OOR	
1727		5	—	15.12	5.77	0.108	4,191+	
1731		7.5	—	14.88	5.51	0.105	2,506+	
1734		10	—	14.63	5.43	0.101	1,386	
1737		12.5	—	14.77	5.42	0.100	932	
1740		15	—	14.63	5.42	0.099	505	
1743		17.5	—	14.30	5.40	0.100	349	
1746		20	6.11	14.31	5.42	0.101	270	

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: SA-PZ-157I
Site: Onsite Southern Area
Date Installed:
Date Developed: 6-30-10
Dev. Method: Check value
Pump Type:

Depth to Bottom (ft.): 48.11
Static Water Level Before (ft.): 4.61
Static Water Level After (ft.):
Screen Length (ft.): 5'
Specific Capacity:
Casing ID (in.): 1"

Responsible Personnel: Jacob Birkett
Drilling Co.: Zebra
Project Name: NWIRP Calverton
Project Number: 112G01659

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1554			4.61					
1557		2.5		15.83	6.76	0.133	Out of range	brown
1559		5	4.68	14.24	6.47	0.129	2714	
1606		7.5		13.30	5.97	0.127	1226	light brown
1609		10		13.22	5.99	0.133	1186	
1612		12.5		13.05	5.95	0.131	984	
1616		15		13.22	5.86	0.125	402	
1620		17.5	4.65	13.02	5.82	0.125	465	light brown

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: PZ-157I1
Site: NWIRP - Calverton - SA
Date Installed: On site
Date Developed: 6-30-10
Dev. Method: Check valve
Pump Type:

Depth to Bottom (ft.): ~~4.89~~ 40.42
Static Water Level Before (ft.): 4.89
Static Water Level After (ft.): 4.91
Screen Length (ft.): 5
Specific Capacity:
Casing ID (in.): 1"

Responsible Personnel: Jacob Birkett, Christopher Fodik
Drilling Co.: Zebra
Project Name: Calverton
Project Number: 112G01655

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1550		0	4.89	—	—	—	—	
1552		2.5	—	14.28	6.02	0.122	411	
1600		5	4.94	13.26	6.56	0.142	605	
1607		7.5	—	13.05	6.48	0.124	307	
1610		10	—	13.25	6.45	0.111	130	
1615		12.5	—	12.90	6.48	0.116	524	
1620		15	4.91	13.14	6.42	0.110	152	

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: PZ-158I
Site: NWIRP - Calverton - SA
Date Installed: on site
Date Developed: 6-30-10
Dev. Method: Check valve
Pump Type:

Depth to Bottom (ft.): 47.99
Static Water Level Before (ft.): 4.91
Static Water Level After (ft.):
Screen Length (ft.): 5
Specific Capacity:
Casing ID (in.): 1"

Responsible Personnel: Jacob Birkett Chris Ferdik
Drilling Co.: Zebra
Project Name: Calverton
Project Number: 112G01655

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units _____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1650		0	4.91	—	—	—	—	
1655		2.5	—	14.42	6.62	0.140	Out of range	extremely turbid
1658		5	4.99	13.58	6.67	0.117	Out of range	
1703		7.5	—	13.27	6.60	0.105	6,496 +	
1709		10	—	13.33	6.48	0.104	6,496 +	
1714		12.5	—	13.09	6.41	0.104	2,976 +	
1718		15	—	13.13	6.38	0.101	1,057	
1721		17.5	—	13.03	6.33	0.102	3,540 +	
1725		20	—	13.15	6.34	0.105	7,859 +	

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: SA-PZ-158I1
Site: On site Southern Area
Date Installed:
Date Developed: 6-30-10
Dev. Method: Check valve
Pump Type:

Depth to Bottom (ft.): 39.90
Static Water Level Before (ft.): 4.52
Static Water Level After (ft.):
Screen Length (ft.): 5'
Specific Capacity:
Casing ID (in.): 1"

Responsible Personnel: Jacob Birkett
Drilling Co.: Zebra
Project Name: NWIRP Calverton
Project Number: 112G01655

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1650			4.52					
1651		2.5		14.49	6.38	0.176	Out of range	brown
1654		5	4.61	13.42	6.49	0.170	10,951	
1704		7.5		13.85	6.52	0.166	4,295	
1707		10		13.45	6.55	0.159	2,432	
1710		12.5		13.19	6.49	0.155	2,315	
1713		15		13.17	6.48	0.162	1,894	
1716		17.5		13.43	6.47	0.166	2,645	
1720		20		13.07	6.51	0.157	1,239	
1725		22.5	4.57	13.08	6.47	0.156	1,820	

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: PZ-159I
Site: NWIRP- Calverton -SA
Date Installed: On site
Date Developed: 7/1/10
Dev. Method: Check-Valve pumping
Pump Type:

Depth to Bottom (ft.): 47.39
Static Water Level Before (ft.): 4.41
Static Water Level After (ft.): 4.40
Screen Length (ft.): 5
Specific Capacity:
Casing ID (in.): 1

Responsible Personnel: Jacob Birkett, Christopher Fordin
Drilling Co.: Zebra
Project Name: Calverton
Project Number: 112G02245 / 01655

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
805		0	4.41	—	—	—	—	
815		2.5	—	13.52	5.46	0.242	1,644	
817		5	—	12.92	5.61	0.135	917	
821		7.5	—	12.69	5.56	0.121	568	
824		10	—	12.73	5.53	0.117	194	
828		12.5	—	12.70	5.64	0.125	4,069+	Stroking out to bottom of well
832		15	—	12.72	5.72	0.121	1,775	
838		17.5	—	12.74	5.82	0.115	8,541+	
840		20	4.40	12.91	5.80	0.117	1,397	

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: SA-PZ-159I1
Site: On site Southern Area
Date Installed:
Date Developed: 7-1-10
Dev. Method: Check value
Pump Type:

Depth to Bottom (ft.): 39.90
Static Water Level Before (ft.): 4.58
Static Water Level After (ft.):
Screen Length (ft.): 5'
Specific Capacity:
Casing ID (in.): 1"

Responsible Personnel: Jacob Birkett
Drilling Co.: Zebra
Project Name: Calverton
Project Number: 112G0165S

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
0810			4.58					
0812		2.5		14.12	5.99	0.344	Out of range	light brown
0814		5 gal		12.96	6.81	0.203	Out of range	light brown
0819		7.5 gal		13.62	6.71	0.210	Out of range	light brown
0824		10 gal		12.85	6.60	0.177	1120	
0827		12.5 gal		12.66	6.57	0.167	361	
0830		15		12.85	6.43	0.176	1300	
0833		17.5		12.74	6.51	0.169	603	
0838		20	4.60	12.61	6.51	0.170	304	

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: PZ-160 I
Site: NWIRP- Calverton -SA
Date Installed:
Date Developed: 7/1/10
Dev. Method:
Pump Type: Check Valve

Depth to Bottom (ft.): 48.98
Static Water Level Before (ft.): 4.71
Static Water Level After (ft.): 4.71
Screen Length (ft.): 5
Specific Capacity:
Casing ID (in.): 1

Responsible Personnel: Jacob Birkett, Christopher Fordin
Drilling Co.: Zebra
Project Name: Calverton
Project Number: 1126-01655 / 02045

*OOR = Out of Range

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
903		0	4.71	—	—	—	—	
911		2.5	—	13.24	6.17	0.134	OOR	
915		5	—	13.05	6.11	0.127	8,072	
921		7.5	—	12.94	6.14	0.142	OOR	
925		10	—	12.91	6.10	0.124	2,183	
929		12.5	—	12.64	6.02	0.119	1,080	
932		15	—	12.74	5.97	0.119	925	
936		17.5	—	12.99	5.99	0.120	541	
941		20	4.71	12.72	6.00	0.119	453	

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: SA-PZ-160I1
Site: On site Southern Area
Date Installed:
Date Developed: 7-1-10
Dev. Method: Check valve
Pump Type:

Depth to Bottom (ft.): 39.77
Static Water Level Before (ft.): 4.35
Static Water Level After (ft.): 4.33
Screen Length (ft.): 5'
Specific Capacity:
Casing ID (in.): 1"

Responsible Personnel: Jacob Birkett
Drilling Co.: Zebra
Project Name: Calverton
Project Number: 12602045/01655

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
0908			4.35					
0910		2.5 gal		13.32	6.68	0.131	Out of range	light brown
0912		5		12.74	6.64	0.129	1410	
0916		7.5		13.13	6.53	0.122	1013	
0923		10		12.87	6.49	0.125	331	
0926		12.5		12.72	6.48	0.126	165	
0930		15		12.64	6.46	0.128	744	
0933		17.5		12.64	6.50	0.124	164	
~~0938~~								

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: SA-PZ-161I
Site: Onsite Souther Area
Date Installed:
Date Developed: 7-1-10
Dev. Method: Check valve
Pump Type:

Depth to Bottom (ft.): 47.90
Static Water Level Before (ft.): 6.21
Static Water Level After (ft.): 6.2
Screen Length (ft.): 5
Specific Capacity:
Casing ID (in.): 1

Responsible Personnel: Jacob Birkett
Drilling Co.: Zebra
Project Name: Calverton
Project Number: 112G02045

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1336			6.21					
1345		2.5		17.28	6.47	0.188	6505	light brown
1348		5		14.91	6.34	0.177	5707	
1351		7.5		13.62	6.28	0.165	1385	
1355		10		13.80	6.23	0.170	1530	
1400		12.5		13.26	6.17	0.163	1061	
1402		15		13.24	6.16	0.158	488	
1406		17.5		13.33	6.06	0.161	1465	
1408		20		13.24	6.05	0.159	590	

ATTACHMENT C-3

PHOTOGRAPH LOG

Photo 1 – View from western portion of the treatment area facing west. Ethyl lactate solution(black drum) and carbon units (blue drums).

Photo 2 – View of the treatment/injection system, facing the south. Red hose is the air line for the air diaphragm pump.

Photo 3 – View of the treatment/injection system facing the north.

ATTACHMENT C-4

LABORATORY COC FORMS

21887

41

CHAIN OF CUSTODY

CompuChem
a division of Liberty Analytical Corp.

501 Madison Ave.
Cary, NC 27513
Phone: 919-379-4100 Fax 919-379-4040

Courier: Fed Ex
Airbill No.: 8706 9629 3026
Sampling Complete? Y or N

Client/Reporting Information

Company Name: Tetra Tech NUS
Address: Twin Oaks 1, Suite 309
City: Norfolk State: VA Zip: 23502
Project Contact: Rob Sok
Phone #: 757-618-2104
Sampler's Name: Donald Whalen

Project Information

Project Name: NWFR P Calverton
Sampling Location: Site 6A
Turnaround time: 7 day
Batch QC or Project Specific? If Specific, which Sample ID?
Are aqueous samples field filtered for metals? Y or N
Are high concentrations expected? Y or N If yes, which ID(s)?

Requested Analysis (include method and bottle type)

Matrices: GW - Ground water; WW - Waste water; SW - Surface water; SO - Soil/Sediment; TB - Trip Blank; RI - Rinsate; WP - Wipe; O - Other

CompuChem No (Lab Use)	Field ID	Collection Date	Collection Time	Matrix	# of bottles	HCl	NaOH	HNO3	H2SO4	MEOH	Other	VOC 40 ml vial	Fe, Mn (250 ml poly)	TOC 40 ml vial	methane, ethane, ethene (40 ml vial)	pH / Sample Info (Lab Use): Fe, Mn	pH / Sample Info (Lab Use): TOC
1007021-07	SA-TB-20100706	7/6/10	0830	TB	2	2						✓					
-08	SA-PZ-158I-20100706	↓	1145	GW	3	3						✓					
-09	SA-PZ-158I1-20100706	↓	1310	GW	3	3						✓					
-10	SA-PZ-160I1-20100706	↓	1540	GW	3	3						✓					
-11	SA-PZ-138I1-20100706	↓	1745	GW	3	3						✓					
-02	SA-PZ-159I-20100707	7/7/10	1015	GW	8	5		1	2			✓	✓	✓	✓	<2	<2
-03	SA-PZ-151I1-20100707	↓	1220	GW	8	5		1	2			✓	✓	✓	✓	<2	<2
-04	SA-PZ-157I1-20100707	↓	1000	GW	8	5		1	2			✓	✓	✓	✓	<2	<2
-05	SA-PZ-155I-20100707	↓	1212	GW	8	5		1	2			✓	✓	✓	✓	<2	<2
-06	SA-20100707-DUP	↓	1305	GW	8	5		1	2			✓	✓	✓	✓	<2	<2

Lab Use Only

Sample Unpacked By: Diane Bryant
Sample Order Entry By: [illegible]
Samples Received in Good Condition? Y or N
If no, explain:

Cyanide samples checked for sulfide & chlorine? Y or NA
625 & Phenol samples checked for chlorine? Y or NA
608 samples checked for pH between 5.0-9.0? Y or NA

Comments

Sample Custody

Relinquished by: Donald Whalen	Date/Time: 7/7/10 1800	Received by: Diane Bryant	Date/Time: 7/08/10 0910
Relinquished by:	Date/Time:	Received by:	Date/Time:

Subcontact? Y or N If yes, where?
Custody Seal(s) intact? Y or N
On Ice? Y or N
Cooler Temp: 2.5 °C

Samples stored 60 days after date report mailed at no extra charge.

White & Yellow copy to lab • Pink copy for customer

SN000

22098

42

CHAIN OF CUSTODY

CompuChem
a division of Liberty Analytical Corp.
501 Madison Ave.
Cary, NC 27513
Phone: 919-379-4100 Fax 919-379-4040

Courier: Fed Ex
Airbill No. 8706 9629 3026
Sampling Complete? Y or N

Client/Reporting Information

Company Name: Tetra Tech NUS
Address: Twin Oaks I, Suite 309
City: Norfolk State: VA Zip: 23502
Project Contact: Rob Sok
Phone #: 757-618-2104
Sampler's Name: Donald Whalen

Project Information

Project Name: NWIRP Calverton
Sampling Location:
Turnaround time: 7 day
Batch QC or Project Specific? If Specific, which Sample ID?
Are aqueous samples field filtered for metals? Y or N
Are high concentrations expected? Y or N? If yes, which ID(s)?

Requested Analysis (include method and bottle type)

CompuChem No (Lab Use)	Field ID	Collection Date	Collection Time	Matrix	# of bottles	HCl	NaOH	HNO3	H2SO4	MEOH	Other	VOC 40ml vial	Fe, Mn 250ml poly	TOC 40ml vial	methane, ethane, ethene (40ml)	pH / Sample Info. (Lab Use) Fe, Mn	pH / Sample Info. (Lab Use) TOC
1007021-12	SA-PZ-161I-20100707	7/7/10	1542	GW	3	3						✓					
1007021-01	SA-PZ-160I-20100707	7/7/10	1540	GW	16	11		3	2			✓	✓	✓	✓	<2	<2

Matrices: GW - Ground water; WW - Waste water; SW - Surface water; SO - Soil/Sediment; TB - Trip Blank; RI - Rinsate; WP - Wipe; O - Other

Lab Use Only

Sample Unpacked By: Wayne Dyal
Sample Order Entry By:
Samples Received in Good Condition? Y or N
If no, explain:
Cyanide samples checked for sulfide & chlorine? Y or NA
625 & Phenol samples checked for chlorine? Y or NA
608 samples checked for pH between 5.0-9.0? Y or NA

Comments

SA-PZ-160I-20100707 DO MS/MSD (VOC, Fe/Mn)

Sample Custody

Relinquished by: Donald Whalen	Date/Time: 7/7/10 1800	Received by: Wayne Dyal	Date/Time: 7/08/10 0910
Relinquished by:	Date/Time:	Received by:	Date/Time:

Subcontact? Y or N If yes, where?
Custody Seal(s) intact? Y or N
On Ice? Y or N
Cooler Temp: 25 °C

Samples stored 60 days after date report mailed at no extra charge.

White & Yellow copy to lab • Pink copy for customer

SN0010

22099

45

CHAIN OF CUSTODY

Page 1 of 1

CompuChem
a division of Liberty Analytical Corp.

501 Madison Ave.
Cary, NC 27513
Phone: 919-379-4100 Fax 919-379-4040

Courier: FedEx
Airbill No.: 8706 9629 2957
Sampling Complete? Y or N

Client/Reporting Information

Company Name: Tetra Tech NUS
Address: Twin Oaks 1, suite 309
City: Norfolk State: VA Zip: 23502
Project Contact: Robert Sok
Phone #: 757-618-2104
Sampler's Name: D. Whalen

Project Information

Project Name: NWIRP CALVERTON
Sampling Location:
Turnaround time: 7 days
Batch QC or Project Specific? If Specific, which Sample ID?
Are aqueous samples field filtered for metals? Y or N
Are high concentrations expected? Y or (N) If yes, which ID(s)?

Requested Analysis (include method and bottle type)

Matrices: GW - Ground water; WW - Waste water; SW - Surface water; SO - Soil/Sediment; TB - Trip Blank; RI - Rinsate; WP - Wipe; O - Other

CompuChem No (Lab Use)	Field ID	Collection Date	Collection Time	Matrix	# of bottles	HCl	NaOH	HNO3	H2SO4	MEOH	Other ZnAc NaOH	VOC 40ml	Fe, Mn 250ml	TOC 40ml	methane, ethane, ethene 40ml	NO2, NO3, chloride 250ml	Sulfide 500ml					pH / Sample Info (Lab Use): Fe&Mn	TOC	Sulfide
1007021-15	SA-TB-20100708	7/8/10	0800	TB	2	2						✓										—	—	—
-16	SA-PZ-138I-20100708		0955	GW	3	3						✓										—	—	—
-17	SA-20100708-DUP		1100	GW	3	3						✓										—	—	—
-18	SA-PZ-149I1-20100708		947	GW	3	3						✓										—	—	—
1007021-13	SA-PZ-159I1-20100708		1340	GW	10	5		1	2		1	✓	✓	✓	✓	✓	✓					<2	<2	>9
-14	SA-PZ-157I-20100708		1347	GW	10	5		1	2		1	✓	✓	✓	✓	✓	✓					<2	<2	>9
-19	SA-PZ-133I-20100708		1605	GW	3	3						✓										—	—	—
-20	SA-PZ-139I-20100708	↓	1542	GW	3	3						✓										—	—	—

Lab Use Only

Sample Unpacked By: K. Manning
Sample Order Entry By:
Samples Received in Good Condition? (Y) or N
If no, explain:

Cyanide samples checked for sulfide & chlorine? Y or (NA)
625 & Phenol samples checked for chlorine? Y or (NA)
608 samples checked for pH between 5.0-9.0? Y or (NA)

Comments

Sample Custody

Relinquished by: D. Whalen	Date/Time: 7/8/10 1730	Received by: K. Manning	Date/Time: 7/09/10 1000
Relinquished by:	Date/Time:	Received by:	Date/Time:

Subcontact? Y or (N) If yes, where?
Custody Seal(s) intact? (Y) or N
On Ice? (Y) or N
Cooler Temp: 4.8 °C

Samples stored 60 days after date report mailed at no extra charge.

White & Yellow copy to lab • Pink copy for customer

SNC010

REPORT TO:

Reports will be provided to the contact(s) listed below. Parties other than the contact(s) listed below will require prior approval.

Name: Donald Whalen
Company: Tetra Tech NUS
Address: Twin Oaks 1, Suite 309
Norfolk, VA 23502

email:
Phone: (757) 618-2104
Fax: ( )

Project Manager: Robert Sok
Project Name: NWIRP Calverton, Site 6A
Project No.: 112G02045

INVOICE TO:

For Invoices **paid by a third party** it is imperative that contact information & corresponding reference No. be provided.

Name:
Company:
Address:

email:
Phone: ( )
Fax: ( )

Purchase Order No.
Subcontract No.

microbialinsights

2340 Stock Creek Blvd.
Rockford, TN 37853-3044
phone (865) 573-8188
fax: (865) 573-8133
email: info@microbe.com
www.microbe.com

Please Check One:

☐ More samples to follow
☐ No Additional Samples

Saturday Delivery
Please use overnight product for next day

Report Type: ☐ Standard (default) ☐ Comprehensive (15% surcharge) ☐ Historical (30% surcharge)

Please contact us prior to submitting samples regarding questions about the analyses you are requesting at (865) 573-8188 (8:00 am to 4:00 pm M-F). After these hours please call (865) 300-8053.

Sample Information											CENSUS: Please select the target organism/gene																							
022HG MI ID (Laboratory Use Only)	Sample Name	Date Sampled	Time Sampled	Matrix	PLFA	VFA	MSIE				qDHC (Dehalococcoides)	DHC Functional genes (bvc, tce, vcr)	qDHE (Dehalobacter)	qDSM (Desulfuromonas)	qDSB (Desulfitobacterium)	qEBAC (Total)	qDSR (SRBs only)	qSRB/RB	qMGN (methanogens)	qMOB (methanotrophs)	qDNF (Denitrifying)	qAOB (ammonia oxidizing)	qPM1 (MTBE aerobic)	qTOD (initial PAHs aerobic)	qPHE (aerobic BTEX)	qBSS (Toluene/Xylene Anaerobic)	qNAH (Naphthalene aerobic)	add qPCR:	add qPCR:	add qPCR:	RNA (Expression Option)*	Oil Retention	Other:	Other:	Other:
1	SA-PZ-159I-20100708	7/8/10	1340	GW							X		X																					
2	SA-PZ-157I-20100708	7/8/10	1347	GW							X		X																					

Relinquished by: Donald Whalen Date: 7/8/10 1730 Received by: Lisa L. Cimbise Date 7/10 7/9/10

In order for analysis to be completed correctly, it is vital that chain of custody is filled out correctly & that all relative information is provided. Failure to provide sufficient and/or correct information regarding reporting, invoicing & analyses requested information may result in delays for which MI will not be liable. Most analyses have a 24-48 hour hold time. *** additional cost and sample preservation are associated with RNA samples.**

PROJECT # 112G02045

22246

CHAIN OF CUSTODY

Page ____ of ____

CompuChem
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501 Madison Ave.
Cary, NC 27513
Phone: 919-379-4100 Fax 919-379-4040

Courier
Airbill No.
Sampling Complete? Y or N

Client/Reporting Information

Company Name: TETRA TECH
Address: 5700 Lake Wright Dr
City: Norfolk State: VA Zip: 23502
Project Contact: Dave Bragack
Phone #:
Sampler's Name: E. Wu / D. Bragack

Project Information

Project Name: NWIRP Calverton - Bio Study
Sampling Location:
Turnaround time:
Batch QC or Project Specific? If Specific, which Sample ID?
Are aqueous samples field filtered for metals? Y or (N)
Are high concentrations expected? Y or (N) If yes, which ID(s)?

Matrices: GW - Ground water; WW - Waste water; SW - Surface water; SO - Soil/Sediment; TB - Trip Blank; RI - Rinsate; WP - Wipe; O - Other

CompuChem No (Lab Use)	Field ID	Collection Date	Collection Time	Matrix	# of bottles	HCl	NaOH	HNO3	H2SO4	MEOH	Other	TCL VOC (3-40ml)	MEE (3-40ml)	TOC (2-40ml)	METALS (1-250ml)		pH / Sample Info (Lab Use) Metals	TOC
1007140-01	CarbonIn-072010	7/20/10	1540	GW	9	✓		✓	✓			✓	✓	✓	✓	all vials & metals: sample times on In are 1525 and 1540 on "Out"	<2	<2
-02	CarbonOut-072010	7/20/10	1525	GW	9	✓		✓	✓			✓	✓	✓	✓		<2	<2
-03	CarbonInID-072110	7/21/10	1030	GW	5	✓		✓				✓		✓				<2
-04	Carbon-TB-072210			TB	3	✓						✓				Lab prepared Trip Blank		

Lab Use Only

Sample Unpacked By: K. Manning
Sample Order Entry By:
Samples Received in Good Condition? (Y) or N
If no, explain:

Cyanide samples checked for sulfide & chlorine? Y or (NA) KM 7-23-10
625 & Phenol samples checked for chlorine? Y or (NA)
608 samples checked for pH between 5.0-9.0? Y or (NA)

Comments

* Rec'd. 2-250mls w/ HNO3 for Metals that say: CarbonOut-072010 on their labels; one has sample time as 1540 & the other one 1525/ did not receive bottle w/ CarbonIn-072010 7/20/10 @ 1540 on label.

Sample Custody

Relinquished by:	Date/Time: 7/22/10 1000	Received by: FED EX # 8715 2350 3491	Date/Time:
Relinquished by:	Date/Time:	Received by: K. Manning	Date/Time: 7/23/10 0919
Subcontact? Y or N If yes, where?		Custody Seal(s) intact? (Y) or N	On Ice? (Y) or N — Cooler Temp: 1.7 °C

Samples stored 60 days after date report mailed at no extra charge.

White & Yellow copy to lab • Pink copy for customer

SN0010

22325

Page 1 of 1

CompuChem
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CHAIN OF CUSTODY

501 Madison Ave.
Cary, NC 27513
Phone: 919-379-4100 Fax 919-379-4040

Courier
Airbill No.
Sampling Complete? Y or N

Client/Reporting Information

Company Name: TETRA TECH NUS
Address: 5700 LAKE WRIGHT DR
City: NORFOLK State: VA Zip: 23502
Project Contact: DAVID BRAYACK
Phone #: 757 461 - 3824
Sampler's Name: E. WU

Project Information

Project Name: NWIRP CALVERTON - BIO STUDY
Sampling Location:
Turnaround time:
Batch QC or Project Specific? If Specific, which Sample ID?
Are aqueous samples field filtered for metals? Y or (N)
Are high concentrations expected? Y or (N)? If yes, which ID(s)?

Requested Analysis (include method and bottle type)

VOC (3-40ml)
TOC (2-40ml)

Matrices

GW - Ground water
WW - Waste water
SW - Surface water
SO - Soil/Sediment
TB - Trip Blank
RI - Rinsate
WP - Wipe
O - Other

CompuChem No (Lab Use)	Field ID	Collection Date	Collection Time	Matrix	# of bottles	HCl	NaOH	HNO3	H2SO4	MEOH	Other	VOC (3-40ml)	TOC (2-40ml)	pH / Sample Info (Lab Use) TOC
	~~CARBON-IN50~~													
1007140-05	CARBON-IN50-07281P	7/28/10	1255	GW	5	✓			✓			✓	✓	2
↓ -06	CARBON-TB-07281P			TB	3	✓						✓		LAB PREPARED TRIP BLANK

Lab Use Only

Sample Unpacked By: K. Manning
Sample Order Entry By:
Samples Received in Good Condition? (Y) or N
If no, explain:

Cyanide samples checked for sulfide & chlorine? Y or (NA)
625 & Phenol samples checked for chlorine? Y or (NA)
608 samples checked for pH between 5.0-9.0? Y or (NA)

KM 7/29/10

Comments

*One of the 3 trip blanks has a > pea size air bubble.

Sample Custody

Relinquished by:	Date/Time: 7/28/10 1330	Received by: K. Manning	Date/Time: 7/29/10 0925
Relinquished by:	Date/Time:	Received by:	Date/Time:
Subcontact? Y or (N) If yes, where?	Custody Seal(s) intact? (Y) or N	On Ice? (Y) or N	Cooler Temp: 4.3 °C

Samples stored 60 days after date report mailed at no extra charge.

White & Yellow copy to lab • Pink copy for customer

SN0010

22245

46

CHAIN OF CUSTODY

Page 1 of 1

CompuChem
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501 Madison Ave.
Cary, NC 27513
Phone: 919-379-4100 Fax 919-379-4040

Courier
Airbill No.
Sampling Complete? Y or N

Client/Reporting Information

Company Name: Tetra Tech NUS
Address: 5700 Lake Wright Dr
City: Norfolk State: VA Zip: 23502
Project Contact: Dave Brayack
Phone #: (757) 461-3824
Sampler's Name: E. Wu

Project Information

Project Name: NNIRP Calibration - Bio Survey
Sampling Location:
Turnaround time:
Batch QC or Project Specific? If Specific, which Sample ID?
Are aqueous samples field filtered for metals? Y or (N)
Are high concentrations expected? Y or (N)? If yes, which ID(s)?

Matrices: GW - Ground water; WW - Waste water; SW - Surface water; SO - Soil/Sediment; TB - Trip Blank; RI - Rinsate; WP - Wipe; O - Other

CompuChem No. (Lab Use)	Field ID	Collection Date	Collection Time	Matrix	# of bottles	HCl	NaOH	HNO3	H2SO4	MEOH	Other	VOC 3-40mL	TOC 2-40mL								pH / Sample Info (Lab Use) TOC
1008026-01	Carbon In 90-080810	8/3/10	1000	GW	5	✓		~~✓~~	✓			✓	✓								<2
✓ -02	Carbon TB-080310	–	–	AQ	3	✓						✓			Lab provided Trip Blank						

Lab Use Only

Sample Unpacked By: Jennifer Doles
Sample Order Entry By: [illegible]
Samples Received in Good Condition? (Y) or N
If no, explain:

Cyanide samples checked for sulfide & chlorine? Y or (NA)
625 & Phenol samples checked for chlorine? Y or (NA)
608 samples checked for pH between 5.0-9.0? Y or (NA)

Comments

Sample Custody

Relinquished by:	Date/Time: 8/3/10 1215	Received by: Jennifer Doles	Date/Time: 8/4/10 0945
Relinquished by:	Date/Time:	Received by:	Date/Time:
Subcontact? Y or (N) If yes, where?		Custody Seal(s) intact? (Y) or N	On Ice? (Y) or N — Cooler Temp: 1.9 °C

Samples stored 60 days after date report mailed at no extra charge.

White & Yellow copy to lab • Pink copy for customer SN0010

170

22704

CHAIN OF CUSTODY

CompuChem
a division of Liberty Analytical Corp.
501 Madison Ave.
Cary, NC 27513
Phone: 919-379-4100 Fax 919-379-4040

Page 1 of 2

Courier: FedEx
Airbill No.: 8741 9938 1519
Sampling Complete? Y or N

Client/Reporting Information

Company Name: Tetra Tech
Address: 5700 Lake Wright Dr. Suite 309
City: Norfolk State: VA Zip: 23502
Project Contact: Dave Brayack
Phone #: 757-461-3824
Sampler's Name: Jacob Birkett Kristi Francisco

Project Information

Project Name: NWIRP Calverton EIAB 3-month
Sampling Location: Southern Area
Turnaround time: Standard
Batch QC or Project Specific? If Specific, which Sample ID?
Are aqueous samples field filtered for metals? Y or N
Are high concentrations expected? Y or N? If yes, which ID(s)?

Requested Analysis (include method and bottle type)

CompuChem No (Lab Use)	Field ID	Collection Date	Collection Time	Matrix	# of bottles	HCl	NaOH	HNO3	H2SO4	MEOH	Other	VOC (3 40mL glass vials)	MEE (40mL glass vial)	TOC (40mL glass vial)	Metals (Fe+Mn) (250mL plastic bottle)							pH / Sample Info (Lab Use) TOC	pH / Sample Info (Lab Use) Metals			
1010082-09	SA-TB-01-20101011	10-11-10	1330	TB	3	3						3						Lab prepared								
1010082-02	SA-PZ-157I-20101011	10-11-10	1410	GW	8	5		1	2			3	2	2	1							<2	<2			
-10	SA-PZ-158I-20101011	10-11-10	1413	GW	3	3						3														
1010082-03	SA-PZ-157I1-20101011	10-11-10	1509	GW	8	5		1	2			3	2	2	1							<2	<2			
-11	SA-PZ-158I1-20101011	10-11-10	1512	GW	3	3						3														
1010082-04	SA-PZ-155I-20101012	10-12-10	0835	GW	8	5		1	2			3	2	2	1							<2	<2			
-05	SA-PZ-151I1-20101012	10-12-10	0836	GW	8	5		1	2			3	2	2	1							<2	<2			
-12	SA-PZ-160I1-20101012*	10-12-10	0956	GW	8	5		1	2			3	2	2	1							—	—			
-06	SA-PZ-159I1-20101012	10-12-10	0957	GW	8	5		1	2			3	2	2	1							<2	<2			
1010082-01	SA-PZ-160I-20101012	10-12-10	1050	GW	~~8~~ 14	~~5~~ 11		1	2			9	2	2	1			Run MS/MSD on VOC				<2	<2			

Matrices
GW - Ground water
WW - Waste water
SW - Surface water
SO - Soil/Sediment
TB - Trip Blank
RI - Rinsate
WP - Wipe
O - Other

Lab Use Only

Sample Unpacked By: Diane Byrd
Sample Order Entry By:
Samples Received in Good Condition? Y or N
If no, explain:
Cyanide samples checked for sulfide & chlorine? Y or NA
625 & Phenol samples checked for chlorine? Y or NA
608 samples checked for pH between 5.0-9.0? Y or NA

Comments

*SA-PZ-160I1-20101012 Only received VOC containers. No containers for MEE, TOC, or Metals. DB 10/14/10

Sample Custody

Relinquished by: Jacob Birkett	Date/Time: 10-13-10 0930	Received by: Diane Byrd	Date/Time: 10/14/10 1030
Relinquished by:	Date/Time:	Received by:	Date/Time:
Subcontact? Y or N If yes, where?	Custody Seal(s) intact? Y or N	On Ice? Y or N	Cooler Temp: 2.0 °C

Samples stored 60 days after date report mailed at no extra charge.

White & Yellow copy to lab • Pink copy for customer

SNP010

22697

CHAIN OF CUSTODY

CompuChem
a division of Liberty Analytical Corp.

501 Madison Ave.
Cary, NC 27513
Phone: 919-379-4100 Fax 919-379-4040

Courier: FedEx
Airbill No.: 8741 9933 1519
Sampling Complete? Y or N

Client/Reporting Information

Company Name: Tetra Tech
Address: 5700 Lake Wright Dr. Suite 309
City: Norfolk State: VA Zip: 23502
Project Contact: Dave Brayack
Phone #: 757-461-3824
Sampler's Name: Jacob Birkett Kristi Francisco

Project Information

Project Name: NWIRP Calverton EIAB 3-month
Sampling Location: Southern Area
Turnaround time: Standard
Batch QC or Project Specific? If Specific, which Sample ID?
Are aqueous samples field filtered for metals? Y or N
Are high concentrations expected? Y or N? If yes, which ID(s)?

Requested Analysis (include method and bottle type)

Matrices: GW - Ground water; WW - Waste water; SW - Surface water; SO - Soil/Sediment; TB - Trip Blank; RI - Rinsate; WP - Wipe; O - Other

CompuChem No. (Lab Use)	Field ID	Collection Date	Collection Time	Matrix	# of bottles	HCl	NaOH	HNO3	H2SO4	MEOH	Other	VOC 40mL glass vial	MEE 40mL glass vial	TOC 40mL glass vial	Metals (Fe+Mn) 250 mL plastic bottle							pH / Sample Info (Lab Use): TOC	pH / Sample Info (Lab Use): Metals			
1010082-07	SA-PZ-159I-20101012	10-12-10	1104	GW	8	5		1	2			3	2	2	1							<2	<2			
-13	SA-PZ-138II-20101012	10-12-10	1246	GW	3	3						3														
-14	SA-PZ-133I-20101012	10-12-10	1250	GW	3	3						3														
-15	SA-PZ-138I-20101012	10-12-10	1336	GW	3	3						3														
-16	SA-PZ-161I-20101012	10-12-10	1354	GW	3	3						3														
-17	SA-PZ-149II-20101012	10-12-10	1457	GW	3	3						3														
-18	SA-PZ-139-20101012	10-12-10	1508	GW	3	3						3														
-08	SA-Dup01-20101012	10-12-10	0800	GW	8	5		1	2			3	2	2	1							<2	<2			
-19	SA-Dup02-20101012	10-12-10	1200	GW	3	3						3														

Lab Use Only

Sample Unpacked By: Diane Byrd
Sample Order Entry By: [illegible]
Samples Received in Good Condition? Y or N
If no, explain:

Cyanide samples checked for sulfide & chlorine? Y or NA
625 & Phenol samples checked for chlorine? Y or NA
608 samples checked for pH between 5.0-9.0? Y or NA

Comments

Sample Custody

Relinquished by: Jacob Birkett	Date/Time: 10-13-10 0930	Received by: Diane Byrd	Date/Time: 10/14/10 1030
Relinquished by:	Date/Time:	Received by:	Date/Time:
Subcontact? Y or N If yes, where?	Custody Seal(s) intact? Y or N	On Ice? Y or N	Cooler Temp: 2.0 °C

Samples stored 60 days after date report mailed at no extra charge.

White & Yellow copy to lab • Pink copy for customer

SN0010

22643

49

CHAIN OF CUSTODY

Page 1 of 1

CompuChem
a division of Liberty Analytical Corp.

501 Madison Ave.
Cary, NC 27513
Phone: 919-379-4100 Fax 919-379-4040

Courier: Fed Ex
Airbill No.: 8741-9938-1563
Sampling Complete? Y or N

Client/Reporting Information

Company Name: Tetra Tech
Address: 5700 Lake Wright Dr. Suite 307
City: Norfolk State: VA Zip: 23502
Project Contact: Dave Brayack
Phone #: 757-461-3768
Sampler's Name: Jacob Birkett Ernie Wu

Project Information

Project Name: NWIRP Calverton EIAB 3 Month Event
Sampling Location: Southern Area
Turnaround time: Standard
Batch QC or Project Specific? If Specific, which Sample ID?
Are aqueous samples field filtered for metals? Y or N
Are high concentrations expected? Y or N If yes, which ID(s)?

Matrices: GW - Ground water; WW - Waste water; SW - Surface water; SO - Soil/Sediment; TB - Trip Blank; RI - Rinsate; WP - Wipe; O - Other

CompuChem No. (Lab Use)	Field ID	Collection Date	Collection Time	Matrix	# of bottles	HCl	NaOH	HNO3	H2SO4	MEOH	Other	VOC 40 mL vial	TOC 40 mL vial								pH / Sample Info (Lab Use) TOC
1010115-01	CA-TB-20101021	10-21-10	0800	TB	3	3						3			Lab prepared						1
1010115-01	CA-CARBONIN10-20101019	10-19-10	1105	GW	5	3			2			3	2								<2
-02	CA-CARBONIN50-20101020	10-20-10	1130	GW	5	3			2			3	2								<2
-03	CA-CARBONIN90-20101021	10-21-10	1034	GW	5	3			2			3	2								<2

Lab Use Only

Sample Unpacked By: Jennifer Doer
Sample Order Entry By:
Samples Received in Good Condition? Y or N
If no, explain:

Cyanide samples checked for sulfide & chlorine? Y or NA
625 & Phenol samples checked for chlorine? Y or NA
608 samples checked for pH between 5.0-9.0? Y or NA

Comments

Sample Custody

Relinquished by: Jacob Birkett	Date/Time: 10-21-10 1700	Received by: Jennifer Doer	Date/Time: 10/22/10 0900
Relinquished by:	Date/Time:	Received by:	Date/Time:
Subcontact? Y or N If yes, where?	Custody Seal(s) intact? Y or N	On Ice? Y or N	Cooler Temp: 0.1 °C

Samples stored 60 days after date report mailed at no extra charge.

White & Yellow copy to lab • Pink copy for customer

SN0015

(**) ALL Sulfide pH (>9), ALL TOC pH (<2), ALL TAL Metals pH (<2)

TETRA TECH NUS, INC. JD 12/22/10 CHAIN OF CUSTODY | NUMBER 27293 | PAGE 1 OF 2

109

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
112G02045	NWIRP Calverton	Dave Brayack	757-461-3824	Cathy Dover CompuChem
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER: Vince Shickora	PHONE NUMBER: 757-814-9916	ADDRESS: 501 Madison Av.
		CARRIER/WAYBILL NUMBER: FedEx 8741 9938 1493		CITY, STATE: Cary, NC 27513

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G G P P G P

PRESERVATIVE USED: HCl HCl NA ZnAcetate NaOH H_2SO_4 HNO_3

TYPE OF ANALYSIS: VOC, MEE, Nitrate/Nitrite, F/Fluoride/Chloride, Sulfide (**), TOC (**), TAL Metals (**)

DATE YEAR 2010	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	VOC	MEE	Nitrate/Nitrite	F/Fluoride/Chloride	Sulfide (**)	TOC (**)	TAL Metals (**)	COMMENTS
		rec'd @ 0.1 °C SN0015 0.2°C														
12-13	1200	SA-TB01-20101213	—	—	—	QC	—	3	3						1012127-11	Lab prepared
12-13	1335	SA-PZ158I1-20101213	—	—	—	GW	G	3	3							1012127-12
12-13	*1337	SA-PZ-158I-20101213	—	—	—	GW	G	3	3	*container ID: SA-PZ-158I-20101213 time 1329 (actual 1339 per Reb)						-13
12-13	1455	SA-PZ160I1-20101213	—	—	—	GW	G	3	3							-14
12-13	*1502	SA-PZ-160I-20101213	—	—	—	GW	G	5	3	2	*no time on containers					(Ab) 15-10
12-14	0857	SA-PZ-135I-20101214	—	—	—	GW	G	3	3							-16
12-14	0908	SA-PZ136I-20101214	—	—	—	GW	G	3	3							-17
12-14	1045	SA-PZ-161I-20101214	—	—	—	GW	G	3	3							-18
12-14	1200	SA-Dup01-20101214	—	—	—	GW	G	10	3	2	1 (*)	1 (*)	2	1	1012127-04	
12-14	1235	SA-PZ-159I1-20101214	—	—	—	GW	G	10	9	2	1	1	2	3	1012127-01	Run MS/MSD for VOC + TAL Metal Only
12-14	1253	SA-PZ-157I1-20101214	—	—	—	GW	G	10	3	2	1 (*)	1 (*)	2	1	1012127-03	o = missing containers
12-14	1420	SA-PZ-159I-20101214	—	—	—	GW	G	8	3	2	~~(*)~~ JD 12/16/10		2	1	~~rec'd~~ JD 12/16/10	1012127-05
12-14	1455	SA-PZ-157I-20101214	—	—	—	GW	G	10	3	2	1	1	2		*VOC, MEE, TOC time 1455	1012127-02

1. RELINQUISHED BY	DATE	TIME	1. RECEIVED BY	DATE	TIME
	12-15-10	1700	Jennifer Dover	12/16/10	1238
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

MTL, Sulfide NO2/NO3 ~~time 1255~~

COMMENTS (*) the Dup "SA-DUP01-20101214" changed to "SA-PZ-157I1-20101214" for NO2/NO3/Fl/Chl & sulfide only →

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TINUS-001

(**) ALL TOC pH (<2), ALL TAL Metals (<2)

TETRA TECH NUS, INC. JD 12/22/10 CHAIN OF CUSTODY | NUMBER 27280 | PAGE 2 OF 2

110

PROJECT NO: 2045 112G02750	FACILITY: NWIRP Calverton	PROJECT MANAGER Dave Brayack	PHONE NUMBER 757-461-3824	LABORATORY NAME AND CONTACT: Cathy Dover CompuChem
SAMPLERS (SIGNATURE) [signature]		FIELD OPERATIONS LEADER Jacob Birkett	PHONE NUMBER 757-814-9916	ADDRESS 501 Madison Av
		CARRIER/WAYBILL NUMBER FedEx 8741 9938 1493		CITY, STATE Cary, NC 27513

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

rec'd @ 0.1 °C 0.2°C SN0015

DATE YEAR 2010	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	VOC	MEE	TOC (**)	TAL Metals (**)					COMMENTS
									CONTAINER TYPE PLASTIC (P) or GLASS (G)		G	G	G	P			
									PRESERVATIVE USED		HCl	HCl	H_2SO_4	HNO_3			
12-15	0910	SA-PZ-133I-20101215	—	—	—	GW	G	3	3								1012127-15
12-15	1035	SA-PZ-139I-20101215	—	—	—	GW	G	3	3								-19
12-15	1047	SA-PZ-138I1-20101215	—	—	—	GW	G	3	3								-20
12-15	1154	SA-PZ-138I-20101215	—	—	—	GW	G	3	3								-21
12-15	1200	SA-PZ-Dup02-20101215	—	—	—	GW	G	3	3								1012127-22
12-15	1205	SA-PZ-157J1-20101215	—	—	—	GW	G	8	3	2	2	1	*container ID: SA-PZ-151I1-20101215 (correct ID)				1012127-06
12-15	1300	SA-PZ-149I1-20101215	—	—	—	GW	G	3	3								1012127-23
12-15	1335	SA-PZ-155I-20101215	—	—	—	GW	G	8	3	2	2	1					1012127-07

1. RELINQUISHED BY	DATE	TIME	1. RECEIVED BY	DATE	TIME
Jacob Birkett [signature]	12-15-10	1700	Jennifer Dover	12/16/10	1238
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TINUS-001

ATTACHMENT C-5

GROUNDWATER LOW FLOW PURGE LOG SHEETS, GROUNDWATER SAMPLE LOG SHEETS, AND QA/QC SAMPLE LOG SHEETS

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NWIRP Calverton Site 6A
Project No.: 112G02045

[] Domestic Well Data
[] Monitoring Well Data
[X] Other Well Type: Pilzometer
[] QA Sample Type:

Sample ID No.: SA-PZ-133I-20100708
Sample Location: SA-PZ-133I
Sampled By: D. Whalen
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Date: 7-8-10	Visual	Standard	mS/cm	°C	NTU	mg/l	mV	NA
Time: 1605								
Method: Peristaltic pump	clear	5.87	0.134	14.72	0.0	4.69	163	

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Other
Date: 7-8-10								
Method: Peristaltic pump								
Monitor Reading (ppm):	—	SEE	LOW	FLOW PU	RGE DA	TA SH	EET	—
Well Casing Diameter & Material								
Type: 1" PVC								
Total Well Depth (TD): 47' bgs								
Static Water Level (WL): 7.78								
One Casing Volume(gal/L):								
Start Purge (hrs): 1511								
End Purge (hrs): 1605								
Total Purge Time (min): 54								
Total Vol. Purged (gal/L): 3.5								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	HCL	3 x 40 ml	✓

OBSERVATIONS / NOTES:

screen interval: 42'-47' bgs

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Donald Whalen

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Calverton Site 6A
PROJECT NUMBER:

WELL ID.: SA-PZ-133I
DATE: 7-8-10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1511	7.78	220								START Purge
1515	7.79	220	6.48	0.141	0.55	15.43	16.43	92	0	clear
1520	7.79	220	6.04	0.138	0.38	9.08	15.40	121	0	"
1525	7.79	220	5.89	0.136	0.26	6.82	15.15	135	0	"
1530	7.79	220	5.88	0.135	0.58	5.76	14.92	144	0	"
1535	7.79	220	5.87	0.135	0.30	5.24	14.86	151	0	"
1540	7.79	220	5.86	0.134	0.29	5.08	15.03	157	0	"
1545	7.79	220	5.87	0.135	0.17	4.92	14.75	157	0	"
1550	7.79	220	5.86	0.134	0.0	4.79	14.90	160	0	"
1555	7.79	220	5.86	0.134	0.0	4.78	14.75	160	0	"
1600	7.79	220	5.86	0.134	0.0	4.67	14.75	162	0	"
1605	7.79	220	5.87	0.134	0.0	4.69	14.72	163	0	"

SIGNATURE(S): David Wilcox

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NWIRP Calverton Site 6A
Project No.: 112G02045

[] Domestic Well Data
[] Monitoring Well Data
[X] Other Well Type: Piezometer
[] QA Sample Type:

Sample ID No.: SA-PZ-138I-20100708
Sample Location: SA-PZ-138I
Sampled By: D. Whalen
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Date: 7-8-10	Visual	Standard	mS/cm	°C	NTU	mg/l	mV	NA
Time: 0955								
Method: peristaltic pump	clear	5.88	0.134	13.67	0.0	4.37	-6	

PURGE DATA:

Date: 7-8-10	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Other
Method: peristaltic pump								
Monitor Reading (ppm):	—	SEE	Low	FLOW	PURGE	DATA	SHEET	—
Well Casing Diameter & Material								
Type: 1" PVC								
Total Well Depth (TD): 53.5 bgs								
Static Water Level (WL): 5.03								
One Casing Volume(gal/L):								
Start Purge (hrs): 0847								
End Purge (hrs): 0950								
Total Purge Time (min): 63								
Total Vol. Purged (gal/L): 5								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	HCL	3 x 40 ml	✓

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.: SA-20100708-DUP

Signature(s): David Whalen

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Calverton Site 6A
PROJECT NUMBER: 112602045

WELL ID.: SA-PZ-138I
DATE: 7-8-10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
0847	~~[illegible]~~ 5.03	230								Start Purge
0850	5.08	230	6.15	0.145	0.42	10.49	14.29	-44	0	clear
0855	5.08	230	5.94	0.142	0	8.17	14.10	-28	0	clear
0900	5.08	230	5.80	0.139	0	6.83	13.95	-11	0	clear
0905	5.08	230	5.77	0.137	0	5.93	13.72	-39	0	clear
0910	5.08	230	5.70	0.136	0	5.31	13.66	3	0	"
0915	5.08	230	5.71	0.136	0	5.11	13.67	-6	0	"
0920	5.08	230	5.73	0.136	0	5.02	13.63	2	0	"
0925	5.08	230	5.76	0.135	0	4.90	13.60	6	0	"
0930	5.08	230	5.79	0.135	0	4.73	13.63	2	0	"
0935	5.08	230	5.82	0.135	0	4.65	13.39	-11	0	"
0940	5.08	230	5.85	0.134	0	4.54	13.46	-8	0	"
0945	5.08	230	5.87	0.134	0	4.44	13.47	-2	0	"
0950	5.08	230	5.88	0.134	0	4.37	13.67	-6	0	"

SIGNATURE(S): David Wilson

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NWIRP Calverton Site 6A
Project No.: 112G02045

[] Domestic Well Data
[] Monitoring Well Data
[X] Other Well Type: Piezometer
[] QA Sample Type:

Sample ID No.: SA-PZ-138I1-20100706
Sample Location: SA-PZ-138I1
Sampled By: D. Whalen
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Date: 7-6-10	Visual	Standard	mS/cm	°C	NTU	mg/l	mV	NA
Time: 1745								
Method: peristaltic pump	Clear	6.12	0.190	14.27	0.45	1.67	62	

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Other
Date: 7-6-10								
Method: peristaltic pump								
Monitor Reading (ppm):	—	SEE	LOW	FLOW	PURGE	DATA	SHEET	—
Well Casing Diameter & Material								
Type: 1" PVC								
Total Well Depth (TD): 42' bgs								
Static Water Level (WL): 4.89								
One Casing Volume(gal/L):								
Start Purge (hrs): 1701								
End Purge (hrs): 1745								
Total Purge Time (min): 44								
Total Vol. Purged (gal/L): 4								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	HCL	3 x 40 ml	✓

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Dalal Whalen

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Site 6A
PROJECT NUMBER: 112G02045
WELL ID.: SA-PZ-138I
DATE: 7-6-10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1701	4.91	250								START PURGE
1705	4.92	250	6.19	0.192	12.6	3.83	15.98	89	0	clear
1710	4.92	250	6.15	0.191	7.39	3.10	15.29	68	0	"
1715	4.92	250	6.10	0.190	3.62	2.22	14.83	66	0	"
1720	4.92	250	6.10	0.190	3.18	1.95	14.66	64	0	"
1725	4.92	250	6.10	0.191	2.75	1.86	14.44	63	0	"
1730	4.92	250	6.10	0.190	2.68	1.77	14.43	66	0	"
1735	4.92	250	6.10	0.190	2.61	1.71	14.30	67	0	"
1740	4.92	250	6.10	0.190	1.55	1.69	14.35	66	0	"
1745	4.92	250	6.11	0.190	0.87	1.68	14.31	64	0	"
1745	4.92	250	6.12	0.190	0.45	1.67	14.27	62	0	"

SIGNATURE(S): David W Kaber

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NWIRP - Calverton - SA
Project No.: 112G02045

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ-139I-20100708
Sample Location: SA-PZ-139I
Sampled By: CF
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 7/8/10	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1542	(Visual)	(S.U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(%)	ORP (mV)
Method: low Flow	clear	5.28	0.099	13.67	1.29	0.00	0	137

PURGE DATA:

Date: 7/8/10	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Method: low Flow								
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 1" PVC pipe								
Total Well Depth (TD): 42.5-47.5'								
Static Water Level (WL): 7.91'								
One Casing Volume(gal/L):								
Start Purge (hrs): 1455								
End Purge (hrs): 1542								
Total Purge Time (min): 47								
Total Vol. Purged (gal/L): 4 gal								

See low Flow purge data sheet

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs	HCl	40mL glass vials	3

OBSERVATIONS / NOTES:

See DO note on 149I1 purge data sheet

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NWIRP- Calverton -SA
PROJECT NUMBER: 112G02045

WELL ID.: SA-PZ-139I
DATE: 7/8/10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1455	7.91	300	5.10	0.102	1.64	0.00	13.85	115	0	
1500	7.91	300	5.09	0.102	1.51	0.00	13.92	120	0	
1505	7.91	300	5.07	0.101	2.09	0.00	14.09	124	0	
1510	7.91	300	5.07	0.100	2.73	0.00	13.87	136	0	
1515	7.91	300	5.10	0.100	2.17	0.00	13.73	136	0	
1520	7.91	300	5.12	0.100	2.22	0.00	13.83	138	0	
1525	7.91	300	5.16	0.099	1.64	0.00	13.71	138	0	
1530	7.91	300	5.19	0.099	1.98	0.00	13.65	137	0	
1535	7.91	300	5.24	0.098	0.70	0.00	13.72	137	0	
1540	7.91	300	5.28	0.099	1.29	0.00	13.67	137	0	
1542	Collected Sample									

SIGNATURE(S): Christopher J. Forlin

PAGE 2 OF 2

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NWIRP - Calverton - SA
Project No.: 112602045

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ-149I1-20100708
Sample Location: SA-PZ-149I1
Sampled By: CF
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other ORP (mV)
Date: 7/8/10								
Time: 947								
Method: low Flow	Clear	5.83	0.103	13.78	0.00	0.00	0	42

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 7/8/10								
Method: low Flow								
Monitor Reading (ppm):								
Well Casing Diameter & Material Type: 1" PVC pipe								
Total Well Depth (TD): 39.13'								
Static Water Level (WL): 9.49'								
One Casing Volume(gal/L):								
Start Purge (hrs): 830								
End Purge (hrs): 947								
Total Purge Time (min): 77								
Total Vol. Purged (gal/L): 6 gal								

See low Flow Purge data sheet

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs	HCl	40mL glass vials	3

OBSERVATIONS / NOTES:

DO sensor was calibrated this morning and battery in Horiba was replaced. It is acting strange when sampling, starting higher and declining

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Christopher G. Faller

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NWIRP- Calverton SA
PROJECT NUMBER: 112G-02045

WELL ID.: SA-PZ-149I1
DATE: 7/8/10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
830	9.49	250	5.42	0.113	3.23	0.99	14.71	65	0	Clear
845	9.50	250	5.39	0.110	2.12	0.25	14.25	68	0	clear
850	9.50	250	5.42	0.108	0.41	0.10	14.21	66	0	clear
855	9.50	250	5.50	0.108	0.21	0.01	14.04	61	0	clear
900	9.50	250	5.59	0.106	0.00	0.00	14.10	55	0	negative turbidity reported
905	9.50	250	5.64	0.105	0.00	0.00	14.03	52	0	clear
910	9.50	250	5.72	0.104	0.44	0.00	13.89	48	0	clear
915	9.50	250	5.76	0.104	0.24	0.00	14.02	45	0	clear
920	9.50	250	5.80	0.104	1.56	0.00	13.97	43	0	clear
925	9.50	250	5.81	0.103	0.67	0.00	13.97	43	0	clear
930	9.50	250	5.82	0.103	0.83	0.00	13.99	42	0	clear
935	9.50	250	5.83	0.104	0.76	0.00	14.05	41	0	clear
940	9.50	250	5.84	0.104	0.52	0.00	13.79	42	0	clear
945	9.50	250	5.83	0.103	0.00	0.00	13.78	42	0	clear
947	Collected Sample									

SIGNATURE(S): [illegible]

PAGE 2 OF 2

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NWIRP Calverton Site 6A
Project No.: 112G02045

[] Domestic Well Data
[] Monitoring Well Data
[X] Other Well Type: Pilezometer
[] QA Sample Type:

Sample ID No.: SA-PZ-151I1-20100707
Sample Location: SA-PZ-151I1
Sampled By: Dwhalen
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Date: 7-7-10	Visual	Standard	mS/cm	°C	NTU	mg/l	mV	NA
Time: 1220								
Method: peristaltic pump	clear	6.38	0.174	14.65	0.84	4.10	-124	

PURGE DATA:

Date: 7-7-10	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Other
Method: peristaltic pump								
Monitor Reading (ppm):	—	SEE	Low	Flow	PURGE	DATA	SHEET	—
Well Casing Diameter & Material								
Type: 1" PVC								
Total Well Depth (TD): 39' BGS								
Static Water Level (WL): 5.50								
One Casing Volume(gal/L):								
Start Purge (hrs): 1111								
End Purge (hrs): 1215								
Total Purge Time (min): 64								
Total Vol. Purged (gal/L): 5								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	HCL	3 x 40 ml	✓
Fe, Mn	HNO_3	1 x 250ml	✓
TOC	H_2SO_4	2 x 40ml	✓
methane, ethane, ethane	HCl	2 x 40ml	✓

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Donald Whalen

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NWFRP Calverton Site 6A
PROJECT NUMBER: 112602045

WELL ID.: SA-PZ-15I I
DATE: 7-7-10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1111	5.50	250								Start purging
1115	5.50	250	6.60	0.192	9.23	9.64	15.13	-120	0	clear
1120	5.50	250	6.41	0.181	7.55	5.89	14.59	-123	0	clear
1125	5.50	250	6.40	0.179	4.93	5.42	14.61	-122	0	clear
1130	5.50	250	6.38	0.179	3.49	5.11	14.74	-121	0	clear
1135	5.50	250	6.36	0.178	2.75	4.68	14.70	-121	0	clear
1140	5.50	250	6.35	0.176	2.04	4.32	14.81	-121	0	clear
1145	5.50	250	6.37	0.176	1.85	4.34	14.63	-125	0	clear
1150	5.50	250	6.37	0.176	1.66	4.18	14.81	-129	0	clear
1155	5.50	250	6.37	0.175	1.05	4.14	14.93	-129	0	clear
1200	5.50	250	6.37	0.175	0.27	4.14	14.83	-123	0	clear
1205	5.50	250	6.38	0.175	0.76	4.11	14.74	-127	0	clear
1210	5.50	250	6.38	0.174	0.64	4.07	14.76	-125	0	clear
1215	5.50	250	6.38	0.174	0.84	4.10	14.65	-124	0	clear

SIGNATURE(S): Donald Whalen

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NWIRP – Calverton SA
Project No.: 112G02045

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ-155I-20100707
Sample Location: SA-PZ-155I
Sampled By: CF
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other ORP (mV)
Date: 7/7/10								
Time: 1212								
Method: low Flow	Clear	5.86	0.118	13.97	5.42	0.0	0	-32

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 7/7/10								
Method: low Flow								
Monitor Reading (ppm):								
Well Casing Diameter & Material Type: 1" PVC pipe								
Total Well Depth (TD): 48.11'								
Static Water Level (WL): 5.33'								
One Casing Volume(gal/L):								
Start Purge (hrs): 1055								
End Purge (hrs): 1212								
Total Purge Time (min): 77								
Total Vol. Purged (gal/L): 7.5 gal								

See low Flow purge data sheet

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs	HCl	40 mL glass vials	3
TOC	H_2SO_4	40 mL glass vials	2
Iron / Manganese (Fe/Mn)	HNO_3	250 mL poly	1
Methane, Ethane, Ethene, (MEE)	HCl	40 mL glass vials	2

OBSERVATIONS / NOTES:

DO Sensor was calibrated correctly; it failed to perform during sampling (started high and steadily decreased to 0.00 mg/l)

Circle if Applicable:

MS/MSD | Duplicate ID No.: SA-20100707-DUP-~~01~~

Signature(s): [illegible]

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NWIRP - Calverton SA
PROJECT NUMBER: 112G02045
WELL ID.: SA-PZ-155I
DATE: 7/7/10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1055	5.33	280	6.15	0.152	46.0	0.37	14.65	-58	0	
1100	5.38	280	5.76	0.140	24.0	0.00	14.25	-37	0	
1105	5.37	280	5.58	0.133	16.4	0.00	14.11	-25	0	
1110	5.36	280	5.54	0.132	8.40	0.00	14.07	-23	0	
1115	5.37	280	5.50	0.128	7.27	0.00	13.99	-19	0	
1120	5.39	275	5.50	0.125	7.08	0.00	14.16	-18	0	
1125	5.38	275	5.51	0.124	6.76	0.00	14.07	-17	0	
1130	5.38	275	5.53	0.122	6.13	0.00	14.17	-19	0	
1135	5.38	275	5.61	0.121	5.85	0.00	14.22	-21	0	
1140	5.38	275	5.63	0.121	6.44	0.00	14.13	-22	0	
1145	5.38	275	5.73	0.120	4.00	0.00	13.89	-26	0	
1150	5.38	275	5.82	0.120	12.0	0.00	14.10	-30	0	
1155	5.38	275	5.83	0.119	8.66	0.00	13.95	-31	0	
1200	5.38	275	5.84	0.119	7.41	0.00	14.02	-31	0	
1205	5.38	275	5.86	0.119	5.47	0.00	13.81	-32	0	
1210	5.38	275	5.86	0.118	5.42	0.00	13.47	-32	0	
1212	Collected Sample									

SIGNATURE(S): Charles D. Fuller

PAGE 2 OF 2

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NWIRP- Calverton -SA
Project No.: 112G02045

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ-157I-20100708
Sample Location: SA-PZ-157I
Sampled By: LF
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other ORP (mV)
Date: 7/8/10								
Time: 1542								
Method: low Flow	Clear	5.57	0.107	13.51	1.78	0.00	0	73

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 7/8/10								
Method: low Flow								
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 1" PVC pipe								
Total Well Depth (TD): 48.11'								
Static Water Level (WL): 4.82'								
One Casing Volume(gal/L):								
Start Purge (hrs): 1215								
End Purge (hrs): 1347								
Total Purge Time (min): 92								
Total Vol. Purged (gal/L): 10 gal								

See low Flow Purge data sheet

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs	HCl	40 mL glass vials	3
TOC	H_2SO_4	40 mL glass vials	2
Iron / Manganese (Fe/Mn)	HNO_3	250 mL poly	1
Methane, Ethane, Ethene (MEE)	HCl	40 mL glass vials	2
NO_3^-, NO_2^-, Chloride	—	250 mL poly	1
Sulfide	ZnAc, NaOH	500 mL poly	1
DHC, DHB	—	Filter	→ (1)

OBSERVATIONS / NOTES:

See DO note on 14AI1 data sheet

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Andrew E. Fellis

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NWIRP- Calverton - SA
PROJECT NUMBER: 112602045

WELL ID.: SA-PZ-157I
DATE: 7/8/10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1215	4.82	265	5.51	0.114	61.7	0.25	14.90	-11	0	tint of brown
1220	4.83	265	5.06	0.112	24.3	0.00	14.01	33	0	
1225	4.85	265	5.01	0.111	14.7	0.00	13.65	54	0	
1230	4.84	265	5.02	0.111	12.4	0.00	13.47	61	0	
1235	4.84	265	5.04	0.110	10.59	0.00	13.56	67	0	
1240	4.84	265	5.06	0.110	11.7	0.00	13.78	71	0	
1245	4.84	265	5.10	0.109	13.8	0.00	13.61	75	0	
1250	4.84	265	5.12	0.109	11.9	0.00	13.59	76	0	
1255	4.83	265	5.16	0.108	26.9	0.00	13.40	77	0	
1300	4.83	265	5.20	0.108	10.10	0.00	13.72	78	0	
1305	4.83	265	5.27	0.108	6.07	0.00	13.66	77	0	
1310	4.83	265	5.32	0.108	6.48	0.00	13.65	76	0	
1315	4.83	265	5.37	0.108	7.29	0.00	13.74	75	0	
1320	4.83	265	5.42	0.107	5.81	0.00	13.66	73	0	
1325	4.83	265	5.46	0.108	5.32	0.00	13.68	73	0	
1330	4.83	265	5.52	0.107	5.50	0.00	13.84	71	0	
1335	4.83	265	5.54	0.107	3.77	0.00	13.74	72	0	
1340	4.83	265	5.56	0.107	2.95	0.00	13.52	72	0	
1345	4.83	265	5.57	0.107	1.78	0.00	13.51	73	0	
1347	Collected Sample									

SIGNATURE(S): Crowley L Fully

PAGE 1/2 OF 1/2

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NWIRP- Calverton SA
Project No.: 112602045

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ-157I1-20100707
Sample Location: SA-PZ-157I1
Sampled By: CF
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (^{0}C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other ORP (mV)
Date: 7/7/10								
Time: 10 00								
Method: low Flow	Clear	5.92	0.132	13.80	0.04	0.00	0	71

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 7/7/10								
Method: low Flow								
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 1" PVC pipe								
Total Well Depth (TD): 40.42'								
Static Water Level (WL): 5.02'								
One Casing Volume(gal/L):								
Start Purge (hrs): 906								
End Purge (hrs): 10 00								
Total Purge Time (min): 54								
Total Vol. Purged (gal/L): 5 gal								

Gal low Flow Purge data sheet

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs	HCl	40 mL glass vials	3
TOC	H_2SO_4	40 mL glass vials	2
Iron / Manganese (Fe, Mn)	HNO_3	250 mL Poly	1
Methane, Ethane, Ethene (MEE)	HCl	40 mL glass vials	2

OBSERVATIONS / NOTES:

DO seems suspiciously low, but DO was calibrated correctly on Horiba morning of 7/7, and no error message occurred that would indicate a DO problem

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Christopher L. Fallon

Error 2 was flashing intermittently on Horiba, which indicates a voltage problem; there was no indication that DO was malfunctioning, and it calibrated correctly this morning

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NWIRP - Calverton SA
PROJECT NUMBER: 112G02045
WELL ID.: SA-PZ-157I1
DATE: 7/7/10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
906	5.02	265	5.60	0.141	22.9	0.22	14.19	70	0	relatively clear
916	5.05	265	5.52	0.142	9.28	0.00	14.09	78	0	[illegible]
925	5.04	265	5.50	0.138	2.06	0.00	13.92	83	0	clear
930	5.04	265	5.58	0.136	2.51	0.00	13.90	80	0	clear
935	5.04	265	5.65	0.135	0.72	0.00	13.87	77	0	clear
940	5.04	265	5.72	0.134	0.41	0.00	13.92	75	0	clear
945	5.04	265	5.84	0.133	0.00	0.00	13.82	71	0	very clear
950	5.04	265	5.89	0.132	0.36	0.00	13.76	71	0	very clear
955	5.04	265	5.92	0.132	0.09	0.00	13.80	71	0	very clear
1000	Collected Sample									

SIGNATURE(S): [illegible] J. Fellin

PAGE ~~1~~ 2 **OF** ~~1~~ 2

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NWIRP Calverton Site 6A
Project No.: 112G02045

[] Domestic Well Data
[] Monitoring Well Data
[X] Other Well Type: Piezometer
[] QA Sample Type:

Sample ID No.: SA-PZ-158I1-20100706
Sample Location: SA-PZ-158I1
Sampled By: D. Whalen
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Date: 7-6-10	Visual	Standard	mS/cm	°C	NTU	mg/l	mV	NA
Time: 1310								
Method: Peristaltic Pump	Clear	6.45	0.161	14.12	1.20	1.59	-224	

PURGE DATA:

Date: 7-6-10	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Other
Method: Peristaltic Pump								
Monitor Reading (ppm):	— SEE LOW FLOW PURGE DATA SHEET —							
Well Casing Diameter & Material Type: 1" PVC								
Total Well Depth (TD): 39'6gs								
Static Water Level (WL): 4.71								
One Casing Volume(gal/L):								
Start Purge (hrs): 1214								
End Purge (hrs): 1305								
Total Purge Time (min): 51								
Total Vol. Purged (gal/L): 4								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	HCL	3 x 40 ml	✓

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Donald Whalen

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Site 6A
PROJECT NUMBER: 112602045

WELL ID.: SA-PZ-158 I1
DATE: 7-6-10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1214	4.72	260								START PURGE
1215	4.73	260	6.51	0.184	20.8	4.61	14.44	-103	0	slightly cloudy
1220	4.73	260	6.50	0.175	16.5	3.50	14.22	-149	0	" "
1225	4.73	260	6.50	0.168	13.1	2.22	14.05	-180	0	clear
1230	4.73	260	6.42	0.164	3.57	1.86	14.42	-182	0	clear
1235	4.73	260	6.42	0.163	2.53	1.75	14.17	-192	0	clear
1240	4.73	260	6.43	0.163	1.53	1.66	14.35	-202	0	clear
1245	4.73	260	6.44	0.162	1.32	1.66	13.89	-208	0	clear
1250	4.73	260	6.44	0.162	1.17	1.63	14.16	-214	0	clear
1255	4.73	260	6.45	0.161	0.40	1.61	14.24	-221	0	clear
1300	4.73	260	6.46	0.161	1.20	1.64	14.11	-224	0	clear
1305	4.73	260	6.45	0.161	1.20	1.59	14.12	-224	0	clear

SIGNATURE(S): David Schaber

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NWIRP Calverton Site 6A
Project No.: 112G02045

[] Domestic Well Data
[] Monitoring Well Data
[X] Other Well Type: Piezometer
[] QA Sample Type:

Sample ID No.: SA-PZ-159I-20100707
Sample Location: SA-PZ-159I
Sampled By: D. Whalen
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Date: 7-7-10	Visual	Standard	mS/cm	°C	NTU	mg/l	mV	NA
Time: 1015								
Method: peristaltic pump	clear	5.79	0.129	14.03	0.55	3.87	105	

PURGE DATA:

Date: 7-7-10	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Other
Method: peristaltic pump								
Monitor Reading (ppm):	— SEE LOW FLOW PURGE DATA SHEET —							
Well Casing Diameter & Material								
Type: 1" PVC								
Total Well Depth (TD): 47' BGS								
Static Water Level (WL): 4.57								
One Casing Volume(gal/L):								
Start Purge (hrs): 0908								
End Purge (hrs): 1010								
Total Purge Time (min): 62								
Total Vol. Purged (gal/L): 4.5								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	HCL	3 x 40 ml	✓
Fe, Mn	HNO_3	1x250 ml	✓
TOC	H_2SO_4	2x40ml	✓
methane, ethane, ethene	HCl ~~H_2SO_4~~	2x40 ml	✓

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Daniel Whalen

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NWIRP Calverton Site 6A
PROJECT NUMBER: 112G02045
WELL ID.: SA-PZ-159F
DATE: 7-7-10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
0908	4.57	260								START PURGE
0910	4.59	260	6.12	0.139	3.88	9.28	14.59	-71	0	clear
0915	4.60	260	5.74	0.139	2.51	6.11	14.63	-118	0	"
0920	4.60	260	5.79	0.137	1.30	5.86	14.37	-90	0	"
0925	4.60	260	5.68	0.133	0.60	4.94	14.02	-16	0	"
0930	4.60	260	5.66	0.131	0.71	4.53	14.13	18	0	"
0935	4.60	260	5.69	0.131	0.87	4.41	13.99	26	0	"
0940	4.60	260	5.72	0.130	0.75	4.15	14.07	79	0	"
0945	4.60	260	5.73	0.130	0.82	4.10	14.05	86	0	"
0950	4.60	260	5.75	0.130	0.97	4.05	14.04	93	0	"
0955	4.60	260	5.76	0.130	0.68	3.97	14.08	98	0	"
1000	4.60	260	5.77	0.130	0.59	3.91	14.11	101	0	"
1005	4.60	260	5.78	0.130	0.54	3.89	14.00	101	0	"
1010	4.60	260	5.79	0.129	0.55	3.87	14.03	105	0	"

SIGNATURE(S): Donald Whelan

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NWIRP Calverton Site 6A
Project No.: 112G02045

[] Domestic Well Data
[] Monitoring Well Data
[X] Other Well Type: Piezometer
[] QA Sample Type:

Sample ID No.: SA-PZ-158I-20100706
Sample Location: SA-PZ-158I
Sampled By: D. Whalen
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Date: 7-6-10	Visual	Standard	mS/cm	°C	NTU	mg/l	mV	NA
Time: 1145								
Method: peristaltic Pump	clear	6.27	0.151	14.87	0.56	1.57	-224	

PURGE DATA:

Date: 7-6-10	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Other
Method: Peristaltic Pump								
Monitor Reading (ppm):	—	SEE	LOW	FLOW	PURGE	DATA	SHEET	—
Well Casing Diameter & Material								
Type: 1" PVC								
Total Well Depth (TD): 47' BGS								
Static Water Level (WL): 5.07								
One Casing Volume(gal/L):								
Start Purge (hrs): 1038								
End Purge (hrs): 1145								
Total Purge Time (min): 67								
Total Vol. Purged (gal/L): 5								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	HCL	3 x 40 ml	✓

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Donald Whalen

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NWIRP CALVERTON SITE 6A
PROJECT NUMBER: 112G02045

WELL ID.: SA-PZ-158I
DATE: 7-6-10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1038	5.07	300								START PURGE
1040	5.10	260	6.67	0.187	56.7	3.71	15.22	-153	0	cloudy
1045	5.10	260	6.37	0.180	42.5	2.55	15.13	-164	0	"
1050	5.10	260	6.16	0.174	25.7	2.14	15.18	-170	0	"
1055	5.10	260	6.08	0.169	14.5	1.92	14.61	-175	0	clear
1100	5.10	260	6.04	0.167	12.9	1.80	14.74	-177	0	clear
1105	5.10	260	6.01	0.163	10.2	1.72	14.77	-179	0	clear
1110	5.10	260	6.00	0.160	8.33	1.66	15.10	-181	0	clear
1115	5.10	260	6.05	0.158	7.54	1.66	15.41	-189	0	clear
1120	5.10	260	6.10	0.156	7.05	1.67	15.15	-194	0	clear
1125	5.10	260	6.15	0.155	6.64	1.63	14.93	-201	0	clear
1130	5.10	260	6.20	0.153	6.13	1.63	14.89	-208	0	clear
1135	5.10	260	6.24	0.153	5.41	1.61	14.81	-214	0	"
1140	5.10	260	6.25	0.151	3.74	1.57	14.95	-218	0	"
1145	5.10	260	6.27	0.151	0.56	1.57	14.87	-224	0	"

SIGNATURE(S): Donald W Laber

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NWIRP Calverton Site 6A
Project No.: 112G02045

[] Domestic Well Data
[] Monitoring Well Data
[X] Other Well Type: piezometer
[] QA Sample Type:

Sample ID No.: SA-PZ-159I1-20100708
Sample Location: SA-PZ-159I1
Sampled By: D. Whalen
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Date: 7-8-10	Visual	Standard	mS/cm	°C	NTU	mg/l	mV	NA
Time: 1340								
Method: peristaltic pump	clear	6.67	0.162	13.78	0.0	4.73	-398	

PURGE DATA:

Date: 7-8-10	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Other
Method: peristaltic pump								
Monitor Reading (ppm):	—	SEE	LOW	FLOW	PURGE	DATA	SHEET	—
Well Casing Diameter & Material								
Type: 1" PVC								
Total Well Depth (TD):								
Static Water Level (WL): 4.81								
One Casing Volume(gal/L):								
Start Purge (hrs): 1222								
End Purge (hrs): 1340								
Total Purge Time (min): 78								
Total Vol. Purged (gal/L): 6								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	HCL	3 x 40 ml	✓
Fe, Mn	HNO_3	1x 250 ml poly	✓
TOC	H_2SO_4	2x 40ml	✓
methane, ethane, ethene	HCl	2 x 40ml	✓
NO_2, NO_3, chloride	—	1x 250 ml poly	✓
Sulfide	ZnAc, NaOH	1x 500 ml poly	✓
DHC, DHB	—	filter	✓

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Dalil Whalen

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Galveston Site 6A
PROJECT NUMBER: 11260245

WELL ID.: SA-PZ-159I
DATE: 7-8-10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1222	4.81	250								START PURGE
1225	4.84	250	6.74	0.195	23.4	15.37	15.86	-144	0	sl. cloudy
1230	4.84	250	6.62	0.167	15.2	9.25	14.06	-188	0	clear
1235	4.84	250	6.57	0.165	9.04	7.21	13.93	-211	0	clear
1240	4.84	250	6.56	0.163	7.26	6.20	14.16	-249	0	clear
1245	4.84	250	6.55	0.164	5.31	5.91	14.06	-268	0	clear
1250	4.84	250	6.56	0.163	3.16	5.60	13.99	-302	0	clear
1255	4.84	250	6.57	0.164	1.80	5.38	14.06	-338	0	clear
1300	4.84	250	6.60	0.164	1.17	5.20	14.05	-356	0	clear
1305	4.84	250	6.61	0.163	0.92	5.01	14.00	-375	0	clear
1310	4.84	250	6.63	0.162	0.65	4.94	13.97	-380	0	clear
1315	4.84	250	6.65	0.162	0.44	4.87	13.93	-385	0	clear
1320	4.84	250	6.66	0.162	0.57	4.86	13.70	-398	0	clear
1325	4.84	250	6.68	0.162	0.68	4.80	13.77	-398	0	clear
1330	4.84	250	6.66	0.162	0.08	4.70	13.93	-396	0	clear
1335	4.84	250	6.67	0.161	0.00	4.68	13.98	-394	0	clear
1340	4.84	250	6.67	0.162	0.00	4.73	13.78	-398	0	clear

SIGNATURE(S): David W Kalm

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NWIRP Calverton Site 6A
Project No.: 112G02045

[] Domestic Well Data
[] Monitoring Well Data
[X] Other Well Type: Piezometer
[] QA Sample Type:

Sample ID No.: SA-PZ-160I1-20100706
Sample Location: SA-PZ-160I
Sampled By: D. Whalen
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Date: 7-6-10	Visual	Standard	mS/cm	°C	NTU	mg/l	mV	NA
Time: 1540								
Method: Peristaltic Pump	clear	6.17	0.115	13.97	1.56	1.71	64	

PURGE DATA:

Date: 7-6-10	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Other
Method: Peristaltic Pump								
Monitor Reading (ppm):	—	SEE	LOW	FLOW	PURGE	DATA	SHEET	—
Well Casing Diameter & Material								
Type: 1" PVC								
Total Well Depth (TD): 40' BGS								
Static Water Level (WL): 4.55								
One Casing Volume(gal/L):								
Start Purge (hrs): 1446								
End Purge (hrs): 1540								
Total Purge Time (min): 54								
Total Vol. Purged (gal/L): 4								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	HCL	3 x 40 ml	✓

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Donald Whalen

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Site 6A
PROJECT NUMBER: 112602045
WELL ID.: SA-PZ-160I1
DATE: 7-6-10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1446	4.55	300								START PURGE
1450	4.55	250	6.36	0.112	12.7	4.05	15.60	103	0	
1455	4.56	250	6.20	0.115	9.35	2.61	14.93	65	0	clear
1500	4.57	250	6.15	0.114	7.21	2.22	14.68	63	0	clear
1505	4.57	250	6.14	0.114	5.85	2.09	14.48	70	0	clear
1510	4.57	250	6.14	0.114	4.66	1.82	14.52	67	0	clear
1515	4.57	250	6.16	0.115	3.01	1.76	14.50	64	0	clear
1520	4.57	250	6.17	0.114	2.38	1.76	14.46	64	0	clear
1525	4.57	250	6.14	0.115	1.45	1.72	14.30	67	0	clear
1530	4.57	250	6.14	0.115	1.94	1.70	14.38	67	0	clear
1535	4.57	250	6.17	0.114	1.82	1.69	14.34	64	0	clear
1540	4.57	250	6.17	0.115	1.56	1.71	13.97	64	0	clear

SIGNATURE(S): Donald W Shah

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NWIRP Calverton Site 6A
Project No.: 112G02045

[] Domestic Well Data
[] Monitoring Well Data
[X] Other Well Type: Piezometer
[] QA Sample Type:

Sample ID No.: SA-PZ-160I-20100707
Sample Location:
Sampled By: D. Whalen
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Date: 7-7-10	Visual	Standard	mS/cm	°C	NTU	mg/l	mV	NA
Time: 1540								
Method: peristaltic pump	clear	6.05	0.133	14.10	3.04	3.91	-111	

PURGE DATA:

Date: 7-7-10	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Other
Method: peristaltic pump								
Monitor Reading (ppm):	—	SEE	LOW	FLOW	PURGE	DATA	SHEET	—
Well Casing Diameter & Material								
Type: 1" PVC								
Total Well Depth (TD): 47' BGS								
Static Water Level (WL): 4.92								
One Casing Volume(gal/L):								
Start Purge (hrs): 1442								
End Purge (hrs): 1535								
Total Purge Time (min): 53								
Total Vol. Purged (gal/L): 4								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	HCL	3x (3 x 40 ml)	✓
Fe, Mn	HNO_3	3x (250 ml poly)	✓
TOC	H_2SO_4	2x 40 ml	✓
methane, ethane, ethene	HCl	2x 40 ml	✓

OBSERVATIONS / NOTES:

Circle if Applicable:
MS/MSD
Duplicate ID No.:

Signature(s): Donald Whalen

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NWIRP Calverton Site 6A
PROJECT NUMBER: 112G02045

WELL ID.: SA-PZ-160I
DATE: 7-7-10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1442	4.93	230	—	—	—	—	—	—	—	START PURGING
1445	4.94	230	6.27	0.137	31.6	8.11	14.86	0	0	cloudy
1450	4.94	230	6.10	0.135	25.8	5.77	14.50	-54	0	cloudy
1455	4.94	230	6.03	0.135	16.1	4.68	14.30	-79	0	slightly cloudy
1500	4.94	230	6.02	0.134	11.0	4.40	14.26	-91	0	clear
1505	4.94	230	6.02	0.134	10.3	4.13	14.07	-101	0	clear
1510	4.94	230	6.03	0.134	8.25	4.05	14.05	-110	0	clear
1515	4.94	230	6.04	0.134	7.09	4.07	13.97	-114	0	clear
1520	4.94	230	6.03	0.133	5.05	3.99	14.19	-108	0	clear
1525	4.94	230	6.04	0.133	3.37	3.95	14.04	-114	0	clear
1530	4.94	230	6.04	0.133	2.92	3.93	13.98	-109	0	clear
1535	4.94	230	6.05	0.133	3.04	3.91	14.10	-111	0	clear

SIGNATURE(S): David W. Luber

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NWIRP- Calverton SA
Project No.: 1126-02045

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ-161I-20100707
Sample Location: SA-PZ-161I
Sampled By: CF
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other ORP (mV)
Date: 7/7/10								
Time: 1542								
Method: low Flow	Clear	5.65	0.129	13.99	7.10	0.00	0	4

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 7/7/10								
Method: low Flow								
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 1" PVC pipe								
Total Well Depth (TD): 47.90'								
Static Water Level (WL): 6.36'								
One Casing Volume(gal/L):								
Start Purge (hrs): 1426								
End Purge (hrs): 1542								
Total Purge Time (min): 76								
Total Vol. Purged (gal/L): 7 gal								

See low Flow purge data sheet

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs	HCl	40mL glass vials	3

OBSERVATIONS / NOTES:

See ISSI groundwater log sheet for note about DO

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NWIRP – Calverton SA
PROJECT NUMBER: 1126-02045
WELL ID.: SA-PZ-161I
DATE: 7/7/10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1426	6.36	260	5.38	0.140	38.7	0.30	14.75	15	0	
1430	6.42	260	5.22	0.137	31.4	0.02	14.83	18	0	
1435	6.40	260	5.22	0.138	25.7	0.00	14.69	14	0	
1440	6.41	260	5.24	0.138	16.3	0.00	14.78	12	0	
1445	6.41	260	5.28	0.136	13.7	0.00	14.72	12	0	
1450	6.41	260	5.30	0.135	12.5	0.00	14.49	11	0	
1455	6.41	260	5.29	0.133	10.40	0.00	14.53	14	0	
1500	6.40	260	5.29	0.132	7.92	0.00	14.71	17	0	
1505	6.40	260	5.30	0.131	7.09	0.00	14.45	17	0	
1510	6.40	260	5.35	0.131	8.35	0.00	14.28	15	0	
1515	6.40	260	5.42	0.130	7.31	0.00	14.36	12	0	
1520	6.40	260	5.48	0.130	7.17	0.00	14.39	9	0	
1525	6.40	260	5.55	0.130	20.0	0.00	14.45	6	0	large particle in turbidity visual
1530	6.40	260	5.60	0.130	8.78	0.00	14.27	5	0	
1535	6.40	260	5.62	0.129	6.86	0.00	14.34	5	0	
1540	6.40	260	5.65	0.129	7.10	0.00	13.99	4	0	
1542	Collected Sample									

SIGNATURE(S): [illegible] S. Fertis

PAGE 2 OF 2

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Calverton Southern Area EIAB Pilot Study
Project No.: 112G02045

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ-133I-201010 12
Sample Location: SA-PZ-133I-201010
Sampled By: K. Francisco
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10/12/10	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (^{0}C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other ORP (mV)
Time: 1250								
Method: Low Flow Peristaltic	Clear	6.41	.103	14.93	0.00	0.00	0.0	156

PURGE DATA:

Date: 10/12/10	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Method: Low Flow Peristaltic								
Monitor Reading (ppm):			See data sheet					
Well Casing Diameter & Material								
Type: PVC 1"								
Total Well Depth (TD):								
Static Water Level (WL): 8.33								
One Casing Volume(gal/L):								
Start Purge (hrs): 1154								
End Purge (hrs): 1250								
Total Purge Time (min): 64								
Total Vol. Purged (gal/L): ~4								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	3 40-mL clear glass vials	3
TOC	H2SO4	40-mL amber glass vial	
MEE	HCl	2 40-mL clear glass vials	
Metals (Fe+Mn)	HNO3	250-mL plastic bottle	

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): K. Francisco

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Calverton EIAB Pilot Study 3-month
PROJECT NUMBER: 112G02045

WELL ID.: SA-PZ-133I-201010
DATE: 10-12-10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity (%) or ppt	Comments
1155	8.37	400	7.02	.104	0.73	5.65	15.20	95	0.0	clear
1200	8.37	400	6.73	.097	0.42	1.71	15.05	119	0.0	
1205	8.37	400	6.56	.103	0.21	0.82	14.91	134	0.0	
1210	8.37	400	6.48	.103	0.10	0.54	14.96	141	0.0	
1215	8.37	400	6.47	.103	0.11	0.49	14.88	143	0.0	
1220	8.37	400	6.45	.103	0.05	0.45	14.86	145	0.0	
1225	8.37	400	6.44	.103	0.00	0.26	14.97	149	0.0	
1230	8.37	400	6.42	.103	0.00	0.21	14.95	152	0.0	
1235	8.37	400	6.42	.103	0.00	0.17	14.95	153	0.0	
1240	8.37	400	6.41	.103	0.00	0.01	14.86	155	0.0	
1245	8.37	400	6.41	.102	0.00	0.00	14.95	156	0.0	
1250	8.37	400	6.41	.103	0.00	0.00	14.93	156	0.0	

SIGNATURE(S): K Frain

PAGE_1__OF_1__

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Calverton Southern Area EIAB Pilot Study
Project No.: 112G02045

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ-138I -20101012
Sample Location: SA-PZ-138I -20101012
Sampled By: JB
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10-12-10	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1336	(Visual)	(S.U.)	(mS/cm)	(^{0}C)	(NTU)	(mg/l)	(%)	ORP
Method: Low Flow Peristaltic	clear	5.85	0.099	13.0	0.00	0.24	0.0	42

PURGE DATA:

Date: 10-12-10	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Method: Low Flow Peristaltic	See low flow purge sheet for details							
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: ⌀ 1" PVC								
Total Well Depth (TD):								
Static Water Level (WL): 5.71								
One Casing Volume(gal/L):								
Start Purge (hrs): 1251								
End Purge (hrs): 1336								
Total Purge Time (min): 45								
Total Vol. Purged (gal/L): 3¼ gal								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	3 40-mL clear glass vials	yes
TOC	H2SO4	40-mL amber glass vial	no
MEE	HCl	2 40-mL clear glass vials	no
Metals (Fe+Mn)	HNO3	250-mL plastic bottle	no

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	SA-Dup02-20101012 1200

Signature(s):

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Calverton EIAB Pilot Study 3-month
PROJECT NUMBER: 112G02045

WELL ID.: SA-PZ-138I-201010 12
DATE: 10-12-10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1251	5.71									
1253	5.74	350	6.36	0.112	0.70	2.64	13.6	-98	0.0	clear
1258	5.74	300	6.12	0.103	0.05	0.42	13.3	-26	0.0	
1303	5.74	300	5.98	0.101	0.00	0.29	13.2	6	0.0	
1308	5.74	300	5.91	0.100	0.00	0.26	13.3	16	0.0	
1313	5.74	300	5.88	0.100	0.00	0.24	13.2	27	0.0	
1319	5.74	300	5.88	0.099	0.00	0.24	13.1	33	0.0	2 gal
1324	5.74	300	5.86	0.099	0.00	0.24	13.1	39	0.0	
1329	5.74	300	5.86	0.099	0.00	0.23	13.0	39	0.0	
1334	5.74	300	5.85	0.099	0.00	0.24	13.0	42	0.0	3 gal
1336	Collect sample									

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Calverton Southern Area EIAB Pilot Study
Project No.: 112G02045

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ-1381-20101012
Sample Location: SA-PZ-1381-20101012
Sampled By: JB
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10-12-10	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1246	(Visual)	(S.U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(%)	ORP
Method: Low Flow Peristaltic	clear	5.93	0.146	13.1	0.00	0.23	0.0	127

PURGE DATA:

Date: 10-12-10	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Method: Low Flow Peristaltic	see low flow purge sheet for details							
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 1" PVC								
Total Well Depth (TD):								
Static Water Level (WL): 5.55								
One Casing Volume(gal/L):								
Start Purge (hrs): 1157								
End Purge (hrs): 1246								
Total Purge Time (min): 49								
Total Vol. Purged (gal/L): 3 3/4 gal								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	3 40-mL clear glass vials	yes
TOC	H2SO4	40-mL amber glass vial	no
MEE	HCl	2 40-mL clear glass vials	no
Metals (Fe+Mn)	HNO3	250-mL plastic bottle	no

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

LOW FLOW PURGE DATA SHEET

138I

PROJECT SITE NAME: Calverton EIAB Pilot Study 3-month
PROJECT NUMBER: 112G02045

WELL ID.: SA-PZ-138I/201010/2
DATE: 10-12-10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1157	5.55									
1159	5.57	350	6.01	0.147	8.39	0.55	14.1	99	0.0	clear
1204	5.57	300	5.99	0.148	0.34	0.34	13.5	109	0.0	
1209	5.57	300	5.96	0.148	0.19	0.30	13.4	124	0.0	
1214	5.57	300	5.91	0.147	0.04	0.28	13.4	123	0.0	
1219	5.57	300	5.89	0.147	0.00	0.25	13.3	130	0.0	
1224	5.57	300	5.90	0.147	0.00	0.24	13.3	131	0.0	
1229	5.57	300	5.90	0.147	0.00	0.24	13.2	131	0.0	2.5 gal
1234	5.57	300	5.92	0.147	0.00	0.24	13.2	130	0.0	
1239	5.57	300	5.92	0.147	0.00	0.23	13.2	128	0.0	
1244	5.57	300	5.93	0.146	0.00	0.23	13.1	127	0.0	
1246	collect sample									

SIGNATURE(S): [signature]

PAGE_1__OF_1__

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Calverton Southern Area EIAB Pilot Study
Project No.: 112G02045

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ-139-201010 12
Sample Location: SA-PZ-139-201010
Sampled By: K. Francisco
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10-12-10	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (^{0}C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other ORP
Time: 1508								
Method: Low Flow Peristaltic	clear	6.15	.101	15.84	0.08	0.00	0.0	183

PURGE DATA:

Date: 10/12/10	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Method: Low Flow Peristaltic								
Monitor Reading (ppm):		See data sheet						
Well Casing Diameter & Material								
Type: PVC 1"								
Total Well Depth (TD):								
Static Water Level (WL): 8.64								
One Casing Volume(gal/L):								
Start Purge (hrs): 1421								
End Purge (hrs): 1508								
Total Purge Time (min): 47								
Total Vol. Purged (gal/L): 3								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	3 40-mL clear glass vials	3
TOC	H2SO4	40-mL amber glass vial	
MEE	HCl	2 40-mL clear glass vials	
Metals (Fe+Mn)	HNO3	250-mL plastic bottle	

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): K. Francisco

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Calverton EIAB Pilot Study 3-month
PROJECT NUMBER: 112G02045

WELL ID.: SA-PZ-139 -201010
DATE: 10-12-10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1423 ~~1422~~	8.67	400	6.55	.121	3.72	2.90	16.12	146	0.0	cloudy
1428	8.67	400	6.27	.108	0.72	1.73	15.86	160	0.0	
1433	8.67	400	6.19	.103	0.39	1.13	16.03	171	0.0	
1438	8.67	400	6.17	.103	0.00	0.89	15.90	176	0.0	clear
1443	8.67	400	6.15	.102	0.00	0.33	15.78	179	0.0	
1448	8.67	400	6.19	.102	0.00	0.18	15.67	180	0.0	
1453	8.68	400	6.13	.101	0.00	0.01	15.59	181	0.0	
1458	8.68	400	6.15	.101	0.02	0.00	15.90	182	0.0	
1503	8.68	400	6.15	.101	0.05	0.00	15.83	183	0.0	
1508	8.68	400	6.15	.101	0.08	0.00	15.84	183	0.0	clear

SIGNATURE(S): K. Francisco

PAGE_1__OF_1__

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Calverton Southern Area EIAB Pilot Study
Project No.: 112G02045

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ-1491-201010 12
Sample Location: SA-PZ-1491-201010 12
Sampled By: JB
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10-12-10	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1457	(Visual)	(S.U.)	(mS/cm)	(^{0}C)	(NTU)	(mg/l)	(%)	ORP
Method: Low Flow Peristaltic	clear	5.96	0.090	13.5	0.00	0.30	0.0	71

PURGE DATA:

Date: 10-12-10	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Method: Low Flow Peristaltic	See low flow purge sheet for details							
Monitor Reading (ppm): –								
Well Casing Diameter & Material								
Type: 1" PVC								
Total Well Depth (TD):								
Static Water Level (WL): 10.27								
One Casing Volume(gal/L):								
Start Purge (hrs): 1408								
End Purge (hrs): 1457								
Total Purge Time (min): 49								
Total Vol. Purged (gal/L): 3 3/4 gal								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	3 40-mL clear glass vials	yes
TOC	H2SO4	40-mL amber glass vial	no
MEE	HCl	2 40-mL clear glass vials	no
Metals (Fe+Mn)	HNO3	250-mL plastic bottle	no

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Calverton EIAB Pilot Study 3-month
PROJECT NUMBER: 112G02045

WELL ID.: SA-PZ-1491-201010 12
DATE: 10-12-10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1408	10.27									
1410	10.29	300	6.08	0.104	11.7	0.67	14.3	66	0.0	clear
1417	10.29	300	6.01	0.097	2.19	0.71	13.8	81	0.0	
1422	10.29	300	5.97	0.095	0.66	0.58	13.7	82	0.0	
1427	10.29	300	5.93	0.093	0.69	0.45	13.6	82	0.0	
1432	10.29	300	5.94	0.092	0.90	0.41	13.5	78	0.0	
1437	10.29	300	5.95	0.092	0.00	0.40	13.6	76	0.0	
1442	10.29	300	5.96	0.092	0.00	0.38	13.6	74	0.0	
1447	10.29	300	5.96	0.091	0.00	0.37	13.6	73	0.0	
1452	10.29	300	5.96	0.090	0.00	0.30	13.5	71	0.0	3 3/4 gal
1457	Collect sample									

SIGNATURE(S): [signature]

PAGE 1 OF 1

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Calverton Southern Area EIAB Pilot Study
Project No.: 112G02045

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ-151I-20101012
Sample Location: SA-PZ-151I-20101012
Sampled By: JB
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10-12-10	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 0836	(Visual)	(S.U.)	(mS/cm)	(^{0}C)	(NTU)	(mg/l)	(%)	ORP
Method: Low Flow Peristaltic	clear	6.10	0.127	13.2	000	0.39	0.0	-16

PURGE DATA:

Date: 10-12-10	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Method: Low Flow Peristaltic	See low flow purge sheet for details							
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 1" PVC								
Total Well Depth (TD):								
Static Water Level (WL): 4.74								
One Casing Volume(gal/L):								
Start Purge (hrs): 0751								
End Purge (hrs): 0836								
Total Purge Time (min): 45								
Total Vol. Purged (gal/L): 4 gal								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	3 40-mL clear glass vials	yes
TOC	H2SO4	2 40-mL ~~amber~~ clear glass vial	yes
MEE	HCl	2 40-mL clear glass vials	yes
Metals (Fe+Mn)	HNO3	250-mL plastic bottle	yes

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	SA-Dup01-20101012 (0800)

Signature(s):

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Calverton EIAB Pilot Study 3-month
PROJECT NUMBER: 112G02045

WELL ID.: SA-PZ-15II-20101012
DATE: 10-12-10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
0751	4.74									
0753	4.77	300	5.91	0.192	7.39	1.61	13.8	-15	0.0	clear
0759	4.77	300	5.80	0.150	2.14	0.36	13.3	4	0.0	
0804	4.77	300	5.82	0.142	0.55	0.32	13.2	-2	0.0	
0809	4.77	300	5.97	0.135	0.05	0.30	13.1	-11	0.0	2 gal
0814	4.77	300	6.02	0.134	0.00	0.29	13.1	-14	0.0	
0819	4.77	300	6.05	0.129	0.00	0.29	13.1	-15	0.0	
0824	4.77	300	6.08	0.129	0.00	0.45	13.1	-15	0.0	3 gal
0829	4.77	300	6.09	0.130	0.00	0.42	13.1	-15	0.0	
0834	4.77	300	6.10	0.127	0.00	0.39	13.2	-16	0.0	
0836	Collect sample									4 gal

SIGNATURE(S): _____

PAGE_1__OF_1__

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Calverton Southern Area EIAB Pilot Study
Project No.: 112G02045

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ-155I-201010 12
Sample Location: SA-PZ- 155I-201010
Sampled By: R. Francisco
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10- 12-10	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other ORP (mV)
Time: 0835								
Method: Low Flow Peristaltic	clear	6.18	0.110	15.62	0.00	0.68	0.0	133

PURGE DATA:

Date: 10/12/10	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Method: Low Flow Peristaltic								
Monitor Reading (ppm):		See data sheet						
Well Casing Diameter & Material								
Type: PVC 1"								
Total Well Depth (TD):								
Static Water Level (WL): 6.05								
One Casing Volume(gal/L):								
Start Purge (hrs): 0734								
End Purge (hrs): 0835								
Total Purge Time (min): 61								
Total Vol. Purged (gal/L): 4 gal								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	3 40-mL clear glass vials	3
TOC	H2SO4	2 -40-mL ~~amber~~ glass vial	2
MEE	HCl	2 40-mL clear glass vials	2
Metals (Fe+Mn)	HNO3	250-mL plastic bottle	1

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): R. Francisco

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Calverton EIAB Pilot Study 3-month
PROJECT NUMBER: 112G02045

WELL ID.: SA-PZ- 155E201010 12
DATE: 10- 12-10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
0735	6.08	300	6.63	0.143	0.57	2.31	15.71	125	0.0	Cloudy
0740	6.09	350	6.41	0.120	0.08	1.89	15.61	139	0.0	
0745	6.09	350	6.36	0.115	0.09	1.72	15.69	140	0.0	
0750	6.09	350	6.32	0.115	0.21	1.42	15.63	140	0.0	
0755	6.09	350	6.29	0.113	0.14	1.26	15.62	138	0.0	
0800	6.09	350	6.26	0.112	0.08	1.20	15.63	137	0.0	
0805	6.09	350	6.25	0.111	0.09	1.03	15.60	136	0.0	
0810	6.09	350	6.21	0.111	0.05	0.87	15.56	136	0.0	
0815	6.09	350	6.21	0.110	0.10	0.77	15.58	135	0.0	
0820	6.09	350	6.19	0.109	0.12	0.70	15.50	135	0.0	
0825	6.09	350	6.19	0.109	0.10	0.72	15.55	136	0.0	
0830	6.09	350	6.18	0.110	0.07	0.69	15.56	135	0.0	
0835	6.09	350	6.18	0.110	0.00	0.68	15.62	133	0.0	

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PAGE_1__OF_1__

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Calverton Southern Area EIAB Pilot Study
Project No.: 112G02045

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ-157I-20101011
Sample Location: SA-PZ-157I-20101011
Sampled By: JB
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10-11-10	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1410	(Visual)	(S.U.)	(mS/cm)	(^{0}C)	(NTU)	(mg/l)	(%)	ORP
Method: Low Flow Peristaltic	clear	6.20	0.121	15.41	0.00	0.89	0.0	79

PURGE DATA:

Date: 10-11-10	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Method: Low Flow Peristaltic	see	low	Flow	purge	sheet			
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 1" PVC								
Total Well Depth (TD):								
Static Water Level (WL): 5.49								
One Casing Volume(gal/L):								
Start Purge (hrs): 1325								
End Purge (hrs): 1410								
Total Purge Time (min): 45								
Total Vol. Purged (gal/L): 3.5 gal								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	3 40-mL clear glass vials	yes
TOC	H2SO4	40-mL amber glass vial	yes
MEE	HCl	2 40-mL clear glass vials	yes
Metals (Fe+Mn)	HNO3	250-mL plastic bottle	yes

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Calverton EIAB Pilot Study 3-month
PROJECT NUMBER: 112G02045

WELL ID.: SA-PZ-157I-20101011
DATE: 10-11-10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1325	5.49									
1327	5.52	400	6.79	0.160	0.31	7.38	15.81	52	0.0	clear
1332	5.52	300	6.61	0.135	0.00	3.48	15.65	63	0.0	
1337	5.52	300	6.38	0.121	0.00	1.85	15.65	74	0.0	
1342	5.52	300	6.29	0.120	0.00	1.50	15.59	75	0.0	
1347	5.52	300	6.27	0.120	0.00	1.40	15.54	77	0.0	
1352	5.52	300	6.23	0.120	0.00	1.18	15.43	78	0.0	2 gal
1357	5.52	300	6.21	0.120	0.00	1.05	15.48	79	0.0	
1402	5.52	300	6.21	0.120	0.00	0.99	15.42	78	0.0	
1407	5.52	300	6.20	0.121	0.00	0.89	15.41	79	0.0	3 gal
1410	Collect sample									

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Calverton Southern Area EIAB Pilot Study
Project No.: 112G02045

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ-1571I-2010101I
Sample Location: SA-PZ-1571I-2010101I
Sampled By: JB
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10-11-10	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1509	(Visual)	(S.U.)	(mS/cm)	(^{0}C)	(NTU)	(mg/l)	(%)	ORP
Method: Low Flow Peristaltic	clear	6.53	0.137	15.34	0.00	0.57	0.0	121

PURGE DATA:

Date: 10-11-10	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Method: Low Flow Peristaltic	see low flow purge sheet							
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 1" PVC								
Total Well Depth (TD):								
Static Water Level (WL): 5.74								
One Casing Volume(gal/L):								
Start Purge (hrs): 1424								
End Purge (hrs): 1509								
Total Purge Time (min): 45								
Total Vol. Purged (gal/L): 3 1/4 gal								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	3 40-mL clear glass vials	yes
TOC	H2SO4	40-mL amber glass vial	yes
MEE	HCl	2 40-mL clear glass vials	yes
Metals (Fe+Mn)	HNO3	250-mL plastic bottle	yes

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	

Signature(s):

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Calverton EIAB Pilot Study 3-month
PROJECT NUMBER: 112G02045

WELL ID.: SA-PZ-1571-201010 11
DATE: 10- 11 -10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1424	5.74									
1426	5.78	300	6.58	0.143	0.00	3.45	16.37	131	0.0	clear
1431	5.78	300	6.53	0.138	0.00	2.34	15.70	129	0.0	
1436	5.78	300	6.52	0.137	0.00	1.46	15.60	126	0.0	
1441	5.78	300	6.52	0.136	0.00	1.10	15.61	124	0.0	battery dieing (adjust speed)
1446	5.78	300	6.52	0.136	0.00	0.86	15.42	124	0.0	
1451	5.78	300	6.52	0.137	0.00	0.78	15.44	123	0.0	2 gal
1456	5.78	300	6.52	0.136	0.00	0.62	15.41	122	0.0	
1501	5.78	300	6.52	0.137	0.00	0.58	15.35	122	0.0	
1506	5.78	300	6.53	0.137	0.00	0.57	15.34	121	0.0	3 gal
1509	Collect sample									

SIGNATURE(S): [illegible]

PAGE_1__OF_1__

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Calverton Southern Area EIAB Pilot Study
Project No.: 112G02045

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ-168T-201010 11
Sample Location: SA-PZ-168T-201010
Sampled By: K. Francisco
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10-11-10	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other (mV)
Time: 1413								
Method: Low Flow Peristaltic	clear	6.17	0.143	14.4	0.30	0.27	0.0	-76

PURGE DATA:

Date: 10/11/10	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Method: Low Flow Peristaltic		see data sheet						
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: PVC 1"								
Total Well Depth (TD):								
Static Water Level (WL): 5.76								
One Casing Volume(gal/L):								
Start Purge (hrs): 1317								
End Purge (hrs): 1413								
Total Purge Time (min): 53								
Total Vol. Purged (gal/L): ~4								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	3 40-mL clear glass vials	3
TOC	H2SO4	40-mL amber glass vial	
MEE	HCl	2 40-mL clear glass vials	
Metals (Fe+Mn)	HNO3	250-mL plastic bottle	

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): K. Francisco

LOW FLOW PURGE DATA SHEET 158I

PROJECT SITE NAME: Calverton EIAB Pilot Study 3-month
PROJECT NUMBER: 112G02045

WELL ID.: SA-PZ- 158I-20101011
DATE: 10- 11 -10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1318	5.79	350	5.66	0.156	5.60	1.16	14.8	-14	0.0	clear
1323	5.79	350	5.82	0.145	1.74	0.31	13.7	-49	0.0	
1328	5.83	350	5.78	0.144	1.46	0.28	13.6	-54	0.0	
1333	5.82	350	5.83	0.145	1.56	0.26	13.4	-59	0.0	
1338	5.82	350	5.88	0.146	1.33	0.27	14.0	-61	0.0	
1343	5.82	350	5.95	0.145	1.10	0.28	14.0	-66	0.0	
1348	5.82	350	5.99	0.144	0.67	0.27	14.0	-69	0.0	
1353	5.82	350	6.04	0.144	0.41	0.27	14.1	-71	0.0	
1358	5.82	350	6.11	0.145	0.20	0.28	14.4	-74	0.0	
1403	5.82	350	6.16	0.144	0.38	0.26	14.4	-77	0.0	
1408	5.82	350	6.17	0.143	0.29	0.27	14.2	-76	0.0	
1413	5.82	350	6.17	0.143	0.30	0.27	14.4	-76	0.0	clear

SIGNATURE(S): K Francis

PAGE_1__OF_1__

158I1

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Calverton Southern Area EIAB Pilot Study
Project No.: 112G02045

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ-158I1-201010 11
Sample Location: SA-PZ-158I1-201010
Sampled By: K. Francisco
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10-11-10	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (^{0}C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other ORP (mV)
Time: 1512								
Method: Low Flow Peristaltic	clear	6.14	0.106	13.7	0.13	0.24	0.0	-94

PURGE DATA:

Date: 10/11/10	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Method: Low Flow Peristaltic		See data sheet						
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: PVC - 1"								
Total Well Depth (TD): 52'								
Static Water Level (WL): 5.42								
One Casing Volume(gal/L):								
Start Purge (hrs): 1421.								
End Purge (hrs): 1512								
Total Purge Time (min): 51								
Total Vol. Purged (gal/L): 3.5								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	3 40-mL clear glass vials	3
TOC	H2SO4	40-mL amber glass vial	
MEE	HCl	2 40-mL clear glass vials	
Metals (Fe+Mn)	HNO3	250-mL plastic bottle	

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): K. Francisco

LOW FLOW PURGE DATA SHEET - 158I1

PROJECT SITE NAME: Calverton EIAB Pilot Study 3-month
PROJECT NUMBER: 112G02045

WELL ID.: SA-PZ-158I-201010 11
DATE: 10- 11 -10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity (% or ppt)	Comments
1422	5.44	300	6.23	0.115	1.86	1.25	14.8	-50	0.0	clear
1427	5.44	300	6.19	0.111	1.23	0.37	14.8	-58	0.0	
1432	5.44	300	6.18	0.109	0.77	0.31	14.4	-63	0.0	
1437	5.44	300	6.17	0.109	0.68	0.30	14.3	-70	0.0	
1442	5.44	300	6.17	0.109	0.71	0.29	14.4	-75	0.0	
1447	5.44	300	6.17	0.108	0.38	0.27	14.1	-82	0.0	
1452	5.44	300	6.17	0.108	0.27	0.25	13.8	-86	0.0	
1457	5.44	300	6.16	0.109	0.27	0.25	13.7	-89	0.0	
1502	5.44	300	6.15	0.108	0.15	0.25	13.6	-91	0.0	
1507	5.44	300	6.14	0.106	0.13	0.24	13.7	-93	0.0	
1512	5.44	300	6.14	0.106	0.13	0.24	13.7	-94	0.0	clear

SIGNATURE(S): [illegible]

PAGE_1__OF_1__

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Calverton Southern Area EIAB Pilot Study
Project No.: 112G02045

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ-159T-20101012
Sample Location: SA-PZ-159T-201010
Sampled By: K. Francisco
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (^{0}C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other ORP (mV)
Date: 10-12-10								
Time: 1104								
Method: Low Flow Peristaltic	Clear	6.58	.159	15.57	0.00	0.00	0.0	-32

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 10/12/10								
Method: Low Flow Peristaltic								
Monitor Reading (ppm):			See data sheet					
Well Casing Diameter & Material								
Type: PVC 1"								
Total Well Depth (TD):								
Static Water Level (WL): 5.25								
One Casing Volume(gal/L):								
Start Purge (hrs): 1008								
End Purge (hrs): 1104								
Total Purge Time (min): 64								
Total Vol. Purged (gal/L): ~4								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	3 40-mL clear glass vials	3
TOC	H2SO4	2 40-mL ~~amber~~ glass vial	2
MEE	HCl	2 40-mL clear glass vials	2
Metals (Fe+Mn)	HNO3	250-mL plastic bottle	1

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): K. Francisco

LOW FLOW PURGE DATA SHEET 159I

PROJECT SITE NAME: Calverton EIAB Pilot Study 3-month
PROJECT NUMBER: 112G02045

WELL ID.: SA-PZ-159I-201010
DATE: 10-12-10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity (%) or ppt	Comments
1009	5.28	350	6.74	.135	1.95	2.42	15.81	3	0.0	clear
1014	5.29	350	6.60	.150	0.31	0.87	15.76	-15	0.0	
1019	5.29	350	6.59	.155	0.07	0.47	15.59	-20	0.0	
1024	5.29	350	6.57	.156	0.00	0.34	15.68	-22	0.0	
1029	5.29	350	6.57	.158	1.47	0.26	15.62	-24	0.0	
1034	5.29	350	6.56	.160	1.40	0.19	15.47	-26	0.0	
1039	5.29	350	6.57	.159	0.46	0.13	15.47	-27	0.0	
1044	5.29	350	6.57	.159	0.00	0.10	15.44	-28	0.0	
1049	5.29	350	6.57	.159	0.00	0.02	15.49	-29	0.0	
1054	5.29	350	6.57	.159	0.00	0.00	15.51	-30	0.0	
1059	5.29	350	6.58	.159	0.00	0.00	15.61	-31	0.0	
1104	5.29	350	6.58	.159	0.00	0.00	15.57	-32	0.0	clear

SIGNATURE(S): [signature]

PAGE 1 OF 1

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

159I 1

Project Site Name: Calverton Southern Area EIAB Pilot Study
Project No.: 112G02045

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ-159I1201010 12
Sample Location: SA-PZ-159I1-201010
Sampled By: R. Francisco
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10-12-10	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other ORP (mV)
Time: 0957								
Method: Low Flow Peristaltic	clear	6.54	.148	15.72	0.00	0.45	0.0	22

PURGE DATA:

Date: 10/12/10	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Method: Low Flow Peristaltic								
Monitor Reading (ppm):			See data sheet					
Well Casing Diameter & Material								
Type: PVC 1"								
Total Well Depth (TD):								
Static Water Level (WL): 5.45								
One Casing Volume(gal/L):								
Start Purge (hrs): 0900								
End Purge (hrs): 0957								
Total Purge Time (min): 57								
Total Vol. Purged (gal/L): ~3.25								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	3 40-mL clear glass vials	3
TOC	H2SO4	2 40-mL ~~amber~~ glass vial	2
MEE	HCl	2 40-mL clear glass vials	2
Metals (Fe+Mn)	HNO3	250-mL plastic bottle	1

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

LOW FLOW PURGE DATA SHEET

159 I 1

PROJECT SITE NAME: Calverton EIAB Pilot Study 3-month
PROJECT NUMBER: 112G02045

WELL ID.: SA-PZ-159I1-201010
DATE: 10- 12 -10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
0902	5.48	1/2 300	6.53	.153	1.34	2.29	15.69	56	0.0	Clear
0907	5.48	300	6.53	.148	0.88	1.27	16.04	43	0.0	
0912	5.48	300	6.52	.149	0.00	1.05	15.83	39	0.0	
0917	5.48	300	6.55	.146	0.00	0.88	16.13	37	0.0	
0922	5.48	300	6.52	.150	0.72	0.82	15.82	32	0.0	
0927	5.48	300	6.52	.149	0.70	0.74	15.72	29	0.0	
0932	5.48	300	6.54	.148	0.71	0.60	15.75	26	0.0	
0937	5.48	300	6.53	.148	0.46	0.56	15.78	25	0.0	
0942	5.48	300	6.54	.149	0.02	0.50	15.60	24	0.0	
0947	5.48	300	6.54	.148	0.00	0.46	15.71	23	0.0	
0952	5.48	300	6.54	.148	0.00	0.45	15.69	23	0.0	
0957	5.48	300	6.54	.148	0.00	0.45	15.72	22	0.0	Clear

SIGNATURE(S): K. Franz

PAGE 1 OF 1

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Calverton Southern Area EIAB Pilot Study
Project No.: 112G02045

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ-160I -201010 12
Sample Location: SA-PZ-160I -201010 12
Sampled By:
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (^{0}C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other ORP
Date: 10-12-10								
Time: 1050								
Method: Low Flow Peristaltic	~~5.78~~ clear	5.78	0.093	13.0	0.31	0.38	0.0	151

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 10-12-10								
Method: Low Flow Peristaltic								
Monitor Reading (ppm): –								
Well Casing Diameter & Material Type: 1" PVC								
Total Well Depth (TD):								
Static Water Level (WL): 5.46								
One Casing Volume(gal/L):								
Start Purge (hrs): 1006								
End Purge (hrs): 1050								
Total Purge Time (min): 44								
Total Vol. Purged (gal/L): 3.5 gal								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	3 40-mL clear glass vials	yes
TOC	H2SO4	2 40-mL ~~amber~~ clear glass vial	yes
MEE	HCl	2 40-mL clear glass vials	yes
Metals (Fe+Mn)	HNO3	250-mL plastic bottle	yes

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD: Yes VOC only

Duplicate ID No.: —

Signature(s):

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Calverton EIAB Pilot Study 3-month
PROJECT NUMBER: 112G02045

WELL ID.: SA-PZ-160I-201010 12
DATE: 10- 12-10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1006	5.46									
1008	5.47	300	6.18	0.100	11.1	2.18	13.4	73	0.0	clear
1013	5.47	300	5.90	0.095	2.98	0.37	13.2	116	0.0	
1018	5.47	300	5.83	0.094	1.13	0.57	13.3	131	0.0	
1023	5.47	300	5.80	0.094	0.29	0.40	13.2	142	0.0	
1028	5.47	300	5.79	0.094	0.28	0.36	13.2	146	0.0	
1033	5.47	300	5.79	0.094	0.36	0.47	13.1	149	0.0	
1038	5.47	300	5.78	0.094	0.25	0.39	13.1	151	0.0	2.5 gal
1043	5.47	300	5.78	0.093	0.34	0.37	13.1	152	0.0	
1048	5.47	300	5.78	0.093	0.31	0.38	13.0	151	0.0	
1050	Collect sample									3.5 gal

SIGNATURE(S): [signature]

PAGE_1__OF_1__

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Calverton Southern Area EIAB Pilot Study
Project No.: 112G02045

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ-160I1-20101012
Sample Location: SA-PZ-160I1-20101012
Sampled By: JB
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10-12-10	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 0956	(Visual)	(S.U.)	(mS/cm)	(^{0}C)	(NTU)	(mg/l)	(%)	ORP
Method: Low Flow Peristaltic	clear	6.15	0.110	13.0	0.00	0.24	0.0	109

PURGE DATA:

Date: 10-12-10	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Method: Low Flow Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 1" PVC								
Total Well Depth (TD):								
Static Water Level (WL): 5.11								
One Casing Volume(gal/L):								
Start Purge (hrs): 0911								
End Purge (hrs): 0956								
Total Purge Time (min): 45								
Total Vol. Purged (gal/L): 3½ gal								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	3 40-mL clear glass vials	yes
TOC	H2SO4	2 40-mL ~~amber~~ clear glass vial	yes
MEE	HCl	2 40-mL clear glass vials	yes
Metals (Fe+Mn)	HNO3	250-mL plastic bottle	yes

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD ~~Yes~~ VOC only → No

Duplicate ID No.: —

Signature(s):

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Calverton EIAB Pilot Study 3-month
PROJECT NUMBER: 112G02045

WELL ID.: SA-PZ-160I-201010/2
DATE: 10-12-10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
0911	5.11									
0913	5.16	400	6.25	0.112	252	1.31	13.5	28	0.0	
0918	5.16	300	6.15	0.112	0.08	0.33	13.2	64	0.0	
0923	5.16	300	6.13	0.112	0.38	0.29	13.2	85	0.0	
0929	5.16	300	6.12	0.111	0.60	0.26	13.1	96	0.0	
0934	5.16	300	6.13	0.112	0.63	0.26	13.1	99	0.0	
0939	5.16	300	6.13	0.111	0.20	0.25	13.0	103	0.0	2 gal
0944	5.16	300	6.14	0.114	0.00	0.24	13.0	106	0.0	
0949	5.16	300	6.14	0.110	0.00	0.25	13.0	108	0.0	
0954	5.16	300	6.15	0.110	0.00	0.24	13.0	109	0.0	3 gal
0956	collect sample									

SIGNATURE(S): _____

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Calverton Southern Area EIAB Pilot Study
Project No.: 112G02045

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ-161I-201010 12
Sample Location: SA-PZ-161I-201010
Sampled By: K. Francisco
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10-12-10	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (^{0}C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other ORP
Time: 1354								
Method: Low Flow Peristaltic	Clear	6.07	.124	14.82	0.00	0.00	0.0	168

PURGE DATA:

Date: 10/12/10	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Method: Low Flow Peristaltic								
Monitor Reading (ppm):			See data sheet					
Well Casing Diameter & Material								
Type: PVC - 1"								
Total Well Depth (TD):								
Static Water Level (WL): 6.97 ~~7.01~~ KF								
One Casing Volume(gal/L):								
Start Purge (hrs): 1312								
End Purge (hrs): 42								
Total Purge Time (min): 1354								
Total Vol. Purged (gal/L): ~40								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	3 40-mL clear glass vials	3
TOC	H2SO4	40-mL amber glass vial	
MEE	HCl	2 40-mL clear glass vials	
Metals (Fe+Mn)	HNO3	250-mL plastic bottle	

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): K. Francisco

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Calverton EIAB Pilot Study 3-month
PROJECT NUMBER: 112G02045

WELL ID.: SA-PZ-161 I-201010
DATE: 10-12-10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity (%) or ppt	Comments
1314	7.02	400	6.30	.129	1.95	8.01	15.61	186	0.0	clear
1319	7.02	400	6.22	.124	5.02	1.96	15.23	185	0.0	
1324	7.02	400	6.12	.124	1.48	1.03	15.03	183	0.0	
1329	7.02	400	6.12	.123	0.00	0.41	14.59	180	0.0	
1334	7.02	400	6.10	.123	0.05	0.10	14.83	174	0.0	
1339	7.02	400	6.09	.123	0.00	0.01	14.88	171	0.0	
1344	7.02	400	6.08	.123	0.00	0.00	14.79	169	0.0	
1349	7.02	400	6.07	.123	0.00	0.00	14.79	168	0.0	
1354	7.02	400	6.07	.124	0.00	0.00	14.82	168	0.0	

SIGNATURE(S): L Francisco

PAGE 1 OF 1

Tetra Tech NUS, Inc.

QA SAMPLE LOG SHEET

Project Site Name: NWIRP Calverton
Project Number: 112G02045
Sample Location:
QA Sample Type:

Sample ID Number: SA-TB-01-20101011
Sampled By: JB/ Lab prepared
C.O.C. Number:

[X] Trip Blank
[] Source Water Blank
[] Rinsate Blank
[] Other Blank

SAMPLING DATA:

Date: 10-11-10
Time: 1330
Method: Lab prepared

WATER SOURCE:

[X] Laboratory Prepared
[] Purchased
[] Other
[] Tap
[] Fire Hydrant

PURCHASED WATER INFORMATION (If Applicable as Source or Rinsate Water):

Product Name:
Supplier:
Manufacturer:
Order Number:
Lot Number:
Expiration Date:

RINSATE INFORMATION (If Applicable):

Media Type:
Equipment Used:
Equipment Type:
[] Dedicated
[] Reusable

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles	Cool 4°C & HCl	3 40 mL glass vials	(YES) / NO
Semivolatiles	Cool 4°C		YES / NO
Pesticide / PCB	Cool 4°C		YES / NO
Metals	Cool 4°C & HNO_3		YES / NO
Cyanide	Cool 4°C & NaOH		YES / NO

OBSERVATIONS / NOTES:

Signature(s):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NWIRP Calverton EIAB 5-Month Sampling
Project No.:

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ-133I-20101215
Sample Location: SA-PZ-133I
Sampled By: Sarah Kinna
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 12-15-10	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (^{0}C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other ORP
Time: 09:10								
Method: Low Flow	Clear	5.62	0.079	10.56	0.00	0.00	0.0	-12

PURGE DATA:

Date: 12-15-10	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Method: Low Flow	See Low Flow Purge Sheet For Details							
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 1" PVC								
Total Well Depth (TD):								
Static Water Level (WL): 7.85								
One Casing Volume(gal/L):								
Start Purge (hrs): 08:25								
End Purge (hrs): 09:10								
Total Purge Time (min): 45								
Total Vol. Purged (gal/L): 5 gal								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOC	HCL	3 40ml glass vials	YES
MEE	HCL	2 40ml glass vials	NO
DHB/DHC	--	1 filter	NO
Nitrate/Nitrite/Fluoride/Chloride	--	1 125ml poly bottle	NO
Sulfide	Zn Acetate NaOH	1 500ml poly bottle	NO
TOC	H2SO4	2 40ml glass vials	NO
TAL Metals	HNO3	1 250ml poly bottle	NO

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	SA-PZ-DUP02-20101215

Signature(s): Sarah Kinna

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NWIRP Calverton EIAB 5-Month Sampling
PROJECT NUMBER: 112G02750
WELL ID.: SA-PZ-133 I
DATE: 12-15-10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
08:25	7.85	300	5.73	0.085	0.81	0.00	10.68	-38	0.0	
08:30	7.85	300	5.66	0.081	0.07	0.00	10.53	-65	0.0	
08:35	7.87	300	5.65	0.080	0.20	0.00	10.47	-66	0.0	
08:40	7.87	300	5.61	0.080	0.18	0.00	10.63	-59	0.0	
08:45	7.87	300	5.61	0.080	0.50	0.00	10.70	-49	0.0	
08:50	7.87	300	5.63	0.080	0.28	0.00	10.71	-33	0.0	
08:55	7.87	300	5.61	0.078	0.04	0.00	10.84	-22	0.0	
09:00	7.87	300	5.62	0.079	0.31	0.00	10.93	-21	0.0	
09:05	7.87	300	5.63	0.079	0.00	0.00	10.85	-17	0.0	
09:10	7.88	300	5.62	0.079	0.00	0.00	10.56	-12	0.0	
	Take Sample									

SIGNATURE(S): Sarah Kinna

PAGE 1 OF 1

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NWIRP Calverton EIAB 5-Month Sampling
Project No.:

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ-135-201012 14
Sample Location: SA-PZ135
Sampled By: Sarah Kinna
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 12-14-10	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 08:57	(Visual)	(S.U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(%)	ORP
Method: Low Flow	clear	4.75	0.090	10.8°	0.00	19.99	0	169

PURGE DATA:

Date: 12-14-10	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Method: Low Flow	See Low Flow Purge Sheet For Details							
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 1" PVC								
Total Well Depth (TD):								
Static Water Level (WL): 4.69								
One Casing Volume(gal/L):								
Start Purge (hrs): 08:12								
End Purge (hrs): 08:57								
Total Purge Time (min): 45								
Total Vol. Purged (gal/L): 4.5								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOC	HCL	3 40ml glass vials	YES
MEE	HCL	2 40ml glass vials	YES
DHB/DHC	--	1 filter	NO
Nitrate/Nitrite/Fluoride/Chloride	--	1 125ml poly bottle	NO
Sulfide	Zn Acetate NaOH	1 500ml poly bottle	NO
TOC	H2SO4	2 40ml glass vials	NO
TAL Metals	HNO3	1 250ml poly bottle	NO

OBSERVATIONS / NOTES:

D.O. flashing on instrument

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	

Signature(s): Sarah Kinna

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NWIRP Calverton EIAB 5-Month Sampling
PROJECT NUMBER: 112G02045
WELL ID.: SA-PZ135-20101214
DATE: 12/14/2010

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
08:12	4.69	300	4.76	0.102	1.06	19.99	10.8°	170	0	flashing DO
08:17	4.69	300	4.77	0.105	1.11	19.99	10.8°	169	0	flashing DO
08:22	4.70	300	4.76	0.099	0.21	19.99	10.9°	171	0	flashing DO
08:27	4.70	300	4.77	0.096	0.21	19.99	10.8°	169	0	flashing DO
08:32	4.70	300	4.78	0.095	0.21	19.99	10.8°	169	0	flashing DO
08:37	4.72	300	4.77	0.091	0.09	19.99	10.80	169	0	flashing DO
08:42	4.72	300	4.75	0.091	0.20	19.99	10.8°	171	0	flashing DO
08:47	4.72	300	4.73	0.090	0.00	19.99	10.7°	171	0	flashing DO
08:52	4.72	300	4.75	0.090	0.00	19.99	10.8°	171	0	flashing DO
08:57	4.72	300	4.75	0.090	0.00	19.99	10.8°	169	0	flashing DO

SIGNATURE(S): Sarah Kline

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NWIRP Calverton EIAB 5-Month Sampling
Project No.: 112G02750

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ136I-201012 14
Sample Location: SA-PZ136I
Sampled By: J. Birkett
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 12-14-10	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP
Time: 0908	(Visual)	(S.U.)	(mS/cm)	(^{0}C)	(NTU)	(mg/l)	(%)	(mV)
Method: Low Flow	clear	5.64	0.123	10.45	4.70	0.00	0.0	-56

PURGE DATA:

Date: 12-14-10	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Method: Low Flow	SEE LOW FLOW PURGE SHEET FOR DETAILS							
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 1" PVC								
Total Well Depth (TD):								
Static Water Level (WL): 5.26								
One Casing Volume(gal/L):								
Start Purge (hrs): 0821								
End Purge (hrs): 0908								
Total Purge Time (min): 47								
Total Vol. Purged (gal/L): 4 gal								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	3 40-mL clear glass vials	yes
MEE	HCl	2 40-mL clear glass vials	yes
DHB/DHC			no
Nitrate/nitrite			no
Chloride			no
Sulfide			no

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): [signature]

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NWIRP Calverton EIAB 5-Month Sampling
PROJECT NUMBER: 112G02750

WELL ID.: SA-PZ-136I
DATE: 12-14-10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
0821	5.26									
0822	5.93	300	5.97	0.189		0.00	10.62	-76	0.0	clear ✓
0828	6.14	350	5.89	0.140	9.84	0.00	10.84	-111	0.0	
0835	5.96	300	5.72	0.127	5.96	0.00	10.88	-91	0.0	
0840	5.90	300	5.70	0.128	4.31	0.00	10.63	-80	0.0	
0846	5.90	300	5.68	0.126	3.74	0.00	10.66	-72	0.0	
0851	5.89	300	5.67	0.127	5.41	0.00	10.54	-67	0.0	
0856	5.89	300	5.65	0.123	4.93	0.00	10.64	-58	0.0	
0901	5.89	300	5.63	0.122	4.84	0.00	10.72	-56	0.0	
0906	5.89	300	5.64	0.123	4.70	0.00	10.45	-56	0.0	
0908	Collect sample									

SIGNATURE(S): [signature]

PAGE 1 OF 1

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NWIRP Calverton EIAB 5-Month Sampling
Project No.: 112G02750

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ-138I-20101215
Sample Location: SA-PZ-138I
Sampled By: J. Birkett
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 12-15-10	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP
Time: 1154	(Visual)	(S.U.)	(mS/cm)	(^{0}C)	(NTU)	(mg/l)	(%)	(mV)
Method: Low Flow	clear	6.38	0.089	11.2	0.00	*19.97	0.0	90

PURGE DATA:

Date: 12-15-10	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Method: Low Flow	SEE LOW FLOW PURGE SHEET FOR DETAILS							
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 1" PVC								
Total Well Depth (TD):								
Static Water Level (WL): 5.25								
One Casing Volume(gal/L):								
Start Purge (hrs): 1054								
End Purge (hrs): 1154								
Total Purge Time (min): 60								
Total Vol. Purged (gal/L): 5 gal								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	3 40-mL clear glass vials	yes
MEE	HCl	2 40-mL clear glass vials	no
DHB/DHC			no
Nitrate/nitrite			no
Chloride			no
Sulfide			no

OBSERVATIONS / NOTES:

*DO sensor malfunctioning

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NWIRP Calverton EIAB 5-Month Sampling
PROJECT NUMBER: 112G02750

WELL ID.: SA-PZ-138I
DATE: 12-15-10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1054	5.25									
1056	5.30	300	7.74	0.093		19.99	9.2	-7	0.0	clear, DO reading Blinking
1101	5.30	300	7.33	0.093	0.77	19.99	10.6	28	0.0	" "
1107	5.30	300	6.65	0.091	0.51	19.99	11.0	73	0.0	" "
1112	5.30	300	6.61	0.90	0.00	19.99	11.2	76	0.0	" "
1117	5.30	300	6.58	0.90	0.11	19.99	11.2	77	0.0	" "
1122	5.30	300	6.57	0.90	0.00	19.99	11.2	78	0.0	" "
1127	5.30	300	6.56	0.089	0.09	19.99	11.2	78	0.0	" "
1132	5.30	300	6.47	0.089	0.52	19.99	11.1	84	0.0	" "
1137	5.30	300	6.43	0.089	0.75	19.99	11.1	86	0.0	" "
1142	5.30	300	6.41	0.088	0.48	19.99	11.1	88	0.0	" "
1147	5.30	300	6.39	0.089	0.36	19.99	11.1	89	0.0	" "
1152	5.30	300	6.38	0.089	0.00	19.99	11.2	90	0.0	" "
1154	Collect sample									

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NWIRP Calverton EIAB 5-Month Sampling
Project No.: 112G02750

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ-138I-20101215
Sample Location: SA-PZ-138I1
Sampled By: J. Birkett
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 12-15-10	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (^{0}C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	ORP (mV)
Time: 1047								
Method: Low Flow	clear	5.97	0.139	11.0	0.24	19.99*	0.0	120

PURGE DATA:

Date: 12-15-10	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Method: Low Flow	SEE LOW FLOW PURGE SHEET FOR DETAILS							
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 1" PVC								
Total Well Depth (TD):								
Static Water Level (WL): 5.11								
One Casing Volume(gal/L):								
Start Purge (hrs): 0955								
End Purge (hrs): 1047								
Total Purge Time (min): 52								
Total Vol. Purged (gal/L): 4 gal								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	3 40-mL clear glass vials	yes
MEE	HCl	2 40-mL clear glass vials	no
DHB/DHC			no
Nitrate/nitrite			no
Chloride			no
Sulfide			no

OBSERVATIONS / NOTES:

*DO sensor on horiba malfunctioning

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): [signature]

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NWIRP Calverton EIAB 5-Month Sampling
PROJECT NUMBER: 112G02750
WELL ID.: SA-PZ-138I1
DATE: 12-15-10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
0955	5.11									
0957	5.14	300	6.08	0.155	3.51	19.99	9.9	107	0.0	Clear DO sensor blinking
1005	5.14	300	6.60	0.148	2.83	19.99	10.9	78	0.0	" "
1010	5.14	300	6.29	0.145	1.45	19.99	10.9	98	0.0	" "
1015	5.14	300	6.14	0.143	0.70	19.99	11.0	108	0.0	" "
1020	5.14	300	6.06	0.143	0.53	19.99	10.9	113	0.0	" "
1025	5.14	300	6.03	0.141	0.64	19.99	10.9	115	0.0	" "
1030	5.14	300	6.00	0.140	0.77	19.99	10.9	117	0.0	" "
1035	5.14	300	5.97	0.139	0.37	19.99	10.9	119	0.0	" "
1040	5.14	300	5.97	0.139	0.24	19.99	11.0	120	0.0	" "
1047	Collect Sample									

SIGNATURE(S): [illegible]

PAGE 1 OF 1

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NWIRP Calverton EIAB 5-Month Sampling
Project No.:

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ-139I-20101215
Sample Location: SA-PZ139I
Sampled By: SK
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 12-15-10	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 10:35	(Visual)	(S.U.)	(mS/cm)	(^{0}C)	(NTU)	(mg/l)	(%)	ORP
Method: Low Flow	clear	5.53	0.087	11.07	0.00	0.00	0.0	-1

PURGE DATA:

Date: 12-15-10	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Method: Low Flow	See Low Flow Purge Sheet For Details							
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 1" PVC								
Total Well Depth (TD):								
Static Water Level (WL): 8.14								
One Casing Volume(gal/L):								
Start Purge (hrs): 09:50								
End Purge (hrs): 10:35								
Total Purge Time (min): 45								
Total Vol. Purged (gal/L): 5 gal								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOC	HCL	3 40ml glass vials	YES
MEE	HCL	2 40ml glass vials	NO
DHB/DHC	--	1 filter	NO
Nitrate/Nitrite/Fluoride/Chloride	--	1 125ml poly bottle	NO
Sulfide	Zn Acetate NaOH	1 500ml poly bottle	NO
TOC	H2SO4	2 40ml glass vials	NO
TAL Metals	HNO3	1 250ml poly bottle	NO

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Sarah Kinna

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NWIRP Calverton EIAB 5-Month Sampling
PROJECT NUMBER: 112G02045
WELL ID.: SA-PZ139I
DATE: 12-15-10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
09:50	8.14	400	5.75	0.088	0.57	0.00	11.57	-19	0.0	
09:55	8.14	400	5.56	0.087	1.11	0.00	11.25	-8	0.0	
10:00	8.14	400	5.53	0.087	0.54	0.00	11.26	-7	0.0	
10:05	8.15	400	5.53	0.087	0.00	0.00	10.97	-4	0.0	
10:10	8.15	400	5.53	0.087	0.00	0.00	10.76	-5	0.0	
10:15	8.15	400	5.53	0.087	0.00	0.00	10.99	-5	0.0	
10:20	8.16	400	5.54	0.087	0.00	0.00	10.62	-4	0.0	
10:25	8.16	400	5.53	0.087	0.00	0.00	10.94	-4	0.0	
10:30	8.16	400	5.53	0.087	0.00	0.00	10.71	-3	0.0	
10:35	8.16	400	5.53	0.087	0.00	0.00	11.07	-1	0.0	
	collect sample									

SIGNATURE(S): Sarah Kirsa

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NWIRP Calverton EIAB 5-Month Sampling
Project No.: 112G02750

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ-149I-201012 15
Sample Location: SA-PZ-149I
Sampled By: J. Birkett
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 12-15-10	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP
Time: 1300	(Visual)	(S.U.)	(mS/cm)	(^{0}C)	(NTU)	(mg/l)	(%)	(mV)
Method: Low Flow	clear	6.70	0.079	11.3	0.74	19.99*	0.0	69

PURGE DATA:

Date: 12-15-10	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Method: Low Flow	SEE LOW FLOW PURGE SHEET FOR DETAILS							
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 1" PVC								
Total Well Depth (TD):								
Static Water Level (WL): 9.86								
One Casing Volume(gal/L):								
Start Purge (hrs): 1209								
End Purge (hrs): 1300								
Total Purge Time (min): 51								
Total Vol. Purged (gal/L): 4.5 gal								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	3 40-mL clear glass vials	yes
MEE	HCl	2 40-mL clear glass vials	no
DHB/DHC			no
Nitrate/nitrite			no
Chloride			no
Sulfide			no

OBSERVATIONS / NOTES:

* DO sensor malfunctioning

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): [signature]

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NWIRP Calverton EIAB 5-Month Sampling
PROJECT NUMBER: 112G02750

WELL ID.: SA-PZ -149I1
DATE: 12-15-10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1209	9.86									clear
1211	9.89	300	7.83	0.085		19.99	8.9	-6	0.0	DO sensor Malfunction
1216	9.89	300	7.15	0.082	14.3	19.99	11.3	38	0.0	" "
1221	9.89	300	6.85	0.081	1.32	19.99	11.5	58	0.0	" "
1226	9.89	300	6.78	0.080	1.29	19.99	11.2	62	0.0	" "
1231	9.89	300	6.76	0.080	0.96	19.99	11.3	63	0.0	" "
1238	9.89	300	6.74	0.080	0.39	19.99	11.4	64	0.0	" "
1243	9.89	300	6.71	0.079	0.89	19.99	11.3	66	0.0	" "
1248	9.89	300	6.71	0.079	0.54	19.99	11.1	66	0.0	" "
1253	9.89	300	6.69	0.079	0.63	19.81	11.2	66	0.0	" "
1258	9.89	300	6.70	0.079	0.74	19.99	11.3	69	0.0	" "
1300	Collect sample									

SIGNATURE(S): [signature]

PAGE 1 OF 1

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NWIRP Calverton EIAB 5-Month Sampling
Project No.:

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ-15I-I1-201012 15
Sample Location: SA-PZ15I1
Sampled By: Sarah Kinna
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 12-15-10	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 12:05	(Visual)	(S.U.)	(mS/cm)	(^{0}C)	(NTU)	(mg/l)	(%)	ORP
Method: Low Flow	Clear	5.90	0.123	10.78	0.03	0.00	0.0	-95

PURGE DATA:

Date: 12-15-10	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Method: Low Flow	See Low Flow Purge Sheet For Details							
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 1" PVC								
Total Well Depth (TD):								
Static Water Level (WL): 4.32								
One Casing Volume(gal/L):								
Start Purge (hrs): 11:20								
End Purge (hrs): 12:05								
Total Purge Time (min): 45								
Total Vol. Purged (gal/L): 4.5 gal								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOC	HCL	3 40ml glass vials	YES
MEE	HCL	2 40ml glass vials	YES
DHB/DHC	--	1 filter	NO
Nitrate/Nitrite/Fluoride/Chloride	--	1 125ml poly bottle	NO
Sulfide	Zn Acetate NaOH	1 500ml poly bottle	NO
TOC	H2SO4	2 40ml glass vials	YES
TAL Metals	HNO3	1 250ml poly bottle	YES

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Sarah Kinna

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NWIRP Calverton EIAB 5-Month Sampling
PROJECT NUMBER: 112G02750

WELL ID.: SA-PZ-151I1
DATE: 12-15-10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
11:20	4.32	300	5.72	0.123	0.31	1.60	10.63	-86	0.0	
11:25	4.32	300	5.80	0.123	0.30	3.010	10.73	-91	0.0	
11:30	4.32	300	5.86	0.123	0.04	5.71	11.08	-94	0.0	
11:35	4.33	300	5.86	0.122	0.00	5.86	11.02	-95	0.0	
11:40	4.33	300	5.89	0.126	0.56	0.00	10.72	-95	0.00	
11:45	4.33	300	5.86	0.124	0.00	0.00	11.05	-95	0.0	
11:50	4.34	300	5.88	0.124	0.08	0.00	10.99	-94	0.0	
11:55	4.34	300	5.89	0.125	0.00	0.00	10.94	-94	0.0	
12:00	4.34	300	5.90	0.124	0.00	0.00	10.85	-96	0.0	
12:05	4.34	300	5.90	0.123	0.03	0.00	10.78	-95	0.0	

SIGNATURE(S): Sarah Kirna

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NWIRP Calverton EIAB 5-Month Sampling
Project No.: 112G02750

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ-155I201012 15
Sample Location: SA-PZ - 155 I
Sampled By: SK
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 12-15-10	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP
Time: 13:35	(Visual)	(S.U.)	(mS/cm)	(^{0}C)	(NTU)	(mg/l)	(%)	(mV)
Method: Low Flow	clear	5.73	0.090	11.07	1.69	0.00	0.0	-51

PURGE DATA:

Date: 12-15-10	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Method: Low Flow	SEE LOW FLOW PURGE SHEET FOR DETAILS							
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 1" PVC								
Total Well Depth (TD):								
Static Water Level (WL): 5.61								
One Casing Volume(gal/L):								
Start Purge (hrs): 12:50								
End Purge (hrs): 13:35								
Total Purge Time (min): 45								
Total Vol. Purged (gal/L): 4.5								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	3 40-mL clear glass vials	YES
MEE	HCl	2 40-mL clear glass vials	YES
DHB/DHC	—	1 filter	NO
Nitrate/nitrite	—	1 125 mL poly bottle	NO
Chloride	—	1 125 mL poly bottle	NO
Sulfide	ZnAcetate NaOH	1 500 mL poly bottle	NO
TOC	H_2SO_4	2 40-mL clear glass vials	YES
TAL Metals	HNO_3	1 250-mL poly bottle	YES

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Sarah Kinna

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NWIRP Calverton EIAB 5-Month Sampling
PROJECT NUMBER: 112G02750

WELL ID.: SA-PZ - 155I
DATE: 12-15-10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
12:50	5.61	400	6.04	0.086	2.31	0.00	10.55	-55	0.0	
12:55	5.61	400	5.92	0.090	1.06	0.00	10.22	-46	0.0	
13:00	5.61	400	5.91	0.089	1.25	0.00	10.53	-48	0.0	
13:05	5.62	400	5.87	0.090	1.28	0.00	10.58	-50	0.0	
13:10	5.62	400	5.86	0.090	0.95	0.00	10.42	-53	0.0	
13:15	5.62	400	5.81	0.089	0.98	0.00	10.81	-53	0.0	
13:20	5.64	400	5.77	0.090	0.78	0.00	11.04	-55	0.0	
13:25	5.64	400	5.75	0.090	3.41	0.00	11.02	-53	0.0	
13:30	5.64	400	5.74	0.089	0.87	0.00	11.19	-52	0.0	
13:35	5.64	400	5.73	0.090	1.69	0.00	11.07	-51	0.0	

SIGNATURE(S): Sarah Kirna

PAGE 1 OF 1

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NWIRP Calverton EIAB 5-Month Sampling
Project No.:

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ-157I-20101214
Sample Location: SA-PZ-157I
Sampled By: SK
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 12-14-10	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 14:55	(Visual)	(S.U.)	(mS/cm)	(^{0}C)	(NTU)	(mg/l)	(%)	ORP
Method: Low Flow	clear	6.05	0.142	10.94°	0.00	0.00	0	-155

PURGE DATA:

Date: 12-14-10	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Method: Low Flow	See Low Flow Purge Sheet For Details							
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 1" PVC								
Total Well Depth (TD):								
Static Water Level (WL): 5.00								
One Casing Volume(gal/L):								
Start Purge (hrs): 14:10								
End Purge (hrs): 14:55								
Total Purge Time (min): 45								
Total Vol. Purged (gal/L): 5 gal								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOC	HCL	3 40ml glass vials	YES
MEE	HCL	2 40ml glass vials	YES
DHB/DHC	--	1 filter	YES
Nitrate/Nitrite/Fluoride/Chloride	--	1 125ml poly bottle	YES
Sulfide	Zn Acetate NaOH	1 500ml poly bottle	YES
TOC	H2SO4	2 40ml glass vials	YES
TAL Metals	HNO3	1 250ml poly bottle	YES

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	

Signature(s): Sarah Kinna

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NWIRP Calverton EIAB 5-Month Sampling
PROJECT NUMBER: 112G02045
WELL ID.: SA-PZ157I
DATE: 12-14-10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
14:10	5.00	400	6.11	0.157	1.33	0.00	11.09°	-134	0	
14:15	5.00	400	6.10	0.146	1.24	0.00	11.17°	-145	0	
14:20	5.00	400	6.12	0.146	1.11	0.00	11.15°	-147	0	
14:25	5.20	400	6.11	0.143	0.87	0.00	11.20°	-151	0	
14:30	5.20	400	6.12	0.143	0.00	0.00	11.15°	-152	0	
14:35	5.20	400	6.10	0.143	0.00	0.00	11.17°	-154	0	
14:40	5.45	400	6.10	0.143	0.00	0.00	10.95°	-154	0	
14:45	5.45	400	6.08	0.140	0.00	0.00	11.13°	-155	0	
14:50	5.50	400	6.07	0.141	0.00	0.00	11.14°	-154	0	
14:55	5.50	400	6.05	0.142	0.00	0.00	10.94°	-155	0	
	collect sample									

SIGNATURE(S): Sarah Finn

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NWIRP Calverton EIAB 5-Month Sampling
Project No.:

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ-157I1-20101214
Sample Location: SA-PZ-157I1
Sampled By: SK
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 12-14-10	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other ORP
Time: 12:53								
Method: Low Flow	Clear	5.86	0.134	10.79	0.00	0.00	0	-116

PURGE DATA:

Date: 12-14-10	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Method: Low Flow	See Low Flow Purge Sheet For Details							
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 1" PVC								
Total Well Depth (TD):								
Static Water Level (WL): 5.28								
One Casing Volume(gal/L):								
Start Purge (hrs): 11:57								
End Purge (hrs): 12:53								
Total Purge Time (min): 56								
Total Vol. Purged (gal/L): 5 gal								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOC	HCL	3 40ml glass vials	YES
MEE	HCL	2 40ml glass vials	YES
DHB/DHC	--	1 filter	NO
Nitrate/Nitrite/Fluoride/Chloride	--	1 125ml poly bottle	YES
Sulfide	Zn Acetate NaOH	1 500ml poly bottle	YES
TOC	H2SO4	2 40ml glass vials	YES
TAL Metals	HNO3	1 250ml poly bottle	YES

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.: SA-DUP01-20101214 (1200)

Signature(s): Sarah Kuina

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NWIRP Calverton EIAB 5-Month Sampling
PROJECT NUMBER: 112G02045
WELL ID.: SA-PZ157I1
DATE: 12-14-10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
11:57	5.28	400	6.07	0.139	0.57	0.00	10.52	-152	0	
12:02	5.28	400	5.90	0.137	0.61	0.00	10.67	-120	0	
12:07	5.28	400	5.88	0.138	0.54	0.00	10.60	-118	0	
12:12	5.28	400	5.86	0.138	0.24	0.00	10.55	-116	0	
12:17	5.29	400	5.85	0.138	0.00	0.00	10.59	-116	0	
12:22	5.29	400	5.85	0.136	0.00	0.00	10.57	-116	0	
12:27	5.30	400	5.84	0.137	0.00	0.00	10.58	-115	0	
12:32	5.30	400	5.85	0.139	0.00	0.00	10.54	-115	0	
12:37	5.30	400	5.83	0.137	0.00	0.00	10.82	-115	0	
12:42	5.30	400	5.83	0.136	0.00	0.00	10.46	-115	0	
12:53	5.30	400	5.86	0.134	0.00	0.00	10.79	-116	0	
	sample collected									

SIGNATURE(S): Sarah Kinna

PAGE 1 **OF** 1

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NWIRP Calverton EIAB 5-Month Sampling
Project No.:

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ-158I-20101213
Sample Location: SA-PZ158I
Sampled By: Sarah Kinna
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 12-13-10	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 13:39	(Visual)	(S.U.)	(mS/cm)	(^{0}C)	(NTU)	(mg/l)	(%)	ORP
Method: Low Flow	clear	7.62	0.107	11.9°	0.00	19.99	0	-55

PURGE DATA:

Date: 12-13-10	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Method: Low Flow	See Low Flow Purge Sheet For Details							
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 1" PVC								
Total Well Depth (TD):								
Static Water Level (WL): 5.28								
One Casing Volume(gal/L):								
Start Purge (hrs): 12:57								
End Purge (hrs): 13:37								
Total Purge Time (min): 40								
Total Vol. Purged (gal/L): 5 gal								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOC	HCL	3 40ml glass vials	YES
MEE	HCL	2 40ml glass vials	YES
DHB/DHC	--	1 filter	NO
Nitrate/Nitrite/Fluoride/Chloride	--	1 125ml poly bottle	NO
Sulfide	Zn Acetate NaOH	1 500ml poly bottle	NO
TOC	H2SO4	2 40ml glass vials	NO
TAL Metals	HNO3	1 250ml poly bottle	NO

OBSERVATIONS / NOTES:

D.O. flashing on instrument

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Sarah Kinna

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NWIRP Calverton EIAB 5-Month Sampling
PROJECT NUMBER: 112G02045
WELL ID.: SA-PZ-158I20101213
DATE: 12-13-10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
12:57	5.28	200	6.71	0.223	94.6	19.99	11.7°	-48	0	DO flashing
13:02	5.28	200	7.80	0.142	77.2	19.99	11.9°	-46	0	
13:07	5.28	200	7.74	0.105	13.3	19.99	12.0°	-46	0	
13:12	5.28	200	7.76	0.102	11.0	19.99	12.0°	-49	0	
13:17	5.32	300	7.75	0.105	6.8	19.99	11.8°	-39	0	
13:22	5.32	300	7.61	0.107	9.8	19.99	11.9°	-50	0	
13:27	5.32	300	7.62	0.106	0.00	19.99	11.9°	-52	0	
13:32	5.32	300	7.60	0.107	0.00	19.99	11.9°	-53	0	
13:37	5.35	400	7.62	0.107	0.00	19.99	11.9°	-55	0	
13:39	collect sample									

SIGNATURE(S): Sarah Kinna

PAGE 1 **OF** 1

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NWIRP Calverton EIAB 5-Month Sampling
Project No.: 112G02750

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ158I-20101213
Sample Location: SA-PZ158I
Sampled By: JB
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 12-13-10	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (^{0}C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	ORP (mV)
Time: 1335								
Method: Low Flow	Clear	6.08	0.135	11.87	0.00	0.00	0.0	-119

PURGE DATA:

Date: 12-13-10	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Method: Low Flow	SEE LOW FLOW PURGE SHEET FOR DETAILS							
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 1" PVC								
Total Well Depth (TD):								
Static Water Level (WL): 5.92								
One Casing Volume(gal/L):								
Start Purge (hrs): 1248								
End Purge (hrs): 1335								
Total Purge Time (min): 47								
Total Vol. Purged (gal/L): 4 gal								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	3 40-mL clear glass vials	yes
MEE	HCl	2 40-mL clear glass vials	yes
DHB/DHC			no
Nitrate/nitrite			no
Chloride			no
Sulfide			no

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NWIRP Calverton EIAB 5-Month Sampling
PROJECT NUMBER: 112G02750

WELL ID.: SA-PZ-158I I
DATE: 12-13-10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1248	4.92									
1250	4.94	300	5.93	0.161	0.53	0.00	11.90	-116	0.0	
1255	4.94	300	6.03	0.145	0.38	0.00	11.97	-129	0.0	
1300	4.94	300	6.04	0.142	0.27	0.00	11.98	-126	0.0	
1305	4.94	300	6.05	0.141	0.00	0.00	11.93	-123	0.0	
1310	4.94	300	6.06	0.138	0.06	0.00	11.97	-119	0.0	
1317	4.94	300	6.06	0.138	0.00	0.00	11.96	-118	0.0	
1322	4.94	300	6.06	0.138	0.00	0.00	11.94	-118	0.0	
1327	4.94	300	6.09	0.136	0.00	0.00	11.84	-119	0.0	
1332	4.94	300	6.08	0.135	0.00	0.00	11.87	-119	0.0	
1335	Collect sample									

SIGNATURE(S): [illegible]

PAGE 1 OF 1

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NWIRP Calverton EIAB 5-Month Sampling
Project No.: 112G02750

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ 159I-20101214
Sample Location: SA-PZ 159I
Sampled By: J. Birkett
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 12-14-10	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP
Time: 1420	(Visual)	(S.U.)	(mS/cm)	(^{0}C)	(NTU)	(mg/l)	(%)	(mV)
Method: Low Flow	clear	7.96	0.117	11.1	0.69	19.99	0.0	-53

PURGE DATA:

Date: 12-14-10	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Method: Low Flow	SEE LOW FLOW PURGE SHEET FOR DETAILS							
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 1" PVC								
Total Well Depth (TD):								
Static Water Level (WL): 4.75								
One Casing Volume(gal/L):								
Start Purge (hrs): 1330								
End Purge (hrs): 1420								
Total Purge Time (min): 50								
Total Vol. Purged (gal/L): 4.5 gal								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	3 40-mL clear glass vials	yes
MEE	HCl	2 40-mL clear glass vials	yes
DHB/DHC			no
Nitrate/nitrite			no
Chloride			no
Sulfide			no
TOC	H_2SO_4	2 40mL clear glass vial	yes
TAL Metals	HNO_3	1 250mL poly bottle	yes

OBSERVATIONS / NOTES:

D.O. sensor on horiba malfunctioning

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NWIRP Calverton EIAB 5-Month Sampling
PROJECT NUMBER: 112G02750

WELL ID.: SA-PZ-159I
DATE: 12-14-10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1330	4.75									
1332	4.82	300	8.42	0.196		19.99	8.8	-80	0.0	
1337	4.82	300	8.08	0.137	2.78	19.99	10.2	-57	0.0	
1342	4.82	300	8.04	0.129	1.34	19.99	11.0	-55	0.0	
1347	4.82	300	7.99	0.125	0.81	19.99	10.9	-53	0.0	
1353	4.82	300	7.97	0.121	0.53	19.99	11.0	-51	0.0	
1358	4.82	300	7.96	0.121	0.73	19.99	10.9	-51	0.0	
1403	4.82	300	7.96	0.119	0.84	19.99	10.9	-52	0.0	
1408	4.82	300	7.96	0.119	0.74	19.99	11.0	-52	0.0	
1413	4.82	300	7.96	0.118	0.73	19.99	11.0	-53	0.0	
1418	4.82	300	7.96	0.117	0.69	19.99	11.1	-53	0.0	
1420	Collect Sample									

SIGNATURE(S): [illegible]

PAGE 1 OF 1

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NWIRP Calverton EIAB 5-Month Sampling
Project No.: 112G02750

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ 159I 201012 14
Sample Location: SA-PZ 159I
Sampled By: J. Birkett
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 12-14-10	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (^{0}C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	ORP (mV)
Time: 1235								
Method: Low Flow	Clear	7.37	0.123	11.2	1.51	19.99	0.0	-9

PURGE DATA:

Date: 12-14-10	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Method: Low Flow	SEE LOW FLOW PURGE SHEET FOR DETAILS							
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 1" PVC								
Total Well Depth (TD):								
Static Water Level (WL): 4.94								
One Casing Volume(gal/L):								
Start Purge (hrs): 1146								
End Purge (hrs): 1235								
Total Purge Time (min): 49								
Total Vol. Purged (gal/L): 4 gal								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	9 40-mL clear glass vials	yes
MEE	HCl	2 40-mL clear glass vials	yes
DHB/DHC	—	1 filter	yes
Nitrate/nitrite/Fluoride/Chloride	None	1 125mL poly bottle	yes
~~Chloride~~			
Sulfide	ZnAcetate NaOH	1 500mL poly bottle	yes
TOC	H_2SO_4	2 40mL glass vial	yes
TAL Metals	HNO_3	3 250mL poly bottle	yes

OBSERVATIONS / NOTES:

DO sensor on horiba malfunctioning

Circle if Applicable:

MS/MSD: yes only for VOC + TAL Metals

Duplicate ID No.:

Signature(s):

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NWIRP Calverton EIAB 5-Month Sampling
PROJECT NUMBER: 112G02750
WELL ID.: SA-PZ-159I1
DATE: 12-14-10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1146	~~5.94~~ 4.94									
1148	5.02	300	6.47	0.138	3.92	19.99	9.5	42	0.0	DO Blinking, clear
1157	~~5.02~~	300	7.38	0.127	4.30	19.99	11.3	-5	0.0	" "
1202	~~5.02~~	300	7.41	0.126	6.37	19.99	11.3	-8	0.0	" "
1207	5.02	300	7.42	0.125	3.45	19.99	11.3	-9	0.0	" "
1212	5.02	300	7.42	0.125	2.15	19.99	11.3	-10	0.0	" "
1217	5.02	300	7.40	0.124	1.98	19.99	11.3	-9	0.0	" "
1222	5.02	300	7.39	0.124	1.85	19.99	11.3	-9	0.0	" "
1227	5.02	300	7.38	0.124	1.53	19.99	11.3	-9	0.0	" "
1232	5.02	300	7.37	0.123	1.51	19.99	11.2	-9	0.0	" "
1235	Collect sample	w/ MS	MSD							

SIGNATURE(S): [illegible]

PAGE 1 OF 1

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NWIRP Calverton EIAB 5-Month Sampling
Project No.:

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ-159I1-201012 16
Sample Location: SA-PZ 159I1
Sampled By: SK
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 12-16-10	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 15:35	(Visual)	(S.U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(%)	ORP
Method: Low Flow	clear	5.85	0.140	11.31	2.00	0.00	0.0	-13

PURGE DATA:

Date: 12-16-10	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Method: Low Flow	See Low Flow Purge Sheet For Details							
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 1" PVC								
Total Well Depth (TD):								
Static Water Level (WL): 5.00								
One Casing Volume(gal/L):								
Start Purge (hrs): 15:15								
End Purge (hrs): 15:35								
Total Purge Time (min): 20								
Total Vol. Purged (gal/L): 2 gal								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOC	HCL	3 40ml glass vials	NO
MEE	HCL	2 40ml glass vials	NO
DHB/DHC	--	1 filter	NO
Nitrate/Nitrite/Fluoride/Chloride	--	1 125ml poly bottle	YES
Sulfide	Zn Acetate NaOH	1 500ml poly bottle	YES
TOC	H2SO4	2 40ml glass vials	NO
TAL Metals	HNO3	1 250ml poly bottle	NO

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	

Signature(s): Sarah Kirino

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NWIRP Calverton EIAB 5-Month Sampling
PROJECT NUMBER: 112G02750

WELL ID.: SA-PZ-159I1
DATE: 12-16-10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
15:15	5.00	300	5.92	0.159	1.78	0.00	10.99	3	0.0	
15:20	5.00	300	5.89	0.143	0.00	0.00	11.50	-6	0.0	
15:25	5.00	300	5.88	0.140	0.00	0.00	11.54	-9	0.0	
15:30	~~5.10~~ 5.01	300	5.85	0.139	2.04	0.00	11.40	-12	0.0	
15:35	5.01	300	5.85	0.140	2.00	0.00	11.31	-13	0.0	
	— take sample									

SIGNATURE(S): Sarah Kinna

PAGE 1 OF 1

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NWIRP Calverton EIAB 5-Month Sampling
Project No.:

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ-160I-20101213
Sample Location: SA-PZ160I
Sampled By: Sarah Kinna
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 12-13-10	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 15:02	(Visual)	(S.U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(%)	ORP
Method: Low Flow	Clear	7.42	0.106	11.8°	0.00	19.99	0	-51

PURGE DATA:

Date: 12-13-10	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Method: Low Flow	See Low Flow Purge Sheet For Details							
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 1" PVC								
Total Well Depth (TD):								
Static Water Level (WL): 5.00								
One Casing Volume(gal/L):								
Start Purge (hrs): 14:22								
End Purge (hrs): 15:02								
Total Purge Time (min): 40								
Total Vol. Purged (gal/L): 5 gal								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOC	HCL	3 40ml glass vials	YES
MEE	HCL	2 40ml glass vials	YES
DHB/DHC	--	1 filter	NO
Nitrate/Nitrite/Fluoride/Chloride	--	1 125ml poly bottle	NO
Sulfide	Zn Acetate NaOH	1 500ml poly bottle	NO
TOC	H2SO4	2 40ml glass vials	NO
TAL Metals	HNO3	1 250ml poly bottle	NO

OBSERVATIONS / NOTES:

DO was flashing on instrument

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Sarah Kinna

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NWIRP Calverton EIAB 5-Month Sampling
PROJECT NUMBER: 112G02045
WELL ID.: SA-PZ160I
DATE: 12-13-10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
14:22	5.00	300	7.05	0.091	0.17	19.99	11.4	-25	0	DO flashing
14:27	5.00	300	7.28	0.100	0.00	19.99	11.8	-38	0	
14:32	5.00	300	7.36	0.105	0.00	19.99	11.8	-44	0	
14:37	5.00	300	7.40	0.105	0.00	19.99	11.8	-47	0	
14:42	5.20	400	7.41	0.105	0.00	19.99	11.8	-48	0	
14:47	5.20	400	7.42	0.105	0.00	19.99	11.8	-49	0	
14:52	5.20	400	7.43	0.106	0.00	19.99	11.8	-50	0	
14:57	5.20	400	7.43	0.106	0.00	19.99	11.8	-50	0	
15:02	5.24	400	7.42	0.106	0.00	19.99	11.8	-51	0	
	collect sample									

SIGNATURE(S): Sarah Kinna

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: NWIRP Calverton EIAB 5-Month Sampling
Project No.: 112G02750

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ160I-20101216
Sample Location: SA-PZ160I
Sampled By: J. Birkett
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 12-16-10	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP
Time: 1541	(Visual)	(S.U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(%)	(mV)
Method: Low Flow	Clear	5.88	0.118	10.87	1.98	0.00	0.0	-18

PURGE DATA:

Date: 12-16-10	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Method: Low Flow	SEE LOW FLOW PURGE SHEET FOR DETAILS							
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 1" PVC								
Total Well Depth (TD):								
Static Water Level (WL): 5.02								
One Casing Volume(gal/L):								
Start Purge (hrs): 1520								
End Purge (hrs): 1541								
Total Purge Time (min): 21								
Total Vol. Purged (gal/L): 2 gal								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	3 40-mL clear glass vials	No
MEE	HCl	2 40-mL clear glass vials	No
DHB/DHC			No
Nitrate/nitrite			No
Chloride			No
Sulfide			No
TOC	H_2SO_4	2 40 mL glass vials	yes
TAL Metals	HNO_3	1 250mL poly bottle	yes

OBSERVATIONS / NOTES:

Repurge to collect missing analysis

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NWIRP Calverton EIAB 5-Month Sampling
PROJECT NUMBER: 112G02750

WELL ID.: SA-PZ-160I Re Purge
DATE: 12-16-10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1520	5.02									
1524	5.04	300	5.94	0.117	1.43	0.81	11.02	-13	0.0	
1532	5.04	300	5.91	0.118	3.45	0.16	11.05	-18	0.0	
1538	5.04	300	5.88	0.118	1.98	0.00	10.87	-18	0.0	
1541	Collect sample									

SIGNATURE(S): [signature]

PAGE 1 OF ___

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NWIRP Calverton EIAB 5-Month Sampling
Project No.: 112G02750

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ160I-201012 13
Sample Location: SA-PZ160I1
Sampled By: J. Birkett
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 12-13-10	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (^{0}C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	ORP (mV)
Time: 1455								
Method: Low Flow	clear	6.06	0.124	11.56	0.33	0.00	0.0	-75

PURGE DATA:

Date: 12-13-10	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Method: Low Flow	SEE LOW FLOW PURGE SHEET FOR DETAILS							
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 1" PVC								
Total Well Depth (TD):								
Static Water Level (WL): 4.67								
One Casing Volume(gal/L):								
Start Purge (hrs): 1405								
End Purge (hrs): 1455								
Total Purge Time (min): 50								
Total Vol. Purged (gal/L): 4 gal								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	3 40-mL clear glass vials	yes
MEE	HCl	2 40-mL clear glass vials	yes
DHB/DHC			no
Nitrate/nitrite			no
Chloride			no
Sulfide			no

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): [signature]

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NWIRP Calverton EIAB 5-Month Sampling
PROJECT NUMBER: 112G02750
WELL ID.: SA-PZ160I1
DATE: 12-13-10

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1405	4.67									
1407	4.69	350	6.09	0.130	2.95	0.02	11.58	-84	0.0	clear
1412	4.69	300	6.07	0.129	1.65	0.00	11.56	-81	0.0	
1417	4.69	300	6.07	0.126	0.81	0.00	11.63	-80	0.0	
1422	4.69	300	6.08	0.126	0.84	0.00	11.53	-80	0.0	
1427	4.69	300	6.07	0.125	0.25	0.00	11.59	-79	0.0	
1432	4.69	300	6.07	0.126	0.33	0.00	11.62	-79	0.0	
1437	4.69	300	6.06	0.125	0.59	0.00	11.62	-78	0.0	
1442	4.69	300	6.07	0.125	0.48	0.00	11.51	-77	0.0	
1447	4.69	300	6.06	0.125	0.29	0.00	11.53	-76	0.0	
1452	4.69	300	6.06	0.124	0.33	0.00	11.56	-75	0.0	
1455	Collect Sample									

SIGNATURE(S): [signature]

PAGE 1 OF 1

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NWIRP Calverton EIAB 5-Month Sampling
Project No.:

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SA-PZ-161I-201012 14
Sample Location: SA-PZ161I
Sampled By: SK
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 12-14-10 Time: 10:45 Method: Low Flow	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other ORP
	Clear	5.14	0.090	9.5°	0.00	19.99*	0	142

PURGE DATA:

Date: 12-14-10	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Method: Low Flow	See Low Flow Purge Sheet For Details							
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 1" PVC								
Total Well Depth (TD):								
Static Water Level (WL): 6.37								
One Casing Volume(gal/L):								
Start Purge (hrs): 10:00								
End Purge (hrs): 10:45								
Total Purge Time (min): 45								
Total Vol. Purged (gal/L): 4.5gal								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOC	HCL	3 40ml glass vials	YES
MEE	HCL	2 40ml glass vials	YES
DHB/DHC	--	1 filter	NO
Nitrate/Nitrite/Fluoride/Chloride	--	1 125ml poly bottle	NO
Sulfide	Zn Acetate NaOH	1 500ml poly bottle	NO
TOC	H2SO4	2 40ml glass vials	NO
TAL Metals	HNO3	1 250ml poly bottle	NO

OBSERVATIONS / NOTES:

*DO flashing on instrument

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Sarah Kinna

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NWIRP Calverton EIAB 5-Month Sampling
PROJECT NUMBER: 112G02750

WELL ID.: SA-PZ-161I
DATE: 12-18-2010

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
10:00	6.37	300	4.73	0.092	2.47	19.99	9.6°C	165	0	Flashing DO
10:05	6.37	300	4.84	0.090	1.09	19.99	8.9°C	161	0	flashing DO
10:10	6.37	300	4.90	0.089	1.08	19.99	8.7°C	157	0	flashing DO
10:15	6.41	300	4.92	0.089	1.01	19.99	9.0°C	156	0	flashing DO
10:20	6.41	300	4.91	0.089	0.11	19.99	8.9°C	156	0	flashing DO
10:25	6.41	300	4.94	0.089	0.00	19.99	8.9°C	153	0	flashing DO
10:30	6.41	300	4.96	0.089	0.00	19.99	9.1°C	153	0	flashing DO
10:35	6.42	300	5.03	0.089	0.00	19.99	9.1°C	149	0	flashing DO
10:40	6.42	300	5.08	0.089	0.00	19.99	9.3°C	146	0	flashing DO
10:45	6.42	300	5.14	0.090	0.00	19.99	9.5°C	142	0	flashing DO
↖	Collect Sample									

SIGNATURE(S): Sarah Kiura

PAGE 1 OF 1

ATTACHMENT C-6

INJECTION SYSTEM PROVE OUT OPERATION FORM Is

ANALYSIS DATA SHEET

SW 8260B

CARBONIN-072010

Client: TETRA TECH | SDG 1007140 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1007140-0159.d | Sampled: 07/20/10 15:25

Initial/Final: 5mL / 5mL | Lab ID: 1007140-01 | Received: 07/29/10 09:25

Dilution: 1 | pH: 1 | Assoc Blank: 0072704-BLK1 | Prepared: 07/27/10 12:34

% Moisture: NA | Analyzed: 07/27/10 20:26

Batch: 0072704 | Sequence: 0G27003 | Calibration: 0072902 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane	42	0.55	2.0	5.0	
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene	11	0.53	2.0	5.0	
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride	1.4	0.49	0.50	5.0	JB
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane	190	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone	33	1.5	5.0	13	
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane	39	0.32	0.50	5.0	
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene	0.57	0.28	0.50	5.0	J
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene	0.65	0.31	0.50	5.0	JB
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

ANALYSIS DATA SHEET

SW 8260B

CARBONIN-072010

Client: TETRA TECH | SDG 1007140 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1007140-0159.d | Sampled: 07/20/10 15:25

Initial/Final: 5mL / 5mL | Lab ID: 1007140-01 | Received: 07/29/10 09:25

Dilution: 1 | pH: 1 | Assoc Blank: 0072704-BLK1 | Prepared: 07/27/10 12:34

% Moisture: NA | Analyzed: 07/27/10 20:26

Batch: 0072704 | Sequence: 0G27003 | Calibration: 0072902 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene	0.39	0.27	0.50	5.0	J
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene		0.36	0.50	5.0	U
106-46-7	1,4-Dichlorobenzene	3.4	0.30	0.50	5.0	J
95-50-1	1,2-Dichlorobenzene	1.3	0.35	0.50	5.0	J
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene	2.1	0.48	0.50	5.0	J
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	49.79	100	85 - 115	
1,2-Dichloroethane-d4	50.00	52.71	105	70 - 120	
Toluene-d8	50.00	51.86	104	85 - 120	
Bromofluorobenzene	50.00	52.97	106	75 - 120	

Environmental Testing Laboratories

CompuChem

A Division Of

Liberty Analytical Corp.

ANALYSIS DATA SHEET

SW 8260B

CARBONIN10-072110

Client: TETRA TECH | SDG 1007140 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1007140-0359.d | Sampled: 07/21/10 18:30

Initial/Final: 5mL / 5mL | Lab ID: 1007140-03 | Received: 07/29/10 09:25

Dilution: 1 | pH: 1 | Assoc Blank: 0072704-BLK1 | Prepared: 07/27/10 12:34

% Moisture: NA | Analyzed: 07/27/10 21:21

Batch: 0072704 | Sequence: 0G27003 | Calibration: 0072902 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane	50	0.55	2.0	5.0	
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene	14	0.53	2.0	5.0	
67-64-1	Acetone	3.4	1.6	5.0	13	J
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride	1.1	0.49	0.50	5.0	JB
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane	220	0.27	0.50	5.0	E
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone	26	1.5	5.0	13	
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane	50	0.32	0.50	5.0	
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene	0.66	0.28	0.50	5.0	J
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene	0.55	0.31	0.50	5.0	JB
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

ANALYSIS DATA SHEET

SW 8260B

CARBONIN10-072110

Client: TETRA TECH | SDG 1007140 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1007140-0359.d | Sampled: 07/21/10 18:30

Initial/Final: 5mL / 5mL | Lab ID: 1007140-03 | Received: 07/29/10 09:25

Dilution: 1 | pH: 1 | Assoc Blank: 0072704-BLK1 | Prepared: 07/27/10 12:34

% Moisture: NA | Analyzed: 07/27/10 21:21

Batch: 0072704 | Sequence: 0G27003 | Calibration: 0072902 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene	0.37	0.27	0.50	5.0	J
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene		0.36	0.50	5.0	U
106-46-7	1,4-Dichlorobenzene	2.8	0.30	0.50	5.0	J
95-50-1	1,2-Dichlorobenzene	1.2	0.35	0.50	5.0	J
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene	2.1	0.48	0.50	5.0	J
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	50.78	102	85 - 115	
1,2-Dichloroethane-d4	50.00	54.86	110	70 - 120	
Toluene-d8	50.00	53.59	107	85 - 120	
Bromofluorobenzene	50.00	54.35	109	75 - 120	

ANALYSIS DATA SHEET

SW 8260B

CARBONIN10-072110RE

Client: TETRA TECH | SDG 1007140 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1007140-03R59.d | Sampled: 07/21/10 18:30

Initial/Final: 5mL / 5mL | Lab ID: 1007140-03RE1 | Received: 07/29/10 09:25

Dilution: 1 | pH: 1 | Assoc Blank: 0072805-BLK1 | Prepared: 07/28/10 11:20

% Moisture: NA | Analyzed: 07/28/10 14:25

Batch: 0072805 | Sequence: 0G28004 | Calibration: 0072902 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane	34	0.55	2.0	5.0	
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene	17	0.53	2.0	5.0	
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride	1.2	0.49	0.50	5.0	JB
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane	190	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone	16	1.5	5.0	13	
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane	45	0.32	0.50	5.0	
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene	0.58	0.28	0.50	5.0	J
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene	0.53	0.31	0.50	5.0	JB
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

ANALYSIS DATA SHEET

SW 8260B

CARBONIN10-072110RE

Client: TETRA TECH | SDG 1007140 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1007140-03R59.d | Sampled: 07/21/10 18:30

Initial/Final: 5mL / 5mL | Lab ID: 1007140-03RE1 | Received: 07/29/10 09:25

Dilution: 1 | pH: 1 | Assoc Blank: 0072805-BLK1 | Prepared: 07/28/10 11:20

% Moisture: NA | Analyzed: 07/28/10 14:25

Batch: 0072805 | Sequence: 0G28004 | Calibration: 0072902 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene	0.34	0.27	0.50	5.0	J
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene		0.36	0.50	5.0	U
106-46-7	1,4-Dichlorobenzene	2.8	0.30	0.50	5.0	J
95-50-1	1,2-Dichlorobenzene	1.3	0.35	0.50	5.0	J
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene	2.0	0.48	0.50	5.0	J
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	50.28	101	85 - 115	
1,2-Dichloroethane-d4	50.00	46.31	93	70 - 120	
Toluene-d8	50.00	50.90	102	85 - 120	
Bromofluorobenzene	50.00	50.23	100	75 - 120	

ANALYSIS DATA SHEET

SW 8260B

CARBONIN50-072810

Client: TETRA TECH | SDG 1007140 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1007140-05D59.d | Sampled: 07/28/10 12:55

Initial/Final: 5mL / 5mL | Lab ID: 1007140-05 | Received: 07/29/10 09:25

Dilution: 1.43 | pH: 1 | Assoc Blank: 0081023-BLK1 | Prepared: 08/10/10 22:19

% Moisture: NA | Analyzed: 08/11/10 00:35

Batch: 0081023 | Sequence: 0H10013 | Calibration: 0081303 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.46	0.72	7.2	U
74-87-3	Chloromethane		0.56	0.72	7.2	U
75-01-4	Vinyl chloride		0.69	0.72	7.2	U
74-83-9	Bromomethane		1.1	2.9	7.2	U
75-00-3	Chloroethane	33	0.79	2.9	7.2	
75-69-4	Trichlorofluoromethane		0.70	0.72	7.2	U
75-35-4	1,1-Dichloroethene	14	0.76	2.9	7.2	
67-64-1	Acetone		2.3	7.2	18	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		1.2	2.9	7.2	U
75-15-0	Carbon disulfide		0.23	0.72	7.2	U
79-20-9	Methyl acetate		1.2	2.9	7.2	U
75-09-2	Methylene chloride		0.70	0.72	7.2	U
156-60-5	trans-1,2-Dichloroethene		0.63	0.72	7.2	U
1634-04-4	Methyl tert-butyl ether		0.31	0.72	7.2	U
75-34-3	1,1-Dichloroethane	210	0.39	0.72	7.2	
156-59-2	cis-1,2-Dichloroethene		0.93	2.9	7.2	U
78-93-3	2-Butanone		2.1	7.2	18	U
67-66-3	Chloroform		0.39	0.72	7.2	U
71-55-6	1,1,1-Trichloroethane	45	0.46	0.72	7.2	
110-82-7	Cyclohexane		0.64	0.72	7.2	U
563-58-6	1,1-Dichloropropene		0.60	0.72	7.2	U
56-23-5	Carbon tetrachloride		0.44	0.72	7.2	U
107-06-2	1,2-Dichloroethane		0.33	0.72	7.2	U
71-43-2	Benzene	0.58	0.40	0.72	7.2	J
79-01-6	Trichloroethene		0.40	0.72	7.2	U
108-87-2	Methylcyclohexane		0.50	0.72	7.2	U
78-87-5	1,2-Dichloropropane		1.2	2.9	7.2	U
75-27-4	Bromodichloromethane		0.51	0.72	7.2	U
10061-01-5	cis-1,3-Dichloropropene		0.74	2.9	7.2	U
108-10-1	4-Methyl-2-pentanone		1.6	1.8	18	U
108-88-3	Toluene	1.1	0.44	0.72	7.2	JB
10061-02-6	trans-1,3-Dichloropropene		0.64	0.72	7.2	U
79-00-5	1,1,2-Trichloroethane		0.73	2.9	7.2	U
127-18-4	Tetrachloroethene		0.60	0.72	7.2	U
591-78-6	2-Hexanone		1.7	1.8	18	U
124-48-1	Dibromochloromethane		0.46	0.72	7.2	U
106-93-4	1,2-Dibromoethane		0.63	0.72	7.2	U
108-90-7	Chlorobenzene		0.39	0.72	7.2	U
100-41-4	Ethylbenzene		0.60	0.72	7.2	U

ANALYSIS DATA SHEET

SW 8260B

CARBONIN50-072810

Client: TETRA TECH | SDG 1007140 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1007140-05D59.d | Sampled: 07/28/10 12:55

Initial/Final: 5mL / 5mL | Lab ID: 1007140-05 | Received: 07/29/10 09:25

Dilution: 1.43 | pH: 1 | Assoc Blank: 0081023-BLK1 | Prepared: 08/10/10 22:19

% Moisture: NA | Analyzed: 08/11/10 00:35

Batch: 0081023 | Sequence: 0H10013 | Calibration: 0081303 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		1.2	1.4	14	U
95-47-6	o-Xylene		0.36	0.72	7.2	U
100-42-5	Styrene		0.51	0.72	7.2	U
75-25-2	Bromoform		1.4	2.9	7.2	U
98-82-8	Isopropylbenzene		0.39	0.72	7.2	U
79-34-5	1,1,2,2-Tetrachloroethane		0.92	2.9	7.2	U
541-73-1	1,3-Dichlorobenzene		0.51	0.72	7.2	U
106-46-7	1,4-Dichlorobenzene		0.43	0.72	7.2	U
95-50-1	1,2-Dichlorobenzene		0.50	0.72	7.2	U
96-12-8	1,2-Dibromo-3-chloropropane		1.3	2.9	7.2	U
120-82-1	1,2,4-Trichlorobenzene		0.69	0.72	7.2	U
91-20-3	Naphthalene		1.6	2.9	7.2	U
540-59-0	1,2-Dichloroethene (total)		0.63	0.72	7.2	U
1330-20-7	Xylenes (total)		0.36	0.72	7.2	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	49.25	98	85 - 115	
1,2-Dichloroethane-d4	50.00	54.54	109	70 - 120	
Toluene-d8	50.00	50.67	101	85 - 120	
Bromofluorobenzene	50.00	53.24	106	75 - 120	

ANALYSIS DATA SHEET

SW 8260B

CARBONOUT-072010

Client: TETRA TECH | SDG 1007140 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1007140-0259.d | Sampled: 07/20/10 15:40

Initial/Final: 5mL / 5mL | Lab ID: 1007140-02 | Received: 07/29/10 09:25

Dilution: 1 | pH: 1 | Assoc Blank: 0072704-BLK1 | Prepared: 07/27/10 12:34

% Moisture: NA | Analyzed: 07/27/10 20:54

Batch: 0072704 | Sequence: 0G27003 | Calibration: 0072902 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane		0.55	2.0	5.0	U
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene		0.53	2.0	5.0	U
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride	1.1	0.49	0.50	5.0	JB
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane		0.27	0.50	5.0	U
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone	42	1.5	5.0	13	
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane		0.32	0.50	5.0	U
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene	0.46	0.31	0.50	5.0	JB
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

ANALYSIS DATA SHEET

SW 8260B

CARBONOUT-072010

Client: TETRA TECH | SDG 1007140 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1007140-0259.d | Sampled: 07/20/10 15:40

Initial/Final: 5mL / 5mL | Lab ID: 1007140-02 | Received: 07/29/10 09:25

Dilution: 1 | pH: 1 | Assoc Blank: 0072704-BLK1 | Prepared: 07/27/10 12:34

% Moisture: NA | Analyzed: 07/27/10 20:54

Batch: 0072704 | Sequence: 0G27003 | Calibration: 0072902 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene		0.36	0.50	5.0	U
106-46-7	1,4-Dichlorobenzene		0.30	0.50	5.0	U
95-50-1	1,2-Dichlorobenzene		0.35	0.50	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene		0.48	0.50	5.0	U
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	51.11	102	85 - 115	
1,2-Dichloroethane-d4	50.00	54.15	108	70 - 120	
Toluene-d8	50.00	53.23	106	85 - 120	
Bromofluorobenzene	50.00	54.41	109	75 - 120	

ANALYSIS DATA SHEET

SW 8260B

CARBON-TB-072210

Client: TETRA TECH | SDG 1007140 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1007140-0459.d | Sampled: 07/22/10 00:00

Initial/Final: 5mL / 5mL | Lab ID: 1007140-04 | Received: 07/29/10 09:25

Dilution: 1 | pH: 1 | Assoc Blank: 0072704-BLK1 | Prepared: 07/27/10 12:34

% Moisture: NA | Analyzed: 07/27/10 21:48

Batch: 0072704 | Sequence: 0G27003 | Calibration: 0072902 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane		0.55	2.0	5.0	U
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene		0.53	2.0	5.0	U
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride	1.1	0.49	0.50	5.0	JB
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane		0.27	0.50	5.0	U
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane		0.32	0.50	5.0	U
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene	0.48	0.31	0.50	5.0	JB
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

ANALYSIS DATA SHEET

SW 8260B

CARBON-TB-072210

Client: TETRA TECH | SDG 1007140 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1007140-0459.d | Sampled: 07/22/10 00:00

Initial/Final: 5mL / 5mL | Lab ID: 1007140-04 | Received: 07/29/10 09:25

Dilution: 1 | pH: 1 | Assoc Blank: 0072704-BLK1 | Prepared: 07/27/10 12:34

% Moisture: NA | Analyzed: 07/27/10 21:48

Batch: 0072704 | Sequence: 0G27003 | Calibration: 0072902 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene		0.36	0.50	5.0	U
106-46-7	1,4-Dichlorobenzene		0.30	0.50	5.0	U
95-50-1	1,2-Dichlorobenzene		0.35	0.50	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene		0.48	0.50	5.0	U
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	52.44	105	85 - 115	
1,2-Dichloroethane-d4	50.00	58.23	116	70 - 120	
Toluene-d8	50.00	52.94	106	85 - 120	
Bromofluorobenzene	50.00	55.69	111	75 - 120	

ANALYSIS DATA SHEET

SW 8260B

CARBON-TB-072810

Client: TETRA TECH | SDG 1007140 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1007140-06R59.d | Sampled: 07/28/10 00:00

Initial/Final: 5mL / 5mL | Lab ID: 1007140-06 | Received: 07/29/10 09:25

Dilution: 1 | pH: 1 | Assoc Blank: 0081023-BLK1 | Prepared: 08/10/10 22:19

% Moisture: NA | Analyzed: 08/11/10 01:02

Batch: 0081023 | Sequence: 0H10013 | Calibration: 0081303 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane		0.55	2.0	5.0	U
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene		0.53	2.0	5.0	U
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride		0.49	0.50	5.0	U
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane		0.27	0.50	5.0	U
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane		0.32	0.50	5.0	U
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene	0.75	0.31	0.50	5.0	JB
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

ANALYSIS DATA SHEET

SW 8260B

CARBON-TB-072810

Client: TETRA TECH | SDG 1007140 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1007140-06R59.d | Sampled: 07/28/10 00:00

Initial/Final: 5mL / 5mL | Lab ID: 1007140-06 | Received: 07/29/10 09:25

Dilution: 1 | pH: 1 | Assoc Blank: 0081023-BLK1 | Prepared: 08/10/10 22:19

% Moisture: NA | Analyzed: 08/11/10 01:02

Batch: 0081023 | Sequence: 0H10013 | Calibration: 0081303 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene		0.36	0.50	5.0	U
106-46-7	1,4-Dichlorobenzene		0.30	0.50	5.0	U
95-50-1	1,2-Dichlorobenzene		0.35	0.50	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene		0.48	0.50	5.0	U
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	48.58	97	85 - 115	
1,2-Dichloroethane-d4	50.00	57.06	114	70 - 120	
Toluene-d8	50.00	49.96	100	85 - 120	
Bromofluorobenzene	50.00	52.90	106	75 - 120	

ANALYSIS DATA SHEET

SW 8260B

CARBONIN90

Client: TETRA TECH | SDG 1008026 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1008026-01D59.d | Sampled: 08/03/10 10:00

Initial/Final: 5mL / 5mL | Lab ID: 1008026-01 | Received: 08/04/10 09:45

Dilution: 1.43 | pH: 1 | Assoc Blank: 0081023-BLK1 | Prepared: 08/10/10 22:19

% Moisture: NA | Analyzed: 08/11/10 01:29

Batch: 0081023 | Sequence: 0H10013 | Calibration: 0081303 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.46	0.72	7.2	U
74-87-3	Chloromethane		0.56	0.72	7.2	U
75-01-4	Vinyl chloride		0.69	0.72	7.2	U
74-83-9	Bromomethane		1.1	2.9	7.2	U
75-00-3	Chloroethane	36	0.79	2.9	7.2	
75-69-4	Trichlorofluoromethane		0.70	0.72	7.2	U
75-35-4	1,1-Dichloroethene	12	0.76	2.9	7.2	
67-64-1	Acetone		2.3	7.2	18	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		1.2	2.9	7.2	U
75-15-0	Carbon disulfide		0.23	0.72	7.2	U
79-20-9	Methyl acetate		1.2	2.9	7.2	U
75-09-2	Methylene chloride		0.70	0.72	7.2	U
156-60-5	trans-1,2-Dichloroethene		0.63	0.72	7.2	U
1634-04-4	Methyl tert-butyl ether		0.31	0.72	7.2	U
75-34-3	1,1-Dichloroethane	200	0.39	0.72	7.2	
156-59-2	cis-1,2-Dichloroethene		0.93	2.9	7.2	U
78-93-3	2-Butanone		2.1	7.2	18	U
67-66-3	Chloroform		0.39	0.72	7.2	U
71-55-6	1,1,1-Trichloroethane	41	0.46	0.72	7.2	
110-82-7	Cyclohexane		0.64	0.72	7.2	U
563-58-6	1,1-Dichloropropene		0.60	0.72	7.2	U
56-23-5	Carbon tetrachloride		0.44	0.72	7.2	U
107-06-2	1,2-Dichloroethane		0.33	0.72	7.2	U
71-43-2	Benzene	0.54	0.40	0.72	7.2	J
79-01-6	Trichloroethene		0.40	0.72	7.2	U
108-87-2	Methylcyclohexane		0.50	0.72	7.2	U
78-87-5	1,2-Dichloropropane		1.2	2.9	7.2	U
75-27-4	Bromodichloromethane		0.51	0.72	7.2	U
10061-01-5	cis-1,3-Dichloropropene		0.74	2.9	7.2	U
108-10-1	4-Methyl-2-pentanone		1.6	1.8	18	U
108-88-3	Toluene	1.0	0.44	0.72	7.2	JB
10061-02-6	trans-1,3-Dichloropropene		0.64	0.72	7.2	U
79-00-5	1,1,2-Trichloroethane		0.73	2.9	7.2	U
127-18-4	Tetrachloroethene		0.60	0.72	7.2	U
591-78-6	2-Hexanone		1.7	1.8	18	U
124-48-1	Dibromochloromethane		0.46	0.72	7.2	U
106-93-4	1,2-Dibromoethane		0.63	0.72	7.2	U
108-90-7	Chlorobenzene		0.39	0.72	7.2	U
100-41-4	Ethylbenzene		0.60	0.72	7.2	U

ANALYSIS DATA SHEET

SW 8260B

CARBONIN90

Client: TETRA TECH | SDG 1008026 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1008026-01D59.d | Sampled: 08/03/10 10:00

Initial/Final: 5mL / 5mL | Lab ID: 1008026-01 | Received: 08/04/10 09:45

Dilution: 1.43 | pH: 1 | Assoc Blank: 0081023-BLK1 | Prepared: 08/10/10 22:19

% Moisture: NA | Analyzed: 08/11/10 01:29

Batch: 0081023 | Sequence: 0H10013 | Calibration: 0081303 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		1.2	1.4	14	U
95-47-6	o-Xylene		0.36	0.72	7.2	U
100-42-5	Styrene		0.51	0.72	7.2	U
75-25-2	Bromoform		1.4	2.9	7.2	U
98-82-8	Isopropylbenzene		0.39	0.72	7.2	U
79-34-5	1,1,2,2-Tetrachloroethane		0.92	2.9	7.2	U
541-73-1	1,3-Dichlorobenzene		0.51	0.72	7.2	U
106-46-7	1,4-Dichlorobenzene		0.43	0.72	7.2	U
95-50-1	1,2-Dichlorobenzene		0.50	0.72	7.2	U
96-12-8	1,2-Dibromo-3-chloropropane		1.3	2.9	7.2	U
120-82-1	1,2,4-Trichlorobenzene		0.69	0.72	7.2	U
91-20-3	Naphthalene		1.6	2.9	7.2	U
540-59-0	1,2-Dichloroethene (total)		0.63	0.72	7.2	U
1330-20-7	Xylenes (total)		0.36	0.72	7.2	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	49.23	98	85 - 115	
1,2-Dichloroethane-d4	50.00	54.77	110	70 - 120	
Toluene-d8	50.00	52.11	104	85 - 120	
Bromofluorobenzene	50.00	52.88	106	75 - 120	

ANALYSIS DATA SHEET

SW 8260B

CARBONTB-080310

Client: TETRA TECH | SDG 1008026 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1008026-02R59.d | Sampled: 08/03/10 00:00

Initial/Final: 5mL / 5mL | Lab ID: 1008026-02 | Received: 08/04/10 09:45

Dilution: 1 | pH: 1 | Assoc Blank: 0081023-BLK1 | Prepared: 08/10/10 22:19

% Moisture: NA | Analyzed: 08/11/10 01:56

Batch: 0081023 | Sequence: 0H10013 | Calibration: 0081303 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane		0.55	2.0	5.0	U
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene		0.53	2.0	5.0	U
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride		0.49	0.50	5.0	U
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane		0.27	0.50	5.0	U
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane		0.32	0.50	5.0	U
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene	0.69	0.31	0.50	5.0	JB
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

ANALYSIS DATA SHEET

SW 8260B

CARBONTB-080310

Client: TETRA TECH | SDG 1008026 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1008026-02R59.d | Sampled: 08/03/10 00:00

Initial/Final: 5mL / 5mL | Lab ID: 1008026-02 | Received: 08/04/10 09:45

Dilution: 1 | pH: 1 | Assoc Blank: 0081023-BLK1 | Prepared: 08/10/10 22:19

% Moisture: NA | Analyzed: 08/11/10 01:56

Batch: 0081023 | Sequence: 0H10013 | Calibration: 0081303 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene		0.36	0.50	5.0	U
106-46-7	1,4-Dichlorobenzene		0.30	0.50	5.0	U
95-50-1	1,2-Dichlorobenzene		0.35	0.50	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene		0.48	0.50	5.0	U
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	47.11	94	85 - 115	
1,2-Dichloroethane-d4	50.00	54.80	110	70 - 120	
Toluene-d8	50.00	49.97	100	85 - 120	
Bromofluorobenzene	50.00	53.05	106	75 - 120	

METHOD DETECTION AND REPORTING LIMITS

Laboratory: COMPUCHEM **SDG:** 1007140

Client: TETRA TECH **Project:** CTO-WE08/112G02045/N62467-04-D-0057

Matrix: WATER **Instrument:**

Analyte	DL	LOQ	Units	Method
Total Organic Carbon	0.13	1.0	mg/L	SM5310B

ANALYSIS DATA SHEET

CARBONIN-072010

Client: TETRA TECH SDG: 1007140 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 1007140-01 % Solid: NA Matrix: Water Sampled: 07/20/10 Received: 07/29/10

CAS NO.	Analyte	Conc. (mg/L)	DL	LOD	LOQ	D.F.	Q	Method	Sequence	Analyzed
TOC	Total Organic Carbon	1.4	0.13	0.36	1.0	1		SM5310B		08/02/10 21:16

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ANALYSIS DATA SHEET

CARBONOUT-072010

Client: TETRA TECH SDG: 1007140 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 1007140-02 % Solid: NA Matrix: Water Sampled: 07/20/10 Received: 07/29/10

CAS NO.	Analyte	Conc. (mg/L)	DL	LOD	LOQ	D.F.	Q	Method	Sequence	Analyzed
TOC	Total Organic Carbon	0.48	0.13	0.36	1.0	1	J	SM5310B		08/02/10 21:24

Environmental Testing Laboratories

CompuChem

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ANALYSIS DATA SHEET

CARBONIN10-072110

Client: TETRA TECH SDG: 1007140 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 1007140-03 % Solid: NA Matrix: Water Sampled: 07/21/10 Received: 07/29/10

CAS NO.	Analyte	Conc. (mg/L)	DL	LOD	LOQ	D.F.	Q	Method	Sequence	Analyzed
TOC	Total Organic Carbon	1.1	0.13	0.36	1.0	1		SM5310B		08/02/10 21:32

Environmental Testing Laboratories
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ANALYSIS DATA SHEET

CARBONIN50-072810

Client: TETRA TECH SDG: 1007140 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 1007140-05 % Solid: NA Matrix: Water Sampled: 07/28/10 Received: 07/29/10

CAS NO.	Analyte	Conc. (mg/L)	DL	LOD	LOQ	D.F.	Q	Method	Sequence	Analyzed
TOC	Total Organic Carbon	1.1	0.13	0.36	1.0	1		SM5310B		08/02/10 21:40

Environmental Testing Laboratories

CompuChem

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ANALYSIS DATA SHEET

CARBONIN90

Client: TETRA TECH SDG: 1008026 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 1008026-01 % Solid: Matrix: Water Sampled: 08/03/10 Received: 08/04/10

CAS NO.	Analyte	Conc. (mg/L)	DL	LOD	LOQ	D.F.	Q	Method	Sequence	Analyzed
TOC	Total Organic Carbon	16	0.13	0.36	1.0	1		SM5310B		08/24/10 11:37

Environmental Testing Laboratories

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ANALYSIS DATA SHEET

CARBONIN-072010

Client: TETRA TECH SDG: 1007140 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 1007140-01 % Solid: Matrix: Water Sampled: 07/20/10 Received: 07/29/10

CAS NO.	Analyte	Conc. (ug/L)	DL	LOD	LOQ	D.F.	Q	Method	Sequence	Analyzed
7439-89-6	Iron	112	12.2	50.0	500	1	J	EPA 6010C	0H15002	08/12/10 23:12:21
7439-96-5	Manganese	2870	0.16	5.00	10.0	1		EPA 6010C	0H15002	08/12/10 23:12:21

ANALYSIS DATA SHEET

CARBONOUT-072010

Client: TETRA TECH SDG: 1007140 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 1007140-02 % Solid: Matrix: Water Sampled: 07/20/10 Received: 07/29/10

CAS NO.	Analyte	Conc. (ug/L)	DL	LOD	LOQ	D.F.	Q	Method	Sequence	Analyzed
7439-89-6	Iron	293	12.2	50.0	500	1	J	EPA 6010C	0H15002	08/12/10 23:34:02
7439-96-5	Manganese	310	0.16	5.00	10.0	1		EPA 6010C	0H15002	08/12/10 23:34:02

ANALYSIS DATA SHEET

SW 8260B

CA-CARBONIN10

Client: TETRA TECH | SDG 1010115 | Project: CTO-WE08/112G02750.TT.TT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010115-0159.d | Sampled: 10/19/10 11:05

Initial/Final: 5mL / 5mL | Lab ID: 1010115-01 | Received: 10/22/10 09:00

Dilution: 1 | pH: 1 | Prepared: 10/26/10 10:48

% Moisture: NA | Analyzed: 10/26/10 16:02

Batch: 0102605 | Sequence: 0J26005 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane	35	0.55	2.0	5.0	
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene	10	0.53	2.0	5.0	
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride		0.49	0.50	5.0	U
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane	150	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane	32	0.32	0.50	5.0	
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene		0.31	0.50	5.0	U
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

ANALYSIS DATA SHEET

SW 8260B

CA-CARBONIN10

Client: TETRA TECH | SDG 1010115 | Project: CTO-WE08/112G02750.TT.TT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010115-0159.d | Sampled: 10/19/10 11:05

Initial/Final: 5mL / 5mL | Lab ID: 1010115-01 | Received: 10/22/10 09:00

Dilution: 1 | pH: 1 | Prepared: 10/26/10 10:48

% Moisture: NA | Analyzed: 10/26/10 16:02

Batch: 0102605 | Sequence: 0J26005 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene	1.1	0.36	0.50	5.0	J
106-46-7	1,4-Dichlorobenzene	4.7	0.30	0.50	5.0	J
95-50-1	1,2-Dichlorobenzene	1.5	0.35	0.50	5.0	J
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene		0.48	0.50	5.0	U
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	50.23	100	85 - 115	
1,2-Dichloroethane-d4	50.00	54.42	109	70 - 120	
Toluene-d8	50.00	54.26	109	85 - 120	
Bromofluorobenzene	50.00	51.71	103	75 - 120	

CAS NO.	TICS	CONC. (ug/L)	Response	R.T.	% Match	Q
NA	Tentatively Identified Compounds	0.0				U

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ANALYSIS DATA SHEET

SW 8260B

CA-CARBONIN50

Client: TETRA TECH | SDG 1010115 | Project: CTO-WE08/112G02750.TT.TT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010115-0259.d | Sampled: 10/20/10 11:30

Initial/Final: 5mL / 5mL | Lab ID: 1010115-02 | Received: 10/22/10 09:00

Dilution: 1 | pH: 1 | Prepared: 10/26/10 10:48

% Moisture: NA | Analyzed: 10/26/10 16:30

Batch: 0102605 | Sequence: 0J26005 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane	37	0.55	2.0	5.0	
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene	10	0.53	2.0	5.0	
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride		0.49	0.50	5.0	U
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane	150	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane	31	0.32	0.50	5.0	
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene		0.31	0.50	5.0	U
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

ANALYSIS DATA SHEET

SW 8260B

CA-CARBONIN50

Client: TETRA TECH | SDG 1010115 | Project: CTO-WE08/112G02750.TT.TT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010115-0259.d | Sampled: 10/20/10 11:30

Initial/Final: 5mL / 5mL | Lab ID: 1010115-02 | Received: 10/22/10 09:00

Dilution: 1 | pH: 1 | Prepared: 10/26/10 10:48

% Moisture: NA | Analyzed: 10/26/10 16:30

Batch: 0102605 | Sequence: 0J26005 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene	0.94	0.36	0.50	5.0	J
106-46-7	1,4-Dichlorobenzene	5.0	0.30	0.50	5.0	J
95-50-1	1,2-Dichlorobenzene	1.6	0.35	0.50	5.0	J
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene		0.48	0.50	5.0	U
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	49.78	100	85 - 115	
1,2-Dichloroethane-d4	50.00	54.88	110	70 - 120	
Toluene-d8	50.00	50.59	101	85 - 120	
Bromofluorobenzene	50.00	50.90	102	75 - 120	

CAS NO.	TICS	CONC. (ug/L)	Response	R.T.	% Match	Q
NA	Tentatively Identified Compounds	0.0				U

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ANALYSIS DATA SHEET

SW 8260B

CA-CARBONIN90

Client: TETRA TECH | SDG 1010115 | Project: CTO-WE08/112G02750.TT.TT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010115-0359.d | Sampled: 10/21/10 10:34

Initial/Final: 5mL / 5mL | Lab ID: 1010115-03 | Received: 10/22/10 09:00

Dilution: 1 | pH: 1 | Prepared: 10/26/10 10:48

% Moisture: NA | Analyzed: 10/26/10 16:57

Batch: 0102605 | Sequence: 0J26005 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane	38	0.55	2.0	5.0	
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene	11	0.53	2.0	5.0	
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride		0.49	0.50	5.0	U
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane	150	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane	32	0.32	0.50	5.0	
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene		0.31	0.50	5.0	U
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

ANALYSIS DATA SHEET

SW 8260B

CA-CARBONIN90

Client: TETRA TECH | SDG 1010115 | Project: CTO-WE08/112G02750.TT.TT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010115-0359.d | Sampled: 10/21/10 10:34

Initial/Final: 5mL / 5mL | Lab ID: 1010115-03 | Received: 10/22/10 09:00

Dilution: 1 | pH: 1 | Prepared: 10/26/10 10:48

% Moisture: NA | Analyzed: 10/26/10 16:57

Batch: 0102605 | Sequence: 0J26005 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene	1.1	0.36	0.50	5.0	J
106-46-7	1,4-Dichlorobenzene	5.3	0.30	0.50	5.0	
95-50-1	1,2-Dichlorobenzene	1.6	0.35	0.50	5.0	J
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene		0.48	0.50	5.0	U
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	50.96	102	85 - 115	
1,2-Dichloroethane-d4	50.00	55.61	111	70 - 120	
Toluene-d8	50.00	52.95	106	85 - 120	
Bromofluorobenzene	50.00	51.95	104	75 - 120	

CAS NO.	TICS	CONC. (ug/L)	Response	R.T.	% Match	Q
NA	Tentatively Identified Compounds	0.0				U

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ANALYSIS DATA SHEET

SW 8260B

CA-TB-20101021

Client: TETRA TECH | SDG 1010115 | Project: CTO-WE08/112G02750.TT.TT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010115-0459.d | Sampled: 10/21/10 08:00

Initial/Final: 5mL / 5mL | Lab ID: 1010115-04 | Received: 10/22/10 09:00

Dilution: 1 | pH: 1 | Prepared: 10/26/10 10:48

% Moisture: NA | Analyzed: 10/26/10 17:24

Batch: 0102605 | Sequence: 0J26005 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane		0.55	2.0	5.0	U
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene		0.53	2.0	5.0	U
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride		0.49	0.50	5.0	U
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane		0.27	0.50	5.0	U
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane		0.32	0.50	5.0	U
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene		0.31	0.50	5.0	U
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

ANALYSIS DATA SHEET

SW 8260B

CA-TB-20101021

Client: TETRA TECH | SDG 1010115 | Project: CTO-WE08/112G02750.TT.TT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010115-0459.d | Sampled: 10/21/10 08:00

Initial/Final: 5mL / 5mL | Lab ID: 1010115-04 | Received: 10/22/10 09:00

Dilution: 1 | pH: 1 | Prepared: 10/26/10 10:48

% Moisture: NA | Analyzed: 10/26/10 17:24

Batch: 0102605 | Sequence: 0J26005 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene		0.36	0.50	5.0	U
106-46-7	1,4-Dichlorobenzene		0.30	0.50	5.0	U
95-50-1	1,2-Dichlorobenzene		0.35	0.50	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene		0.48	0.50	5.0	U
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	53.31	107	85 - 115	
1,2-Dichloroethane-d4	50.00	59.19	118	70 - 120	
Toluene-d8	50.00	54.95	110	85 - 120	
Bromofluorobenzene	50.00	52.98	106	75 - 120	

CAS NO.	TICS	CONC. (ug/L)	Response	R.T.	% Match	Q
NA	Tentatively Identified Compounds	0.0				U

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ATTACHMENT C-7

DATA VALIDATION REPORTS

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**D. BRAYACK**	**DATE:**	**SEPTEMBER 10, 2010**
FROM:	**JOSEPH KALINYAK**	**COPIES:**	**DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION – VOC / OVG**
NWIRP CALVERTON CTO WE08
SDG 1007021

SAMPLES: 20 / Aqueous / VOC

SA-20100707-DUP	SA-20100708-DUP	SA-PZ-133I-20100708
SA-PZ-138I-20100708	SA-PZ-138I1-20100706	SA-PZ-139I-20100708
SA-PZ-149I1-20100708	SA-PZ-151I1-20100707	SA-PZ-155I-20100707
SA-PZ-157I-20100708	SA-PZ-157I1-20100707	SA-PZ-158I-20100706
SA-PZ-158I1-20100706	SA-PZ-159I-20100707	SA-PZ-159I1-20100708
SA-PZ-160I-20100707	SA-PZ-160I1-20100706	SA-PZ-161I-20100707
SA-TB-20100706	SA-TB-20100708	

8 / Aqueous / OVG

SA-20100707-DUP	SA-PZ-151I1-20100707	SA-PZ-155I-20100707
SA-PZ-157I-20100708	SA-PZ-157I1-20100707	SA-PZ-159I-20100707
SA-PZ-159I1-20100708	SA-PZ-160I-20100707	

Overview

The sample set for NWIRP Calverton, SDG 1007021 consisted of twenty (20) aqueous environmental samples including two (2) trip blanks and two (2) field duplicate sample pairs. All aqueous samples were analyzed for volatile organic compounds (VOC) and six (6) samples were analyzed for organic volatile gases (OVG). Two (2) field duplicate pairs were included in this Sample Delivery Group (SDG): SA-20100707-DUP / SA-PZ-155I-20100707 and SA-20100708-DUP / SA-PZ-138I-20100708.

The samples were collected by Tetra Tech on July 6, 7, and 8, 2010 and analyzed by CompuChem, a division of Liberty Analytical Corporation. All analyses were conducted in accordance with EPA Method SW-846 8260B and RSK-175 analytical and reporting protocols. The data contained in this SDG were validated with regard to the following parameters:

*	•	Data completeness
*	•	Hold times
*	•	GC/MS System Tuning and Performance
	•	Initial/continuing calibrations
	•	Laboratory Control Sample Recoveries
	•	Laboratory Method Blank Results
*	•	Matrix Spike/Matrix Spike Duplicate Recoveries
*	•	Surrogate Spike Recoveries
*	•	Internal Standard Recoveries
*	•	Field Duplicate Precision
*	•	Compound Identification
*	•	Compound Quantitation
*	•	Detection Limits

The symbol (*) indicates that all quality control criteria were met for this parameter. Qualified analytical results are presented in Appendix A, results as reported by the laboratory are presented in Appendix B, Region II data validation forms are presented in Appendix C, and documentation supporting these findings is presented in Appendix D.

Volatile

The continuing calibration verification percent difference (%D) was greater than the 20% quality control limit for bromomethane for instrument 5972HP59 on 07/14/10 @ 11:50 affecting samples SA-PZ-157I1-20100707, SA-PZ-158I-20100706, SA-PZ-158I1-20100706, SA-PZ-160I1-20100706, SA-PZ-138I1-20100706, SA-PZ-161I-20100707, SA-PZ-159I1-20100708, SA-TB-20100708, and SA-PZ-133I-20100708. All affected sample results were non-detected and were qualified estimated, (UJ).

The continuing calibration verification %D was greater than the 20% quality control limit for chloromethane for instrument 5972HP59 on 07/15/10 @ 11:54 affecting samples SA-PZ-159I1-20100708, SA-PZ-157I-20100708, SA-PZ-138I-20100708, SA-20100708-DUP, SA-PZ-149I1-20100708, and SA-PZ-139I-20100708. All affected sample results were non-detected and were qualified estimated, (UJ).

The following analytes were detected in the associated method blanks or the trip blank SA-TB-20100708 (for the common laboratory contaminant methylene chloride) at the maximum concentrations as indicated below affecting all samples:

Compound	Maximum Conc. (µg/L)	Action Level (µg/L)
Methylene Chloride (1)	1.7	17.0
Toluene (2)	0.42	2.10
Toluene (3)	0.64	3.20
Naphthalene (3)	2.2	11.0
Bromomethane (4)	1.1	5.5
Toluene (4)	0.50	2.50

(1) Trip blank SA-TB-20100708 affecting all samples for the common laboratory contaminant methylene chloride.

(2) Method blank VBLKIW affecting samples SA-PZ-160I-20100707, SA-20100707-DUP, SA-PZ-155I-20100707, SA-PZ-159I-20100707, and SA-PZ-151I1-20100707.

(3) Method blank VBLKIY affecting samples SA-PZ-157I1-20100707, SA-PZ-158I-20100706, SA-PZ-158I1-20100706, SA-PZ-160I1-20100706, SA-PZ-138I1-20100706, SA-PZ-161I-20100707, SA-PZ-159I1-20100708, SA-TB-20100708, and SA-PZ-133I-20100708.

(4) Method blank VBLKJA affecting samples SA-PZ-159I1-20100708 dilution, SA-PZ-157I-20100708, SA-PZ-138I-20100708, SA-20100708-DUP, SA-PZ-149I1-20100708, and SA-PZ-139I-20100708.

An action level of 10X the maximum contaminant concentration for the common laboratory contaminant compound methylene chloride, and 5X for other contaminant compounds was established to evaluate laboratory contamination for the aforementioned compounds. Dilution factors and sample aliquots were taken into consideration during the application of all action levels. Positive results less than the action level were qualified as non-detected, (U), as a result of laboratory blank contamination and the results were reported to the contract required quantitation limit (CRQL).

The matrix spike (MS) and the MS duplicate (MSD) percent recoveries (%R) were less than the quality control limit for 1,1-dichloroethane for sample SA-PZ-160I-20100707. The positive 1,1-dichloroethane result for the sample SA-PZ-160I-20100707 was qualified estimated, (J).

Sample SA-PZ-159I1-20100708 was analyzed for OVGs both undiluted and at a 5X dilution due to the methane result exceeding the highest calibration level in the undiluted sample analysis. The 5X dilution result for methane was inconsistent with the initial undiluted analysis result. The initial undiluted analysis result for methane was 130µg/L for methane, whereas the dilution 5X result was 30µg/L. The initial methane result was reported from the undiluted analysis for sample SA-PZ-159I1-20100708 and was qualified estimated, (J), due to exceeding the calibration level.

Additional Comments

Positive results below the Reporting Limit (RL) and above the detection limit were qualified as estimated, (J), due to uncertainty near the detection limit.

The laboratory control sample (LCS)/LCS duplicate (LCSD) VIZLCS RPD for bromomethane was greater than the 30% quality control limit. No action was taken as the LCS and the LCSD %Rs for bromomethane were within the quality control limits.

The trip blanks had positive VOC detections for 1,2,4-trichlorobenzene, naphthalene, methylene chloride, and toluene.

Form I results for VOCs and OVGs had abbreviated sample numbers listed by the laboratory on the forms.

The following samples were analyzed for VOCs at a dilution due to a pre-screening analysis by the laboratory. The minimum detection limits (MDL) and reporting limits (RL) for the non-detected sample results were higher as a result of the dilution analyses. Sample SA-PZ-159I1-20100708 was analyzed both undiluted and at a 2X dilution due to the 1,1-dichloroethane result exceeding the highest calibration level in the undiluted sample analysis.. Only the 1,1-dichloroethane result was reported from the dilution analysis for sample SA-PZ-159I1-20100708.

Sample	Dilution
SA-PZ-138I1-20100706	6.7X
SA-PZ-151I1-20100707	3.3X
SA-PZ-157I-20100708	1.4X
SA-PZ-157I1-20100707	2.5X
SA-PZ-158I-20100706	1.7X
SA-PZ-158I1-20100706	2.5X
SA-PZ-159I-20100707	2.0X
SA-PZ-159I1-20100708RE	2.0X
SA-PZ-160I-20100707	1.7X
SA-PZ-160I1-20100706	1.7X
SA-PZ-161I-20100707	4.0X

The following samples were analyzed for OVGs at a dilution due to analytes exceeding the highest calibration level in the undiluted sample analysis. The minimum detection limits (MDL) and reporting limits (RL) for the non-detected sample results were higher as a result of the dilution analyses.

Sample	Dilution
SA-PZ-151I1-20100707	5X
SA-PZ-157I1-20100707	5X

EXECUTIVE SUMMARY

Laboratory Performance Issues: Method blank and trip blank contamination resulted in sample data qualification. The sample SA-PZ-160I-20100707 1,1-dichloroethane positive result was qualified for due to an MS/MSD quality control limit exceedance. The methane and OVG result for sample SA-PZ-159I1-20100708 was qualified due to exceeding the highest calibration level for the analysis.

Other Factors Affecting Data Quality: Positive results below the Reporting Limit (RL) and above the detection limit were qualified as estimated, (J), due to uncertainty near the detection limit.

The data for these analyses were reviewed with reference to the SOP #HW-24 Revision #2, October 2006, USEPA Region II Hazardous Waste Support Branch Validating Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry SW-846 Method 8260B (October 2006) and the Department of Defense (DoD) document entitled "Quality Systems Manual (QSM) for Environmental Laboratories" (January 2006).

TetraTech NUS
Joseph Kalinyak
Chemist/Data Validator

Edward Sedlayer for
TetraTech NUS
Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:
1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C – Region II Data Validation Forms
4. Appendix D - Support Documentation

Appendix A

Qualified Analytical Results

Value Qualifier Key (Val Qual)

J – The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

UJ – The result is an estimated non-detected quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

U - Value is a non-detect as reported by the laboratory.

UR – Non-detected result is considered rejected, (UR), as a result of technical non-compliances.

DATA QUALIFICATION CODE (QUAL CODE)

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's r < 0.995 / ICP PDS Recovery Noncompliance
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (e.g. base-line drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficent r < 0.995
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is greater than sample activity

PROJ_NO: 02045	NSAMPLE	SA-20100707-DUP			SA-20100708-DUP			SA-PZ-133I-20100708			SA-PZ-138I1-20100706		
SDG: 1007021	LAB_ID	1007021-06			1007021-17			1007021-19			1007021-11		
FRACTION: OV	SAMP_DATE	7/7/2010			7/8/2010			7/8/2010			7/6/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF	SA-PZ-155I-20100707			SA-PZ-138I-20100708								
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
1,1,1-TRICHLOROETHANE		36			4.4	J	P	24			220		
1,1,2,2-TETRACHLOROETHANE		5	U		5	U		5	U		33	U	
1,1,2-TRICHLOROETHANE		5	U		5	U		5	U		33	U	
1,1,2-TRICHLOROTRIFLUOROETHANE		5	U		5	U		5	U		33	U	
1,1-DICHLOROETHANE		150			20			130			980		
1,1-DICHLOROETHENE		11			1	J	P	7.8			65		
1,1-DICHLOROPROPENE		5	U		5	U		5	U		33	U	
1,2,4-TRICHLOROBENZENE		5	U		5	U		0.98	J	P	5.7	J	P
1,2-DIBROMO-3-CHLOROPROPANE		5	U		5	U		5	U		33	U	
1,2-DIBROMOETHANE		5	U		5	U		5	U		33	U	
1,2-DICHLOROBENZENE		0.4	J	P	5	U		5	U		6.4	J	P
1,2-DICHLOROETHANE		5	U		5	U		5	U		33	U	
1,2-DICHLOROPROPANE		5	U		5	U		5	U		33	U	
1,3-DICHLOROBENZENE		5	U		5	U		0.7	J	P	3.1	J	P
1,4-DICHLOROBENZENE		5	U		5	U		5	U		13	J	P
2-BUTANONE		13	U		13	U		13	U		83	U	
2-HEXANONE		13	U		13	U		13	U		83	U	
4-METHYL-2-PENTANONE		13	U		13	U		13	U		83	U	
ACETONE		13	U		13	U		13	U		83	U	
BENZENE		0.31	J	P	5	U		5	U		3.4	J	P
BROMODICHLOROMETHANE		5	U		5	U		5	U		33	U	
BROMOFORM		5	U		5	U		5	U		33	U	
BROMOMETHANE		5	U		5	U		5	UJ	C	33	UJ	C
CARBON DISULFIDE		5	U		5	U		5	U		33	U	
CARBON TETRACHLORIDE		5	U		5	U		5	U		33	U	
CHLOROBENZENE		5	U		5	U		5	U		33	U	
CHLORODIBROMOMETHANE		5	U		5	U		5	U		33	U	
CHLOROETHANE		19			1.7	J	P	9.6			210		
CHLOROFORM		5	U		5	U		5	U		33	U	
CHLOROMETHANE		5	U		5	UJ	C	5	U		33	U	
CIS-1,2-DICHLOROETHENE		5	U		5	U		5	U		33	U	
CIS-1,3-DICHLOROPROPENE		5	U		5	U		5	U		33	U	
CYCLOHEXANE		5	U		5	U		5	U		33	U	
DICHLORODIFLUOROMETHANE		5	U		5	U		5	U		33	U	
ETHYLBENZENE		5	U		5	U		5	U		33	U	
ISOPROPYLBENZENE		5	U		5	U		5	U		6.5	J	P

PROJ_NO: 02045	NSAMPLE	SA-PZ-138I-20100708			SA-PZ-139I-20100708			SA-PZ-149I1-20100708			SA-PZ-151I1-20100707		
SDG: 1007021	LAB_ID	1007021-16			1007021-20			1007021-18			1007021-03		
FRACTION: OV	SAMP_DATE	7/8/2010			7/8/2010			7/8/2010			7/7/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
1,1,1-TRICHLOROETHANE		4.4	J	P	2.3	J	P	6.6			110		
1,1,2,2-TETRACHLOROETHANE		5	U		5	U		5	U		17	U	
1,1,2-TRICHLOROETHANE		5	U		5	U		5	U		17	U	
1,1,2-TRICHLOROTRIFLUOROETHANE		5	U		5	U		5	U		17	U	
1,1-DICHLOROETHANE		20			17			40			490		
1,1-DICHLOROETHENE		1.2	J	P	0.94	J	P	2.6	J	P	33		
1,1-DICHLOROPROPENE		5	U		5	U		5	U		17	U	
1,2,4-TRICHLOROBENZENE		5	U		5	U		5	U		17	U	
1,2-DIBROMO-3-CHLOROPROPANE		5	U		5	U		5	U		17	U	
1,2-DIBROMOETHANE		5	U		5	U		5	U		17	U	
1,2-DICHLOROBENZENE		5	U		5	U		1.6	J	P	17	U	
1,2-DICHLOROETHANE		5	U		5	U		5	U		17	U	
1,2-DICHLOROPROPANE		5	U		5	U		5	U		17	U	
1,3-DICHLOROBENZENE		5	U		5	U		1.1	J	P	17	U	
1,4-DICHLOROBENZENE		5	U		5	U		5.4			17	U	
2-BUTANONE		13	U		13	U		13	U		42	U	
2-HEXANONE		13	U		13	U		13	U		42	U	
4-METHYL-2-PENTANONE		13	U		13	U		13	U		42	U	
ACETONE		13	U		13	U		13	U		42	U	
BENZENE		5	U		5	U		5	U		1.1	J	P
BROMODICHLOROMETHANE		5	U		5	U		5	U		17	U	
BROMOFORM		5	U		5	U		5	U		17	U	
BROMOMETHANE		5	U		5	U		5	U		17	U	
CARBON DISULFIDE		5	U		5	U		5	U		17	U	
CARBON TETRACHLORIDE		5	U		5	U		5	U		17	U	
CHLOROBENZENE		5	U		5	U		1.3	J	P	17	U	
CHLORODIBROMOMETHANE		5	U		5	U		5	U		17	U	
CHLOROETHANE		5	U		1.8	J	P	9.8			99		
CHLOROFORM		5	U		5	U		5	U		17	U	
CHLOROMETHANE		5	UJ	C	5	UJ	C	5	UJ	C	17	U	
CIS-1,2-DICHLOROETHENE		5	U		5	U		5	U		17	U	
CIS-1,3-DICHLOROPROPENE		5	U		5	U		5	U		17	U	
CYCLOHEXANE		5	U		5	U		5	U		17	U	
DICHLORODIFLUOROMETHANE		5	U		5	U		5	U		17	U	
ETHYLBENZENE		5	U		5	U		5	U		17	U	
ISOPROPYLBENZENE		5	U		5	U		0.42	J	P	17	U	

PROJ_NO: 02045 SDG: 1007021 FRACTION: OV MEDIA: WATER	NSAMPLE	SA-PZ-155I-20100707			SA-PZ-157I1-20100707			SA-PZ-157I-20100708			SA-PZ-158I1-20100706		
	LAB_ID	1007021-05			1007021-04			1007021-14			1007021-09		
	SAMP_DATE	7/7/2010			7/7/2010			7/8/2010			7/6/2010		
	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
1,1,1-TRICHLOROETHANE		38			73			46			66		
1,1,2,2-TETRACHLOROETHANE		5	U		13	U		7.2	U		13	U	
1,1,2-TRICHLOROETHANE		5	U		13	U		7.2	U		13	U	
1,1,2-TRICHLOROTRIFLUOROETHANE		5	U		13	U		7.2	U		13	U	
1,1-DICHLOROETHANE		150			340			180			340		
1,1-DICHLOROETHENE		12			23			13			19		
1,1-DICHLOROPROPENE		5	U		13	U		7.2	U		13	U	
1,2,4-TRICHLOROBENZENE		5	U		13	U		7.2	U		13	U	
1,2-DIBROMO-3-CHLOROPROPANE		5	U		13	U		7.2	U		13	U	
1,2-DIBROMOETHANE		5	U		13	U		7.2	U		13	U	
1,2-DICHLOROBENZENE		5	U		13	U		7.2	U		13	U	
1,2-DICHLOROETHANE		5	U		13	U		7.2	U		13	U	
1,2-DICHLOROPROPANE		5	U		13	U		7.2	U		13	U	
1,3-DICHLOROBENZENE		5	U		13	U		7.2	U		13	U	
1,4-DICHLOROBENZENE		0.31	J	P	13	U		7.2	U		13	U	
2-BUTANONE		13	U		31	U		18	U		31	U	
2-HEXANONE		13	U		31	U		18	U		31	U	
4-METHYL-2-PENTANONE		13	U		31	U		18	U		31	U	
ACETONE		13	U		31	U		18	U		31	U	
BENZENE		0.33	J	P	0.81	J	P	0.43	J	P	0.77	J	P
BROMODICHLOROMETHANE		5	U		13	U		7.2	U		13	U	
BROMOFORM		5	U		13	U		7.2	U		13	U	
BROMOMETHANE		5	U		13	UJ	C	7.2	U		13	UJ	C
CARBON DISULFIDE		5	U		13	U		7.2	U		13	U	
CARBON TETRACHLORIDE		5	U		13	U		7.2	U		13	U	
CHLOROBENZENE		5	U		13	U		7.2	U		13	U	
CHLORODIBROMOMETHANE		5	U		13	U		7.2	U		13	U	
CHLOROETHANE		17			57			24			52		
CHLOROFORM		5	U		13	U		7.2	U		13	U	
CHLOROMETHANE		5	U		13	U		7.2	UJ	C	13	U	
CIS-1,2-DICHLOROETHENE		5	U		13	U		7.2	U		13	U	
CIS-1,3-DICHLOROPROPENE		5	U		13	U		7.2	U		13	U	
CYCLOHEXANE		5	U		13	U		7.2	U		13	U	
DICHLORODIFLUOROMETHANE		5	U		13	U		7.2	U		13	U	
ETHYLBENZENE		5	U		13	U		7.2	U		13	U	
ISOPROPYLBENZENE		5	U		13	U		7.2	U		13	U	

PROJ_NO: 02045 SDG: 1007021 FRACTION: OV MEDIA: WATER	NSAMPLE	SA-PZ-158I-20100706			SA-PZ-159I1-20100708			SA-PZ-159I1-20100708RE			SA-PZ-159I-20100707		
	LAB_ID	1007021-08			1007021-13			1007021-13RE1			1007021-02		
	SAMP_DATE	7/6/2010			7/8/2010			7/8/2010			7/7/2010		
	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
1,1,1-TRICHLOROETHANE		51			41						75		
1,1,2,2-TETRACHLOROETHANE		8.4	U		5	U					10	U	
1,1,2-TRICHLOROETHANE		8.4	U		5	U					10	U	
1,1,2-TRICHLOROTRIFLUOROETHANE		8.4	U		5	U					10	U	
1,1-DICHLOROETHANE		230						250			300		
1,1-DICHLOROETHENE		15			18						22		
1,1-DICHLOROPROPENE		8.4	U		5	U					10	U	
1,2,4-TRICHLOROBENZENE		8.4	U		5	U					10	U	
1,2-DIBROMO-3-CHLOROPROPANE		8.4	U		5	U					10	U	
1,2-DIBROMOETHANE		8.4	U		5	U					10	U	
1,2-DICHLOROBENZENE		8.4	U		5	U					10	U	
1,2-DICHLOROETHANE		8.4	U		5	U					10	U	
1,2-DICHLOROPROPANE		8.4	U		5	U					10	U	
1,3-DICHLOROBENZENE		8.4	U		5	U					10	U	
1,4-DICHLOROBENZENE		8.4	U		1.7	J	P				10	U	
2-BUTANONE		21	U		13	U					25	U	
2-HEXANONE		21	U		13	U					25	U	
4-METHYL-2-PENTANONE		21	U		13	U					25	U	
ACETONE		21	U		13	U					25	U	
BENZENE		0.52	J	P	0.64	J	P				0.57	J	P
BROMODICHLOROMETHANE		8.4	U		5	U					10	U	
BROMOFORM		8.4	U		5	U					10	U	
BROMOMETHANE		8.4	UJ	C	5	U					10	U	
CARBON DISULFIDE		8.4	U		5	U					10	U	
CARBON TETRACHLORIDE		8.4	U		5	U					10	U	
CHLOROBENZENE		8.4	U		5	U					10	U	
CHLORODIBROMOMETHANE		8.4	U		5	U					10	U	
CHLOROETHANE		26			50						35		
CHLOROFORM		8.4	U		5	U					10	U	
CHLOROMETHANE		8.4	U		5	UJ	C				10	U	
CIS-1,2-DICHLOROETHENE		8.4	U		5	U					10	U	
CIS-1,3-DICHLOROPROPENE		8.4	U		5	U					10	U	
CYCLOHEXANE		8.4	U		5	U					10	U	
DICHLORODIFLUOROMETHANE		8.4	U		5	U					10	U	
ETHYLBENZENE		8.4	U		5	U					10	U	
ISOPROPYLBENZENE		8.4	U		0.29	J	P				10	U	

PROJ_NO: 02045 SDG: 1007021 FRACTION: OV MEDIA: WATER	NSAMPLE	SA-PZ-160I1-20100706			SA-PZ-160I-20100707			SA-PZ-161I-20100707			SA-TB-20100706		
	LAB_ID	1007021-10			1007021-01			1007021-12			1007021-07		
	SAMP_DATE	7/6/2010			7/7/2010			7/7/2010			7/6/2010		
	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
1,1,1-TRICHLOROETHANE		43			53			100			5	U	
1,1,2,2-TETRACHLOROETHANE		8.4	U		8.4	U		20	U		5	U	
1,1,2-TRICHLOROETHANE		8.4	U		8.4	U		20	U		5	U	
1,1,2-TRICHLOROTRIFLUOROETHANE		8.4	U		8.4	U		20	U		5	U	
1,1-DICHLOROETHANE		250			210	J	D	530			5	U	
1,1-DICHLOROETHENE		17			17			31			5	U	
1,1-DICHLOROPROPENE		8.4	U		8.4	U		20	U		5	U	
1,2,4-TRICHLOROBENZENE		8.4	U		1.9	J	P	20	U		0.95	J	P
1,2-DIBROMO-3-CHLOROPROPANE		8.4	U		8.4	U		20	U		5	U	
1,2-DIBROMOETHANE		8.4	U		8.4	U		20	U		5	U	
1,2-DICHLOROBENZENE		8.4	U		8.4	U		20	U		5	U	
1,2-DICHLOROETHANE		8.4	U		8.4	U		20	U		5	U	
1,2-DICHLOROPROPANE		8.4	U		8.4	U		20	U		5	U	
1,3-DICHLOROBENZENE		8.4	U		8.4	U		20	U		5	U	
1,4-DICHLOROBENZENE		8.4	U		8.4	U		20	U		5	U	
2-BUTANONE		21	U		21	U		50	U		13	U	
2-HEXANONE		21	U		21	U		50	U		13	U	
4-METHYL-2-PENTANONE		21	U		21	U		50	U		13	U	
ACETONE		21	U		21	U		50	U		13	U	
BENZENE		0.5	J	P	0.48	J	P	20	U		5	U	
BROMODICHLOROMETHANE		8.4	U		8.4	U		20	U		5	U	
BROMOFORM		8.4	U		8.4	U		20	U		5	U	
BROMOMETHANE		8.4	UJ	C	8.4	U		20	UJ	C	5	U	
CARBON DISULFIDE		8.4	U		8.4	U		20	U		5	U	
CARBON TETRACHLORIDE		8.4	U		8.4	U		20	U		5	U	
CHLOROBENZENE		8.4	U		8.4	U		20	U		5	U	
CHLORODIBROMOMETHANE		8.4	U		8.4	U		20	U		5	U	
CHLOROETHANE		34			26			51			5	U	
CHLOROFORM		8.4	U		8.4	U		20	U		5	U	
CHLOROMETHANE		8.4	U		8.4	U		20	U		5	U	
CIS-1,2-DICHLOROETHENE		8.4	U		8.4	U		20	U		5	U	
CIS-1,3-DICHLOROPROPENE		8.4	U		8.4	U		20	U		5	U	
CYCLOHEXANE		8.4	U		8.4	U		20	U		5	U	
DICHLORODIFLUOROMETHANE		8.4	U		8.4	U		20	U		5	U	
ETHYLBENZENE		8.4	U		8.4	U		20	U		5	U	
ISOPROPYLBENZENE		8.4	U		8.4	U		20	U		5	U	

PROJ_NO: 02045	NSAMPLE	SA-TB-20100708
SDG: 1007021	LAB_ID	1007021-15
FRACTION: OV	SAMP_DATE	7/8/2010
MEDIA: WATER	QC_TYPE	NM
	UNITS	UG/L
	PCT_SOLIDS	0.0
	DUP_OF	

PARAMETER	RESULT	VQL	QLCD
1,1,1-TRICHLOROETHANE	5	U	
1,1,2,2-TETRACHLOROETHANE	5	U	
1,1,2-TRICHLOROETHANE	5	U	
1,1,2-TRICHLOROTRIFLUOROETHANE	5	U	
1,1-DICHLOROETHANE	5	U	
1,1-DICHLOROETHENE	5	U	
1,1-DICHLOROPROPENE	5	U	
1,2,4-TRICHLOROBENZENE	5	U	
1,2-DIBROMO-3-CHLOROPROPANE	5	U	
1,2-DIBROMOETHANE	5	U	
1,2-DICHLOROBENZENE	5	U	
1,2-DICHLOROETHANE	5	U	
1,2-DICHLOROPROPANE	5	U	
1,3-DICHLOROBENZENE	5	U	
1,4-DICHLOROBENZENE	5	U	
2-BUTANONE	13	U	
2-HEXANONE	13	U	
4-METHYL-2-PENTANONE	13	U	
ACETONE	13	U	
BENZENE	5	U	
BROMODICHLOROMETHANE	5	U	
BROMOFORM	5	U	
BROMOMETHANE	5	UJ	C
CARBON DISULFIDE	5	U	
CARBON TETRACHLORIDE	5	U	
CHLOROBENZENE	5	U	
CHLORODIBROMOMETHANE	5	U	
CHLOROETHANE	5	U	
CHLOROFORM	5	U	
CHLOROMETHANE	5	U	
CIS-1,2-DICHLOROETHENE	5	U	
CIS-1,3-DICHLOROPROPENE	5	U	
CYCLOHEXANE	5	U	
DICHLORODIFLUOROMETHANE	5	U	
ETHYLBENZENE	5	U	
ISOPROPYLBENZENE	5	U	

PROJ_NO: 02045	NSAMPLE	SA-20100707-DUP			SA-20100708-DUP			SA-PZ-133I-20100708			SA-PZ-138I1-20100706		
SDG: 1007021	LAB_ID	1007021-06			1007021-17			1007021-19			1007021-11		
FRACTION: OV	SAMP_DATE	7/7/2010			7/8/2010			7/8/2010			7/6/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF	SA-PZ-155I-20100707			SA-PZ-138I-20100708								
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
M+P-XYLENES		10	U		10	U		10	U		67	U	
METHYL ACETATE		5	U		5	U		5	U		33	U	
METHYL CYCLOHEXANE		5	U		5	U		5	U		33	U	
METHYL TERT-BUTYL ETHER		5	U		5	U		5	U		33	U	
METHYLENE CHLORIDE		5	U	B	5	U	B	5	U	B	33	U	B
NAPHTHALENE		5	U		5	U		5	U		33	U	
O-XYLENE		5	U		5	U		5	U		33	U	
STYRENE		5	U		5	U		5	U		33	U	
TETRACHLOROETHENE		5	U		5	U		5	U		33	U	
TOLUENE		5	U	A	5	U		5	U	A	33	U	A
TOTAL 1,2-DICHLOROETHENE		5	U		5	U		5	U		33	U	
TOTAL XYLENES		5	U		5	U		5	U		33	U	
TRANS-1,2-DICHLOROETHENE		5	U		5	U		5	U		33	U	
TRANS-1,3-DICHLOROPROPENE		5	U		5	U		5	U		33	U	
TRICHLOROETHENE		5	U		5	U		5	U		33	U	
TRICHLOROFLUOROMETHANE		5	U		5	U		5	U		33	U	
VINYL CHLORIDE		5	U		5	U		5	U		33	U	

PROJ_NO: 02045	NSAMPLE	SA-PZ-138I-20100708			SA-PZ-139I-20100708			SA-PZ-149I1-20100708			SA-PZ-151I1-20100707		
SDG: 1007021	LAB_ID	1007021-16			1007021-20			1007021-18			1007021-03		
FRACTION: OV	SAMP_DATE	7/8/2010			7/8/2010			7/8/2010			7/7/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
M+P-XYLENES		10	U		10	U		10	U		33	U	
METHYL ACETATE		5	U		5	U		5	U		17	U	
METHYL CYCLOHEXANE		5	U		5	U		5	U		17	U	
METHYL TERT-BUTYL ETHER		5	U		5	U		5	U		17	U	
METHYLENE CHLORIDE		5	U	B	5	U	B	5	U	B	17	U	
NAPHTHALENE		5	U		5	U		5	U		17	U	
O-XYLENE		5	U		5	U		5	U		17	U	
STYRENE		5	U		5	U		5	U		17	U	
TETRACHLOROETHENE		5	U		5	U		5	U		17	U	
TOLUENE		5	U		5	U	A	5	U	A	17	U	A
TOTAL 1,2-DICHLOROETHENE		5	U		5	U		5	U		17	U	
TOTAL XYLENES		5	U		5	U		5	U		17	U	
TRANS-1,2-DICHLOROETHENE		5	U		5	U		5	U		17	U	
TRANS-1,3-DICHLOROPROPENE		5	U		5	U		5	U		17	U	
TRICHLOROETHENE		5	U		5	U		5	U		17	U	
TRICHLOROFLUOROMETHANE		5	U		5	U		5	U		17	U	
VINYL CHLORIDE		5	U		5	U		5	U		17	U	

PROJ_NO: 02045 SDG: 1007021 FRACTION: OV MEDIA: WATER	NSAMPLE	SA-PZ-155I-20100707			SA-PZ-157I1-20100707			SA-PZ-157I-20100708			SA-PZ-158I1-20100706		
	LAB_ID	1007021-05			1007021-04			1007021-14			1007021-09		
	SAMP_DATE	7/7/2010			7/7/2010			7/8/2010			7/6/2010		
	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
M+P-XYLENES		10	U		25	U		14	U		25	U	
METHYL ACETATE		5	U		13	U		7.2	U		13	U	
METHYL CYCLOHEXANE		5	U		13	U		7.2	U		13	U	
METHYL TERT-BUTYL ETHER		5	U		13	U		7.2	U		13	U	
METHYLENE CHLORIDE		5	U		13	U	B	7.2	U	B	13	U	B
NAPHTHALENE		5	U		13	U		7.2	U		13	U	
O-XYLENE		5	U		13	U		7.2	U		13	U	
STYRENE		5	U		13	U		7.2	U		13	U	
TETRACHLOROETHENE		5	U		13	U		7.2	U		13	U	
TOLUENE		5	U	A	13	U	A	7.2	U	A	13	U	A
TOTAL 1,2-DICHLOROETHENE		5	U		13	U		7.2	U		13	U	
TOTAL XYLENES		5	U		13	U		7.2	U		13	U	
TRANS-1,2-DICHLOROETHENE		5	U		13	U		7.2	U		13	U	
TRANS-1,3-DICHLOROPROPENE		5	U		13	U		7.2	U		13	U	
TRICHLOROETHENE		5	U		13	U		7.2	U		13	U	
TRICHLOROFLUOROMETHANE		5	U		13	U		7.2	U		13	U	
VINYL CHLORIDE		5	U		13	U		7.2	U		13	U	

PROJ_NO: 02045 SDG: 1007021 FRACTION: OV MEDIA: WATER	NSAMPLE	SA-PZ-158I-20100706			SA-PZ-159I1-20100708			SA-PZ-159I1-20100708RE			SA-PZ-159I-20100707		
	LAB_ID	1007021-08			1007021-13			1007021-13RE1			1007021-02		
	SAMP_DATE	7/6/2010			7/8/2010			7/8/2010			7/7/2010		
	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
M+P-XYLENES		17	U		5	U					20	U	
METHYL ACETATE		8.4	U		5	U					10	U	
METHYL CYCLOHEXANE		8.4	U		5	U					10	U	
METHYL TERT-BUTYL ETHER		8.4	U		5	U					10	U	
METHYLENE CHLORIDE		8.4	U	B	5	U	B				10	U	B
NAPHTHALENE		8.4	U		5	U					10	U	
O-XYLENE		8.4	U		10	U					10	U	
STYRENE		8.4	U		5	U					10	U	
TETRACHLOROETHENE		8.4	U		5	U					10	U	
TOLUENE		8.4	U	A	5	U	A				10	U	A
TOTAL 1,2-DICHLOROETHENE		8.4	U		5	U					10	U	
TOTAL XYLENES		8.4	U		5	U					10	U	
TRANS-1,2-DICHLOROETHENE		8.4	U		5	U					10	U	
TRANS-1,3-DICHLOROPROPENE		8.4	U		5	U					10	U	
TRICHLOROETHENE		8.4	U		5	U					10	U	
TRICHLOROFLUOROMETHANE		8.4	U		5	U					10	U	
VINYL CHLORIDE		8.4	U		5	U					10	U	

PROJ_NO: 02045	NSAMPLE	SA-PZ-160I1-20100706			SA-PZ-160I-20100707			SA-PZ-161I-20100707			SA-TB-20100706		
SDG: 1007021	LAB_ID	1007021-10			1007021-01			1007021-12			1007021-07		
FRACTION: OV	SAMP_DATE	7/6/2010			7/7/2010			7/7/2010			7/6/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
M+P-XYLENES		17	U		17	U		40	U		10	U	
METHYL ACETATE		8.4	U		8.4	U		20	U		5	U	
METHYL CYCLOHEXANE		8.4	U		8.4	U		20	U		5	U	
METHYL TERT-BUTYL ETHER		8.4	U		8.4	U		20	U		5	U	
METHYLENE CHLORIDE		8.4	U	B	8.4	U	B	20	U	B	0.75	J	P
NAPHTHALENE		8.4	U		4.5	J	P	20	U		2.4	J	P
O-XYLENE		8.4	U		8.4	U		20	U		5	U	
STYRENE		8.4	U		8.4	U		20	U		5	U	
TETRACHLOROETHENE		8.4	U		8.4	U		20	U		5	U	
TOLUENE		8.4	U	A	8.4	U	A	20	U	A	0.72	J	P
TOTAL 1,2-DICHLOROETHENE		8.4	U		8.4	U		20	U		5	U	
TOTAL XYLENES		8.4	U		8.4	U		20	U		5	U	
TRANS-1,2-DICHLOROETHENE		8.4	U		8.4	U		20	U		5	U	
TRANS-1,3-DICHLOROPROPENE		8.4	U		8.4	U		20	U		5	U	
TRICHLOROETHENE		8.4	U		8.4	U		20	U		5	U	
TRICHLOROFLUOROMETHANE		8.4	U		8.4	U		20	U		5	U	
VINYL CHLORIDE		8.4	U		8.4	U		20	U		5	U	

PROJ_NO: 02045	NSAMPLE	SA-TB-20100708
SDG: 1007021	LAB_ID	1007021-15
FRACTION: OV	SAMP_DATE	7/8/2010
MEDIA: WATER	QC_TYPE	NM
	UNITS	UG/L
	PCT_SOLIDS	0.0
	DUP_OF	

PARAMETER	RESULT	VQL	QLCD
M+P-XYLENES	10	U	
METHYL ACETATE	5	U	
METHYL CYCLOHEXANE	5	U	
METHYL TERT-BUTYL ETHER	5	U	
METHYLENE CHLORIDE	1.7	J	P
NAPHTHALENE	5	U	
O-XYLENE	5	U	
STYRENE	5	U	
TETRACHLOROETHENE	5	U	
TOLUENE	0.58	J	P
TOTAL 1,2-DICHLOROETHENE	5	U	
TOTAL XYLENES	5	U	
TRANS-1,2-DICHLOROETHENE	5	U	
TRANS-1,3-DICHLOROPROPENE	5	U	
TRICHLOROETHENE	5	U	
TRICHLOROFLUOROMETHANE	5	U	
VINYL CHLORIDE	5	U	

PROJ_NO: 02045	NSAMPLE	SA-20100707-DUP			SA-PZ-151I1-20100707			SA-PZ-155I-20100707			SA-PZ-157I1-20100707		
SDG: 1007021	LAB_ID	1007021-06			1007021-03			1007021-05			1007021-04		
FRACTION: OVG	SAMP_DATE	7/7/2010			7/7/2010			7/7/2010			7/7/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF	SA-PZ-155I-20100707											
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ETHANE		1	U		5	U		1	U		5	U	
ETHENE		1	U		5	U		1	U		5	U	
METHANE		12			110			9			80		

PROJ_NO: 02045	NSAMPLE	SA-PZ-157I-20100708			SA-PZ-159I1-20100708			SA-PZ-159I-20100707			SA-PZ-160I-20100707		
SDG: 1007021	LAB_ID	1007021-14			1007021-13			1007021-02			1007021-01		
FRACTION: OVG	SAMP_DATE	7/8/2010			7/8/2010			7/7/2010			7/7/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ETHANE		1	U		1	U		1	U		1	U	
ETHENE		1	U		1	U		1	U		1	U	
METHANE		14			130	J	L	13			0.6		

Appendix B

Results as Reported by the Laboratory

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

20100707-DUP

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-06

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-06R59

Level: (low/med) LOW Date Received: 07/08/10

% Moisture: not dec. _____ Date Analyzed: 07/14/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-38-3	m,p-Xylene (part of total)	10	U
95-47-6	o-Xylene (part of total)	5.0	U
156-60-5	trans-1,2-DCE (part of total	5.0	U
75-71-8	Dichlorodifluoromethane	5.0	U
156-59-2	cis-1,2-DCE (part of total)	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl Chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	19	
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	11	
75-15-0	Carbon disulfide	5.0	U
76-13-1	1,1,2-trichloro-1,2,2-triflu	5.0	U
67-64-1	Acetone	13	U
75-09-2	Methylene Chloride	0.89	JB
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl-tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	150	
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-butanone	13	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	36	
56-23-5	Carbon Tetrachloride	5.0	U
563-58-6	1,1-dichloropropene	5.0	U
71-43-2	Benzene	0.31	J
107-06-2	1,2-Dichloroethane	5.0	U
79-01-6	Trichloroethene	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	13	U
108-88-3	Toluene	0.73	JB
10061-02-6	trans-1,3-Dichloropropene	5.0	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

20100707-DUP

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-06

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-06R59

Level: (low/med) LOW Date Received: 07/08/10

% Moisture: not dec. _____ Date Analyzed: 07/14/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U
591-78-6	2-hexanone	13	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropyl Benzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	0.40	J
96-12-8	1,2-Dibromo-3-Chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
91-20-3	Naphthalene	5.0	U
540-59-0	1,2-Dichloroethene (total)	5.0	U
1330-20-7	Xylene (total)	5.0	U
79-20-9	Methyl acetate	5.0	U
110-82-7	Cyclohexane	5.0	U
108-87-2	Methylcyclohexane	5.0	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

20100708-DUP

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-17

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-17R59

Level: (low/med) LOW Date Received: 07/09/10

% Moisture: not dec. _____ Date Analyzed: 07/15/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-38-3	m,p-Xylene (part of total)	10	U
95-47-6	o-Xylene (part of total)	5.0	U
156-60-5	trans-1,2-DCE (part of total	5.0	U
75-71-8	Dichlorodifluoromethane	5.0	U
156-59-2	cis-1,2-DCE (part of total)	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl Chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	1.7	J
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	1.0	J
75-15-0	Carbon disulfide	5.0	U
76-13-1	1,1,2-trichloro-1,2,2-triflu	5.0	U
67-64-1	Acetone	13	U
75-09-2	Methylene Chloride	1.1	JB
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl-tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	20	
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-butanone	13	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	4.4	J
56-23-5	Carbon Tetrachloride	5.0	U
563-58-6	1,1-dichloropropene	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
79-01-6	Trichloroethene	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	13	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

20100708-DUP

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-17

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-17R59

Level: (low/med) LOW Date Received: 07/09/10

% Moisture: not dec. _____ Date Analyzed: 07/15/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U
591-78-6	2-hexanone	13	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropyl Benzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-Chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
91-20-3	Naphthalene	5.0	U
540-59-0	1,2-Dichloroethene (total)	5.0	U
1330-20-7	Xylene (total)	5.0	U
79-20-9	Methyl acetate	5.0	U
110-82-7	Cyclohexane	5.0	U
108-87-2	Methylcyclohexane	5.0	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

SA-PZ-133I

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-19

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-1959

Level: (low/med) LOW Date Received: 07/09/10

% Moisture: not dec. _____ Date Analyzed: 07/14/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-38-3	m,p-Xylene (part of total)	10	U
95-47-6	o-Xylene (part of total)	5.0	U
156-60-5	trans-1,2-DCE (part of total	5.0	U
75-71-8	Dichlorodifluoromethane	5.0	U
156-59-2	cis-1,2-DCE (part of total)	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl Chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	9.6	
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	7.8	
75-15-0	Carbon disulfide	5.0	U
76-13-1	1,1,2-trichloro-1,2,2-triflu	5.0	U
67-64-1	Acetone	13	U
75-09-2	Methylene Chloride	1.9	JB
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl-tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	130	
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-butanone	13	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	24	
56-23-5	Carbon Tetrachloride	5.0	U
563-58-6	1,1-dichloropropene	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
79-01-6	Trichloroethene	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	13	U
108-88-3	Toluene	0.51	JB
10061-02-6	trans-1,3-Dichloropropene	5.0	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

SA-PZ-133I

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-19

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-1959

Level: (low/med) LOW Date Received: 07/09/10

% Moisture: not dec. _____ Date Analyzed: 07/14/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U
591-78-6	2-hexanone	13	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropyl Benzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	0.70	J
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-Chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	0.98	J
91-20-3	Naphthalene	5.0	U
540-59-0	1,2-Dichloroethene (total)	5.0	U
1330-20-7	Xylene (total)	5.0	U
79-20-9	Methyl acetate	5.0	U
110-82-7	Cyclohexane	5.0	U
108-87-2	Methylcyclohexane	5.0	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

SA-PZ-138I

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-16

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-16R59

Level: (low/med) LOW Date Received: 07/09/10

% Moisture: not dec. _____ Date Analyzed: 07/15/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-38-3	m,p-Xylene (part of total)	10	U
95-47-6	o-Xylene (part of total)	5.0	U
156-60-5	trans-1,2-DCE (part of total	5.0	U
75-71-8	Dichlorodifluoromethane	5.0	U
156-59-2	cis-1,2-DCE (part of total)	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl Chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	1.2	J
75-15-0	Carbon disulfide	5.0	U
76-13-1	1,1,2-trichloro-1,2,2-triflu	5.0	U
67-64-1	Acetone	13	U
75-09-2	Methylene Chloride	0.90	JB
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl-tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	20	
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-butanone	13	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	4.4	J
56-23-5	Carbon Tetrachloride	5.0	U
563-58-6	1,1-dichloropropene	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
79-01-6	Trichloroethene	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	13	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

SA-PZ-138I

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-16

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-16R59

Level: (low/med) LOW Date Received: 07/09/10

% Moisture: not dec. _____ Date Analyzed: 07/15/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U
591-78-6	2-hexanone	13	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropyl Benzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-Chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
91-20-3	Naphthalene	5.0	U
540-59-0	1,2-Dichloroethene (total)	5.0	U
1330-20-7	Xylene (total)	5.0	U
79-20-9	Methyl acetate	5.0	U
110-82-7	Cyclohexane	5.0	U
108-87-2	Methylcyclohexane	5.0	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

SA-PZ-138I1

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-11

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-11D59

Level: (low/med) LOW Date Received: 07/08/10

% Moisture: not dec. _____ Date Analyzed: 07/14/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 6.7

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-38-3	m,p-Xylene (part of total)	67	U
95-47-6	o-Xylene (part of total)	33	U
156-60-5	trans-1,2-DCE (part of total	33	U
75-71-8	Dichlorodifluoromethane	33	U
156-59-2	cis-1,2-DCE (part of total)	33	U
74-87-3	Chloromethane	33	U
75-01-4	Vinyl Chloride	33	U
74-83-9	Bromomethane	33	U
75-00-3	Chloroethane	210	
75-69-4	Trichlorofluoromethane	33	U
75-35-4	1,1-Dichloroethene	65	
75-15-0	Carbon disulfide	33	U
76-13-1	1,1,2-trichloro-1,2,2-triflu	33	U
67-64-1	Acetone	83	U
75-09-2	Methylene Chloride	19	JB
156-60-5	trans-1,2-Dichloroethene	33	U
1634-04-4	Methyl-tert-butyl ether	33	U
75-34-3	1,1-Dichloroethane	980	
156-59-2	cis-1,2-Dichloroethene	33	U
78-93-3	2-butanone	83	U
67-66-3	Chloroform	33	U
71-55-6	1,1,1-Trichloroethane	220	
56-23-5	Carbon Tetrachloride	33	U
563-58-6	1,1-dichloropropene	33	U
71-43-2	Benzene	3.4	J
107-06-2	1,2-Dichloroethane	33	U
79-01-6	Trichloroethene	33	U
78-87-5	1,2-Dichloropropane	33	U
75-27-4	Bromodichloromethane	33	U
10061-01-5	cis-1,3-Dichloropropene	33	U
108-10-1	4-Methyl-2-pentanone	83	U
108-88-3	Toluene	4.0	JB
10061-02-6	trans-1,3-Dichloropropene	33	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

SA-PZ-138I1

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-11

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-11D59

Level: (low/med) LOW Date Received: 07/08/10

% Moisture: not dec. _____ Date Analyzed: 07/14/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 6.7

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-00-5	1,1,2-Trichloroethane	33	U
127-18-4	Tetrachloroethene	33	U
591-78-6	2-hexanone	83	U
124-48-1	Dibromochloromethane	33	U
106-93-4	1,2-Dibromoethane	33	U
108-90-7	Chlorobenzene	33	U
100-41-4	Ethylbenzene	33	U
100-42-5	Styrene	33	U
75-25-2	Bromoform	33	U
98-82-8	Isopropyl Benzene	6.5	J
79-34-5	1,1,2,2-Tetrachloroethane	33	U
541-73-1	1,3-Dichlorobenzene	3.1	J
106-46-7	1,4-Dichlorobenzene	13	J
95-50-1	1,2-Dichlorobenzene	6.4	J
96-12-8	1,2-Dibromo-3-Chloropropane	33	U
120-82-1	1,2,4-Trichlorobenzene	5.7	J
91-20-3	Naphthalene	33	U
540-59-0	1,2-Dichloroethene (total)	33	U
1330-20-7	Xylene (total)	33	U
79-20-9	Methyl acetate	33	U
110-82-7	Cyclohexane	33	U
108-87-2	Methylcyclohexane	33	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

SA-PZ-139I

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-20

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-20R59

Level: (low/med) LOW Date Received: 07/09/10

% Moisture: not dec. _____ Date Analyzed: 07/15/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-38-3	m,p-Xylene (part of total)	10	U
95-47-6	o-Xylene (part of total)	5.0	U
156-60-5	trans-1,2-DCE (part of total	5.0	U
75-71-8	Dichlorodifluoromethane	5.0	U
156-59-2	cis-1,2-DCE (part of total)	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl Chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	1.8	J
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	0.94	J
75-15-0	Carbon disulfide	5.0	U
76-13-1	1,1,2-trichloro-1,2,2-triflu	5.0	U
67-64-1	Acetone	13	U
75-09-2	Methylene Chloride	1.2	JB
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl-tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	17	
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-butanone	13	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	2.3	J
56-23-5	Carbon Tetrachloride	5.0	U
563-58-6	1,1-dichloropropene	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
79-01-6	Trichloroethene	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	13	U
108-88-3	Toluene	0.57	JB
10061-02-6	trans-1,3-Dichloropropene	5.0	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

SA-PZ-139I

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-20

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-20R59

Level: (low/med) LOW Date Received: 07/09/10

% Moisture: not dec. _____ Date Analyzed: 07/15/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U
591-78-6	2-hexanone	13	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropyl Benzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-Chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
91-20-3	Naphthalene	5.0	U
540-59-0	1,2-Dichloroethene (total)	5.0	U
1330-20-7	Xylene (total)	5.0	U
79-20-9	Methyl acetate	5.0	U
110-82-7	Cyclohexane	5.0	U
108-87-2	Methylcyclohexane	5.0	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

SA-PZ-149I1

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-18

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-18R59

Level: (low/med) LOW Date Received: 07/09/10

% Moisture: not dec. _____ Date Analyzed: 07/15/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-38-3	m,p-Xylene (part of total)	10	U
95-47-6	o-Xylene (part of total)	5.0	U
156-60-5	trans-1,2-DCE (part of total	5.0	U
75-71-8	Dichlorodifluoromethane	5.0	U
156-59-2	cis-1,2-DCE (part of total)	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl Chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	9.8	
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	2.6	J
75-15-0	Carbon disulfide	5.0	U
76-13-1	1,1,2-trichloro-1,2,2-triflu	5.0	U
67-64-1	Acetone	13	U
75-09-2	Methylene Chloride	0.81	JB
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl-tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	40	
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-butanone	13	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	6.6	
56-23-5	Carbon Tetrachloride	5.0	U
563-58-6	1,1-dichloropropene	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
79-01-6	Trichloroethene	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	13	U
108-88-3	Toluene	0.41	JB
10061-02-6	trans-1,3-Dichloropropene	5.0	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

SA-PZ-149I1

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-18

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-18R59

Level: (low/med) LOW Date Received: 07/09/10

% Moisture: not dec. _____ Date Analyzed: 07/15/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U
591-78-6	2-hexanone	13	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	1.3	J
100-41-4	Ethylbenzene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropyl Benzene	0.42	J
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	1.1	J
106-46-7	1,4-Dichlorobenzene	5.4	
95-50-1	1,2-Dichlorobenzene	1.6	J
96-12-8	1,2-Dibromo-3-Chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
91-20-3	Naphthalene	5.0	U
540-59-0	1,2-Dichloroethene (total)	5.0	U
1330-20-7	Xylene (total)	5.0	U
79-20-9	Methyl acetate	5.0	U
110-82-7	Cyclohexane	5.0	U
108-87-2	Methylcyclohexane	5.0	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

SA-PZ-151I1

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-03

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-03D59

Level: (low/med) LOW Date Received: 07/08/10

% Moisture: not dec. _____ Date Analyzed: 07/14/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 3.3

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-38-3	m,p-Xylene (part of total)	33	U
95-47-6	o-Xylene (part of total)	17	U
156-60-5	trans-1,2-DCE (part of total	17	U
75-71-8	Dichlorodifluoromethane	17	U
156-59-2	cis-1,2-DCE (part of total)	17	U
74-87-3	Chloromethane	17	U
75-01-4	Vinyl Chloride	17	U
74-83-9	Bromomethane	17	U
75-00-3	Chloroethane	99	
75-69-4	Trichlorofluoromethane	17	U
75-35-4	1,1-Dichloroethene	33	
75-15-0	Carbon disulfide	17	U
76-13-1	1,1,2-trichloro-1,2,2-triflu	17	U
67-64-1	Acetone	42	U
75-09-2	Methylene Chloride	17	U
156-60-5	trans-1,2-Dichloroethene	17	U
1634-04-4	Methyl-tert-butyl ether	17	U
75-34-3	1,1-Dichloroethane	490	
156-59-2	cis-1,2-Dichloroethene	17	U
78-93-3	2-butanone	42	U
67-66-3	Chloroform	17	U
71-55-6	1,1,1-Trichloroethane	110	
56-23-5	Carbon Tetrachloride	17	U
563-58-6	1,1-dichloropropene	17	U
71-43-2	Benzene	1.1	J
107-06-2	1,2-Dichloroethane	17	U
79-01-6	Trichloroethene	17	U
78-87-5	1,2-Dichloropropane	17	U
75-27-4	Bromodichloromethane	17	U
10061-01-5	cis-1,3-Dichloropropene	17	U
108-10-1	4-Methyl-2-pentanone	42	U
108-88-3	Toluene	1.9	JB
10061-02-6	trans-1,3-Dichloropropene	17	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

SA-PZ-151I1

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-03

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-03D59

Level: (low/med) LOW Date Received: 07/08/10

% Moisture: not dec. _____ Date Analyzed: 07/14/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 3.3

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-00-5	1,1,2-Trichloroethane	17	U
127-18-4	Tetrachloroethene	17	U
591-78-6	2-hexanone	42	U
124-48-1	Dibromochloromethane	17	U
106-93-4	1,2-Dibromoethane	17	U
108-90-7	Chlorobenzene	17	U
100-41-4	Ethylbenzene	17	U
100-42-5	Styrene	17	U
75-25-2	Bromoform	17	U
98-82-8	Isopropyl Benzene	17	U
79-34-5	1,1,2,2-Tetrachloroethane	17	U
541-73-1	1,3-Dichlorobenzene	17	U
106-46-7	1,4-Dichlorobenzene	17	U
95-50-1	1,2-Dichlorobenzene	17	U
96-12-8	1,2-Dibromo-3-Chloropropane	17	U
120-82-1	1,2,4-Trichlorobenzene	17	U
91-20-3	Naphthalene	17	U
540-59-0	1,2-Dichloroethene (total)	17	U
1330-20-7	Xylene (total)	17	U
79-20-9	Methyl acetate	17	U
110-82-7	Cyclohexane	17	U
108-87-2	Methylcyclohexane	17	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

SA-PZ-155I

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-05

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-05R59

Level: (low/med) LOW Date Received: 07/08/10

% Moisture: not dec. _____ Date Analyzed: 07/14/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-38-3	m,p-Xylene (part of total)	10	U
95-47-6	o-Xylene (part of total)	5.0	U
156-60-5	trans-1,2-DCE (part of total	5.0	U
75-71-8	Dichlorodifluoromethane	5.0	U
156-59-2	cis-1,2-DCE (part of total)	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl Chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	17	
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	12	
75-15-0	Carbon disulfide	5.0	U
76-13-1	1,1,2-trichloro-1,2,2-triflu	5.0	U
67-64-1	Acetone	13	U
75-09-2	Methylene Chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl-tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	150	
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-butanone	13	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	38	
56-23-5	Carbon Tetrachloride	5.0	U
563-58-6	1,1-dichloropropene	5.0	U
71-43-2	Benzene	0.33	J
107-06-2	1,2-Dichloroethane	5.0	U
79-01-6	Trichloroethene	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	13	U
108-88-3	Toluene	0.61	JB
10061-02-6	trans-1,3-Dichloropropene	5.0	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

SA-PZ-155I

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-05

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-05R59

Level: (low/med) LOW Date Received: 07/08/10

% Moisture: not dec. _____ Date Analyzed: 07/14/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U
591-78-6	2-hexanone	13	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropyl Benzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	0.31	J
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-Chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
91-20-3	Naphthalene	5.0	U
540-59-0	1,2-Dichloroethene (total)	5.0	U
1330-20-7	Xylene (total)	5.0	U
79-20-9	Methyl acetate	5.0	U
110-82-7	Cyclohexane	5.0	U
108-87-2	Methylcyclohexane	5.0	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

SA-PZ-157I

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-14

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-14D59

Level: (low/med) LOW Date Received: 07/09/10

% Moisture: not dec. _____ Date Analyzed: 07/15/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.4

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-38-3	m,p-Xylene (part of total)	14	U
95-47-6	o-Xylene (part of total)	7.2	U
156-60-5	trans-1,2-DCE (part of total	7.2	U
75-71-8	Dichlorodifluoromethane	7.2	U
156-59-2	cis-1,2-DCE (part of total)	7.2	U
74-87-3	Chloromethane	7.2	U
75-01-4	Vinyl Chloride	7.2	U
74-83-9	Bromomethane	7.2	U
75-00-3	Chloroethane	24	
75-69-4	Trichlorofluoromethane	7.2	U
75-35-4	1,1-Dichloroethene	13	
75-15-0	Carbon disulfide	7.2	U
76-13-1	1,1,2-trichloro-1,2,2-triflu	7.2	U
67-64-1	Acetone	18	U
75-09-2	Methylene Chloride	1.4	JB
156-60-5	trans-1,2-Dichloroethene	7.2	U
1634-04-4	Methyl-tert-butyl ether	7.2	U
75-34-3	1,1-Dichloroethane	180	
156-59-2	cis-1,2-Dichloroethene	7.2	U
78-93-3	2-butanone	18	U
67-66-3	Chloroform	7.2	U
71-55-6	1,1,1-Trichloroethane	46	
56-23-5	Carbon Tetrachloride	7.2	U
563-58-6	1,1-dichloropropene	7.2	U
71-43-2	Benzene	0.43	J
107-06-2	1,2-Dichloroethane	7.2	U
79-01-6	Trichloroethene	7.2	U
78-87-5	1,2-Dichloropropane	7.2	U
75-27-4	Bromodichloromethane	7.2	U
10061-01-5	cis-1,3-Dichloropropene	7.2	U
108-10-1	4-Methyl-2-pentanone	18	U
108-88-3	Toluene	0.61	JB
10061-02-6	trans-1,3-Dichloropropene	7.2	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

SA-PZ-157I

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-14

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-14D59

Level: (low/med) LOW Date Received: 07/09/10

% Moisture: not dec. _____ Date Analyzed: 07/15/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.4

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-00-5	1,1,2-Trichloroethane	7.2	U
127-18-4	Tetrachloroethene	7.2	U
591-78-6	2-hexanone	18	U
124-48-1	Dibromochloromethane	7.2	U
106-93-4	1,2-Dibromoethane	7.2	U
108-90-7	Chlorobenzene	7.2	U
100-41-4	Ethylbenzene	7.2	U
100-42-5	Styrene	7.2	U
75-25-2	Bromoform	7.2	U
98-82-8	Isopropyl Benzene	7.2	U
79-34-5	1,1,2,2-Tetrachloroethane	7.2	U
541-73-1	1,3-Dichlorobenzene	7.2	U
106-46-7	1,4-Dichlorobenzene	7.2	U
95-50-1	1,2-Dichlorobenzene	7.2	U
96-12-8	1,2-Dibromo-3-Chloropropane	7.2	U
120-82-1	1,2,4-Trichlorobenzene	7.2	U
91-20-3	Naphthalene	7.2	U
540-59-0	1,2-Dichloroethene (total)	7.2	U
1330-20-7	Xylene (total)	7.2	U
79-20-9	Methyl acetate	7.2	U
110-82-7	Cyclohexane	7.2	U
108-87-2	Methylcyclohexane	7.2	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

SA-PZ-157I1

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-04

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-04D259

Level: (low/med) LOW Date Received: 07/08/10

% Moisture: not dec. _____ Date Analyzed: 07/14/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 2.5

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-38-3	m,p-Xylene (part of total)	25	U
95-47-6	o-Xylene (part of total)	13	U
156-60-5	trans-1,2-DCE (part of total	13	U
75-71-8	Dichlorodifluoromethane	13	U
156-59-2	cis-1,2-DCE (part of total)	13	U
74-87-3	Chloromethane	13	U
75-01-4	Vinyl Chloride	13	U
74-83-9	Bromomethane	13	U
75-00-3	Chloroethane	57	
75-69-4	Trichlorofluoromethane	13	U
75-35-4	1,1-Dichloroethene	23	
75-15-0	Carbon disulfide	13	U
76-13-1	1,1,2-trichloro-1,2,2-triflu	13	U
67-64-1	Acetone	31	U
75-09-2	Methylene Chloride	8.8	JB
156-60-5	trans-1,2-Dichloroethene	13	U
1634-04-4	Methyl-tert-butyl ether	13	U
75-34-3	1,1-Dichloroethane	340	
156-59-2	cis-1,2-Dichloroethene	13	U
78-93-3	2-butanone	31	U
67-66-3	Chloroform	13	U
71-55-6	1,1,1-Trichloroethane	73	
56-23-5	Carbon Tetrachloride	13	U
563-58-6	1,1-dichloropropene	13	U
71-43-2	Benzene	0.81	J
107-06-2	1,2-Dichloroethane	13	U
79-01-6	Trichloroethene	13	U
78-87-5	1,2-Dichloropropane	13	U
75-27-4	Bromodichloromethane	13	U
10061-01-5	cis-1,3-Dichloropropene	13	U
108-10-1	4-Methyl-2-pentanone	31	U
108-88-3	Toluene	1.0	JB
10061-02-6	trans-1,3-Dichloropropene	13	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

SA-PZ-157I1

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-04

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-04D259

Level: (low/med) LOW Date Received: 07/08/10

% Moisture: not dec. _____ Date Analyzed: 07/14/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 2.5

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-00-5	1,1,2-Trichloroethane	13	U
127-18-4	Tetrachloroethene	13	U
591-78-6	2-hexanone	31	U
124-48-1	Dibromochloromethane	13	U
106-93-4	1,2-Dibromoethane	13	U
108-90-7	Chlorobenzene	13	U
100-41-4	Ethylbenzene	13	U
100-42-5	Styrene	13	U
75-25-2	Bromoform	13	U
98-82-8	Isopropyl Benzene	13	U
79-34-5	1,1,2,2-Tetrachloroethane	13	U
541-73-1	1,3-Dichlorobenzene	13	U
106-46-7	1,4-Dichlorobenzene	13	U
95-50-1	1,2-Dichlorobenzene	13	U
96-12-8	1,2-Dibromo-3-Chloropropane	13	U
120-82-1	1,2,4-Trichlorobenzene	13	U
91-20-3	Naphthalene	13	U
540-59-0	1,2-Dichloroethene (total)	13	U
1330-20-7	Xylene (total)	13	U
79-20-9	Methyl acetate	13	U
110-82-7	Cyclohexane	13	U
108-87-2	Methylcyclohexane	13	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

SA-PZ-158I

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-08

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-08D259

Level: (low/med) LOW Date Received: 07/08/10

% Moisture: not dec. _____ Date Analyzed: 07/14/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.7

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-38-3	m,p-Xylene (part of total)	17	U
95-47-6	o-Xylene (part of total)	8.4	U
156-60-5	trans-1,2-DCE (part of total	8.4	U
75-71-8	Dichlorodifluoromethane	8.4	U
156-59-2	cis-1,2-DCE (part of total)	8.4	U
74-87-3	Chloromethane	8.4	U
75-01-4	Vinyl Chloride	8.4	U
74-83-9	Bromomethane	8.4	U
75-00-3	Chloroethane	26	
75-69-4	Trichlorofluoromethane	8.4	U
75-35-4	1,1-Dichloroethene	15	
75-15-0	Carbon disulfide	8.4	U
76-13-1	1,1,2-trichloro-1,2,2-triflu	8.4	U
67-64-1	Acetone	21	U
75-09-2	Methylene Chloride	5.4	JB
156-60-5	trans-1,2-Dichloroethene	8.4	U
1634-04-4	Methyl-tert-butyl ether	8.4	U
75-34-3	1,1-Dichloroethane	230	
156-59-2	cis-1,2-Dichloroethene	8.4	U
78-93-3	2-butanone	21	U
67-66-3	Chloroform	8.4	U
71-55-6	1,1,1-Trichloroethane	51	
56-23-5	Carbon Tetrachloride	8.4	U
563-58-6	1,1-dichloropropene	8.4	U
71-43-2	Benzene	0.52	J
107-06-2	1,2-Dichloroethane	8.4	U
79-01-6	Trichloroethene	8.4	U
78-87-5	1,2-Dichloropropane	8.4	U
75-27-4	Bromodichloromethane	8.4	U
10061-01-5	cis-1,3-Dichloropropene	8.4	U
108-10-1	4-Methyl-2-pentanone	21	U
108-88-3	Toluene	1.0	JB
10061-02-6	trans-1,3-Dichloropropene	8.4	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

SA-PZ-158I

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-08

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-08D259

Level: (low/med) LOW Date Received: 07/08/10

% Moisture: not dec. _____ Date Analyzed: 07/14/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.7

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-00-5	1,1,2-Trichloroethane	8.4	U
127-18-4	Tetrachloroethene	8.4	U
591-78-6	2-hexanone	21	U
124-48-1	Dibromochloromethane	8.4	U
106-93-4	1,2-Dibromoethane	8.4	U
108-90-7	Chlorobenzene	8.4	U
100-41-4	Ethylbenzene	8.4	U
100-42-5	Styrene	8.4	U
75-25-2	Bromoform	8.4	U
98-82-8	Isopropyl Benzene	8.4	U
79-34-5	1,1,2,2-Tetrachloroethane	8.4	U
541-73-1	1,3-Dichlorobenzene	8.4	U
106-46-7	1,4-Dichlorobenzene	8.4	U
95-50-1	1,2-Dichlorobenzene	8.4	U
96-12-8	1,2-Dibromo-3-Chloropropane	8.4	U
120-82-1	1,2,4-Trichlorobenzene	8.4	U
91-20-3	Naphthalene	8.4	U
540-59-0	1,2-Dichloroethene (total)	8.4	U
1330-20-7	Xylene (total)	8.4	U
79-20-9	Methyl acetate	8.4	U
110-82-7	Cyclohexane	8.4	U
108-87-2	Methylcyclohexane	8.4	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

SA-PZ-158I1

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-09

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-09D59

Level: (low/med) LOW Date Received: 07/08/10

% Moisture: not dec. _____ Date Analyzed: 07/14/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 2.5

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-38-3	m,p-Xylene (part of total)	25	U
95-47-6	o-Xylene (part of total)	13	U
156-60-5	trans-1,2-DCE (part of total	13	U
75-71-8	Dichlorodifluoromethane	13	U
156-59-2	cis-1,2-DCE (part of total)	13	U
74-87-3	Chloromethane	13	U
75-01-4	Vinyl Chloride	13	U
74-83-9	Bromomethane	13	U
75-00-3	Chloroethane	52	
75-69-4	Trichlorofluoromethane	13	U
75-35-4	1,1-Dichloroethene	19	
75-15-0	Carbon disulfide	13	U
76-13-1	1,1,2-trichloro-1,2,2-triflu	13	U
67-64-1	Acetone	31	U
75-09-2	Methylene Chloride	6.5	JB
156-60-5	trans-1,2-Dichloroethene	13	U
1634-04-4	Methyl-tert-butyl ether	13	U
75-34-3	1,1-Dichloroethane	340	
156-59-2	cis-1,2-Dichloroethene	13	U
78-93-3	2-butanone	31	U
67-66-3	Chloroform	13	U
71-55-6	1,1,1-Trichloroethane	66	
56-23-5	Carbon Tetrachloride	13	U
563-58-6	1,1-dichloropropene	13	U
71-43-2	Benzene	0.77	J
107-06-2	1,2-Dichloroethane	13	U
79-01-6	Trichloroethene	13	U
78-87-5	1,2-Dichloropropane	13	U
75-27-4	Bromodichloromethane	13	U
10061-01-5	cis-1,3-Dichloropropene	13	U
108-10-1	4-Methyl-2-pentanone	31	U
108-88-3	Toluene	1.1	JB
10061-02-6	trans-1,3-Dichloropropene	13	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

SA-PZ-158I1

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-09

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-09D59

Level: (low/med) LOW Date Received: 07/08/10

% Moisture: not dec. _____ Date Analyzed: 07/14/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 2.5

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-00-5	1,1,2-Trichloroethane	13	U
127-18-4	Tetrachloroethene	13	U
591-78-6	2-hexanone	31	U
124-48-1	Dibromochloromethane	13	U
106-93-4	1,2-Dibromoethane	13	U
108-90-7	Chlorobenzene	13	U
100-41-4	Ethylbenzene	13	U
100-42-5	Styrene	13	U
75-25-2	Bromoform	13	U
98-82-8	Isopropyl Benzene	13	U
79-34-5	1,1,2,2-Tetrachloroethane	13	U
541-73-1	1,3-Dichlorobenzene	13	U
106-46-7	1,4-Dichlorobenzene	13	U
95-50-1	1,2-Dichlorobenzene	13	U
96-12-8	1,2-Dibromo-3-Chloropropane	13	U
120-82-1	1,2,4-Trichlorobenzene	13	U
91-20-3	Naphthalene	13	U
540-59-0	1,2-Dichloroethene (total)	13	U
1330-20-7	Xylene (total)	13	U
79-20-9	Methyl acetate	13	U
110-82-7	Cyclohexane	13	U
108-87-2	Methylcyclohexane	13	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

SA-PZ-159I

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-02

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-02D59

Level: (low/med) LOW Date Received: 07/08/10

% Moisture: not dec. _____ Date Analyzed: 07/14/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 2.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-38-3	m,p-Xylene (part of total)	20	U
95-47-6	o-Xylene (part of total)	10	U
156-60-5	trans-1,2-DCE (part of total	10	U
75-71-8	Dichlorodifluoromethane	10	U
156-59-2	cis-1,2-DCE (part of total)	10	U
74-87-3	Chloromethane	10	U
75-01-4	Vinyl Chloride	10	U
74-83-9	Bromomethane	10	U
75-00-3	Chloroethane	35	
75-69-4	Trichlorofluoromethane	10	U
75-35-4	1,1-Dichloroethene	22	
75-15-0	Carbon disulfide	10	U
76-13-1	1,1,2-trichloro-1,2,2-triflu	10	U
67-64-1	Acetone	25	U
75-09-2	Methylene Chloride	1.0	JB
156-60-5	trans-1,2-Dichloroethene	10	U
1634-04-4	Methyl-tert-butyl ether	10	U
75-34-3	1,1-Dichloroethane	300	
156-59-2	cis-1,2-Dichloroethene	10	U
78-93-3	2-butanone	25	U
67-66-3	Chloroform	10	U
71-55-6	1,1,1-Trichloroethane	75	
56-23-5	Carbon Tetrachloride	10	U
563-58-6	1,1-dichloropropene	10	U
71-43-2	Benzene	0.57	J
107-06-2	1,2-Dichloroethane	10	U
79-01-6	Trichloroethene	10	U
78-87-5	1,2-Dichloropropane	10	U
75-27-4	Bromodichloromethane	10	U
10061-01-5	cis-1,3-Dichloropropene	10	U
108-10-1	4-Methyl-2-pentanone	25	U
108-88-3	Toluene	1.1	JB
10061-02-6	trans-1,3-Dichloropropene	10	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

SA-PZ-159I

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-02

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-02D59

Level: (low/med) LOW Date Received: 07/08/10

% Moisture: not dec. _____ Date Analyzed: 07/14/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 2.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-00-5	1,1,2-Trichloroethane	10	U
127-18-4	Tetrachloroethene	10	U
591-78-6	2-hexanone	25	U
124-48-1	Dibromochloromethane	10	U
106-93-4	1,2-Dibromoethane	10	U
108-90-7	Chlorobenzene	10	U
100-41-4	Ethylbenzene	10	U
100-42-5	Styrene	10	U
75-25-2	Bromoform	10	U
98-82-8	Isopropyl Benzene	10	U
79-34-5	1,1,2,2-Tetrachloroethane	10	U
541-73-1	1,3-Dichlorobenzene	10	U
106-46-7	1,4-Dichlorobenzene	10	U
95-50-1	1,2-Dichlorobenzene	10	U
96-12-8	1,2-Dibromo-3-Chloropropane	10	U
120-82-1	1,2,4-Trichlorobenzene	10	U
91-20-3	Naphthalene	10	U
540-59-0	1,2-Dichloroethene (total)	10	U
1330-20-7	Xylene (total)	10	U
79-20-9	Methyl acetate	10	U
110-82-7	Cyclohexane	10	U
108-87-2	Methylcyclohexane	10	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

SA-PZ-159I1

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-13

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-1359

Level: (low/med) LOW Date Received: 07/09/10

% Moisture: not dec. _____ Date Analyzed: 07/14/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-38-3	m,p-Xylene (part of total)	10	U
95-47-6	o-Xylene (part of total)	5.0	U
156-60-5	trans-1,2-DCE (part of total	5.0	U
75-71-8	Dichlorodifluoromethane	5.0	U
156-59-2	cis-1,2-DCE (part of total)	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl Chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	50	
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	18	
75-15-0	Carbon disulfide	5.0	U
76-13-1	1,1,2-trichloro-1,2,2-triflu	5.0	U
67-64-1	Acetone	13	U
75-09-2	Methylene Chloride	1.6	JB
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl-tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	260	E
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-butanone	13	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	41	
56-23-5	Carbon Tetrachloride	5.0	U
563-58-6	1,1-dichloropropene	5.0	U
71-43-2	Benzene	0.64	J
107-06-2	1,2-Dichloroethane	5.0	U
79-01-6	Trichloroethene	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	13	U
108-88-3	Toluene	0.54	JB
10061-02-6	trans-1,3-Dichloropropene	5.0	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

SA-PZ-159I1

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-13

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-1359

Level: (low/med) LOW Date Received: 07/09/10

% Moisture: not dec. _____ Date Analyzed: 07/14/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U
591-78-6	2-hexanone	13	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropyl Benzene	0.29	J
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	1.7	J
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-Chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
91-20-3	Naphthalene	5.0	U
540-59-0	1,2-Dichloroethene (total)	5.0	U
1330-20-7	Xylene (total)	5.0	U
79-20-9	Methyl acetate	5.0	U
110-82-7	Cyclohexane	5.0	U
108-87-2	Methylcyclohexane	5.0	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

SA-PZ-159I1DL

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-13RE1

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-13D59

Level: (low/med) LOW Date Received: 07/09/10

% Moisture: not dec. _____ Date Analyzed: 07/15/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 2.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-38-3	m,p-Xylene (part of total)	20	U
95-47-6	o-Xylene (part of total)	10	U
156-60-5	trans-1,2-DCE (part of total	10	U
75-71-8	Dichlorodifluoromethane	10	U
156-59-2	cis-1,2-DCE (part of total)	10	U
74-87-3	Chloromethane	10	U
75-01-4	Vinyl Chloride	10	U
74-83-9	Bromomethane	10	U
75-00-3	Chloroethane	50	D
75-69-4	Trichlorofluoromethane	10	U
75-35-4	1,1-Dichloroethene	21	D
75-15-0	Carbon disulfide	10	U
76-13-1	1,1,2-trichloro-1,2,2-triflu	10	U
67-64-1	Acetone	25	U
75-09-2	Methylene Chloride	2.1	DJB
156-60-5	trans-1,2-Dichloroethene	10	U
1634-04-4	Methyl-tert-butyl ether	10	U
75-34-3	1,1-Dichloroethane	250	D
156-59-2	cis-1,2-Dichloroethene	10	U
78-93-3	2-butanone	25	U
67-66-3	Chloroform	10	U
71-55-6	1,1,1-Trichloroethane	43	D
56-23-5	Carbon Tetrachloride	10	U
563-58-6	1,1-dichloropropene	10	U
71-43-2	Benzene	0.70	DJ
107-06-2	1,2-Dichloroethane	10	U
79-01-6	Trichloroethene	10	U
78-87-5	1,2-Dichloropropane	10	U
75-27-4	Bromodichloromethane	10	U
10061-01-5	cis-1,3-Dichloropropene	10	U
108-10-1	4-Methyl-2-pentanone	25	U
108-88-3	Toluene	0.86	DJB
10061-02-6	trans-1,3-Dichloropropene	10	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

SA-PZ-159I1DL

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-13RE1

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-13D59

Level: (low/med) LOW Date Received: 07/09/10

% Moisture: not dec. _____ Date Analyzed: 07/15/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 2.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-00-5	1,1,2-Trichloroethane	10	U
127-18-4	Tetrachloroethene	10	U
591-78-6	2-hexanone	25	U
124-48-1	Dibromochloromethane	10	U
106-93-4	1,2-Dibromoethane	10	U
108-90-7	Chlorobenzene	10	U
100-41-4	Ethylbenzene	10	U
100-42-5	Styrene	10	U
75-25-2	Bromoform	10	U
98-82-8	Isopropyl Benzene	10	U
79-34-5	1,1,2,2-Tetrachloroethane	10	U
541-73-1	1,3-Dichlorobenzene	10	U
106-46-7	1,4-Dichlorobenzene	2.2	DJ
95-50-1	1,2-Dichlorobenzene	1.3	DJ
96-12-8	1,2-Dibromo-3-Chloropropane	10	U
120-82-1	1,2,4-Trichlorobenzene	3.2	DJ
91-20-3	Naphthalene	5.0	DJ
540-59-0	1,2-Dichloroethene (total)	10	U
1330-20-7	Xylene (total)	10	U
79-20-9	Methyl acetate	10	U
110-82-7	Cyclohexane	10	U
108-87-2	Methylcyclohexane	10	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

SA-PZ-160I

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-01

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-01D59

Level: (low/med) LOW Date Received: 07/08/10

% Moisture: not dec. _____ Date Analyzed: 07/14/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.7

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-38-3	m,p-Xylene (part of total)	17	U
95-47-6	o-Xylene (part of total)	8.4	U
156-60-5	trans-1,2-DCE (part of total	8.4	U
75-71-8	Dichlorodifluoromethane	8.4	U
156-59-2	cis-1,2-DCE (part of total)	8.4	U
74-87-3	Chloromethane	8.4	U
75-01-4	Vinyl Chloride	8.4	U
74-83-9	Bromomethane	8.4	U
75-00-3	Chloroethane	26	
75-69-4	Trichlorofluoromethane	8.4	U
75-35-4	1,1-Dichloroethene	17	
75-15-0	Carbon disulfide	8.4	U
76-13-1	1,1,2-trichloro-1,2,2-triflu	8.4	U
67-64-1	Acetone	21	U
75-09-2	Methylene Chloride	2.0	JB
156-60-5	trans-1,2-Dichloroethene	8.4	U
1634-04-4	Methyl-tert-butyl ether	8.4	U
75-34-3	1,1-Dichloroethane	210	
156-59-2	cis-1,2-Dichloroethene	8.4	U
78-93-3	2-butanone	21	U
67-66-3	Chloroform	8.4	U
71-55-6	1,1,1-Trichloroethane	53	
56-23-5	Carbon Tetrachloride	8.4	U
563-58-6	1,1-dichloropropene	8.4	U
71-43-2	Benzene	0.48	J
107-06-2	1,2-Dichloroethane	8.4	U
79-01-6	Trichloroethene	8.4	U
78-87-5	1,2-Dichloropropane	8.4	U
75-27-4	Bromodichloromethane	8.4	U
10061-01-5	cis-1,3-Dichloropropene	8.4	U
108-10-1	4-Methyl-2-pentanone	21	U
108-88-3	Toluene	1.4	JB
10061-02-6	trans-1,3-Dichloropropene	8.4	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

SA-PZ-160I

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-01

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-01D59

Level: (low/med) LOW Date Received: 07/08/10

% Moisture: not dec. _____ Date Analyzed: 07/14/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.7

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-00-5	1,1,2-Trichloroethane	8.4	U
127-18-4	Tetrachloroethene	8.4	U
591-78-6	2-hexanone	21	U
124-48-1	Dibromochloromethane	8.4	U
106-93-4	1,2-Dibromoethane	8.4	U
108-90-7	Chlorobenzene	8.4	U
100-41-4	Ethylbenzene	8.4	U
100-42-5	Styrene	8.4	U
75-25-2	Bromoform	8.4	U
98-82-8	Isopropyl Benzene	8.4	U
79-34-5	1,1,2,2-Tetrachloroethane	8.4	U
541-73-1	1,3-Dichlorobenzene	8.4	U
106-46-7	1,4-Dichlorobenzene	8.4	U
95-50-1	1,2-Dichlorobenzene	8.4	U
96-12-8	1,2-Dibromo-3-Chloropropane	8.4	U
120-82-1	1,2,4-Trichlorobenzene	1.9	J
91-20-3	Naphthalene	4.5	J
540-59-0	1,2-Dichloroethene (total)	8.4	U
1330-20-7	Xylene (total)	8.4	U
79-20-9	Methyl acetate	8.4	U
110-82-7	Cyclohexane	8.4	U
108-87-2	Methylcyclohexane	8.4	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

SA-PZ-160I1

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-10

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-10D59

Level: (low/med) LOW Date Received: 07/08/10

% Moisture: not dec. _____ Date Analyzed: 07/14/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.7

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-38-3	m,p-Xylene (part of total)	17	U
95-47-6	o-Xylene (part of total)	8.4	U
156-60-5	trans-1,2-DCE (part of total	8.4	U
75-71-8	Dichlorodifluoromethane	8.4	U
156-59-2	cis-1,2-DCE (part of total)	8.4	U
74-87-3	Chloromethane	8.4	U
75-01-4	Vinyl Chloride	8.4	U
74-83-9	Bromomethane	8.4	U
75-00-3	Chloroethane	34	
75-69-4	Trichlorofluoromethane	8.4	U
75-35-4	1,1-Dichloroethene	17	
75-15-0	Carbon disulfide	8.4	U
76-13-1	1,1,2-trichloro-1,2,2-triflu	8.4	U
67-64-1	Acetone	21	U
75-09-2	Methylene Chloride	4.6	JB
156-60-5	trans-1,2-Dichloroethene	8.4	U
1634-04-4	Methyl-tert-butyl ether	8.4	U
75-34-3	1,1-Dichloroethane	250	
156-59-2	cis-1,2-Dichloroethene	8.4	U
78-93-3	2-butanone	21	U
67-66-3	Chloroform	8.4	U
71-55-6	1,1,1-Trichloroethane	43	
56-23-5	Carbon Tetrachloride	8.4	U
563-58-6	1,1-dichloropropene	8.4	U
71-43-2	Benzene	0.50	J
107-06-2	1,2-Dichloroethane	8.4	U
79-01-6	Trichloroethene	8.4	U
78-87-5	1,2-Dichloropropane	8.4	U
75-27-4	Bromodichloromethane	8.4	U
10061-01-5	cis-1,3-Dichloropropene	8.4	U
108-10-1	4-Methyl-2-pentanone	21	U
108-88-3	Toluene	0.67	JB
10061-02-6	trans-1,3-Dichloropropene	8.4	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

SA-PZ-160I1

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-10

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-10D59

Level: (low/med) LOW Date Received: 07/08/10

% Moisture: not dec. _____ Date Analyzed: 07/14/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.7

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-00-5	1,1,2-Trichloroethane	8.4	U
127-18-4	Tetrachloroethene	8.4	U
591-78-6	2-hexanone	21	U
124-48-1	Dibromochloromethane	8.4	U
106-93-4	1,2-Dibromoethane	8.4	U
108-90-7	Chlorobenzene	8.4	U
100-41-4	Ethylbenzene	8.4	U
100-42-5	Styrene	8.4	U
75-25-2	Bromoform	8.4	U
98-82-8	Isopropyl Benzene	8.4	U
79-34-5	1,1,2,2-Tetrachloroethane	8.4	U
541-73-1	1,3-Dichlorobenzene	8.4	U
106-46-7	1,4-Dichlorobenzene	8.4	U
95-50-1	1,2-Dichlorobenzene	8.4	U
96-12-8	1,2-Dibromo-3-Chloropropane	8.4	U
120-82-1	1,2,4-Trichlorobenzene	8.4	U
91-20-3	Naphthalene	8.4	U
540-59-0	1,2-Dichloroethene (total)	8.4	U
1330-20-7	Xylene (total)	8.4	U
79-20-9	Methyl acetate	8.4	U
110-82-7	Cyclohexane	8.4	U
108-87-2	Methylcyclohexane	8.4	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

SA-PZ-161I

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-12

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-12D59

Level: (low/med) LOW Date Received: 07/08/10

% Moisture: not dec. _____ Date Analyzed: 07/14/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 4.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-38-3	m,p-Xylene (part of total)	40	U
95-47-6	o-Xylene (part of total)	20	U
156-60-5	trans-1,2-DCE (part of total	20	U
75-71-8	Dichlorodifluoromethane	20	U
156-59-2	cis-1,2-DCE (part of total)	20	U
74-87-3	Chloromethane	20	U
75-01-4	Vinyl Chloride	20	U
74-83-9	Bromomethane	20	U
75-00-3	Chloroethane	51	
75-69-4	Trichlorofluoromethane	20	U
75-35-4	1,1-Dichloroethene	31	
75-15-0	Carbon disulfide	20	U
76-13-1	1,1,2-trichloro-1,2,2-triflu	20	U
67-64-1	Acetone	50	U
75-09-2	Methylene Chloride	11	JB
156-60-5	trans-1,2-Dichloroethene	20	U
1634-04-4	Methyl-tert-butyl ether	20	U
75-34-3	1,1-Dichloroethane	530	
156-59-2	cis-1,2-Dichloroethene	20	U
78-93-3	2-butanone	50	U
67-66-3	Chloroform	20	U
71-55-6	1,1,1-Trichloroethane	100	
56-23-5	Carbon Tetrachloride	20	U
563-58-6	1,1-dichloropropene	20	U
71-43-2	Benzene	20	U
107-06-2	1,2-Dichloroethane	20	U
79-01-6	Trichloroethene	20	U
78-87-5	1,2-Dichloropropane	20	U
75-27-4	Bromodichloromethane	20	U
10061-01-5	cis-1,3-Dichloropropene	20	U
108-10-1	4-Methyl-2-pentanone	50	U
108-88-3	Toluene	1.9	JB
10061-02-6	trans-1,3-Dichloropropene	20	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

SA-PZ-161I

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-12

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-12D59

Level: (low/med) LOW Date Received: 07/08/10

% Moisture: not dec. _____ Date Analyzed: 07/14/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 4.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-00-5	1,1,2-Trichloroethane	20	U
127-18-4	Tetrachloroethene	20	U
591-78-6	2-hexanone	50	U
124-48-1	Dibromochloromethane	20	U
106-93-4	1,2-Dibromoethane	20	U
108-90-7	Chlorobenzene	20	U
100-41-4	Ethylbenzene	20	U
100-42-5	Styrene	20	U
75-25-2	Bromoform	20	U
98-82-8	Isopropyl Benzene	20	U
79-34-5	1,1,2,2-Tetrachloroethane	20	U
541-73-1	1,3-Dichlorobenzene	20	U
106-46-7	1,4-Dichlorobenzene	20	U
95-50-1	1,2-Dichlorobenzene	20	U
96-12-8	1,2-Dibromo-3-Chloropropane	20	U
120-82-1	1,2,4-Trichlorobenzene	20	U
91-20-3	Naphthalene	20	U
540-59-0	1,2-Dichloroethene (total)	20	U
1330-20-7	Xylene (total)	20	U
79-20-9	Methyl acetate	20	U
110-82-7	Cyclohexane	20	U
108-87-2	Methylcyclohexane	20	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

SA-TB20100706

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-07

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-07R59

Level: (low/med) LOW Date Received: 07/08/10

% Moisture: not dec. _____ Date Analyzed: 07/14/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-38-3	m,p-Xylene (part of total)	10	U
95-47-6	o-Xylene (part of total)	5.0	U
156-60-5	trans-1,2-DCE (part of total	5.0	U
75-71-8	Dichlorodifluoromethane	5.0	U
156-59-2	cis-1,2-DCE (part of total)	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl Chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
75-15-0	Carbon disulfide	5.0	U
76-13-1	1,1,2-trichloro-1,2,2-triflu	5.0	U
67-64-1	Acetone	13	U
75-09-2	Methylene Chloride	0.75	JB
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl-tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-butanone	13	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
56-23-5	Carbon Tetrachloride	5.0	U
563-58-6	1,1-dichloropropene	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
79-01-6	Trichloroethene	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	13	U
108-88-3	Toluene	0.72	JB
10061-02-6	trans-1,3-Dichloropropene	5.0	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

SA-TB20100706

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-07

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-07R59

Level: (low/med) LOW Date Received: 07/08/10

% Moisture: not dec. _____ Date Analyzed: 07/14/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U
591-78-6	2-hexanone	13	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropyl Benzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-Chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	0.95	J
91-20-3	Naphthalene	2.4	J
540-59-0	1,2-Dichloroethene (total)	5.0	U
1330-20-7	Xylene (total)	5.0	U
79-20-9	Methyl acetate	5.0	U
110-82-7	Cyclohexane	5.0	U
108-87-2	Methylcyclohexane	5.0	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

SA-TB-20100708

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-15

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-1559

Level: (low/med) LOW Date Received: 07/09/10

% Moisture: not dec. _____ Date Analyzed: 07/14/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-38-3	m,p-Xylene (part of total)	10	U
95-47-6	o-Xylene (part of total)	5.0	U
156-60-5	trans-1,2-DCE (part of total	5.0	U
75-71-8	Dichlorodifluoromethane	5.0	U
156-59-2	cis-1,2-DCE (part of total)	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl Chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
75-15-0	Carbon disulfide	5.0	U
76-13-1	1,1,2-trichloro-1,2,2-triflu	5.0	U
67-64-1	Acetone	13	U
75-09-2	Methylene Chloride	1.7	JB
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl-tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-butanone	13	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
56-23-5	Carbon Tetrachloride	5.0	U
563-58-6	1,1-dichloropropene	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
79-01-6	Trichloroethene	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	13	U
108-88-3	Toluene	0.58	JB
10061-02-6	trans-1,3-Dichloropropene	5.0	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

SA-TB-20100708

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-15

Sample wt/vol: 5 (g/ml) ML Lab File ID: 1007021-1559

Level: (low/med) LOW Date Received: 07/09/10

% Moisture: not dec. _____ Date Analyzed: 07/14/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U
591-78-6	2-hexanone	13	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropyl Benzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-Chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
91-20-3	Naphthalene	5.0	U
540-59-0	1,2-Dichloroethene (total)	5.0	U
1330-20-7	Xylene (total)	5.0	U
79-20-9	Methyl acetate	5.0	U
110-82-7	Cyclohexane	5.0	U
108-87-2	Methylcyclohexane	5.0	U

FORM I VOA

1D
GC EXTRACTABLE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

20100707-DUP

Lab Name: COMPUCHEM Contract: RSK 175

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-06

Sample wt/vol: 1.000 (g/mL) ML Lab File ID: _____

% Moisture: _____ decanted: (Y/N)___ Date Received: 07/08/10

Extraction: (SepF/Cont/Sonc) Date Extracted: 07/12/10

Concentrated Extract Volume: _____(uL) Date Analyzed: 07/12/10

Injection Volume: _____(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: ___ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-82-8	Methane	12	
74-84-0	Ethane	1	U
74-85-1	Ethene	1	U

FORM I PEST

1D
GC EXTRACTABLE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

SA-PZ-151I1

Lab Name: COMPUCHEM Contract: RSK 175

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-03

Sample wt/vol: 1.000 (g/mL) ML Lab File ID: _____

% Moisture: _____ decanted: (Y/N)___ Date Received: 07/08/10

Extraction: (SepF/Cont/Sonc) Date Extracted:07/12/10

Concentrated Extract Volume:_____(uL) Date Analyzed: 07/12/10

Injection Volume: _____(uL) Dilution Factor: 5.0

GPC Cleanup: (Y/N) N pH: ___ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-82-8	Methane	110	
74-84-0	Ethane	5	U
74-85-1	Ethene	5	U

FORM I PEST

1D
GC EXTRACTABLE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

SA-PZ-155I

Lab Name: COMPUCHEM Contract: RSK 175

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-05

Sample wt/vol: 1.000 (g/mL) ML Lab File ID: _____

% Moisture: _____ decanted: (Y/N)___ Date Received: 07/08/10

Extraction: (SepF/Cont/Sonc) Date Extracted:07/12/10

Concentrated Extract Volume:_____(uL) Date Analyzed: 07/12/10

Injection Volume: _____(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: ___ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-82-8	Methane	9	
74-84-0	Ethane	1	U
74-85-1	Ethene	1	U

FORM I PEST

1D
GC EXTRACTABLE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

SA-PZ-157I

Lab Name: COMPUCHEM Contract: RSK 175

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-14

Sample wt/vol: 1.000 (g/mL) ML Lab File ID: _____

% Moisture: _____ decanted: (Y/N)___ Date Received: 07/09/10

Extraction: (SepF/Cont/Sonc) Date Extracted: 07/12/10

Concentrated Extract Volume: _____(uL) Date Analyzed: 07/12/10

Injection Volume: _____(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: ___ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-82-8	Methane	14	
74-84-0	Ethane	1	U
74-85-1	Ethene	1	U

FORM I PEST

1D
GC EXTRACTABLE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

SA-PZ-157I1

Lab Name: COMPUCHEM Contract: RSK 175

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-04

Sample wt/vol: 1.000 (g/mL) ML Lab File ID: _____

% Moisture: _____ decanted: (Y/N)___ Date Received: 07/08/10

Extraction: (SepF/Cont/Sonc) Date Extracted: 07/12/10

Concentrated Extract Volume: _____(uL) Date Analyzed: 07/12/10

Injection Volume: _____(uL) Dilution Factor: 5.0

GPC Cleanup: (Y/N) N pH: ___ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-82-8	Methane	80	
74-84-0	Ethane	5	U
74-85-1	Ethene	5	U

FORM I PEST

1D
GC EXTRACTABLE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

SA-PZ-159I

Lab Name: COMPUCHEM Contract: RSK 175

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-02

Sample wt/vol: 1.000 (g/mL) ML Lab File ID: _____

% Moisture: _____ decanted: (Y/N)___ Date Received: 07/08/10

Extraction: (SepF/Cont/Sonc) Date Extracted: 07/12/10

Concentrated Extract Volume: _____(uL) Date Analyzed: 07/12/10

Injection Volume: _____(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: ___ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-82-8	Methane	13	
74-84-0	Ethane	1	U
74-85-1	Ethene	1	U

FORM I PEST

1D
GC EXTRACTABLE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

SA-PZ-159I1

Lab Name: COMPUCHEM Contract: RSK 175

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-13

Sample wt/vol: 1.000 (g/mL) ML Lab File ID: _____

% Moisture: _____ decanted: (Y/N)___ Date Received: 07/09/10

Extraction: (SepF/Cont/Sonc) Date Extracted:07/12/10

Concentrated Extract Volume:_____(uL) Date Analyzed: 07/12/10

Injection Volume: _____(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: ___ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-82-8	Methane	130	E
74-84-0	Ethane	1	U
74-85-1	Ethene	1	U

FORM I PEST

1D
GC EXTRACTABLE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

SA-PZ-159I1DL

Lab Name: COMPUCHEM Contract: RSK 175

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-13RE1

Sample wt/vol: 1.000 (g/mL) ML Lab File ID: _____

% Moisture: _____ decanted: (Y/N)___ Date Received: 07/09/10

Extraction: (SepF/Cont/Sonc) Date Extracted: 07/12/10

Concentrated Extract Volume: _____(uL) Date Analyzed: 07/12/10

Injection Volume: _____(uL) Dilution Factor: 5.0

GPC Cleanup: (Y/N) N pH: ___ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-82-8	Methane	30	D
74-84-0	Ethane	5	U
74-85-1	Ethene	5	U

FORM I PEST

1D
GC EXTRACTABLE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

SA-PZ-160I

Lab Name: COMPUCHEM Contract: RSK 175

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 1007021-01

Sample wt/vol: 1.000 (g/mL) ML Lab File ID: _____

% Moisture: _____ decanted: (Y/N)___ Date Received: 07/08/10

Extraction: (SepF/Cont/Sonc) Date Extracted: 07/12/10

Concentrated Extract Volume: _____(uL) Date Analyzed: 07/12/10

Injection Volume: _____(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: ___ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-82-8	Methane	0.6	
74-84-0	Ethane	1	U
74-85-1	Ethene	1	U

FORM I PEST

Appendix C

Region II Data Validation Forms

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ [✓] ___

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? ___ [/] ___

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C,then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water [✓] ___ ___

b. Soil [ ] ___ ✓

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water [✓] ___ ___

b. Soil [ ] ___ ✓

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal,make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, sectiom 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. [✓] ___ ___

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? [ ] ___ ✓

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. [ ] ✓ ___

If yes, were samples reanalyzed? [ ] ___ ✓

Were method blanks reanalyzed? [ ] ___ ✓

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] [✓] ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 <u>Laboratory Control Sample(Form III/Equivalent)</u>

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. [✓] ___ ___

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water	[✓]	___	___
B. Soil	[ ]	___	✓
C. Med Soil	[ ]	___	✓

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [ ] ___ ✓

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. [ ] ✓ ___

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	**Non-Detected Spiked Compounds**
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent)

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? [✓] ___ ___

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? [✓] ___ ___

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month [page 8000C, section 9.5.])

a. Water [✓] ___ ___

b. Waste [ ] ___ ✓

c. Soil/Solid [ ] ___ ✓

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7) for each matrix. [✓] ___ ___

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. [✓] ___ ___

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD resuts in conjunction with other QC criteria to determine the need for some qualificatios.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as welll as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determned that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	**Non-Detected Spiked Compounds**
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

	YES	NO	N/A
6.0 Blank (CLP Form IV Equivalent)			
6.1 Is the Method Blank Summary form present?	[✓]	___	___
6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch?	[✓]	___	___
6.3 Has a method blank been analyzed for each GC/MS system used ?	[✓]	___	___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject (R) all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.			
Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds?	[✓]	___	___
7.0 Contamination			

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are <u>not</u> used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary.	[✓]	___	___

	YES	NO	N/A
7.2 Do any field/rinse blanks have positive volatile organic compound results? Trip Blank	/	[ ]	

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.) See DV Report

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified forsurrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	> CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or quanity the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone

** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? Trip blank [✓] ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. [✓] ___ ___

NOTE: For the analysis of volatiles, the method requires requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? [✓] ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? [✓] ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) [✓] ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? [✓] ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? [✓] ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ [✓] ___

9.7 Have the appropriate number of significant figures (two) been reported? [✓] ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. [✓] ___ ___

ACTION: Use professional judgement to determine wheather associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates [✓] ___ ___

c. Blanks [✓] ___ ___

d. Laboratory Control Samples [✓] ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) [✓] ___ ___

c. Blanks [✓] ___ ___

d. Laboratory Control Samples [✓] ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? [✓] ___ ___

	YES	NO	N/A
Resolution?	[✓]	___	___
Peak shape?	[✓]	___	___
Full-scale graph (attenuation)?	[✓]	___	___

Other:_____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? [✓] ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab.

10.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? [✓] ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [✓] ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? [✓] ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? [ ] ___ ✓

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate [ ] ___ ✓

b. Blanks [ ] ___ ✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [ ] ___ ✓

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [ ] ___ ✓

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ ✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [ ] ✓ ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? [✓] ___ ___

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC exceedance dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? [✓] ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39)qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? [✓] ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. [✓] ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? [ ] ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) [ ] ___ ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 <u>GC/MS Calibration Verification (CLP Form VII Equivalent)</u>

	YES	NO	N/A
15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest?	[✓]	___	___
15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument?	[✓]	___	___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

	YES	NO	N/A
15.3 Was the % D determined from the calibration verification determined using RRF or CF?	[✓]	___	___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

	YES	NO	N/A
15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2).	[✓]	___	___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? [ ] / ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the the requirements for the 5 compounds is section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? [✓] ___ ___

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION:

1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.

2. Do not qualify non-detects when the associated IS are counts area > + 100%.

3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".

4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? [✓] ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

	YES	NO	N/A
17.0 Field Duplicates			
17.1 Were any field duplicates submitted for volatile analysis?	✓		

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

Appendix D

Support Documentation

HOLDTIME

SDG 1006192

SORT	UNITS	NSAMPLE	LAB_ID	QC_TYPE	SAMP_DATE	EXTR_DATE	ANAL_DATE	SMP_EXTR	EXTR_ANL	SMP_ANL
HG	UG/L	SA-PZ-151I1-20100707	1007021-03	NM	07/07/2010	07/16/2010	07/16/2010	9	0	9
HG	UG/L	SA-PZ-155I-20100707	1007021-05	NM	07/07/2010	07/16/2010	07/16/2010	9	0	9
HG	UG/L	SA-PZ-159I-20100707	1007021-02	NM	07/07/2010	07/16/2010	07/16/2010	9	0	9
M	UG/L	SASI-100K	1007087-04	NM	07/14/2010	07/26/2010	07/29/2010	12	3	15
M	UG/L	SA-PZ-151I1-20100707	1007021-03	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
M	UG/L	SA-PZ-155I-20100707	1007021-05	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
M	UG/L	SA-PZ-157I1-20100707	1007021-04	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
M	UG/L	SA-PZ-157I-20100708	1007021-14	NM	07/08/2010	07/12/2010	07/12/2010	4	0	4
M	UG/L	SA-PZ-159I1-20100708	1007021-13	NM	07/08/2010	07/12/2010	07/12/2010	4	0	4
M	UG/L	SAPT2-09HR	1007087-12	NM	07/21/2010	07/26/2010	07/30/2010	5	4	9
M	UG/L	SA-PZ-160I-20100707	1007021-01	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
M	UG/L	SAPT2-04HR	1007087-11	NM	07/21/2010	07/26/2010	07/30/2010	5	4	9
M	UG/L	SASI-200K	1007087-06	NM	07/15/2010	07/26/2010	07/29/2010	11	3	14
M	UG/L	SASI-300K	1007087-08	NM	07/15/2010	07/26/2010	07/30/2010	11	4	15
M	UG/L	SASI-50K	1007087-02	NM	07/14/2010	07/26/2010	07/29/2010	12	3	15

SORT	UNITS	NSAMPLE	LAB_ID	QC_TYPE	SAMP_DATE	EXTR_DATE	ANAL_DATE	SMP_EXTR	EXTR_ANL	SMP_ANL
M	UG/L	SA-PZ-159I-20100707	1007021-02	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
M	UG/L	SAGAC-OUT35GPM	1006192-04	NM	06/23/2010	06/25/2010	06/26/2010	2	1	3
M	UG/L	SA-20100707-DUP	1007021-06	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
M	UG/L	SAGAC-IN20GPM	1006192-01	NM	06/23/2010	06/25/2010	06/26/2010	2	1	3
M	UG/L	SAGAC-IN35GPM	1006192-03	NM	06/23/2010	06/25/2010	06/26/2010	2	1	3
M	UG/L	SAPT2-INIT	1007087-10	NM	07/21/2010	07/26/2010	07/30/2010	5	4	9
M	UG/L	SAGAC-OUT20GPM	1006192-02	NM	06/23/2010	06/25/2010	06/26/2010	2	1	3
M	UG/L	SAGAC-OUT60GPM	1006192-06	NM	06/23/2010	06/25/2010	06/26/2010	2	1	3
M	UG/L	SAPT1-07HR	1007087-03	NM	07/14/2010	07/26/2010	07/29/2010	12	3	15
M	UG/L	SAPT1-22HR	1007087-05	NM	07/15/2010	07/26/2010	07/29/2010	11	3	14
M	UG/L	SAPT1-END	1007087-07	NM	07/15/2010	07/26/2010	07/29/2010	11	3	14
M	UG/L	SAPT1-IN1T	1007087-01	NM	07/14/2010	07/26/2010	07/29/2010	12	3	15
M	UG/L	SAGAC-IN60GPM	1006192-05	NM	06/23/2010	06/25/2010	06/26/2010	2	1	3
CL	MG/L	SA-PZ-157I-20100708	1007021-14	NM	07/08/2010	07/09/2010	07/09/2010	1	0	1
CL	MG/L	SA-PZ-159I1-20100708	1007021-13	NM	07/08/2010	07/09/2010	07/09/2010	1	0	1
NTA	MG/L	SA-PZ-159I1-20100708	1007021-13	NM	07/08/2010	07/09/2010	07/09/2010	1	0	1
NTA	MG/L	SA-PZ-157I-20100708	1007021-14	NM	07/08/2010	07/09/2010	07/09/2010	1	0	1
NTI	MG/L	SA-PZ-159I1-20100708	1007021-13	NM	07/08/2010	07/09/2010	07/09/2010	1	0	1

SORT	UNITS	NSAMPLE	LAB_ID	QC_TYPE	SAMP_DATE	EXTR_DATE	ANAL_DATE	SMP_EXTR	EXTR_ANL	SMP_ANL
NTI	MG/L	SA-PZ-157I-20100708	1007021-14	NM	07/08/2010	07/09/2010	07/09/2010	1	0	1
SUL	MG/L	SA-PZ-159I1-20100708	1007021-13	NM	07/08/2010	07/13/2010	07/16/2010	5	3	8
SUL	MG/L	SA-PZ-157I-20100708	1007021-14	NM	07/08/2010	07/13/2010	07/16/2010	5	3	8
TOC	MG/L	SA-PZ-157I1-20100707	1007021-04	NM	07/07/2010	07/13/2010	07/13/2010	6	0	6
TOC	MG/L	SA-PZ-155I-20100707	1007021-05	NM	07/07/2010	07/13/2010	07/13/2010	6	0	6
TOC	MG/L	SA-PZ-151I1-20100707	1007021-03	NM	07/07/2010	07/13/2010	07/13/2010	6	0	6
TOC	MG/L	SA-20100707-DUP	1007021-06	NM	07/07/2010	07/13/2010	07/13/2010	6	0	6
TOC	MG/L	SA-PZ-159I1-20100708	1007021-13	NM	07/08/2010	07/13/2010	07/13/2010	5	0	5
TOC	MG/L	SA-PZ-157I-20100708	1007021-14	NM	07/08/2010	07/13/2010	07/13/2010	5	0	5
TOC	MG/L	SA-PZ-160I-20100707	1007021-01	NM	07/07/2010	07/13/2010	07/13/2010	6	0	6
TOC	MG/L	SA-PZ-159I-20100707	1007021-02	NM	07/07/2010	07/13/2010	07/13/2010	6	0	6
OV	UG/L	SA-PZ-159I-20100707	1007021-02	NM	07/07/2010	07/14/2010	07/14/2010	7	0	7
OV	UG/L	SA-PZ-159I1-20100708	1007021-13RE1	NM	07/08/2010	07/15/2010	07/15/2010	7	0	7
OV	UG/L	SA-PZ-159I1-20100708	1007021-13	NM	07/08/2010	07/14/2010	07/14/2010	6	0	6
OV	UG/L	SA-PZ-158I1-20100706	1007021-09	NM	07/06/2010	07/14/2010	07/14/2010	8	0	8
OV	UG/L	SA-PZ-155I-20100707	1007021-05	NM	07/07/2010	07/14/2010	07/14/2010	7	0	7
OV	UG/L	SA-PZ-157I1-20100707	1007021-04	NM	07/07/2010	07/14/2010	07/14/2010	7	0	7
OV	UG/L	SASI-300K	1007087-08	NM	07/15/2010	07/19/2010	07/19/2010	4	0	4

SORT	UNITS	NSAMPLE	LAB_ID	QC_TYPE	SAMP_DATE	EXTR_DATE	ANAL_DATE	SMP_EXTR	EXTR_ANL	SMP_ANL
OV	UG/L	SA-PZ-133I-20100708	1007021-19	NM	07/08/2010	07/14/2010	07/14/2010	6	0	6
OV	UG/L	SA-PZ-160I1-20100706	1007021-10	NM	07/06/2010	07/14/2010	07/14/2010	8	0	8
OV	UG/L	SA-PZ-160I-20100707	1007021-01	NM	07/07/2010	07/14/2010	07/14/2010	7	0	7
OV	UG/L	SA-PZ-161I-20100707	1007021-12	NM	07/07/2010	07/14/2010	07/14/2010	7	0	7
OV	UG/L	SA-PZ-151I1-20100707	1007021-03	NM	07/07/2010	07/14/2010	07/14/2010	7	0	7
OV	UG/L	SASI-200K	1007087-06	NM	07/15/2010	07/19/2010	07/19/2010	4	0	4
OV	UG/L	SA-PZ-157I-20100708	1007021-14	NM	07/08/2010	07/15/2010	07/15/2010	7	0	7
OV	UG/L	SASI-50K	1007087-02	NM	07/14/2010	07/19/2010	07/19/2010	5	0	5
OV	UG/L	SASITB071410	1007087-09	NM	07/14/2010	07/19/2010	07/19/2010	5	0	5
OV	UG/L	SA-TB-20100706	1007021-07	NM	07/06/2010	07/14/2010	07/14/2010	8	0	8
OV	UG/L	SA-TB-20100708	1007021-15	NM	07/08/2010	07/14/2010	07/14/2010	6	0	6
OV	UG/L	SASI-100K	1007087-04	NM	07/14/2010	07/19/2010	07/19/2010	5	0	5
OV	UG/L	SAGAC-OUT60GPM	1006192-06	NM	06/23/2010	06/25/2010	06/25/2010	2	0	2
OV	UG/L	SAPT2TB072110	1007087-13	NM	07/21/2010	07/28/2010	07/28/2010	7	0	7
OV	UG/L	SAPT2-INIT	1007087-10	NM	07/21/2010	07/27/2010	07/27/2010	6	0	6
OV	UG/L	SAPT2-09HR	1007087-12	NM	07/21/2010	07/28/2010	07/28/2010	7	0	7
OV	UG/L	SAPT2-04HR	1007087-11	NM	07/21/2010	07/27/2010	07/27/2010	6	0	6
OV	UG/L	SAPT1-IN1T	1007087-01	NM	07/14/2010	07/19/2010	07/19/2010	5	0	5

SORT	UNITS	NSAMPLE	LAB_ID	QC_TYPE	SAMP_DATE	EXTR_DATE	ANAL_DATE	SMP_EXTR	EXTR_ANL	SMP_ANL
OV	UG/L	SAPT1-END	1007087-07	NM	07/15/2010	07/19/2010	07/19/2010	4	0	4
OV	UG/L	SAPT1-22HR	1007087-05	NM	07/15/2010	07/19/2010	07/19/2010	4	0	4
OV	UG/L	SA-PZ-158I-20100706	1007021-08	NM	07/06/2010	07/14/2010	07/14/2010	8	0	8
OV	UG/L	SAGAC-TB01	1006192-07	NM	06/18/2010	06/25/2010	06/25/2010	7	0	7
OV	UG/L	SAGAC-OUT35GPM	1006192-04	NM	06/23/2010	06/25/2010	06/25/2010	2	0	2
OV	UG/L	SAGAC-OUT20GPM	1006192-02	NM	06/23/2010	06/25/2010	06/25/2010	2	0	2
OV	UG/L	SAGAC-IN60GPM	1006192-05	NM	06/23/2010	06/25/2010	06/25/2010	2	0	2
OV	UG/L	SAGAC-IN35GPM	1006192-03	NM	06/23/2010	06/25/2010	06/25/2010	2	0	2
OV	UG/L	SA-20100708-DUP	1007021-17	NM	07/08/2010	07/15/2010	07/15/2010	7	0	7
OV	UG/L	SA-20100707-DUP	1007021-06	NM	07/07/2010	07/14/2010	07/14/2010	7	0	7
OV	UG/L	SA-PZ-138I1-20100706	1007021-11	NM	07/06/2010	07/14/2010	07/14/2010	8	0	8
OV	UG/L	SAPT1-07HR	1007087-03	NM	07/14/2010	07/19/2010	07/19/2010	5	0	5
OV	UG/L	SA-PZ-138I-20100708	1007021-16	NM	07/08/2010	07/15/2010	07/15/2010	7	0	7
OV	UG/L	SA-PZ-139I-20100708	1007021-20	NM	07/08/2010	07/15/2010	07/15/2010	7	0	7
OV	UG/L	SA-PZ-149I1-20100708	1007021-18	NM	07/08/2010	07/15/2010	07/15/2010	7	0	7
OV	UG/L	SAGAC-IN20GPM	1006192-01	NM	06/23/2010	06/25/2010	06/25/2010	2	0	2
ETHA	UG/L	SA-PZ-155I-20100707	1007021-05	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
ETHA	UG/L	SA-PZ-159I-20100707	1007021-02	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5

SORT	UNITS	NSAMPLE	LAB_ID	QC_TYPE	SAMP_DATE	EXTR_DATE	ANAL_DATE	SMP_EXTR	EXTR_ANL	SMP_ANL
ETHA	UG/L	SA-PZ-160I-20100707	1007021-01	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
ETHA	UG/L	SA-PZ-157I1-20100707	1007021-04	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
ETHA	UG/L	SA-PZ-151I1-20100707	1007021-03	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
ETHA	UG/L	SA-20100707-DUP	1007021-06	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
ETHA	UG/L	SA-PZ-159I1-20100708	1007021-13RE1	NM	07/08/2010	07/12/2010	07/12/2010	4	0	4
ETHA	UG/L	SA-PZ-159I1-20100708	1007021-13	NM	07/08/2010	07/12/2010	07/12/2010	4	0	4
ETHA	UG/L	SA-PZ-157I-20100708	1007021-14	NM	07/08/2010	07/12/2010	07/12/2010	4	0	4
ETHE	UG/L	SA-PZ-160I-20100707	1007021-01	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
ETHE	UG/L	SA-PZ-159I-20100707	1007021-02	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
ETHE	UG/L	SA-PZ-159I1-20100708	1007021-13RE1	NM	07/08/2010	07/12/2010	07/12/2010	4	0	4
ETHE	UG/L	SA-PZ-159I1-20100708	1007021-13	NM	07/08/2010	07/12/2010	07/12/2010	4	0	4
ETHE	UG/L	SA-PZ-157I-20100708	1007021-14	NM	07/08/2010	07/12/2010	07/12/2010	4	0	4
ETHE	UG/L	SA-PZ-157I1-20100707	1007021-04	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
ETHE	UG/L	SA-PZ-155I-20100707	1007021-05	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
ETHE	UG/L	SA-PZ-151I1-20100707	1007021-03	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
ETHE	UG/L	SA-20100707-DUP	1007021-06	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
METH	UG/L	SA-PZ-160I-20100707	1007021-01	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
METH	UG/L	SA-20100707-DUP	1007021-06	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5

SORT	UNITS	NSAMPLE	LAB_ID	QC_TYPE	SAMP_DATE	EXTR_DATE	ANAL_DATE	SMP_EXTR	EXTR_ANL	SMP_ANL
METH	UG/L	SA-PZ-151I1-20100707	1007021-03	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
METH	UG/L	SA-PZ-155I-20100707	1007021-05	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
METH	UG/L	SA-PZ-157I1-20100707	1007021-04	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
METH	UG/L	SA-PZ-157I-20100708	1007021-14	NM	07/08/2010	07/12/2010	07/12/2010	4	0	4
METH	UG/L	SA-PZ-159I1-20100708	1007021-13	NM	07/08/2010	07/12/2010	07/12/2010	4	0	4
METH	UG/L	SA-PZ-159I-20100707	1007021-02	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
METH	UG/L	SA-PZ-159I1-20100708	1007021-13RE1	NM	07/08/2010	07/12/2010	07/12/2010	4	0	4

21887

41

CHAIN OF CUSTODY

CompuChem
a division of Liberty Analytical Corp.

501 Madison Ave.
Cary, NC 27513
Phone: 919-379-4100 Fax 919-379-4040

Courier: Fed Ex
Airbill No. 8706 9629 3026
Sampling Complete? Y or (N)

Client/Reporting Information

Company Name: Tetra Tech NUS
Address: Twin Oaks 1, Suite 309
City: Norfolk State: VA Zip: 23502
Project Contact: Rob Sok
Phone #: 757-618-2104
Sampler's Name: Donald Whalen

Project Information

Project Name: NWFP Calverton
Sampling Location: Site 6A
Turnaround time: 7 day
Batch QC or Project Specific? If Specific, which Sample ID?
Are aqueous samples field filtered for metals? Y or N
Are high concentrations expected? Y or (N) If yes, which ID(s)?

Requested Analysis (include method and bottle type)

Matrices: GW - Ground water; WW - Waste water; SW - Surface water; SO - Soil/Sediment; TB - Trip Blank; RI - Rinsate; WP - Wipe; O - Other

CompuChem No (Lab Use)	Field ID	Collection Date	Collection Time	Matrix	# of bottles	HCl	NaOH	HNO3	H2SO4	MEOH	Other	VOC 40 ml vial	Fe, Mn (250 ml poly)	TOC 40 ml vial	methane, ethane, ethene (40 ml vial)	pH / Sample Info (Lab Use): Fe, Mn	pH / Sample Info (Lab Use): TOC
1007021-07	SA-TB-20100706	7/6/10	0830	TB	2	2						✓					
-08	SA-PZ-158I-20100706		1145	GW	3	3						✓					
-09	SA-PZ-158I1-20100706		1310	GW	3	3						✓					
-10	SA-PZ-160I1-20100706		1540	GW	3	3						✓					
-11	SA-PZ-138I1-20100706		1745	GW	3	3						✓					
-02	SA-PZ-159I-20100707	7/7/10	1015	GW	8	5		1	2			✓	✓	✓	✓	<2	<2
-03	SA-PZ-151I1-20100707		1220	GW	8	5		1	2			✓	✓	✓	✓	<2	<2
-04	SA-PZ-157I1-20100707		1000	GW	8	5		1	2			✓	✓	✓	✓	<2	<2
-05	SA-PZ-155I-20100707		1212	GW	8	5		1	2			✓	✓	✓	✓	<2	<2
-06	SA-20100707-DUP		1305	GW	8	5		1	2			✓	✓	✓	✓	<2	<2

Lab Use Only

Sample Unpacked By: [signature]
Sample Order Entry By: [signature]
Samples Received in Good Condition? (Y) or N
If no, explain:

Cyanide samples checked for sulfide & chlorine? Y or (NA)
625 & Phenol samples checked for chlorine? Y or (NA)
608 samples checked for pH between 5.0-9.0? Y or (NA)

Comments

Sample Custody

Relinquished by: Donald Whalen	Date/Time: 7/7/10 1800	Received by: [signature]	Date/Time: 7/08/10 0910
Relinquished by:	Date/Time:	Received by:	Date/Time:

Subcontact? Y or (N) If yes, where?
Custody Seal(s) intact? (Y) or N
On Ice? (Y) or N
Cooler Temp: 2.5 °C

Samples stored 60 days after date report mailed at no extra charge.

White & Yellow copy to lab • Pink copy for customer

SN000

22098

42

CHAIN OF CUSTODY

CompuChem
a division of Liberty Analytical Corp.

501 Madison Ave.
Cary, NC 27513
Phone: 919-379-4100 Fax 919-379-4040

Courier: FED EX
Airbill No. 8706 9629 3026
Sampling Complete? Y or N

Client/Reporting Information

Company Name: Tetra Tech NUS
Address: Twin Oaks I, Suite 309
City: Norfolk State: VA Zip: 23502
Project Contact: Rob Sok
Phone #: 757-618-2104
Sampler's Name: Donald Whalen

Project Information

Project Name: NWIRP Calverton
Sampling Location:
Turnaround time: 7 day
Batch QC or Project Specific? If Specific, which Sample ID?
Are aqueous samples field filtered for metals? Y or N
Are high concentrations expected? Y or N? If yes, which ID(s)?

Requested Analysis (include method and bottle type)

CompuChem No (Lab Use)	Field ID	Collection Date	Collection Time	Matrix	# of bottles	HCl	NaOH	HNO3	H2SO4	MEOH	Other	VOC 40ml vial	Fe, Mn 250ml poly	TOC 40ml vial	Methane, Ethane, Ethene (40ml)	pH / Sample Info. (Lab Use) Fe, Mn	TOC
1007021-12	SA-PZ-161I-20100707	7/7/10	1542	GW	3	3						✓					
1007021-01	SA-PZ-160I-20100707	7/7/10	1540	GW	16	11		3	2			✓	✓	✓	✓	<2	<2

Matrices: GW - Ground water; WW - Waste water; SW - Surface water; SO - Soil/Sediment; TB - Trip Blank; RI - Rinsate; WP - Wipe; O - Other

Lab Use Only

Sample Unpacked By: Dyane Dyad
Sample Order Entry By:
Samples Received in Good Condition? Y or N
If no, explain:

Cyanide samples checked for sulfide & chlorine? Y or NA
625 & Phenol samples checked for chlorine? Y or NA
608 samples checked for pH between 5.0-9.0? Y or NA

Comments

SA-PZ-160I-20100707 DO MS/MSD (VOC, Fe/Mn)

Sample Custody

Relinquished by: Donald Whalen	Date/Time: 7/7/10 1800	Received by: Dyane Dyad	Date/Time: 7/08/10 0910
Relinquished by:	Date/Time:	Received by:	Date/Time:

Subcontact? Y or N If yes, where?
Custody Seal(s) intact? Y or N
On Ice? Y or N
Cooler Temp: 2.5 °C

Samples stored 60 days after date report mailed at no extra charge.

White & Yellow copy to lab • Pink copy for customer

SN0010

CompuChem
A Division Of
Liberty Analytical Corp.

Sample ID Cross Reference

LAB WO	Project	Sample #	Field ID	Sample Date	Rec Date	DueDate	Chain of Custody ID
1007021	CTO-WE08/7 DAY TAT/112G02045/N62472	1007021-01	SA-PZ-160I	07/07/2010	07/08/2010	07/14/2010	SA-PZ-160I-20100707
1007021	CTO-WE08/7 DAY TAT/112G02045/N62472	1007021-02	SA-PZ-159I	07/07/2010	07/08/2010	07/14/2010	SA-PZ-159I-20100707
1007021	CTO-WE08/7 DAY TAT/112G02045/N62472	1007021-03	SA-PZ-151I1	07/07/2010	07/08/2010	07/14/2010	SA-PZ-151I1-20100707
1007021	CTO-WE08/7 DAY TAT/112G02045/N62472	1007021-04	SA-PZ-157I1	07/07/2010	07/08/2010	07/14/2010	SA-PZ-157I1-20100707
1007021	CTO-WE08/7 DAY TAT/112G02045/N62472	1007021-05	SA-PZ-155I	07/07/2010	07/08/2010	07/14/2010	SA-PZ-155I-20100707
1007021	CTO-WE08/7 DAY TAT/112G02045/N62472	1007021-06	20100707-DUP	07/07/2010	07/08/2010	07/14/2010	SA-20100707-DUP
1007021	CTO-WE08/7 DAY TAT/112G02045/N62472	1007021-07	SA-TB20100706	07/06/2010	07/08/2010	07/14/2010	SA-TB-20100706
1007021	CTO-WE08/7 DAY TAT/112G02045/N62472	1007021-08	SA-PZ-158I	07/06/2010	07/08/2010	07/14/2010	SA-PZ-158I-20100706
1007021	CTO-WE08/7 DAY TAT/112G02045/N62472	1007021-09	SA-PZ-158I1	07/06/2010	07/08/2010	07/14/2010	SA-PZ-158I1-20100706
1007021	CTO-WE08/7 DAY TAT/112G02045/N62472	1007021-10	SA-PZ-160I1	07/06/2010	07/08/2010	07/14/2010	SA-PZ-160I1-20100706
1007021	CTO-WE08/7 DAY TAT/112G02045/N62472	1007021-11	SA-PZ-138I1	07/06/2010	07/08/2010	07/14/2010	SA-PZ-138I1-20100706
1007021	CTO-WE08/7 DAY TAT/112G02045/N62472	1007021-12	SA-PZ-161I	07/07/2010	07/08/2010	07/14/2010	SA-PZ-161I-20100707

44

WORK ORDER

Printed: 7/8/2010 12:05:46PM

1007021

COMPUCHEM

Client:	TETRA TECH	Project Manager:	Cathy Dover
Project:	CTO-WE08/7 DAY TAT/112G02045/N62472-03-D	Project Number:	CTO-WE08/7 DAY TAT/112G02045/N62472-03-
SDG:	1007021 CASE:	Status:	Received

Report To:
TETRA TECH
TOBRENA SKEEN
661 ANDERSEN DRIVE, FOSTER PLAZA 7
PITTSBURGH, PA 15220
Phone: 4129218182
Fax: (412) 921-4040

Invoice To:
TETRA TECH
ACCOUNTING SUPERVISOR
661 ANDERSEN DRIVE FOSTER PLAZA 7
PITTSBURGH, PA 15220
Phone :(412) 921-8506
Fax: (412) 921-4040

Date Due:	07/14/2010 00:00 (6 day TAT)		
Received By:	Cathy Dover	Date Received:	07/08/2010 09:10
Logged In By:	Cathy Dover	Date Logged In:	07/08/2010 11:45

J & B Flags?: YES Metals ND to? MDL	TICS?:NO Spike Level: FULL Spike	Deliverable: Style 9 CD Only	EDD : 56) TETRA TECH ADR

DOD*1007021-01 FOR VOC&MTL QC*LCS/LCSD FOR OTHERS*VOC 8260B 5ML=NEWTETRA.SUB*6010B MTL= Fe&Mn ONLY*RSK=MEE*TOC 9060QUAD-RPT. AVG.+ALL 4 RESULTS ON HC & AVG. IN EDD*CASE NARRATIVE NEEDS: CTO-WE08/112G02045 & PM: DAVE BRAYACK*NEED ALL FORMS FOR SUMMARY PKG.

Analysis	Due	TAT	Expires	Received	Comments
1007021-01 SA-PZ-160I [Water] Sampled 07/07/2010 15:40 Eastern					**USE FOR VOC & MTL QC*LCS/LCSD FOR OTHERS**
6010B VARIABLE METALS Invoice	07/14/2010 16:00	6	01/03/2011 15:40	07/08/2010 09:10	
6010 METALS DOD	07/14/2010 16:00	6	01/03/2011 15:40	07/08/2010 09:10	
VOA-8260B 5PPB D.O.D.	07/14/2010 16:00	6	07/21/2010 15:40	07/08/2010 09:10	SubList (7/8/2010) = VOA- NEWTETRA
TTL ORGNC CRBN (TOC) 9060 QUA	07/14/2010 16:00	6	08/04/2010 15:40	07/08/2010 09:10	
GC-RSK-175 DOD	07/14/2010 16:00	6	07/21/2010 15:40	07/08/2010 09:10	SubList (7/8/2010) = GC- RSK MEE
1007021-02 SA-PZ-159I [Water] Sampled 07/07/2010 10:15 Eastern					
VOA-8260B 5PPB D.O.D.	07/14/2010 16:00	6	07/21/2010 10:15	07/08/2010 09:10	SubList (7/8/2010) = VOA- NEWTETRA
GC-RSK-175 DOD	07/14/2010 16:00	6	07/21/2010 10:15	07/08/2010 09:10	SubList (7/8/2010) = GC- RSK MEE
6010B VARIABLE METALS Invoice	07/14/2010 16:00	6	01/03/2011 10:15	07/08/2010 09:10	
6010 METALS DOD	07/14/2010 16:00	6	01/03/2011 10:15	07/08/2010 09:10	
TTL ORGNC CRBN (TOC) 9060 QUA	07/14/2010 16:00	6	08/04/2010 10:15	07/08/2010 09:10	
1007021-03 SA-PZ-151I1 [Water] Sampled 07/07/2010 12:20 Eastern					
VOA-8260B 5PPB D.O.D.	07/14/2010 16:00	6	07/21/2010 12:20	07/08/2010 09:10	SubList (7/8/2010) = VOA- NEWTETRA
TTL ORGNC CRBN (TOC) 9060 QUA	07/14/2010 16:00	6	08/04/2010 12:20	07/08/2010 09:10	
GC-RSK-175 DOD	07/14/2010 16:00	6	07/21/2010 12:20	07/08/2010 09:10	SubList (7/8/2010) = GC- RSK MEE
6010B VARIABLE METALS Invoice	07/14/2010 16:00	6	01/03/2011 12:20	07/08/2010 09:10	
6010 METALS DOD	07/14/2010 16:00	6	01/03/2011 12:20	07/08/2010 09:10	

22099

45

CHAIN OF CUSTODY

Page 1 of 1

CompuChem
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501 Madison Ave.
Cary, NC 27513
Phone: 919-379-4100 Fax 919-379-4040

Courier: FedEx
Airbill No.: 8706 9629 2957
Sampling Complete? Y or N

Client/Reporting Information

Company Name: Tetra Tech NUS
Address: Twin Oaks 1, Suite 309
City: Norfolk State: VA Zip: 23502
Project Contact: Robert Sok
Phone #: 757-618-2104
Sampler's Name: D. Whalen

Project Information

Project Name: NWIRP CALVERTON
Sampling Location:
Turnaround time: 7 days
Batch QC or Project Specific? If Specific, which Sample ID?
Are aqueous samples field filtered for metals? Y or N
Are high concentrations expected? Y or (N) If yes, which ID(s)?

Requested Analysis (include method and bottle type)

Matrices: GW - Ground water; WW - Waste water; SW - Surface water; SO - Soil/Sediment; TB - Trip Blank; RI - Rinsate; WP - Wipe; O - Other

CompuChem No (Lab Use)	Field ID	Collection Date	Collection Time	Matrix	# of bottles	HCl	NaOH	HNO3	H2SO4	MEOH	Other ZnAc NaOH	VOC 40ml	Fe, Mn 250ml	TOC 40ml	methane, ethane, ethene 40ml	NO2, NO3, chloride 250ml	Sulfide 500ml					pH / Sample Info (Lab Use): Fe&Mn	TOC	Sulfide		
1007021-15	SA-TB-20100708	7/8/10	0800	TB	2	2						✓										—	—	—		
-16	SA-PZ-138I-20100708		0955	GW	3	3						✓										—	—	—		
-17	SA-20100708-DUP		1100	GW	3	3						✓										—	—	—		
-18	SA-PZ-149I1-20100708		947	GW	3	3						✓										—	—	—		
1007021-13	SA-PZ-159I1-20100708		1340	GW	10	5		1	2		1	✓	✓	✓	✓	✓	✓					<2	<2	>9		
-14	SA-PZ-157I-20100708		1347	GW	10	5		1	2		1	✓	✓	✓	✓	✓	✓					<2	<2	>9		
-19	SA-PZ-133I-20100708		1605	GW	3	3						✓										—	—	—		
-20	SA-PZ-139I-20100708	↓	1542	GW	3	3						✓										—	—	—		

Lab Use Only

Sample Unpacked By: K. Manning
Sample Order Entry By:
Samples Received in Good Condition? (Y) or N
If no, explain:

Cyanide samples checked for sulfide & chlorine? Y or (N/A)
625 & Phenol samples checked for chlorine? Y or (N/A)
608 samples checked for pH between 5.0-9.0? Y or (N/A)

Comments

Sample Custody

Relinquished by: D. Whalen	Date/Time: 7/8/10 1730	Received by: K. Manning	Date/Time: 7/09/10 1000
Relinquished by:	Date/Time:	Received by:	Date/Time:

Subcontact? Y or (N) If yes, where?
Custody Seal(s) intact? (Y) or N
On Ice? (Y) or N
Cooler Temp: 4.8 °C

Samples stored 60 days after date report mailed at no extra charge.

White & Yellow copy to lab • Pink copy for customer SNC010

CompuChem
A Division Of
Liberty Analytical Corp.

Sample ID Cross Reference

LAB WO	Project	Sample #	Field ID	Sample Date	Rec Date	DueDate	Chain of Custody ID
1007021	CTO-WE08/7 DAY TAT/112G02045/N62472	1007021-01	SA-PZ-160I	07/07/2010	07/08/2010	07/15/2010	SA-PZ-160I-20100707
1007021	CTO-WE08/7 DAY TAT/112G02045/N62472	1007021-02	SA-PZ-159I	07/07/2010	07/08/2010	07/15/2010	SA-PZ-159I-20100707
1007021	CTO-WE08/7 DAY TAT/112G02045/N62472	1007021-03	SA-PZ-151I1	07/07/2010	07/08/2010	07/15/2010	SA-PZ-151I1-20100707
1007021	CTO-WE08/7 DAY TAT/112G02045/N62472	1007021-04	SA-PZ-157I1	07/07/2010	07/08/2010	07/15/2010	SA-PZ-157I1-20100707
1007021	CTO-WE08/7 DAY TAT/112G02045/N62472	1007021-05	SA-PZ-155I	07/07/2010	07/08/2010	07/15/2010	SA-PZ-155I-20100707
1007021	CTO-WE08/7 DAY TAT/112G02045/N62472	1007021-06	20100707-DUP	07/07/2010	07/08/2010	07/15/2010	SA-20100707-DUP
1007021	CTO-WE08/7 DAY TAT/112G02045/N62472	1007021-07	SA-TB20100706	07/06/2010	07/08/2010	07/15/2010	SA-TB-20100706
1007021	CTO-WE08/7 DAY TAT/112G02045/N62472	1007021-08	SA-PZ-158I	07/06/2010	07/08/2010	07/15/2010	SA-PZ-158I-20100706
1007021	CTO-WE08/7 DAY TAT/112G02045/N62472	1007021-09	SA-PZ-158I1	07/06/2010	07/08/2010	07/15/2010	SA-PZ-158I1-20100706
1007021	CTO-WE08/7 DAY TAT/112G02045/N62472	1007021-10	SA-PZ-160I1	07/06/2010	07/08/2010	07/15/2010	SA-PZ-160I1-20100706
1007021	CTO-WE08/7 DAY TAT/112G02045/N62472	1007021-11	SA-PZ-138I1	07/06/2010	07/08/2010	07/15/2010	SA-PZ-138I1-20100706
1007021	CTO-WE08/7 DAY TAT/112G02045/N62472	1007021-12	SA-PZ-161I	07/07/2010	07/08/2010	07/15/2010	SA-PZ-161I-20100707
1007021	CTO-WE08/7 DAY TAT/112G02045/N62472	1007021-13	SA-PZ-159I1	07/08/2010	07/09/2010	07/15/2010	SA-PZ-159I1-20100708
1007021	CTO-WE08/7 DAY TAT/112G02045/N62472	1007021-14	SA-PZ-157I	07/08/2010	07/09/2010	07/15/2010	SA-PZ-157I-20100708
1007021	CTO-WE08/7 DAY TAT/112G02045/N62472	1007021-15	SA-TB-20100708	07/08/2010	07/09/2010	07/15/2010	
1007021	CTO-WE08/7 DAY TAT/112G02045/N62472	1007021-16	SA-PZ-138I	07/08/2010	07/09/2010	07/15/2010	SA-PZ-138I-20100708
1007021	CTO-WE08/7 DAY TAT/112G02045/N62472	1007021-17	20100708-DUP	07/08/2010	07/09/2010	07/15/2010	SA-20100708-DUP

LAB WO	Project	Sample #	Field ID	Sample Date	Rec Date	DueDate	Chain of Custody ID
1007021	CTO-WE08/7 DAY TAT/112G02045/N62472	1007021-18	SA-PZ-149I1	07/08/2010	07/09/2010	07/15/2010	SA-PZ-149I1-20100708
1007021	CTO-WE08/7 DAY TAT/112G02045/N62472	1007021-19	SA-PZ-133I	07/08/2010	07/09/2010	07/15/2010	SA-PZ-133I-20100708
1007021	CTO-WE08/7 DAY TAT/112G02045/N62472	1007021-20	SA-PZ-139I	07/08/2010	07/09/2010	07/15/2010	SA-PZ-139I-20100708

WORK ORDER

Printed: 7/13/2010 4:17:53PM

1007021

COMPUCHEM

Client:	**TETRA TECH**	**Project Manager:**	**Cathy Dover**
Project:	**CTO-WE08/7 DAY TAT/112G02045/N62472-03-D**	**Project Number:**	**CTO-WE08/7 DAY TAT/112G02045/N62472-03-**
SDG:	**1007021** **CASE:**	**Status:**	**Prepared**

Report To:
TETRA TECH
TOBRENA SKEEN
661 ANDERSEN DRIVE, FOSTER PLAZA 7
PITTSBURGH, PA 15220
Phone: 4129218182
Fax: (412) 921-4040

Invoice To:
TETRA TECH
ACCOUNTING SUPERVISOR
661 ANDERSEN DRIVE FOSTER PLAZA 7
PITTSBURGH, PA 15220
Phone :(412) 921-8506
Fax: (412) 921-4040

Date Due:	07/15/2010 00:00 (6 day TAT)		
Received By:	Cathy Dover	Date Received:	07/09/2010 10:00
Logged In By:	Cathy Dover	Date Logged In:	07/08/2010 11:45

J & B Flags?: **YES** Metals ND to? **MDL**	TICS?:**NO** Spike Level: **FULL Spike**	Deliverable: **Style 9 CD Only**	EDD : **56) TETRA TECH ADR**

DOD*1007021-01 FOR VOC&MTL QC*LCS/LCSD FOR OTHERS*VOC 8260B 5ML=NEWTETRA.SUB*MTL =Fe&Mn*RSK=MEE*TOC 9060QUAD-RPT. AVG.+ALL 4 RESULTS ON HC & AVG. IN EDD*CASE NARRATIVE NEEDS: CTO-WE08/112G02045 & PM: DAVE BRAYACK*NEED ALL FORMS FOR SUMMARY PKG.

Analysis	Due	TAT	Expires	Received	Comments
1007021-01 SA-PZ-160I [Water] Sampled 07/07/2010 15:40 Eastern					**USE FOR VOC&MTL QC*LCS/LCSD FOR OTHERS**
6010 METALS DOD	07/15/2010 16:00	6	01/03/2011 15:40	07/08/2010 09:10	
GC-RSK-175 DOD	07/15/2010 16:00	6	07/21/2010 15:40	07/08/2010 09:10	SubList (7/8/2010) = GC- RSK MEE
TTL ORGNC CRBN (TOC) 9060 QUA	07/15/2010 16:00	6	08/04/2010 15:40	07/08/2010 09:10	
VOA-8260B 5PPB D.O.D.	07/15/2010 16:00	6	07/21/2010 15:40	07/08/2010 09:10	SubList (7/8/2010) = VOA- NEWTETRA
6010B VARIABLE METALS Invoice	07/15/2010 16:00	6	01/03/2011 15:40	07/08/2010 09:10	
1007021-02 SA-PZ-159I [Water] Sampled 07/07/2010 10:15 Eastern					
VOA-8260B 5PPB D.O.D.	07/15/2010 16:00	6	07/21/2010 10:15	07/08/2010 09:10	SubList (7/8/2010) = VOA- NEWTETRA
6010 METALS DOD	07/15/2010 16:00	6	01/03/2011 10:15	07/08/2010 09:10	
6010B VARIABLE METALS Invoice	07/15/2010 16:00	6	01/03/2011 10:15	07/08/2010 09:10	
GC-RSK-175 DOD	07/15/2010 16:00	6	07/21/2010 10:15	07/08/2010 09:10	SubList (7/8/2010) = GC- RSK MEE
TTL ORGNC CRBN (TOC) 9060 QUA	07/15/2010 16:00	6	08/04/2010 10:15	07/08/2010 09:10	
1007021-03 SA-PZ-151I1 [Water] Sampled 07/07/2010 12:20 Eastern					
6010B VARIABLE METALS Invoice	07/15/2010 16:00	6	01/03/2011 12:20	07/08/2010 09:10	
GC-RSK-175 DOD	07/15/2010 16:00	6	07/21/2010 12:20	07/08/2010 09:10	SubList (7/8/2010) = GC- RSK MEE
VOA-8260B 5PPB D.O.D.	07/15/2010 16:00	6	07/21/2010 12:20	07/08/2010 09:10	SubList (7/8/2010) = VOA- NEWTETRA
TTL ORGNC CRBN (TOC) 9060 QUA	07/15/2010 16:00	6	08/04/2010 12:20	07/08/2010 09:10	
6010 METALS DOD	07/15/2010 16:00	6	01/03/2011 12:20	07/08/2010 09:10	

WORK ORDER

Printed: 7/13/2010 4:17:53PM

1007021

COMPUCHEM

Client:	TETRA TECH	Project Manager:	Cathy Dover
Project:	CTO-WE08/7 DAY TAT/112G02045/N62472-03-D	Project Number:	CTO-WE08/7 DAY TAT/112G02045/N62472-03
SDG:	1007021 CASE:	Status:	Prepared

Analysis	Due	TAT	Expires		Comments
1007021-04 SA-PZ-157I1 [Water] Sampled 07/07/2010 10:00 Eastern					
6010 METALS DOD	07/15/2010 16:00	6	01/03/2011 10:00	07/08/2010 09:10	
6010B VARIABLE METALS Invoice	07/15/2010 16:00	6	01/03/2011 10:00	07/08/2010 09:10	
GC-RSK-175 DOD	07/15/2010 16:00	6	07/21/2010 10:00	07/08/2010 09:10	SubList (7/8/2010) = GC- RSK MEE
TTL ORGNC CRBN (TOC) 9060 QUA	07/15/2010 16:00	6	08/04/2010 10:00	07/08/2010 09:10	
VOA-8260B 5PPB D.O.D.	07/15/2010 16:00	6	07/21/2010 10:00	07/08/2010 09:10	SubList (7/8/2010) = VOA- NEWTETRA
1007021-05 SA-PZ-155I [Water] Sampled 07/07/2010 12:12 Eastern					
VOA-8260B 5PPB D.O.D.	07/15/2010 16:00	6	07/21/2010 12:12	07/08/2010 09:10	SubList (7/8/2010) = VOA- NEWTETRA
TTL ORGNC CRBN (TOC) 9060 QUA	07/15/2010 16:00	6	08/04/2010 12:12	07/08/2010 09:10	
GC-RSK-175 DOD	07/15/2010 16:00	6	07/21/2010 12:12	07/08/2010 09:10	SubList (7/8/2010) = GC- RSK MEE
6010B VARIABLE METALS Invoice	07/15/2010 16:00	6	01/03/2011 12:12	07/08/2010 09:10	
6010 METALS DOD	07/15/2010 16:00	6	01/03/2011 12:12	07/08/2010 09:10	
1007021-06 20100707-DUP [Water] Sampled 07/07/2010 13:05 Eastern					
VOA-8260B 5PPB D.O.D.	07/15/2010 16:00	6	07/21/2010 13:05	07/08/2010 09:10	SubList (7/8/2010) = VOA- NEWTETRA
6010 METALS DOD	07/15/2010 16:00	6	01/03/2011 13:05	07/08/2010 09:10	
TTL ORGNC CRBN (TOC) 9060 QUA	07/15/2010 16:00	6	08/04/2010 13:05	07/08/2010 09:10	
GC-RSK-175 DOD	07/15/2010 16:00	6	07/21/2010 13:05	07/08/2010 09:10	SubList (7/8/2010) = GC- RSK MEE
6010B VARIABLE METALS Invoice	07/15/2010 16:00	6	01/03/2011 13:05	07/08/2010 09:10	
1007021-07 SA-TB20100706 [Water] Sampled 07/06/2010 08:30 Eastern					
VOA-8260B 5PPB D.O.D.	07/15/2010 16:00	6	07/20/2010 08:30	07/08/2010 09:10	SubList (7/8/2010) = VOA- NEWTETRA
1007021-08 SA-PZ-158I [Water] Sampled 07/06/2010 11:45 Eastern					
VOA-8260B 5PPB D.O.D.	07/15/2010 16:00	6	07/20/2010 11:45	07/08/2010 09:10	SubList (7/8/2010) = VOA- NEWTETRA
1007021-09 SA-PZ-158I1 [Water] Sampled 07/06/2010 13:10 Eastern					
VOA-8260B 5PPB D.O.D.	07/15/2010 16:00	6	07/20/2010 13:10	07/08/2010 09:10	SubList (7/8/2010) = VOA- NEWTETRA
1007021-10 SA-PZ-160I1 [Water] Sampled 07/06/2010 15:40 Eastern					
VOA-8260B 5PPB D.O.D.	07/15/2010 16:00	6	07/20/2010 15:40	07/08/2010 09:10	SubList (7/8/2010) = VOA- NEWTETRA
1007021-11 SA-PZ-138I1 [Water] Sampled 07/06/2010 17:45 Eastern					
VOA-8260B 5PPB D.O.D.	07/15/2010 16:00	6	07/20/2010 17:45	07/08/2010 09:10	SubList (7/8/2010) = VOA- NEWTETRA
1007021-12 SA-PZ-161I [Water] Sampled 07/07/2010 15:42 Eastern					
VOA-8260B 5PPB D.O.D.	07/15/2010 16:00	6	07/21/2010 15:42	07/08/2010 09:10	SubList (7/8/2010) = VOA- NEWTETRA

WORK ORDER

Printed: 7/13/2010 4:17:53PM

1007021

COMPUCHEM

Client:	TETRA TECH	Project Manager:	Cathy Dover
Project:	CTO-WE08/7 DAY TAT/112G02045/N62472-03-D	Project Number:	CTO-WE08/7 DAY TAT/112G02045/N62472-03-
SDG:	1007021 CASE:	Status:	Batched

Analysis	Due	TAT	Expires		Comments
1007021-13 SA-PZ-159I1 [Water] Sampled 07/08/2010 13:40 Eastern					
TTL ORGNC CRBN (TOC) 9060 QUA	07/15/2010 16:00	6	08/05/2010 13:40	07/09/2010 10:00	
VOA-8260B 5PPB D.O.D.	07/15/2010 16:00	6	07/22/2010 13:40	07/09/2010 10:00	SubList (7/8/2010) = VOA- NEWTETRA
GC-RSK-175 DOD	07/15/2010 16:00	6	07/22/2010 13:40	07/09/2010 10:00	SubList (7/8/2010) = GC- RSK MEE
SULFIDE SM4500S-2-F WATER DOD	07/15/2010 16:00	6	07/15/2010 13:40	07/09/2010 10:00	
IC 300 Anions DOD	07/15/2010 16:00	6	08/05/2010 13:40	07/09/2010 10:00	
6010B VARIABLE METALS Invoice	07/15/2010 16:00	6	01/04/2011 13:40	07/09/2010 10:00	
6010 METALS DOD	07/15/2010 16:00	6	01/04/2011 13:40	07/09/2010 10:00	
1007021-14 SA-PZ-157I [Water] Sampled 07/08/2010 13:47 Eastern					
TTL ORGNC CRBN (TOC) 9060 QUA	07/15/2010 16:00	6	08/05/2010 13:47	07/09/2010 10:00	
6010B VARIABLE METALS Invoice	07/15/2010 16:00	6	01/04/2011 13:47	07/09/2010 10:00	
6010 METALS DOD	07/15/2010 16:00	6	01/04/2011 13:47	07/09/2010 10:00	
VOA-8260B 5PPB D.O.D.	07/15/2010 16:00	6	07/22/2010 13:47	07/09/2010 10:00	SubList (7/8/2010) = VOA- NEWTETRA
SULFIDE SM4500S-2-F WATER DOD	07/15/2010 16:00	6	07/15/2010 13:47	07/09/2010 10:00	
IC 300 Anions DOD	07/15/2010 16:00	6	08/05/2010 13:47	07/09/2010 10:00	
GC-RSK-175 DOD	07/15/2010 16:00	6	07/22/2010 13:47	07/09/2010 10:00	SubList (7/8/2010) = GC- RSK MEE
1007021-15 SA-TB-20100708 [Water] Sampled 07/08/2010 08:00 Eastern				**TRIP BLK**	
VOA-8260B 5PPB D.O.D.	07/15/2010 16:00	6	07/22/2010 08:00	07/09/2010 10:00	SubList (7/8/2010) = VOA- NEWTETRA
1007021-16 SA-PZ-138I [Water] Sampled 07/08/2010 09:55 Eastern					
VOA-8260B 5PPB D.O.D.	07/15/2010 16:00	6	07/22/2010 09:55	07/09/2010 10:00	SubList (7/8/2010) = VOA- NEWTETRA
1007021-17 20100708-DUP [Water] Sampled 07/08/2010 10:00 Eastern					
VOA-8260B 5PPB D.O.D.	07/15/2010 16:00	6	07/22/2010 10:00	07/09/2010 10:00	SubList (7/8/2010) = VOA- NEWTETRA
1007021-18 SA-PZ-149I1 [Water] Sampled 07/08/2010 09:47 Eastern					
VOA-8260B 5PPB D.O.D.	07/15/2010 16:00	6	07/22/2010 09:47	07/09/2010 10:00	SubList (7/8/2010) = VOA- NEWTETRA
1007021-19 SA-PZ-133I [Water] Sampled 07/08/2010 16:05 Eastern					
VOA-8260B 5PPB D.O.D.	07/15/2010 16:00	6	07/22/2010 16:05	07/09/2010 10:00	SubList (7/8/2010) = VOA- NEWTETRA
1007021-20 SA-PZ-139I [Water] Sampled 07/08/2010 15:42 Eastern					
VOA-8260B 5PPB D.O.D.	07/15/2010 16:00	6	07/22/2010 15:42	07/09/2010 10:00	SubList (7/8/2010) = VOA- NEWTETRA

CompuChem

A division of Liberty Analytical Corporation
501 Madison Avenue
Cary, N.C. 27513
Tel: 919/379-4100 Fax: 919/379-4050

SDG NARRATIVE
SDG # 1007021
PROTOCOL: SW-846

CTO-WE08/112G02045
PM: DAVE BRAYACK

SAMPLE IDENTIFICATIONS:

SA-PZ-151I1	**SA-PZ-157I1**	**SA-PZ-160I**	**SA-PZ-159I**
SA-TB20100706	**SA-PZ-158I**	**SA-PZ-155I**	**20100707-DUP**
SA-PZ-138I1	**SA-PZ-161I**	**SA-PZ-158I1**	**SA-PZ-160I1**
SA-TB-20100708	**SA-PZ-138I**	**SA-PZ-159I1**	**SA-PZ-157I**
SA-PZ-133I	**SA-PZ-139I**	**20100708-DUP**	**SA-PZ-149I1**

The 20 aqueous samples listed above were received intact, properly refrigerated between 2.5°C and 4.8°C, with proper documentation, in sealed shipping containers, on July 8 through 9, 2010. The samples were scheduled for the requested analyses of the volatile fraction. SW-846, 3rd Edition, Update 3, 8260B was used to prepare and analyze the samples, with the exceptions and/or additions requested by the client. All pertinent Quality Assurance notices are included in the narrative section, and all pertinent Laboratory notices for SDG 1007021 are included in the sample data sections.

Analysis holding time requirements were met for all of the samples. The pH values of these samples were equal to 1. There were volatile Project/Target Compound List (TCL) analytes identified above the Contract Required Quantitation Limit (CRQL) in eighteen of these twenty samples. All of the system monitoring compounds not previously mentioned met recovery criteria in the analyses of the samples. All of the internal standards met response and retention time criteria in the analyses of the samples.

In the initial analyses of sample SA-PZ-159I1, the on-column amount of 1,1-Dichloroethane exceeded the instrument's analytical range as defined by the highest concentration level of the Initial Calibration. The sample was reanalyzed using a smaller aliquot of raw sample to bring the on-column amount into range. We have reported both analyses of sample SA-PZ-159I1. Due to the results of a screen, samples SA-PZ-160I, SA-PZ-159I, SA-PZ-151I1, SA-PZ-157I1, SA-PZ-158I, SA-PZ-158I1, SA-PZ-160I1, SA-PZ-138I1, SA-PZ-161I and SA-PZ-157I were initially analyzed using a dilution of raw sample. The screen Reconstructed Ion Chromatogram (RIC) is included in the sample data package immediately following the RIC for the sample's reportable run.

All Bromofluorobenzene (BFB) abundance criteria were met for tunes associated to this SDG. All QC criteria were met for all initial and continuing calibration standards associated to this SDG. Manual integrations were performed on one or more of the process files associated with this SDG including OG13007-CAL159 and OG13007-CAL259. The reasons have been coded with explanations provided in the notice included in the narrative section of the SDG. The associated method blanks met all quality control criteria. The associated Laboratory Control Samples (LCS/LCSD) met overall accuracy criteria. However, the relative percent difference was above the QC Limits for Bromomethane in the comparison of VIZLCS/VIZLCSD. SA-PZ-160I was used as the original to prepare the duplicate matrix spikes as requested. The associated duplicate matrix spikes met most of the advisory accuracy and precision criteria.

I certify that this data package complies with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Furthermore, I certify that the tests used in this report meet all requirements of the NELAC standards unless otherwise stated in the SDG narrative or QA notice. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on diskette has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Quentisha Forrester

Quentisha L. Forrester
Data Reviewer
July 19, 2010

GC and GC/MS Column and Trap Specifications Table

SDG #:	1007021

COLUMNS

Columns Utilized	Brand Name	Coating Material	ID (mm)	Film Thickness (um)	Length (m)
	GC Laboratory				
	Restek	RTX-5	0.53	1.0	30
	Restek	RTX-SMS	0.53	1.0	30
√	Restek	clpest	0.32	0.5	30
√	Restek	clpest2	0.32	0.42	30
	J&W	DB-210	0.53	1.0	30
	J&W	GS-GASPRO	0.32	N/A	30
	GC Volatiles Laboratory				
	Restek	RTX-Volatiles	0.53	2.0	30
	GC/MS Volatiles Laboratory				
	Restek	RTX-VMS	0.18	1.0	20
√	Supelco	SPB-624	0.32	1.8	60
	Supelco	SPB-624	0.53	3.0	75
	Phenomonex	ZB-624	0.32	1.8	60
	GC/MS Semivolatiles Laboratory				
√	Restek	RTX-5MS	0.32	0.25	30
	Phenomonex	ZB-5MS	0.32	0.25	30
	HPLC Laboratory				
	Supelco	Supelcosil LC-PAH	4.6	5.0	15 cm
	Supelco	Discovery RP Amide C16	4.6	5.0	25 cm
	Restek	Pinnacle Cyano	4.6	5.0	25 cm
	Restek	Allure C18	4.6	5.0	25 cm

TRAPS

	GC and GC/MS Volatiles Laboratory	
	Supelco J (BETXTRAP™)	* 7.7 cm Carbopack C
		* 1.2 cm Carbopack B
√	Supelco K (Vocarb3000)	* 10 cm of Carbopack B (Graphitized Carbons)
		* 6 cm of Carboxen 1000 (Carbon molecular sieves)
		* 1 cm of Carboxen 1001 (Carbon molecular sieves)

Rev. 28

CompuChem's Pagination Convention

As required by the EPA CLP Statement of Work (SOW) documents, data to be delivered must be paginated (by machine or hand). In the event that the initial numbering is incorrect (a page numbered twice or a page skipped, for example), it is CompuChem's policy to add an alphabetic suffix to a page number when necessary (e.g., 100A, 100B, etc.).

Revision 6 (12/6/2005)

Notification Regarding Manual Editing/Integration Flags

In some instances, manual adjustments to the software output are necessary to provide accurate data. These manual integrations are performed by the data reviewers, GC/MS operators, or GC chemists. An Extracted Ion Current Profile (EICP) or a GC chromatographic peak has been provided for the manual integration performed on each compound to demonstrate the accuracy of that process. The manual integrations are flagged on the quantitation report in the far right column beyond the FINAL concentration for GC/MS analysis, and in the "Flags" column for GC analysis. The manual editing/integration flags are:

M - Denotes that a manual integration has been performed for this compound. The manual integration was performed in order to provide the most accurate area count possible for the peak.

H - Denotes that the data reviewer, GC/MS operator, or GC Chemist has chosen an alternate peak within the retention time window from that chosen by the software for that compound. No manual integration is performed in choosing an alternate peak. The software still performs the integration.

MH - Denotes that an alternate peak has been chosen within the retention time window from that chosen by the software for that compound and also a manual integration of the chosen peak has been performed. The manual integration was performed in order to provide the most accurate area count possible for the peak.

L - Denotes that a data reviewer or GC/MS operator has selected an alternate library search. This is typically done when an additional tentatively identified compound (TIC) has been added to the number of peaks searched. No manual integration is performed in choosing an alternate peak. The software still performs the integration.

ML - Denotes that an alternate library search has been selected and a manual integration has also been performed. This is typically done when an additional TIC has been added and the TIC peak also required a manual integration.

The EPA CLP SOW documents require additional explanations for manual editing/integration. In the accompanying raw data packages, additional codes have been applied to the "M" flag and carry the following meanings;

M1 - The compound was not found by the automatic integration routine.

M2 - The compound was incorrectly integrated by the automatic integration routine.

M3 - The co-eluting compounds were incorrectly integrated by the automatic integration routine.

These codes will appear in the GC/MS and GC raw data.

Revision 7 (12/6/2005

DATA REPORTING QUALIFIERS

On the Form I, under the column labeled "Q" for qualifier, each result is flagged with the specific data reporting qualifiers listed below, as appropriate. Up to five qualifiers may be reported on Form I for each compound. The qualifiers used are:

U : This flag indicates the compound was analyzed for but not detected. The Contract Required Quantitation Limit (CRQL), or reporting limit, will be adjusted to reflect any dilution and, for soils, the percent moisture.

J : This flag indicates an estimated value. The flag is used as detailed below:

1. When estimating a concentration for tentatively identified compounds (TICs) where a response factor of 1:1 is assumed for the TIC analyte,

2. When the mass spectral and retention time data indicate the presence of a compound that meets the volatile and semivolatile GC/MS identification criteria, and the result is less than the adjusted CRQL (or Reporting Limit) but greater than zero, and

3. When the retention time data indicate the presence of a compound that meets the pesticide and/or Aroclor or other GC or HPLC identification criteria, and the result is less than the adjusted CRQL (or Reporting Limit) but greater than zero. For example, if the CRQL (or Reporting Limit) is 10 µg/L, but a concentration of 3 µg/L is calculated, it is reported as 3J.

N : This flag indicates presumptive evidence of a compound. This flag is only used for TICs, where the identification is based on a mass spectral library search and must be used with the J flag. For generic characterization of a TIC such as "chlorinated hydrocarbon" (or for an "unknown," with no matches ≥85% in the SOM01.1 SOW), the N flag is not used.

P : In the EPA's Contract Laboratory Program (CLP), this flag is used for a pesticide/Aroclor target analyte, when there is greater than 25% difference for detected concentrations between the two GC columns. The lower of the two values is reported on the Form I and flagged with a P.
For SW 846 GC and HPLC analyses, when the Relative Percent Difference (RPD) is greater than 40% and there is no evidence of chromatographic anomalies or interferences, then the lower of the two values is reported and flagged with a P. When the RPD is equal to or less than 40%, our policy is to also report the lower of the two values, although the choice could be a project specific issue. These SW-846 policies are consistent with Method 8000C. If Method 8000B is required, the higher of the two values is reported. For certain HPLC analyses, if one of the HPLC columns displays co-elution of target analytes, all results are reported from a primary column displaying no co-elution. Results are still flagged with a P if the RPD between columns is greater than 40%.

C : This flag applies to GC or HPLC results where the identification has been confirmed by GC/MS. If GC/MS confirmation was attempted but was unsuccessful, this flag is not applied; a laboratory-defined flag is used instead (see the X/Y/Z qualifier.)

DATA REPORTING QUALIFIERS (continued)

B : This flag is used when the analyte is found in the associated blank as well as in the sample. It indicates probable blank contamination and warns the data user to take appropriate action. This flag is used for a TIC as well as for a positively identified target compound. The combination of flags BU or UB is not an allowable policy. Blank contaminants are flagged B only when they are detected in the sample.

E : This flag identifies compounds whose concentrations (responses in the SOM01.1 SOW) exceed the upper level of the calibration range (exceed the response of the high ICAL standard in the SOM01.1 SOW) of the instrument for that specific analysis. If one or more compounds have a response greater than the upper level of the calibration range (greater than the response of the highest ICAL standard in the SOM01.1 SOW), the sample or extract will be diluted and reanalyzed. All such compounds with a response greater than the upper level of the calibration range (with responses greater than the response of the highest ICAL standard in the SOM01.1 SOW) will have the concentration (result in the SOM01.1 SOW) flagged with an E on Form I for the original analysis.

D : If a sample or extract is reanalyzed at a higher dilution factor, for example when the concentration (response in the SOM01.1 SOW) of an analyte exceeds the upper calibration range (exceeds the response of the highest ICAL standard in the SOM01.1 SOW), the DL suffix is appended to the sample number on the Form I for the more diluted sample, and **all** reported concentrations on that Form I are flagged with the D flag. This flag alerts data users that any discrepancies between the reported concentrations may be due to dilution of the sample or extract.

NOTE 1: The D flag is not applied to compounds which are not detected in the sample analysis i.e. compounds reported with the CRQL (or Reporting Limit) and the U flag.

NOTE 2: Separate Forms I are used for reporting the original analysis (Client Sample No. XXXXX) and the more diluted sample analysis (Client Sample No. XXXXXDL) i.e. the results from both analyses <u>are not combined</u> on a single Form I.

A: This flag indicates that a TIC is a suspected aldol-condensation product.

S: In the SOM01.1 SOW, this flag is used to indicate an estimated value for Aroclor target compounds where a valid 5-point initial calibration was not performed prior to the analytes detection in a sample. If an "S" flag is used for a specific Aroclor, then a reanalysis of the sample is required after a valid 5-point calibration is performed for the detected Aroclor.

X/Y/Z : Other specific flags may be required to properly define the results. If used, the flags will be fully described in the SDG Narrative. The laboratory-defined flags are limited to X, Y, and Z.

CompuChem, a division of Liberty Analytical

Client: TETRA TECH **Work:** 1007021

Project: CTO-WE08/7 DAY TAT/112G02045/N62472-03-D-0057 **Sdg:** DRAFT 1007021

Lab ID	Client ID	Matrix	Date Sampled	Date Received
1007021-01	SA-PZ-160I	Water	7/7/10 3:40 pm	7/8/10 9:10 am
1007021-02	SA-PZ-159I	Water	7/7/10 10:15 am	7/8/10 9:10 am
1007021-03	SA-PZ-151I1	Water	7/7/10 12:20 pm	7/8/10 9:10 am
1007021-04	SA-PZ-157I1	Water	7/7/10 10:00 am	7/8/10 9:10 am
1007021-05	SA-PZ-155I	Water	7/7/10 12:12 pm	7/8/10 9:10 am
1007021-06	20100707-DUP	Water	7/7/10 1:05 pm	7/8/10 9:10 am
1007021-07	SA-TB20100706	Water	7/6/10 8:30 am	7/8/10 9:10 am
1007021-08	SA-PZ-158I	Water	7/6/10 11:45 am	7/8/10 9:10 am
1007021-09	SA-PZ-158I1	Water	7/6/10 1:10 pm	7/8/10 9:10 am
1007021-10	SA-PZ-160I1	Water	7/6/10 3:40 pm	7/8/10 9:10 am
1007021-11	SA-PZ-138I1	Water	7/6/10 5:45 pm	7/8/10 9:10 am
1007021-12	SA-PZ-161I	Water	7/7/10 3:42 pm	7/8/10 9:10 am
1007021-13	SA-PZ-159I1	Water	7/8/10 1:40 pm	7/9/10 10:00 am
1007021-14	SA-PZ-157I	Water	7/8/10 1:47 pm	7/9/10 10:00 am
1007021-15	SA-TB-20100708	Water	7/8/10 8:00 am	7/9/10 10:00 am
1007021-16	SA-PZ-138I	Water	7/8/10 9:55 am	7/9/10 10:00 am
1007021-17	20100708-DUP	Water	7/8/10 10:00 am	7/9/10 10:00 am
1007021-18	SA-PZ-149I1	Water	7/8/10 9:47 am	7/9/10 10:00 am
1007021-19	SA-PZ-133I	Water	7/8/10 4:05 pm	7/9/10 10:00 am
1007021-20	SA-PZ-139I	Water	7/8/10 3:42 pm	7/9/10 10:00 am

FORM 5
VOLATILE ORGANIC INSTRUMENT PERFORMANCE CHECK
BROMOFLUOROBENZENE (BFB)

Lab Name: COMPUCHEM Contract: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Lab File ID: 0G13007-TUN159 BFB Injection Date: 07/13/10

Instrument ID: 5972HP59 BFB Injection Time: 2246

GC Column: SPB-624 ID: 0.32 (mm) Heated Purge: (Y/N) N

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
50	15.0 - 40.0% of mass 95	25.3
75	30.0 - 60.0% of mass 95	53.0
95	Base Peak, 100% relative abundance	100.0
96	5.0 - 9.0% of mass 95	6.9
173	Less than 2.0% of mass 174	0.0 (0.0)1
174	Greater than 50.0% of mass 95	51.3
175	5.0 - 9.0% of mass 174	3.9 (7.7)1
176	95.0 - 101.0% of mass 174	49.9 (97.2)1
177	5.0 - 9.0% of mass 176	3.5 (7.1)2

1-Value is % mass 174 2-Value is % mass 176

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	VSTD005	0G13007-CAL	0G13007-CAL159	07/13/10	2311
02	VSTD010	0G13007-CAL	0G13007-CAL259	07/13/10	2339
03	VSTD020	0G13007-CAL	0G13007-CAL359	07/14/10	0006
04	VSTD200	0G13007-CAL	0G13007-CAL659	07/14/10	0126
05	VSTD100	0G13007-CAL	0G13007-CAL559	07/14/10	0154
06	VSTD050	0G13007-CAL	0G13007-CAL459	07/14/10	0221
07	VBLKIW	0071315-BLK	0071315-BLK159	07/14/10	0316
08	VIWLCS	0071315-BS1	0071315-BS159	07/14/10	0351
09	VIWLCSD	0071315-BSD	0071315-BSD159	07/14/10	0419
10	SA-PZ-160I	1007021-01	1007021-01D59	07/14/10	0446
11	SA-PZ-160IMS	0071315-MS1	0071315-MS159	07/14/10	0514
12	SA-PZ-160IMSD	0071315-MSD	0071315-MSD159	07/14/10	0541
13	SA-TB20100706	1007021-07	1007021-07R59	07/14/10	0608
14	20100707-DUP	1007021-06	1007021-06R59	07/14/10	0636
15	SA-PZ-155I	1007021-05	1007021-05R59	07/14/10	0704
16	SA-PZ-159I	1007021-02	1007021-02D59	07/14/10	0732
17	SA-PZ-151I1	1007021-03	1007021-03D59	07/14/10	0759
18					
19					
20					
21					
22					

page 1 of 1

FORM V VOA

FORM 6
VOLATILE INITIAL CALIBRATION DATA

Lab Name: COMPUCHEM Contract: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Instrument ID: 5972HP59 Calibration Date(s): 07/13/10 07/14/10

Column: SPB-624 ID: 0.32 (mm) Calibration Time(s): 2311 0221

COMPOUND	CURVE	COEFFICENTS A0	A1	%RSD OR R^2	MAX %RSD OR R^2	
m,p-Xylene (part of total)	AVRG		0.59206133	6.284	15.000	
o-Xylene (part of total)	AVRG		0.59415026	5.430	15.000	
trans-1,2-DCE (part of total	AVRG		0.24529494	7.935	15.000	
Dichlorodifluoromethane	AVRG		0.39045181	6.819	15.000	
cis-1,2-DCE (part of total)	AVRG		0.25896518	6.683	15.000	
Chloromethane	AVRG		0.59834936	5.682	15.000	
Vinyl Chloride	AVRG		0.35602387	7.759	30.000	
Bromomethane	AVRG		0.16814395	12.410	15.000	<-
Chloroethane	AVRG		0.24922696	13.380	15.000	
Trichlorofluoromethane	AVRG		0.37430482	7.443	15.000	
1,1-Dichloroethene	AVRG		0.20623096	7.898	30.000	
Carbon disulfide	AVRG		0.90403478	9.051	15.000	
1,1,2-trichloro-1,2,2-triflu	AVRG		0.27258502	7.374	15.000	
Acetone	LINR	-0.2330057	19.6085578	0.9996001	0.9900000	
Methylene Chloride	AVRG		0.27400516	12.635	15.000	
trans-1,2-Dichloroethene	AVRG		0.24529494	7.935	15.000	
Methyl-tert-butyl ether	AVRG		0.58834297	7.289	15.000	
1,1-Dichloroethane	AVRG		0.57422507	8.149	15.000	
cis-1,2-Dichloroethene	AVRG		0.25896518	6.683	15.000	
2-butanone	LINR	-0.2354382	10.6338581	0.9993471	0.9900000	
Chloroform	AVRG		0.47303503	7.863	30.000	
1,1,1-Trichloroethane	AVRG		0.35998910	6.712	15.000	
Carbon Tetrachloride	AVRG		0.26793411	5.092	15.000	
1,1-dichloropropene	AVRG		0.41353666	7.992	15.000	
Benzene	AVRG		1.06898319	9.360	15.000	
1,2-Dichloroethane	AVRG		0.30610834	7.884	15.000	
Trichloroethene	AVRG		0.20313857	5.333	15.000	
1,2-Dichloropropane	AVRG		0.28416045	8.357	30.000	
Bromodichloromethane	AVRG		0.34240244	6.364	15.000	
cis-1,3-Dichloropropene	AVRG		0.42719042	7.672	15.000	
4-Methyl-2-pentanone	AVRG		0.43849440	14.357	15.000	
Toluene	AVRG		1.04733560	10.812	30.000	
trans-1,3-Dichloropropene	AVRG		0.60032087	8.806	15.000	
1,1,2-Trichloroethane	AVRG		0.26557614	7.372	15.000	
Tetrachloroethene	AVRG		0.22867163	6.247	15.000	
2-hexanone	LINR	-0.3897967	4.26996448	0.9959971	0.9900000	
Dibromochloromethane	AVRG		0.28781296	4.626	15.000	
1,2-Dibromoethane	AVRG		0.25901508	7.689	15.000	
Chlorobenzene	AVRG		0.84021056	5.291	15.000	
Ethylbenzene	AVRG		0.46796423	6.079	30.000	
Styrene	AVRG		0.95073842	7.157	15.000	
Bromoform	AVRG		0.14742467	4.650	15.000	
Isopropyl Benzene	AVRG		1.52190355	8.976	15.000	
1,1,2,2-Tetrachloroethane	AVRG		0.94986028	10.839	15.000	

FORM VI VOA

FORM 6
VOLATILE INITIAL CALIBRATION DATA

Lab Name: COMPUCHEM Contract: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Instrument ID: 5972HP59 Calibration Date(s): 07/13/10 07/14/10

Column: SPB-624 ID: 0.32 (mm) Calibration Time(s): 2311 0221

COMPOUND	CURVE	COEFFICENTS A0	A1	%RSD OR R^2	MAX %RSD OR R^2
1,3-Dichlorobenzene	AVRG		1.35459304	7.690	15.000
1,4-Dichlorobenzene	AVRG		1.29344106	7.265	15.000
1,2-Dichlorobenzene	AVRG		1.18753746	6.709	15.000
1,2-Dibromo-3-Chloropropane	AVRG		0.10088094	6.967	15.000
1,2,4-Trichlorobenzene	AVRG		0.61670983	6.637	15.000
Naphthalene	AVRG		1.23092764	5.428	15.000
1,2-Dichloroethene (total)	AVRG		0.25213006	7.284	15.000
Xylene (total)	AVRG		0.59275764	5.876	15.000
Methyl acetate	LINR	-0.0994375	6.02781683	0.9993673	0.9900000
Cyclohexane	AVRG		0.56467270	9.685	15.000
Methylcyclohexane	AVRG		0.44609450	6.594	15.000
Dibromofluoromethane	AVRG		0.23122652	4.937	15.000
1,2-Dichloroethane-d4	AVRG		0.26935596	6.236	15.000
Toluene-d8	AVRG		1.40680168	10.226	15.000
Bromofluorobenzene	AVRG		1.28760814	5.550	15.000

FORM VI VOA

FORM 6
VOLATILE INITIAL CALIBRATION DATA

Lab Name: COMPUCHEM Contract: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Instrument ID: 5972HP59 Calibration Date(s): 07/13/10 07/14/10

Column: SPB-624 ID: 0.32 (mm) Calibration Time(s): 2311 0221

LAB FILE ID: RF5: 0G13007-CAL15RF10: 0G13007-CAL2RF20: 0G13007-CAL3
RF50: 0G13007-CAL4RF100: 0G13007-CALRF200: 0G13007-CAL

COMPOUND	RF5	RF10	RF20	RF50	RF100	RF200
m,p-Xylene (part of total)	0.59187	0.60618	0.63328	0.62426	0.55758	0.53919
o-Xylene (part of total)	0.57007	0.61285	0.63788	0.61665	0.56224	0.56521
trans-1,2-DCE (part of total	0.26157	0.25539	0.26286	0.24937	0.22627	0.21631
Dichlorodifluoromethane	0.38735	0.40179	0.41321	0.42049	0.36779	0.35208
cis-1,2-DCE (part of total)	0.27088	0.26756	0.27686	0.26287	0.24286	0.23276
Chloromethane	0.53548	0.62266	0.62256	0.61642	0.58392	0.60906
Vinyl Chloride	0.33757	0.37052	0.39698	0.37110	0.32846	0.33151
Bromomethane	0.14406	0.18369	0.19495	0.16317	0.15484	
Chloroethane	0.25965	0.28248	0.27559	0.25764	0.22584	0.19416
Trichlorofluoromethane	0.38032	0.39200	0.39463	0.39825	0.35114	0.32949
1,1-Dichloroethene	0.21404	0.21568	0.21728	0.21853	0.19217	0.17968
Carbon disulfide	0.91440	0.95589	0.97364	0.96778	0.84260	0.76989
1,1,2-trichloro-1,2,2-triflu	0.27781	0.27252	0.29344	0.29228	0.25767	0.24180
Acetone	15215	27277	47399	119057	233096	419230
Methylene Chloride	0.29914	0.30887	0.29778	0.27015	0.24768	0.22040
trans-1,2-Dichloroethene	0.26157	0.25539	0.26286	0.24937	0.22627	0.21631
Methyl-tert-butyl ether	0.59753	0.63466	0.62416	0.59578	0.55832	0.51960
1,1-Dichloroethane	0.60610	0.60582	0.61566	0.58435	0.53249	0.50093
cis-1,2-Dichloroethene	0.27088	0.26756	0.27686	0.26287	0.24286	0.23276
2-butanone	27647	45276	86513	224801	437912	768716
Chloroform	0.47975	0.50096	0.51739	0.48098	0.44147	0.41766
1,1,1-Trichloroethane	0.36194	0.37445	0.38602	0.37595	0.33663	0.32494
Carbon Tetrachloride	0.27486	0.26902	0.28662	0.27296	0.25076	0.25338
1,1-dichloropropene	0.42027	0.43634	0.44881	0.42926	0.38226	0.36428
Benzene	1.12381	1.13689	1.16416	1.09703	0.98025	0.91176
1,2-Dichloroethane	0.30895	0.33606	0.32938	0.30349	0.28325	0.27551
Trichloroethene	0.20063	0.20875	0.21492	0.21297	0.19278	0.18878
1,2-Dichloropropane	0.29444	0.30312	0.30577	0.29186	0.26240	0.24736
Bromodichloromethane	0.34753	0.36376	0.36459	0.34567	0.32092	0.31195
cis-1,3-Dichloropropene	0.44589	0.45249	0.46269	0.42382	0.39940	0.37884
4-Methyl-2-pentanone	0.49124	0.50280	0.47248	0.43812	0.37721	0.34911
Toluene	1.18075	1.10329	1.11049	1.06907	0.93383	0.88658
trans-1,3-Dichloropropene	0.63002	0.63354	0.65456	0.61312	0.55008	0.52060
1,1,2-Trichloroethane	0.26710	0.28001	0.28363	0.27917	0.24731	0.23623
Tetrachloroethene	0.22851	0.23541	0.24183	0.24321	0.21276	0.21031
2-hexanone	37332	76140	132191	349887	662343	1134512
Dibromochloromethane	0.29844	0.29014	0.29643	0.29858	0.27690	0.26640
1,2-Dibromoethane	0.27144	0.27314	0.27957	0.25952	0.24124	0.22918
Chlorobenzene	0.84235	0.85114	0.89176	0.87832	0.80244	0.77525
Ethylbenzene	0.44892	0.49752	0.49088	0.49175	0.44579	0.43292
Styrene	0.94099	1.00540	1.02097	0.99245	0.89569	0.84892
Bromoform	0.14116	0.14848	0.15889	0.15102	0.14160	0.14340
Isopropyl Benzene	1.53796	1.60203	1.66268	1.61662	1.39367	1.31846
1,1,2,2-Tetrachloroethane	1.00436	1.06199	1.00049	0.98225	0.86166	0.78842

FORM VI VOA

FORM 6
VOLATILE INITIAL CALIBRATION DATA

Lab Name: COMPUCHEM Contract: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Instrument ID: 5972HP59 Calibration Date(s): 07/13/10 07/14/10

Column: SPB-624 ID: 0.32 (mm) Calibration Time(s): 2311 0221

LAB FILE ID: RF5: 0G13007-CAL15RF10: 0G13007-CAL2RF20: 0G13007-CAL3
RF50: 0G13007-CAL4RF100: 0G13007-CALRF200: 0G13007-CAL

COMPOUND	RF5	RF10	RF20	RF50	RF100	RF200
1,3-Dichlorobenzene	1.37297	1.47298	1.43433	1.39145	1.23452	1.22131
1,4-Dichlorobenzene	1.22451	1.39109	1.39443	1.34260	1.22905	1.17896
1,2-Dichlorobenzene	1.21784	1.27795	1.25452	1.18789	1.10897	1.07804
1,2-Dibromo-3-Chloropropane	0.09487	0.11053	0.09716	0.10897	0.09865	0.09510
1,2,4-Trichlorobenzene	0.53618	0.61990	0.62029	0.64738	0.63736	0.63914
Naphthalene	1.17261	1.17691	1.22851	1.35350	1.24870	1.20534
1,2-Dichloroethene (total)	0.26623	0.26148	0.26986	0.25612	0.23456	0.22453
Xylene (total)	0.58460	0.60841	0.63482	0.62172	0.55913	0.54786
Methyl acetate	18586	34836	63310	157819	306893	544570
Cyclohexane	0.58886	0.61799	0.59716	0.59058	0.51352	0.47992
Methylcyclohexane	0.42500	0.47234	0.47272	0.47301	0.42101	0.41249
Dibromofluoromethane	0.21993	0.23905	0.23871	0.24515	0.22736	0.21715
1,2-Dichloroethane-d4	0.27214	0.28209	0.28103	0.28298	0.25549	0.24240
Toluene-d8	1.45825	1.46960	1.50395	1.53862	1.30997	1.16042
Bromofluorobenzene	1.30326	1.31147	1.30788	1.37792	1.26197	1.16314

FORM VI VOA

FORM 5
VOLATILE ORGANIC INSTRUMENT PERFORMANCE CHECK
BROMOFLUOROBENZENE (BFB)

Lab Name: COMPUCHEM Contract: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Lab File ID: 0G14010-TUN159 BFB Injection Date: 07/14/10

Instrument ID: 5972HP59 BFB Injection Time: 1150

GC Column: SPB-624 ID: 0.32 (mm) Heated Purge: (Y/N) N

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
50	15.0 - 40.0% of mass 95	23.5
75	30.0 - 60.0% of mass 95	51.6
95	Base Peak, 100% relative abundance	100.0
96	5.0 - 9.0% of mass 95	6.9
173	Less than 2.0% of mass 174	0.0 (0.0)1
174	Greater than 50.0% of mass 95	50.5
175	5.0 - 9.0% of mass 174	3.8 (7.6)1
176	95.0 - 101.0% of mass 174	48.7 (96.4)1
177	5.0 - 9.0% of mass 176	3.2 (6.7)2

1-Value is % mass 174 2-Value is % mass 176

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	VSTD050	0G14010-CCV	0G14010-CCV159	07/14/10	1218
02	VBLKIY	0071409-BLK	0071409-BLK159	07/14/10	1256
03	VIYLCS	0071409-BS1	0071409-BS159	07/14/10	1332
04	VIYLCSD	0071409-BSD	0071409-BSD159	07/14/10	1359
05	SA-PZ-157I1	1007021-04	1007021-04D259	07/14/10	1645
06	SA-PZ-158I	1007021-08	1007021-08D259	07/14/10	1713
07	SA-PZ-158I1	1007021-09	1007021-09D59	07/14/10	1741
08	SA-PZ-160I1	1007021-10	1007021-10D59	07/14/10	1808
09	SA-PZ-138I1	1007021-11	1007021-11D59	07/14/10	1836
10	SA-PZ-161I	1007021-12	1007021-12D59	07/14/10	1903
11	SA-PZ-159I1	1007021-13	1007021-1359	07/14/10	1931
12	SA-TB-20100708	1007021-15	1007021-1559	07/14/10	2026
13	SA-PZ-133I	1007021-19	1007021-1959	07/14/10	2217
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FORM V VOA

FORM 7B
VOLATILE CALIBRATION VERIFICATION SUMMARY

Lab Name: COMPUCHEM Contract: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Instrument ID: 5972HP59 Calibration Date: 07/14/10 Time: 1218

Lab File ID: 0G14010-CCV159 Init. Calib. Date(s): 07/13/10 07/14/10

Init. Calib. Times: 2311 0221

GC Column: SPB-624 ID: 0.32 (mm)

COMPOUND	RRF or AMOUNT	RRF50 or AMOUNT	CCAL RRF50	MIN RRF	%D or %DRIFT	MAX %D or %DRIFT	CURV TYPE
m,p-Xylene (part of total)	0.5920600	0.5929448	0.5929448	0.001	0.15	25.00	AVRG
o-Xylene (part of total)	0.5941500	0.5952433	0.5952433	0.001	0.18	25.00	AVRG
trans-1,2-DCE (part of total	0.2453000	0.2375050	0.2375050	0.001	-3.18	25.00	AVRG
Dichlorodifluoromethane	0.3904500	0.3983035	0.3983035	0.001	2.01	25.00	AVRG
cis-1,2-DCE (part of total)	0.2589600	0.2548165	0.2548165	0.001	-1.60	25.00	AVRG
Chloromethane	0.5983500	0.5610247	0.5610247	0.1	-6.24	25.00	AVRG
Vinyl Chloride	0.3560200	0.3496134	0.3496134	0.001	-1.80	20.00	AVRG
Bromomethane	0.1681400	0.2020593	0.2020593	0.001	20.17	25.00	AVRG
Chloroethane	0.2492300	0.2819215	0.2819215	0.001	13.12	25.00	AVRG
Trichlorofluoromethane	0.3743000	0.3681382	0.3681382	0.001	-1.65	25.00	AVRG
1,1-Dichloroethene	0.2062300	0.2062620	0.2062620	0.001	0.02	20.00	AVRG
Carbon disulfide	0.9040300	0.9280924	0.9280924	0.001	2.66	25.00	AVRG
1,1,2-trichloro-1,2,2-triflu	0.2725900	0.2752462	0.2752462	0.001	0.97	25.00	AVRG
Acetone	566.49225	625.00000	0.0509772	0.001	-9.36	25.00	LINR
Methylene Chloride	0.2740000	0.2726556	0.2726556	0.001	-0.49	25.00	AVRG
trans-1,2-Dichloroethene	0.2453000	0.2375050	0.2375050	0.001	-3.18	25.00	AVRG
Methyl-tert-butyl ether	0.5883400	0.5540826	0.5540826	0.001	-5.82	25.00	AVRG
1,1-Dichloroethane	0.5742200	0.5528493	0.5528493	0.1	-3.72	25.00	AVRG
cis-1,2-Dichloroethene	0.2589600	0.2548165	0.2548165	0.001	-1.60	25.00	AVRG
2-butanone	593.70826	625.00000	0.0981872	0.001	-5.01	25.00	LINR
Chloroform	0.4730400	0.4589093	0.4589093	0.001	-2.99	20.00	AVRG
1,1,1-Trichloroethane	0.3599900	0.3432000	0.3432000	0.001	-4.66	25.00	AVRG
Carbon Tetrachloride	0.2679300	0.2525717	0.2525717	0.001	-5.73	25.00	AVRG
1,1-dichloropropene	0.4135400	0.4023423	0.4023423	0.001	-2.71	25.00	AVRG
Benzene	1.0689800	1.0647708	1.0647708	0.001	-0.39	25.00	AVRG
1,2-Dichloroethane	0.3061100	0.2778403	0.2778403	0.001	-9.24	25.00	AVRG
Trichloroethene	0.2031400	0.1950794	0.1950794	0.001	-3.97	25.00	AVRG
1,2-Dichloropropane	0.2841600	0.2844626	0.2844626	0.001	0.11	20.00	AVRG
Bromodichloromethane	0.3424000	0.3258507	0.3258507	0.001	-4.83	25.00	AVRG
cis-1,3-Dichloropropene	0.4271900	0.4052020	0.4052020	0.001	-5.15	25.00	AVRG
4-Methyl-2-pentanone	0.4384900	0.3772587	0.3772587	0.001	-13.96	25.00	AVRG
Toluene	1.0473400	1.0074170	1.0074170	0.001	-3.81	20.00	AVRG
trans-1,3-Dichloropropene	0.6003200	0.5532775	0.5532775	0.001	-7.84	25.00	AVRG
1,1,2-Trichloroethane	0.2655800	0.2584243	0.2584243	0.001	-2.69	25.00	AVRG
Tetrachloroethene	0.2286700	0.2163968	0.2163968	0.001	-5.37	25.00	AVRG
2-hexanone	605.06077	625.00000	0.2632378	0.001	-3.19	25.00	LINR
Dibromochloromethane	0.2878200	0.2693195	0.2693195	0.001	-6.43	25.00	AVRG
1,2-Dibromoethane	0.2590200	0.2521880	0.2521880	0.001	-2.64	25.00	AVRG
Chlorobenzene	0.8402100	0.8306618	0.8306618	0.3	-1.14	25.00	AVRG
Ethylbenzene	0.4679600	0.4677682	0.4677682	0.001	-0.04	20.00	AVRG
Styrene	0.9507400	0.9598462	0.9598462	0.001	0.96	25.00	AVRG
Bromoform	0.1474200	0.1347729	0.1347729	0.1	-8.58	25.00	AVRG

FORM VII VOA

FORM 7B
VOLATILE CALIBRATION VERIFICATION SUMMARY

Lab Name: COMPUCHEM Contract: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Instrument ID: 5972HP59 Calibration Date: 07/14/10 Time: 1218

Lab File ID: 0G14010-CCV159 Init. Calib. Date(s): 07/13/10 07/14/10

Init. Calib. Times: 2311 0221

GC Column: SPB-624 ID: 0.32 (mm)

COMPOUND	RRF or AMOUNT	RRF50 or AMOUNT	CCAL RRF50	MIN RRF	%D or %DRIFT	MAX %D or %DRIFT	CURV TYPE
Isopropyl Benzene	1.5219000	1.5507990	1.5507990	0.001	1.90	25.00	AVRG
1,1,2,2-Tetrachloroethane	0.9498600	0.8921297	0.8921297	0.3	-6.08	25.00	AVRG
1,3-Dichlorobenzene	1.3545900	1.2822558	1.2822558	0.001	-5.34	25.00	AVRG
1,4-Dichlorobenzene	1.2934400	1.2113611	1.2113611	0.001	-6.34	25.00	AVRG
1,2-Dichlorobenzene	1.1875400	1.1271510	1.1271510	0.001	-5.08	25.00	AVRG
1,2-Dibromo-3-Chloropropane	0.1008800	0.0919568	0.0919568	0.001	-8.84	25.00	AVRG
1,2,4-Trichlorobenzene	0.6167100	0.5706201	0.5706201	0.001	-7.47	25.00	AVRG
Naphthalene	1.2309300	1.1111132	1.1111132	0.001	-9.73	25.00	AVRG
1,2-Dichloroethene (total)	0.2521300	0.2461607	0.2461607	0.001	-2.37	25.00	AVRG
Xylene (total)	0.5927600	0.5937110	0.5937110	0.001	0.16	25.00	AVRG
Methyl acetate	231.97855	250.00000	0.1704351	0.001	-7.21	25.00	LINR
Cyclohexane	0.5646700	0.5500120	0.5500120	0.001	-2.60	25.00	AVRG
Methylcyclohexane	0.4461000	0.4503349	0.4503349	0.001	0.95	25.00	AVRG
Dibromofluoromethane	0.2312200	0.2432751	0.2432751	0.001	5.21	25.00	AVRG
1,2-Dichloroethane-d4	0.2693600	0.2652863	0.2652863	0.001	-1.51	25.00	AVRG
Toluene-d8	1.4068000	1.4974197	1.4974197	0.001	6.44	25.00	AVRG
Bromofluorobenzene	1.2876100	1.3466790	1.3466790	0.001	4.59	25.00	AVRG

FORM 5
VOLATILE ORGANIC INSTRUMENT PERFORMANCE CHECK
BROMOFLUOROBENZENE (BFB)

Lab Name: COMPUCHEM Contract: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Lab File ID: 0G15009-TUN159 BFB Injection Date: 07/15/10

Instrument ID: 5972HP59 BFB Injection Time: 1129

GC Column: SPB-624 ID: 0.32 (mm) Heated Purge: (Y/N) N

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
50	15.0 - 40.0% of mass 95	22.6
75	30.0 - 60.0% of mass 95	48.6
95	Base Peak, 100% relative abundance	100.0
96	5.0 - 9.0% of mass 95	6.8
173	Less than 2.0% of mass 174	0.0 (0.0)1
174	Greater than 50.0% of mass 95	52.8
175	5.0 - 9.0% of mass 174	3.8 (7.3)1
176	95.0 - 101.0% of mass 174	50.3 (95.2)1
177	5.0 - 9.0% of mass 176	3.3 (6.7)2

1-Value is % mass 174 2-Value is % mass 176

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	VSTD050	0G15009-CCV	0G15009-CCV159	07/15/10	1154
02	VBLKJA	0071511-BLK	0071511-BLK1R9	07/15/10	1313
03	VIZLCS	0071511-BS1	0071511-BS159	07/15/10	1421
04	VIZLCSD	0071511-BSD	0071511-BSD159	07/15/10	1449
05	SA-PZ-159I1DL	1007021-13R	1007021-13D59	07/15/10	1519
06	SA-PZ-157I	1007021-14	1007021-14D59	07/15/10	1546
07	SA-PZ-138I	1007021-16	1007021-16R59	07/15/10	1613
08	20100708-DUP	1007021-17	1007021-17R59	07/15/10	1641
09	SA-PZ-149I1	1007021-18	1007021-18R59	07/15/10	1709
10	SA-PZ-139I	1007021-20	1007021-20R59	07/15/10	1737
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FORM V VOA

FORM 7B
VOLATILE CALIBRATION VERIFICATION SUMMARY

Lab Name: COMPUCHEM Contract: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Instrument ID: 5972HP59 Calibration Date: 07/15/10 Time: 1154

Lab File ID: 0G15009-CCV159 Init. Calib. Date(s): 07/13/10 07/14/10

Init. Calib. Times: 2311 0221

GC Column: SPB-624 ID: 0.32 (mm)

COMPOUND	RRF or AMOUNT	RRF50 or AMOUNT	CCAL RRF50	MIN RRF	%D or %DRIFT	MAX %D or %DRIFT	CURV TYPE	
m,p-Xylene (part of total)	0.5920600	0.6357586	0.6357586	0.001	7.38	25.00	AVRG	
o-Xylene (part of total)	0.5941500	0.6338507	0.6338507	0.001	6.68	25.00	AVRG	
trans-1,2-DCE (part of total	0.2453000	0.2390924	0.2390924	0.001	-2.53	25.00	AVRG	
Dichlorodifluoromethane	0.3904500	0.3846421	0.3846421	0.001	-1.49	25.00	AVRG	
cis-1,2-DCE (part of total)	0.2589600	0.2560575	0.2560575	0.001	-1.12	25.00	AVRG	
Chloromethane	0.5983500	0.4335921	0.4335921	0.1	-27.54	25.00	AVRG	<-
Vinyl Chloride	0.3560200	0.2883511	0.2883511	0.001	-19.01	20.00	AVRG	
Bromomethane	0.1681400	0.1431170	0.1431170	0.001	-14.88	25.00	AVRG	
Chloroethane	0.2492300	0.2673528	0.2673528	0.001	7.27	25.00	AVRG	
Trichlorofluoromethane	0.3743000	0.3868062	0.3868062	0.001	3.34	25.00	AVRG	
1,1-Dichloroethene	0.2062300	0.2006970	0.2006970	0.001	-2.68	20.00	AVRG	
Carbon disulfide	0.9040300	0.8460958	0.8460958	0.001	-6.41	25.00	AVRG	
1,1,2-trichloro-1,2,2-triflu	0.2725900	0.2794719	0.2794719	0.001	2.52	25.00	AVRG	
Acetone	591.58164	625.00000	0.0530200	0.001	-5.35	25.00	LINR	
Methylene Chloride	0.2740000	0.2663143	0.2663143	0.001	-2.80	25.00	AVRG	
trans-1,2-Dichloroethene	0.2453000	0.2390924	0.2390924	0.001	-2.53	25.00	AVRG	
Methyl-tert-butyl ether	0.5883400	0.5579496	0.5579496	0.001	-5.16	25.00	AVRG	
1,1-Dichloroethane	0.5742200	0.5495827	0.5495827	0.1	-4.29	25.00	AVRG	
cis-1,2-Dichloroethene	0.2589600	0.2560575	0.2560575	0.001	-1.12	25.00	AVRG	
2-butanone	592.40626	625.00000	0.0979913	0.001	-5.21	25.00	LINR	
Chloroform	0.4730400	0.4628632	0.4628632	0.001	-2.15	20.00	AVRG	
1,1,1-Trichloroethane	0.3599900	0.3566393	0.3566393	0.001	-0.93	25.00	AVRG	
Carbon Tetrachloride	0.2679300	0.2568231	0.2568231	0.001	-4.14	25.00	AVRG	
1,1-dichloropropene	0.4135400	0.4078461	0.4078461	0.001	-1.38	25.00	AVRG	
Benzene	1.0689800	1.0318215	1.0318215	0.001	-3.48	25.00	AVRG	
1,2-Dichloroethane	0.3061100	0.2870025	0.2870025	0.001	-6.24	25.00	AVRG	
Trichloroethene	0.2031400	0.1937063	0.1937063	0.001	-4.64	25.00	AVRG	
1,2-Dichloropropane	0.2841600	0.2749180	0.2749180	0.001	-3.25	20.00	AVRG	
Bromodichloromethane	0.3424000	0.3339753	0.3339753	0.001	-2.46	25.00	AVRG	
cis-1,3-Dichloropropene	0.4271900	0.4072410	0.4072410	0.001	-4.67	25.00	AVRG	
4-Methyl-2-pentanone	0.4384900	0.3736466	0.3736466	0.001	-14.79	25.00	AVRG	
Toluene	1.0473400	1.0499387	1.0499387	0.001	0.25	20.00	AVRG	
trans-1,3-Dichloropropene	0.6003200	0.5917157	0.5917157	0.001	-1.43	25.00	AVRG	
1,1,2-Trichloroethane	0.2655800	0.2691190	0.2691190	0.001	1.33	25.00	AVRG	
Tetrachloroethene	0.2286700	0.2379237	0.2379237	0.001	4.05	25.00	AVRG	
2-hexanone	595.31561	625.00000	0.2595861	0.001	-4.75	25.00	LINR	
Dibromochloromethane	0.2878200	0.2701943	0.2701943	0.001	-6.12	25.00	AVRG	
1,2-Dibromoethane	0.2590200	0.2651189	0.2651189	0.001	2.35	25.00	AVRG	
Chlorobenzene	0.8402100	0.8829035	0.8829035	0.3	5.08	25.00	AVRG	
Ethylbenzene	0.4679600	0.5050208	0.5050208	0.001	7.92	20.00	AVRG	
Styrene	0.9507400	1.0200614	1.0200614	0.001	7.29	25.00	AVRG	
Bromoform	0.1474200	0.1455490	0.1455490	0.1	-1.27	25.00	AVRG	

FORM 7B
VOLATILE CALIBRATION VERIFICATION SUMMARY

Lab Name: COMPUCHEM Contract: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Instrument ID: 5972HP59 Calibration Date: 07/15/10 Time: 1154

Lab File ID: 0G15009-CCV159 Init. Calib. Date(s): 07/13/10 07/14/10

Init. Calib. Times: 2311 0221

GC Column: SPB-624 ID: 0.32 (mm)

COMPOUND	RRF or AMOUNT	RRF50 or AMOUNT	CCAL RRF50	MIN RRF	%D or %DRIFT	MAX %D or %DRIFT	CURV TYPE
Isopropyl Benzene	1.5219000	1.6964380	1.6964380	0.001	11.47	25.00	AVRG
1,1,2,2-Tetrachloroethane	0.9498600	0.8780737	0.8780737	0.3	-7.56	25.00	AVRG
1,3-Dichlorobenzene	1.3545900	1.3733306	1.3733306	0.001	1.38	25.00	AVRG
1,4-Dichlorobenzene	1.2934400	1.3085545	1.3085545	0.001	1.17	25.00	AVRG
1,2-Dichlorobenzene	1.1875400	1.1840527	1.1840527	0.001	-0.29	25.00	AVRG
1,2-Dibromo-3-Chloropropane	0.1008800	0.0998219	0.0998219	0.001	-1.05	25.00	AVRG
1,2,4-Trichlorobenzene	0.6167100	0.6958547	0.6958547	0.001	12.83	25.00	AVRG
Naphthalene	1.2309300	1.2004176	1.2004176	0.001	-2.48	25.00	AVRG
1,2-Dichloroethene (total)	0.2521300	0.2475749	0.2475749	0.001	-1.81	25.00	AVRG
Xylene (total)	0.5927600	0.6351226	0.6351226	0.001	7.15	25.00	AVRG
Methyl acetate	230.67152	250.00000	0.1696000	0.001	-7.73	25.00	LINR
Cyclohexane	0.5646700	0.5458914	0.5458914	0.001	-3.32	25.00	AVRG
Methylcyclohexane	0.4461000	0.4641771	0.4641771	0.001	4.05	25.00	AVRG
Dibromofluoromethane	0.2312200	0.2321737	0.2321737	0.001	0.41	25.00	AVRG
1,2-Dichloroethane-d4	0.2693600	0.2595217	0.2595217	0.001	-3.65	25.00	AVRG
Toluene-d8	1.4068000	1.5158246	1.5158246	0.001	7.75	25.00	AVRG
Bromofluorobenzene	1.2876100	1.3001282	1.3001282	0.001	0.97	25.00	AVRG

FORM 4
VOLATILE METHOD BLANK SUMMARY

CLIENT SAMPLE NO.

VBLKIW

Lab Name: COMPUCHEM Contract: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Lab File ID: 0071315-BLK159_N Lab Sample ID: 0071315-BLK1

Date Analyzed: 07/14/10 Time Analyzed: 0316

GC Column: SPB-624 ID: 0.32 (mm) Heated Purge: (Y/N) Y

Instrument ID: 5972HP59

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS and MSD:

	SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	TIME ANALYZED
01	VIWLCS	0071315-BS1	0071315-BS15	0351
02	VIWLCSD	0071315-BSD1	0071315-BSD1	0419
03	SA-PZ-160I	1007021-01	1007021-01D5	0446
04	SA-PZ-160IMS	0071315-MS1	0071315-MS15	0514
05	SA-PZ-160IMSD	0071315-MSD1	0071315-MSD1	0541
06	SA-TB20100706	1007021-07	1007021-07R5	0608
07	20100707-DUP	1007021-06	1007021-06R5	0636
08	SA-PZ-155I	1007021-05	1007021-05R5	0704
09	SA-PZ-159I	1007021-02	1007021-02D5	0732
10	SA-PZ-151I1	1007021-03	1007021-03D5	0759
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COMMENTS:

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VBLKIW

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 0071315-BLK1

Sample wt/vol: 5 (g/ml) ML Lab File ID: 0071315-BLK159_N

Level: (low/med) LOW Date Received: _____

% Moisture: not dec. _____ Date Analyzed: 07/14/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-38-3	m,p-Xylene (part of total)	10	U
95-47-6	o-Xylene (part of total)	5.0	U
156-60-5	trans-1,2-DCE (part of total	5.0	U
75-71-8	Dichlorodifluoromethane	5.0	U
156-59-2	cis-1,2-DCE (part of total)	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl Chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
75-15-0	Carbon disulfide	5.0	U
76-13-1	1,1,2-trichloro-1,2,2-triflu	5.0	U
67-64-1	Acetone	13	U
75-09-2	Methylene Chloride	0.51	J
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl-tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-butanone	13	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
56-23-5	Carbon Tetrachloride	5.0	U
563-58-6	1,1-dichloropropene	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
79-01-6	Trichloroethene	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	13	U
108-88-3	Toluene	0.42	J
10061-02-6	trans-1,3-Dichloropropene	5.0	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VBLKIW

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 0071315-BLK1

Sample wt/vol: 5 (g/ml) ML Lab File ID: 0071315-BLK159_N

Level: (low/med) LOW Date Received: _____

% Moisture: not dec. _____ Date Analyzed: 07/14/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U
591-78-6	2-hexanone	13	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropyl Benzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-Chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
91-20-3	Naphthalene	5.0	U
540-59-0	1,2-Dichloroethene (total)	5.0	U
1330-20-7	Xylene (total)	5.0	U
79-20-9	Methyl acetate	5.0	U
110-82-7	Cyclohexane	5.0	U
108-87-2	Methylcyclohexane	5.0	U

FORM I VOA

FORM 4
VOLATILE METHOD BLANK SUMMARY

CLIENT SAMPLE NO.

VBLKIY

Lab Name: COMPUCHEM Contract: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Lab File ID: 0071409-BLK159_N Lab Sample ID: 0071409-BLK1

Date Analyzed: 07/14/10 Time Analyzed: 1256

GC Column: SPB-624 ID: 0.32 (mm) Heated Purge: (Y/N) Y

Instrument ID: 5972HP59

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS and MSD:

	SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	TIME ANALYZED
01	VIYLCS	0071409-BS1	0071409-BS15	1332
02	VIYLCSD	0071409-BSD1	0071409-BSD1	1359
03	SA-PZ-157I1	1007021-04	1007021-04D2	1645
04	SA-PZ-158I	1007021-08	1007021-08D2	1713
05	SA-PZ-158I1	1007021-09	1007021-09D5	1741
06	SA-PZ-160I1	1007021-10	1007021-10D5	1808
07	SA-PZ-138I1	1007021-11	1007021-11D5	1836
08	SA-PZ-161I	1007021-12	1007021-12D5	1903
09	SA-PZ-159I1	1007021-13	1007021-1359	1931
10	SA-TB-20100708	1007021-15	1007021-1559	2026
11	SA-PZ-133I	1007021-19	1007021-1959	2217
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COMMENTS:

page 1 of 1

FORM IV VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VBLKIY

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 0071409-BLK1

Sample wt/vol: 5 (g/ml) ML Lab File ID: 0071409-BLK159_N

Level: (low/med) LOW Date Received: _____

% Moisture: not dec. _____ Date Analyzed: 07/14/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-38-3	m,p-Xylene (part of total)	10	U
95-47-6	o-Xylene (part of total)	5.0	U
156-60-5	trans-1,2-DCE (part of total	5.0	U
75-71-8	Dichlorodifluoromethane	5.0	U
156-59-2	cis-1,2-DCE (part of total)	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl Chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
75-15-0	Carbon disulfide	5.0	U
76-13-1	1,1,2-trichloro-1,2,2-triflu	5.0	U
67-64-1	Acetone	13	U
75-09-2	Methylene Chloride	1.1	J
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl-tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-butanone	13	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
56-23-5	Carbon Tetrachloride	5.0	U
563-58-6	1,1-dichloropropene	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
79-01-6	Trichloroethene	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	13	U
108-88-3	Toluene	0.64	J
10061-02-6	trans-1,3-Dichloropropene	5.0	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VBLKIY

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 0071409-BLK1

Sample wt/vol: 5 (g/ml) ML Lab File ID: 0071409-BLK159_N

Level: (low/med) LOW Date Received: _____

% Moisture: not dec. _____ Date Analyzed: 07/14/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U
591-78-6	2-hexanone	13	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropyl Benzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-Chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
91-20-3	Naphthalene	2.2	J
540-59-0	1,2-Dichloroethene (total)	5.0	U
1330-20-7	Xylene (total)	5.0	U
79-20-9	Methyl acetate	5.0	U
110-82-7	Cyclohexane	5.0	U
108-87-2	Methylcyclohexane	5.0	U

FORM I VOA

FORM 4
VOLATILE METHOD BLANK SUMMARY

CLIENT SAMPLE NO.

VBLKJA

Lab Name: COMPUCHEM Contract: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Lab File ID: 0071511-BLK1R9_N Lab Sample ID: 0071511-BLK1

Date Analyzed: 07/15/10 Time Analyzed: 1313

GC Column: SPB-624 ID: 0.32 (mm) Heated Purge: (Y/N) N

Instrument ID: 5972HP59

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS and MSD:

	SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	TIME ANALYZED
01	VIZLCS	0071511-BS1	0071511-BS15	1421
02	VIZLCSD	0071511-BSD1	0071511-BSD1	1449
03	SA-PZ-159I1DL	1007021-13RE1	1007021-13D5	1519
04	SA-PZ-157I	1007021-14	1007021-14D5	1546
05	SA-PZ-138I	1007021-16	1007021-16R5	1613
06	20100708-DUP	1007021-17	1007021-17R5	1641
07	SA-PZ-149I1	1007021-18	1007021-18R5	1709
08	SA-PZ-139I	1007021-20	1007021-20R5	1737
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COMMENTS:

FORM IV VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VBLKJA

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 0071511-BLK1

Sample wt/vol: 5 (g/ml) ML Lab File ID: 0071511-BLK1R9_N

Level: (low/med) LOW Date Received: _____

% Moisture: not dec. _____ Date Analyzed: 07/15/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-38-3	m,p-Xylene (part of total)	10	U
95-47-6	o-Xylene (part of total)	5.0	U
156-60-5	trans-1,2-DCE (part of total	5.0	U
75-71-8	Dichlorodifluoromethane	5.0	U
156-59-2	cis-1,2-DCE (part of total)	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl Chloride	5.0	U
74-83-9	Bromomethane	1.1	J
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
75-15-0	Carbon disulfide	5.0	U
76-13-1	1,1,2-trichloro-1,2,2-triflu	5.0	U
67-64-1	Acetone	13	U
75-09-2	Methylene Chloride	1.2	J
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl-tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-butanone	13	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
56-23-5	Carbon Tetrachloride	5.0	U
563-58-6	1,1-dichloropropene	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
79-01-6	Trichloroethene	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	13	U
108-88-3	Toluene	0.50	J
10061-02-6	trans-1,3-Dichloropropene	5.0	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VBLKJA

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 0071511-BLK1

Sample wt/vol: 5 (g/ml) ML Lab File ID: 0071511-BLK1R9_N

Level: (low/med) LOW Date Received: _____

% Moisture: not dec. _____ Date Analyzed: 07/15/10

GC Column: SPB-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U
591-78-6	2-hexanone	13	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropyl Benzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-Chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
91-20-3	Naphthalene	5.0	U
540-59-0	1,2-Dichloroethene (total)	5.0	U
1330-20-7	Xylene (total)	5.0	U
79-20-9	Methyl acetate	5.0	U
110-82-7	Cyclohexane	5.0	U
108-87-2	Methylcyclohexane	5.0	U

FORM I VOA

FORM 2
WATER VOLATILE SYSTEM MONITORING COMPOUND RECOVERY

Lab Name: COMPUCHEM Contract: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

	CLIENT SAMPLE NO.	SMC1 (DBF) #	SMC2 (DCE) #	SMC3 (TOL) #	SMC4 (BFB) #	TOT OUT
01	VBLKIW	105	109	109	112	0
02	VIWLCS	103	110	109	108	0
03	VIWLCSD	104	111	107	111	0
04	SA-PZ-160I	107	112	111	114	0
05	SA-PZ-160IMS	102	106	110	111	0
06	SA-PZ-160IMSD	104	109	107	110	0
07	SA-TB20100706	104	112	109	111	0
08	20100707-DUP	105	115	111	115	0
09	SA-PZ-155I	108	116	113	115	0
10	SA-PZ-159I	104	118	112	117	0
11	SA-PZ-151I1	106	119	114	118	0
12	VBLKIY	105	100	109	113	0
13	VIYLCS	103	99	108	108	0
14	VIYLCSD	102	98	108	108	0
15	SA-PZ-157I1	102	110	113	116	0
16	SA-PZ-158I	102	114	114	115	0
17	SA-PZ-158I1	101	111	112	115	0
18	SA-PZ-160I1	104	113	112	116	0
19	SA-PZ-138I1	103	114	114	114	0
20	SA-PZ-161I	103	117	114	113	0
21	SA-PZ-159I1	100	114	112	115	0
22	SA-TB-20100708	102	117	113	115	0
23	SA-PZ-133I	102	119	113	111	0
24	VBLKJA	100	95	114	108	0
25	VIZLCS	101	96	109	102	0
26	VIZLCSD	100	91	111	106	0
27	SA-PZ-159I1DL	104	95	116	107	0
28	SA-PZ-157I	102	96	113	112	0

		QC LIMITS
SMC1 (DBF)	= Dibromofluoromethane	(85-115)
SMC2 (DCE)	= 1,2-Dichloroethane-d4	(70-120)
SMC3 (TOL)	= Toluene-d8	(80-120)
SMC4 (BFB)	= Bromofluorobenzene	(75-120)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D System Monitoring Compound diluted out

FORM 2
WATER VOLATILE SYSTEM MONITORING COMPOUND RECOVERY

Lab Name: COMPUCHEM Contract: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

	CLIENT SAMPLE NO.	SMC1 (DBF) #	SMC2 (DCE) #	SMC3 (TOL) #	SMC4 (BFB) #	TOT OUT
01	SA-PZ-138I	101	103	112	110	0
02	20100708-DUP	101	100	114	110	0
03	SA-PZ-149I1	100	101	116	107	0
04	SA-PZ-139I	100	105	114	110	0
05						
06						
07						
08						
09						
10						
11						
12						
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14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						

		QC LIMITS
SMC1 (DBF)	= Dibromofluoromethane	(85-115)
SMC2 (DCE)	= 1,2-Dichloroethane-d4	(70-120)
SMC3 (TOL)	= Toluene-d8	(80-120)
SMC4 (BFB)	= Bromofluorobenzene	(75-120)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D System Monitoring Compound diluted out

FORM 8
VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: COMPUCHEM Contract: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Lab File ID (Standard): 0G13007-CAL459 Date Analyzed: 07/14/10

Instrument ID: 5972HP59 Time Analyzed: 0221

GC Column: SPB-624 ID: 0.32 (mm) Heated Purge: (Y/N) Y

		IS1(FBZ) AREA #	RT #	IS2(CBZ) AREA #	RT #	IS3(DCB) AREA #	RT #
	12 HOUR STD	826576	11.19	456658	13.53	188521	15.26
	UPPER LIMIT	1653152	11.69	913316	14.03	377042	15.76
	LOWER LIMIT	413288	10.69	228329	13.03	94261	14.76
	CLIENT SAMPLE NO.						
01	VBLKIW	713594	11.18	393101	13.54	155299	15.26
02	VIWLCS	679867	11.18	374867	13.54	155682	15.26
03	VIWLCSD	696228	11.18	397105	13.53	161664	15.27
04	SA-PZ-160I	738639	11.18	412306	13.54	162170	15.26
05	SA-PZ-160IMS	742967	11.18	413855	13.53	170773	15.27
06	SA-PZ-160IMSD	766049	11.18	430101	13.54	178047	15.26
07	SA-TB20100706	740693	11.19	408481	13.53	161715	15.26
08	20100707-DUP	703635	11.19	384066	13.53	148193	15.26
09	SA-PZ-155I	675044	11.18	352147	13.53	135466	15.26
10	SA-PZ-159I	647594	11.19	349083	13.53	131145	15.26
11	SA-PZ-151I1	628681	11.19	341838	13.53	130822	15.26
12							
13							
14							
15							
16							
17							
18							
19							
20							

IS1 (FBZ) = Fluorobenzene
IS2 (CBZ) = Chlorobenzene-d5
IS3 (DCB) = 1,4-Dichlorobenzene-d4

AREA UPPER LIMIT = +100% of internal standard area
AREA LOWER LIMIT = - 50% of internal standard area
RT UPPER LIMIT = + 0.50 minutes of internal standard RT
RT LOWER LIMIT = - 0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

FORM VIII VOA

FORM 8
VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: COMPUCHEM Contract: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Lab File ID (Standard): 0G14010-CCV159 Date Analyzed: 07/14/10

Instrument ID: 5972HP59 Time Analyzed: 1218

GC Column: SPB-624 ID: 0.32 (mm) Heated Purge: (Y/N) Y

		IS1(FBZ) AREA #	RT #	IS2(CBZ) AREA #	RT #	IS3(DCB) AREA #	RT #
	12 HOUR STD	847296	11.18	486181	13.53	209381	15.26
	UPPER LIMIT	1694592	11.68	972362	14.03	418762	15.76
	LOWER LIMIT	423648	10.68	243091	13.03	104691	14.76
	CLIENT SAMPLE NO.						
01	VBLKIY	816655	11.18	447621	13.53	168108	15.26
02	VIYLCS	790945	11.18	444728	13.53	189603	15.26
03	VIYLCSD	851246	11.19	467738	13.53	198163	15.26
04	SA-PZ-157I1	661167	11.19	357767	13.53	138320	15.26
05	SA-PZ-158I	650422	11.19	344920	13.53	132306	15.26
06	SA-PZ-158I1	650042	11.19	347255	13.53	133053	15.26
07	SA-PZ-160I1	635297	11.19	341382	13.53	131236	15.26
08	SA-PZ-138I1	617530	11.19	330490	13.53	129791	15.26
09	SA-PZ-161I	596693	11.18	325021	13.53	125578	15.27
10	SA-PZ-159I1	619681	11.19	325487	13.53	123195	15.26
11	SA-TB-20100708	591040	11.18	320259	13.53	121912	15.26
12	SA-PZ-133I	560081	11.18	307372	13.53	120962	15.26
13							
14							
15							
16							
17							
18							
19							
20							

IS1 (FBZ) = Fluorobenzene
IS2 (CBZ) = Chlorobenzene-d5
IS3 (DCB) = 1,4-Dichlorobenzene-d4

AREA UPPER LIMIT = +100% of internal standard area
AREA LOWER LIMIT = - 50% of internal standard area
RT UPPER LIMIT = + 0.50 minutes of internal standard RT
RT LOWER LIMIT = - 0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

FORM VIII VOA

FORM 8
VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: COMPUCHEM Contract: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Lab File ID (Standard): 0G15009-CCV159 Date Analyzed: 07/15/10

Instrument ID: 5972HP59 Time Analyzed: 1154

GC Column: SPB-624 ID: 0.32 (mm) Heated Purge: (Y/N) N

		IS1(FBZ) AREA #	RT #	IS2(CBZ) AREA #	RT #	IS3(DCB) AREA #	RT #
	12 HOUR STD	722248	11.18	411985	13.52	188696	15.26
	UPPER LIMIT	1444496	11.68	823970	14.02	377392	15.76
	LOWER LIMIT	361124	10.68	205993	13.02	94348	14.76
	CLIENT SAMPLE NO.						
01	VBLKJA	761977	11.18	403496	13.52	163117	15.26
02	VIZLCS	699391	11.18	385028	13.53	175077	15.25
03	VIZLCSD	759951	11.18	410570	13.53	184524	15.26
04	SA-PZ-159I1DL	746858	11.18	377012	13.53	153330	15.26
05	SA-PZ-157I	704838	11.18	376242	13.53	148076	15.25
06	SA-PZ-138I	649009	11.18	340513	13.53	136293	15.26
07	20100708-DUP	696003	11.18	359765	13.53	144324	15.26
08	SA-PZ-149I1	677588	11.18	349229	13.53	143485	15.26
09	SA-PZ-139I	599480	11.18	315943	13.53	128515	15.26
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

IS1 (FBZ) = Fluorobenzene
IS2 (CBZ) = Chlorobenzene-d5
IS3 (DCB) = 1,4-Dichlorobenzene-d4

AREA UPPER LIMIT = +100% of internal standard area
AREA LOWER LIMIT = - 50% of internal standard area
RT UPPER LIMIT = + 0.50 minutes of internal standard RT
RT LOWER LIMIT = - 0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

FORM VIII VOA

3A
WATER VOLATILE LAB CONTROL SAMPLE

VIWLCS

Lab Name: COMPUCHEM Contract: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix Spike - EPA Sample No.: VIWLCS

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (mg/L)	LCS CONCENTRATION (ug/L)	LCS % REC #	QC. LIMITS REC.
Dichlorodifluoromethane	50		63.24	126	30-155
Chloromethane	50		59.43	119	40-125
Vinyl Chloride	50		60.43	121	50-145
Bromomethane	50		59.88	120	30-145
Chloroethane	50		59.87	120	60-135
Trichlorofluoromethane	50		54.49	109	60-145
1,1-Dichloroethene	50		51.83	104	70-130
Carbon disulfide	50		55.36	111	35-160
1,1,2-trichloro-1,2,2-t	50		52.54	105	78-150
Acetone	125		155.2	124	40-140
Methylene Chloride	50		49.23	98	55-140
trans-1,2-Dichloroethen	50		51	102	60-140
Methyl-tert-butyl ether	50		50.65	101	65-125
1,1-Dichloroethane	50		51.51	103	70-135
cis-1,2-Dichloroethene	50		49.48	99	70-125
2-butanone	125		153.4	123	30-150
Chloroform	50		50.64	101	65-135
1,1,1-Trichloroethane	50		51.34	103	65-130
Carbon Tetrachloride	50		49.84	100	65-140
1,1-dichloropropene	50		50.97	102	75-130
Benzene	50		51.07	102	80-120
1,2-Dichloroethane	50		50.22	100	70-130
Trichloroethene	50		47.09	94	70-125
1,2-Dichloropropane	50		50.15	100	75-125
Bromodichloromethane	50		49.95	100	75-120
cis-1,3-Dichloropropene	50		50.91	102	70-130
4-Methyl-2-pentanone	125		138.4	111	60-135
Toluene	50		48.94	98	75-120

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

COMMENTS: _____

3A
WATER VOLATILE LAB CONTROL SAMPLE

VIWLCS

Lab Name: COMPUCHEM Contract: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix Spike - EPA Sample No.: VIWLCS

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (mg/L)	LCS CONCENTRATION (ug/L)	LCS % REC #	QC. LIMITS REC.
trans-1,3-Dichloroprope	50		47.32	95	55-140
1,1,2-Trichloroethane	50		49.77	100	75-125
Tetrachloroethene	50		49.5	99	45-150
2-hexanone	125		154.1	123	55-130
Dibromochloromethane	50		51.03	102	50-150
1,2-Dibromoethane	50		50.19	100	80-120
Chlorobenzene	50		50.69	101	80-120
Ethylbenzene	50		50.95	102	75-125
Styrene	50		50.59	101	65-135
Bromoform	50		48.47	97	70-130
Isopropyl Benzene	50		45.72	91	75-125
1,1,2,2-Tetrachloroetha	50		50.21	100	65-130
1,3-Dichlorobenzene	50		50.19	100	75-125
1,4-Dichlorobenzene	50		50.96	102	75-125
1,2-Dichlorobenzene	50		50.85	102	70-120
1,2-Dibromo-3-Chloropro	50		47.66	95	50-130
1,2,4-Trichlorobenzene	50		51.25	103	65-135
Naphthalene	50		51.68	103	55-140
1,2-Dichloroethene (tot	100		100.4	100	50-150
Xylene (total)	150		154.4	103	50-150
Methyl acetate	50		59.54	119	50-150
Cyclohexane	50		55.27	111	50-150
Methylcyclohexane	50		51.92	104	50-150

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

COMMENTS:

3A
WATER VOLATILE LAB CONTROL SAMPLE

VIWLCS

Lab Name: COMPUCHEM Contract: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix Spike - EPA Sample No.: VIWLCS

COMPOUND	SPIKE ADDED (ug/L)	LCSD CONCENTRATION (ug/L)	LCSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
Dichlorodifluoromethane	50	56.18	112	12	30	30-155
Chloromethane	50	54.58	109	9	30	40-125
Vinyl Chloride	50	58.09	116	4	30	50-145
Bromomethane	50	56.05	112	7	30	30-145
Chloroethane	50	55.87	112	7	30	60-135
Trichlorofluoromethane	50	53.94	108	1	30	60-145
1,1-Dichloroethene	50	52.37	105	1	30	70-130
Carbon disulfide	50	53.76	108	3	30	35-160
1,1,2-trichloro-1,2,2-t	50	54.01	108	3	30	78-150
Acetone	125	147.7	118	5	30	40-140
Methylene Chloride	50	49.98	100	2	30	55-140
trans-1,2-Dichloroethen	50	50.4	101	1	30	60-140
Methyl-tert-butyl ether	50	51.39	103	2	30	65-125
1,1-Dichloroethane	50	52.58	105	2	30	70-135
cis-1,2-Dichloroethene	50	49.64	99	0	30	70-125
2-butanone	125	153.3	123	0	30	30-150
Chloroform	50	51.55	103	2	30	65-135
1,1,1-Trichloroethane	50	53.69	107	4	30	65-130
Carbon Tetrachloride	50	52.6	105	5	30	65-140
1,1-dichloropropene	50	53.57	107	5	30	75-130
Benzene	50	51.93	104	2	30	80-120
1,2-Dichloroethane	50	51.85	104	4	30	70-130
Trichloroethene	50	50.55	101	7	30	70-125
1,2-Dichloropropane	50	52.85	106	6	30	75-125
Bromodichloromethane	50	50.6	101	1	30	75-120
cis-1,3-Dichloropropene	50	51.16	102	0	30	70-130
4-Methyl-2-pentanone	125	133.9	107	4	30	60-135
Toluene	50	49.3	99	1	30	75-120

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

COMMENTS:

3A
WATER VOLATILE LAB CONTROL SAMPLE

VIWLCS

Lab Name: COMPUCHEM Contract: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix Spike - EPA Sample No.: VIWLCS

COMPOUND	SPIKE ADDED (ug/L)	LCSD CONCENTRATION (ug/L)	LCSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
trans-1,3-Dichloroprope	50	51.75	103	8	30	55-140
1,1,2-Trichloroethane	50	49.65	99	1	30	75-125
Tetrachloroethene	50	49.7	99	0	30	45-150
2-hexanone	125	157.7	126	2	30	55-130
Dibromochloromethane	50	49.55	99	3	30	50-150
1,2-Dibromoethane	50	50.83	102	2	30	80-120
Chlorobenzene	50	50.3	101	0	30	80-120
Ethylbenzene	50	51.03	102	0	30	75-125
Styrene	50	50.41	101	0	30	65-135
Bromoform	50	47.94	96	1	30	70-130
Isopropyl Benzene	50	52.42	105	14	30	75-125
1,1,2,2-Tetrachloroetha	50	53.15	106	6	30	65-130
1,3-Dichlorobenzene	50	48.9	98	2	30	75-125
1,4-Dichlorobenzene	50	49.21	98	4	30	75-125
1,2-Dichlorobenzene	50	48.78	98	4	30	70-120
1,2-Dibromo-3-Chloropro	50	51.13	102	7	30	50-130
1,2,4-Trichlorobenzene	50	48.97	98	5	30	65-135
Naphthalene	50	53.78	108	5	30	55-140
1,2-Dichloroethene (tot	100	100	100	0	30	50-150
Xylene (total)	150	153.1	102	1	30	50-150
Methyl acetate	50	59.45	119	0	30	50-150
Cyclohexane	50	54.81	110	1	30	50-150
Methylcyclohexane	50	53.53	107	3	30	50-150

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 0 out of 51 outside limits
Spike Recovery: 0 out of 102 outside limits

COMMENTS:

3A
WATER VOLATILE LAB CONTROL SAMPLE

VIYLCS

Lab Name: COMPUCHEM Contract: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix Spike - EPA Sample No.: VIYLCS

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (mg/L)	LCS CONCENTRATION (ug/L)	LCS % REC #	QC. LIMITS REC.
Dichlorodifluoromethane	50		52.5	105	30-155
Chloromethane	50		51.12	102	40-125
Vinyl Chloride	50		54.86	110	50-145
Bromomethane	50		58.01	116	30-145
Chloroethane	50		58.9	118	60-135
Trichlorofluoromethane	50		50.81	102	60-145
1,1-Dichloroethene	50		50.57	101	70-130
Carbon disulfide	50		51.99	104	35-160
1,1,2-trichloro-1,2,2-t	50		52.68	105	78-150
Acetone	125		119.9	96	40-140
Methylene Chloride	50		50.65	101	55-140
trans-1,2-Dichloroethen	50		49.37	99	60-140
Methyl-tert-butyl ether	50		47.69	95	65-125
1,1-Dichloroethane	50		50.74	101	70-135
cis-1,2-Dichloroethene	50		49.91	100	70-125
2-butanone	125		128.2	103	30-150
Chloroform	50		50.46	101	65-135
1,1,1-Trichloroethane	50		48.52	97	65-130
Carbon Tetrachloride	50		49.43	99	65-140
1,1-dichloropropene	50		52.08	104	75-130
Benzene	50		51.74	103	80-120
1,2-Dichloroethane	50		48.03	96	70-130
Trichloroethene	50		49.9	100	70-125
1,2-Dichloropropane	50		52.48	105	75-125
Bromodichloromethane	50		49.45	99	75-120
cis-1,3-Dichloropropene	50		50.79	102	70-130
4-Methyl-2-pentanone	125		113.8	91	60-135
Toluene	50		51.14	102	75-120

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

COMMENTS:

3A
WATER VOLATILE LAB CONTROL SAMPLE

VIYLCS

Lab Name: COMPUCHEM Contract: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix Spike - EPA Sample No.: VIYLCS

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (mg/L)	LCS CONCENTRATION (ug/L)	LCS % REC #	QC. LIMITS REC.
trans-1,3-Dichloroprope	50		50.06	100	55-140
1,1,2-Trichloroethane	50		49.55	99	75-125
Tetrachloroethene	50		52.18	104	45-150
2-hexanone	125		128.1	102	55-130
Dibromochloromethane	50		48.56	97	50-150
1,2-Dibromoethane	50		49.35	99	80-120
Chlorobenzene	50		51.75	104	80-120
Ethylbenzene	50		53	106	75-125
Styrene	50		53.3	107	65-135
Bromoform	50		45.33	91	70-130
Isopropyl Benzene	50		54.65	109	75-125
1,1,2,2-Tetrachloroetha	50		49.53	99	65-130
1,3-Dichlorobenzene	50		50.71	101	75-125
1,4-Dichlorobenzene	50		51.56	103	75-125
1,2-Dichlorobenzene	50		50.27	101	70-120
1,2-Dibromo-3-Chloropro	50		45.56	91	50-130
1,2,4-Trichlorobenzene	50		50.75	102	65-135
Naphthalene	50		48.8	98	55-140
1,2-Dichloroethene (tot	100		99.3	99	50-150
Xylene (total)	150		159.4	106	50-150
Methyl acetate	50		50.65	101	50-150
Cyclohexane	50		53.96	108	50-150
Methylcyclohexane	50		55.62	111	50-150

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

COMMENTS:

3A
WATER VOLATILE LAB CONTROL SAMPLE

VIYLCS

Lab Name: COMPUCHEM Contract: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix Spike - EPA Sample No.: VIYLCS

COMPOUND	SPIKE ADDED (ug/L)	LCSD CONCENTRATION (ug/L)	LCSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
Dichlorodifluoromethane	50	50.27	101	4	30	30-155
Chloromethane	50	48.63	97	5	30	40-125
Vinyl Chloride	50	50.11	100	10	30	50-145
Bromomethane	50	58.44	117	1	30	30-145
Chloroethane	50	57.27	115	3	30	60-135
Trichlorofluoromethane	50	49.24	98	4	30	60-145
1,1-Dichloroethene	50	48.85	98	3	30	70-130
Carbon disulfide	50	50.91	102	2	30	35-160
1,1,2-trichloro-1,2,2-t	50	51.64	103	2	30	78-150
Acetone	125	121.2	97	1	30	40-140
Methylene Chloride	50	50.17	100	1	30	55-140
trans-1,2-Dichloroethen	50	48.27	97	2	30	60-140
Methyl-tert-butyl ether	50	48.85	98	3	30	65-125
1,1-Dichloroethane	50	50.37	101	0	30	70-135
cis-1,2-Dichloroethene	50	49.66	99	1	30	70-125
2-butanone	125	122.7	98	5	30	30-150
Chloroform	50	50	100	1	30	65-135
1,1,1-Trichloroethane	50	47.61	95	2	30	65-130
Carbon Tetrachloride	50	48.71	97	2	30	65-140
1,1-dichloropropene	50	51	102	2	30	75-130
Benzene	50	50.92	102	1	30	80-120
1,2-Dichloroethane	50	46.44	93	3	30	70-130
Trichloroethene	50	49.07	98	2	30	70-125
1,2-Dichloropropane	50	51.93	104	1	30	75-125
Bromodichloromethane	50	48.85	98	1	30	75-120
cis-1,3-Dichloropropene	50	49.71	99	3	30	70-130
4-Methyl-2-pentanone	125	116.6	93	2	30	60-135
Toluene	50	51.08	102	0	30	75-120

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

COMMENTS:

3A
WATER VOLATILE LAB CONTROL SAMPLE

VIYLCS

Lab Name: COMPUCHEM Contract: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix Spike - EPA Sample No.: VIYLCS

COMPOUND	SPIKE ADDED (ug/L)	LCSD CONCENTRATION (ug/L)	LCSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
trans-1,3-Dichloroprope	50	51.15	102	2	30	55-140
1,1,2-Trichloroethane	50	50.83	102	3	30	75-125
Tetrachloroethene	50	51.01	102	2	30	45-150
2-hexanone	125	135.2	108	6	30	55-130
Dibromochloromethane	50	50.07	100	3	30	50-150
1,2-Dibromoethane	50	49.92	100	1	30	80-120
Chlorobenzene	50	52.43	105	1	30	80-120
Ethylbenzene	50	53.95	108	2	30	75-125
Styrene	50	53.62	107	0	30	65-135
Bromoform	50	46.99	94	3	30	70-130
Isopropyl Benzene	50	54.89	110	1	30	75-125
1,1,2,2-Tetrachloroetha	50	51.04	102	3	30	65-130
1,3-Dichlorobenzene	50	51.09	102	1	30	75-125
1,4-Dichlorobenzene	50	52.55	105	2	30	75-125
1,2-Dichlorobenzene	50	52.88	106	5	30	70-120
1,2-Dibromo-3-Chloropro	50	48.35	97	6	30	50-130
1,2,4-Trichlorobenzene	50	53.7	107	5	30	65-135
Naphthalene	50	54.81	110	12	30	55-140
1,2-Dichloroethene (tot	100	97.96	98	1	30	50-150
Xylene (total)	150	161	107	1	30	50-150
Methyl acetate	50	48.88	98	3	30	50-150
Cyclohexane	50	53.08	106	2	30	50-150
Methylcyclohexane	50	54.94	110	1	30	50-150

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 0 out of 51 outside limits
Spike Recovery: 0 out of 102 outside limits

COMMENTS:

3A
WATER VOLATILE LAB CONTROL SAMPLE

VIZLCS

Lab Name: COMPUCHEM Contract: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix Spike - EPA Sample No.: VIZLCS

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (mg/L)	LCS CONCENTRATION (ug/L)	LCS % REC #	QC. LIMITS REC.
Dichlorodifluoromethane	50		47.89	96	30-155
Chloromethane	50		38.37	77	40-125
Vinyl Chloride	50		39.79	80	50-145
Bromomethane	50		31.7	63	30-145
Chloroethane	50		49.27	99	60-135
Trichlorofluoromethane	50		50.89	102	60-145
1,1-Dichloroethene	50		48.29	97	70-130
Carbon disulfide	50		46.44	93	35-160
1,1,2-trichloro-1,2,2-t	50		51.5	103	78-150
Acetone	125		117.3	94	40-140
Methylene Chloride	50		46.97	94	55-140
trans-1,2-Dichloroethen	50		49.67	99	60-140
Methyl-tert-butyl ether	50		45.57	91	65-125
1,1-Dichloroethane	50		47.95	96	70-135
cis-1,2-Dichloroethene	50		49.38	99	70-125
2-butanone	125		119.9	96	30-150
Chloroform	50		49.2	98	65-135
1,1,1-Trichloroethane	50		50.32	101	65-130
Carbon Tetrachloride	50		47.59	95	65-140
1,1-dichloropropene	50		49.44	99	75-130
Benzene	50		48.84	98	80-120
1,2-Dichloroethane	50		46.51	93	70-130
Trichloroethene	50		47.87	96	70-125
1,2-Dichloropropane	50		49.25	98	75-125
Bromodichloromethane	50		48.06	96	75-120
cis-1,3-Dichloropropene	50		46.38	93	70-130
4-Methyl-2-pentanone	125		109.6	88	60-135
Toluene	50		51.26	103	75-120

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

COMMENTS: _____

3A
WATER VOLATILE LAB CONTROL SAMPLE

VIZLCS

Lab Name: COMPUCHEM Contract: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix Spike - EPA Sample No.: VIZLCS

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (mg/L)	LCS CONCENTRATION (ug/L)	LCS % REC #	QC. LIMITS REC.
trans-1,3-Dichloroprope	50		48.93	98	55-140
1,1,2-Trichloroethane	50		52.19	104	75-125
Tetrachloroethene	50		55.18	110	45-150
2-hexanone	125		126.1	101	55-130
Dibromochloromethane	50		47.2	94	50-150
1,2-Dibromoethane	50		50.03	100	80-120
Chlorobenzene	50		52.53	105	80-120
Ethylbenzene	50		54.61	109	75-125
Styrene	50		53.83	108	65-135
Bromoform	50		48.76	98	70-130
Isopropyl Benzene	50		56.72	113	75-125
1,1,2,2-Tetrachloroetha	50		48.55	97	65-130
1,3-Dichlorobenzene	50		49.93	100	75-125
1,4-Dichlorobenzene	50		51.57	103	75-125
1,2-Dichlorobenzene	50		51.48	103	70-120
1,2-Dibromo-3-Chloropro	50		50.55	101	50-130
1,2,4-Trichlorobenzene	50		54.12	108	65-135
Naphthalene	50		44.94	90	55-140
1,2-Dichloroethene (tot	100		99.04	99	50-150
Xylene (total)	150		161.8	108	50-150
Methyl acetate	50		46.83	94	50-150
Cyclohexane	50		50.03	100	50-150
Methylcyclohexane	50		53.8	108	50-150

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

COMMENTS:

3A
WATER VOLATILE LAB CONTROL SAMPLE

VIZLCS

Lab Name: COMPUCHEM Contract: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix Spike - EPA Sample No.: VIZLCS

COMPOUND	SPIKE ADDED (ug/L)	LCSD CONCENTRATION (ug/L)	LCSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
Dichlorodifluoromethane	50	47.89	96	0	30	30-155
Chloromethane	50	34.64	69	11	30	40-125
Vinyl Chloride	50	38.26	77	4	30	50-145
Bromomethane	50	54.95	110	54*	30	30-145
Chloroethane	50	54.63	109	10	30	60-135
Trichlorofluoromethane	50	51.89	104	2	30	60-145
1,1-Dichloroethene	50	48.93	98	1	30	70-130
Carbon disulfide	50	46.41	93	0	30	35-160
1,1,2-trichloro-1,2,2-t	50	51.97	104	1	30	78-150
Acetone	125	95.12	76	21	30	40-140
Methylene Chloride	50	48.49	97	3	30	55-140
trans-1,2-Dichloroethen	50	48.9	98	1	30	60-140
Methyl-tert-butyl ether	50	43.87	88	3	30	65-125
1,1-Dichloroethane	50	46.55	93	3	30	70-135
cis-1,2-Dichloroethene	50	49.19	98	1	30	70-125
2-butanone	125	101.1	81	17	30	30-150
Chloroform	50	47.85	96	2	30	65-135
1,1,1-Trichloroethane	50	49.63	99	2	30	65-130
Carbon Tetrachloride	50	48.17	96	1	30	65-140
1,1-dichloropropene	50	47.9	96	3	30	75-130
Benzene	50	47.99	96	2	30	80-120
1,2-Dichloroethane	50	43.9	88	6	30	70-130
Trichloroethene	50	46.84	94	2	30	70-125
1,2-Dichloropropane	50	46.87	94	4	30	75-125
Bromodichloromethane	50	46.41	93	3	30	75-120
cis-1,3-Dichloropropene	50	46.76	94	1	30	70-130
4-Methyl-2-pentanone	125	97.74	78	12	30	60-135
Toluene	50	50.9	102	1	30	75-120

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

COMMENTS:

3A
WATER VOLATILE LAB CONTROL SAMPLE

VIZLCS

Lab Name: COMPUCHEM Contract: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix Spike - EPA Sample No.: VIZLCS

COMPOUND	SPIKE ADDED (ug/L)	LCSD CONCENTRATION (ug/L)	LCSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
trans-1,3-Dichloroprope	50	48.3	97	1	30	55-140
1,1,2-Trichloroethane	50	52.27	105	1	30	75-125
Tetrachloroethene	50	53.96	108	2	30	45-150
2-hexanone	125	110.8	89	13	30	55-130
Dibromochloromethane	50	47.18	94	0	30	50-150
1,2-Dibromoethane	50	50.7	101	1	30	80-120
Chlorobenzene	50	52.95	106	1	30	80-120
Ethylbenzene	50	55.06	110	1	30	75-125
Styrene	50	53.39	107	1	30	65-135
Bromoform	50	46.22	92	6	30	70-130
Isopropyl Benzene	50	56.65	113	0	30	75-125
1,1,2,2-Tetrachloroetha	50	45.82	92	5	30	65-130
1,3-Dichlorobenzene	50	49.32	99	1	30	75-125
1,4-Dichlorobenzene	50	49.84	100	3	30	75-125
1,2-Dichlorobenzene	50	50.06	100	3	30	70-120
1,2-Dibromo-3-Chloropro	50	43.92	88	14	30	50-130
1,2,4-Trichlorobenzene	50	54.61	109	1	30	65-135
Naphthalene	50	48.96	98	9	30	55-140
1,2-Dichloroethene (tot	100	98.1	98	1	30	50-150
Xylene (total)	150	163.3	109	1	30	50-150
Methyl acetate	50	40.52	81	15	30	50-150
Cyclohexane	50	47.87	96	4	30	50-150
Methylcyclohexane	50	51.92	104	4	30	50-150

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 1 out of 51 outside limits
Spike Recovery: 0 out of 102 outside limits

COMMENTS:

FORM 3
WATER VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix Spike - Sample No.: SA-PZ-160I

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC #	QC. LIMITS REC.
Dichlorodifluoromethane	83.5	0.0	79.48	95	30-155
Chloromethane	83.5	0.0	85.95	103	40-125
Vinyl Chloride	83.5	0.0	89.36	107	50-145
Bromomethane	83.5	0.0	89.06	107	30-145
Chloroethane	83.5	26.28	106.9	97	60-135
Trichlorofluoromethane	83.5	0.0	77.57	93	60-145
1,1-Dichloroethene	83.5	17.24	90.63	88	70-130
Carbon disulfide	83.5	0.0	80.11	96	35-160
1,1,2-trichloro-1,2,2-t	83.5	0.0	73.13	88	78-150
Acetone	208.8	0.0	207.1	99	40-140
Methylene Chloride	83.5	2.033	79.38	93	55-140
trans-1,2-Dichloroethen	83.5	0.0	75.25	90	60-140
Methyl-tert-butyl ether	83.5	0.0	78.46	94	65-125
1,1-Dichloroethane	83.5	210.9	267.7	68*	70-135
cis-1,2-Dichloroethene	83.5	0.0	79.14	95	70-125
2-butanone	208.8	0.0	214.9	103	30-150
Chloroform	83.5	0.0	80.52	96	65-135
1,1,1-Trichloroethane	83.5	53.03	130	92	65-130
Carbon Tetrachloride	83.5	0.0	78.32	94	65-140
1,1-dichloropropene	83.5	0.0	78.23	94	75-130
Benzene	83.5	0.4799	80.47	96	80-120
1,2-Dichloroethane	83.5	0.0	81.53	98	70-130
Trichloroethene	83.5	0.0	75.11	90	70-125
1,2-Dichloropropane	83.5	0.0	83.76	100	75-125
Bromodichloromethane	83.5	0.0	81.65	98	75-120
cis-1,3-Dichloropropene	83.5	0.0	79.83	96	70-130
4-Methyl-2-pentanone	208.8	0.0	196	94	60-135
Toluene	83.5	1.444	78.17	92	75-120

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

COMMENTS:

FORM 3
WATER VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix Spike - Sample No.: SA-PZ-160I

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC #	QC. LIMITS REC.
trans-1,3-Dichloroprope	83.5	0.0	82.34	99	55-140
1,1,2-Trichloroethane	83.5	0.0	78.94	95	75-125
Tetrachloroethene	83.5	0.0	71.76	86	45-150
2-hexanone	208.8	0.0	230.6	110	55-130
Dibromochloromethane	83.5	0.0	78.84	94	50-150
1,2-Dibromoethane	83.5	0.0	80.79	97	80-120
Chlorobenzene	83.5	0.0	80.25	96	80-120
Ethylbenzene	83.5	0.0	79.27	95	75-125
Styrene	83.5	0.0	81.13	97	65-135
Bromoform	83.5	0.0	74.91	90	70-130
Isopropyl Benzene	83.5	0.0	80.36	96	75-125
1,1,2,2-Tetrachloroetha	83.5	0.0	78.2	94	65-130
1,3-Dichlorobenzene	83.5	0.0	77.87	93	75-125
1,4-Dichlorobenzene	83.5	0.0	81.08	97	75-125
1,2-Dichlorobenzene	83.5	0.0	79.59	95	70-120
1,2-Dibromo-3-Chloropro	83.5	0.0	75.16	90	50-130
1,2,4-Trichlorobenzene	83.5	1.914	81.46	95	65-135
Naphthalene	83.5	4.476	78.53	89	55-140
1,2-Dichloroethene (tot	167	0.0	154.5	93	50-150
Xylene (total)	250.5	0.0	236.8	95	50-150
Methyl acetate	83.5	0.0	80.22	96	50-150
Cyclohexane	83.5	0.0	79.21	95	50-150
Methylcyclohexane	83.5	0.0	72.74	87	50-150

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

COMMENTS: _____

FORM 3
WATER VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix Spike - Sample No.: SA-PZ-160I

COMPOUND	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
Dichlorodifluoromethane	83.5	77.99	93	2	30	30-155
Chloromethane	83.5	85.33	102	1	30	40-125
Vinyl Chloride	83.5	87.75	105	2	30	50-145
Bromomethane	83.5	88.25	106	1	30	30-145
Chloroethane	83.5	106.3	96	1	30	60-135
Trichlorofluoromethane	83.5	76.63	92	1	30	60-145
1,1-Dichloroethene	83.5	89.53	87	1	30	70-130
Carbon disulfide	83.5	78.06	93	3	30	35-160
1,1,2-trichloro-1,2,2-t	83.5	71.13	85	3	30	78-150
Acetone	208.8	211.7	101	2	30	40-140
Methylene Chloride	83.5	78.57	92	1	30	55-140
trans-1,2-Dichloroethen	83.5	75.45	90	0	30	60-140
Methyl-tert-butyl ether	83.5	81.85	98	4	30	65-125
1,1-Dichloroethane	83.5	266.4	66*	0	30	70-135
cis-1,2-Dichloroethene	83.5	78.01	93	1	30	70-125
2-butanone	208.8	230.8	111	7	30	30-150
Chloroform	83.5	80.05	96	1	30	65-135
1,1,1-Trichloroethane	83.5	128.2	90	1	30	65-130
Carbon Tetrachloride	83.5	76.78	92	2	30	65-140
1,1-dichloropropene	83.5	78.3	94	0	30	75-130
Benzene	83.5	79.21	94	2	30	80-120
1,2-Dichloroethane	83.5	82.88	99	2	30	70-130
Trichloroethene	83.5	75.56	90	1	30	70-125
1,2-Dichloropropane	83.5	83.35	100	0	30	75-125
Bromodichloromethane	83.5	82.17	98	1	30	75-120
cis-1,3-Dichloropropene	83.5	81.02	97	1	30	70-130
4-Methyl-2-pentanone	208.8	206.4	99	5	30	60-135
Toluene	83.5	76.66	90	2	30	75-120

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

COMMENTS:

FORM 3
WATER VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: COMPUCHEM Method: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix Spike - Sample No.: SA-PZ-160I

COMPOUND	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
trans-1,3-Dichloroprope	83.5	82.25	99	0	30	55-140
1,1,2-Trichloroethane	83.5	81.15	97	3	30	75-125
Tetrachloroethene	83.5	70.9	85	1	30	45-150
2-hexanone	208.8	245.2	117	6	30	55-130
Dibromochloromethane	83.5	80.46	96	2	30	50-150
1,2-Dibromoethane	83.5	79.53	95	2	30	80-120
Chlorobenzene	83.5	79.83	96	1	30	80-120
Ethylbenzene	83.5	77.22	92	3	30	75-125
Styrene	83.5	80.87	97	0	30	65-135
Bromoform	83.5	76.92	92	3	30	70-130
Isopropyl Benzene	83.5	78.91	95	2	30	75-125
1,1,2,2-Tetrachloroetha	83.5	81.77	98	4	30	65-130
1,3-Dichlorobenzene	83.5	77.69	93	0	30	75-125
1,4-Dichlorobenzene	83.5	78.1	94	4	30	75-125
1,2-Dichlorobenzene	83.5	80.47	96	1	30	70-120
1,2-Dibromo-3-Chloropro	83.5	81.03	97	8	30	50-130
1,2,4-Trichlorobenzene	83.5	84.5	99	4	30	65-135
Naphthalene	83.5	84.65	96	8	30	55-140
1,2-Dichloroethene (tot	167	153.5	92	1	30	50-150
Xylene (total)	250.5	234.3	94	1	30	50-150
Methyl acetate	83.5	86.89	104	8	30	50-150
Cyclohexane	83.5	77.54	93	2	30	50-150
Methylcyclohexane	83.5	72.88	87	0	30	50-150

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 0 out of 51 outside limits
Spike Recovery: 2 out of 102 outside limits

COMMENTS: _____

CompuChem

a division of Liberty Analytical Corporation
501 Madison Avenue
Cary, N.C. 27513
Tel: 919/379-4100 Fax: 919/379-4050

SDG NARRATIVE
SDG # 1007021
PROTOCOL: SW-846
PROJECT: CTO-WE08/ 112G02045
PM: DAVE BRAYACK

SAMPLE IDENTIFICATIONS: SA-PZ-160I, SA-PZ-159I, SA-PZ-151I1, SA-PZ-157I1, SA-PZ-155I, 20100707-DUP

The six water samples listed above were received intact, refrigerated at 2.5°C, with proper documentation, in sealed shipping containers, on July 8, 2010. The samples were scheduled for the requested analysis by SW-846, 3rd Edition, Update 4, Method RSK-175 for Methane, Ethane, Ethene. All pertinent Quality Assurance notices are included in the narrative section and all pertinent Laboratory notices for SDG # 1007021 included in the sample data sections.

The samples were prepped and analyzed within the method holding time.

Target analytes were present above the reporting limits in the samples. Samples SA-PZ-151I1, SA-PZ-157I1, SA-PZ-159I1 were analyzed and reported at a dilution, as well as neat or a lesser dilution, due to target analytes exceeding the calibration range.

All QC criteria were met for all initial and continuing calibration standards associated to this SDG.

The method blanks associated with the samples met all quality control criteria.

Duplicate matrix spikes were performed with sample SA-PZ-160I, and met recovery and precision criteria. The Laboratory Control Sample (LCS) that were prepared and analyzed with the samples met recovery criteria.

I certify that the tests used in this report meet all requirements of the NELAC standards unless otherwise stated in the SDG narrative or QA notice.

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on CD has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Teresa Amentt Jennings

Teresa Amentt Jennings
GC/HPLC Data Reviewer
July 13, 2010

GC and GC/MS Column and Trap Specifications Table

SDG #: 1007021

COLUMNS

Columns Utilized	Brand Name	Coating Material	ID (mm)	Film Thickness (um)	Length (m)
	GC Laboratory				
	Restek	RTX-5	0.53	1.0	30
	Restek	RTX-SMS	0.53	1.0	30
	Restek	clpest	0.32	0.5	30
	Restek	clpest2	0.32	0.42	30
	J&W	DB-210	0.53	1.0	30
✓	J&W	GS-GASPRO	0.32	N/A	30
	GC Volatiles Laboratory				
	Restek	RTX-Volatiles	0.53	2.0	30
	GC/MS Volatiles Laboratory				
	Restek	RTX-VMS	0.18	1.0	20
	Supelco	SPB-624	0.32	1.8	60
	Supelco	SPB-624	0.53	3.0	75
	Phenomonex	ZB-624	0.32	1.8	60
	GC/MS Semivolatiles Laboratory				
	Restek	RTX-5MS	0.32	0.25	30
	HPLC Laboratory				
	Supelco	Supelcosil LC-PAH	4.6	5.0	15 cm
	Supelco	Discovery RP Amide C16	4.6	5.0	25 cm
	Restek	Pinnacle Cyano	4.6	5.0	25 cm
	Restek	Allure C18	4.6	5.0	25 cm

TRAPS

GC and GC/MS Volatiles Laboratory	
Supelco J (BETXTRAP™)	* 7.7 cm Carbopack C
	* 1.2 cm Carbopack B
Supelco K (Vocarb3000)	* 10 cm of Carbopack B (Graphitized Carbons)
	* 6 cm of Carboxen 1000 (Carbon molecular sieves)
	* 1 cm of Carboxen 1001 (Carbon molecular sieves)

Rev. 28

CompuChem

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CompuChem's Pagination Convention

As required by the EPA CLP Statement of Work (SOW) documents, data to be delivered must be paginated (by machine or hand). In the event that the initial numbering is incorrect (a page numbered twice or a page skipped, for example), it is CompuChem's policy to add an alphabetic suffix to a page number when necessary (e.g., 100A, 100B, etc.).

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Notification Regarding Manual Editing/Integration Flags

In some instances, manual adjustments to the software output are necessary to provide accurate data. These manual integrations are performed by the data reviewers, GC/MS operators, or GC chemists. An Extracted Ion Current Profile (EICP) or a GC chromatographic peak has been provided for the manual integration performed on each compound to demonstrate the accuracy of that process. The manual integrations are flagged on the quantitation report in the far right column beyond the FINAL concentration for GC/MS analysis, and in the "Flags" column for GC analysis. The manual editing/integration flags are:

M - Denotes that a manual integration has been performed for this compound. The manual integration was performed in order to provide the most accurate area count possible for the peak.

H - Denotes that the data reviewer, GC/MS operator, or GC Chemist has chosen an alternate peak within the retention time window from that chosen by the software for that compound. No manual integration is performed in choosing an alternate peak. The software still performs the integration.

MH - Denotes that an alternate peak has been chosen within the retention time window from that chosen by the software for that compound and also a manual integration of the chosen peak has been performed. The manual integration was performed in order to provide the most accurate area count possible for the peak.

L - Denotes that a data reviewer or GC/MS operator has selected an alternate library search. This is typically done when an additional tentatively identified compound (TIC) has been added to the number of peaks searched. No manual integration is performed in choosing an alternate peak. The software still performs the integration.

ML - Denotes that an alternate library search has been selected and a manual integration has also been performed. This is typically done when an additional TIC has been added and the TIC peak also required a manual integration.

The EPA CLP SOW documents require additional explanations for manual editing/integration. In the accompanying raw data packages, additional codes have been applied to the "M" flag and carry the following meanings;

M1 - The compound was not found by the automatic integration routine.

M2 - The compound was incorrectly integrated by the automatic integration routine.

M3 - The co-eluting compounds were incorrectly integrated by the automatic integration routine.

These codes will appear in the GC/MS and GC raw data.

Revision 7 (12/6/2005)

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DATA REPORTING QUALIFIERS

On the Form I, under the column labeled "Q" for qualifier, each result is flagged with the specific data reporting qualifiers listed below, as appropriate. Up to five qualifiers may be reported on Form I for each compound. The qualifiers used are:

U : This flag indicates the compound was analyzed for but not detected. The Contract Required Quantitation Limit (CRQL), or reporting limit, will be adjusted to reflect any dilution and, for soils, the percent moisture.

J : This flag indicates an estimated value. The flag is used as detailed below:

1. When estimating a concentration for tentatively identified compounds (TICs) where a response factor of 1:1 is assumed for the TIC analyte,

2. When the mass spectral and retention time data indicate the presence of a compound that meets the volatile and semivolatile GC/MS identification criteria, and the result is less than the adjusted CRQL (or Reporting Limit) but greater than zero, and

3. When the retention time data indicate the presence of a compound that meets the pesticide and/or Aroclor or other GC or HPLC identification criteria, and the result is less than the adjusted CRQL (or Reporting Limit) but greater than zero. For example, if the CRQL (or Reporting Limit) is 10 µg/L, but a concentration of 3 µg/L is calculated, it is reported as 3J.

N : This flag indicates presumptive evidence of a compound. This flag is only used for TICs, where the identification is based on a mass spectral library search and must be used with the J flag. For generic characterization of a TIC such as "chlorinated hydrocarbon" (or for an "unknown," with no matches ≥ 85% in the SOM01.2 SOW document), the N flag is not used.

P : In the EPA's Contract Laboratory Program (CLP), this flag is used for a pesticide/Aroclor target analyte, when there is greater than 25% difference for detected concentrations between the two GC columns. The lower of the two values is reported on the Form I and flagged with a P.
For SW-846 GC and HPLC analyses, when the Relative Percent Difference (RPD) is greater than 40% and there is no evidence of chromatographic anomalies or interferences, then the lower of the two values is reported and flagged with a P. When the RPD is equal to or less than 40%, our policy is to also report the lower of the two values, although the choice could be a project specific issue. These SW-846 policies are consistent with Method 8000C. If Method 8000B is required, the higher of the two values is reported. For certain HPLC analyses, if one of the HPLC columns displays co-elution of target analytes, all results are reported from a primary column displaying no co-elution. Results are still flagged with a P if the RPD between columns is greater than 40%.

C : This flag applies to GC or HPLC results where the identification has been confirmed by GC/MS. If GC/MS confirmation was attempted but was unsuccessful, this flag is not applied; a laboratory-defined flag is used instead (see the X/Y/Z qualifier.)

DATA REPORTING QUALIFIERS (continued)

B : This flag is used when the analyte is found in the associated blank as well as in the sample. It indicates probable blank contamination and warns the data user to take appropriate action. This flag is used for a TIC as well as for a positively identified target compound. The combination of flags BU or UB is not an allowable policy. Blank contaminants are flagged B only when they are detected in the sample.

E : This flag identifies compounds whose concentrations exceed the upper level of the calibration range of the instrument for that specific analysis. If one or more compounds have a concentration greater than the upper level of the calibration range, the sample or extract will be diluted and reanalyzed. All such compounds with a concentration greater than the upper level of the calibration range will have the result flagged with an E on Form I for the original analysis.

D : If a sample or extract is reanalyzed at a higher dilution factor, for example when the concentration of an analyte exceeds the upper calibration range, the DL suffix is appended to the sample number on the Form I for the more diluted sample, and **all** reported concentrations on that Form I are flagged with the D flag. This flag alerts data users that any discrepancies between the reported concentrations may be due to dilution of the sample or extract.

NOTE 1: The D flag is not applied to compounds which are not detected in the sample analysis i.e. compounds reported with the CRQL (or Reporting Limit) and the U flag.

NOTE 2: Separate Forms I are used for reporting the original analysis (Client Sample No. XXXXX) and the more diluted sample analysis (Client Sample No. XXXXXDL) i.e. the results from both analyses <u>are not combined</u> on a single Form I.

A: This flag indicates that a TIC is a suspected aldol-condensation product.

S: In the SOM01.2 SOW document, this flag is used to indicate an estimated value for Aroclor target compounds where a valid 5-point initial calibration was not performed prior to the analytes detection in a sample. If an "S" flag is used for a specific Aroclor, then a reanalysis of the sample is required after a valid 5-point calibration is performed for the detected Aroclor.

X/Y/Z : Other specific flags may be required to properly define the results. If used, the flags will be fully described in the SDG Narrative. The laboratory-defined flags are limited to X, Y, and Z.

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Client: TETRA TECH **Work:** 1007021

Project: CTO-WE08/7 DAY TAT/112G02045/N62472-03-D-0057 **Sdg:** DRAFT 1007021

Lab ID	Client ID	Matrix	Date Sampled	Date Received
1007021-01	SA-PZ-160I	Water	7/7/10 3:40 pm	7/8/10 9:10 am
1007021-02	SA-PZ-159I	Water	7/7/10 10:15 am	7/8/10 9:10 am
1007021-03	SA-PZ-151I1	Water	7/7/10 12:20 pm	7/8/10 9:10 am
1007021-04	SA-PZ-157I1	Water	7/7/10 10:00 am	7/8/10 9:10 am
1007021-05	SA-PZ-155I	Water	7/7/10 12:12 pm	7/8/10 9:10 am
1007021-06	20100707-DUP	Water	7/7/10 1:05 pm	7/8/10 9:10 am
1007021-07	SA-TB20100706	Water	7/6/10 8:30 am	7/8/10 9:10 am
1007021-08	SA-PZ-158I	Water	7/6/10 11:45 am	7/8/10 9:10 am
1007021-09	SA-PZ-158I1	Water	7/6/10 1:10 pm	7/8/10 9:10 am
1007021-10	SA-PZ-160I1	Water	7/6/10 3:40 pm	7/8/10 9:10 am
1007021-11	SA-PZ-138I1	Water	7/6/10 5:45 pm	7/8/10 9:10 am
1007021-12	SA-PZ-161I	Water	7/7/10 3:42 pm	7/8/10 9:10 am
1007021-13	SA-PZ-159I1	Water	7/8/10 1:40 pm	7/9/10 10:00 am
1007021-14	SA-PZ-157I	Water	7/8/10 1:47 pm	7/9/10 10:00 am
1007021-15	SA-TB-20100708	Water	7/8/10 8:00 am	7/9/10 10:00 am
1007021-16	SA-PZ-138I	Water	7/8/10 9:55 am	7/9/10 10:00 am
1007021-17	20100708-DUP	Water	7/8/10 10:00 am	7/9/10 10:00 am
1007021-18	SA-PZ-149I1	Water	7/8/10 9:47 am	7/9/10 10:00 am
1007021-19	SA-PZ-133I	Water	7/8/10 4:05 pm	7/9/10 10:00 am
1007021-20	SA-PZ-139I	Water	7/8/10 3:42 pm	7/9/10 10:00 am

8D
PESTICIDE ANALYTICAL SEQUENCE

Lab Name: COMPUCHEM Contract: RSK 175

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

GC Column: J&W GS-GASPRO ID: 0.32 (mm) Init. Calib. Date(s): 07/01/10 07/01/1

Instrument ID: VARIAN67

THE ANALYTICAL SEQUENCE OF PERFORMANCE EVALUATION MIXTURES, BLANKS, SAMPLES, AND STANDARDS IS GIVEN BELOW:

	MEAN SURROGATE RT FROM INITIAL CALIBRATION					
	EPA SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED	RT #	RT #
01	CALFTA	0G01009-CAL6	07/01/10	1140		
02	CALETA	0G01009-CAL5	07/01/10	1151		
03	CALDTA	0G01009-CAL4	07/01/10	1225		
04	CALCTA	0G01009-CAL3	07/01/10	1247		
05	CALBTA	0G01009-CAL2	07/01/10	1303		
06	CALATA	0G01009-CAL1	07/01/10	1326		
07	CALDTI	SEQ-CCV1	07/12/10	0851		
08	PBLKAW	0070928-BLK1	07/12/10	0902		
09	PLCSAW	0070928-BS1	07/12/10	0908		
10	SA-PZ-160I	1007021-01	07/12/10	0938		
11	SA-PZ-159I	1007021-02	07/12/10	0943		
12	SA-PZ-151I1	1007021-03	07/12/10	0954		
13	SA-PZ-157I1	1007021-04	07/12/10	1005		
14	SA-PZ-155I	1007021-05	07/12/10	1016		
15	20100707-DUP	1007021-06	07/12/10	1027		
16	SA-PZ-159I1	1007021-13	07/12/10	1038		
17	SA-PZ-157I	1007021-14	07/12/10	1050		
18	SA-PZ-159I1D	1007021-13RE	07/12/10	1112		
19	SA-PZ-160IMS	0070928-MS1	07/12/10	1119		
20	SA-PZ-160IMS	0070928-MSD1	07/12/10	1128		
21	CALDTJ	SEQ-CCV2	07/12/10	1209		
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						
32						

QC LIMITS

Column used to flag retention time values with an asterisk.
* Values outside of QC limits.

page 1 of 1

FORM VIII PEST

FORM 6
VOLATILE INITIAL CALIBRATION DATA

Lab Name: COMPUCHEM Contract: RSK 175

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Instrument ID: VARIAN67 Calibration Date(s): 07/01/10 07/01/10

Column: J&W GS-GASPRO ID: 0.32 (mm) Calibration Time(s): 1140 1326

RF1000: 001T0G0100

COMPOUND	RF1000	CURVE	COEFFICENT A1	%RSD OR R^2
Methane	2643.717	AVRG	3046.71465	17.2
Ethane	2672.672	AVRG	2786.58483	6.5
Ethene	2708.683	AVRG	2796.86401	5.9

FORM VI VOA

FORM 6
VOLATILE INITIAL CALIBRATION DATA

Lab Name: COMPUCHEM Contract: RSK 175

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Instrument ID: VARIAN67 Calibration Date(s): 07/01/10 07/01/10

Column: J&W GS-GASPRO ID: 0.32 (mm) Calibration Time(s): 1140 1326

LAB FILE ID: RF10: 006T0G01009-RF20: 005T0G01009-RF50: 004T0G01009-RF100: 003T0G01009RF500: 002T0G01009

COMPOUND	RF10	RF20	RF50	RF100	RF500
Methane	3984.293	3252.632	3015.035	2542.583	2842.028
Ethane	3023.364	2786.448	2797.393	2510.841	2928.790
Ethene	3000.000	2787.129	2802.372	2538.100	2944.901

FORM VI VOA

FORM 6
VOLATILE INITIAL CALIBRATION DATA

Lab Name: COMPUCHEM Contract: RSK 175

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Instrument ID: VARIAN67 Calibration Date(s): 07/01/10 07/01/10

Column: J&W GS-GASPRO ID: 0.32 (mm) Calibration Time(s): 1140 1326

RT6: 001T0G01009-C

COMPOUND	RT6	MEAN RT	RT WINDOW FROM	RT WINDOW TO
Methane	1.557	1.558	1.453	1.653
Ethane	1.752	1.754	1.655	1.855
Ethene	1.828	1.831	1.733	1.933

FORM VI VOA

FORM 6
VOLATILE INITIAL CALIBRATION DATA

Lab Name: COMPUCHEM Contract: RSK 175

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Instrument ID: VARIAN67 Calibration Date(s): 07/01/10 07/01/10

Column: J&W GS-GASPRO ID: 0.32 (mm) Calibration Time(s): 1140 1326

LAB FILE ID: RT1: 006T0G01009-CRT2: 005T0G01009-CRT3: 004T0G01009-C
RT4: 003T0G01009-CRT5: 002T0G01009-C

COMPOUND	RT1	RT2	RT3	RT4	RT5
Methane	1.553	1.558	1.560	1.562	1.558
Ethane	1.755	1.757	1.752	1.753	1.755
Ethene	1.833	1.833	1.828	1.833	1.830

FORM VI VOA

FORM 7B
VOLATILE CALIBRATION VERIFICATION SUMMARY

Lab Name: COMPUCHEM Contract: RSK 175

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Instrument ID: VARIAN67 Calibration Date: 07/12/10 Time: 0851

Lab File ID: 042TSEQ-CCV1 Init. Calib. Date(s): 07/01/10 07/01/10

Init. Calib. Times: 1140 1326

GC Column: J&W GS-GASPRO ID: 0.32 (mm)

COMPOUND	RRF OR AMOUNT	RRF100.00 OR AMOUNT	MIN RRF	%D OR %DRIFT	MAX %D OR %DRIFT	CURV TYPE
Methane	3046.7150	2546.3351	0.01	-16.42	25.00	AVRG
Ethane	2786.5850	2457.3551	0.01	-11.81	25.00	AVRG
Ethene	2796.8640	2504.9450	0.01	-10.44	25.00	AVRG

FORM VII VOA

FORM 7B
VOLATILE CALIBRATION VERIFICATION SUMMARY

Lab Name: COMPUCHEM Contract: RSK 175

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Instrument ID: VARIAN67 Calibration Date: 07/12/10 Time: 1209

Lab File ID: 057TSEQ-CCV2 Init. Calib. Date(s): 07/01/10 07/01/10

Init. Calib. Times: 1140 1326

GC Column: J&W GS-GASPRO ID: 0.32 (mm)

COMPOUND	RRF OR AMOUNT	RRF100.00 OR AMOUNT	MIN RRF	%D OR %DRIFT	MAX %D OR %DRIFT	CURV TYPE
Methane	3046.7150	3045.3752	0.01	-0.04	25.00	AVRG
Ethane	2786.5850	2882.4299	0.01	3.44	25.00	AVRG
Ethene	2796.8640	3010.7000	0.01	7.64	25.00	AVRG

FORM VII VOA

4C
PESTICIDE METHOD BLANK SUMMARY

EPA SAMPLE NO.

PBLKAW

Lab Name: COMPUCHEM Contract: RSK 175

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Lab Sample ID: 0070928-BLK1 Lab File ID: 043T0070928-BLK1

Matrix (soil/water) WATER Extraction:(SepF/Cont/Sonc)

Sulfur Cleanup (Y/N) N Date Extracted: 07/12/10

Date Analyzed (1): 07/12/10 Date Analyzed (2):

Time Analyzed (1): 0902 Time Analyzed (2):

Instrument ID (1): VARIAN67 Instrument ID (2):

GC Column (1): J&W GS-GASPRO ID: 0.32(mm) GC Column (2): ID:

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS and MSD:

	EPA SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED 1	DATE ANALYZED 2
01	PLCSAW	0070928-BS1	07/12/10	
02	SA-PZ-160I	1007021-01	07/12/10	
03	SA-PZ-159I	1007021-02	07/12/10	
04	SA-PZ-151I1	1007021-03	07/12/10	
05	SA-PZ-157I1	1007021-04	07/12/10	
06	SA-PZ-155I	1007021-05	07/12/10	
07	20100707-DUP	1007021-06	07/12/10	
08	SA-PZ-159I1	1007021-13	07/12/10	
09	SA-PZ-157I	1007021-14	07/12/10	
10	SA-PZ-159I1D	1007021-13RE1	07/12/10	
11	SA-PZ-160IMS	0070928-MS1	07/12/10	
12	SA-PZ-160IMS	0070928-MSD1	07/12/10	
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				

COMMENTS:

FORM IV PEST

1D
GC EXTRACTABLE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PBLKAW

Lab Name: COMPUCHEM Contract: RSK 175

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix: (soil/water) WATER Lab Sample ID: 0070928-BLK1

Sample wt/vol: 1.000 (g/mL) ML Lab File ID: _____

% Moisture: _____ decanted: (Y/N)___ Date Received: _____

Extraction: (SepF/Cont/Sonc) Date Extracted:07/12/10

Concentrated Extract Volume:_____(uL) Date Analyzed: 07/12/10

Injection Volume: _____(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: ___ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-82-8	Methane	0.5	U
74-84-0	Ethane	1	U
74-85-1	Ethene	1	U

FORM I PEST

3E
WATER PESTICIDE LAB CONTROL SAMPLE

Lab Name: COMPUCHEM Contract: RSK 175

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

LCS ID: PLCSAW

COMPOUND	SPIKE ADDED (ug/L)	LCS CONCENTRATION (ug/L)	LCS % REC #	QC. LIMITS REC.
Methane	6	6	100	58-120
Ethane	11	12	110	61-134
Ethene	10	11	110	58-129

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

Spike Recovery: 0 out of 3 outside limits

COMMENTS: _____

FORM III PEST-1

3E
WATER PESTICIDE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: COMPUCHEM Contract: RSK 175

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix Spike - EPA Sample No.: SA-PZ-160I

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC #	QC. LIMITS REC.
Methane	6	0.6	5	73	58-120
Ethane	11	0	10	91	61-134
Ethene	10	0	10	100	58-129

COMPOUND	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
Methane	6	6	90	18	20	58-120
Ethane	11	11	100	10	20	61-134
Ethene	10	10	100	0	20	58-129

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 0 out of 3 outside limits
Spike Recovery: 0 out of 6 outside limits

COMMENTS: _____

FORM III PEST-1

NWIRP CALVERTON
WATER DATA
1007021

FRACTION	CHEMICAL	SA-20100707-DUP	UNITS	SA-PZ-155I-20100707	RPD	D
OV	1,1,1-TRICHLOROETHANE	36	UG/L	38	5.41	2.00
OV	1,1-DICHLOROETHANE	150	UG/L	150	0.00	0.00
OV	1,1-DICHLOROETHENE	11	UG/L	12	8.70	1.00
OV	1,2-DICHLOROBENZENE	0.4 J	UG/L	ND	200.00	0.40 N/A <2xR.L.
OV	1,4-DICHLOROBENZENE	ND	UG/L	0.31 J	200.00	0.31 N/A <2xR.L.
OV	BENZENE	0.31 J	UG/L	0.33 J	6.25	0.02
OV	CHLOROETHANE	19	UG/L	17	11.11	2.00

Current RPD Quality Control Limit: 30 %.
Shaded cells indicate RPDs that exceed the applicable quality control limit.

NWIRP CALVERTON
WATER DATA
1007021

FRACTION	CHEMICAL	SA-20100707-DUP	UNITS	SA-PZ-155I-20100707	RPD	D
OVG	METHANE	12	UG/L	9	28.57	3.00

Current RPD Quality Control Limit: 30 %.
Shaded cells indicate RPDs that exceed the applicable quality control limit.

NWIRP CALVERTON
WATER DATA
1007021

FRACTION	CHEMICAL	SA-20100708-DUP	UNITS	SA-PZ-138I-20100708	RPD	D
OV	1,1,1-TRICHLOROETHANE	4.4 J	UG/L	4.4 J	0.00	0.00
OV	1,1-DICHLOROETHANE	20	UG/L	20	0.00	0.00
OV	1,1-DICHLOROETHENE	1 J	UG/L	1.2 J	18.18	0.20
OV	CHLOROETHANE	1.7 J	UG/L	ND	200.00	1.70 N/A<2xR.L.

Current RPD Quality Control Limit: 30 %.
Shaded cells indicate RPDs that exceed the applicable quality control limit.

TETRA TECH NUS, INC. **CALCULATION WORKSHEET** PAGE 1 OF 1

CLIENT NWIRP Calverton		JOB NUMBER 02045	
SUBJECT Calculation Check SDG 1007021			
BASED ON		DRAWING NUMBER	
BY J. Kalinyak	CHECKED BY	APPROVED BY	DATE 08/20/10

VOC - 1,1-dichloroethane Sample - SA-PZ-1381I-20100706

$$\frac{1037877 \times 250\,mg \times 6.67\,df}{617530 \times 0.5742 \times 5\,ml} \approx 976\,\frac{mg}{L} \text{ or } \mu g/l$$

OVG - Methane Sample - SA-PZ-1511I-20100707

$$\frac{67495}{3047} \times 5\,df \approx 110\,mg/l$$

Data File: /chem/5972hp59.i/DF100714A59.b/1007021-11D59.d
Report Date: 15-Jul-2010 17:04

CompuChem

SW846 UPDATE III METHOD 8260B QUANT & RATIO REPORT

Data file : /chem/5972hp59.i/DF100714A59.b/1007021-11D59.d
Lab Smp Id: 1007021-11 Client Smp ID: SA-PZ-138I1
Inj Date : 14-JUL-2010 18:36
Operator : JAO Inst ID: 5972hp59.i
Smp Info : 1007021-11:JAO
Misc Info : SA-PZ-138I1
Comment :
Method : /chem/5972hp59.i/DF100714A59.b/W8260B_5MLv3.m
Meth Date : 15-Jul-2010 16:12 walker Quant Type: ISTD
Cal Date : 14-JUL-2010 00:06 Cal File: 0G13007-CAL359.d
Als bottle: 15
Dil Factor: 6.67000
Integrator: HP RTE Compound Sublist: NEWTETRA-DOD.sub
Target Version: 3.50
Processing Host: dante

Concentration Formula: Amt * DF * 1/(Vo) * CpndVariable

Name	Value	Description
DF	6.67000	Dilution Factor
Vo	5.00000	volume of water
DF	6.67000	dilution factor

Cpnd Variable Local Compound Variable

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ng)	FINAL (ug/L)
* 1 Fluorobenzene	96	11.187	11.178	(1.000)	617530	250.000	
* 2 Chlorobenzene-d5	117	13.533	13.534	(1.000)	330490	250.000	
* 3 1,4-Dichlorobenzene-d4	152	15.258	15.259	(1.000)	129791	250.000	
$ 4 Dibromofluoromethane	113	10.547	10.547	(0.943)	147036	257.435	340
$ 5 1,2-Dichloroethane-d4	65	10.911	10.902	(0.975)	189353	284.595	380
$ 6 Toluene-d8	98	12.459	12.450	(0.921)	532081	286.106	380
$ 7 Bromofluorobenzene	95	14.361	14.352	(0.941)	190540	285.035	380
8 Dichlorodifluoromethane	85	Compound Not Detected.					
9 Chloromethane	50	Compound Not Detected.					
10 Vinyl Chloride	62	Compound Not Detected.					
11 Bromomethane	94	Compound Not Detected.					
12 Chloroethane	64	6.209	6.210	(0.555)	98198	159.511	210
13 Trichlorofluoromethane	101	Compound Not Detected.					
17 1,1-Dichloroethene	96	7.727	7.718	(0.691)	24947	48.9718	65
18 Acetone	43	Compound Not Detected.					

Data File: /chem/5972hp59.i/DF100714A59.b/1007021-11D59.d
Report Date: 15-Jul-2010 17:04

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ng)	FINAL (ug/L)
16 1,1,2-trichloro-1,2,2-trifluo	101	Compound Not Detected.					
20 Carbon disulfide	76	Compound Not Detected.					
23 Methyl acetate	43	Compound Not Detected.					
24 Methylene Chloride	84	8.516	8.517	(0.761)	9873	14.5872	19(a)
28 trans-1,2-Dichloroethene	96	Compound Not Detected.					
29 trans-1,2-DCE (part of total)	96	Compound Not Detected.					
26 Methyl-tert-butyl ether	73	Compound Not Detected.					
32 1,1-Dichloroethane	63	9.423	9.423	(0.842)	1037877	731.721	980
35 2-butanone	43	Compound Not Detected.					
37 cis-1,2-Dichloroethene	96	Compound Not Detected.					
38 cis-1,2-DCE (part of total)	96	Compound Not Detected.					
42 Chloroform	83	Compound Not Detected.					
43 1,1,1-Trichloroethane	97	10.586	10.587	(0.946)	146426	164.669	220
44 Cyclohexane	56	Compound Not Detected.					
46 1,1-dichloropropene	75	Compound Not Detected.					
48 Carbon Tetrachloride	117	Compound Not Detected.					
50 1,2-Dichloroethane	62	Compound Not Detected.					
49 Benzene	78	10.941	10.942	(0.978)	6826	2.58510	3.4(a)
51 Trichloroethene	130	Compound Not Detected.					
52 Methylcyclohexane	83	Compound Not Detected.					
54 1,2-Dichloropropane	63	Compound Not Detected.					
57 Bromodichloromethane	83	Compound Not Detected.					
58 cis-1,3-Dichloropropene	75	Compound Not Detected.					
59 4-Methyl-2-pentanone	43	Compound Not Detected.					
60 Toluene	92	12.508	12.509	(0.924)	4198	3.03206	4.0(a)
62 trans-1,3-Dichloropropene	75	Compound Not Detected.					
63 1,1,2-Trichloroethane	97	Compound Not Detected.					
64 2-hexanone	43	Compound Not Detected.					
67 Tetrachloroethene	164	Compound Not Detected.					
68 Dibromochloromethane	129	Compound Not Detected.					
69 1,2-Dibromoethane	107	Compound Not Detected.					
71 Chlorobenzene	112	Compound Not Detected.					
72 Ethylbenzene	106	Compound Not Detected.					
75 m,p-Xylene (part of total)	106	Compound Not Detected.					
77 o-Xylene (part of total)	106	Compound Not Detected.					
78 Styrene	104	Compound Not Detected.					
79 Bromoform	173	Compound Not Detected.					
80 Isopropyl Benzene	105	14.174	14.175	(1.047)	9760	4.85115	6.5(a)
81 1,1,2,2-Tetrachloroethane	83	Compound Not Detected.					
94 1,3-Dichlorobenzene	146	15.209	15.210	(0.997)	1642	2.33485	3.1(a)
95 1,4-Dichlorobenzene	146	15.288	15.279	(1.002)	6424	9.56653	13(a)
97 1,2-Dichlorobenzene	146	15.633	15.624	(1.025)	2952	4.78811	6.4(a)
98 1,2-Dibromo-3-Chloropropane	157	Compound Not Detected.					
99 1,2,4-Trichlorobenzene	180	17.210	17.211	(1.128)	1361	4.25082	5.7(a)
101 Naphthalene	128	Compound Not Detected.					
M 103 1,2-Dichloroethene (total)	96	Compound Not Detected.					
M 104 Xylene (total)	106	Compound Not Detected.					

FORM 7B
VOLATILE CALIBRATION VERIFICATION SUMMARY

Lab Name: COMPUCHEM Contract: 8260B

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Instrument ID: 5972HP59 Calibration Date: 07/14/10 Time: 1218

Lab File ID: 0G14010-CCV159 Init. Calib. Date(s): 07/13/10 07/14/10

Init. Calib. Times: 2311 0221

GC Column: SPB-624 ID: 0.32 (mm)

COMPOUND	RRF or AMOUNT	RRF50 or AMOUNT	CCAL RRF50	MIN RRF	%D or %DRIFT	MAX %D or %DRIFT	CURV TYPE
m,p-Xylene (part of total)	0.5920600	0.5929448	0.5929448	0.001	0.15	25.00	AVRG
o-Xylene (part of total)	0.5941500	0.5952433	0.5952433	0.001	0.18	25.00	AVRG
trans-1,2-DCE (part of total	0.2453000	0.2375050	0.2375050	0.001	-3.18	25.00	AVRG
Dichlorodifluoromethane	0.3904500	0.3983035	0.3983035	0.001	2.01	25.00	AVRG
cis-1,2-DCE (part of total)	0.2589600	0.2548165	0.2548165	0.001	-1.60	25.00	AVRG
Chloromethane	0.5983500	0.5610247	0.5610247	0.1	-6.24	25.00	AVRG
Vinyl Chloride	0.3560200	0.3496134	0.3496134	0.001	-1.80	20.00	AVRG
Bromomethane	0.1681400	0.2020593	0.2020593	0.001	20.17	25.00	AVRG
Chloroethane	0.2492300	0.2819215	0.2819215	0.001	13.12	25.00	AVRG
Trichlorofluoromethane	0.3743000	0.3681382	0.3681382	0.001	-1.65	25.00	AVRG
1,1-Dichloroethene	0.2062300	0.2062620	0.2062620	0.001	0.02	20.00	AVRG
Carbon disulfide	0.9040300	0.9280924	0.9280924	0.001	2.66	25.00	AVRG
1,1,2-trichloro-1,2,2-triflu	0.2725900	0.2752462	0.2752462	0.001	0.97	25.00	AVRG
Acetone	566.49225	625.00000	0.0509772	0.001	-9.36	25.00	LINR
Methylene Chloride	0.2740000	0.2726556	0.2726556	0.001	-0.49	25.00	AVRG
trans-1,2-Dichloroethene	0.2453000	0.2375050	0.2375050	0.001	-3.18	25.00	AVRG
~~Methyl-tert-butyl~~ ether	0.5883400	0.5540826	0.5540826	0.001	-5.82	25.00	AVRG
1,1-Dichloroethane	0.5742200	0.5528493	0.5528493	0.1	-3.72	25.00	AVRG
cis-1,2-Dichloroethene	0.2589600	0.2548165	0.2548165	0.001	-1.60	25.00	AVRG
2-butanone	593.70826	625.00000	0.0981872	0.001	-5.01	25.00	LINR
Chloroform	0.4730400	0.4589093	0.4589093	0.001	-2.99	20.00	AVRG
1,1,1-Trichloroethane	0.3599900	0.3432000	0.3432000	0.001	-4.66	25.00	AVRG
Carbon Tetrachloride	0.2679300	0.2525717	0.2525717	0.001	-5.73	25.00	AVRG
1,1-dichloropropene	0.4135400	0.4023423	0.4023423	0.001	-2.71	25.00	AVRG
Benzene	1.0689800	1.0647708	1.0647708	0.001	-0.39	25.00	AVRG
1,2-Dichloroethane	0.3061100	0.2778403	0.2778403	0.001	-9.24	25.00	AVRG
Trichloroethene	0.2031400	0.1950794	0.1950794	0.001	-3.97	25.00	AVRG
1,2-Dichloropropane	0.2841600	0.2844626	0.2844626	0.001	0.11	20.00	AVRG
Bromodichloromethane	0.3424000	0.3258507	0.3258507	0.001	-4.83	25.00	AVRG
cis-1,3-Dichloropropene	0.4271900	0.4052020	0.4052020	0.001	-5.15	25.00	AVRG
4-Methyl-2-pentanone	0.4384900	0.3772587	0.3772587	0.001	-13.96	25.00	AVRG
Toluene	1.0473400	1.0074170	1.0074170	0.001	-3.81	20.00	AVRG
trans-1,3-Dichloropropene	0.6003200	0.5532775	0.5532775	0.001	-7.84	25.00	AVRG
1,1,2-Trichloroethane	0.2655800	0.2584243	0.2584243	0.001	-2.69	25.00	AVRG
Tetrachloroethene	0.2286700	0.2163968	0.2163968	0.001	-5.37	25.00	AVRG
2-hexanone	605.06077	625.00000	0.2632378	0.001	-3.19	25.00	LINR
Dibromochloromethane	0.2878200	0.2693195	0.2693195	0.001	-6.43	25.00	AVRG
1,2-Dibromoethane	0.2590200	0.2521880	0.2521880	0.001	-2.64	25.00	AVRG
Chlorobenzene	0.8402100	0.8306618	0.8306618	0.3	-1.14	25.00	AVRG
Ethylbenzene	0.4679600	0.4677682	0.4677682	0.001	-0.04	20.00	AVRG
Styrene	0.9507400	0.9598462	0.9598462	0.001	0.96	25.00	AVRG
Bromoform	0.1474200	0.1347729	0.1347729	0.1	-8.58	25.00	AVRG

FORM VII VOA

CompuChem

Lab Smp Id : 1007021-03 Client Smp Id : SA-PZ-151I1
Sample Type : SAMPLE Sublist : MEE
Inj Date : 12-JUL-2010 09:54 Inst ID : VARIAN67
Operator : BWL
Method : /chem/varian67.i/t100701h.b/RSK175_v3.m
Misc. Info : SA-PZ-151I1

Method Type: undefined

RT	RT WINDOW		AREA	QUANT RF	COMPOUND	CONCENTRATIONS ON-COLUMN (Ng)	FINAL (ug/L)	ADJUSTED PQL (ug/L)	% REC	RECOVERY LIMITS	FLAGS
1.56	1.46	1.66	67495	3047	Methane	22.15304	110.7652	2.500000			

5X dil

KEH 7/13/10

FORM 6
VOLATILE INITIAL CALIBRATION DATA

Lab Name: COMPUCHEM Contract: RSK 175

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Instrument ID: VARIAN67 Calibration Date(s): 07/01/10 07/01/10

Column: J&W GS-GASPRO ID: 0.32 (mm) Calibration Time(s): 1140 1326

RF1000: 001T0G0100

COMPOUND	RF1000	CURVE	COEFFICENT A1	%RSD OR R^2
Methane	2643.717	AVRG	3046.71465	17.2
Ethane	2672.672	AVRG	2786.58483	6.5
Ethene	2708.683	AVRG	2796.86401	5.9

FORM VI VOA

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**D. BRAYACK**	**DATE:**	**SEPTEMBER 13, 2010**
FROM:	**DANIELLE BAUGHMAN**	**COPIES:**	**DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION – TAL METALS AND MISC PARAMETERS**
CTO WE08 NWIRP CALVERTON
SAMPLE DELIVERY GROUPS (SDG) – 1007021

SAMPLES: 8/Aqueous/

SA-20100707-DUP	SA-PZ-151I1-20100707	SA-PZ-155I-20100707
SA-PZ-157I-20100708	SA-PZ-157I1-20100707	SA-PZ-159I-20100707
SA-PZ-159I1-20100708	SA-PZ-160I-20100707	

Overview

The sample set for NWIRP Calverton, CTO WE08, SDG 1007021, consists of eight (8) aqueous environmental samples. One field duplicate pair (SA-20100707-DUP / SA-PZ-155I-20100707) was included within this SDG.

Three (3) samples, SA-PZ-151I1-20100707, SA-PZ-155I-20100707, and SA-PZ-159I-20100707, were analyzed for aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc. The remaining samples were analyzed for iron and manganese. All samples were analyzed for TOC. Samples SA-PZ-157I-20100708 and SA-PZ-159I1-20100708 were analyzed for chloride, nitrate, nitrite, and sulfide. The samples were collected by Tetra Tech NUS on July 6, 7, and 8, 2010 and analyzed by CompuChem under Naval Facilities Engineering Service Center (NFESC) Quality Assurance / Quality Control (QA/QC) criteria. Metals analyses were conducted using SW-846 method 6010. Chloride, nitrate, and nitrite analyses were conducted using EPA method 300.0. Total organic carbon analyses were conducted using SW-546 9060A. Sulfide analyses were conducted using Standard Method 4500S-2F.

These data were evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
• Initial and Continuing Calibration Verification Results
• Laboratory Method / Preparation Blank Analyses
* • ICP Interference Results
* • Laboratory Duplicate Results
* • Laboratory Control Standard Results
* • ICP Serial Dilution Results
* • Detection Limits
* • Analyte Quantitation

* - All quality control criteria were met for this parameter.

Metals

The following contaminants were detected in the laboratory preparation blank at the following maximum concentrations:

Analyte	Maximum Concentration	Action Level
Aluminum	49.061 ug/L	245.3 ug/L
Antimony	5.013 ug/L	25.065 ug/L
Calcium	440.904 ug/L	2204.52 ug/L
Iron	12.872 ug/L	64.36 ug/L
Lead	2.082 ug/L	10.41 ug/L
Sodium	243.878 ug/L	1219.39 ug/L

An action level of 5X the maximum contaminant level has been used to evaluate sample data for blank contamination. Sample aliquot and dilution factors, if applicable, were taken into consideration when evaluating for blank contamination. Positive results less than the blank action level reported for aluminum, antimony, iron, and lead were qualified "B" as a result of laboratory blank contamination.

- Positive results greater than the MDL, but less than the RL were qualified as estimated "J".
- The CRDL % recovery on 7/12/10 was <70% quality control limit for iron. The positive results <2X CRDL in the affected samples were qualified as estimated "J".
- The CRDL % recovery on 7/12/10 was >130% quality control limit for selenium. Only nondetects were reported for selenium so qualification of the date was not required.

Miscellaneous Parameters

No issues to report.

Notes

Executive Summary

Laboratory Performance: Several analytes were present in the laboratory method / preparation blanks. CRDL % recoveries for iron and selenium were outside the 70-130% quality control limits.

Other Factors Affecting Data Quality: Positive results greater than the MDL, but less than the RL were qualified.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Data Validation" as amended for Region II and the Department of Defense (DoD) document entitled "Quality Systems Manual (QSM) for Environmental Laboratories", January 2006.

The text of this report has been formulated to address only those problem areas affecting data quality.

Tetra Tech NUS
Danielle M. Baughman
Environmental Scientist

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C – Region II Worksheets
3. Appendix D - Support Documentation

APPENDIX A
QUALIFIED ANALYTICAL RESULTS

Data Validation Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS-GFAA MSA's r < 0.995 / ICP PDS Recovery Noncompliance
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O - Poor Instrument Performance (e.g. base-line drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DOT and Endrin
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient r < 0.995
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is greater than sample activity

PROJ_NO: 02045 SDG: 1007021 FRACTION: M MEDIA: WATER	NSAMPLE	SA-20100707-DUP			SA-PZ-151I1-20100707			SA-PZ-155I-20100707			SA-PZ-157I1-20100707		
	LAB_ID	1007021-06			1007021-03			1007021-05			1007021-04		
	SAMP_DATE	7/7/2010			7/7/2010			7/7/2010			7/7/2010		
	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF	SAPZ155I-20100707											
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ALUMINUM					62.8	U	A	69	U	A			
ANTIMONY					7.6	U	A	5.6	U	A			
ARSENIC					2.5	U		2.5	U				
BARIUM					18	J	P	20.1	J	P			
BERYLLIUM					0.73	U		0.73	U				
CADMIUM					0.64	U		0.64	U				
CALCIUM					14900			6640					
CHROMIUM					1.9	J	P	2	J	P			
COBALT					1.5	U		1.5	U				
COPPER					1	U		1	U				
IRON		4230			1500			4320			93.4	J	PK
LEAD					1.6	U	A	2.2	U	A			
MAGNESIUM					972	J	P	1730	J	P			
MANGANESE		292			4680			302			4430		
MERCURY					0.091	U		0.091	U				
NICKEL					3.3	J	P	4.5	J	P			
POTASSIUM					1910	J	P	30.9	U				
SELENIUM					2.1	U		2.1	U				
SILVER					0.64	U		0.64	U				
SODIUM					7930			9320					
THALLIUM					3	U		3	U				
VANADIUM					1.5	U		1.5	U				
ZINC					4.2	U		4.2	U				

PROJ_NO: 02045	NSAMPLE	SA-PZ-157I-20100708			SA-PZ-159I1-20100708			SA-PZ-159I-20100707			SA-PZ-160I-20100707		
SDG: 1007021	LAB_ID	1007021-14			1007021-13			1007021-02			1007021-01		
FRACTION: M	SAMP_DATE	7/8/2010			7/8/2010			7/7/2010			7/7/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ALUMINUM								32.1	U	A			
ANTIMONY								2.8	U	A			
ARSENIC								2.5	U				
BARIUM								20.8	J	P			
BERYLLIUM								0.73	U				
CADMIUM								0.64	U				
CALCIUM								6810					
CHROMIUM								0.75	U				
COBALT								1.5	U				
COPPER								1	U				
IRON		275			2610			28.9	U	A	1520		
LEAD								2.6	U	A			
MAGNESIUM								2190	J	P			
MANGANESE		293			4150			388			571		
MERCURY								0.091	U				
NICKEL								0.63	U				
POTASSIUM								30.9	U				
SELENIUM								2.1	U				
SILVER								0.64	U				
SODIUM								9980					
THALLIUM								3	U				
VANADIUM								1.5	U				
ZINC								4.2	U				

PROJ_NO: 02045	NSAMPLE	SA-20100707-DUP			SA-PZ-151I1-20100707			SA-PZ-155I-20100707			SA-PZ-157I1-20100707		
SDG: 1007021	LAB_ID	1007021-06			1007021-03			1007021-05			1007021-04		
FRACTION: MISC	SAMP_DATE	7/7/2010			7/7/2010			7/7/2010			7/7/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/L			MG/L			MG/L			MG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF	SAPZ155I-20100707											
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CHLORIDE													
NITRATE-N													
NITRITE-N													
SULFIDE													
TOTAL ORGANIC CARBON		0.77	J	P	1.5			0.83	J	P	1.3		

PROJ_NO: 02045 SDG: 1007021 FRACTION: MISC MEDIA: WATER	NSAMPLE	SA-PZ-157I-20100708			SA-PZ-159I1-20100708			SA-PZ-159I-20100707			SA-PZ-160I-20100707		
	LAB_ID	1007021-14			1007021-13			1007021-02			1007021-01		
	SAMP_DATE	7/8/2010			7/8/2010			7/7/2010			7/7/2010		
	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/L			MG/L			MG/L			MG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CHLORIDE		8.31			4.26								
NITRATE-N		0.702			0.4	U							
NITRITE-N		0.4	U		0.4	U							
SULFIDE		1	U		1	U							
TOTAL ORGANIC CARBON		0.73	J	P	1.3			0.69	J	P	0.81	J	P

APPENDIX B
RESULTS AS REPORTED BY THE LABORATORY

SW846 - METALS

-1-

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

20100707-DUP

Lab Name: COMPUCHEM Contract:

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix (soil/water): WATER Lab Sample ID: 1007021-06

Level (low/med): LOW Date Received: 7/8/2010

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-89-6	Iron	4230			P
7439-96-5	Manganese	292			P

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

SW846 - METALS

-1-

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

SA-PZ-151I1

Lab Name: COMPUCHEM Contract:

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix (soil/water): WATER Lab Sample ID: 1007021-03

Level (low/med): LOW Date Received: 7/8/2010

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	62.8	B		P
7440-36-0	Antimony	7.6	B		P
7440-38-2	Arsenic	2.5	U		P
7440-39-3	Barium	18.0	B		P
7440-41-7	Beryllium	0.73	U		P
7440-43-9	Cadmium	0.64	U		P
7440-70-2	Calcium	14900			P
7440-47-3	Chromium	1.9	B		P
7440-48-4	Cobalt	1.5	U		P
7440-50-8	Copper	1.0	U		P
7439-89-6	Iron	1500			P
7439-92-1	Lead	1.6	B		P
7439-95-4	Magnesium	972	B		P
7439-96-5	Manganese	4680			P
7439-97-6	Mercury	0.091	U		CV
7440-02-0	Nickel	3.3	B		P
7440-09-7	Potassium	1910	B		P
7782-49-2	Selenium	2.1	U		P
7440-22-4	Silver	0.64	U		P
7440-23-5	Sodium	7930			P
7440-28-0	Thallium	3.0	U		P
7440-62-2	Vanadium	1.5	U		P
7440-66-6	Zinc	4.2	U		P

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

SW846 - METALS

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

SA-PZ-155I

Lab Name: COMPUCHEM Contract:

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix (soil/water): WATER Lab Sample ID: 1007021-05

Level (low/med): LOW Date Received: 7/8/2010

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	69.0	B		P
7440-36-0	Antimony	5.6	B		P
7440-38-2	Arsenic	2.5	U		P
7440-39-3	Barium	20.1	B		P
7440-41-7	Beryllium	0.73	U		P
7440-43-9	Cadmium	0.64	U		P
7440-70-2	Calcium	6640			P
7440-47-3	Chromium	2.0	B		P
7440-48-4	Cobalt	1.5	U		P
7440-50-8	Copper	1.0	U		P
7439-89-6	Iron	4320			P
7439-92-1	Lead	2.2	B		P
7439-95-4	Magnesium	1730	B		P
7439-96-5	Manganese	302			P
7439-97-6	Mercury	0.091	U		CV
7440-02-0	Nickel	4.5	B		P
7440-09-7	Potassium	30.9	U		P
7782-49-2	Selenium	2.1	U		P
7440-22-4	Silver	0.64	U		P
7440-23-5	Sodium	9320			P
7440-28-0	Thallium	3.0	U		P
7440-62-2	Vanadium	1.5	U		P
7440-66-6	Zinc	4.2	U		P

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

SW846 - METALS

-1-

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

SA-PZ-157I

Lab Name: COMPUCHEM Contract:

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix (soil/water): WATER Lab Sample ID: 1007021-14

Level (low/med): LOW Date Received: 7/9/2010

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-89-6	Iron	275			P
7439-96-5	Manganese	293			P

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

SW846 - METALS

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

SA-PZ-157I1

Lab Name: COMPUCHEM Contract:

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix (soil/water): WATER Lab Sample ID: 1007021-04

Level (low/med): LOW Date Received: 7/8/2010

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-89-6	Iron	93.4	B		P
7439-96-5	Manganese	4430			P

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

SW846 - METALS

-1-

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

SA-PZ-159I

Lab Name: COMPUCHEM Contract:

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix (soil/water): WATER Lab Sample ID: 1007021-02

Level (low/med): LOW Date Received: 7/8/2010

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	32.1	B		P
7440-36-0	Antimony	2.8	B		P
7440-38-2	Arsenic	2.5	U		P
7440-39-3	Barium	20.8	B		P
7440-41-7	Beryllium	0.73	U		P
7440-43-9	Cadmium	0.64	U		P
7440-70-2	Calcium	6810			P
7440-47-3	Chromium	0.75	U		P
7440-48-4	Cobalt	1.5	U		P
7440-50-8	Copper	1.0	U		P
7439-89-6	Iron	28.9	B		P
7439-92-1	Lead	2.6	B		P
7439-95-4	Magnesium	2190	B		P
7439-96-5	Manganese	388			P
7439-97-6	Mercury	0.091	U		CV
7440-02-0	Nickel	0.63	U		P
7440-09-7	Potassium	30.9	U		P
7782-49-2	Selenium	2.1	U		P
7440-22-4	Silver	0.64	U		P
7440-23-5	Sodium	9980			P
7440-28-0	Thallium	3.0	U		P
7440-62-2	Vanadium	1.5	U		P
7440-66-6	Zinc	4.2	U		P

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

SW846 - METALS

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

SA-PZ-159I1

Lab Name: COMPUCHEM Contract:

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix (soil/water): WATER Lab Sample ID: 1007021-13

Level (low/med): LOW Date Received: 7/9/2010

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-89-6	Iron	2610			P
7439-96-5	Manganese	4150			P

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

SW846 - METALS

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

SA-PZ-160I

Lab Name: COMPUCHEM Contract:

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix (soil/water): WATER Lab Sample ID: 1007021-01

Level (low/med): LOW Date Received: 7/8/2010

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-89-6	Iron	1520			P
7439-96-5	Manganese	571			P

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

CompuChem
A Division Of
Liberty Analytical Corp.

TETRA TECH	Project: CTO-WE08/7 DAY TAT/112G02045/N62472-03-D-0057	
661 ANDERSEN DRIVE, FOSTER PLAZA 7	Project Number: CTO-WE08/7 DAY TAT/112G02045/N62472-03	**Reported:**
PITTSBURGH PA, 15220	Project Manager: TOBRENA SKEEN	07/16/2010 12:57

SA-PZ-160I

1007021-01 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	
COMPUCHEM									
WET CHEMISTRY PARAMETERS									
Total Organic Carbon	**0.81**	1.0	mg/L	1	0071331	07/13/2010 14:23	07/13/2010 19:31	EPA 9060A	J
Replicate results:	**0.8858, 0.7482, 0.7672, 0.8318**								

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Preeti Khare For Cathy Dover, Project Manager

CompuChem
A Division Of
Liberty Analytical Corp.

TETRA TECH 661 ANDERSEN DRIVE, FOSTER PLAZA 7 PITTSBURGH PA, 15220	Project: CTO-WE08/7 DAY TAT/112G02045/N62472-03-D-0057 Project Number: CTO-WE08/7 DAY TAT/112G02045/N62472-03 Project Manager: TOBRENA SKEEN	**Reported:** 07/16/2010 12:57

SA-PZ-159I

1007021-02 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	
COMPUCHEM									
WET CHEMISTRY PARAMETERS									
Total Organic Carbon	**0.69**	1.0	mg/L	1	0071331	07/13/2010 14:23	07/13/2010 19:53	EPA 9060A	J
Replicate results:	**0.6591, 0.7123, 0.6616, 0.7255**								

CompuChem
A Division Of
Liberty Analytical Corp.

TETRA TECH 661 ANDERSEN DRIVE, FOSTER PLAZA 7 PITTSBURGH PA, 15220	Project: CTO-WE08/7 DAY TAT/112G02045/N62472-03-D-0057 Project Number: CTO-WE08/7 DAY TAT/112G02045/N62472-03 Project Manager: TOBRENA SKEEN	**Reported:** 07/16/2010 12:57

SA-PZ-151I1

1007021-03 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
			COMPUCHEM					
WET CHEMISTRY PARAMETERS								
Total Organic Carbon	**1.5**	1.0	mg/L	1	0071331	07/13/2010 14:23	07/13/2010 20:16	EPA 9060A
Replicate results:	**1.321, 1.414, 1.554, 1.641**							

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Preeti Khare For Cathy Dover, Project Manager

CompuChem
A Division Of
Liberty Analytical Corp.

TETRA TECH	Project: CTO-WE08/7 DAY TAT/112G02045/N62472-03-D-0057	
661 ANDERSEN DRIVE, FOSTER PLAZA 7	Project Number: CTO-WE08/7 DAY TAT/112G02045/N62472-03	**Reported:**
PITTSBURGH PA, 15220	Project Manager: TOBRENA SKEEN	07/16/2010 12:57

SA-PZ-157I1

1007021-04 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
COMPUCHEM								
WET CHEMISTRY PARAMETERS								
Total Organic Carbon	**1.3**	1.0	mg/L	1	0071331	07/13/2010 14:23	07/13/2010 20:39	EPA 9060A
Replicate results:	**1.23, 1.283, 1.362, 1.28**							

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Preeti Khare For Cathy Dover, Project Manager

CompuChem
A Division Of
Liberty Analytical Corp.

TETRA TECH	Project: CTO-WE08/7 DAY TAT/112G02045/N62472-03-D-0057	
661 ANDERSEN DRIVE, FOSTER PLAZA 7	Project Number: CTO-WE08/7 DAY TAT/112G02045/N62472-03	**Reported:**
PITTSBURGH PA, 15220	Project Manager: TOBRENA SKEEN	07/16/2010 12:57

SA-PZ-155I

1007021-05 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	
COMPUCHEM									
WET CHEMISTRY PARAMETERS									
Total Organic Carbon	**0.83**	1.0	mg/L	1	0071331	07/13/2010 14:23	07/13/2010 21:01	EPA 9060A	J
Replicate results:	**0.7069, 0.8466, 0.9033, 0.8659**								

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Preeti Khare For Cathy Dover, Project Manager

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TETRA TECH	Project: CTO-WE08/7 DAY TAT/112G02045/N62472-03-D-0057	
661 ANDERSEN DRIVE, FOSTER PLAZA 7	Project Number: CTO-WE08/7 DAY TAT/112G02045/N62472-03	**Reported:**
PITTSBURGH PA, 15220	Project Manager: TOBRENA SKEEN	07/16/2010 12:57

20100707-DUP

1007021-06 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	
COMPUCHEM									
WET CHEMISTRY PARAMETERS									
Total Organic Carbon	**0.77**	1.0	mg/L	1	0071331	07/13/2010 14:23	07/13/2010 21:24	EPA 9060A	J
Replicate results:	**0.7314, 0.7621, 0.8159, 0.7875**								

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Preeti Khare For Cathy Dover, Project Manager

CompuChem
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Liberty Analytical Corp.

TETRA TECH 661 ANDERSEN DRIVE, FOSTER PLAZA 7 PITTSBURGH PA, 15220	Project: CTO-WE08/7 DAY TAT/112G02045/N62472-03-D-0057 Project Number: CTO-WE08/7 DAY TAT/112G02045/N62472-03 Project Manager: TOBRENA SKEEN	**Reported:** 07/16/2010 12:57

SA-PZ-159I1

1007021-13 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	
			COMPUCHEM						
INORGANIC ANIONS BY IC									
Nitrite as N	ND	0.400	mg/L	1	0070921	07/09/2010 15:13	07/09/2010 18:44	EPA 300	U
Nitrate as N	ND	0.400	mg/L	1	0070921	07/09/2010 15:13	07/09/2010 18:44	EPA 300	U
Chloride	**4.26**	4.00	mg/L	1	0070921	07/09/2010 15:13	07/09/2010 18:44	EPA 300	
WET CHEMISTRY PARAMETERS									
Sulfide, total	ND	1.0	mg/L	1	0071357	07/13/2010 15:26	07/16/2010 12:00	SM4500S-2 F	U
Total Organic Carbon	**1.3**	1.0	mg/L	1	0071331	07/13/2010 14:23	07/13/2010 21:46	EPA 9060A	
Replicate results:	**1.199, 1.417, 1.327, 1.379**								

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Preeti Khare For Cathy Dover, Project Manager

CompuChem
A Division Of
Liberty Analytical Corp.

TETRA TECH 661 ANDERSEN DRIVE, FOSTER PLAZA 7 PITTSBURGH PA, 15220	Project: CTO-WE08/7 DAY TAT/112G02045/N62472-03-D-0057 Project Number: CTO-WE08/7 DAY TAT/112G02045/N62472-03 Project Manager: TOBRENA SKEEN	**Reported:** 07/16/2010 12:57

SA-PZ-157I

1007021-14 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	
			COMPUCHEM						
INORGANIC ANIONS BY IC									
Chloride	**8.31**	4.00	mg/L	1	0070921	07/09/2010 15:13	07/09/2010 19:00	EPA 300	
Nitrate as N	**0.702**	0.400	mg/L	1	0070921	07/09/2010 15:13	07/09/2010 19:00	EPA 300	
Nitrite as N	ND	0.400	mg/L	1	0070921	07/09/2010 15:13	07/09/2010 19:00	EPA 300	U
WET CHEMISTRY PARAMETERS									
Sulfide, total	ND	1.0	mg/L	1	0071357	07/13/2010 15:26	07/16/2010 12:00	SM4500S-2 F	U
Total Organic Carbon	**0.73**	1.0	mg/L	1	0071331	07/13/2010 14:23	07/13/2010 22:24	EPA 9060A	J
Replicate results:	**0.667, 0.8156, 0.7216, 0.7176**								

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Preeti Khare For Cathy Dover, Project Manager

APPENDIX C
REGION II WORKSHEETS

SOP # HW-2
Revision 13
September 2006

Validation of Metals for the Contract Laboratory Program (CLP) based on SOW ILMO5.3 (SOP Revision 13)

PREPARED BY: Hanif Sheikh Date: 12-05-06
Hanif Sheikh, Chemist
Hazardous Waste Support Section

Peer Reviewed by: Russell Arnone Date: 12-08-06
Russell Arnone, Chemist
Hazardous Waste Support Section

Concurred by: Linda M. Mauel Date: 12/8/06
Linda Mauel, Chief
Hazardous Waste Support Section

Approved by: _____ Date: _____
Robert Runyon, Chief
Hazardous Waste Support Branch

Hanif Sheikh 8/10/07
Annual Review

Reviewed by: Hanif Sheikh Date: 2/10/09
Name

Reviewed by: _____ Date: _____
Name

Table of Contents

Subject	Page
Scope	1
Contract Compliance Review	1
-Completeness	1
-Compliance	1
-Contract Compliance Screening	2, 11
Contractual qualifiers	5
Technical Review	2
Raw data	3, 17
QA/QC Acceptance Criteria	3
Data Validation Flags	3
Data Review Narrative	4, 47
Computer-Aided Data Review and Evaluation	5
PES Based Data Validation Strategy	6
Sampling Trip Report	10, 15
Telephone Record Log	10, 50
Request for Re-Analysis Form	10, 53
CLP Data Assessment Summary Form	10, 54
Data Review Log	10
Record of Communication	11
Forward Paper Work	11
Acronyms	12
Inorganic Target Analyte List and Contract Required Quantitation Limits	13
Chain of Custody/Sample Traffic Report	15
Cover Page	16
SDG Narrative , DC-1 & DC-2 Form	16
Raw Data	17
Technical Holding Time	18
Final Data Correctness	19
Initial Calibration	21
Initial and Continuing Calibration Verification	22
CRQL Standard Analysis	23
Initial and Continuing Calibration Blanks	25
Preparation Blank	26
ICP-AES/ICP-MS Interference Check Sample	28
Spiked Sample Recovery	30

Lab Duplicates 33
Field Duplicates 36, 51
Laboratory Control Sample 38
ICP-AES/ICP-MS Serial Dilution 40
Dissolved/Total or Inorganic/Total Analytes 41, 52
Field Blank 42
Verification of Instrumental Parameters 43
ICP-MS Tune Analysis 44
ICP-MS Internal Standards 45
Percent Solids 46
Inorganic Data Review Narrative (Appendix A.2) 47
Telephone Record Log (Appendix A.3) 50
Field Duplicates Form (appendix A.4) 51
Total/Dissolved Concentrations Form (Appendix A.5) 52
Re-Analysis Request/Approval Record Form (Appendix A.6) 53
Data Assessment Summary Form (Appendix A.7) 54

1.0 Scope

1.1 This Standard Operating Procedure (SOP) applies to the evaluation of Routine Analytical Services (RAS) inorganic data generated in accordance with the EPA Contract Laboratory Program (CLP) protocols.

1.2 This Region 2 inorganic data validation SOP is used to determine the usability of analytical data generated from water and soil/sediment samples collected from Superfund sites in EPA Region 2.

1.3 Data should be generated and validated in accordance with the site specific Project Quality Objectives (PQOs) developed prior to the sample collection event. This SOP can be customized to validate the data according to the site specific PQOs. If the site specific DQOs are not available, this SOP must be used in its entirety.

1.4 This SOP is based, for the most part, upon analytical and quality assurance requirements specified in the Statement of Work SOW-ILM05.3, as well as in the final (October 2004) of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review. The SOP Checklist, Appendix A.1, provides guidance in conducting the data validation. The result of the use of this SOP is a **Total Review** of the data: **Technical plus Contract - Compliance Review.**

2.0 Contract Compliance Review

This type of review is the first step in data validation which is carried out to ensure that the CLP laboratory has analyzed the environmental samples in accordance with the Statement of Work (SOW), and provided a data package which is both complete and compliant. This means that laboratory's procedures were performed exactly as specified in the CLP Statement of Works (SOW) and the data package contains all the deliverables including the information required under the contract.

2.1 Completeness

The data validator must check the entire data package to ensure that all deliverables required under the CLP contract are present and legible. In addition, copies of the Contract Compliance Screening (CCS) report, re-submittal from the laboratory, and Regional documentation should also be present in the data package. In Region 2, the data package completeness check is currently performed by the Regional Sample Control Coordinator (RSCC)for each Sample Delivery Group (SDG). The data package is not released to the data validator until all the required deliverables are received
from the laboratory.

2.2 Compliance

The data validator must check to ensure that all steps from sample receipt through sample preparation, analysis, data calculation and reporting are documented, and the information/data required under the contract is present in the appropriate reporting Forms and laboratory logs.

2.3 Contract Compliance Screening (CCS)

This screening step essentially checks the data package for the Completeness and Compliance requirements, and is performed by the Sample Management Office (SMO) currently operated by Computer Sciences Corporation (CSC), an EPA contractor. The CCS Report outlines the incomplete and non-compliant items as "Defects" in the data package, and is sent to the laboratory which is required to

provide additional or missing information/data required under the contract. The CCS Report for each SDG is transmitted electronically by the SMO to the Regional office. The CCS Report is intended to aid the data validator in locating any problems, both corrected and uncorrected. The incorrect original deliverable(s)of the data package must be replaced by the re-submittal(s)received from the laboratory in response to the CCS Report. The data validation should, however, be carried out even if the CCS Report is not available.

Web-based CCS is available for CLP laboratories to check their data prior to its delivery to EPA.

3.0 **Technical Review**

Technical review of the RAS data is carried out on the complete and compliant data to ensure its **validity** (i.e., data is of known quality and scientifically valid) and **usability** (i.e., data set is sufficiently complete and of sufficient quality to support a decision or an action described in the specific objectives of a data collection activity). The technical review process provides information on analytical limitations of data, if any, based on specific Quality Assurance/Quality Control (QA/QC) criteria. This is accomplished by performing an in-depth review of both the field deliverables which document the field sampling activities, and the laboratory analytical data deliverables which document the laboratory activities carried out to generate the reported data. Essentially, the validator shall first ensure that the data package is complete and compliant. The validator shall then evaluate data/information on all these deliverables (Final data sheets, Forms for QC analyses Chain-of-Custody/Traffic Report Forms, raw data, etc.) against the QA/QC acceptance criteria specified in the SOP "Checklist" (Appendix A.1). The validator must answer each question in the " Checklist" and take an appropriate action as required under "Action" to qualify the data. As a result of the technical review, the data validator may qualify some of the data as **rejected** or as **estimated.** The data validator shall write a **Data Review Narrative** documenting the qualified data and the reason(s) for the qualification.

3.1 If the **raw data** necessary to support the reported results are not provided, the data validation must not be performed. The laboratory must be contacted to obtain missing raw data.

3.2 If batch quality control analyses are performed on samples other than **site specific samples**, data must not be validated
or at best be considered as estimated. The data user must be notified of this action.

3.3 **QA/QC Acceptance Criteria**

In order that reviews be consistent among reviewers, QA/QC protocol (stated in Appendix A.I) should be strictly adhered to. If a lab provides more than one set of QC analyses or more than one particular QC analysis for an SDG, the validator shall use the worst QC analysis to evaluate the SDG data. Professional judgement should only be used in the rare instances not addressed in the "Checklist".

3.4 **Data Validation Flags**

Three types of data validation flags (J, R & U) are used in Region 2 to qualify the data.

3.4.1 **Flag "R" indicates Rejected Data**

Sample results determined to be unacceptable must preferably be lined over and flagged " R" with a red pencil only on the Inorganic Analysis Data Sheets (CLP Form I's). Data rejected on the basis of an unacceptable QC analysis should be excluded from further review or consideration. Data are rejected when associated QC analysis results exceed the expanded control limits of the QC criteria. The rejected data are known to contain significant errors based on documented information. The data user **must not** use the rejected data to make environmental decisions.

3.4.2 **Flag "J" indicates Estimated Data**

Sample results determined to be estimated must be flagged "J" with a red pencil only on the CLP Form I's. Data are flagged (J) when a QC analysis falls outside the primary acceptance limits. The qualified "J" data are not excluded from further review or consideration. However, only one flag (J) is applied to a sample result even though several associated QC analyses may fail. The "J" data may be biased high or low.

3.4.3 **Flg "U" indicates Non-Detects**

Sample results ≥ MDL associated with a contaminated blank are flagged "U" with a red pencil only on Form I's.

4.0 **Contractual Qualifiers**

The CLP laboratory applies contractual qualifiers on all Form I'S and the QC Forms when QC analyses are outside the control limits. These qualifiers are not applied on the Lotus or XLS spreadsheets with the exception of U and J. The contractual qualifiers and their meanings are as follows:

N : This qualifier indicates the lack of accuracy in the reported result, and is applied when matrix spiked sample recovery is outside the control limits.

E : This qualifier indicates the presence of interference, and is applied when the ICP serial dilution analysis is outside the control limits.

* : This qualifier indicates the lack of precision, and is applied to sample results on Form I's and Form VI when the Lab Duplicate analysis is outside the control limits.

U : This is a concentration qualifier that laboratory applies to a non-detected result which is essentially less than the Method Detection Limit(MDL). A non-detected result of an analysis is indicated by the Contract Required Quantitation Limit (CRQL) of that analyze suffixed with "U".

J : This is a concentration qualifier that the laboratory applies to a positive result below the CRQL(i.e.,≥MDL but <CRQL).

NOTE: The laboratory qualifiers are crossed out and replaced with the appropriate data validation qualifiers (J, R or U) by the data validator.

4.0 Rounding Rule

The data reviewer must follow the standard practice to round off percent recoveries on the QC reporting forms.

5.0 Data Review Narrative (Appendix A.2)

The data review narrative should be written using the format of Appendix A.2. The narrative should indicate the QC analyses outside the acceptance limits and the actions taken to qualify the associated data. The narrative should be prepared on a Personal Computer or a typewriter. If hand-written, under no circumstances should a pencil be used to write the narrative. The Data Review Narrative should be written in four (4) Sections: (i)Data Case Description, (ii)Complete SDG File (CSF) Audit Section, (iii) Technical Review Section, and (iv) Contract-Problems/Non-Compliance Section.

5.1 Data Case Description Section

The data validator must briefly describe the data case in this Section, outlining important information such as the number of samples, their matrix, sampling date(s), analysis (TAL metals, mercury or cyanide), samples used for QC analyses, Field Blank(s), Field Duplicates, etc.

5.2 Complete SDG File (CSF) Audit Section

The data validator must perform an audit on each SDG in the data package to ensure that all SDG-specific documents (sampling, samples shipping and receiving, telephone contact logs, etc.) are present in the data case. The audit shall also discover any discrepancy in the deliverables. In Region 2, this audit is currently performed by the ESAT data validator and its findings reported under "Comments" on a CSF inventory checklist. The validator informs the CLP Project Officer (PO) of the missing or additional information/deliverable required for data validation. The PO then contacts the lab for the desired deliverable/information. The findings of the CSF audit are reported in the CSF Section of the Data Review Narrative (Appendix A.2).

5.3 Technical Review Section

The data validator shall report in this Section only the rejected (R) and estimated data (J) and the data rendered non-detects (U) as a result of technical review. It is imperative that the data reviewer highlights (i) QC analysis criteria applied to reject (R) or flag (J, U) the data, (ii) Samples rejected (R) or flagged (J, U), and (iii) the QC analysis out of control limits. The rest of the data that are not qualified (rejected or estimated) are not reported in this Section, and should be considered **fully useable.**

5.4 Contract-Problems/Non-Compliance Section

All the CLP non-compliant items detected during data review must be reported in this Section.

6.0 Computer-Aided Data Review and Evaluation (CADRE)

CADRE is a computer program that performs semi-automated Quality Assurance (QA) and Quality Control (QC) checks of results from the chemical analysis of soil and water samples according to the CLP protocols. After the CADRE data qualification is complete, a Lotus 1,2,3 spreadsheet or an XLS spreadsheet with data validation qualifiers (R,J,U) is generated for each SDG. Currently, Sample Management Office (SMO) performs this task using Data Assessment Tool (DAT), a software-driven process, and forwards to the Regions the customized electronic spreadsheets (Lotus 1,2,3 or XLS spreadsheet) and QC reports via the DART (Data Assessment Rapid Transmittal) system. Manual data validation is performed in conjunction with electronic data validation which can only be done by a trained and experienced data validator. The manual data review complements CADRE's findings to complete an assessment of data quality in a shorter time than by a solely manual process. The data validator must review the XLS or Lotus 1,2,3 spreadsheet against Form I's to ensure that the same results on Form I's and the Spreadsheet are qualified with the same data validation qualifiers. The spreadsheet for each SDG is provided with the Data Review Narrative.

7.0 Performance Evaluation Sample(PES)Based Data Validation Strategy

7.1 Scope and Summary

This strategy offers the use of Performance Evaluation Samples (PES) in the data validation process as a means of ensuring the quality of the CLP data while significantly reducing the validation time. The single blind PES provided by EPA (or any other reputable firm) is analyzed with samples of each matrix in a Sample Delivery Group (SDG). A software program (e.g.,PEAC TOOLS, SPS Web or equivalent)is used to determine whether or not the PES results fall within the previously statistically determined acceptance limits ("Action Low" and "Action High")for the Contaminants of Concern (**COC**). The PES results falling within the Action Limits are considered as acceptable results and may be designated as "Passed" analytes, and results of the analytes falling outside the Action Limits are considered as unacceptable and may be designated as "Failed" analytes. In either case ("Passed" Analytes or "Failed" analytes), the associated data is validated according to the Region 2 data validation SOP HW-2 in conjunction with the latest version of the WinCadre QC reports. The following strategy (procedure) is used:

7.2 "Passed" COC

If the COC in an SDG are within statistically generated Action Limits, the data validation is conducted according
to QC analyses indicated by check marks (√)in the "Review COC For" column of the Table I. The SDG samples are validated using the Region 2 data validation SOP in

conjunction with the latest version of the WinCADRE QC reports. The validation flags (J, R, U) are applied on Form I's as well on the CADRE Lotus 1,2,3 or XLS spreadsheet. Corrections, if needed, are
then made on the Lotus or XLS spreadsheet to ensure that all results on Form I's carry the same data validation and concentration flags as are on the Lotus or XLS Spreadsheet.

7.3 **"Failed" COC**

If the COC in an SDG are not within the statistically generated Action Limits, the data validation is conducted according to the data validation SOP QC Criteria indicated by check marks (√)in the "Review COC For" column of Table II. The SDG samples are validated using the Region 2 data validation SOP in conjunction with the latest version of the WinCADRE QC reports. The data validation flags (J,R,U) are applied on Form I's as well on the CADRE Lotus 1,2,3 or XLS Spreadsheet. Corrections, if needed, are then made on the Lotus or XLS spreadsheet to ensure that all results on Form I's carry the same data validation and concentration flags as are on the Lotus or XLS Spreadsheet.

7.4 **COC "Not Evaluated"**

Acceptance limits for the analytes not present/spiked in the PE sample are not provided on the PES Scoring Evaluation Report. Such analytes will be marked as "Not Evaluated" in the PES Evaluation Column. These analytes will be validated much the same way as the "Failed Analytes".

The failed analytes and the analytes not present/spiked in the PE sample require data validation according to the QC criteria specified in Table II, and are identified by the TOPO in the TDF for the Case/SDG.

Table I

Passed PES - All Contaminants of Concern are within the limits
(Action Low ≤ PES Result ≤ Action High)

QC Criteria	Review COC for
Holding Time & Preservation	√
Initial Calibration	
Initial Calibration Verification	
CRQL Standard	√
Blanks-Initial & Continuing	
Preparation Blank	
ICP Interference Check Sample	
Pre- Digestion/Distillation Matrix Spike	
Post Digestion Spike	
Laboratory Duplicate	
Field Duplicates Comparison	√
Lab Control Sample	
ICP Serial Dilution	
Field Blank Contamination	√
Percent Solids	√
Transcription/Computation Check	
Raw Data	
Total vs. Dissolved Concentrations Comparison	√

- The CSF (Complete SDG File) audit will be completed before the PES validation strategy is applied.
- Comparison of the Lotus or XLS Spreadsheet must be after the PES validation strategy is applied. The Contract
- Compliance can be checked after the PES validation strategy is applied.

Table II
Failed PES - Contaminants of Concern are not within the limits
(PES Result ≤ Action Low, PES Result ≥ Action High **OR** The Limits Not Established)

QC Criteria	Review COC for
Holding Time & Preservation	√
Initial Calibration	
Initial Calibration Verification	
CRQL Standard	√
Blanks-Initial & Continuing	
Preparation Blank	√
ICP Interference Check Sample	
Pre- Digestion/Distillation Matrix Spike	√
Post Digestion Spike	
Laboratory Duplicate	√
Field Duplicates Comparison	√
Lab Control Sample	√
ICP Serial Dilution	√
Field Blank Contamination	√
Percent Solids	√
Transcription/Computation Check	√
Raw Data	
Total vs. Dissolved Concentrations Comparison	√

- The CSF (Complete SDG File) audit will be completed before the PES validation strategy is applied.
- Comparison of the Lotus or XLS Spreadsheet must be after the PES validation strategy is applied.
- The Contract Compliance can be checked after the PES validation strategy is applied.

8.0 **Sampling Trip Report**

The sampler prepares a Sampling Trip Report for each sampling event and sends it to the RSCC. The report provides details of all activities performed for each sampling event on the Superfund site. It also lists the field QC samples such as Field Duplicates, Field/Rinse Blanks, sampling time and date for each sample, and samples associated with each field/rinse blank. The validator must use this information to evaluate the Field Duplicate pairs as well as the samples associated with contaminated Field/Rinse Blanks.

9.0 **Telephone Record Log (Appendix A.3)**

A Telephone Record Log (Appendix A.3) must be written by the data validator when a deliverable is missing or a clarification is needed about a lab procedure. The data validator should outline a basic profile of the Case on the Telephone Record Log Form, clearly indicating the reason(s) for inquiry and forward this Form to CLP PO/TOPO who will contact the lab to receive the missing document or information. The original Telephone Record Log is kept in the data package and a copy attached to the Data Review Narrative.

10.0 **Request for Re-Analysis (Appendix A.6)**

Data validator must note all items of contract non-compliance in the Data Review Narrative. If holding times and sample storage times have not been exceeded, the Project Officer (PO) may request re-analysis if items of non-compliance are critical to data assessment. Requests are to be made on "CLP Re-Analysis Request/Approval Record" form (Appendix A.4).

11.0 **CLP Data Assessment Summary Form (Appendix A.7)**

Fill in the total number of analytes performed by different methods and the number of analytes rejected (R) or flagged (J) as estimated due to corresponding quality control criteria. Place an "X" in boxes wherever analyses were not performed, or criteria do not apply.

12.0 **Data Review Log:**

It is recommended that the data validator maintain a log of the reviews completed to document:

a. Case number
b. SDG # (s)
c. number of samples
d. matrix of samples
e. contract laboratory
f. site name
g. start-date of the data case review
h. completion-date of the data case review
i. actual hours spent
j. reviewer's signature

13.0 **Record of Communication** -

This is a Regional document prepared and provided by the RSCC for each data package. The ROC indicates the Case #, site name, samples and sample matrix and the laboratory name. The presence of a ROC in a data package is an indication that the package has been reviewed by the RSCC for completeness and is ready for data validation.

14.0 **Forwarded Paperwork**

Upon completion of review, the following are to be forwarded to EPA for final review:

a. Data package
b. Completed data assessment checklist (Appendix A.1,original)
c. Original and a copy of completed data review narrative Appendix A.2)
d. CLASS Contract Compliance Screening (CCS) report
e. Telephone Record Log (Appendix A.3)
f. Field Duplicates Form (Appendix A.4)
g. Total/Dissolved Concentrations Form (Appendix A.5)
h. CLP Re-analysis Request/Approval Record Form (Appendix A.6)
i. Data Assessment Summary Form (Appendix A.7)
j. CADRE Spreadsheet on a computer diskette.

ACRONYMS

AA	Atomic Absorption
AOC	Analytical Operations/Data Quality Center
CADRE	Computer-Aided Data Review and Evaluation
CCB	Continuing Calibration Blank
CCS	Contract Compliance Screening
CCV	Continuing Calibration Verification
CLP	Contract Laboratory Program
CO	Contracting Officer
COC	Contaminants of Concern
CRI	CRQL Check Standard
CRQL	Contract Required Quantitation Limit
CSF	Complete SDG File
CVAA	Cold Vapor AA
DART	Data Assessment Rapid Transmittal
DAT	Data Assessment Tool
DF	Dilution Factor
DQO	Data Quality Objective
ICB	Initial Calibration Blank
ICP	Inductively Coupled Plasma
ICP-AES	Inductively Coupled Plasma - Atomic Emission Spectroscopy
ICP-MS	Inductively Coupled Plasma - Mass Spectrometry
ICS	Interference Check Sample
ICV	Initial Calibration Verification
LCS	Laboratory Control Sample
LRS	Linear Range Sample
MDL	Method Detection Limit
NIST	National Institute of Standards and Technology
OERR	Office of Emergency and Remedial Response
OSWER	Office of Solid Waste and Emergency Response
PB	Preparation Blank
PE	Performance Evaluation
%D	Percent Difference
%R	Percent Recovery
%RI	Percent Relative Intensity
%RSD	Percent Relative Standard Deviation
%S	Percent Solids
PO	Project Officer
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RPD	Relative Percent Difference
RSCC	Regional Sample Control Center

SDG	Sample Delivery Group
SMO	Sample Management Office
SOP	Standard Operating Procedure
SOW	Statement of Work
TAL	Target Analyze List
TR/COC	Traffic Report/Chain of Custody Documentation

Inorganic Target Analyze List And Contract Required Quantitation Limits (CRQLs)

Analyze	CAS Number	ICP-AES CRQL Water Ug/L	ICP-AES CRQL Soil mg/kg	ICP-MS CRQL Water Ug/L
Aluminum	7429-90-5	200	20	---
Antimony	7440-36-0	60	6	2
Arsenic	7440-38-2	10	1	1
Barium	7440-39-3	200	20	10
Beryllium	7440-41-7	5	0.5	1
Cadmium	7440-43-9	5	0.5	1
Calcium	7440-70-2	5000	500	-----
Chromium	7440-47-3	10	1	2
Cobalt	7440-48-4	50	5	1
Copper	7440-50-8	25	2.5	2
Iron	7439-89-6	100	10	----
Lead	7439-92-1	10	1	1
Magnesium	7439-95-4	5000	500	-----
Manganese	7439-96-5	15	1.5	1
Mercury	7439-97-6	0.2	0.1	---
Nickel	7440-02-0	40	4	1
Potassium	7440-09-7	5000	500	-----
Selenium	7782-49-2	35	3.5	5
Silver	7440-22-4	10	1	1
Sodium	7440-23-5	5000	500	-----
Thallium	7440-28-0	25	2.5	1
Vanadium	7440-62-2	50	5	1
Zinc	7440-66-6	60	6	2
Cyanide	57-12-5	10	2.5	----

Site: NWIRP CAIVERTON

Case #:

SDG #: 1007021

Samples:	**Soil**	**Water**
		X
SA-20100707-DUP		X
SAPZ-1511-20100707		X
SA-PZ-1551-20100707		
SA-PZ-1571-20100708		X
SA-PZ-1571-20100707		X
SA-PZ-1591-20100707		X
SA-PZ-1591-20100708		X
SA-PZ-1601-20100707		X

	YES	NO	N/A
A.I.I **Contract Compliance Screening Report**			
Present?	[ ]		X
ACTION: If no, contact RSCC/PO.			
A.I.2 **Record of Communication (from RSCC)**			
Present?	[ ]		X
ACTION: If no, request from the RSCC.			
A.1.3 **Sampling Trip Report**			
Present and complete?	[ ]		X
ACTION: If no, contact RSCC/PO.			
A.I.4 **Chain of Custody/Sample Traffic Report**			
Present?	[X]		
Legible?	[X]		
Signature of sample custodian present?	[X]		
ACTION: If no, contact RSCC/WAM/PO.			
A.I.5 **Cover Page**			
Present?	[X]		
Is the Cover Page properly filled in and the verbatim signed by the lab manager or the manager's designee?	[X]		
Do the sample identification numbers on the Cover Page agree with sample Identification numbers on:			
(a) Traffic Report Sheet?	[X]		

	YES	NO	N/A
(b) Form I's?	[X]	___	___
Is the number of samples on the Cover Page the same as the number of samples on the Traffic Report sheet and the Regional Record of Communication (ROC) for the data Case?	[X]	___	___

ACTION:
If no for any of the above, prepare Telephone Record Log and contact RSCC/PO for re-submittal of the corrected Cover Page from the laboratory.

A.1.6 **SDG Narrative, DC-1 & DC-2 Form**

Is the SDG Narrative present?	[X]	___	___
Is Sample Log-In Sheet(Form DC-1) present and complete?	[X]	___	___
Is Complete SDG Inventory Sheet(Form DC-2) present and complete?	[X]	___	___

ACTION:
If no, write in the Contract-Problems/ Non-Compliance Section of the Data Review Narrative.

A.1.7 **Form I to XV**

A.1.7.1 Are all the Form I through Form XV labeled with:

Laboratory Name?	[X]	___	___
Laboratory Code?	[X]	___	___
RAS/Non-RAS Case No.?	[___]	___	X
SDG No.?	[X]	___	___

	YES	NO	N/A
Contract No.?	[ ]	X	

ACTION:
If no for any of the above, note under Contract Problem/Non-Compliance Section of the "Data Review Narrative" and contact PO for corrected Form(s) from the laboratory.

A.1.7.2 After comparing values on Forms I-IX against the raw data, do any computation/ transcription errors exceed 10% of the reported values on the Forms for:

(a) all analytes analyzed by ICP-AES?	X	[ ]	
(b) all analytes analyzed by ICP-MS?		[ ]	X
(c) Mercury?	X	[ ]	
(d) Cyanide?		[ ]	X

ACTION:
If yes, prepare Telephone Record Log and contact CLP PO/TOPO for the corrected data from the laboratory.

A.1.8 Raw Data

Data shall not be validated without the hard/electronic copies of the associated raw data for samples and QC samples.

A.1.8.1 Digestion/Distillation Log

Digestion Log for ICP-AES (Form XII)present?	[X]		
Digestion Log for ICP-MS (Form XII) present?	[ ]		X
Digestion Log for mercury (Form XII) present?	[X]		
Distillation Log for cyanide (Form XII) present?	[ ]		X

Are pH values for metals and

	YES	NO	N/A
cyanide reported for each aqueous sample?	[ ]		X
Are percent solids calculations present for soils/sediments?	[ ]		X
Are preparation dates present on the sample preparation logs/bench sheets?	[X]		

NOTE:
Digestion/Distillation log must include weights, volumes, and dilutions used to obtain the reported results.

A.1.8.2 Is the analytical instrument real-time printouts present for:

	YES	NO	N/A
ICP-AES?	[X]		
ICP-MS?	[ ]		X
Mercury?	[X]		
Cyanide?	[ ]		X

Are all laboratory bench sheets and instrument raw data printouts necessary to support all sample analyses and QC operations:

	YES	NO	N/A
Legible?	[X]		
Properly labeled?	[X]		

Are all field samples, QC samples and field QC samples present on:

	YES	NO	N/A
Digestion/Distillation log?	[X]		
Instrument Printouts?	[X]		

ACTION:
If no for any of the above questions in Section A.1.8.1 and Section A.1.8.2, write Telephone Record Log and contact TOPO/PO for re-submittal from the laboratory.

	YES	NO	N/A
A.1.9 **Technical Holding Times**: (Aqueous and soil samples) (Examine sample Traffic Reports and digestion/distillation logs to determine the holding time from the sample collection date to the sample preparation date.)			
A.1.9.1 Cyanide distillation(14 days)exceeded?		[ ]	X
Mercury analysis(28 days) exceeded?		[X]	
Other Metals analysis(180 days)exceeded?		[X]	

ACTION:
If yes, reject (R) and red-line non-detects and flag as estimated (J)results ≥ MDL even if sample(s) was preserved properly.

NOTE:
In addition to qualifying the data, a list of all samples and analytes which exceeded the holding times must be prepared. Report for each sample the number of days that were exceeded. (Subtract the sample collection date from the sample preparation date). Attach this list to the data review narrative.

	YES	NO	N/A
A.1.9.2 Is pH of aqueous samples for:			
Metals Analysis ≤ 2?	[X]		
Cyanide Analysis ≥ 12?	[X]		X

ACTION:
If no for any of the above, flag non-detects as "R" and detects as "J".

	YES	NO	N/A
A.1.9.3 Is the cooler temperature ≤ 10 C°?	[X]		

ACTION:
If cooler temperature is >10 °C , flag non-detects as "UJ" and detects as "J".

A.1.10 **Final Data Correctness - Form I**

A.1.10.1 Are Form I's for all samples

	YES	NO	N/A
present and complete?	[X]	___	___

ACTION:
If no, prepare Telephone Record Log and contact CLP PO/TOPO for submittal from the laboratory.

A.1.10.2 Verify there are no calculation and transcription errors in the results reported on Form I's. Circle on each Form I all results that are incorrect.

	YES	NO	N/A
Is the calculation error less than 10% of the correct result?	[X]	___	___
Are results on Form I's reported in correct units (ug/L for aqueous and MG/KG for soils)?	[X]	___	___
Are results on Form I'S reported by correct significant figures?	[X]	___	___
Are soil sample results on Form I's corrected for percent solids?	[___]	___	X
Are all "less than MDL" values reported by the CRQLs and coded with "U"?	[X]	___	___
Are values less than the CRQLs but greater than or equal to the MDLs flagged with "J"?	[X]	___	___
Are appropriate contractual quality control and Method qualifiers used?	[X]	___	___

ACTION:
If no for any of the above questions, prepare Telephone Record Log, and contact CLP PO/TOPO for corrected data.

A.1.10.3 Do EPA sample identification numbers and the corresponding laboratory sample identification numbers match on the Cover Page, Form I's and in the raw data? [X] ___ ___

Was a brief physical description

	YES	NO	N/A
of the samples before and after digestion given on the Form I's?	[X]	___	___
Was any sample result outside the mercury/cyanide calibration range or the ICP-AES/ICP-MS linear range diluted and noted on the Form I?	[X]	___	___

ACTION:
If no for any of the above, note under the Contract-Problem/Non-Compliance Section of the Data Review Narrative.

A.1.11 **Initial Calibration**

	YES	NO	N/A
A.1.11.1 Is a record of at least 2 point (A blank and a standard)calibration present for ICP-AES analysis?	[X]	___	___
Is a record of at least 2 point (a blank and a standard)calibration present for ICP-MS analysis?	[___]	___	X
Is a record of at least 5 point calibration (a blank & 4 standards)present for Hg analysis?	[X]	___	___
Is a record of at least 4 point calibration (a blank & 4 standards)present for cyanide?	[___]	___	X

ACTION:
If incomplete or no initial calibration was performed, reject (R) and red-line the associated data (detects & non-detects).

	YES	NO	N/A
Is one initial calibration standard at the CRQL level for cyanide and mercury?	[X]	___	___

ACTION:
If no, write in the Contract Problem/ Non-Compliance Section of the Data Review Narrative.

A.1.11.2 Is the curve correlation coefficient $\geq$ 0.995 for:

		YES	NO	N/A
	Mercury Analysis?	[X]	___	___
	Cyanide Analysis?	[___]	___	X
	ICP-AES(more than 2 point Calib.)?	[X]	___	___
	ICP-MS (more than 2 point calib.)?	[___]	___	X

ACTION:
If no, qualify the associated sample results ≥ MDL as estimated "J" and non-detects as "UJ".
NOTE:
The correlation coefficient shall be calculated by the data validator using standard concentrations and the corresponding instrument response (e.g. absorbance, peak area, peak height, etc.).

A.1.12 Initial and Continuing Calibration Verification- Form IIA

		YES	NO	N/A
A.1.12.1	Present and complete for every metal and cyanide?	[X]	___	___
	Present and complete for ICP-AES and ICP-MS when both these methods were used for the same analyte?	[X]	___	X

ACTION:
If no for any of the above, prepare a Telephone Record Log and contact PO/TOPO for re-submittal from the laboratory.

		YES	NO	N/A
A.1.12.2	Was a Continuing Calibration Verification performed every 10 samples or every 2 hours whichever is more frequent?	[X]	___	___

ACTION:
If no for any of the above, write in the Contract-Problem/Non-Compliance Section of the Data Review Narrative.

		YES	NO	N/A
A.1.12.3	Was an ICV or a mid-range standard distilled and analyzed with each batch of cyanide samples?	[___]	___	X

	YES	NO	N/A

ACTION:
If no for any of the above, write in the Contract-Problem/Non-Compliance Section of the Data Review Narrative and qualify results ≥ MDL as estimated (J).

A.1.12.2 Circle on each Form IIA all percent recoveries that are outside the contract windows.

Are ICV/CCVs within control limits for:

	YES	NO	N/A
Metals - 90-110%R?	[X]	___	___
Hg - 80-120%R?	[X]	___	___
Cyanide - 85-115%R?	[___]	___	X

ACTION:
If no, qualify all samples between a previous technically acceptable CCV standard and a subsequent technically acceptable CCV standard as follows as follows:

Qualify as estimated (J) all detects and non-detects, if the ICV/CCV %R is between 75-89%(65-79% for Hg; 70-84% for CN). Qualify only positive results(≥ MDL) as "J" if the ICV/CCV %R is between 111-125%(121-135% for Hg;116-130% for CN). Reject (R) and red-line only
detects if the recovery is greater than 125% (135% for Hg; 130% for CN). Reject (R) and red-line all associated results (hits and non-detects)if the recovery is less than 75%(65% for Hg;70% for CN).

NOTE:
For ICV that does not fall within the acceptance limits, qualify all samples reported from the analytical run.

A.1.12.3 Was the distilled ICV or mid-range standard for cyanide within acceptance limits (85-115%)? [___] ___ X

ACTION:
If no, Qualify all cyanide results ≥ MDL as "J".

A.1.13 **CRQL Standard Analysis - Form IIB**

A.1.13.1 For each ICP-AES run, was a CRI

	YES	NO	N/A
(CRQL or MDL when MDL > CRQL) standard analyzed? (Note:CRI is not required for Al, Ba, Ca, Fe, Mg, Na and K.)	[X]	___	___
For each ICP-MS run, was a CRI (CRQL or MDL when MDL > CRQL) standard analyzed for each mass/isotope used for the analysis?	[X]	___	___ ___
For each mercury run, was a CRQL standard analyzed?	[X]	___	___
For each cyanide run, was a CRQL standard analyzed?	[___]	___	X

ACTION:
If no for any of the above, write this deficiency in the Contract Problems/ Non-Compliance Section of the Data Review Narrative, inform CLP PO and flag results in the affected ranges (detects <2xCRQL)as J and non-detects UJ.

The affected ranges are:
ICP-AES Analysis - *True Value ± CRQL
ICP-MS Analysis - *True Value ± CRQL
Mercury Analysis - *True Value ± CRQL
Cyanide Analysis - *True Value ± CRQL
* True value of the CRQL Standard

A.1.13.2 Was a CRQL standard analyzed after the ICV/ICB, before the final CCV/CCB and once every 20 analytical samples in the analytical run for each analysis? [X] ___ ___

ACTION:
If no, write in the Contract Problem/ Non-Compliance Section of the "Data Review Narrative".

A.1.13.3 Circle on each Form IIB all percent recoveries that are outside the acceptance windows.

	YES	NO	N/A
Is the CRQL standard within control limits for:			
Metals(ICP-AES/ICP-MS)- 70 - 130%?	[ ]	X	
Mercury- 70 - 130%?	[X]		
Cyanide - 70 - 130%?	[ ]		X

ACTION:
If no, flag detects <2xCRQL as "J" and non-detects as "UJ" if the CRQL standard recovery is between 50-69%. Flag(J) only detects <2xCRQL if the recovery is between 131% and ≤180%. If the recovery is less than 150%, reject(R) and red-line non-detects and detects < 2xCRQL, and flag (J) detects between 2xCRQL and ICV/CCV. Reject and red-line only detects <2xCRQL and flag (J)detects ≥ 2xCRQL but < ICV/CCV if the recovery is > 180%.

NOTE:
1. Qualify all field samples analyzed between a previous technically acceptable analysis of the CRQL standard and a subsequent acceptable analysis of the CRQL standard
2. Flag (J) or reject (R) only the final sample results on Form I's when Sample raw data are within the affected ranges and the CRQL standard is outside the acceptance windows.
3. The samples and the CRQL standard must be analyzed in the same analytical run.

A.1.14 Initial and Continuing Calibration Blanks - Form III

	YES	NO	N/A
A.1.14.1 Present and complete for all the instruments used for the metals and cyanide analyses?	[X]		
Was an initial Calibration Blank analyzed after ICV?	[X]		
Was a continuing Calibration Blank analyzed after every CCV and every 10 samples or every 2 hours, whichever is more frequent?	[X]		

Were the ICB & CCB values ≥ MDL but < CRQL reported on Form III and flagged "J" by

		YES	NO	N/A
	using MDLs from direct analysis(Preparation Method "NP1")? (Check Form III against the raw data)	[X]	___	___
	ACTION: If no, inform CLP PO/TOPO and make a note in the Contract-Problems/Non-Compliance Section of the "Data Review Narrative".			
A.1.14.2	Circle with red pencil on each Form III all Calib. Blank values that are:			
	≥ MDL but ≤ CRQL			
	> CRQL			
A.1.14.2.1	When MDL < CRQL, is any Calib. Blank value ≥ MDL but ≤ CRQL?	___	[X]	___
	ACTION: If yes, change sample results ≥ MDL but ≤ CRQL to the CRQL with a "U". Do not qualify non-detects.			
A.1.14.2.2	When MDL < CRQL, is any Calib. Blank value > CRQL?	___	[X]	___
	ACTION: If yes, reject (R) and red line the associated sample results > CRQL but <ICB/CCB Blank Result. Flag as "J" detects > ICB/CCB blank value but < 10xICB/CCB value. Change the sample results ≥ MDL but ≤ the CRQL to CRQL with a "U".			
A.1.14.2.3	Is any Calibration Blank value below the negative CRQL?	___	[X]	___
	ACTION: If yes, flag (J) as estimated all associated sample results ≥ CRQL but <10xCRQL.			

NOTE:

1. For ICB that does not meet the technical QC Criteria, apply the action to all samples

	YES	NO	N/A

reported from the analytical run.

2. For CCBs that do not meet the technical QC criteria, apply the action to all samples analyzed between a previous technically acceptable analysis of CCB and a subsequent technically acceptable analysis of the CCB in the analytical run.,

A.1.15 **Preparation Blank - FORM III**

NOTE: The Preparation Blank for mercury is the same as the calibration blank.

A.1.15.1 Was one Preparation Blank prepared with and analyzed for:

	YES	NO	N/A
Each Sample Delivery Group (SDG)?	[X]	___	___
Each batch of the SDG samples digested/distilled?	[X]	___	___
Each matrix type?	[X]	___	___
All instruments used for metals and cyanide analyses?	[X]	___	___

ACTION:
If no for any of the above, flag as estimated (J) all the associated positive data <10xMDL for which the Preparation Blank was not analyzed.

NOTE:
If only one blank was analyzed for more than 20 samples, then the first 20 samples analyzed are not estimated(J), but all additional samples must be qualified (J).

A.1.15.2 Circle with red pencil on each Form III all Prep. Blank values that are:

≥ MDL but ≤ CRQL, and

> CRQL

	YES	NO	N/A
A.1.15.2.1 When MDL < CRQL, is any preparation blank value ≥ MDL but ≤ CRQL?	X	[___]	___

ACTION:
If yes, change sample result ≥ MDL

	YES	NO	N/A
but ≤ CRQL to CRQL with a "U".			
A.1.15.2.2 When the MDL ≤ CRQL, is any Preparation Blank value greater than its CRQL?	___	[X]	___
If yes, is the Prep. Blank value greater than the value of the associated Field Blank collected and analyzed with the SDG samples?	___	[X]	___
If yes, is the lowest concentration of that analyte in the associated samples less than 10 times the Preparation Blank value?	___	[X]	___

ACTION:
If yes, reject (R) and red-line all associated sample results greater than the CRQL but less than the Prep.Blank value. Flag as "J" detects > Prep. Blank value but <10xPrep.Blank. If the sample result ≥ MDL but ≤ CRQL, replace it with CRQL-U.

If the Prep. Blank value is less than the same analyte value in the Field Blank, do not qualify the sample results due to the Prep. Blank criteria.

NOTE:
Convert soil sample result to mg/Kg on wet weight basis to compare with the soil Prep. Blank result on Form III.

A.1.15.2.3 Is the Prep. Blank concentration below the negative CRQL?	___	[X]	___

ACTION:
If yes, flag (J) all associated sample results less than 10xCRQL. Qualify non-detects as estimated (UJ).

A.1.15.2.4 When the MDL is greater than the CRQL, is the preparation blank concentration on Form III greater than two times the MDL?	___	[X]	___

ACTION:

		YES	NO	N/A
	If yes, reject (R) and red-line all positive sample results with sample raw data less than 10 times the Preparation Blank value.			
A.1.16	**ICP-AES/ICP-MS Interference Check Sample (ICS) - Form IV** **NOTE:** Not required for CN, Hg, Al, Ca, Fe and Mg.			
A.1.16.1	Present and complete?	[X]	___	___
	Was ICS analyzed at the beginning and end of each analytical run, and once for every 20 analytical samples?	[X]	___	___
	Was ICS analyzed at the beginning of the ICP-MS analytical run?	[X]	___	___
	ACTION: If no, flag as estimated (J) all sample results.			
A.1.16.2	**ICP-AES Method**			
A.1.16.2.1	**ICSA Solution:** For ICP-AES, are the ICSA "Found" analyte values within the control limits ± of CRQL of the true/established mean value?	[X]	___	___
	If no for any of the above, is the sample concentration of Al, Ca, Fe, or Mg in the same units (ug/L or MG/KG) greater than or equal to its respective concentration in the ICSA Solution on Form IV?	[N/A]	___	___
	ACTION: If yes, apply the following action to all samples analyzed between a previous technically acceptable analysis of the ICS and a subsequent technically acceptable analysis of the ICS in the analytical run: Flag (J) as estimated only sample results ≥MDL			

	YES	NO	N/A
for which the ICSA "Found" value is greater than (True value+CRQL). Do not qualify non-detects. If the ICSA "Found" value is less than (True value-CRQL), flag non-detects as "UJ" and detects as "J".			
A.1.16.2.3 **ICSAB Solution** For ICP-AES, are all analyte results in ICSAB within the control limits of 80-120 of the true/established mean value?	[X]	___	___
If no for any of the above, is the sample concentration of Al, Ca, Fe, or Mg in the same units (ug/L or MG/KG) greater than or equal to its respective concentration in the ICSAB Solution on Form IV?	[~~X~~]	___	X

ACTION:
If yes, apply the following action to all samples analyzed between a previous technically acceptable analysis of the ICS and a subsequent technically acceptable analysis of the ICS in the analytical run:

Flag (J) as estimated those associated sample results ≥ MDL for which the ICSAB analyte recovery is greater than 120% but ≤ 150%. If the ICSAB recovery falls within 50-79%, qualify sample results ≥ MDL as "J" and non-detects as "UJ". Reject (R) and red-line all sample results (detects & non-detects) for which the ICSAB analyte recovery is less than 50%. If the recovery is above 150%, reject (R) and red-line only positive results.

A.1.16.3 **ICP-MS Method**

A.1.16.3.1 **ICSA Solution:** For ICP-MS, are the ICSA "Found" analyte values within the control limits of ±CRQL of the true/established mean value?	[___]	___	X

ACTION:
If no, apply the following action to all samples reported from the analytical run:

Flag (J) as estimated only sample results ≥ MDL if the ICSA "Found" value is greater than (True value+CRQL). Do not qualify non-detects. If the ICSA "Found" value is less than (True value-CRQL), flag the associated sample detects as "J" and non-detects as "UJ".

		YES	NO	N/A
A.1.16.3.3	**ICSAB Solution** For ICP-MS, are all analyte results in ICSAB within the control limits of 80-120% of the true/established mean value, whichever is greater?	[___]	___	X

ACTION:
If no, apply the following action to all samples reported from the analytical run:

Flag (J) as estimated those associated sample results ≥ MDL for which the ICSAB analyte recovery is greater than 120% but ≤ 150%. If the ICSAB recovery falls within 50-79% flag (J) as estimated the associated sample results ≥ MDL. Reject (R) and red-line those all sample detects and non-detects for which the ICSAB analyte recovery is less than 50%. If the recovery is above 150%,reject (R) and red-line only detects (≥ MDL).

A.1.17 **Spiked Sample Recovery: Pre-Digestion/Pre-Distillation)-Form V A**
Note:Not required for Ca,Mg,K,and Na(both matrices);Al and Fe (soil only)

		YES	NO	N/A
A.1.17.1	Was Matrix Spike analysis performed:			
	For each matrix type?	[X]	___	X
	For each SDG?	[X]	___	X
	On one of the SDG samples?	[___]	___	X
	For each concentration range (i.e.,low, med., high)?	[___]	___	X
	For each analytical Method (ICP-AES,ICP-MS, Hg, CN)used?	[___]	___	X
	Was a spiked sample prepared and analyzed with the SDG samples?	[___]	___	X

ACTION:
If no for any of the above, flag as estimated(J)all the positive data for which a spiked sample was not analyzed.

NOTE:
If more than one spiked sample were analyzed for one SDG, then qualify the associated data based on the worst spiked sample analysis.

		YES	NO	N/A
A.1.17.2	Was a field blank or PE sample used for the spiked sample analysis?	___	[___]	X
	ACTION: If yes, flag (J) as estimated positive data of the associated SDG samples for which field blank or PE sample was used for the spiked sample analysis.			
A.1.17.3	Circle on each Form VA all spike recoveries that are outside the control limits (75-125%) that have sample concentrations less than four times the added spike concentrations.			
	Are all recoveries within the control limits when sample concentrations are less than or equal to four times the spike concentrations?	[___]	___	X
	NOTE: Disregard the out of control spike recoveries for analytes whose concentrations are greater than or equal to four times the spike added.			
	Are results outside the control limits (75-125%)flagged with Lab Qualifier "N" on Form I's and Form VA?	[___]	___	X
	ACTION: If no for any of the above, write in the Contract - Problems/Non-Compliance Section of the Data Review Narrative.			
A.1.17.4	Aqueous			
	Are any spike recoveries:			
	(a) less than 30%?	___	[___]	X
	(b) between 30-74%?	___	[___]	X
	(c) between 126-150%?	___	[___]	X
	(d) greater than 150%?	___	[___]	X
	ACTION: If the matrix spike recovery is less than 30%,reject (R) and red-line all associated aqueous data (detects & non-detects). If between 30-74%, qualify all associated aqueous data ≥ MDL as "J" and non-detects			

	YES	NO	N/A
as "UJ". If between 126-150%, flag (J) all data ≥ MDL as "J". If greater than 150%, reject (R) and red-line all associated data ≥ MDL.			
(NOTE:Replace "N" with "J", "R" as appropriate.)			
A.1.17.5 **Soil/Sediment**			
Are any spike recoveries:			
(a) less than 10%?	___	[___]	X
(b) between 10-74%?	___	[___]	X
(c) between 126-200%?	___	[___]	X
(d) greater than 200%?	___	[___]	X
ACTION: If yes for any of the above, proceed as follows:			
If the matrix spike recovery is less than 10%,reject (R) and red-line all associated data (detects & non-detects); if between 10-74%,qualify all associated data ≥ MDL as "J" and non-detects as "UJ"; if between 126-200%, flag (J) all associated data ≥ MDL as "J" If greater than 200%, reject (R) and red-line all associated data ≥ MDL. (NOTE:Replace "N" with "J" or "R" as appropriate.)			
A.1.18 **Lab Duplicates) - Form VI**			
A.1.18.1 Was the lab duplicate analysis performed:			
For each SDG?	[___]	___	X
On one of the SDG samples?	[___]	___	X
For each matrix type?	[___]	___	X
For each concentration range (low or med.)?	[___]	___	X
For each analytical Method (ICP-AES/ICP-MS,Hg,CN)Used?	[___]	___	X
Was a lab duplicate prepared and analyzed with the SDG samples?	[___]	___	X

		YES	NO	N/A
	ACTION: If no for any of the above, flag (J) as estimated all the SDG sample results (detects & non-detects) for which the lab duplicate analysis was not performed.			
	NOTE: If more than one lab duplicate sample were analyzed for an SDG, then qualify the associated samples based on the worst lab duplicate analysis.			
A.1.18.2	Was a Field Blank or PE sample used for the Lab Duplicate analysis?	___	[___]	X
	ACTION: If yes, flag as estimated (J) all SDG sample results (hits & non-detects) for which Field Blank or PE sample was used for duplicate analysis.			
A.1.18.3	Circle on each Form VI all values that are:			
	RPD > 20%, or			
	Absolute Difference > CRQL			
	Are all values within control limits (RPD ≤ 20% or absolute difference ≤ ±CRQL)?	[___]	___	X
	If no, are all results outside the control limits flagged with an "*" (Lab Qualifier) on Form VI and on all Form I's?	[___]	___	X
	ACTION: If no, write in the Contract-Problems/ Non-Compliance Section of the Data Review Narrative.			
	NOTE: The laboratory is not required to report on Form VI the RPD when both values are non-detects.			
A.1.18.4	Aqueous			
A.1.18.4.1	When sample and duplicate values are both ≥ 5xCRQL (substitute MDL for CRQL when MDL > CRQL),			

	YES	NO	N/A
is any RPD > 20% but < 100%?	___	[___]	X
is any RPD ≥ 100%?	___	[___]	X

ACTION:
If the RPD is > 20% but < 100%, flag (J) as estimated the associated sample data ≥ CRQL. If the RPD is ≥ 100%, reject (R) and red-line the associated sample data ≥ CRQL.

(**NOTE:** Replace "*" with "J" or "R" as appropriate.)

A.1.18.4.2 When the sample and/or duplicate value <5xCRQL (substitute MDL for CRQL when MDL >CRQL), is the absolute difference between sample and duplicate values:

> ± CRQL?	___	[___]	X
> ± 2xCRQL?	___	[___]	X

ACTION:
If the absolute difference is > CRQL, flag as estimated all the associated sample results ≥ MDL but < 5xCRQL as "J" and non-detects as "UJ". If the absolute difference is > 2xCRQL, reject (R) and red-line all the associated non-detects and detects ≥ MDL but < 5xCRQL.

NOTE:
1. Replace "*" with "J", "UJ" or "R" as appropriate.)
2. If one value is >CRQL and the other value is non-detect, calculate the absolute difference between the value > CRQL and the MDL, and use this difference to qualify sample results.

A.1.18.5 **Soil/Sediment**

A.1.18.5.1 When sample and duplicate values are both ≥ 5xCRQL (substitute MDL for CRQL when MDL > CRQL),

is any RPD ≥ 35% but < 120%?	___	[___]	X
is any RPD ≥ 120%?	___	[___]	X

ACTION:
If the RPD is ≥ 35% and < 120%, flag (J) as estimated the associated sample

		YES	NO	N/A
	data ≥ CRQL. If the RPD is ≥ 120%, reject (R)and red-line the associated sample data ≥ CRQL.			
A.1.18.5.2	When the sample and/or duplicate value <5xCRQL(substitute MDL for CRQL when MDL > CRQL), is the absolute difference between sample and duplicate:			
	> ± 2 x CRQL?	___	[___]	X
	> ± 4 x CRQL	___	[___]	X

ACTION:
If the absolute difference is > 2 x CRQL, flag all the associated sample results ≥ MDL but < 5xCRQL as "J" and non-detects as "UJ". If the absolute difference is > 4xCRQL, reject (R) and red-line all the associated non-detects and detects ≥ MDL but <5xCRQL.

NOTE:
1. Replace "*" with "J", "UJ" or "R" as appropriate.)
2. If one value is >CRQL and the other value is non-detect, calculate the absolute difference between the value > CRQL and the MDL, and use this difference to qualify sample results.

A.1.19 **Field Duplicates**

Aqueous Field Duplicates

A.1.19.1	Was an aqueous Field Duplicate pair collected and analyzed? (Check Sampling Trip Report)	[X]	___	___

ACTION:
If yes, prepare a Form (Appendix A.4) for each aqueous Field Duplicate pair. Report the sample and Field Duplicate results on Appendix A.4 from their respective Form I's. Calculate and report RPD on Appendix A.4 when sample and its Field Duplicate values are both > 5xCRQL. Calculate and report the absolute difference on Appendix A.4 when at least one value (sample or duplicate) is <5xCRQL. Evaluate the aqueous Field Duplicate analysis in accordance with the

	YES	NO	N/A
QC criteria stated in Sections A.1.19.2 and A.1.19.3.			

NOTE:
1. Do not transfer "*" from Form I's to Appendix A.4.
2. Do not calculate RPD when both values are non-detects.
3. Substitute MDL for CRQL when MDL > CRQL.
4. If one value is >CRQL and the other value is non-detect, calculate the absolute difference between the value > CRQL and the MDL, and use this the criteria to qualify the results.

A.1.19.2 Circle all values on the Form (Appendix A.4) for Field Duplicates that have:

RPD ≥ 20% or

Difference > ± CRQL

When sample and duplicate values are both ≥5xCRQL (substitute MDL for CRQL when MDL > CRQL),

is any RPD ≥ 20%?	___	[X]	___
is any RPD ≥ 100%?	___	[X]	___

ACTION:
If the RPD is >20% but < 100%, flag (J) only the associated sample and its Field Duplicate results ≥ CRQL. If the RPD is ≥ 100%, reject(R) and red-line only the associated sample and its Field Duplicate result ≥ CRQL.

A.1.19.3 When the sample and/or duplicate value(s) <5xCRQL (substitute MDL for CRQL when MDL >CRQL), is the absolute difference between sample and duplicate:

> ± CRQL?	___	[X]	___
> ± 2 x CRQL?	___	[X]	___

ACTION:
If the absolute difference is > CRQL, flag detects ≥ MDL but < 5xCRQL as "J" and non-detects as "UJ". If the difference is > 2xCRQL, reject (R) and red-line non-detects

		YES	NO	N/A
	and results ≥ MDL but <5xCRQL of the sample and its Field Duplicate.			
	Soil/Sediment Field Duplicates			
A.1.19.4	Was a soil field duplicate pair collected and analyzed? (Check Sampling Trip Report)	[___]	___	X
	ACTION: If yes, for each soil Field Duplicate pair proceed as follows:			
	Prepare Appendix A.4 for each Field Duplicate pair. Report on Appendix A.4 all sample and its Field Duplicate results in MG/KG from their respective Form I's. Calculate and report RPD when sample and its duplicate values are both greater than 5xCRQL. Calculate and report the absolute difference when at least one value (sample or duplicate)is < 5xCRQL. Evaluate the Field Duplicate analysis in accordance with the QC Criteria stated in Sections A.1.19.5 and A.1.19.6.			
	NOTE: 1. Do not transfer "*" from Form I's to Appendix A.4. 2. Do not calculate RPD when both values are non-detects. 3.Substitute MDL for CRQL when MDL > CRQL. 4.If one value is >CRQL and the other value is non-detect, calculate the absolute difference between the value > CRQL and the MDL, and apply the criteria to qualify the results.			
A.1.19.5	Circle on each Appendix A.4 all values that have:			
	RPD ≥ 35%, or Difference > ± 2xCRQL When sample and duplicate values are both ≥ 5xCRQL (substitute MDL for CRQL when MDL > CRQL),			
	is any RPD ≥ 35% but < 120%?	___	[___]	X
	is any RPD ≥ 120%?	___	[___]	X
	ACTION: If the RPD is ≥ 35% but < 120%,			

		YES	NO	N/A
	flag only the associated sample and its Field Duplicate results ≥ CRQL as "J". If the RPD is ≥ 120%, reject (R) and red-line only the sample and its Field Duplicate results ≥ CRQL.			
A.1.19.6	When the sample and/or duplicate value(s) <5xCRQL (substitute MDL for CRQL when MDL > CRQL), is the absolute difference between sample and Field Duplicate:			
	> ± 2 x CRQL?	___	[___]	X
	> ± 4 x CRQL?	___	[___]	X
	ACTION: If the absolute difference is > 2xCRQL, flag Sample and its Field Duplicate resuts ≥ MDL but <5xCRQL as "J" and non-detects as "UJ". If the difference is >4xCRQL, reject(R) and red-line non-detects and detects ≥ MDL but <5xCRQL of the sample and its Field Duplicate.			
A.1.20	**Laboratory Control Sample (LCS)- Form VII**			
A.1.20.1	Was one LCS prepared and analyzed for:			
	Each SDG?	[X]	___	___
	Each matrix type?	[X]	___	___
	Each batch samples digested/distilled?	[X]	___	___
	For each Method(ICP-AES,ICP-MS,Hg,CN) used?	[X]	___	___
	Was an LCS prepared and analyzed with the samples?	[X]	___	___
	ACTION: If no for any of the above, prepare Telephone Record Log and contact CLP PO or TOPO for submittal of the LCS results. Flag (J) as estimated all the data for which an LCS was not analyzed.			
	NOTE: If only one LCS was analyzed for			

	YES	NO	N/A
more than 20 samples, then the first 20 samples analyzed are not flagged(J), but all additional samples must be qualified (J).			

A.1.20.2 Aqueous LCS

Circle on each Form VII the LCS percent recoveries outside control limits 80-120%.

NOTE: 1.Use digested ICV as LCS for aqueous mercury
2.Use distilled ICV as LCS for aqueous cyanide

Is any LCS recovery:

	YES	NO	N/A
Less than 50%?	___	[X]	___
Between 50% and 79%?	___	[X]	___
Between 121% and 150%?	___	[X]	___
Greater than 150%?	___	[X]	___

ACTION:
If the LCS recovery is less than 50%, reject (R) and red-line all associated sample data (detects & non-detects); for a recovery between 50-79%, flag detects as "J" all non-detects as "UJ". if the LCS recovery is between 121-150%, flag only detects as "J". if the recovery is greater than 150%, reject (R) and red-line all detects.

A.1.20.3 Solid LCS

If an analyte's MDL is equal to or greater than the true value of LCS, disregard the "Action" below for that analyte even though the LCS is out of control limits.

	YES	NO	N/A
Is the LCS "Found" value greater than the Upper Control Limit reported on Form VII?	___	[___]	X

ACTION:

		YES	NO	N/A
	If yes, flag (J) all the associated detects ≥ MDL as estimated (J).			
	Is the LCS "Found" value lower than the Lower Control Limit reported on Form VII?	[ ]	[ ]	[X]
	ACTION: If yes, flag detects as "J" and non-dectes as "UJ".			
A.1.21	**ICP-AES/ICP-MS Serial Dilution - Form VIII**			
	NOTE: Serial dilution analysis is required only when the initial concentration is equal to or greater than 50 x MDL.			
A.1.21.1	Was a Serial Dilution analysis performed:			
	For each SDG?	[ ]	[X]	
	On one of the SDG samples?	[X]		
	For each matrix type?	[X]		
	For each concentration range (low or med.)?	[X]		
	Was a Serial Dilution sample analyzed with the SDG samples?	[X]		
	ACTION: If no for any of the above, flag as estimated (J) detects ≥ MDL of all the SDG samples for which the ICP Serial Dilution Analysis was not performed.			
A.1.21.2	Was a Field Blank or PE sample used for the Serial Dilution Analysis?		[X]	
	ACTION: If yes, flag as estimated (J) detects ≥ MDL of all the SDG samples			
A.1.21.3	Circle on Form VIII the Percent Differences (%D) between sample results and its dilution results that are outside the control limits ± 10%			

		YES	NO	N/A
	when initial concentrations ≥ 50 x MDLs.			
	Are results outside the control limits flagged with an "E"(Lab Qualifier) on Form VIII and all Form I's?	[X]	___	___
	ACTION: If no, write in the Contract-Problem/ Non-Compliance Section of the Data Review Narrative.			
A.1.21.4	Are any %D values:			
	> 10%?	___	[X]	___
	≥ 100%?	___	[X]	___
	ACTION: If the Percent Difference (%D) is greater than 10%, flag (J) as estimated all associated samples whose raw data ≥ MDL; if the %D is ≥ 100%, reject (R) and red-line all associated samples with raw data ≥ MDL.			
	(NOTE:Replace "E" with "J" or "R" as appropriate.)			
A.1.22	Total/Dissolved or Inorganic/Total Analytes			
A.1.22.1	Were any analyses performed for dissolved as well as total analytes on the same sample(s)?	___	[Y]	___
	Were any analyses performed for inorganic as well as total analytes on the same sample(s)?	___	[Y]	___
	ACTION: If yes, prepare a Form (Appendix A.5) to compare the differences between dissolved (or inorganic)and total analyte concentrations. Compute each difference on Appendix A.5 as a percent of the total analyte only when both of the following conditions are fulfilled: (1) The dissolved(or inorganic)concentration is greater than total concentration, and (2) greater than or equal to 5xMDL.			
A.1.22.2	Is any dissolved (or inorganic) concentration greater than its total concentration by more than 20%?	___	[Y]	___

		YES	NO	N/A
A.1.22.3	Is any dissolved(or inorganic) concentration greater than its total concentration by more than 50%?	___	[X]	___
	ACTION: If the percent difference is greater than 20%, flag (J) both dissolved/inorganic and total concentrations as estimated. If the difference is more than 50%, reject (R) and red-line both the values.			
A.1.23	**Field Blank - Form I** **NOTE: Designate "Field Blank" as such on Form I**			
A.1.23.1	Was a Field/Rinsate Bank collected and analyzed with the SDG samples?	[X]	___	___
	If yes, is any Field/Rinsate Blank absolute value of an analyte on Form I greater than its CRQL(or 2xMDL when MDL>CRQL)?	___	[X]	___
	If yes, circle the Field Blank value on Form I that is greater than the CRQL, (or 2 x MDL when MDL > CRQL).			
	Is any Field Blank value greater than CRQL also greater than the Preparation Blank value?	___	[X]	___
	If yes, is the Field Blank value (> CRQL and > the prep. blank value) already rejected due to other QC criteria?	[X]	___	___

ACTION:
If the Field Blank value was not rejected, reject all associated sample data (except the Field Blank results)greater than the CRQL but less than the Field Blank value. Reject on Form I's the soil sample results whose raw values in ug/L in the instrument printout are greater than the CRQL but less than the Field Blank value in ug/L. Flag as "J" detects between the Field Blank value and 10xField Blank value. If the sample result ≥ MDL but ≤ CRQL, replace it with CRQL-U.

If the Field Blank value is less than the

	YES	NO	N/A
Prep.Blank value, do not qualify the sample results due to the Field Blank criteria.			

NOTE:
1. Field Blank result previously rejected due to other criteria cannot be used to qualify field samples.
2. Do not use Rinsate Blank associated with soils to qualify water samples and vice versa.

A.1.24 Verification of Instrumental Parameters - Form IX, XA, XB, XI

A.1.24.1 Is verification report present for:

	YES	NO	N/A
Method Detection Limits (Form IX-Annually)?	[X]	___	___
ICP-AES Interelement Correction Factors (Form XA & XB -Quarterly)?	[X]	___	___
ICP-AES & ICP-MS Linear Ranges (Form XI-Quarterly)?	[X]	___	___

ACTION:
If no, contact CLP PO/TOPO for submittal from the laboratory.

A.1.24.2 Method Detection Limits - Form IX

A.1.24.2.1 Are MDLs present on Form IX for:

	YES	NO	N/A
All the analytes?	[X]	___	___
All the instruments used?	[X]	___	___
Digested and undigested samples and Calib.Blanks?	[X]	___	___
ICP-AES and ICP-MS when both instruments are used for the same analyte?	[X]	___	___

ACTION:
If no for any of the above, prepare Telephone Record Log and contact CLP PO/TOPO for submittal of the MDLs from the laboratory. Report to CLP PO and write in the Contract Problems/ Non-Compliance Section of the Data Review Narrative if the MDL concentration is not less than ½ CRQL.

		YES	NO	N/A
A.1.24.2.2	Is MDL greater than the CRQL for any analyte?	___	[X]	___
	If yes, is the analyte concentration on Form I greater than 5 x MDL for the sample analyzed on the instrument whose MDL exceeds CRQL?	[X]	___	___
	ACTION: If no, flag as estimated (J) all values less than five times MDL for the analyte whose MDL exceeds the CRQL.			
A.1.24.3	**Linear Ranges - Form XI**			
A.1.24.3.1	Was any sample result higher than the high linear range for ICP-AES or ICP-MS?	___	[X]	___
	Was any sample result higher than the highest calibration standard for mercury or cyanide?	___	[X]	___
	If yes for any of the above, was the sample diluted to obtain the result reported on Form I?	[X]	___	___
	ACTION: If no, flag (J) as estimated the affected detects (≥ MDL) reported on Form I.			
A.1.25	**ICP-MS Tune Analysis - Form XIV**			
A.1.25.1	Was the ICP-MS instrument tuned prior to calibration?	[___]	___	X
	ACTION: If no, reject (R) and red-line all sample data for which tuning was not performed.			
A.1.25.2	Was the tuning solution analyzed or scanned at least five times consecutively?	[___]	___	X
	Were all the required isotopes spanning the analytical range present in the tuning solution?	[___]	___	X
	Was the mass resolution within			

		YES	NO	N/A
	0.1 amu for each isotope in the tuning solution?	[___]	___	X
	Was %RSD less than 5% for each isotope of each analyte in the tuning solution?	[___]	___	X
	ACTION: If no for any of the above, qualify all results ≥ MDL associated with that Tune as estimated "J", and all non-detects associated with that Tune as "UJ".			
A.1.26	**ICP-MS Internal Standards - Form XV**			
A.1.26.1	Were the Internal Standards added to all the samples and all QC samples and calibration standards (except the Tuning Solution)?	[___]	___	X
	Were all the target analyte masses bracketed by the masses of the five internal standards?	[___]	___	X
	ACTION: If none of the Internal Standards was added to the samples, reject (R) and red-line all the associated sample data (detects & non-detects). If internal standards were used but did not cover all the analyte masses, reject (R) and red-line only the analyte results not bracketed by the internal standard masses.			
A.1.26.2	Was the intensity of an Internal Standard in each sample within 60-125% of the intensity of the same Internal Standard in the calibration blank?	[___]	___	X
	If no, was the original sample diluted two fold, Internal Standard added and the sample re-analyzed?	[___]	___	X
	Was the %RI for the two fold diluted sample within the acceptance limits (60-125%)?	[___]	___	X
	ACTION: If no for any of the above, flag detects as "J" and non-detects "UJ" of all the analytes with atomic masses between the atomic mass of the internal standard lighter			

than the affected internal standard, and the atomic mass of the internal standard heavier than the affected internal standard.

A.1.27 Percent Solids of Sediments

A.1.27.1 Are percent solids in sediment(s):

< 50%? ___ [___] X

ACTION:
If yes, qualify as estimated (J) all detects and non-detects of a sample that has percent solids less than 50%(i.e.,moisture content greater than 50%).

NOTE:
Flag(J) only the sample results that were not previously flagged due to other QC criteria.

Inorganic Data Review Narrative

Case# _____ Site: NWIRP CALVERTON Matrix: Soil ___

SDG# 1007021 Lab: Compu Chem Water X

Sampling Team: _____ Reviewer: Danielle Baughman Other _____

A.2.1 Data Validation Flags:
The following flags may have been applied in red by the data validator and must be considered by the data user.

J - This flag indicates the result qualified as estimated

R and Red-Line - A red-line drawn through a sample result indicates unusable value. The red-lined data are known to contain significant errors based on documented information and must not be used by the data user.

U - This data validation qualifier is applied to sample results ≥ MDL when associated blank is contaminated

Fully Usable Data - The results that do not carry "J" or "red-line" are fully usable.

A.2.2 Laboratory Qualifiers:
The CLP laboratory applies a contractual qualifier on all

Form I'S and the QC Form when a QC analysis is outside the control limits. These qualifiers are not applied on the Lotus or XLS spreadsheets. These qualifiers and their meanings are as follows:

N: This qualifier indicates the lack of accuracy in the reported result, and is applied when matrix spiked sample recovery is outside the control limits.

E: This qualifier indicates the the presence of interference, and is applied when the ICP serial dilution is outside the control limits.

*: This qualifier indicate the lack of precision , and is pplied on Fom I'S and Form VI when the Lab Duplicate analysis is outside the control limits.

U: This is a concentration qualifier that laboratory applies to a non-detected result which is essentially less than the Method Detection Limit(MDL). A non-detected result of an analyte is indicated by the Contract Required Quantitation Limit (CRQL) of that analyte suffixed with "U".

J: This is also a concentration qualifier that laboratory applies to a positive result below the CRQL.

NOTE: The laboratory qualifiers are crossed out and replaced with the appropriate data validation qualifiers (J, R or U) by the data validator.

A.2.3.1 Data Case Description:

This SDG consisted of 8 aqueous samples. One field dup pair (SA-20100707DUP/ SA-PZ-155I-20100707) was included.

A.2.3.2 CSF Audit:

A.2.3.3 **Technical Review:**

See Letter.

A.2.3.4 **Contract-Problem/Non-Compliance:**

See Letter

HWSS Reviewer: _____ Date:_____
Signature

Contractor Reviewer: _____ Date:_____
Signature

Verified by: _____ Date:_____
Signature

CASE #
SDG #

Contract Laboratory Program
REGION II/LABORATORY COMMUNICATION SYSTEM

Telephone Record Log

Date of Call: _____

ESAT Reviewer/Date: _____

Type of Analysis: ___Inorganic_____

Laboratory Name: _____

Lab Contact: _____

Call Initiated By: ___Laboratory _X_Region II

Inquiry made in reference to data for the following sample number(s):

Summary of Questions/Issues Discussed:

Summary of Resolution:

Signature

Date: _____

FIELD DUPLICATES

Sample No. SAPZ155I-20100701 Field Duplicate No. SA-20100707-DUP Sample Matrix: Aqueous

Lab Code: LIBRTY Case No.: — SDG No.: 1007021

% Solids Sample: 0 % Solids Duplicate: 0

Concentration Units (ug/l or mg/kg dry weight): ug/l

	Action Limit	Sample Concentration	C	Duplicate Concentration	C	RPD	Difference	Q	M
Aluminum									
Antimony									
Arsenic									
Barium									
Beryllium									
Cadmium									
Calcium									
Chromium									
Cobalt									
Copper									
Iron	12.2	4320		4230		2.11			
Lead									
Magnesium									

					YES	NO	N/A		
Manganese	0.17	302		292		337			
Mercury									
Nickel									
Potassium									
Selenium									
Silver									
Sodium									
Thallium									
Vanadium									
Zinc									
Cyanide									

Total/Dissolved Concentrations

Lab Code Case No. SDG No. Sample Matrix: Water

Concentration: ug/L

ANALYTE	TOTAL	C	DISSOLVED	C	DIFFERENCE	Q	M
ALUMINUM							
ARSENIC							
BARIUM							
BERYLLIUM							
CADMIUM							
CALCIUM							
CHROMIUM							
COBALT							
COPPER							
IRON							
LEAD							
MAGNESIUM							
MAGNESE							
MERCURY							

NICKEL							
POTASSIUM							
SELENIUM							
SILVER							
SODIUM							
THALLIUM							
VANADIUM							
ZINC							
CYANIDE							

CONTRACT LABORATORY PROGRAM
CLP RAS RE-ANALYSIS REQUEST/APPROVAL RECORD

SECTION A (TO BE COMPLETED BY REGIONAL SENDING OFFICIAL)

Initiated By:

Name, Affiliation, Phone Number

_____

Case Number: _____
- OLM
- OLC
- ILM

Details of Re-Analysis Request:

- Laboratory Name /Contract Number: _____
- Affected Sample Number(s) and Fraction(s): _____
- Reason for Re-Analysis: _____
- Contract Statement of Work Citation*: _____
- Comments: _____
- * PROVIDE SOW CITATION THAT SUPPORTS THIS REQUEST

RE-ANALYSIS Billable ( ) Not Billable ( )

- Approved By: _____ Date: _____

Authorized Regional Sending CLP PO Signature

SECTION B (TO BE COMPLETED BY SMO)

Name of SMO Contact _____ Date: _____

Date of Laboratory Notification (Verbal): _____

Re-analysis Start Date: _____ Data Due Date: _____

Return completed form to:
Sample Management Office (SMO)

Distribtion: (1) CLP PO Copy (2) Regional Sending Official Copy (3) SMO File Copy (4) Laboratory Copy
Final 9/3/99

CLP DATA ASSESSMENT SUMMARY FORM (INORGANICS)

Type of Review: _____ Date:_____ Case# _____SDG#___

Site: _____ Lab Name: _____

Reviewer's Initials:_____ Number of Samples:_____

Analytes Rejected (R) Due to Exceeding Review Criteria

	Holding Time	CRQL Std	Blanks	ICS	Spike Recovery	Dup. Lab.	Dup. Field	LCS	ICP Serial Dilution	% Solids	Internal Std. ICP-MS	Tuning ICP-MS	Total Analytes	Rejection %
ICP-AES														
ICP-MS														
Mercury														
Cyanide														
Total														

See letter

Analytes Flagged (J) as Estimated Due to Exceeding Review Criteria

	Holding Time	CRQL Std	Blanks	ICS	Spike Recovery	Dup. Lab.	Dup. Field	LCS	ICP Serial Dilution	% Solids	Internal Std. ICP-MS	Tuning ICP-MS	Total Analytes	Rejection %
ICP-AES														
ICP-MS														
Mercury														
Cyanide														
Total														

	YES	NO	N/A

APPENDIX D
SUPPORT DOCUMENTATION

SW846 - METALS

COVER PAGE - INORGANIC ANALYSES DATA PACKAGE

Lab Name: COMPUCHEM Contract: _____

Lab Code: LIBRTY Case No.: _____ SAS No.: _____ SDG No.: 1007021

SOW No.: SW846

EPA Sample No.	Lab Sample ID.
20100707-DUP	1007021-06
SA-PZ-151I1	1007021-03
SA-PZ-155I	1007021-05
SA-PZ-157I	1007021-14
SA-PZ-157IL	1007021-04
SA-PZ-159I	1007021-02
SA-PZ-159I1	1007021-13
SA-PZ-160I	1007021-01

Were ICP interelement corrections applied? Yes/No YES

Were ICP background corrections applied? Yes/No YES
If yes-were raw data generated before application of background corrections? Yes/No NO

Comments: _____

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on diskette has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: L. Fonseta for Susan Bass Name: Susan W Bass

Date: 7-13-10 Title: Senior Chemist

CompuChem
a Division of Liberty Analytical Corp.
501 Madison Avenue
Cary, NC 27513

SDG NARRATIVE
SDG # 1007021
CTO-WE08/112G02045
PM: DAVE BRAYACK

The indicated Sample Delivery Group (SDG) consisting of eight (8) liquid samples was received into the laboratory information management system (LIMS) on July 8 and 9, 2010 intact and in good condition with Chain of Custody (COC) Records in order, unless otherwise noted in any attachments or Quality Assurance Notices. The temperature of the sampled upon receipt was 2.5 to 4.8°C. Sample ID's reported in this data package are noted by the receiving department on the COC if they differ from those listed by the samplers on the COC.

The samples were prepared and analyzed in accordance with SW846 6010 methodology for the requested metals and mercury.

INSTRUMENTAL QUALITY CONTROL:

All calibration verification solutions (ICV & CCV) and blanks (ICB & CCB) associated with this data were confirmed to be within allowable limits.

SAMPLE PREPARATION QUALITY CONTROL:

The sample preparation procedure verification (PBW, LCSW, & LCSWD) was found to be within acceptable ranges and field samples were prepared and analyzed within the specified holding times.

MATRIX RELATED QUALITY CONTROL:

No matrix spikes were requested for this SDG.

A five-fold serial dilution of sample, CCN = 1007012-01 ID SA-PZ-160IL was performed in accordance with requirements for ICP and CCN = 1007012-02 ID SA-PZ-159IL was performed in accordance with requirements for mercury analysis.

The adjusted sample concentration was inside control limits for the requested analytes.

Control limits for serial dilution are defined as a deviation less than or equal to 10% in the dilution adjusted concentrations from the original values for all analyte concentrations greater than fifty (50) times their respective Instrument Detection Limit (IDL) in the original sample.

The laboratory manager or his designee, as verified by the following signature has authorized release of the data contained in this hard copy data package. Furthermore, I certify that the tests used in this report meet all requirements of the NELAC standards unless otherwise stated in the SDG narrative or QA notice.

Susan W. Bass
Senior Chemist
July 20, 2010

Cathy Dover

From: Brayack, David [David.Brayack@tetratech.com]
Sent: Friday, July 09, 2010 8:21 AM
To: Cathy Dover
Subject: Calverton Sample Analysis Modification.

Cathy, you are receiving a series of Samples from Calverton this week. They are targeted for 7-day turn. Please email me the results when they are ready. The only data that I need in seven days is the VOCs, the other can take longer.

Also, we got a request from one of the regulators last night. Most (or all of the wells) get iron and manganese analysis. For three of the wells, I would like to expand the list to TAL metals. The three well IDs are:

SA-MW-151I1, 155I, and 159I. Again, I don't need the metal analysis in 7 days.

Call me in the office if you have any questions.

David Brayack, P.E. | Project Manager
Direct: 757.461.3824 | Personal Fax: 757.461.4148
david.brayack@tetratech.com

Tetra Tech NUS, Inc. | Twin Oaks I | Suite 309 | 5700 Lake Wright Drive | Norfolk, VA 23502 | www.ttnus.com

PLEASE NOTE: This message, including any attachments, may include privileged, confidential and/or inside information. Any distribution or use of this communication by anyone other than the intended recipient is strictly prohibited and may be unlawful. If you are not the intended recipient, please notify the sender by replying to this message and then delete it from your system.

21887

95

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CHAIN OF CUSTODY

501 Madison Ave.
Cary, NC 27513
Phone: 919-379-4100 Fax 919-379-4040

Page 1 of 2

Courier: Fed Ex
Airbill No.: 8706 9629 3026
Sampling Complete? Y or N

Client/Reporting Information

Company Name: Tetra Tech NUS
Address: Twin Oaks I, Suite 309
City: Norfolk State: VA Zip: 23502
Project Contact: Rob Sok
Phone #: 757-618-2104
Sampler's Name: Donald Whalen

Project Information

Project Name: NWTF P Calverton
Sampling Location: Site 6A
Turnaround time: 7 day
Batch QC or Project Specific? If Specific, which Sample ID?
Are aqueous samples field filtered for metals? Y or N
Are high concentrations expected? Y or N If yes, which ID(s)?

Requested Analysis (include method and bottle type)

Matrices: GW - Ground water; WW - Waste water; SW - Surface water; SO - Soil/Sediment; TB - Trip Blank; RI - Rinsate; WP - Wipe; O - Other

CompuChem No (Lab Use)	Field ID	Collection Date	Collection Time	Matrix	# of bottles	HCl	NaOH	HNO3	H2SO4	MEOH	Other	VOC 40 ml vial	Fe, Mn (250 ml poly)	TOC 40 ml vial	methane, ethane, ethene (40 ml vial)	pH / Sample Info (Lab Use): Fe, Mn	pH / Sample Info (Lab Use): TOC
1007021-07	SA-TB-20100706	7/6/10	0830	TB	2	2						✓					
-08	SA-PZ-158I-20100706		1145	GW	3	3						✓					
-09	SA-PZ-158I1-20100706		1310	GW	3	3						✓					
-10	SA-PZ-160I1-20100706		1540	GW	3	3						✓					
-11	SA-PZ-138I1-20100706		1745	GW	3	3						✓					
-02	SA-PZ-159I-20100707	7/7/10	1015	GW	8	5		1	2			✓	✓	✓	✓	<2	<2
-03	SA-PZ-151I1-20100707		1220	GW	8	5		1	2			✓	✓	✓	✓	<2	<2
-04	SA-PZ-157I1-20100707		1000	GW	8	5		1	2			✓	✓	✓	✓	<2	<2
-05	SA-PZ-155I-20100707		1212	GW	8	5		1	2			✓	✓	✓	✓	<2	<2
-06	SA-20100707-DUP		1305	GW	8	5		1	2			✓	✓	✓	✓	<2	<2

Lab Use Only

Sample Unpacked By: [signature]
Sample Order Entry By: [signature]
Samples Received in Good Condition? Y or N
If no, explain:

Cyanide samples checked for sulfide & chlorine? Y or NA
625 & Phenol samples checked for chlorine? Y or NA
608 samples checked for pH between 5.0-9.0? Y or NA

Comments

Sample Custody

Relinquished by: Donald Whalen	Date/Time: 7/7/10 1800	Received by: [signature]	Date/Time: 7/08/10 0910
Relinquished by:	Date/Time:	Received by:	Date/Time:
Subcontact? Y or N If yes, where?	Custody Seal(s) intact? Y or N	On Ice? Y or N	Cooler Temp: 2.5 °C

Samples stored 60 days after date report mailed at no extra charge.

White & Yellow copy to lab • Pink copy for customer

SN040

22098

96

CHAIN OF CUSTODY

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501 Madison Ave.
Cary, NC 27513
Phone: 919-379-4100 Fax 919-379-4040

Page 2 of 2

Courier: Fed Ex
Airbill No.: 8706 9629 3026
Sampling Complete? Y or N

Client/Reporting Information

Company Name: Tetra Tech NUS
Address: Twin Oaks 1, Suite 309
City: Norfolk State: VA Zip: 23502
Project Contact: Rob Sok
Phone #: 757-618-2104
Sampler's Name: Donald Whalen

Project Information

Project Name: NWFRD Calverton
Sampling Location:
Turnaround time: 7 day
Batch QC or Project Specific? If Specific, which Sample ID?
Are aqueous samples field filtered for metals? Y or N
Are high concentrations expected? Y or N? If yes, which ID(s)?

Requested Analysis (include method and bottle type): VOC (40ml vial); Fe, Mn (250ml poly); TOC (40ml vial); Methane, Ethane, Ethene (40ml)

Matrices: GW - Ground water; WW - Waste water; SW - Surface water; SO - Soil/Sediment; TB - Trip Blank; RI - Rinsate; WP - Wipe; O - Other

CompuChem No (Lab Use)	Field ID	Collection Date	Collection Time	Matrix	# of bottles	HCl	NaOH	HNO3	H2SO4	MEOH	Other	VOC	Fe, Mn	TOC	Methane, Ethane, Ethene	pH / Sample Info (Lab Use) Fe, Mn	pH / Sample Info (Lab Use) TOC
1007021-12	SA-PZ-161I-20100707	7/7/10	1542	GW	3	3						✓					
1007021-01	SA-PZ-160I-20100707	7/7/10	1540	GW	16	11		3	2			✓	✓	✓	✓	<2	<2

Lab Use Only

Sample Unpacked By: Diane Dyed
Sample Order Entry By:
Samples Received in Good Condition? Y or N
If no, explain:

Cyanide samples checked for sulfide & chlorine? Y or NA
625 & Phenol samples checked for chlorine? Y or NA
608 samples checked for pH between 5.0-9.0? Y or NA

Comments: SA-PZ-160I-20100707 DO MS/MSD (VOC, Fe/Mn)

Sample Custody

Relinquished by: Donald Whalen	Date/Time: 7/7/10 1800	Received by: Diane Dyed	Date/Time: 7/08/10 0910
Relinquished by:	Date/Time:	Received by:	Date/Time:

Subcontact? Y or N If yes, where?
Custody Seal(s) intact? Y or N
On Ice? Y or N
Cooler Temp: 25 °C

Samples stored 60 days after date report mailed at no extra charge.

White & Yellow copy to lab • Pink copy for customer

SN0010

22099 99

Page 1 of 1

CompuChem
a division of Liberty Analytical Corp.

CHAIN OF CUSTODY

501 Madison Ave.
Cary, NC 27513
Phone: 919-379-4100 Fax 919-379-4040

Courier: FedEx
Airbill No.: 8706 9629 2957
Sampling Complete? Y or N

Client/Reporting Information

Company Name: TetraTech NUS
Address: Twin Oaks 1, Suite 309
City: Norfolk State: VA Zip: 23502
Project Contact: Robert Sok
Phone #: 757-618-2104
Sampler's Name: D. Whalen

Project Information

Project Name: NWIRP CALVERTON
Sampling Location:
Turnaround time: 7 days
Batch QC or Project Specific? If Specific, which Sample ID?
Are aqueous samples field filtered for metals? Y or N
Are high concentrations expected? Y or (N) If yes, which ID(s)?

Requested Analysis (include method and bottle type)

CompuChem No (Lab Use)	Field ID	Collection Date	Collection Time	Matrix	# of bottles	HCl	NaOH	HNO3	H2SO4	MEOH	Other Zn Ac NaOH	VOC 40ml	Fe, Mn 250ml	TOC 40ml	methane, ethane, ethene 40ml	NO2, NO3, chloride 250ml	Sulfide 500ml					pH / Sample Info (Lab Use) Fe&Mn	TOC	Sulfide
1007021-15	SA-TB-20100708	7/8/10	0800	TB	2	2						✓										—	—	—
-16	SA-PZ-138I-20100708		0955	GW	3	3						✓										—	—	—
-17	SA-20100708-DUP		1100	GW	3	3						✓										—	—	—
-18	SA-PZ-149I1-20100708		947	GW	3	3						✓										—	—	—
1007021-13	SA-PZ-159I1-20100708		1340	GW	10	5		1	2		1	✓	✓	✓	✓	✓	✓					<2	<2	>9
-14	SA-PZ-157I-20100708		1347	GW	10	5		1	2		1	✓	✓	✓	✓	✓	✓					<2	<2	>9
-19	SA-PZ-133I-20100708		1605	GW	3	3						✓										—	—	—
-20	SA-PZ-139I-20100708		1542	GW	3	3						✓										—	—	—

Matrices
GW - Ground water
WW - Waste water
SW - Surface water
SO - Soil/Sediment
TB - Trip Blank
RI - Rinsate
WP - Wipe
O - Other

Lab Use Only

Sample Unpacked By: K. Manning
Sample Order Entry By:
Samples Received in Good Condition? (Y) or N
If no, explain:
Cyanide samples checked for sulfide & chlorine? Y or (N)A
625 & Phenol samples checked for chlorine? Y or (N)A
608 samples checked for pH between 5.0-9.0? Y or (N)A

Comments

Sample Custody

Relinquished by: D. Whalen	Date/Time: 7/8/10 1730	Received by: K. Manning	Date/Time: 7/09/10 1000
Relinquished by:	Date/Time:	Received by:	Date/Time:
Subcontact? Y or (N) If yes, where?	Custody Seal(s) intact? (Y) or N	On Ice? (Y) or N	Cooler Temp: 4.8 °C

Samples stored 60 days after date report mailed at no extra charge.

White & Yellow copy to lab • Pink copy for customer SN0010

HOLDTIME

SDG 1006192

SORT	UNITS	NSAMPLE	LAB_ID	QC_TYPE	SAMP_DATE	EXTR_DATE	ANAL_DATE	SMP_EXTR	EXTR_ANL	SMP_ANL
HG	UG/L	SA-PZ-151I1-20100707	1007021-03	NM	07/07/2010	07/16/2010	07/16/2010	9	0	9
HG	UG/L	SA-PZ-155I-20100707	1007021-05	NM	07/07/2010	07/16/2010	07/16/2010	9	0	9
HG	UG/L	SA-PZ-159I-20100707	1007021-02	NM	07/07/2010	07/16/2010	07/16/2010	9	0	9
M	UG/L	SASI-100K	1007087-04	NM	07/14/2010	07/26/2010	07/29/2010	12	3	15
M	UG/L	SA-PZ-151I1-20100707	1007021-03	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
M	UG/L	SA-PZ-155I-20100707	1007021-05	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
M	UG/L	SA-PZ-157I1-20100707	1007021-04	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
M	UG/L	SA-PZ-157I-20100708	1007021-14	NM	07/08/2010	07/12/2010	07/12/2010	4	0	4
M	UG/L	SA-PZ-159I1-20100708	1007021-13	NM	07/08/2010	07/12/2010	07/12/2010	4	0	4
M	UG/L	SAPT2-09HR	1007087-12	NM	07/21/2010	07/26/2010	07/30/2010	5	4	9
M	UG/L	SA-PZ-160I-20100707	1007021-01	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
M	UG/L	SAPT2-04HR	1007087-11	NM	07/21/2010	07/26/2010	07/30/2010	5	4	9
M	UG/L	SASI-200K	1007087-06	NM	07/15/2010	07/26/2010	07/29/2010	11	3	14
M	UG/L	SASI-300K	1007087-08	NM	07/15/2010	07/26/2010	07/30/2010	11	4	15
M	UG/L	SASI-50K	1007087-02	NM	07/14/2010	07/26/2010	07/29/2010	12	3	15

SORT	UNITS	NSAMPLE	LAB_ID	QC_TYPE	SAMP_DATE	EXTR_DATE	ANAL_DATE	SMP_EXTR	EXTR_ANL	SMP_ANL
M	UG/L	SA-PZ-159I-20100707	1007021-02	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
M	UG/L	SAGAC-OUT35GPM	1006192-04	NM	06/23/2010	06/25/2010	06/26/2010	2	1	3
M	UG/L	SA-20100707-DUP	1007021-06	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
M	UG/L	SAGAC-IN20GPM	1006192-01	NM	06/23/2010	06/25/2010	06/26/2010	2	1	3
M	UG/L	SAGAC-IN35GPM	1006192-03	NM	06/23/2010	06/25/2010	06/26/2010	2	1	3
M	UG/L	SAPT2-INIT	1007087-10	NM	07/21/2010	07/26/2010	07/30/2010	5	4	9
M	UG/L	SAGAC-OUT20GPM	1006192-02	NM	06/23/2010	06/25/2010	06/26/2010	2	1	3
M	UG/L	SAGAC-OUT60GPM	1006192-06	NM	06/23/2010	06/25/2010	06/26/2010	2	1	3
M	UG/L	SAPT1-07HR	1007087-03	NM	07/14/2010	07/26/2010	07/29/2010	12	3	15
M	UG/L	SAPT1-22HR	1007087-05	NM	07/15/2010	07/26/2010	07/29/2010	11	3	14
M	UG/L	SAPT1-END	1007087-07	NM	07/15/2010	07/26/2010	07/29/2010	11	3	14
M	UG/L	SAPT1-IN1T	1007087-01	NM	07/14/2010	07/26/2010	07/29/2010	12	3	15
M	UG/L	SAGAC-IN60GPM	1006192-05	NM	06/23/2010	06/25/2010	06/26/2010	2	1	3
CL	MG/L	SA-PZ-157I-20100708	1007021-14	NM	07/08/2010	07/09/2010	07/09/2010	1	0	1
CL	MG/L	SA-PZ-159I1-20100708	1007021-13	NM	07/08/2010	07/09/2010	07/09/2010	1	0	1
NTA	MG/L	SA-PZ-159I1-20100708	1007021-13	NM	07/08/2010	07/09/2010	07/09/2010	1	0	1
NTA	MG/L	SA-PZ-157I-20100708	1007021-14	NM	07/08/2010	07/09/2010	07/09/2010	1	0	1
NTI	MG/L	SA-PZ-159I1-20100708	1007021-13	NM	07/08/2010	07/09/2010	07/09/2010	1	0	1

SORT	UNITS	NSAMPLE	LAB_ID	QC_TYPE	SAMP_DATE	EXTR_DATE	ANAL_DATE	SMP_EXTR	EXTR_ANL	SMP_ANL
NTI	MG/L	SA-PZ-157I-20100708	1007021-14	NM	07/08/2010	07/09/2010	07/09/2010	1	0	1
SUL	MG/L	SA-PZ-159I1-20100708	1007021-13	NM	07/08/2010	07/13/2010	07/16/2010	5	3	8
SUL	MG/L	SA-PZ-157I-20100708	1007021-14	NM	07/08/2010	07/13/2010	07/16/2010	5	3	8
TOC	MG/L	SA-PZ-157I1-20100707	1007021-04	NM	07/07/2010	07/13/2010	07/13/2010	6	0	6
TOC	MG/L	SA-PZ-155I-20100707	1007021-05	NM	07/07/2010	07/13/2010	07/13/2010	6	0	6
TOC	MG/L	SA-PZ-151I1-20100707	1007021-03	NM	07/07/2010	07/13/2010	07/13/2010	6	0	6
TOC	MG/L	SA-20100707-DUP	1007021-06	NM	07/07/2010	07/13/2010	07/13/2010	6	0	6
TOC	MG/L	SA-PZ-159I1-20100708	1007021-13	NM	07/08/2010	07/13/2010	07/13/2010	5	0	5
TOC	MG/L	SA-PZ-157I-20100708	1007021-14	NM	07/08/2010	07/13/2010	07/13/2010	5	0	5
TOC	MG/L	SA-PZ-160I-20100707	1007021-01	NM	07/07/2010	07/13/2010	07/13/2010	6	0	6
TOC	MG/L	SA-PZ-159I-20100707	1007021-02	NM	07/07/2010	07/13/2010	07/13/2010	6	0	6
OV	UG/L	SA-PZ-159I-20100707	1007021-02	NM	07/07/2010	07/14/2010	07/14/2010	7	0	7
OV	UG/L	SA-PZ-159I1-20100708	1007021-13RE1	NM	07/08/2010	07/15/2010	07/15/2010	7	0	7
OV	UG/L	SA-PZ-159I1-20100708	1007021-13	NM	07/08/2010	07/14/2010	07/14/2010	6	0	6
OV	UG/L	SA-PZ-158I1-20100706	1007021-09	NM	07/06/2010	07/14/2010	07/14/2010	8	0	8
OV	UG/L	SA-PZ-155I-20100707	1007021-05	NM	07/07/2010	07/14/2010	07/14/2010	7	0	7
OV	UG/L	SA-PZ-157I1-20100707	1007021-04	NM	07/07/2010	07/14/2010	07/14/2010	7	0	7
OV	UG/L	SASI-300K	1007087-08	NM	07/15/2010	07/19/2010	07/19/2010	4	0	4

SORT	UNITS	NSAMPLE	LAB_ID	QC_TYPE	SAMP_DATE	EXTR_DATE	ANAL_DATE	SMP_EXTR	EXTR_ANL	SMP_ANL
OV	UG/L	SA-PZ-133I-20100708	1007021-19	NM	07/08/2010	07/14/2010	07/14/2010	6	0	6
OV	UG/L	SA-PZ-160I1-20100706	1007021-10	NM	07/06/2010	07/14/2010	07/14/2010	8	0	8
OV	UG/L	SA-PZ-160I-20100707	1007021-01	NM	07/07/2010	07/14/2010	07/14/2010	7	0	7
OV	UG/L	SA-PZ-161I-20100707	1007021-12	NM	07/07/2010	07/14/2010	07/14/2010	7	0	7
OV	UG/L	SA-PZ-151I1-20100707	1007021-03	NM	07/07/2010	07/14/2010	07/14/2010	7	0	7
OV	UG/L	SASI-200K	1007087-06	NM	07/15/2010	07/19/2010	07/19/2010	4	0	4
OV	UG/L	SA-PZ-157I-20100708	1007021-14	NM	07/08/2010	07/15/2010	07/15/2010	7	0	7
OV	UG/L	SASI-50K	1007087-02	NM	07/14/2010	07/19/2010	07/19/2010	5	0	5
OV	UG/L	SASITB071410	1007087-09	NM	07/14/2010	07/19/2010	07/19/2010	5	0	5
OV	UG/L	SA-TB-20100706	1007021-07	NM	07/06/2010	07/14/2010	07/14/2010	8	0	8
OV	UG/L	SA-TB-20100708	1007021-15	NM	07/08/2010	07/14/2010	07/14/2010	6	0	6
OV	UG/L	SASI-100K	1007087-04	NM	07/14/2010	07/19/2010	07/19/2010	5	0	5
OV	UG/L	SAGAC-OUT60GPM	1006192-06	NM	06/23/2010	06/25/2010	06/25/2010	2	0	2
OV	UG/L	SAPT2TB072110	1007087-13	NM	07/21/2010	07/28/2010	07/28/2010	7	0	7
OV	UG/L	SAPT2-INIT	1007087-10	NM	07/21/2010	07/27/2010	07/27/2010	6	0	6
OV	UG/L	SAPT2-09HR	1007087-12	NM	07/21/2010	07/28/2010	07/28/2010	7	0	7
OV	UG/L	SAPT2-04HR	1007087-11	NM	07/21/2010	07/27/2010	07/27/2010	6	0	6
OV	UG/L	SAPT1-IN1T	1007087-01	NM	07/14/2010	07/19/2010	07/19/2010	5	0	5

SORT	UNITS	NSAMPLE	LAB_ID	QC_TYPE	SAMP_DATE	EXTR_DATE	ANAL_DATE	SMP_EXTR	EXTR_ANL	SMP_ANL
OV	UG/L	SAPT1-END	1007087-07	NM	07/15/2010	07/19/2010	07/19/2010	4	0	4
OV	UG/L	SAPT1-22HR	1007087-05	NM	07/15/2010	07/19/2010	07/19/2010	4	0	4
OV	UG/L	SA-PZ-158I-20100706	1007021-08	NM	07/06/2010	07/14/2010	07/14/2010	8	0	8
OV	UG/L	SAGAC-TB01	1006192-07	NM	06/18/2010	06/25/2010	06/25/2010	7	0	7
OV	UG/L	SAGAC-OUT35GPM	1006192-04	NM	06/23/2010	06/25/2010	06/25/2010	2	0	2
OV	UG/L	SAGAC-OUT20GPM	1006192-02	NM	06/23/2010	06/25/2010	06/25/2010	2	0	2
OV	UG/L	SAGAC-IN60GPM	1006192-05	NM	06/23/2010	06/25/2010	06/25/2010	2	0	2
OV	UG/L	SAGAC-IN35GPM	1006192-03	NM	06/23/2010	06/25/2010	06/25/2010	2	0	2
OV	UG/L	SA-20100708-DUP	1007021-17	NM	07/08/2010	07/15/2010	07/15/2010	7	0	7
OV	UG/L	SA-20100707-DUP	1007021-06	NM	07/07/2010	07/14/2010	07/14/2010	7	0	7
OV	UG/L	SA-PZ-138I1-20100706	1007021-11	NM	07/06/2010	07/14/2010	07/14/2010	8	0	8
OV	UG/L	SAPT1-07HR	1007087-03	NM	07/14/2010	07/19/2010	07/19/2010	5	0	5
OV	UG/L	SA-PZ-138I-20100708	1007021-16	NM	07/08/2010	07/15/2010	07/15/2010	7	0	7
OV	UG/L	SA-PZ-139I-20100708	1007021-20	NM	07/08/2010	07/15/2010	07/15/2010	7	0	7
OV	UG/L	SA-PZ-149I1-20100708	1007021-18	NM	07/08/2010	07/15/2010	07/15/2010	7	0	7
OV	UG/L	SAGAC-IN20GPM	1006192-01	NM	06/23/2010	06/25/2010	06/25/2010	2	0	2
ETHA	UG/L	SA-PZ-155I-20100707	1007021-05	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
ETHA	UG/L	SA-PZ-159I-20100707	1007021-02	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5

SORT	UNITS	NSAMPLE	LAB_ID	QC_TYPE	SAMP_DATE	EXTR_DATE	ANAL_DATE	SMP_EXTR	EXTR_ANL	SMP_ANL
ETHA	UG/L	SA-PZ-160I-20100707	1007021-01	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
ETHA	UG/L	SA-PZ-157I1-20100707	1007021-04	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
ETHA	UG/L	SA-PZ-151I1-20100707	1007021-03	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
ETHA	UG/L	SA-20100707-DUP	1007021-06	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
ETHA	UG/L	SA-PZ-159I1-20100708	1007021-13RE1	NM	07/08/2010	07/12/2010	07/12/2010	4	0	4
ETHA	UG/L	SA-PZ-159I1-20100708	1007021-13	NM	07/08/2010	07/12/2010	07/12/2010	4	0	4
ETHA	UG/L	SA-PZ-157I-20100708	1007021-14	NM	07/08/2010	07/12/2010	07/12/2010	4	0	4
ETHE	UG/L	SA-PZ-160I-20100707	1007021-01	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
ETHE	UG/L	SA-PZ-159I-20100707	1007021-02	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
ETHE	UG/L	SA-PZ-159I1-20100708	1007021-13RE1	NM	07/08/2010	07/12/2010	07/12/2010	4	0	4
ETHE	UG/L	SA-PZ-159I1-20100708	1007021-13	NM	07/08/2010	07/12/2010	07/12/2010	4	0	4
ETHE	UG/L	SA-PZ-157I-20100708	1007021-14	NM	07/08/2010	07/12/2010	07/12/2010	4	0	4
ETHE	UG/L	SA-PZ-157I1-20100707	1007021-04	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
ETHE	UG/L	SA-PZ-155I-20100707	1007021-05	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
ETHE	UG/L	SA-PZ-151I1-20100707	1007021-03	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
ETHE	UG/L	SA-20100707-DUP	1007021-06	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
METH	UG/L	SA-PZ-160I-20100707	1007021-01	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
METH	UG/L	SA-20100707-DUP	1007021-06	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5

SORT	UNITS	NSAMPLE	LAB_ID	QC_TYPE	SAMP_DATE	EXTR_DATE	ANAL_DATE	SMP_EXTR	EXTR_ANL	SMP_ANL
METH	UG/L	SA-PZ-151I1-20100707	1007021-03	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
METH	UG/L	SA-PZ-155I-20100707	1007021-05	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
METH	UG/L	SA-PZ-157I1-20100707	1007021-04	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
METH	UG/L	SA-PZ-157I-20100708	1007021-14	NM	07/08/2010	07/12/2010	07/12/2010	4	0	4
METH	UG/L	SA-PZ-159I1-20100708	1007021-13	NM	07/08/2010	07/12/2010	07/12/2010	4	0	4
METH	UG/L	SA-PZ-159I-20100707	1007021-02	NM	07/07/2010	07/12/2010	07/12/2010	5	0	5
METH	UG/L	SA-PZ-159I1-20100708	1007021-13RE1	NM	07/08/2010	07/12/2010	07/12/2010	4	0	4

SW846 - METALS

2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: COMPUCHEM Contract:

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Initial Calibration Source: EPA-0307

Continuing Calibration Source: HP0912103/4

Concentration Units: ug/L

Analyte	Initial Calibration			Continuing Calibration					M
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Aluminum	2521.0	2422.46	96	50000.0	46392.41	93	46067.31	92	P
Antimony	994.0	993.86	100	1000.0	1001.82	100	997.26	100	P
Arsenic	999.0	1006.50	101	1000.0	1000.99	100	1008.84	101	P
Barium	497.0	493.67	99	1000.0	960.52	96	941.28	94	P
Beryllium	495.0	505.02	102	1000.0	1011.34	101	1031.08	103	P
Cadmium	496.0	497.88	100	1000.0	978.21	98	996.63	100	P
Calcium	10026.0	9845.06	98	50000.0	48138.58	96	49550.61	99	P
Chromium	490.0	500.60	102	1000.0	975.32	98	995.24	100	P
Cobalt	499.0	509.55	102	1000.0	984.99	98	1005.26	101	P
Copper	492.0	511.13	104	1000.0	1001.22	100	1009.87	101	P
Iron	5082.0	5027.56	99	25000.0	24468.13	98	24806.72	99	P
Lead	1002.0	997.91	100	1000.0	971.00	97	987.51	99	P
Magnesium	6074.0	6119.57	101	50000.0	50326.46	101	50541.80	101	P
Manganese	499.0	498.63	100	1000.0	981.72	98	1001.27	100	P
Mercury	4.0	3.90	98	5.0	5.05	101	5.07	101	CV
Nickel	503.0	503.71	100	1000.0	982.26	98	997.35	100	P
Potassium	10021.0	10144.89	101	50000.0	51018.63	102	49304.87	99	P
Selenium	1029.0	1003.64	98	1000.0	989.71	99	988.63	99	P
Silver	501.0	509.91	102	100.0	101.39	101	103.25	103	P
Sodium	10097.0	10274.18	102	50000.0	51614.91	103	50683.67	101	P
Thallium	1028.0	1030.06	100	1000.0	984.28	98	985.56	99	P
Vanadium	501.0	507.41	101	1000.0	983.31	98	996.84	100	P
Zinc	1025.0	972.27	95	1100.0	1057.11	96	1095.00	100	P

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

SW846 - METALS

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: COMPUCHEM Contract:

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Initial Calibration Source: EPA-0307

Continuing Calibration Source: HP0912103/4

Concentration Units: ug/L

Analyte	Initial Calibration			Continuing Calibration					M
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Aluminum				50000.0	47106.72	94	46678.75	93	P
Antimony				1000.0	999.53	100	990.96	99	P
Arsenic				1000.0	995.72	100	982.87	98	P
Barium				1000.0	957.42	96	958.51	96	P
Beryllium				1000.0	997.13	100	988.62	99	P
Cadmium				1000.0	959.95	96	946.30	95	P
Calcium				50000.0	47405.69	95	47101.84	94	P
Chromium				1000.0	964.92	96	960.33	96	P
Cobalt				1000.0	978.00	98	964.98	96	P
Copper				1000.0	989.07	99	980.83	98	P
Iron				25000.0	24230.31	97	23902.38	96	P
Lead				1000.0	966.55	97	960.00	96	P
Magnesium				50000.0	50603.57	101	50007.43	100	P
Manganese				1000.0	976.76	98	967.83	97	P
Mercury				5.0	5.10	102			CV
Nickel				1000.0	970.57	97	958.58	96	P
Potassium				50000.0	52341.66	105	51477.94	103	P
Selenium				1000.0	993.83	99	977.10	98	P
Silver				100.0	98.43	98	97.96	98	P
Sodium				50000.0	52168.78	104	51423.31	103	P
Thallium				1000.0	986.47	99	970.45	97	P
Vanadium				1000.0	982.60	98	975.99	98	P
Zinc				1100.0	1025.79	93	1009.40	92	P

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

SW846 - METALS

2B-IN

CRDL STANDARD FOR AA AND ICP

Lab Name: COMPUCHEM Contract: _____

Lab Code: LIBRTY Case No.: _____ SAS No.: _____ SDG No.: 1007021

AA CRDL Standard Source: HP0916320

ICP CRDL Standard Source: HP1004012

Concentration Units: ug/L

Analyte	True	Found	%R	CRDL Standard for ICP Initial True	Initial Found	Initial %R	Final Found	Final %R
Aluminum				200.0	194.18	97.1		
Antimony				10.0	11.29	112.9		
Arsenic				10.0	11.46	114.6		
Barium				200.0	194.48	97.2		
Beryllium				5.0	5.27	105.4		
Cadmium				5.0	4.70	94.0		
Calcium				5000.0	5024.75	100.5		
Chromium				10.0	9.62	96.2		
Cobalt				5.0	3.90	78.0		
Copper				5.0	5.32	106.4		
Iron				100.0	48.94	48.9		
Lead				3.0	3.19	106.3		
Magnesium				5000.0	5056.99	101.1		
Manganese				10.0	9.92	99.2		
Mercury	0.2	0.16	80.0					
Nickel				5.0	4.86	97.2		
Potassium				5000.0	4340.15	86.8		
Selenium				5.0	6.87	137.4		
Silver				5.0	3.31	66.2		
Sodium				5000.0	4932.64	98.7		
Thallium				10.0	8.99	89.9		
Vanadium				20.0	19.77	98.8		
Zinc				20.0	20.05	100.2		

Control Limits: no limits have been established by EPA at this time

SW846 - METALS

3

BLANKS

Lab Name: COMPUCHEM Contract:

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Preparation Blank	C	M
Aluminum	31.0	U	31.0	U	31.0	U	31.0	U	49.061	B	P
Antimony	-2.2	B	2.0	U	2.0	U	2.0	U	5.013	B	P
Arsenic	-2.7	B	2.5	U	2.5	U	2.5	U	2.500	U	P
Barium	15.2	U	15.2	U	15.2	U	15.2	U	15.200	U	P
Beryllium	0.7	U	0.7	U	0.7	U	0.7	U	0.730	U	P
Cadmium	0.6	U	0.6	U	0.6	U	0.6	U	-0.926	B	P
Calcium	377.0	B	361.8	B	374.2	B	376.2	B	440.904	B	P
Chromium	0.8	U	0.8	U	0.8	U	0.8	U	0.750	U	P
Cobalt	1.5	U	1.5	U	1.5	U	1.5	U	-2.924	B	P
Copper	1.0	U	1.0	U	1.0	U	1.0	U	1.000	U	P
Iron	12.2	U	12.2	U	12.2	U	12.2	U	12.872	B	P
Lead	1.6	U	1.6	U	1.6	U	1.6	U	2.082	B	P
Magnesium	7.8	U	-12.0	B	7.8	U	7.8	U	7.800	U	P
Manganese	0.2	U	0.2	U	0.2	U	0.2	U	0.170	U	P
Mercury	0.091	U	0.091	U	0.091	U	0.091	U	0.091	U	CV
Nickel	0.6	U	0.6	U	0.6	U	0.6	U	0.630	U	P
Potassium	-1437.4	B	-1455.0	B	-1439.9	B	-1445.2	B	-1445.920	B	P
Selenium	2.1	U	2.1	U	2.1	U	2.1	U	-2.326	B	P
Silver	0.6	U	0.6	U	0.6	U	-0.9	B	0.640	U	P
Sodium	156.0	U	156.0	U	156.0	U	156.0	U	243.878	B	P
Thallium	3.0	U	3.0	U	3.0	U	3.0	U	-3.664	B	P
Vanadium	1.5	U	1.5	U	1.5	U	1.5	U	1.500	U	P
Zinc	4.2	U	4.2	U	4.2	U	4.2	U	4.200	U	P

SW846 - METALS

3

BLANKS

Lab Name: COMPUCHEM Contract:

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Preparation Blank	C	M
Aluminum			31.0	U							P
Antimony			2.0	U							P
Arsenic			2.5	U							P
Barium			15.2	U							P
Beryllium			0.7	U							P
Cadmium			0.6	U							P
Calcium			377.7	B							P
Chromium			0.8	U							P
Cobalt			1.5	U							P
Copper			1.0	U							P
Iron			12.2	U							P
Lead			-1.8	B							P
Magnesium			7.8	U							P
Manganese			0.2	U							P
Nickel			0.6	U							P
Potassium			-1439.4	B							P
Selenium			2.1	U							P
Silver			0.6	U							P
Sodium			156.0	U							P
Thallium			3.0	U							P
Vanadium			1.5	U							P
Zinc			4.2	U							P

SW846 - METALS

4

ICP INTERFERENCE CHECK SAMPLE

Lab Name: COMPUCHEM Contract:

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

ICP ID Number: P4 ICS Source: EPA-503-203

Concentration Units: ug/L

Analyte	True		Initial Found			Final Found		
	Sol.A	Sol.AB	Sol.A	Sol.AB	%R	Sol.A	Sol.AB	%R
Aluminum	244100	241100	245000	245000	101.6			
Antimony	0	589	-2.3	610	103.6			
Arsenic	0	101	-1.3	101	100.0			
Barium	0	495	2.6	492	99.4			
Beryllium	0	475	1.2	497	104.6			
Cadmium	0	940	2.7	957	101.8			
Calcium	234900	231100	257000	253000	109.5			
Chromium	43	511	43.3	529	103.5			
Cobalt	0	461	-0.65	494	107.2			
Copper	23	548	23.9	537	98.0			
Iron	95600	94800	98700	97700	103.1			
Lead	10	61	7.8	57.1	93.6			
Magnesium	247500	251100	273000	270000	107.5			
Manganese	19	502	18.5	515	102.6			
Nickel	21	984	21.3	1000	101.6			
Potassium	0	0	-1440	-1450				
Selenium	0	53	1.9	52.2	98.5			
Silver	0	206	-0.068	202	98.1			
Sodium	0	0	981	907				
Thallium	0	103	7.5	111	107.8			
Vanadium	0	494	-3.0	495	100.2			
Zinc	28	1028	31.0	951	92.5			

SW846 - METALS

7

LABORATORY CONTROL SAMPLE

Lab Name: COMPUCHEM Contract:

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Solid LCS Source:

Aqueous LCS Source: HP0935232 N/A

Analyte	Aqueous (ug/L) True	Aqueous (ug/L) Found	Aqueous (ug/L) %R	Solid (mg/kg) True	Solid (mg/kg) Found	C	Limits		%R
Aluminum	20000.0	18682.22	93						
Antimony	6000.0	5856.16	98						
Arsenic	1000.0	970.16	97						
Barium	20000.0	19217.35	96						
Beryllium	500.0	503.56	101						
Cadmium	500.0	487.41	97						
Calcium	50000.0	49307.07	99						
Chromium	1000.0	993.45	99						
Cobalt	5000.0	4954.40	99						
Copper	2500.0	2556.59	102						
Iron	10000.0	9734.46	97						
Lead	300.0	290.88	97						
Magnesium	50000.0	49729.03	99						
Manganese	1500.0	1483.68	99						
Mercury	3.0	3.00	100						
Nickel	4000.0	3881.70	97						
Potassium	50000.0	50849.54	102						
Selenium	500.0	460.81	92						
Silver	1000.0	1007.54	101						
Sodium	50000.0	51516.24	103						
Thallium	1000.0	951.02	95						
Vanadium	5000.0	5017.58	100						
Zinc	2000.0	1924.05	96						

SW846 - METALS

7

LABORATORY CONTROL SAMPLE

Lab Name: COMPUCHEM Contract: _____

Lab Code: LIBRTY Case No.: _____ SAS No.: _____ SDG No.: 1007021

Solid LCS Source: _____

Aqueous LCS Source: HP0935232

Analyte	Aqueous (ug/L) True	Found	%R	Solid (mg/kg) True	Found	C	Limits		%R
Aluminum	20000.0	18131.79	91						
Antimony	6000.0	5629.14	94						
Arsenic	1000.0	920.00	92						
Barium	20000.0	18949.23	95						
Beryllium	500.0	471.07	94						
Cadmium	500.0	455.78	91						
Calcium	50000.0	45516.48	91						
Chromium	1000.0	927.02	93						
Cobalt	5000.0	4644.02	93						
Copper	2500.0	2436.17	97						
Iron	10000.0	9099.04	91						
Lead	300.0	271.98	91						
Magnesium	50000.0	47338.15	95						
Manganese	1500.0	1391.87	93						
Mercury	3.0	2.96	99						
Nickel	4000.0	3664.59	92						
Potassium	50000.0	50447.07	101						
Selenium	500.0	444.35	89						
Silver	1000.0	940.75	94						
Sodium	50000.0	49958.95	100						
Thallium	1000.0	908.80	91						
Vanadium	5000.0	4735.90	95						
Zinc	2000.0	1755.24	88						

9
ICP SERIAL DILUTIONS

SAMPLE NO.

SA-PZ-160IL

Lab Name: COMPUCHEM Contract:

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix (soil/water): WATER Level (low/med): LOW

Concentration Units: ug/L

Analyte	Initial Sample Result (I)	C	Serial Dilution Result (S)	C	% Difference	Q	M
Iron	1524.32		1433.00		6.0		P
Manganese	570.96		552.33		3.3		P

9
ICP SERIAL DILUTIONS

SAMPLE NO.

SA-PZ-159IL

Lab Name: COMPUCHEM Contract:

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Matrix (soil/water): WATER Level (low/med): LOW

Concentration Units: ug/L

Analyte	Initial Sample Result (I)	C	Serial Dilution Result (S)	C	% Difference	Q	M
Mercury	0.09	U	0.46	U			CV

SW846 - METALS

10

INSTRUMENT DETECTION LIMITS (QUARTERLY)

Lab Name: COMPUCHEM Contract: _____

Lab Code: LIBRTY Case No.: _____ SAS No.: _____ SDG No.: 1007021

ICP ID Number: P4 Date: 4/15/2010

Flame AA ID Number: _____

Furnace AA ID Number: _____

Analyte	Wave-length (nm)	Back-ground	CRQL ug/L	MDL ug/L	M
Aluminum	308.22		200	31.0	P
Antimony	206.84		10	2.0	P
Arsenic	189.04		10	2.5	P
Barium	493.41		200	15.2	P
Beryllium	313.04		5	0.73	P
Cadmium	226.50		5.0	0.64	P
Calcium	317.93		5000	122	P
Chromium	267.72		10	0.75	P
Cobalt	228.62		5	1.5	P
Copper	324.70		5	1.0	P
Iron	271.44		100	12.2	P
Lead	220.35		3	1.6	P
Magnesium	279.08		5000	7.8	P
Manganese	257.61		10	0.17	P
Nickel	231.60		5	0.63	P
Potassium	766.49		5000	30.9	P
Selenium	196.03		5	2.1	P
Silver	328.07		5	0.64	P
Sodium	330.23		5000	156	P
Thallium	190.86		10	3.0	P
Vanadium	292.40		20	1.5	P
Zinc	206.20		20	4.2	P

Comments: _____

SW846 - METALS

10

INSTRUMENT DETECTION LIMITS (QUARTERLY)

Lab Name: COMPUCHEM Contract: _____

Lab Code: LIBRTY Case No.: _____ SAS No.: _____ SDG No.: 1007021

ICP ID Number: _____ Date: 4/10/2010

Flame AA ID Number: V4

Furnace AA ID Number: _____

Analyte	Wave-length (nm)	Back-ground	CRQL ug/L	MDL ug/L	M
Mercury	253.70		0.20	0.091	CV

Comments: _____

13

PREPARATION LOG

Lab Name: COMPUCHEM Contract:

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Method: P

EPA Sample No.	Preparation Date		Volume (mL)
20100707-DUP	7/12/2010		50.0
LCSW	7/12/2010		50.0
LCSWD	7/12/2010		50.0
PBW	7/12/2010		50.0
SA-PZ-151I1	7/12/2010		50.0
SA-PZ-155I	7/12/2010		50.0
SA-PZ-157I	7/12/2010		50.0
SA-PZ-157I1	7/12/2010		50.0
SA-PZ-159I	7/12/2010		50.0
SA-PZ-159I1	7/12/2010		50.0
SA-PZ-160I	7/12/2010		50.0

SW846 - METALS

13

PREPARATION LOG

Lab Name: COMPUCHEM Contract:

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Method: CV

EPA Sample No.	Preparation Date		Volume (mL)
LCSW	7/16/2010		100.0
LCSWD	7/16/2010		100.0
PBW	7/16/2010		100.0
SA-PZ-151I1	7/16/2010		100.0
SA-PZ-155I	7/16/2010		100.0
SA-PZ-159I	7/16/2010		100.0

SW846 - METALS

14

ANALYSIS RUN LOG

Lab Name: COMPUCHEM Contract:

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Instrument ID Number: P4 Method: P

Start Date: 7/12/2010 End Date: 7/12/2010

EPA Sample No.	D/F	Time	% R	Analytes																							
				AL	SB	AS	BA	BE	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	V	ZN	CN
S0	1.00	1150		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	
S	1.00	1157							X		X		X		X				X		X	X		X		X	
S	1.00	1204		X						X						X				X			X				
S	1.00	1209				X	X	X				X		X			X								X		
S	1.00	1216			X																						
ICV	1.00	1221		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	
ICB	1.00	1229		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	
ZZZZZZ	1.00	1236																									
ICSA	1.00	1243		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	
ICSAB	1.00	1250		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	
CCV	1.00	1257		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	
CCB	1.00	1304		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	
LRS	1.00	1315		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	
ZZZZZZ	1.00	1322																									
ZZZZZZ	1.00	1329																									
ZZZZZZ	1.00	1336																									
CCV	1.00	1343		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	
CCB	1.00	1350		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	
PBW	1.00	1404		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	
LCSW	1.00	1411		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	
LCSWD	1.00	1418		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	
SA-PZ-160I	1.00	1425												X			X										
SA-PZ-160IL	5.00	1432												X			X										
SA-PZ-159I	1.00	1439		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	
SA-PZ-151I1	1.00	1447		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	
SA-PZ-157I1	1.00	1454												X			X										
SA-PZ-155I	1.00	1501		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	
CCV	1.00	1508		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	
CCB	1.00	1515		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	
20100707-DUP	1.00	1522												X			X										
SA-PZ-159I1	1.00	1529												X			X										
SA-PZ-157I	1.00	1537												X			X										
CCV	1.00	1544		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	
CCB	1.00	1551		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	

SW846 - METALS

14

ANALYSIS RUN LOG

Lab Name: COMPUCHEM Contract:

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: 1007021

Instrument ID Number: V4 Method: CV

Start Date: 7/16/2010 End Date: 7/16/2010

EPA Sample No.	D/F	Time	% R	Analytes																								
				AL	SB	AS	BA	BE	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	V	ZN	CN
S0	1.00	1529																X									
S0.2	1.00	1531																X									
S0.5	1.00	1533																X									
S1	1.00	1535																X									
S5	1.00	1537																X									
S10	1.00	1539																X									
ICV	1.00	1541																X									
ICB	1.00	1543																X									
CRA	1.00	1545																X									
CCV	1.00	1547																X									
CCB	1.00	1549																X									
ZZZZZZ	1.00	1551																									
ZZZZZZ	1.00	1553																									
ZZZZZZ	1.00	1554																									
ZZZZZZ	1.00	1556																									
ZZZZZZ	1.00	1558																									
ZZZZZZ	1.00	1600																									
ZZZZZZ	1.00	1603																									
ZZZZZZ	1.00	1604																									
PBW	1.00	1606																X									
CCV	1.00	1608																X									
CCB	1.00	1610																X									
LCSW	1.00	1612																X									
LCSWD	1.00	1614																X									
✓ SA-PZ-159I	1.00	1616																X									
SA-PZ-159IL	5.00	1618																X									
✓ SA-PZ-151I1	1.00	1620																X									
✓ SA-PZ-155I	1.00	1622																X									
CCV	1.00	1624																X									
CCB	1.00	1626																X									

ANALYSIS REPORT 07/12/10 02:54:12 PM PAGE 1

METHOD: ALT-P4Q2 SAMPLE NAME: 1007021-03 OPERATOR:
RUN TIME: 07/12/10 14:47:07
COMMENT: SDG:1007021 CLIENTID:SA-PZ-151I1 1:1
MODE: CONC CORR. FACTOR: 1

ELEM	AG3280	AL3082	BA4934	BE3130	CA3179	CD2265	CO2286
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
AVGE	-.189946	62.82108	18.03432	-.341400	14855.09	-.037778	-2.54368
SDEV	.204866	5.21613	.21393	.220041	86.62	.101558	.16463
%RSD	107.8548	8.303153	1.186217	64.45262	.5831148	268.8286	6.472236
#1	-.407028	57.01323	17.85706	-.584069	14955.11	-.148763	-2.53519
#2	-.162811	64.34308	17.97395	-.285272	14804.88	-.015085	-2.71240
#3	.0000000	67.10692	18.27194	-.154859	14805.27	.0505143	-2.38346
ERRORS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS
HIGH	1000.000	400000.0	50000.00	5000.000	700000.0	10000.00	50000.00
LOW	-10.0000	-200.000	-200.000	-5.00000	-1000.00	-5.00000	-50.0000

ELEM	CR2677	CU3247	FE2714	K_7664	MG2790	MN2576	NA3302
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
AVGE	1.871187	.5831379	1500.254	1906.896	971.8319	4676.942	7928.064
SDEV	.361576	.1910552	10.848	31.726	4.6985	20.456	127.186
%RSD	19.32336	32.76329	.7230563	1.663749	.4834693	.4373702	1.604248
#1	2.210999	.7945252	1512.700	1872.006	966.4476	4698.902	7990.980
#2	1.911359	.5321128	1495.250	1914.668	975.1017	4658.428	7781.682
#3	1.491202	.4227758	1492.811	1934.014	973.9462	4673.498	8011.529
ERRORS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS
HIGH	60000.00	30000.00	700000.0	100000.0	300000.0	50000.00	700000.0
LOW	-10.0000	-25.0000	-100.000	-1000.00	-1000.00	-15.0000	-2000.00

ELEM	NI2316	TL1908	V_2924	ZN2062	PB2203	SE1960	SB2068
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
AVGE	3.303865	-3.51912	.2013608	3.379590	1.620936	-.482297	7.581873
SDEV	.273221	4.40243	.5737023	.288198	.122727	.398545	.852321
%RSD	8.269738	125.1003	284.9126	8.527605	7.571341	82.63459	11.24156
#1	3.403370	.8867605	-.052154	3.624076	1.495620	-.918874	7.609771
#2	3.513388	-3.52603	-.201912	3.452867	1.626290	-.390060	8.419903
#3	2.994837	-7.91809	.8581485	3.061827	1.740897	-.137959	6.715946
ERRORS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS
HIGH	60000.00	60000.00	50000.00	60000.00	60000.00	40000.00	40000.00
LOW	-40.0000	-10.0000	-50.0000	-20.0000	-3.00000	-5.00000	-60.0000

ELEM	AS1890	22031	22032	19601	19602	SN1899	BI2230
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
AVGE	.2125510	3.787730	.5358739	-11.0681	4.799375	-.517874	-3.34421
SDEV	2.064284	1.366551	.6100780	2.1984	1.080963	1.419004	2.03377
%RSD	971.1947	36.07835	113.8473	19.86292	22.52300	274.0059	60.81468
#1	1.983011	2.445791	1.017996	-12.5559	4.887690	-1.68556	-5.63741
#2	-2.05484	5.177630	-.150006	-8.54291	3.676963	-.929502	-2.63592
#3	.7094838	3.739770	.7396322	-12.1054	5.833472	1.061438	-1.75928
ERRORS	LC PASS	NOCHECK	NOCHECK	NOCHECK	NOCHECK	LC PASS	LC PASS
HIGH	20000.00					40000.00	40000.00
LOW	-5.00000					-20.0000	-10.0000

ELEM	MO2020	TI3349	Y_3710
UNITS	UG/L	UG/L	PPM
AVGE	-.522566	.7647263	3677.000
SDEV	.803291	.1023722	43.300
%RSD	153.7204	13.38678	1.177598
#1	-.006362	.7639152	3720.400
#2	-1.44807	.8675016	3676.800
#3	-.113266	.6627620	3633.800
ERRORS	LC PASS	LC PASS	NOCHECK
HIGH	20000.00	40000.00	
LOW	-10.0000	-30.0000	

Sample Calc 1.62

Form I 1.6

METHOD: ALT-P4Q2 SAMPLE NAME: 1007021-06 OPERATOR:
RUN TIME: 07/12/10 15:22:51
COMMENT: SDG:1007021 CLIENTID:20100707-DUP 1:1
MODE: CONC CORR. FACTOR: 1

ELEM	AG3280	AL3082	BA4934	BE3130	CA3179	CD2265	CO2286
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
AVGE	-.189946	148.2855	19.87729	.1988323	6369.531	-.613489	-2.28640
SDEV	.316157	12.0519	.32958	.3503397	41.130	.206410	.21576
%RSD	166.4454	8.127472	1.658060	176.1985	.6457263	33.64530	9.436697
#1	.1628112	156.1408	20.25571	.4948361	6330.180	-.827573	-2.03728
#2	-.447731	154.3061	19.72298	.2896279	6366.178	-.597173	-2.40830
#3	-.284920	134.4095	19.65317	-.187967	6412.234	-.415721	-2.41361
ERRORS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS
HIGH	1000.000	400000.0	50000.00	5000.000	700000.0	10000.00	50000.00
LOW	-10.0000	-200.000	-200.000	-5.00000	-1000.00	-5.00000	-50.0000

ELEM	CR2677	CU3247	FE2714	K_7664	MG2790	MN2576	NA3302
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
AVGE	1.786192	.5539808	4230.370	-95.4029	1686.547	291.7881	9029.540
SDEV	.302698	.4592208	22.820	13.7084	5.233	1.2990	84.767
%RSD	16.94657	82.89471	.5394416	14.36892	.3102573	.4451776	.9387704
#1	2.070600	.3571717	4205.070	-82.0020	1688.623	290.3841	9124.638
#2	1.819942	.2259662	4249.401	-94.8073	1690.422	292.9471	9002.060
#3	1.468033	1.078805	4236.637	-109.399	1680.595	292.0332	8961.923
ERRORS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS
HIGH	60000.00	30000.00	700000.0	100000.0	300000.0	50000.00	700000.0
LOW	-10.0000	-25.0000	-100.000	-1000.00	-1000.00	-15.0000	-2000.00

ELEM	NI2316	TL1908	V_2924	ZN2062	PB2203	SE1960	SB2068
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
AVGE	4.827945	-4.18450	.7483423	1.263582	2.442358	-1.57388	2.626668
SDEV	.904840	2.25459	.6537663	.235003	.529068	2.69268	1.426101
%RSD	18.74171	53.87944	87.36194	18.59818	21.66220	171.0854	54.29318
#1	5.841433	-1.58137	1.203631	1.134752	2.961527	-1.92992	1.294284
#2	4.101279	-5.51671	-.000785	1.121167	1.903917	1.279105	4.130911
#3	4.541123	-5.45543	1.042181	1.534827	2.461631	-4.07083	2.454807
ERRORS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS
HIGH	60000.00	60000.00	50000.00	60000.00	60000.00	40000.00	40000.00
LOW	-40.0000	-10.0000	-50.0000	-20.0000	-3.00000	-5.00000	-60.0000

ELEM	AS1890	22031	22032	19601	19602	SN1899	BI2230
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
AVGE	-1.28067	8.085865	-.378485	-11.2182	3.237885	2.572486	-2.42386
SDEV	.86108	4.892291	1.893283	5.5370	1.272872	.887566	2.48526
%RSD	67.23657	60.50424	500.2264	49.35756	39.31182	34.50229	102.5328
#1	-.969537	13.69032	-2.39819	-11.9696	3.079020	2.571943	.0211546
#2	-2.25407	5.897672	-.093285	-5.34389	4.582732	1.685191	-2.34526
#3	-.618399	4.669600	1.356018	-16.3413	2.051903	3.460324	-4.94749
ERRORS	LC PASS	NOCHECK	NOCHECK	NOCHECK	NOCHECK	LC PASS	LC PASS
HIGH	20000.00					40000.00	40000.00
LOW	-5.00000					-20.0000	-10.0000

ELEM	MO2020	TI3349	Y_3710
UNITS	UG/L	UG/L	PPM
AVGE	.1380013	3.582090	3641.222
SDEV	1.349533	.429222	41.285
%RSD	977.9132	11.98246	1.133814
#1	1.694345	3.660448	3598.800
#2	-.707884	3.966736	3643.600
#3	-.572457	3.119088	3681.266
ERRORS	LC PASS	LC PASS	NOCHECK
HIGH	20000.00	40000.00	
LOW	-10.0000	-30.0000	

METHOD: ALT-P4Q2 SAMPLE NAME: 1007021-05 OPERATOR:
RUN TIME: 07/12/10 15:01:23
COMMENT: SDG:1007021 CLIENTID:SA-PZ-1551 1:1
MODE: CONC CORR. FACTOR: 1

ELEM	AG3280	AL3082	BA4934	BE3130	CA3179	CD2265	CO2286
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
AVGE	-.569839	68.97954	20.11478	-.029040	6644.555	-.570390	-1.17223
SDEV	.162811	6.46204	.17570	.123453	69.972	.008258	.26769
%RSD	28.57143	9.368056	.8734950	425.1067	1.053080	1.447772	22.83595
#1	-.407028	62.22450	19.94573	-.158556	6653.486	-.572862	-1.41248
#2	-.732650	69.61204	20.10215	-.015858	6709.633	-.577129	-.883680
#3	-.569839	75.10207	20.29646	.0872923	6570.545	-.561178	-1.22053
ERRORS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS
HIGH	1000.000	400000.0	50000.00	5000.000	700000.0	10000.00	50000.00
LOW	-10.0000	-200.000	-200.000	-5.00000	-1000.00	-5.00000	-50.0000

ELEM	CR2677	CU3247	FE2714	K_7664	MG2790	MN2576	NA3302
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
AVGE	2.020883	.6414516	4321.065	-80.0885	1729.192	302.0534	9318.462
SDEV	.121125	.1530733	27.873	20.1215	17.437	1.2607	180.964
%RSD	5.993688	23.86358	.6450444	25.12409	1.008387	.4173782	1.941991
#1	2.145989	.7945252	4309.248	-102.411	1709.960	301.4717	9117.033
#2	2.012484	.6414512	4352.899	-74.5075	1743.970	301.1886	9371.035
#3	1.904175	.4883785	4301.046	-63.3466	1733.646	303.4999	9467.318
ERRORS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS
HIGH	60000.00	30000.00	700000.0	100000.0	300000.0	50000.00	700000.0
LOW	-10.0000	-25.0000	-100.000	-1000.00	-1000.00	-15.0000	-2000.00

ELEM	NI2316	TL1908	V_2924	ZN2062	PB2203	SE1960	SB2068
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
AVGE	4.457772	-6.44446	-.070125	1.581811	2.218641	-.141439	5.570410
SDEV	.626768	4.16734	.076240	.416718	1.452213	1.217537	.700062
%RSD	14.06011	64.66550	108.7201	26.34435	65.45504	860.8210	12.56751
#1	4.579500	-1.69698	-.112807	1.891872	.5788485	-.422309	4.793444
#2	5.014747	-9.49852	-.115465	1.108111	2.734843	-1.19400	6.152102
#3	3.779070	-8.13787	.0178961	1.745449	3.342234	1.191989	5.765685
ERRORS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS
HIGH	60000.00	60000.00	50000.00	60000.00	60000.00	40000.00	40000.00
LOW	-40.0000	-10.0000	-50.0000	-20.0000	-3.00000	-5.00000	-60.0000

ELEM	AS1890	22031	22032	19601	19602	SN1899	BI2230
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
AVGE	.7064496	2.879645	1.885394	-11.9684	5.759959	.6227509	-2.24585
SDEV	.6121905	1.428399	1.632591	5.0449	1.304978	2.210168	.64285
%RSD	86.65735	49.60330	86.59149	42.15143	22.65602	354.9040	28.62389
#1	1.255945	1.346445	.1924595	-10.1337	4.422939	1.625991	-2.90910
#2	.0465807	4.172835	2.013647	-17.6739	7.030341	-1.91110	-2.20289
#3	.8168233	3.119655	3.450077	-8.09771	5.826597	2.153364	-1.62556
ERRORS	LC PASS	NOCHECK	NOCHECK	NOCHECK	NOCHECK	LC PASS	LC PASS
HIGH	20000.00					40000.00	40000.00
LOW	-5.00000					-20.0000	-10.0000

ELEM	MO2020	TI3349	Y_3710
UNITS	UG/L	UG/L	PPM
AVGE	.4710497	1.929658	3732.400
SDEV	.4852614	.451401	75.596
%RSD	103.0170	23.39277	2.025394
#1	.2300337	2.319389	3819.666
#2	.1534801	2.034534	3690.533
#3	1.029635	1.435052	3687.000
ERRORS	LC PASS	LC PASS	NOCHECK
HIGH	20000.00	40000.00	
LOW	-10.0000	-30.0000	

ANALYSIS REPORT 07/12/10 03:44:12 PM PAGE 1

METHOD: ALT-P4Q2 SAMPLE NAME: 1007021-14 OPERATOR:
RUN TIME: 07/12/10 15:37:07
COMMENT: SDG:1007021 CLIENTID:SA-PZ-1571 1:1
MODE: CONC CORR. FACTOR: 1

ELEM	AG3280	AL3082	BA4934	BE3130	CA3179	CD2265	CO2286
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
AVGE	.0542704	109.4984	19.81395	-.068666	6260.080	-.576708	-.914657
SDEV	.1694593	2.2371	.14001	.228200	71.470	.314129	.193263
%RSD	312.2498	2.043019	.7066196	332.3336	1.141678	54.46939	21.12957
#1	.2442168	112.0253	19.76713	.1897832	6177.889	-.910497	-1.13730
#2	.0000000	107.7705	19.97137	-.242369	6307.614	-.532763	-.816458
#3	-.081406	108.6995	19.70336	-.153412	6294.735	-.286865	-.790210
ERRORS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS
HIGH	1000.000	400000.0	50000.00	5000.000	700000.0	10000.00	50000.00
LOW	-10.0000	-200.000	-200.000	-5.00000	-1000.00	-5.00000	-50.0000

ELEM	CR2677	CU3247	FE2714	K_7664	MG2790	MN2576	NA3302
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
AVGE	1.005202	.7945247	275.2982	-38.5255	1928.370	293.3916	10088.87
SDEV	.677386	.2521897	16.7144	8.5134	13.035	1.9576	98.59
%RSD	67.38807	31.74096	6.071372	22.09803	.6759518	.6672324	.9772356
#1	.2692125	.5102456	256.7787	-28.7470	1916.806	291.5652	10201.44
#2	1.602525	.9913334	289.2632	-44.2882	1925.809	293.1514	10017.84
#3	1.143867	.8819950	279.8529	-42.5413	1942.496	295.4582	10047.34
ERRORS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS
HIGH	60000.00	30000.00	700000.0	100000.0	300000.0	50000.00	700000.0
LOW	-10.0000	-25.0000	-100.000	-1000.00	-1000.00	-15.0000	-2000.00

ELEM	NI2316	TL1908	V_2924	ZN2062	PB2203	SE1960	SB2068
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
AVGE	1.480657	-4.94314	1.355517	38.13833	1.076726	-.458262	3.031218
SDEV	.859503	1.74026	.359991	.43654	.858894	3.209331	1.936944
%RSD	58.04872	35.20561	26.55745	1.144633	79.76907	700.3262	63.89988
#1	.4886451	-6.18044	1.562042	37.63560	2.068072	2.547834	.8782212
#2	1.950609	-5.69575	1.564671	38.35775	.5560885	-.084518	3.583113
#3	2.002717	-2.95324	.9398386	38.42164	.6060166	-3.83810	4.632319
ERRORS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS
HIGH	60000.00	60000.00	50000.00	60000.00	60000.00	40000.00	40000.00
LOW	-40.0000	-10.0000	-50.0000	-20.0000	-3.00000	-5.00000	-60.0000

ELEM	AS1890	22031	22032	19601	19602	SN1899	BI2230
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
AVGE	-3.44416	5.117008	-.944121	-8.57407	3.590239	.6640398	-.590183
SDEV	1.13991	2.253764	1.325082	2.38205	3.744568	1.083100	1.302763
%RSD	33.09685	44.04456	140.3509	27.78203	104.2986	163.1077	220.7387
#1	-4.41160	6.235068	-.016059	-7.14386	7.383077	1.889551	-1.02268
#2	-2.18750	6.593145	-2.46166	-7.25447	3.491757	-.164814	.8738241
#3	-3.73338	2.522810	-.354649	-11.3239	-.104117	.2673820	-1.62169
ERRORS	LC PASS	NOCHECK	NOCHECK	NOCHECK	NOCHECK	LC PASS	LC PASS
HIGH	20000.00					40000.00	40000.00
LOW	-5.00000					-20.0000	-10.0000

ELEM	MO2020	TI3349	Y_3710
UNITS	UG/L	UG/L	PPM
AVGE	-.407766	5.140004	3642.800
SDEV	1.038483	.238206	24.971
%RSD	254.6760	4.634361	.6854911
#1	.3370915	5.110374	3621.933
#2	.0336455	4.917999	3636.000
#3	-1.59404	5.391639	3670.467
ERRORS	LC PASS	LC PASS	NOCHECK
HIGH	20000.00	40000.00	
LOW	-10.0000	-30.0000	

ANALYSIS REPORT 07/12/10 03:01:20 PM PAGE 1

METHOD: ALT-P4Q2 SAMPLE NAME: 1007021-04 OPERATOR:
RUN TIME: 07/12/10 14:54:15
COMMENT: SDG:1007021 CLIENTID:SA-PZ-157IL 1:1
MODE: CONC CORR. FACTOR: 1

ELEM	AG3280	AL3082	BA4934	BE3130	CA3179	CD2265	CO2286
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
AVGE	-.284920	49.99097	13.17077	-.206566	12233.45	-.069684	-2.45872
SDEV	.146756	11.44185	.09802	.277545	58.68	.424355	.27163
%RSD	51.50788	22.88783	.7442016	134.3610	.4796776	608.9726	11.04760
#1	-.122108	56.80159	13.25891	.0012253	12168.76	.0644927	-2.68098
#2	-.407028	56.39014	13.18819	-.099161	12283.26	.2713637	-2.15593
#3	-.325622	36.78120	13.06521	-.521763	12248.32	-.544908	-2.53924
ERRORS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS
HIGH	1000.000	400000.0	50000.00	5000.000	700000.0	10000.00	50000.00
LOW	-10.0000	-200.000	-200.000	-5.00000	-1000.00	-5.00000	-50.0000

ELEM	CR2677	CU3247	FE2714	K_7664	MG2790	MN2576	NA3302
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
AVGE	.7140821	5.576250	93.36083	1541.843	786.4318	4427.760	7569.379
SDEV	.9789953	.297700	5.80205	28.675	10.2419	51.887	120.780
%RSD	137.0984	5.338714	6.214647	1.859789	1.302330	1.171860	1.595635
#1	.0447668	5.474201	88.03887	1563.231	787.2842	4449.919	7673.548
#2	1.837691	5.342994	92.49742	1553.038	796.2210	4464.888	7436.987
#3	.2597882	5.911553	99.54620	1509.259	775.7903	4368.472	7597.602
ERRORS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS
HIGH	60000.00	30000.00	700000.0	100000.0	300000.0	50000.00	700000.0
LOW	-10.0000	-25.0000	-100.000	-1000.00	-1000.00	-15.0000	-2000.00

ELEM	NI2316	TL1908	V_2924	ZN2062	PB2203	SE1960	SB2068
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
AVGE	.6447737	-5.23994	.8019696	.9768869	1.005988	-1.30376	4.134136
SDEV	.2176794	3.63397	.2379391	.3181640	.169038	.81178	1.230948
%RSD	33.76059	69.35142	29.66933	32.56918	16.80316	62.26477	29.77521
#1	.5552476	-1.25165	.6064487	.6950300	1.062504	-1.91291	3.882870
#2	.4861329	-8.36365	1.066894	.9137420	.8159331	-1.61619	5.471330
#3	.8929405	-6.10452	.7325666	1.321889	1.139527	-.382182	3.048207
ERRORS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS
HIGH	60000.00	60000.00	50000.00	60000.00	60000.00	40000.00	40000.00
LOW	-40.0000	-10.0000	-50.0000	-20.0000	-3.00000	-5.00000	-60.0000

ELEM	AS1890	22031	22032	19601	19602	SN1899	BI2230
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
AVGE	-.482158	5.544073	-1.26298	-9.81155	2.940428	1.049644	-2.58508
SDEV	1.669624	1.212535	.67061	2.46553	.449043	.754519	1.50088
%RSD	346.2816	21.87084	53.09723	25.12889	15.27134	71.88332	58.05942
#1	.8121943	6.856564	-1.83353	-12.3173	3.278124	1.920238	-.872013
#2	.1080558	5.310044	-1.43110	-9.72909	2.430830	.5852275	-3.66899
#3	-2.36672	4.465610	-.524308	-7.38828	3.112330	.6434657	-3.21423
ERRORS	LC PASS	NOCHECK	NOCHECK	NOCHECK	NOCHECK	LC PASS	LC PASS
HIGH	20000.00					40000.00	40000.00
LOW	-5.00000					-20.0000	-10.0000

ELEM	MO2020	TI3349	Y_3710
UNITS	UG/L	UG/L	PPM
AVGE	-.507854	-.156200	3635.356
SDEV	.671745	.036247	37.682
%RSD	132.2714	23.20569	1.036540
#1	-1.14549	-.196250	3613.467
#2	.1934662	-.146707	3613.733
#3	-.571539	-.125644	3678.867
ERRORS	LC PASS	LC PASS	NOCHECK
HIGH	20000.00	40000.00	
LOW	-10.0000	-30.0000	

ANALYSIS REPORT 07/12/10 03:37:04 PM PAGE 1

METHOD: ALT-P4Q2 SAMPLE NAME: 1007021-13 OPERATOR:
RUN TIME: 07/12/10 15:29:59
COMMENT: SDG:1007021 CLIENTID:SA-PZ-159I1 1:1
MODE: CONC CORR. FACTOR: 1

ELEM	AG3280	AL3082	BA4934	BE3130	CA3179	CD2265	CO2286
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
AVGE	-.081406	42.30999	12.46927	-.537197	13150.93	-.557705	-3.20358
SDEV	.500164	7.32124	.10497	.235072	288.10	.244301	1.38559
%RSD	614.4105	17.30381	.8417937	43.75903	2.190733	43.80476	43.25119
#1	.4884337	33.91513	12.36995	-.760628	13421.19	-.284558	-1.67807
#2	-.284920	47.37072	12.45876	-.558965	13183.79	-.633234	-3.54865
#3	-.447731	45.64411	12.57909	-.291998	12847.80	-.755321	-4.38402
ERRORS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS
HIGH	1000.000	400000.0	50000.00	5000.000	700000.0	10000.00	50000.00
LOW	-10.0000	-200.000	-200.000	-5.00000	-1000.00	-5.00000	-50.0000

ELEM	CR2677	CU3247	FE2714	K_7664	MG2790	MN2576	NA3302
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
AVGE	1.509520	.7653680	2608.853	1356.925	812.6832	4153.195	6407.304
SDEV	.504574	.2698979	42.996	48.350	8.3294	73.358	102.026
%RSD	33.42616	35.26381	1.648068	3.563185	1.024931	1.766308	1.592332
#1	1.677298	.8382607	2634.648	1304.306	820.1221	4210.328	6391.904
#2	1.908832	.9913334	2632.692	1367.074	814.2437	4178.790	6313.853
#3	.9424298	.4665100	2559.218	1399.394	803.6839	4070.469	6516.153
ERRORS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS
HIGH	60000.00	30000.00	700000.0	100000.0	300000.0	50000.00	700000.0
LOW	-10.0000	-25.0000	-100.000	-1000.00	-1000.00	-15.0000	-2000.00

ELEM	NI2316	TL1908	V_2924	ZN2062	PB2203	SE1960	SB2068
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
AVGE	2.782639	-2.27388	-.127405	1.894304	1.999931	-.095133	6.398891
SDEV	.721377	2.02561	.452914	.515931	.870837	3.702433	2.253543
%RSD	25.92421	89.08183	355.4913	27.23593	43.54333	3891.838	35.21771
#1	2.599930	-1.41725	.2757148	2.373185	1.091610	4.124615	4.837933
#2	3.577804	-4.58707	-.617499	1.961768	2.080499	-2.79940	8.982427
#3	2.170185	-.817320	-.040431	1.347960	2.827683	-1.61062	5.376314
ERRORS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS
HIGH	60000.00	60000.00	50000.00	60000.00	60000.00	40000.00	40000.00
LOW	-40.0000	-10.0000	-50.0000	-20.0000	-3.00000	-5.00000	-60.0000

ELEM	AS1890	22031	22032	19601	19602	SN1899	BI2230
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
AVGE	.9094186	3.499014	1.248211	-12.5897	6.139494	-1.61387	-4.00313
SDEV	.6348593	2.210068	1.847200	6.1441	2.923121	.24415	1.57710
%RSD	69.80936	63.16257	147.9878	48.80233	47.61176	15.12803	39.39669
#1	1.131030	4.970062	-.847976	-6.49401	9.422701	-1.34092	-2.20375
#2	.1934579	.9575523	2.637844	-18.7811	5.176164	-1.81142	-4.66006
#3	1.403768	4.569428	1.954765	-12.4941	3.819618	-1.68927	-5.14557
ERRORS	LC PASS	NOCHECK	NOCHECK	NOCHECK	NOCHECK	LC PASS	LC PASS
HIGH	20000.00					40000.00	40000.00
LOW	-5.00000					-20.0000	-10.0000

ELEM	MO2020	TI3349	Y_3710
UNITS	UG/L	UG/L	PPM
AVGE	-1.25021	.1594594	3662.289
SDEV	1.07725	.0257508	49.501
%RSD	86.16512	16.14878	1.351631
#1	-.433207	.1817596	3701.066
#2	-2.47102	.1312762	3679.266
#3	-.846411	.1653425	3606.533
ERRORS	LC PASS	LC PASS	NOCHECK
HIGH	20000.00	40000.00	
LOW	-10.0000	-30.0000	

METHOD: ALT-P4Q2 SAMPLE NAME: 1007021-02 OPERATOR:
RUN TIME: 07/12/10 14:39:59
COMMENT: SDG:1007021 CLIENTID:SA-PZ-159I 1:1
MODE: CONC CORR. FACTOR: 1

ELEM	AG3280	AL3082	BA4934	BE3130	CA3179	CD2265	CO2286
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
AVGE	-.257784	32.09293	20.79571	-.125572	6813.519	-.411487	-.386451
SDEV	.208871	1.78388	.15014	.134215	30.465	.117873	.449517
%RSD	81.02529	5.558496	.7219914	106.8834	.4471265	28.64558	116.3192
#1	-.203514	34.07938	20.88583	.0294023	6778.859	-.495904	-.765200
#2	-.488434	30.62773	20.62239	-.204084	6836.060	-.461741	.1102949
#3	-.081406	31.57169	20.87892	-.202034	6825.636	-.276816	-.504447
ERRORS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS
HIGH	1000.000	400000.0	50000.00	5000.000	700000.0	10000.00	50000.00
LOW	-10.0000	-200.000	-200.000	-5.00000	-1000.00	-5.00000	-50.0000

ELEM	CR2677	CU3247	FE2714	K_7664	MG2790	MN2576	NA3302
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
AVGE	.2432745	.2988589	28.86499	-48.7188	2187.439	388.4482	9976.905
SDEV	.1076737	.2338236	10.57158	4.4814	6.057	.8036	82.740
%RSD	44.26015	78.23882	36.62424	9.198579	.2769131	.2068668	.8293143
#1	.2450277	.2478346	18.30316	-43.5464	2182.669	387.6166	10056.20
#2	.3500609	.5539812	28.84553	-51.4392	2194.254	388.5076	9983.411
#3	.1347349	.0947607	39.44630	-51.1707	2185.394	389.2205	9891.104
ERRORS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS
HIGH	60000.00	30000.00	700000.0	100000.0	300000.0	50000.00	700000.0
LOW	-10.0000	-25.0000	-100.000	-1000.00	-1000.00	-15.0000	-2000.00

ELEM	NI2316	TL1908	V_2924	ZN2062	PB2203	SE1960	SB2068
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
AVGE	.2455646	-4.85009	1.482302	.6640406	2.614552	.2767507	2.755489
SDEV	.7038634	2.76182	.512467	.2049625	.959648	.3611750	.716085
%RSD	286.6307	56.94374	34.57234	30.86596	36.70411	130.5055	25.98759
#1	-.468918	-3.40573	1.971956	.6665657	3.721939	.5089204	1.931671
#2	.9383050	-3.10994	.9497234	.4578272	2.026293	.4606996	3.228809
#3	.2673069	-8.03459	1.525227	.8677290	2.095423	-.139368	3.105986
ERRORS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS
HIGH	60000.00	60000.00	50000.00	60000.00	60000.00	40000.00	40000.00
LOW	-40.0000	-10.0000	-50.0000	-20.0000	-3.00000	-5.00000	-60.0000

ELEM	AS1890	22031	22032	19601	19602	SN1899	BI2230
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
AVGE	-2.33589	7.856237	-.005549	-8.33945	4.575207	-.673249	-3.75260
SDEV	2.44130	.221126	1.399034	.74299	.218629	3.700836	.50430
%RSD	104.5128	2.814653	25210.23	8.909290	4.778552	549.6976	13.43872
#1	-1.25066	7.964997	1.600390	-8.09909	4.803275	-4.94276	-3.89823
#2	L-5.13165	8.001920	-.960226	-7.74640	4.554915	1.304547	-3.19151
#3	-.625356	7.601794	-.656813	-9.17286	4.367432	1.618466	-4.16806
ERRORS	LC PASS	NOCHECK	NOCHECK	NOCHECK	NOCHECK	LC PASS	LC PASS
HIGH	20000.00					40000.00	40000.00
LOW	-5.00000					-20.0000	-10.0000

ELEM	MO2020	TI3349	Y_3710
UNITS	UG/L	UG/L	PPM
AVGE	-.797837	-.447490	3795.955
SDEV	.864457	.194023	13.450
%RSD	108.3500	43.35805	.3543145
#1	-1.74048	-.653355	3781.266
#2	-.042173	-.268009	3798.933
#3	-.610855	-.421106	3807.666
ERRORS	LC PASS	LC PASS	NOCHECK
HIGH	20000.00	40000.00	
LOW	-10.0000	-30.0000	

ANALYSIS REPORT 07/12/10 02:32:48 PM PAGE 1

METHOD: ALT-P4Q2 SAMPLE NAME: 1007021-01 OPERATOR:
RUN TIME: 07/12/10 14:25:43
COMMENT: SDG:1007021 CLIENTID:SA-PZ-1601 1:1
MODE: CONC CORR. FACTOR: 1

ELEM	AG3280	AL3082	BA4934	BE3130	CA3179	CD2265	CO2286
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
AVGE	-.067838	50.24353	19.55933	-.217734	7331.699	-.390736	-.776141
SDEV	.062175	2.90716	.38301	.042000	22.210	.030848	.257560
%RSD	91.65153	5.786142	1.958204	19.28941	.3029320	7.894896	33.18469
#1	-.081406	52.27243	19.87343	-.169654	7312.912	-.355132	-.582739
#2	.0000000	46.91299	19.13264	-.247272	7325.973	-.407614	-1.06850
#3	-.122108	51.54516	19.67191	-.236275	7356.211	-.409463	-.677179
ERRORS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS
HIGH	1000.000	400000.0	50000.00	5000.000	700000.0	10000.00	50000.00
LOW	-10.0000	-200.000	-200.000	-5.00000	-1000.00	-5.00000	-50.0000

ELEM	CR2677	CU3247	FE2714	K_7664	MG2790	MN2576	NA3302
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
AVGE	.7724414	.5102461	1524.321	96.17653	1930.771	570.9578	9169.979
SDEV	.2136397	.2941991	7.671	6.16597	2.807	2.3967	98.372
%RSD	27.65773	57.65828	.5032492	6.411095	.1453781	.4197760	1.072758
#1	.7780064	.2697018	1520.323	103.2948	1928.064	572.5044	9202.274
#2	.9832442	.8382607	1533.165	92.48817	1930.582	568.1970	9059.520
#3	.5560735	.4227758	1519.474	92.74661	1933.668	572.1721	9248.144
ERRORS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS
HIGH	60000.00	30000.00	700000.0	100000.0	300000.0	50000.00	700000.0
LOW	-10.0000	-25.0000	-100.000	-1000.00	-1000.00	-15.0000	-2000.00

ELEM	NI2316	TL1908	V_2924	ZN2062	PB2203	SE1960	SB2068
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
AVGE	3.173419	-4.36512	2.102860	1.758556	1.429228	-.953683	4.624850
SDEV	.664548	4.42739	.392154	.116523	.711299	1.401852	2.794009
%RSD	20.94107	101.4267	18.64861	6.626070	49.76809	146.9935	60.41297
#1	2.944890	-6.13044	2.404525	1.698917	2.086367	-.956027	6.241476
#2	3.922076	-7.63752	2.244490	1.892826	.6739582	-2.35436	6.234467
#3	2.653290	.6726057	1.659566	1.683924	1.527358	.4493393	1.398609
ERRORS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS
HIGH	60000.00	60000.00	50000.00	60000.00	60000.00	40000.00	40000.00
LOW	-40.0000	-10.0000	-50.0000	-20.0000	-3.00000	-5.00000	-60.0000

ELEM	AS1890	22031	22032	19601	19602	SN1899	BI2230
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
AVGE	.2748214	5.943526	-.827713	-12.7364	4.925643	1.258309	-.996303
SDEV	1.223530	1.259963	1.081923	4.1102	.361058	2.272618	1.630198
%RSD	445.2090	21.19891	130.7124	32.27157	7.330170	180.6089	163.6247
#1	.4502120	7.098252	-.419011	-13.5574	5.332026	1.359772	.8792551
#2	-1.02694	6.132623	-2.05445	-16.3741	4.641814	-1.06334	-2.07285
#3	1.401191	4.599702	-.009674	-8.27757	4.803090	3.478496	-1.79531
ERRORS	LC PASS	NOCHECK	NOCHECK	NOCHECK	NOCHECK	LC PASS	LC PASS
HIGH	20000.00					40000.00	40000.00
LOW	-5.00000					-20.0000	-10.0000

ELEM	MO2020	TI3349	Y_3710
UNITS	UG/L	UG/L	PPM
AVGE	.9936870	1.065465	3808.488
SDEV	1.621404	.099502	17.970
%RSD	163.1705	9.338872	.4718378
#1	2.800718	1.152945	3788.200
#2	.5143535	.9572180	3814.867
#3	-.334011	1.086231	3822.400
ERRORS	LC PASS	LC PASS	NOCHECK
HIGH	20000.00	40000.00	
LOW	-10.0000	-30.0000	

CompuChem
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SDG NARRATIVE
SDG # 1007021
CTO-WE08/112G02045
PM: DAVE BRAYACK

The 8 water samples were received intact at 2.5C and 4.8C, with proper documentations, in sealed shipping containers, on June 8th and 9th, 2010. The samples were scheduled for the requested analyses of the Wet Chemistry fraction. The samples were analyzed, in accordance with current EPA methods, for the analytes requested as per the COC, with the exceptions and/or additions requested by the client.

SAMPLE IDs:

The cover page contained in this package lists the client ID's and the associated CompuChem numbers which are part of this SDG.

INSTRUMENTAL QUALITY CONTROL:

All calibration verification solutions (ICV & CCV), blanks (ICB, & CCB), associated with this data were confirmed to be within allowable limits.

SAMPLE PREPARATION QUALITY CONTROL:

The sample preparation procedure verifications (LCS/LCS Dup & Blank) were found to be within acceptable ranges. The samples were analyzed within contract holding times for TOC 9060 and IC 300.0. The samples for Sulfide SM4500S-2-F were reanalyzed and reported out of holding times due to QC failures in the initial analyses. The initial analyses for Sulfide samples are included in the package for holding time confirmation.

MATRIX RELATED QUALITY CONTROL:

N/A

I certify that this Sample Data Package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy Sample Data Package and in the electronic data deliverable has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Preeti Khare
Data Reviewer I
July 16th, 2010

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TETRA TECH 661 ANDERSEN DRIVE, FOSTER PLAZA 7 PITTSBURGH PA, 15220	Project: CTO-WE08/7 DAY TAT/112G02045/N62472-03-D-0057 Project Number: CTO-WE08/7 DAY TAT/112G02045/N62472-03 Project Manager: TOBRENA SKEEN	**Reported:** 07/16/2010 12:57

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SA-PZ-160I	1007021-01	Water	07/07/2010 15:40	07/08/2010 09:10
SA-PZ-159I	1007021-02	Water	07/07/2010 10:15	07/08/2010 09:10
SA-PZ-151I1	1007021-03	Water	07/07/2010 12:20	07/08/2010 09:10
SA-PZ-157I1	1007021-04	Water	07/07/2010 10:00	07/08/2010 09:10
SA-PZ-155I	1007021-05	Water	07/07/2010 12:12	07/08/2010 09:10
20100707-DUP	1007021-06	Water	07/07/2010 13:05	07/08/2010 09:10
SA-PZ-159I1	1007021-13	Water	07/08/2010 13:40	07/09/2010 10:00
SA-PZ-157I	1007021-14	Water	07/08/2010 13:47	07/09/2010 10:00

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Preeti Khare For Cathy Dover, Project Manager

Notes and Definitions

U	The compound was analyzed for but not detected (CLP U-flag).
J	Compound detected below the Reporting Limit; therefore, result is an estimated concentration (CLP J-flag).
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

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TETRA TECH 661 ANDERSEN DRIVE, FOSTER PLAZA 7 PITTSBURGH PA, 15220	Project: CTO-WE08/7 DAY TAT/112G02045/N62472-03-D-0057 Project Number: CTO-WE08/7 DAY TAT/112G02045/N62472-03 Project Manager: TOBRENA SKEEN	**Reported:** 07/16/2010 12:57

INORGANIC ANIONS BY IC - Quality Control

COMPUCHEM

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0070921 - NO PREP										
Blank (0070921-BLK1)				Prepared: 07/09/2010 15:13			Analyzed: 07/09/2010 17:56			
Nitrite as N	ND	0.400	mg/L							U
Nitrate as N	ND	0.400	mg/L							U
Chloride	ND	4.00	mg/L							U
LCS (0070921-BS1)				Prepared: 07/09/2010 15:13			Analyzed: 07/09/2010 18:12			
Nitrite as N	2.42	0.400	mg/L	2.500		97	90-110		20	
Nitrate as N	2.48	0.400	mg/L	2.500		99	90-110		20	
Chloride	23.2	4.00	mg/L	25.00		93	90-110		20	
LCS Dup (0070921-BSD1)				Prepared: 07/09/2010 15:13			Analyzed: 07/09/2010 18:28			
Nitrite as N	2.46	0.400	mg/L	2.500		98	90-110	1	20	
Nitrate as N	2.46	0.400	mg/L	2.500		98	90-110	0.9	20	
Chloride	23.1	4.00	mg/L	25.00		92	90-110	0.8	20	

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Preeti Khare For Cathy Dover, Project Manager

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TETRA TECH 661 ANDERSEN DRIVE, FOSTER PLAZA 7 PITTSBURGH PA, 15220	Project: CTO-WE08/7 DAY TAT/112G02045/N62472-03-D-0057 Project Number: CTO-WE08/7 DAY TAT/112G02045/N62472-03 Project Manager: TOBRENA SKEEN	**Reported:** 07/16/2010 12:57

WET CHEMISTRY PARAMETERS - Quality Control

COMPUCHEM

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0071331 - NO PREP										
Blank (0071331-BLK1)				Prepared: 07/13/2010 14:23			Analyzed: 07/13/2010 18:54			
Total Organic Carbon	ND	1.0	mg/L							U
LCS (0071331-BS1)				Prepared: 07/13/2010 14:23			Analyzed: 07/13/2010 19:03			
Total Organic Carbon	75	1.0	mg/L	75.00		99.7	90-110			
LCS Dup (0071331-BSD1)				Prepared: 07/13/2010 14:23			Analyzed: 07/13/2010 19:09			
Total Organic Carbon	77	1.0	mg/L	75.00		103	90-110	2.81	20	
Batch 0071357 - NO PREP										
Blank (0071357-BLK1)				Prepared: 07/13/2010 15:26			Analyzed: 07/16/2010 12:00			
Sulfide, total	ND	1.0	mg/L							U
LCS (0071357-BS1)				Prepared: 07/13/2010 15:26			Analyzed: 07/16/2010 12:00			
Sulfide, total	11	1.0	mg/L	10.00		106	90-110			
LCS Dup (0071357-BSD1)				Prepared: 07/13/2010 15:26			Analyzed: 07/16/2010 12:00			
Sulfide, total	11	1.0	mg/L	10.00		106	90-110	0.00	20	

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Preeti Khare For Cathy Dover, Project Manager

Reagent /Standards/QC Preparation for IC

File Seq. Number: 070910

CompuChem a Division of Liberty Analytical Corporation WORKSHEET 1W(7) 1

STANDARDS AND REAGENTS TRACEABILITY*	REF#:	MANUFACTURER	LOT#	EXPIRATION DATE
Calibration Standard Stock A - Nitrite (50 ppm)	1u(6)1-17-15	High-Purity	0923623	08/27/10
Calibration Standard Stock B - Fluoride (50 ppm), Bromide (50 ppm), Nitrate (50 ppm), Phosphate, (50 ppm), Chloride (500 ppm), Sulfate (1000 ppm)	1u(6)1-17-14	High-Purity	0923615	08/27/10
ICV/MS/MSD- 2ND source Stock Standard A - Fluoride (500 ppm), Bromide (500 ppm), Nitrate (500 ppm), Phosphate, (500 ppm), Chloride (4000 ppm), Sulfate (4000 ppm)	1u(6)1-18-9	NSI	112409	11/2011
ICV/MS/MSD- 2nd source Stock Standards B - Nitrite (500 ppm)	1u(6)1-18-8	NSI	112409	11/20/2010
Sulfuric acid	1m2-182-4	Caledon	65758	07/31/11
Sodium bicarbonate	1u(6)1-15-5	emd	48007815	9-10-11
Sodium carbonate	1u(6)1-15-7	Jt baker	G06153	9-10-11

REAGENT LOT NUMBER**	PREPARATION INSTRUCTIONS
Regenerant solution – 06 29 10 jm	In a 1L volumetric flask partially filled with reagent water, add 14-mL of sulfuric acid and dilute to volume.
Eluent stock sodium bicarbonate soln. (100mM) – 06 11 10 jm	Dissolve 8.40 g of sodium bicarbonate into reagent water in a 1 L volumetric flask.
Eluent stock sodium carbonate soln. (100mM) – 06 11 10 jm	Dissolve 10.60 g of sodium carbonate into reagent water in a 1 L volumetric flask.
Eluent working solution – 07 09 10 jm	Add to 40 mL of stock sodium bicarbonate solution and 52 mL of stock sodium carbonate solution and dilute in a 2 L volumetric flask with reagent water.

STANDARD LOT NUMBER**	PREPARATION INSTRUCTIONS
ICV Working Standard - Fluoride (2.5 ppm), Nitrate (2.5 ppm), Nitrite (2.5 ppm), Phosphate, (2.5 ppm), Chloride (20 ppm), Sulfate (20 ppm) – 07 09 10 jm	Place in a 50-ml volumetric flask: 0.250-ml of ICV Stock Standards A & B Dilute to the mark with reagent water.
MS/MSD Spiking Solution yields - Fluoride (2.5 ppm), Bromide (2.5 ppm), Nitrate (2.5 ppm), Nitrite (2.5 ppm), Phosphate, (2.5 ppm), Chloride (20 ppm), Sulfate (20 ppm) – 07 09 10 jm	Pipette 10ml of sample in a 30-ml volumetric cup: Pipette .050 ml of the ICV/MS/MSD and mix.
Working Calibration Standard - Fluoride (5 ppm), Bromide (5 ppm), Nitrate (5 ppm), Nitrite (5 ppm), Phosphate, (5 ppm), Chloride (50 ppm), Sulfate (100 ppm) – 06 29 10 jm	Place in a 200-ml volumetric flask: 20-ml of Calibration Standard Stock A & B Dilute to the mark with reagent water.
CCV/LCS - Fluoride (2.5 ppm), Bromide (2.5 ppm), Nitrate (2.5 ppm), Nitrite (2.5 ppm), Phosphate, (2.5 ppm), Chloride (25 ppm), Sulfate (50 ppm) – 07 09 10 jm	Place in a 100-ml volumetric flask: 50-ml of Working Calibration Standard Dilute to the mark with reagent water.

*Ref# = Logbook ID, Page number, and item number from Materials Receipt Log
**Standard Lot Number consists of standard ID, date prepared, and initials of preparer.

Standard Solutions Prepared and Entered By: _____ Date: 07/09/10

Reviewed By: _____ Date: 7-16-10

Worksheet 1 D(6) 1 CompuChem, a Division of Liberty Analytical Corporation

Sulfide Preparation & Analysis

Method: SM 4500S-2-F

Analyst: JM / 2477

Date: 7/16/2010 Time: 1200

SDG: **1007021** Batch No.: 0071357

Cond.	CompuChem No.	Sample Type	Total or Insoluable Sulfide?	Sample Vol. (mL)	Iodine Vol. (mL)	Sodium Thiosulfate Vol. (mL)	Sulfide Result (mg/L)	Comments
	0071357-BLK1	PBW	Total	200	1.0	0.90	0.20	
	0071357-BS1	LCSW	Total	200	6.0	0.70	10.60	
	0071357-BSD1	LCSWD	Total	200	6.0	0.70	10.60	
	1007021-13	SAMPLE	Total	200	1.0	1.10	-0.20	
	1007021-14	SAMPLE	Total	200	1.0	1.00	0.00	

Concentration of Sulfide = (Iodine volume - sodium thiosulfate volume)(400)/Initial Sample volume

Reagent/Standard	Reference #	Manufacturer	Lot#	Expiration Date
Soluble Starch	1U(6)1-18-15	BDH	9282	4/30/11
Iodine Solution	1U(6)1-18-14	BDH	9288	4/30/11
Hydrocloric Acid	1M2-186-1	JT BAKER	15940	2/28/11
Sodium Thiosulfate (0.025N)	1U96)1-18-21	Mallinckrodt	H51N39	4/30/11
Sulfide Stock Standard 10000ppm	~~1U(6)1-17-21~~ 1U(6)1-14	NSI Solutions	~~61808~~ 20210	~~06/2010~~ 02/12
Reagent/Standard Lot #	RLP for JM 7/16/10	**Preparation Instructions**	RLP for JM 7/16/10	RLP for JM 7/16/10

HCl(6N) -	Add 500-mL concentrated HCl to reagent water in a one liter volumetric flask. Dilute to volume with reagent water.
LCS/MS/MSD (spike concentration 10mg/L)	Prepare the LCS by adding 200-µL of Sulfide Stock Standard to 200-mL if reagent water. Prepare the MS and MSD by adding 200-uL of the Sulfide Stock Standard to 200-mL of separate aliquots of sample for the MS and MSD.

The presence of the Chemist's employee ID number, or signature, on this run log attests that strict compliance with the method's SOP has occurred. Any SOP deviations require documentation by the responsible chemist together with the chemist's initials and the initials of the lab supervisor and a QA department representative, signifying approval of the deviation.

Reviewed By: [signature] Date: 7-16-10

Worksheet 1 D(6) 1 CompuChem, a Division of Liberty Analytical Corporation

Sulfide Preparation & Analysis

Method: SM 4500S-2-F

Analyst: JM

Date: 7/16/10 Time: 12:00

SDG: 1007021 Batch No.: 0071357

Cond.	CompuChem No.	Sample Type	Total or Insoluable Sulfide?	Sample Vol. (mL)	Iodine Vol. (mL)	Sodium Thiosulfate Vol. (mL)	Sulfide Result (mg/L)	Comments
	0071357-BLK1		Total	200	1	.9	0.00	
	0071357-BS1				6	.7		
	0071357-BSD1				6	.7		
	1007021-13				1	1.1		
	1007021-14				1	1		

7/16/10

JM

Concentration of Sulfide = (Iodine volume - sodium thiosulfate volume)(400)/Initial Sample volume

Reagent/Standard	Reference #	Manufacturer	Lot#	Expiration Date
Soluble Starch	1U(6)1-18-15	BDH	9282	4/30/11
Iodine Solution	1U(6)1-18-14	BDH	9288	4/30/11
Hydrocloric Acid	1M2-186-1	JT BAKER	15940	2/28/11
Sodium Thiosulfate (0.025N)	1U96)1-18-21	Mallinckrodt	H51N39	4/30/11
Sulfide Stock Standard 10000ppm	~~1U(6)1-17-21~~ 1U(6)1-19-4	NSI Solutions	~~61808~~ 20210	~~06/2010~~ 02/12
Reagent/Standard Lot #	JM 7/16/10 Preparation Instructions		PK JSH 7/16/10	PK JSH 7/16/10
HCl(6N) -	Add 500-mL concentrated HCl to reagent water in a one liter volumetric flask. Dilute to volume with reagent water.			
LCS/MS/MSD (spike concentration 10mg/L)	Prepare the LCS by adding 200-µL of Sulfide Stock Standard to 200-mL if reagent water. Prepare the MS and MSD by adding 200-uL of the Sulfide Stock Standard to 200-mL of separate aliquots of sample for the MS and MSD.			

The presence of the Chemist's employee ID number, or signature, on this run log attests that strict compliance with the method's SOP has occurred. Any SOP deviations require documentation by the responsible chemist together with the chemist's initials and the initials of the lab supervisor and a QA department representative, signifying approval of the deviation.

Reviewed By: [signature] Date: 7-16-10

Generated on: 7/16/2010 11:49 AM

Worksheet 1 D(6) 1 CompuChem, a Division of Liberty Analytical Corporation

Sulfide Preparation & Analysis

Method: SM 4500S-2-F

Analyst: 1151 NB

Date: 7/14/2010 Time: 15:00

SDG: **1007021** Batch No.: 0071357

Cond	CompuChem No.	Sample Type	Total or Insoluable Sulfide?	Sample Vol. (mL)	Iodine Vol. (mL)	Sodium Thiosulfate Vol. (mL)	Sulfide Result (mg/L)	Comments
	NBDOC1	LCS	Total	200	6.3	0.70	11.20	
	NBDOC2	LCS	Total	200	6.5	0.70	11.60	
	NBDOC3	LCS	Total	200	6.3	0.50	11.60	
	NBDOC4	LCS	Total	200	6.4	0.80	11.20	
	0071357-BLK1	**Blank**	**Total**	**200**	**1.0**	**1.10**	**-0.20**	
	0071357-BS1	**LCS**	**Total**	**200**	**6.5**	**0.70**	**11.60**	
	0071357-BSD1	**LCS Dup**	**Total**	**200**	**6.3**	**0.70**	**11.20**	
	1007021-13	**Sample**	**Total**	**200**	**1.0**	**1.30**	**-0.60**	
	1007021-14	**Sample**	**Total**	**200**	**1.0**	**1.10**	**-0.20**	

Concentration of Sulfide = (Iodine volume - sodium thiosulfate volume)(400)/Initial Sample volume

Reagent/Standard	Reference #	Manufacturer	Lot#	Expiration Date
Soluble Starch	1U(6)1-18-15	BDH	9282	4/30/11
Iodine Solution	1U(6)1-18-14	BDH	9288	4/30/11
Hydrocloric Acid	1M2-186-1	JT BAKER	15940	2/28/11
Sodium Thiosulfate (0.025N)	1U96)1-18-21	Mallinckrodt	H51N39	4/30/11
Sulfide Stock Standard 10000ppm	1U(6)1-19-4	NSI Solutions	20210	02/12

Reagent/Standard Lot #	Preparation Instructions
HCl(6N) - 071410 jm	Add 500-mL concentrated HCl to reagent water in a one liter volumetric flask. Dilute to volume with reagent water.
LCS/MS/MSD (spike concentration 10mg/L)	Prepare the LCS by adding 200-µL of Sulfide Stock Standard to 200-mL if reagent water. Prepare the MS and MSD by adding 200-uL of the Sulfide Stock Standard to 200-mL of separate aliquots of sample for the MS and MSD.

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Reviewed By: JM Date: 7-14-10

8/26/08:vr

Generated on: 7/14/2010 4:44 PM

Worksheet 1 D(6) 1 CompuChem, a Division of Liberty Analytical Corporation

Sulfide Preparation & Analysis

Method: SM 4500S-2-F

Analyst: 1151 NB

Date: 7/14/2010 Time: 15:00

SDG: **1007021** Batch No.: 0071357

Cond	CompuChem No.	Sample Type	Total or Insoluable Sulfide?	Sample Vol. (mL)	Iodine Vol. (mL)	Sodium Thiosulfate Vol. (mL)	Sulfide Result (mg/L)	Comments
	NBDOC1	LCS	Total	200	~~5.0~~ 6.3	.79	0.00	
	NBDOC2	LCS	Total	200	6.5	.7		
	NBDOC3	LCS	Total	200	6.3	.5		
	NBDOC4	LCS	Total	200	6.4	.8		
	0071357-BLK1	Blank	Total	200	1	1.1		1.1
	0071357-BS1	LCS	Total	200	6.5	.7		
	0071357-BSD1	LCS Dup	Total	200	6.3	.7		
	1007021-13	Sample	Total	200	1.0	1.3		
	1007021-14	Sample	Total	200	1.0	1.1		

7/14/10

Concentration of Sulfide = (Iodine volume - sodium thiosulfate volume)(400)/Initial Sample volume

Reagent/Standard	Reference #	Manufacturer	Lot#	Expiration Date
Soluble Starch	1U(6)1-18-15	BDH	9282	4/30/11
Iodine Solution	1U(6)1-18-14	BDH	9288	4/30/11
Hydrocloric Acid	1M2-186-1	JT BAKER	15940	2/28/11
Sodium Thiosulfate (0.025N)	1U96)1-18-21	Mallinckrodt	H51N39	4/30/11
Sulfide Stock Standard 10000ppm	1U(6)1-17-21	NSI Solutions	61808	06/2010

Reagent/Standard Lot #	Preparation Instructions
HCl(6N) -	Add 500-mL concentrated HCl to reagent water in a one liter volumetric flask. Dilute to volume with reagent water.
LCS/MS/MSD (spike concentration 10mg/L)	Prepare the LCS by adding 200-µL of Sulfide Stock Standard to 200-mL if reagent water. Prepare the MS and MSD by adding 200-uL of the Sulfide Stock Standard to 200-mL of separate aliquots of sample for the MS and MSD.

The presence of the Chemist's employee ID number, or signature, on this run log attests that strict compliance with the method's SOP has occurred. Any SOP deviations require documentation by the responsible chemist together with the chemist's initials and the initials of the lab supervisor and a QA department representative, signifying approval of the deviation.

Reviewed By: JM Date: 7-14-10

8/26/08:vr

Generated on: 7/14/2010 2:38 PM

Reagent /Standards/QC Preparation for IC

 File Seq. Number: 070910

CompuChem a Division of Liberty Analytical Corporation WORKSHEET 1W(7) 1

STANDARD LOT NUMBER**	PREPARATION INSTRUCTIONS
Standard 1 (Working Calibration Standard) - Fluoride (5 ppm), Bromide (5 ppm), Nitrate (5 ppm), Nitrite 5 ppm) Phosphate, (5 ppm), Chloride (50 ppm), Sulfate (100 ppm) – 06 28 10 jm	Use Working Calibration Standard A listed above.
Standard 2 - Fluoride (3 ppm), Bromide (3 ppm), Nitrate (3 ppm), Nitrite (3 ppm), Phosphate, (3 ppm), Chloride (30 ppm), Sulfate (60 ppm) – 06 28 10 jm	Place in a 50-mL volumetric flask: 3-mL of Calibration Standard Stock A & B Dilute to the mark with reagent water.
Standard 3 - Fluoride (1 ppm), Bromide (1 ppm), Nitrate (1 ppm), Nitrite (1 ppm), Phosphate, (1 ppm), Chloride (10 ppm), Sulfate (20 ppm) – 06 28 10 jm	Place in a 50-mL volumetric flask: 1-mL of Calibration Standard Stock A & B Dilute to the mark with reagent water.
Standard 4 - Fluoride (0.4 ppm), Bromide (0.4 ppm), Nitrate (0.4 ppm), Nitrite (0.4 ppm), Phosphate, (0.4 ppm), Chloride (4 ppm), Sulfate (8 ppm) – 06 28 10 jm **USE FOR LOQ**	Place in a 50-mL volumetric flask: 0.4-mL of Calibration Standard Stock A & B Dilute to the mark with reagent water.
Standard 5 - Fluoride (0.1 ppm), Bromide (0.1 ppm), Nitrate (0.1 ppm), Nitrite (0.1 ppm), Phosphate, (0.1 ppm), Chloride (1 ppm), Sulfate (2 ppm) – 06 28 10 jm	Place in a 50-mL volumetric flask: 0.1-mL of Calibration Standard Stock A & B Dilute to the mark with reagent water.
Standard 6 - Fluoride (0.05 ppm), Bromide (0.05 ppm), Nitrate (0.05 ppm), Nitrite (0.05 ppm), Phosphate, (0.05 ppm), Chloride (0.5 ppm), Sulfate (1 ppm) – 06 28 10 jm **USE FOR N02 LOD**	Place in a 50-mL volumetric flask: 0.05-mL of Calibration Standard Stock A & B Dilute to the mark with reagent water.
Standard 7 - Fluoride (0 ppm), Bromide (0 ppm), Nitrate (0 ppm), Nitrite (0 ppm), Phosphate, (0 ppm), Chloride (0 ppm), Sulfate (0 ppm) 06 28 10 jm	Di water.
FL , SO4 LOD - 06 29 10 jm	Place in a 50-mL volumetric flask: 0.2-mL of Standard 1 (Working Calibration Standard) Dilute to the mark with reagent water
CL LOD - 06 29 10 jm	Place in a 50-mL volumetric flask: 1.5-mL of Standard 1 (Working Calibration Standard) Dilute to the mark with reagent water
N03 LOD - 06 29 10 jm	Place in a 50-mL volumetric flask: 1.0-mL of Standard 1 (Working Calibration Standard) Dilute to the mark with reagent water

*Ref# = Logbook ID, Page number, and item number from Materials Receipt Log
**Standard Lot Number consists of standard ID, date prepared, and initials of preparer.

Standard Solutions Prepared and Entered By: JM Date: 07/09/10

Reviewed By: _____ Date: 7/16/10

The presence of the Chemist's/Analyst's employee ID number, or signature, on this run log attests that strict compliance with the method's SOP has occurred. Any SOP deviations require by the documentation responsible chemist/analyst together with the chemist's/analyst's initials and the initials of the lab supervisor and a QA department representative, signifying approval of the deviation.

TOC Run Log

Printed: 7/14/2010 10:18:17 A

Analyst(s): JM

Analysis: TTL ORGNC CRBN (TOC) 9060 QUAD

File Name: TOC_2010_07_13

Date/Time 07/13/2010

Instrument: TOC

Units: ppm

SDG	Matrix	Comments
1007021	Water	

Batch
0071331

Cup	Sample ID	Client ID	Sample Type	DF	Date	Time	Results	Comments
	ICAL	ICAL	CALIB STD	1.00	7/13/2010	5:31:08 PM	0.000	
	ICAL	ICAL	CALIB STD	1.00	7/13/2010	5:39:59 PM	1.000	
	ICAL	ICAL	CALIB STD	1.00	7/13/2010	5:48:57 PM	5.000	
	ICAL	ICAL	CALIB STD	1.00	7/13/2010	5:56:37 PM	25.00	
	ICAL	ICAL	CALIB STD	1.00	7/13/2010	6:03:59 PM	50.00	
	ICAL	ICAL	CALIB STD	1.00	7/13/2010	6:10:55 PM	100.0	
N	ICV	ICV	ICV	1.00	7/13/2010	6:20:29 PM	78.00	
N	ICB	ICB	ICB	1.00	7/13/2010	6:30:03 PM	0.2420	
N	CCV	CCV	CCV	1.00	7/13/2010	6:39:51 PM	49.19	
N	CCB	CCB	CCB	1.00	7/13/2010	6:47:21 PM	0.2508	
N	0071331-BLK1	Blank	BLANK	1.00	7/13/2010	6:54:54 PM	0.2068	
N	0071331-BS1	LCS	LCS	1.00	7/13/2010	7:03:44 PM	74.76	
N	0071331-BSD1	LCS Dup	LCS DUP	1.00	7/13/2010	7:09:44 PM	76.89	
N	1007021-01	SA-PZ-160I	SAMPLE	1.00	7/13/2010	7:17:25 PM	0.8858	
N	1007021-01	SA-PZ-160I	SAMPLE	1.00	7/13/2010	7:22:11 PM	0.7482	
N	1007021-01	SA-PZ-160I	SAMPLE	1.00	7/13/2010	7:26:46 PM	0.7672	
N	1007021-01	SA-PZ-160I	SAMPLE	1.00	7/13/2010	7:31:18 PM	0.8318	
N	1007021-02	SA-PZ-159I	SAMPLE	1.00	7/13/2010	7:38:57 PM	0.6591	
N	1007021-02	SA-PZ-159I	SAMPLE	1.00	7/13/2010	7:43:58 PM	0.7123	
N	1007021-02	SA-PZ-159I	SAMPLE	1.00	7/13/2010	7:48:47 PM	0.6616	
N	1007021-02	SA-PZ-159I	SAMPLE	1.00	7/13/2010	7:53:26 PM	0.7255	
N	1007021-03	SA-PZ-151I1	SAMPLE	1.00	7/13/2010	8:01:15 PM	1.321	
N	1007021-03	SA-PZ-151I1	SAMPLE	1.00	7/13/2010	8:06:14 PM	1.414	
N	1007021-03	SA-PZ-151I1	SAMPLE	1.00	7/13/2010	8:11:19 PM	1.554	
N	1007021-03	SA-PZ-151I1	SAMPLE	1.00	7/13/2010	8:16:29 PM	1.641	

The presence of the Chemist's/Analyst's employee ID number, or signature, on this run log attests that strict compliance with the method's SOP has occurred. Any SOP deviations require documentation by the responsible chemist/analyst together with the chemist's/analyst's initials and the initials of the lab supervisor and a QA department representative, signifying approval of the deviation.

Reviewed By: [signature] Date: 7-16-10

Cup	Sample ID	Client ID	Sample Type	DF	Date	Time	Results	Comments
N	1007021-04	SA-PZ-157I1	SAMPLE	1.00	7/13/2010	8:24:15 PM	1.230	
N	1007021-04	SA-PZ-157I1	SAMPLE	1.00	7/13/2010	8:29:14 PM	1.283	
N	1007021-04	SA-PZ-157I1	SAMPLE	1.00	7/13/2010	8:34:22 PM	1.362	
N	1007021-04	SA-PZ-157I1	SAMPLE	1.00	7/13/2010	8:39:24 PM	1.280	
N	1007021-05	SA-PZ-155I	SAMPLE	1.00	7/13/2010	8:47:05 PM	0.7069	
N	1007021-05	SA-PZ-155I	SAMPLE	1.00	7/13/2010	8:52:07 PM	0.8466	
N	1007021-05	SA-PZ-155I	SAMPLE	1.00	7/13/2010	8:57:00 PM	0.9033	
N	1007021-05	SA-PZ-155I	SAMPLE	1.00	7/13/2010	9:01:57 PM	0.8659	
N	1007021-06	20100707-DUP	SAMPLE	1.00	7/13/2010	9:09:34 PM	0.7314	
N	1007021-06	20100707-DUP	SAMPLE	1.00	7/13/2010	9:14:10 PM	0.7621	
N	1007021-06	20100707-DUP	SAMPLE	1.00	7/13/2010	9:19:05 PM	0.8159	
N	1007021-06	20100707-DUP	SAMPLE	1.00	7/13/2010	9:24:02 PM	0.7875	
N	1007021-13	SA-PZ-159I1	SAMPLE	1.00	7/13/2010	9:31:39 PM	1.199	
N	1007021-13	SA-PZ-159I1	SAMPLE	1.00	7/13/2010	9:36:10 PM	1.417	
N	1007021-13	SA-PZ-159I1	SAMPLE	1.00	7/13/2010	9:41:15 PM	1.327	
N	1007021-13	SA-PZ-159I1	SAMPLE	1.00	7/13/2010	9:46:12 PM	1.379	
N	CCV	CCV	CCV	1.00	7/13/2010	9:55:41 PM	49.32	
N	CCB	CCB	CCB	1.00	7/13/2010	10:03:09 PM	0.2601	
N	1007021-14	SA-PZ-157I	SAMPLE	1.00	7/13/2010	10:10:54 PM	0.6670	
N	1007021-14	SA-PZ-157I	SAMPLE	1.00	7/13/2010	10:15:33 PM	0.8156	
N	1007021-14	SA-PZ-157I	SAMPLE	1.00	7/13/2010	10:20:24 PM	0.7216	
N	1007021-14	SA-PZ-157I	SAMPLE	1.00	7/13/2010	10:24:52 PM	0.7176	
N	CCV	CCV	CCV	1.00	7/13/2010	10:35:03 PM	49.01	
N	CCB	CCB	CCB	1.00	7/13/2010	10:42:58 PM	0.2977	

The presence of the Chemist's/Analyst's employee ID number, or signature, on this run log attests that strict compliance with the method's SOP has occurred. Any SOP deviations require documentation by the responsible chemist/analyst together with the chemist's/analyst's initials and the initials of the lab supervisor and a QA department representative, signifying approval of the deviation.

Reviewed By: _____ Date: 7/16/10

LACHAT IC Run Log

Printed: 7/13/2010 10:08:45 AM

Printed: 7/13/2010 10:08:45 AM

37

Analyst(s): 2477

Date/Time 07/09/10 - 16:52

Analysis: IC 300 Anions

Instrument: LACHAT IC 5000

File Name: 5_300A1__070910

Units: mg/L

SDG	Matrix	Comments
1006131	Water	01,02 CL
1007021	Water	NO2, NO3, CL 13,14 ✓ (DOD)
1007041	Water	01 CL, SO4 ✓

Batch
0062216
0070921

Sample ID	Client ID	Sample Type	DF	Date	Time	Fluoride	Chloride	Nitrite-N	Bromide	Nitrate-N	Phosphate-P	Sulfate
ICV	ICV	ICV		07/9/2010	16:52:34	2.425	19.235	2.725	0.000	2.572	4.997	19.205
ICB	ICB	ICB		07/9/2010	17:08:31	0.000	0.000	0.065	0.000	0.000	0.000	0.000
CCV	CCV	CCV		07/9/2010	17:24:29	2.391	23.507	2.342	2.605	2.493	3.012	47.107
CCB	CCB	CCB		07/9/2010	17:40:27	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0070921-BLK1	0070921-BLK1	BLANK		07/9/2010	17:56:26	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0070921-BS1	0070921-BS1	LCS		07/9/2010	18:12:24	2.371	23.248	2.421	2.575	2.480	2.845	46.848
0070921-BSD1	0070921-BSD1	LCS DUP		07/9/2010	18:28:22	2.350	23.073	2.457	2.510	2.457	3.101	47.193
1007021-13	SA-PZ-159I1	SAMPLE		07/9/2010	18:44:21	0.000	4.256	0.000	0.000	0.000	0.000	6.128
1007021-14	SA-PZ-157I	SAMPLE		07/9/2010	19:00:20	0.000	8.306	0.000	0.000	0.702	0.000	13.915
1007041-01	MW-13S	SAMPLE		07/9/2010	19:16:19	0.000	2.524	0.000	0.000	3.064	0.000	49.241
0062216-BLK2	0062216-BLK2	BLANK		07/9/2010	19:32:17	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0062216-BS2	0062216-BS2	LCS		07/9/2010	19:48:14	2.376	22.843	2.399	2.571	2.486	2.866	47.094
1006131-01	MP-7	SAMPLE		07/9/2010	20:04:13	0.122	7.313	0.000	0.000	0.197	0.000	30.233
1006131-02	TP-9	SAMPLE		07/9/2010	20:20:10	0.047	2.102	0.000	0.000	0.122	0.000	3.709
CCV	CCV	CCV		07/9/2010	20:36:08	2.352	22.527	2.422	2.507	2.474	2.825	46.458
CCB	CCB	CCB		07/9/2010	20:52:06	0.000	0.000	0.000	0.000	0.000	0.000	0.000

The presence of the Chemist's/Analyst's employee ID number, or signature, on this run log attests that strict compliance with the method's SOP has occurred. Any SOP deviations require documentation by the responsible chemist/analyst together with the chemist's/analyst's initials and the initials of the lab supervisor and a QA department representative, signifying approval of the deviation.

Reviewed By: _____ Date: 7-16-10

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**D. BRAYACK**	**DATE:**	**SEPTEMBER 13, 2010**
FROM:	**DANIELLE M. BAUGHMAN**	**COPIES:**	**DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION – DEHALOBACTER AND DEHALOCOCCIDES**
NWIRP CALVERTON
SAMPLE DELIVERY GROUP (SDG) – 022HG

SAMPLES: 2/Misc/

SA-PZ-157I-20100708
SA-PZ-159I1-20100708

Overview

The sample set for NWIRP Calverton, SDG 022HG, consists of two (2) aqueous environmental samples. No field duplicate pairs were included within this SDG.

All samples were analyzed for dehalobacter and dehalococcides. The samples were collected by Tetra Tech NUS on July 8, 2010 and analyzed by Microbial Insights. Analyses were conducted using the CENSUS method.

These data were evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
• Initial and Continuing Calibrations
* • Laboratory Method Blank Analyses
* • Detection Limits

* - All quality control criteria were met for this parameter.

Dehalobacter and Dehalococcides

Positive results greater than the LQL, but less than the PQL were qualified as estimated "J" for conflicting noncompliances.

Notes

Executive Summary

Laboratory Performance: No issues to report.

Other Factors Affecting Data Quality: Positive results greater than the LQL, but less than the PQL were qualified as estimated "J".

The data for these analyses were reviewed with reference to Region II, and the Department of Defense (DoD) document entitled "Quality Systems Manual (QSM) for Environmental Laboratories", January 2006.

The text of this report has been formulated to address only those problem areas affecting data quality.

Tetra Tech NUS
Danielle M. Baughman
Project Engineer

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

APPENDIX A
QUALIFIED ANALYTICAL RESULTS

Data Validation Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS-GFAA MSA's r < 0.995 / ICP PDS Recovery Noncompliance
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O - Poor Instrument Performance (e.g. base-line drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DOT and Endrin
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient r < 0.995
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is greater than sample activity

PROJ_NO: 02045 SDG: 022HG FRACTION: MISC MEDIA: WATER	NSAMPLE	SA-PZ-157I-20100708			SA-PZ-159I1-20100708		
	LAB_ID	022HG-2			022HG-1		
	SAMP_DATE	7/8/2010			7/8/2010		
	QC_TYPE	NM			NM		
	UNITS	CELLS/ML			CELLS/ML		
	PCT_SOLIDS						
	DUP_OF						
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
DEHALOBACTER		50.2			649		
DEHALOCOCCOIDES		0.2	J	P	2.7		

APPENDIX B
RESULTS AS REPORTED BY THE LABORATORY

MICROBIAL INSIGHTS, INC.

2340 Stock Creek Blvd. Rockford, TN 37853-3044
Tel. (865) 573-8188 Fax. (865) 573-8133

CENSUS

Client: **Tetra Tech , Inc.**
Project: NWIRP Calverton, Site 6A

MI Project Number: **022HG**
Date Received: 07/09/2010

Sample Information

Client Sample ID:		**SA-PZ-159I1-20 100708**	**SA-PZ-157I-201 00708**
Sample Date:		07/08/2010	07/08/2010
Units:		cells/mL	cells/mL
Analyst:		CT	CT
Dechlorinating Bacteria			
Dehalococcoides spp.	DHC	**2.70E+00**	**2.00E-01 (J)**
Dehalobacter spp.	DHB	**6.49E+02**	**5.02E+01**

Legend:
NA = Not Analyzed NS = Not Sampled J = Estimated gene copies below PQL but above LQL I = Inhibited
< = Result not detected

APPENDIX C
SUPPORT DOCUMENTATION

microbialinsights

2340 Stock Creek Blvd.
Rockford TN 37853-3044
Phone: (865) 573-8188
Fax: (865) 573-8133
Email: info@microbe.com

Client: Tobrena Skeen
Tetra Tech , Inc.
661 Andersen Drive
Foster Plaza 7
Pittsburgh, PA 15220

Phone: 412.921.8874

Fax: 412.921.7276

Identifier: 022HG **Date Rec:** 07/09/2010 **Report Date:** 07/13/2010

Client Project #: 112G02045 CTO WE08 **Client Project Name:** NWIRP Calverton, Site 6A

Purchase Order #:

Analysis Requested: CENSUS

Reviewed By:

Anita Biernacki

NOTICE: This report is intended only for the addressee shown above and may contain confidential or privileged information. If the recipient of this material is not the intended recipient or if you have received this in error, please notify Microbial Insights, Inc. immediately. The data and other information in this report represent only the sample(s) analyzed and are rendered upon condition that it is not to be reproduced without approval from Microbial Insights, Inc. Thank you for your cooperation.

REPORT TO:

Reports will be provided to the contact(s) listed below. Parties other than the contact(s) listed below will require prior approval.

Name: Donald Whalen
Company: Tetra Tech NUS
Address: Twin Oaks 1, Suite 309
Norfolk, VA 23502

email:
Phone: (757) 618-2104
Fax: ( )

Project Manager: Robert Sok
Project Name: NWIRP Calverton, Site 6A
Project No.: 112G02045

INVOICE TO:

For Invoices **paid by a third party** it is imperative that contact information & corresponding reference No. be provided.

Name:
Company:
Address:

email:
Phone: ( )
Fax: ( )

Purchase Order No.
Subcontract No.

microbialinsights

2340 Stock Creek Blvd.
Rockford, TN 37853-3044
phone (865) 573-8188
fax: (865) 573-8133
email: info@microbe.com
www.microbe.com

Please Check One:

☐ More samples to follow
☐ No Additional Samples

Saturday Delivery

Please see shipping policies for details.

Report Type: ☐ Standard (default) ☐ Comprehensive (15% surcharge) ☐ Historical (30% surcharge)

Please contact us prior to submitting samples regarding questions about the analyses you are requesting at (865) 573-8188 (8:00 am to 4:00 pm M-F). After these hours please call (865) 300-8053.

Sample Information											CENSUS: Please select the target organism/gene																								
022HG MI ID (Laboratory Use Only)	Sample Name	Date Sampled	Time Sampled	Matrix	PLFA	VFA	MSE				qDHC (Dehalococcoides)	DHC Functional genes (bvc, tce, vcr)	qDHB (Dehalobacter)	qDSM (Desulfuromonas)	qDSB (Desulfitobacterium)	qEBAC (Total)	qDSR (SRBs only)	qSRB/RB	qMGN (methanogens)	qMOB (methanotrophs)	qDNF (Denitrifying)	qAOB (ammonia oxidizing)	qPM1 (MTBE aerobic)	qTOD (Initial PAHs aerobic)	qPHE (aerobic BTEX)	qBSS (Toluene/Xylene Anaerobic)	qNAH (Naphthalene aerobic)	add qPCR:	add qPCR:	add qPCR:	RNA (Expression Option)*	Of Retention	Other:	Other:	Other:
1	SA-PZ-159I-20100708	7/8/10	1340	GW							X		X																						
2	SA-PZ-157I-20100708	7/8/10	1347	GW							X		X																						

Relinquished by: Donald Whalen Date: 7/8/10 1730 Received by: Lisa L. Cimolise Date 7/10 7/9/10

In order for analysis to be completed correctly, it is vital that chain of custody is filled out correctly & that all relative information is provided. Failure to provide sufficient and/or correct information regarding reporting, invoicing & analyses requested information may result in delays for which MI will not be liable. Most analyses have a 24-48 hour hold time. *** additional cost and sample preservation are associated with RNA samples.**

HOLDTIME

SDG 022HG

SORT	UNITS	NSAMPLE	LAB_ID	QC_TYPE	SAMP_DATE	EXTR_DATE	ANAL_DATE	SMP_EXTR	EXTR_ANL	SMP_ANL
DEHAL	CELLS	SA-PZ-159I1-20100708	022HG-1	NM	07/08/2010	07/09/2010	07/12/2010	1	3	4
DEHAL	CELLS	SA-PZ-157I-20100708	022HG-2	NM	07/08/2010	07/09/2010	07/12/2010	1	3	4

microbialinsights

2340 Stock Creek Blvd.
Rockford TN 37853-3044
Phone: (865) 573-8188
Fax: (865) 573-8133
Email: info@microbe.com

Identifier: 022HG **Date Rec:** 07/09/2010 **Report Date:** 07/13/2010

Client Project #: 112G02045 CTO WE08 **Client Project Name:** NWIRP Calverton, Site 6A

Purchase Order #:

Comments:

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**D. BRAYACK**	**DATE:**	**DECEMBER 7, 2010**
FROM:	**MICHELLE L. ALLEN**	**COPIES:**	**DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION – VOC, OVG**
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT (NWIRP), CALVERTON
CTO WE08
SAMPLE DELIVERY GROUP (SDG) 1010082

SAMPLES: 19/Aqueous/VOC

SA-DUP01-20101012	SA-DUP02-20101012	SA-PZ-133I-20101012
SA-PZ-138I-20101012	SA-PZ-138I1-20101012	SZ-PZ-139-20101012
SA-PZ-149I1-20101012	SA-PZ-151I1-20101012	SA-PZ-155I-20101012
SA-PZ-157I-20101011	SA-PZ-157I1-20101011	SA-PZ-158I-20101011
SA-PZ-158I1-20101011	SA-PZ-159I-20101012	SA-PZ-159I1-20101012
SA-PZ-160I-20101012	SA-PZ-160I1-20101012	SA-PZ-161I-20101012
SA-TB-01-20101011		

8/Aqueous/OVG

SA-DUP01-20101012	SA-PZ-151I1-20101012	SA-PZ-155I-20101012
SA-PZ-157I-20101011	SA-PZ-157I1-20101011	SA-PZ-159I-20101012
A-PZ-159I1-20101012	SA-PZ-160I-20101012	
SA-TB-01-20101011		

Overview

The sample sets for NWIRP Calverton, SDG 1010082 consisted of eighteen (18) aqueous environmental samples and one (1) aqueous trip blank. All nineteen (19) aqueous samples were analyzed for volatile organic compounds (VOC). Eight (8) aqueous environmental samples were analyzed for organic volatile gases (OVG). Two field duplicate sample pairs were associated with this sample data group (SDG); SA-DUP01-20101012/SA-PZ-151I1-20101012 and SA-DUP02-20101012/SA-PZ-138I-20101012.

The samples were collected by Tetra Tech on October 11 and 12, 2010 and analyzed by CompuChem, a division of Liberty Analytical Corporation. All analyses were conducted in accordance with EPA Method SW-846 8260B and RSK-175 analytical and reporting protocols. The data contained in this SDG was validated with regard to the following parameters:

*	•	Data completeness
*	•	Hold times
*	•	GC/MS System Tuning and Performance
	•	Initial/continuing calibrations
	•	Laboratory Method Blank Results
	•	Surrogate Spike Recoveries
*	•	Internal Standard Recoveries
*	•	Laboratory Control Sample/Laboratory Control Sample Duplicate Recoveries
	•	Matrix Spike/Matrix Spike Duplicate Results
	•	Field Duplicate Precision Results
*	•	Compound Identification

* • Compound Quantitation
* • Detection Limits

The symbol (*) indicates that all quality control criteria were met for this parameter. Qualified analytical results are presented in Appendix A, results as reported by the laboratory are presented in Appendix B, Region II data validation forms are presented in Appendix C, and documentation supporting these findings is presented in Appendix D.

Volatile (VOC)

All initial and continuing calibrations performed on instrument 5972hp59 had Relative Response Factors (RRFs) less than the 0.05 quality control criteria for acetone. The positive result reported for acetone in sample SA-PZ-159I1-20101012 was qualified as estimated, (J). The remaining non-detected results for acetone were rejected, (UR), due to calibration noncompliance.

The initial calibration performed on instrument 5972hp59 on 10/20/10 had a Percent Relative Standard Deviation (%RSD) above the 15% quality control limit for bromomethane. The non-detected results reported for this compound in the affected samples, SA-DUP01-20101012, SA-DUP02-20101012, SA-PZ-133I-20101012, SA-PZ-138I-20101012, SA-PZ-139-20101012, SA-PZ-149I1-20101012, SA-PZ-151I1-20101012, SA-PZ-155I-20101012, SA-PZ-158I-20101011, SA-PZ-158I1-20101011, SA-PZ-159I-20101012, SA-PA-160I-20101012, SA-PZ-161I-20101012, and SA-TB-01-20101011, were qualified as estimated, (UJ).

The Percent Differences (%Ds) for 1,1,2,2-tetrachloroethane, bromomethane, chloromethane and vinyl chloride exceeded the 20% quality control limit for the continuing calibration performed on instrument 5972hp59 on 10/15/10 @ 14:26. Samples SA-PZ-138I-20101012, SA-PZ-157I1-20101011, SA-PZ-159I1-20101012, and SA-PZ-160I1-20101012 were affected. Only non-detected results were reported for these compounds in the affected samples and these non-detects were qualified as estimated, (UJ).

The %Ds for chloromethane, vinyl chloride, bromomethane, 1,1,2,2-tetrachloroethane, and 1,2,4-trichlorobenzene exceeded 20% on instrument 5972hp59 on 10/19/10 @ 12:37 affecting sample SA-PZ-157I-20101011. The non-detected results reported for these compounds were qualified as estimated, (UJ). No action was taken for the diluted analysis of sample SA-PZ-157I1-20101011DL since the results for these compounds were not used in the data validation.

The continuing calibration performed on instrument 5972hp59 on 10/21/10 @11:51 had a %D for 1,2-dibromo-3-chloropropane that exceeded the 20% quality control limit. The non-detected results reported for this compound in the associated samples, SA-PZ-139-20101012, SA-DUP02-20101012, and SA-PZ-160I-20101012, were qualified as estimated, (UJ). No action was taken in the diluted analyses of samples SA-PZ-138I1-20101012DL, SA-PZ-159I1-20101012DL, and SA-PZ-160I1-20101012DL since the results for the noncompliant compound were not used in the data validation.

The following analytes were detected in the associated method blanks and the trip blank at the maximum concentrations as indicated below:

Compound	Maximum Conc. (µg/L)	Action Level (µg/L)
Toluene [(1)]	0.58	2.9
1,2,4-Trichlorobenzene [(1)]	1.5	7.5
Naphthalene [(1)]	4.7	23.5
Toluene [(2)]	0.49	2.45
1,2,4-Trichlorobenzene [(2)]	1.4	7.0
Naphthalene [(2)]	4.3	21.5

Naphthalene [3]	2.7	13.5
Methylene Chloride [4]	1.4	14.0
Toluene [4]	0.49	2.45
1,2,4-Trichlorobenzene [4]	1.9	9.5
Naphthalene [4]	4.4	22.0

1 Maximum concentration detected in laboratory method blank VBLKIU affecting samples SA-PZ-138I1-20101012, SA-PZ-157I1-20101011, SA-PZ-159I1-20101012, and SA-PZ-160I1-20101012.

2 Maximum concentration detected in laboratory method blank VBLKJC affecting samples SA-PZ-157I-20101011, and SA-PZ-157I1-20101011DL.

3 Maximum concentration detected in laboratory method blank VBLKJD affecting samples SA-DUP01-20101012, SA-PZ-133I-20101012, SA-PZ-138I-20101012, SA-PZ-149I1-20101012, SA-PZ-151I1-20101012, SA-PZ-155I-20101012, SA-PZ-158I-20101011, SA-PZ-158I1-20101011, SA-PZ-159I-20101012, SA-PZ-161I-20101012, and SA-TB-01-20101011.

4 Maximum concentration detected in laboratory method blank VBLKJH affecting samples SA-PZ-139-20101012, SA-DUP02-20101012, SA-PZ-160I-20101012, SA-PZ-138I1-20101012DL, SA-PZ-159I1-20101012DL, and SA-PZ-160I1-20101012DL

An action level of 10X the maximum contaminant concentration for the common laboratory contaminant compounds methylene chloride and 5X for other contaminant compounds was established to evaluate laboratory contamination for the above compounds. Dilution factors and sample aliquots were taken into consideration during the application of all action levels. Positive results less than the action level were qualified as non-detected, (U), as a result of laboratory blank contamination and the results were reported to the Level of Quantitation (LOQ).

The surrogate spike Percent Recoveries (%Rs) for Bromofluorobenzene (BFB) were above the quality control limit in samples SA-PZ-138I1-20101012, SA-PZ-157I1-20101011, SA-PZ-159I1-20101012, and SA-PZ-160I1-20101012. In addition, the %R for the surrogate 1,2-Dichloroethane-d4 was above the quality control limit in sample SA-PZ-138I1-20101012. The positive results that were used in the data validation were qualified as estimated, (J), for surrogate noncompliance. No action was taken on the non-detected results in these samples.

The %R for chloroethane in Matrix Spike (MS) was above the upper quality control limit. The Relative Percent Difference (RPD) for this compound also exceeded the 30% quality control limit. In addition, the %R for 1,2-dichloroethane was slightly below the lower quality control limit in the Matrix Spike Duplicate (MSD) sample. The positive result reported for chloroethane was qualified as estimated, (J), in the MS/MSD sample, SA-PZ-160I-20101012. No action was taken for the non-detected result for 1,2-dichloroethane in the environmental sample since the %R was acceptable in the MS sample and the RPD was below 30%.

Positive results reported below the LOQ but above the method detection limit were qualified as estimated, (J). Non-detected results are reported to the LOD.

Organic Volatile Gases (OVG)

The %R for methane was below the lower quality control limit in the MS sample. Additionally, the RPD exceeded the 20% quality control criteria for methane. The positive result reported for methane was qualified as estimated, (J).

The RPD for methane was greater than the 30% quality control criteria in the field duplicate pair SA-

DUP01-20101012/SA-PZ-151I1-20101012. The positive results reported for this compound in the field duplicate pair were qualified as estimated, (J).

Additional Comments

Some volatile target compounds exceeded the instrument's linear calibration range in samplesSA-PZ-138I1-20101012, SA-PZ-157I1-20101011, SA-PZ-159I1-20101012, and SA-PZ-160I1-20101012. The samples were diluted and reanalyzed. The results from the reanalyses were used in the data validation for compounds that were out of calibration range in the initial analyses.

Methane exceeded the instrument's linear calibration range in samples SA-DUP01-20101012, SA-PZ-151I1-20101012, SA-PZ-157I1-20101011, SA-PZ-159I-20101012, SA-PZ-159I1-20101012. The laboratory reanalyzed these samples at a dilution. The diluted results for methane in these samples were used in the validation of the data.

The laboratory used a 25% quality control criteria for the initial calibration %RSD and a 25% quality control limit for the continuing calibration %D for the OVG fraction analyses. All laboratory established calibration criteria were met for the OVG fraction.

EXECUTIVE SUMMARY

Laboratory Performance Issues: Acetone results were estimated or rejected due to initial and continuing calibration RRFs below 0.05. Some compounds were estimated due to initial and/or continuing calibration %RSDs and/or %Ds greater than their respective quality control limits. Method blank contamination resulted in qualification of sample analyte data.

Other Factors Affecting Data Quality: The MS/MSD sample was qualified for some VOC and OVG %Rs and/or RPDs outside the quality control limits. Noncompliant surrogate %Rs resulted in the qualification of several sample results. Positive results reported below the LOQ but above the method detection limit were qualified as estimated, (J). Non-detected results are reported to the LOD. Field duplicate imprecision was noted for methane in one field duplicate pair SA-DUP01-20101012/SA-PZ-151I1-20101012. Several samples needed to be diluted in both VOC and OVG fractions because initial results exceeded the instruments' linear calibration ranges.

The data for these analyses were reviewed with reference to the SOP #HW-24 Revision #2, October 2006, USEPA Region II Hazardous Waste Support Branch Validating Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry SW-846 Method 8260B (October 2006) and the Department of Defense (DoD) document entitled "Quality Systems Manual (QSM) for Environmental Laboratories" (January 2006).

TetraTech NUS
Michelle L. Allen
Chemist/Data Validator

TetraTech NUS
Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:
1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C – Region II Data Validation Forms
4. Appendix D - Support Documentation

Appendix A

Qualified Analytical Results

Data Validation Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's r < 0.995 / ICP PDS Recovery Noncompliance
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (e.g. base-line drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient r < 0.995
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is greater than sample activity

PROJ_NO: 02045	NSAMPLE	SA-DUP01-20101012			SA-DUP02-20101012			SA-PZ-133I-20101012			SA-PZ-138I1-20101012		
SDG: 1010082	LAB_ID	1010082-08			1010082-19			1010082-14			1010082-13		
FRACTION: OV	SAMP_DATE	10/12/2010			10/12/2010			10/12/2010			10/12/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF	SA-PZ-151I1-20101012			SA-PZ-138I-20101012								
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
1,1,1-TRICHLOROETHANE		35			8.2			14			170	J	R
1,1,2,2-TETRACHLOROETHANE		2	U		2	U		2	U		2	UJ	C
1,1,2-TRICHLOROETHANE		2	U		2	U		2	U		2	U	
1,1,2-TRICHLOROTRIFLUOROETHANE		2	U		2	U		2	U		2	U	
1,1-DICHLOROETHANE		170			32			98					
1,1-DICHLOROETHENE		13			2	J	P	4.9	J	P	60	J	R
1,1-DICHLOROPROPENE		0.5	U		0.5	U		0.5	U		0.5	U	
1,2,4-TRICHLOROBENZENE		1.8	J	P	0.5	U		0.5	U		14	J	R
1,2-DIBROMO-3-CHLOROPROPANE		2	U		2	UJ	C	2	U		2	U	
1,2-DIBROMOETHANE		0.5	U		0.5	U		0.5	U		0.5	U	
1,2-DICHLOROBENZENE		3.6	J	P	0.5	U		0.5	U		6.3	J	R
1,2-DICHLOROETHANE		0.5	U		0.5	U		0.5	U		0.91	J	PR
1,2-DICHLOROPROPANE		2	U		2	U		2	U		2	U	
1,3-DICHLOROBENZENE		2.3	J	P	0.5	U		0.5	U		4	J	PR
1,4-DICHLOROBENZENE		11			0.5	U		0.5	U		16	J	R
2-BUTANONE		5	U		5	U		5	U		5	U	
2-HEXANONE		1.3	U		1.3	U		1.3	U		1.3	U	
4-METHYL-2-PENTANONE		1.3	U		1.3	U		1.3	U		1.3	U	
ACETONE		5	UR	C	5	UR	C	5	UR	C	5	UR	C
BENZENE		1.2	J	P	0.5	U		0.5	U		4.4	J	PR
BROMODICHLOROMETHANE		0.5	U		0.5	U		0.5	U		0.5	U	
BROMOFORM		2	U		2	U		2	U		2	U	
BROMOMETHANE		2	UJ	C	2	UJ	C	2	UJ	C	2	UJ	C
CARBON DISULFIDE		0.5	U		0.5	U		0.5	U		0.5	U	
CARBON TETRACHLORIDE		0.5	U		0.5	U		0.5	U		0.5	U	
CHLOROBENZENE		0.5	U		0.5	U		0.5	U		1.1	J	PR
CHLORODIBROMOMETHANE		0.5	U		0.5	U		0.5	U		0.5	U	
CHLOROETHANE		91			2	U		17					
CHLOROFORM		0.5	U		0.5	U		0.5	U		0.5	U	
CHLOROMETHANE		0.5	U		0.5	U		0.5	U		0.5	UJ	C
CIS-1,2-DICHLOROETHENE		2	U		2	U		2	U		1	J	PR
CIS-1,3-DICHLOROPROPENE		2	U		2	U		2	U		2	U	
CYCLOHEXANE		0.5	U		0.5	U		0.5	U		0.5	U	
DICHLORODIFLUOROMETHANE		0.5	U		0.5	U		0.5	U		0.5	U	
ETHYLBENZENE		0.5	U		0.5	U		0.5	U		0.5	U	
ISOPROPYLBENZENE		0.47	J	P	0.5	U		0.5	U		11	J	R

PROJ_NO: 02045 SDG: 1010082 FRACTION: OV MEDIA: WATER	NSAMPLE	SA-PZ-138I1-20101012DL			SA-PZ-138I-20101012			SA-PZ-139-20101012			SA-PZ-149I1-20101012		
	LAB_ID	1010082-13RE1			1010082-15			1010082-18			1010082-17		
	SAMP_DATE	10/12/2010			10/12/2010			10/12/2010			10/12/2010		
	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
1,1,1-TRICHLOROETHANE					8.1			0.92	J	P	0.5	U	
1,1,2,2-TETRACHLOROETHANE					2	U		2	U		2	U	
1,1,2-TRICHLOROETHANE					2	U		2	U		2	U	
1,1,2-TRICHLOROTRIFLUOROETHANE					2	U		2	U		2	U	
1,1-DICHLOROETHANE		970			33			7.6			3.6	J	P
1,1-DICHLOROETHENE					1.7	J	P	2	U		2	U	
1,1-DICHLOROPROPENE					0.5	U		0.5	U		0.5	U	
1,2,4-TRICHLOROBENZENE					0.5	U		5	U	A	0.5	U	
1,2-DIBROMO-3-CHLOROPROPANE					2	U		2	UJ	C	2	U	
1,2-DIBROMOETHANE					0.5	U		0.5	U		0.5	U	
1,2-DICHLOROBENZENE					0.5	U		0.5	U		1.2	J	P
1,2-DICHLOROETHANE					0.5	U		0.5	U		0.5	U	
1,2-DICHLOROPROPANE					2	U		2	U		2	U	
1,3-DICHLOROBENZENE					0.5	U		0.5	U		1	J	P
1,4-DICHLOROBENZENE					0.5	U		0.5	U		4.7	J	P
2-BUTANONE					5	U		5	U		5	U	
2-HEXANONE					1.3	U		1.3	U		1.3	U	
4-METHYL-2-PENTANONE					1.3	U		1.3	U		1.3	U	
ACETONE					5	UR	C	5	UR	C	5	UR	C
BENZENE					0.5	U		0.5	U		0.5	U	
BROMODICHLOROMETHANE					0.5	U		0.5	U		0.5	U	
BROMOFORM					2	U		2	U		2	U	
BROMOMETHANE					2	UJ	C	2	UJ	C	2	UJ	C
CARBON DISULFIDE					0.5	U		0.5	U		0.5	U	
CARBON TETRACHLORIDE					0.5	U		0.5	U		0.5	U	
CHLOROBENZENE					0.5	U		0.5	U		0.5	U	
CHLORODIBROMOMETHANE					0.5	U		0.5	U		0.5	U	
CHLOROETHANE		230			2	U		2	U		2	U	
CHLOROFORM					0.5	U		0.5	U		0.5	U	
CHLOROMETHANE					0.5	U		0.5	U		0.5	U	
CIS-1,2-DICHLOROETHENE					2	U		2	U		2	U	
CIS-1,3-DICHLOROPROPENE					2	U		2	U		2	U	
CYCLOHEXANE					0.5	U		0.5	U		0.5	U	
DICHLORODIFLUOROMETHANE					0.5	U		0.5	U		0.5	U	
ETHYLBENZENE					0.5	U		0.5	U		0.5	U	
ISOPROPYLBENZENE					0.5	U		0.5	U		0.5	U	

PROJ_NO: 02045 SDG: 1010082 FRACTION: OV MEDIA: WATER	NSAMPLE	SA-PZ-151I1-20101012			SA-PZ-155I-20101012			SA-PZ-157I1-20101011			SA-PZ-157I1-20101011DL		
	LAB_ID	1010082-05			1010082-04			1010082-03			1010082-03RE1		
	SAMP_DATE	10/12/2010			10/12/2010			10/11/2010			10/11/2010		
	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
1,1,1-TRICHLOROETHANE		36			15			48	J	R			
1,1,2,2-TETRACHLOROETHANE		2	U		2	U		2	UJ	C			
1,1,2-TRICHLOROETHANE		2	U		2	U		2	U				
1,1,2-TRICHLOROTRIFLUOROETHANE		2	U		2	U		2	U				
1,1-DICHLOROETHANE		180			65						220		
1,1-DICHLOROETHENE		14			3.7	J	P	17	J	R			
1,1-DICHLOROPROPENE		0.5	U		0.5	U		0.5	U				
1,2,4-TRICHLOROBENZENE		1.8	J	P	0.5	U		5	U	A			
1,2-DIBROMO-3-CHLOROPROPANE		2	U		2	U		2	U				
1,2-DIBROMOETHANE		0.5	U		0.5	U		0.5	U				
1,2-DICHLOROBENZENE		3.6	J	P	0.5	U		2.3	J	PR			
1,2-DICHLOROETHANE		0.5	U		0.5	U		0.5	U				
1,2-DICHLOROPROPANE		2	U		2	U		2	U				
1,3-DICHLOROBENZENE		2.5	J	P	0.5	U		1.3	J	PR			
1,4-DICHLOROBENZENE		11			0.5	U		6.1	J	R			
2-BUTANONE		5	U		5	U		5	U				
2-HEXANONE		1.3	U		1.3	U		1.3	U				
4-METHYL-2-PENTANONE		1.3	U		1.3	U		1.3	U				
ACETONE		5	UR	C	5	UR	C	5	UR	C			
BENZENE		1.3	J	P	0.5	U		0.84	J	PR			
BROMODICHLOROMETHANE		0.5	U		0.5	U		0.5	U				
BROMOFORM		2	U		2	U		2	U				
BROMOMETHANE		2	UJ	C	2	UJ	C	2	UJ	C			
CARBON DISULFIDE		0.5	U		0.5	U		0.5	U				
CARBON TETRACHLORIDE		0.5	U		0.5	U		0.5	U				
CHLOROBENZENE		0.5	U		0.5	U		0.5	U				
CHLORODIBROMOMETHANE		0.5	U		0.5	U		0.5	U				
CHLOROETHANE		91			2	U		57	J	R			
CHLOROFORM		0.5	U		0.5	U		0.5	U				
CHLOROMETHANE		0.5	U		0.5	U		0.5	UJ	C			
CIS-1,2-DICHLOROETHENE		2	U		2	U		2	U				
CIS-1,3-DICHLOROPROPENE		2	U		2	U		2	U				
CYCLOHEXANE		0.5	U		0.5	U		0.5	U				
DICHLORODIFLUOROMETHANE		0.5	U		0.5	U		0.5	U				
ETHYLBENZENE		0.5	U		0.5	U		0.5	U				
ISOPROPYLBENZENE		0.49	J	P	0.5	U		0.5	U				

PROJ_NO: 02045 SDG: 1010082 FRACTION: OV MEDIA: WATER	NSAMPLE	SA-PZ-157I-20101011			SA-PZ-158I1-20101011			SA-PZ-158I-20101011			SA-PZ-159I1-20101012		
	LAB_ID	1010082-02			1010082-11			1010082-10			1010082-06		
	SAMP_DATE	10/11/2010			10/11/2010			10/11/2010			10/12/2010		
	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
1,1,1-TRICHLOROETHANE		15			39			7.9			44	J	R
1,1,2,2-TETRACHLOROETHANE		2	UJ	C	2	U		2	U		2	UJ	C
1,1,2-TRICHLOROETHANE		2	U		2	U		2	U		2	U	
1,1,2-TRICHLOROTRIFLUOROETHANE		2	U		2	U		2	U		2	U	
1,1-DICHLOROETHANE		65			160			43					
1,1-DICHLOROETHENE		4.2	J	P	12			2.6	J	P	14	J	R
1,1-DICHLOROPROPENE		0.5	U		0.5	U		0.5	U		0.5	U	
1,2,4-TRICHLOROBENZENE		5	U	A	1.4	J	P	0.5	U		5	U	A
1,2-DIBROMO-3-CHLOROPROPANE		2	U	C	2	U		2	U		2	U	
1,2-DIBROMOETHANE		0.5	U		0.5	U		0.5	U		0.5	U	
1,2-DICHLOROBENZENE		0.5	U		1.2	J	P	0.5	U		0.5	U	
1,2-DICHLOROETHANE		0.5	U		0.5	U		0.5	U		0.5	U	
1,2-DICHLOROPROPANE		2	U		2	U		2	U		2	U	
1,3-DICHLOROBENZENE		0.5	U		0.69	J	P	0.5	U		0.5	U	
1,4-DICHLOROBENZENE		0.5	U		2.8	J	P	0.5	U		0.5	U	
2-BUTANONE		5	U		5	U		5	U		5	U	
2-HEXANONE		1.3	U		1.3	U		1.3	U		1.3	U	
4-METHYL-2-PENTANONE		1.3	U		1.3	U		1.3	U		1.3	U	
ACETONE		5	UR	C	5	UR	C	5	UR	C	11	J	CPR
BENZENE		0.5	U		0.51	J	P	0.5	U		0.52	J	PR
BROMODICHLOROMETHANE		0.5	U		0.5	U		0.5	U		0.5	U	
BROMOFORM		2	U		2	U		2	U		2	U	
BROMOMETHANE		2	UJ	C	2	UJ	C	2	UJ	C	2	UJ	C
CARBON DISULFIDE		0.5	U		0.5	U		0.5	U		0.5	U	
CARBON TETRACHLORIDE		0.5	U		0.5	U		0.5	U		0.5	U	
CHLOROBENZENE		0.5	U		0.5	U		0.5	U		0.5	U	
CHLORODIBROMOMETHANE		0.5	U		0.5	U		0.5	U		0.5	U	
CHLOROETHANE		5.7			27			2	U		39	J	R
CHLOROFORM		0.5	U		0.5	U		0.5	U		0.5	U	
CHLOROMETHANE		0.5	UJ	C	0.5	U		0.5	U		0.5	UJ	C
CIS-1,2-DICHLOROETHENE		2	U		2	U		2	U		2	U	
CIS-1,3-DICHLOROPROPENE		2	U		2	U		2	U		2	U	
CYCLOHEXANE		0.5	U		0.5	U		0.5	U		0.5	U	
DICHLORODIFLUOROMETHANE		0.5	U		0.5	U		0.5	U		0.5	U	
ETHYLBENZENE		0.5	U		0.5	U		0.5	U		0.5	U	
ISOPROPYLBENZENE		0.5	U		0.5	U		0.5	U		0.5	U	

PROJ_NO: 02045 SDG: 1010082 FRACTION: OV MEDIA: WATER	NSAMPLE	SA-PZ-159I1-20101012DL			SA-PZ-159I-20101012			SA-PZ-160I1-20101012			SA-PZ-160I1-20101012DL		
	LAB_ID	1010082-06RE1			1010082-07			1010082-12			1010082-12RE1		
	SAMP_DATE	10/12/2010			10/12/2010			10/12/2010			10/12/2010		
	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
1,1,1-TRICHLOROETHANE					5.6			40	J	R			
1,1,2,2-TETRACHLOROETHANE					2	U		2	UJ	C			
1,1,2-TRICHLOROETHANE					2	U		2	U				
1,1,2-TRICHLOROTRIFLUOROETHANE					2	U		2	U				
1,1-DICHLOROETHANE		200			35						200		
1,1-DICHLOROETHENE					2.2	J	P	15	J	R			
1,1-DICHLOROPROPENE					0.5	U		0.5	U				
1,2,4-TRICHLOROBENZENE					0.5	U		0.5	U				
1,2-DIBROMO-3-CHLOROPROPANE					2	U		2	U				
1,2-DIBROMOETHANE					0.5	U		0.5	U				
1,2-DICHLOROBENZENE					0.5	U		0.5	U				
1,2-DICHLOROETHANE					0.5	U		0.5	U				
1,2-DICHLOROPROPANE					2	U		2	U				
1,3-DICHLOROBENZENE					0.5	U		0.5	U				
1,4-DICHLOROBENZENE					0.5	U		0.5	U				
2-BUTANONE					5	U		5	U				
2-HEXANONE					1.3	U		1.3	U				
4-METHYL-2-PENTANONE					1.3	U		1.3	U				
ACETONE					5	UR	C	5	UR	C			
BENZENE					0.5	U		0.51	J	PR			
BROMODICHLOROMETHANE					0.5	U		0.5	U				
BROMOFORM					2	U		2	U				
BROMOMETHANE					2	UJ	C	2	UJ	C			
CARBON DISULFIDE					0.5	U		0.5	U				
CARBON TETRACHLORIDE					0.5	U		0.5	U				
CHLOROBENZENE					0.5	U		0.5	U				
CHLORODIBROMOMETHANE					0.5	U		0.5	U				
CHLOROETHANE					3.3	J	P	42	J	R			
CHLOROFORM					0.5	U		0.5	U				
CHLOROMETHANE					0.5	U		0.5	UJ	C			
CIS-1,2-DICHLOROETHENE					2	U		2	U				
CIS-1,3-DICHLOROPROPENE					2	U		2	U				
CYCLOHEXANE					0.5	U		0.5	U				
DICHLORODIFLUOROMETHANE					0.5	U		0.5	U				
ETHYLBENZENE					0.5	U		0.5	U				
ISOPROPYLBENZENE					0.5	U		0.5	U				

PROJ_NO: 02045 SDG: 1010082 FRACTION: OV MEDIA: WATER	NSAMPLE	SA-PZ-160I-20101012			SA-PZ-161I-20101012			SA-TB-01-20101011		
	LAB_ID	1010082-01			1010082-16			1010082-09		
	SAMP_DATE	10/12/2010			10/12/2010			10/11/2010		
	QC_TYPE	NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0		
	DUP_OF									
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
1,1,1-TRICHLOROETHANE		37			18			0.5	U	
1,1,2,2-TETRACHLOROETHANE		2	U		2	U		2	U	
1,1,2-TRICHLOROETHANE		2	U		2	U		2	U	
1,1,2-TRICHLOROTRIFLUOROETHANE		2	U		2	U		2	U	
1,1-DICHLOROETHANE		150	J	P	110			0.5	U	
1,1-DICHLOROETHENE		11			6.9			2	U	
1,1-DICHLOROPROPENE		0.5	U		0.5	U		0.5	U	
1,2,4-TRICHLOROBENZENE		0.5	U		0.5	U		0.5	U	
1,2-DIBROMO-3-CHLOROPROPANE		2	UJ	C	2	U		2	U	
1,2-DIBROMOETHANE		0.5	U		0.5	U		0.5	U	
1,2-DICHLOROBENZENE		0.5	U		0.5	U		0.5	U	
1,2-DICHLOROETHANE		0.5	U		0.5	U		0.5	U	
1,2-DICHLOROPROPANE		2	U		2	U		2	U	
1,3-DICHLOROBENZENE		0.5	U		0.5	U		0.5	U	
1,4-DICHLOROBENZENE		0.5	U		0.5	U		0.5	U	
2-BUTANONE		5	U		5	U		5	U	
2-HEXANONE		1.3	U		1.3	U		1.3	U	
4-METHYL-2-PENTANONE		1.3	U		1.3	U		1.3	U	
ACETONE		5	UR	C	5	UR	C	5	UR	C
BENZENE		0.5	U		0.5	U		0.5	U	
BROMODICHLOROMETHANE		0.5	U		0.5	U		0.5	U	
BROMOFORM		2	U		2	U		2	U	
BROMOMETHANE		2	UJ	C	2	UJ	C	2	UJ	C
CARBON DISULFIDE		0.5	U		0.5	U		0.5	U	
CARBON TETRACHLORIDE		0.5	U		0.5	U		0.5	U	
CHLOROBENZENE		0.5	U		0.5	U		0.5	U	
CHLORODIBROMOMETHANE		0.5	U		0.5	U		0.5	U	
CHLOROETHANE		13	J	DP	9.5			2	U	
CHLOROFORM		0.5	U		0.5	U		0.5	U	
CHLOROMETHANE		0.5	U		0.5	U		0.5	U	
CIS-1,2-DICHLOROETHENE		2	U		2	U		2	U	
CIS-1,3-DICHLOROPROPENE		2	U		2	U		2	U	
CYCLOHEXANE		0.5	U		0.5	U		0.5	U	
DICHLORODIFLUOROMETHANE		0.5	U		0.5	U		0.5	U	
ETHYLBENZENE		0.5	U		0.5	U		0.5	U	
ISOPROPYLBENZENE		0.5	U		0.5	U		0.5	U	

PROJ_NO: 02045	NSAMPLE	SA-DUP01-20101012			SA-DUP02-20101012			SA-PZ-133I-20101012			SA-PZ-138I1-20101012		
SDG: 1010082	LAB_ID	1010082-08			1010082-19			1010082-14			1010082-13		
FRACTION: OV	SAMP_DATE	10/12/2010			10/12/2010			10/12/2010			10/12/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF	SA-PZ-151I1-20101012			SA-PZ-138I-20101012								
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
M+P-XYLENES		1	U		1	U		1	U		1	U	
METHYL ACETATE		2	U		2	U		2	U		2	U	
METHYL CYCLOHEXANE		0.5	U		0.5	U		0.5	U		0.5	U	
METHYL TERT-BUTYL ETHER		0.5	U		0.5	U		0.5	U		0.5	U	
METHYLENE CHLORIDE		0.5	U		0.5	U		0.5	U		0.5	U	
NAPHTHALENE		2	U		2	U		2	U		2	U	
O-XYLENE		0.5	U		0.5	U		0.5	U		0.5	U	
STYRENE		0.5	U		0.5	U		0.5	U		0.5	U	
TETRACHLOROETHENE		0.5	U		0.5	U		0.5	U		0.5	U	
TOLUENE		0.38	J	P	0.5	U		0.5	U		0.5	U	
TOTAL 1,2-DICHLOROETHENE		0.5	U		0.5	U		0.5	U		1	J	PR
TOTAL XYLENES		0.5	U		0.5	U		0.5	U		0.5	U	
TRANS-1,2-DICHLOROETHENE		0.5	U		0.5	U		0.5	U		0.5	U	
TRANS-1,3-DICHLOROPROPENE		0.5	U		0.5	U		0.5	U		0.5	U	
TRICHLOROETHENE		0.5	U		0.5	U		0.5	U		0.88	J	PR
TRICHLOROFLUOROMETHANE		0.5	U		0.5	U		0.5	U		0.5	U	
VINYL CHLORIDE		0.5	U		0.5	U		0.5	U		0.5	UJ	C

PROJ_NO: 02045 SDG: 1010082 FRACTION: OV MEDIA: WATER	NSAMPLE	SA-PZ-138I1-20101012DL			SA-PZ-138I-20101012			SA-PZ-139-20101012			SA-PZ-149I1-20101012		
	LAB_ID	1010082-13RE1			1010082-15			1010082-18			1010082-17		
	SAMP_DATE	10/12/2010			10/12/2010			10/12/2010			10/12/2010		
	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
M+P-XYLENES					1	U		1	U		1	U	
METHYL ACETATE					2	U		2	U		2	U	
METHYL CYCLOHEXANE					0.5	U		0.5	U		0.5	U	
METHYL TERT-BUTYL ETHER					0.5	U		0.5	U		0.5	U	
METHYLENE CHLORIDE					0.5	U		0.5	U		0.5	U	
NAPHTHALENE					2	U		5	U	A	2	U	
O-XYLENE					0.5	U		0.5	U		0.5	U	
STYRENE					0.5	U		0.5	U		0.5	U	
TETRACHLOROETHENE					0.5	U		0.5	U		0.5	U	
TOLUENE					0.5	U		0.5	U		0.5	U	
TOTAL 1,2-DICHLOROETHENE					0.5	U		0.5	U		0.5	U	
TOTAL XYLENES					0.5	U		0.5	U		0.5	U	
TRANS-1,2-DICHLOROETHENE					0.5	U		0.5	U		0.5	U	
TRANS-1,3-DICHLOROPROPENE					0.5	U		0.5	U		0.5	U	
TRICHLOROETHENE					0.5	U		0.5	U		0.5	U	
TRICHLOROFLUOROMETHANE					0.5	U		0.5	U		0.5	U	
VINYL CHLORIDE					0.5	U		0.5	U		0.5	U	

PROJ_NO: 02045 SDG: 1010082 FRACTION: OV MEDIA: WATER	NSAMPLE	SA-PZ-151I1-20101012			SA-PZ-155I-20101012			SA-PZ-157I1-20101011			SA-PZ-157I1-20101011DL		
	LAB_ID	1010082-05			1010082-04			1010082-03			1010082-03RE1		
	SAMP_DATE	10/12/2010			10/12/2010			10/11/2010			10/11/2010		
	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
M+P-XYLENES		1	U		1	U		1	U				
METHYL ACETATE		2	U		2	U		2	U				
METHYL CYCLOHEXANE		0.5	U		0.5	U		0.5	U				
METHYL TERT-BUTYL ETHER		0.5	U		0.5	U		0.5	U				
METHYLENE CHLORIDE		0.5	U		0.5	U		0.5	U				
NAPHTHALENE		2	U		2	U		2	U				
O-XYLENE		0.5	U		0.5	U		0.5	U				
STYRENE		0.5	U		0.5	U		0.5	U				
TETRACHLOROETHENE		0.5	U		0.5	U		0.5	U				
TOLUENE		0.33	J	P	0.5	U		0.5	U				
TOTAL 1,2-DICHLOROETHENE		0.5	U		0.5	U		0.5	U				
TOTAL XYLENES		0.5	U		0.5	U		0.5	U				
TRANS-1,2-DICHLOROETHENE		0.5	U		0.5	U		0.5	U				
TRANS-1,3-DICHLOROPROPENE		0.5	U		0.5	U		0.5	U				
TRICHLOROETHENE		0.5	U		0.5	U		0.5	U				
TRICHLOROFLUOROMETHANE		0.5	U		0.5	U		0.5	U				
VINYL CHLORIDE		0.5	U		0.5	U		0.5	UJ	C			

PROJ_NO: 02045 SDG: 1010082 FRACTION: OV MEDIA: WATER	NSAMPLE	SA-PZ-157I-20101011			SA-PZ-158I1-20101011			SA-PZ-158I-20101011			SA-PZ-159I1-20101012		
	LAB_ID	1010082-02			1010082-11			1010082-10			1010082-06		
	SAMP_DATE	10/11/2010			10/11/2010			10/11/2010			10/12/2010		
	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
M+P-XYLENES		1	U		1	U		1	U		1	U	
METHYL ACETATE		2	U		2	U		2	U		2	U	
METHYL CYCLOHEXANE		0.5	U		0.5	U		0.5	U		0.5	U	
METHYL TERT-BUTYL ETHER		0.5	U		0.5	U		0.5	U		0.5	U	
METHYLENE CHLORIDE		0.5	U		0.5	U		0.5	U		0.5	U	
NAPHTHALENE		5	U	A	2	U		2	U		2	U	
O-XYLENE		0.5	U		0.5	U		0.5	U		0.5	U	
STYRENE		0.5	U		0.5	U		0.5	U		0.5	U	
TETRACHLOROETHENE		0.5	U		0.5	U		0.5	U		0.5	U	
TOLUENE		0.5	U		0.5	U		0.5	U		0.5	U	
TOTAL 1,2-DICHLOROETHENE		0.5	U		0.5	U		0.5	U		0.5	U	
TOTAL XYLENES		0.5	U		0.5	U		0.5	U		0.5	U	
TRANS-1,2-DICHLOROETHENE		0.5	U		0.5	U		0.5	U		0.5	U	
TRANS-1,3-DICHLOROPROPENE		0.5	U		0.5	U		0.5	U		0.5	U	
TRICHLOROETHENE		0.5	U		0.5	U		0.5	U		0.5	U	
TRICHLOROFLUOROMETHANE		0.5	U		0.5	U		0.5	U		0.5	U	
VINYL CHLORIDE		0.5	UJ	C	0.5	U		0.5	U		0.5	UJ	C

PROJ_NO: 02045 SDG: 1010082 FRACTION: OV MEDIA: WATER	NSAMPLE	SA-PZ-159I1-20101012DL			SA-PZ-159I-20101012			SA-PZ-160I1-20101012			SA-PZ-160I1-20101012DL		
	LAB_ID	1010082-06RE1			1010082-07			1010082-12			1010082-12RE1		
	SAMP_DATE	10/12/2010			10/12/2010			10/12/2010			10/12/2010		
	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
M+P-XYLENES					1	U		1	U				
METHYL ACETATE					2	U		2	U				
METHYL CYCLOHEXANE					0.5	U		0.5	U				
METHYL TERT-BUTYL ETHER					0.5	U		0.5	U				
METHYLENE CHLORIDE					0.5	U		0.5	U				
NAPHTHALENE					2	U		2	U				
O-XYLENE					0.5	U		0.5	U				
STYRENE					0.5	U		0.5	U				
TETRACHLOROETHENE					0.5	U		0.5	U				
TOLUENE					0.5	U		0.5	U				
TOTAL 1,2-DICHLOROETHENE					0.5	U		0.5	U				
TOTAL XYLENES					0.5	U		0.5	U				
TRANS-1,2-DICHLOROETHENE					0.5	U		0.5	U				
TRANS-1,3-DICHLOROPROPENE					0.5	U		0.5	U				
TRICHLOROETHENE					0.5	U		0.5	U				
TRICHLOROFLUOROMETHANE					0.5	U		0.5	U				
VINYL CHLORIDE					0.5	U		0.5	UJ	C			

PROJ_NO: 02045 SDG: 1010082 FRACTION: OV MEDIA: WATER	NSAMPLE	SA-PZ-160I-20101012			SA-PZ-161I-20101012			SA-TB-01-20101011		
	LAB_ID	1010082-01			1010082-16			1010082-09		
	SAMP_DATE	10/12/2010			10/12/2010			10/11/2010		
	QC_TYPE	NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0		
	DUP_OF									
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
M+P-XYLENES		1	U		1	U		1	U	
METHYL ACETATE		2	U		2	U		2	U	
METHYL CYCLOHEXANE		0.5	U		0.5	U		0.5	U	
METHYL TERT-BUTYL ETHER		0.5	U		0.5	U		0.5	U	
METHYLENE CHLORIDE		0.5	U		0.5	U		0.5	U	
NAPHTHALENE		2	U		2	U		2	U	
O-XYLENE		0.5	U		0.5	U		0.5	U	
STYRENE		0.5	U		0.5	U		0.5	U	
TETRACHLOROETHENE		0.5	U		0.5	U		0.5	U	
TOLUENE		5	U	A	0.4	J	P	0.5	U	
TOTAL 1,2-DICHLOROETHENE		0.5	U		0.5	U		0.5	U	
TOTAL XYLENES		0.5	U		0.5	U		0.5	U	
TRANS-1,2-DICHLOROETHENE		0.5	U		0.5	U		0.5	U	
TRANS-1,3-DICHLOROPROPENE		0.5	U		0.5	U		0.5	U	
TRICHLOROETHENE		0.5	U		0.5	U		0.5	U	
TRICHLOROFLUOROMETHANE		0.5	U		0.5	U		0.5	U	
VINYL CHLORIDE		0.5	U		0.5	U		0.5	U	

PROJ_NO: 02045 SDG: 1010082 FRACTION: OVG MEDIA: WATER	NSAMPLE	SA-DUP01-20101012			SA-DUP01-20101012DL			SA-PZ-151I1-20101012			SA-PZ-151I1-20101012DL		
	LAB_ID	1010082-08			1010082-08RE1			1010082-05			1010082-05RE1		
	SAMP_DATE	10/12/2010			10/12/2010			10/12/2010			10/12/2010		
	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF	SA-PZ-151I1-20101012			SA-PZ-151I1-20101012								
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ETHANE		0.27	U					0.27	U				
ETHENE		0.25	U					0.25	U				
METHANE					300	J	G				140	J	G

PROJ_NO: 02045 SDG: 1010082 FRACTION: OVG MEDIA: WATER	NSAMPLE	SA-PZ-155I-20101012			SA-PZ-157I1-20101011			SA-PZ-157I1-20101011DL			SA-PZ-157I-20101011		
	LAB_ID	1010082-04			1010082-03			1010082-03RE1			1010082-02		
	SAMP_DATE	10/12/2010			10/11/2010			10/11/2010			10/11/2010		
	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ETHANE		0.27	U		0.27	U					0.27	U	
ETHENE		0.25	U		0.25	U					0.25	U	
METHANE		3.7						66			2.7		

PROJ_NO: 02045	NSAMPLE	SA-PZ-159I1-20101012			SA-PZ-159I1-20101012DL			SA-PZ-159I-20101012			SA-PZ-159I-20101012DL		
SDG: 1010082	LAB_ID	1010082-06			1010082-06RE1			1010082-07			1010082-07RE1		
FRACTION: OVG	SAMP_DATE	10/12/2010			10/12/2010			10/12/2010			10/12/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ETHANE		0.27	U					0.27	U				
ETHENE		0.25	U					0.25	U				
METHANE					51						29		

PROJ_NO: 02045	NSAMPLE	SA-PZ-160I-20101012		
SDG: 1010082	LAB_ID	1010082-01		
FRACTION: OVG	SAMP_DATE	10/12/2010		
MEDIA: WATER	QC_TYPE	NM		
	UNITS	UG/L		
	PCT_SOLIDS	0.0		
	DUP_OF			
PARAMETER		RESULT	VQL	QLCD
ETHANE		0.27	U	
ETHENE		0.25	U	
METHANE		6.4	J	D

Appendix B

Results as Reported by the Laboratory

ANALYSIS DATA SHEET

SW 8260B

SA-DUP01

Client: TETRA TECH SDG 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water Preparation: SW 5030A/5030B File ID: 1010082-08R59.d Sampled: 10/12/10 08:00

Initial/Final: 5mL / 5mL Lab ID: 1010082-08 Received: 10/14/10 10:30

Dilution: 1 pH: 1 Prepared: 10/20/10 15:07

% Moisture: NA Analyzed: 10/20/10 21:18

Batch: 0102012 Sequence: 0J20005 Calibration: 0102201 Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane	91	0.55	2.0	5.0	
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene	13	0.53	2.0	5.0	
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride		0.49	0.50	5.0	U
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane	170	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane	35	0.32	0.50	5.0	
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene	1.2	0.28	0.50	5.0	J
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene	0.38	0.31	0.50	5.0	J
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

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SW 8260B

SA-DUP01

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-08R59.d | Sampled: 10/12/10 08:00

Initial/Final: 5mL / 5mL | Lab ID: 1010082-08 | Received: 10/14/10 10:30

Dilution: 1 | pH: 1 | Prepared: 10/20/10 15:07

% Moisture: NA | Analyzed: 10/20/10 21:18

Batch: 0102012 | Sequence: 0J20005 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene	0.47	0.27	0.50	5.0	J
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene	2.3	0.36	0.50	5.0	J
106-46-7	1,4-Dichlorobenzene	11	0.30	0.50	5.0	
95-50-1	1,2-Dichlorobenzene	3.6	0.35	0.50	5.0	J
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene	1.8	0.48	0.50	5.0	J
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	48.75	97	85 - 115	
1,2-Dichloroethane-d4	50.00	53.55	107	70 - 120	
Toluene-d8	50.00	50.92	102	85 - 120	
Bromofluorobenzene	50.00	52.85	106	75 - 120	

CAS NO.	TICS	CONC. (ug/L)	Response	R.T.	% Match	Q
000135-98-8	Benzene, (1-methylpropyl)-	5.5	179497	15.056	90	JN

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SW 8260B

SA-DUP02

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-19R59.d | Sampled: 10/12/10 12:00

Initial/Final: 5mL / 5mL | Lab ID: 1010082-19 | Received: 10/14/10 10:30

Dilution: 1 | pH: 1 | Prepared: 10/21/10 13:01

% Moisture: NA | Analyzed: 10/21/10 15:13

Batch: 0102112 | Sequence: 0J21009 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane		0.55	2.0	5.0	U
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene	2.0	0.53	2.0	5.0	J
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride		0.49	0.50	5.0	U
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane	32	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane	8.2	0.32	0.50	5.0	
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene		0.31	0.50	5.0	U
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

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SW 8260B

SA-DUP02

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-19R59.d | Sampled: 10/12/10 12:00

Initial/Final: 5mL / 5mL | Lab ID: 1010082-19 | Received: 10/14/10 10:30

Dilution: 1 | pH: 1 | Prepared: 10/21/10 13:01

% Moisture: NA | Analyzed: 10/21/10 15:13

Batch: 0102112 | Sequence: 0J21009 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene		0.36	0.50	5.0	U
106-46-7	1,4-Dichlorobenzene		0.30	0.50	5.0	U
95-50-1	1,2-Dichlorobenzene		0.35	0.50	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene		0.48	0.50	5.0	U
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	51.89	104	85 - 115	
1,2-Dichloroethane-d4	50.00	51.21	102	70 - 120	
Toluene-d8	50.00	51.95	104	85 - 120	
Bromofluorobenzene	50.00	50.77	102	75 - 120	

CAS NO.	TICS	CONC. (ug/L)	Response	R.T.	% Match	Q
NA	Tentatively Identified Compounds	0.0				U

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SW 8260B

SA-PZ-133I

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-14R59.d | Sampled: 10/12/10 12:50

Initial/Final: 5mL / 5mL | Lab ID: 1010082-14 | Received: 10/14/10 10:30

Dilution: 1 | pH: 1 | Prepared: 10/20/10 15:07

% Moisture: NA | Analyzed: 10/20/10 21:45

Batch: 0102012 | Sequence: 0J20005 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane	17	0.55	2.0	5.0	
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene	4.9	0.53	2.0	5.0	J
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride		0.49	0.50	5.0	U
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane	98	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane	14	0.32	0.50	5.0	
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene		0.31	0.50	5.0	U
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

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SW 8260B

SA-PZ-133I

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-14R59.d | Sampled: 10/12/10 12:50

Initial/Final: 5mL / 5mL | Lab ID: 1010082-14 | Received: 10/14/10 10:30

Dilution: 1 | pH: 1 | Prepared: 10/20/10 15:07

% Moisture: NA | Analyzed: 10/20/10 21:45

Batch: 0102012 | Sequence: 0J20005 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene		0.36	0.50	5.0	U
106-46-7	1,4-Dichlorobenzene		0.30	0.50	5.0	U
95-50-1	1,2-Dichlorobenzene		0.35	0.50	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene		0.48	0.50	5.0	U
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	49.06	98	85 - 115	
1,2-Dichloroethane-d4	50.00	55.26	111	70 - 120	
Toluene-d8	50.00	54.05	108	85 - 120	
Bromofluorobenzene	50.00	53.34	107	75 - 120	

CAS NO.	TICS	CONC. (ug/L)	Response	R.T.	% Match	Q
NA	Tentatively Identified Compounds	0.0				U

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SW 8260B

SA-PZ-138I

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-15R59.d | Sampled: 10/12/10 13:36

Initial/Final: 5mL / 5mL | Lab ID: 1010082-15 | Received: 10/14/10 10:30

Dilution: 1 | pH: 1 | Prepared: 10/20/10 15:07

% Moisture: NA | Analyzed: 10/20/10 22:12

Batch: 0102012 | Sequence: 0J20005 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane		0.55	2.0	5.0	U
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene	1.7	0.53	2.0	5.0	J
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride		0.49	0.50	5.0	U
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane	33	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane	8.1	0.32	0.50	5.0	
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene		0.31	0.50	5.0	U
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

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SW 8260B

SA-PZ-138I

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-15R59.d | Sampled: 10/12/10 13:36

Initial/Final: 5mL / 5mL | Lab ID: 1010082-15 | Received: 10/14/10 10:30

Dilution: 1 | pH: 1 | Prepared: 10/20/10 15:07

% Moisture: NA | Analyzed: 10/20/10 22:12

Batch: 0102012 | Sequence: 0J20005 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene		0.36	0.50	5.0	U
106-46-7	1,4-Dichlorobenzene		0.30	0.50	5.0	U
95-50-1	1,2-Dichlorobenzene		0.35	0.50	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene		0.48	0.50	5.0	U
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	48.28	97	85 - 115	
1,2-Dichloroethane-d4	50.00	54.58	109	70 - 120	
Toluene-d8	50.00	53.82	108	85 - 120	
Bromofluorobenzene	50.00	53.94	108	75 - 120	

CAS NO.	TICS	CONC. (ug/L)	Response	R.T.	% Match	Q
NA	Tentatively Identified Compounds	0.0				U

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ANALYSIS DATA SHEET

SW 8260B

SA-PZ-138I1

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-1359.d | Sampled: 10/12/10 12:46

Initial/Final: 5mL / 5mL | Lab ID: 1010082-13 | Received: 10/14/10 10:30

Dilution: 1 | pH: 1 | Prepared: 10/15/10 15:06

% Moisture: NA | Analyzed: 10/15/10 22:38

Batch: 0101505 | Sequence: 0J15007 | Calibration: UNASSIGNED | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane	340	0.55	2.0	5.0	
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene	60	0.53	2.0	5.0	
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride		0.49	0.50	5.0	U
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane	750	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene	1.0	0.65	2.0	5.0	J
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane	170	0.32	0.50	5.0	
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane	0.91	0.23	0.50	5.0	J
71-43-2	Benzene	4.4	0.28	0.50	5.0	J
79-01-6	Trichloroethene	0.88	0.28	0.50	5.0	J
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene		0.31	0.50	5.0	U
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene	1.1	0.27	0.50	5.0	J
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

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ANALYSIS DATA SHEET

SW 8260B

SA-PZ-138I1

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-1359.d | Sampled: 10/12/10 12:46

Initial/Final: 5mL / 5mL | Lab ID: 1010082-13 | Received: 10/14/10 10:30

Dilution: 1 | pH: 1 | Prepared: 10/15/10 15:06

% Moisture: NA | Analyzed: 10/15/10 22:38

Batch: 0101505 | Sequence: 0J15007 | Calibration: UNASSIGNED | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene	11	0.27	0.50	5.0	
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene	4.0	0.36	0.50	5.0	J
106-46-7	1,4-Dichlorobenzene	16	0.30	0.50	5.0	
95-50-1	1,2-Dichlorobenzene	6.3	0.35	0.50	5.0	
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene	14	0.48	0.50	5.0	B
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)	1.0	0.44	0.50	5.0	J
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	52.43	105	85 - 115	
1,2-Dichloroethane-d4	50.00	60.95	122	70 - 120	*
Toluene-d8	50.00	53.99	108	85 - 120	
Bromofluorobenzene	50.00	60.87	122	75 - 120	*

CAS NO.	TICS	CONC. (ug/L)	Response	R.T.	% Match	Q
000135-98-8	Benzene, (1-methylpropyl)-	13	422309	15.045	91	JN
767-58-8	Indan, 1-methyl- $$ 1H-Indene, 2,3-dihyd	13	438600	15.982	93	JN
NA	Unknown 16.120	6.2	205778	16.12	0	J
NA	Unknown 5.026	18	540258	5.026	0	J

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SW 8260B

SA-PZ-138I1DL

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-13D59.d | Sampled: 10/12/10 12:46

Initial/Final: 5mL / 5mL | Lab ID: 1010082-13RE1 | Received: 10/14/10 10:30

Dilution: 7.14 | pH: 1 | Prepared: 10/21/10 13:01

% Moisture: NA | Analyzed: 10/21/10 16:35

Batch: 0102112 | Sequence: 0J21009 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		2.3	3.6	36	U
74-87-3	Chloromethane		2.8	3.6	36	U
75-01-4	Vinyl chloride		3.4	3.6	36	U
74-83-9	Bromomethane		5.4	14	36	U
75-00-3	Chloroethane	230	3.9	14	36	D
75-69-4	Trichlorofluoromethane		3.5	3.6	36	U
75-35-4	1,1-Dichloroethene	64	3.8	14	36	D
67-64-1	Acetone		11	36	89	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		5.9	14	36	U
75-15-0	Carbon disulfide		1.1	3.6	36	U
79-20-9	Methyl acetate		6.1	14	36	U
75-09-2	Methylene chloride		3.5	3.6	36	U
156-60-5	trans-1,2-Dichloroethene		3.1	3.6	36	U
1634-04-4	Methyl tert-butyl ether		1.6	3.6	36	U
75-34-3	1,1-Dichloroethane	970	1.9	3.6	36	D
156-59-2	cis-1,2-Dichloroethene		4.6	14	36	U
78-93-3	2-Butanone		11	36	89	U
67-66-3	Chloroform		1.9	3.6	36	U
71-55-6	1,1,1-Trichloroethane	190	2.3	3.6	36	D
110-82-7	Cyclohexane		3.2	3.6	36	U
563-58-6	1,1-Dichloropropene		3.0	3.6	36	U
56-23-5	Carbon tetrachloride		2.2	3.6	36	U
107-06-2	1,2-Dichloroethane		1.6	3.6	36	U
71-43-2	Benzene	4.4	2.0	3.6	36	JD
79-01-6	Trichloroethene		2.0	3.6	36	U
108-87-2	Methylcyclohexane		2.5	3.6	36	U
78-87-5	1,2-Dichloropropane		6.1	14	36	U
75-27-4	Bromodichloromethane		2.6	3.6	36	U
10061-01-5	cis-1,3-Dichloropropene		3.7	14	36	U
108-10-1	4-Methyl-2-pentanone		7.9	8.9	89	U
108-88-3	Toluene		2.2	3.6	36	U
10061-02-6	trans-1,3-Dichloropropene		3.2	3.6	36	U
79-00-5	1,1,2-Trichloroethane		3.6	14	36	U
127-18-4	Tetrachloroethene		3.0	3.6	36	U
591-78-6	2-Hexanone		8.6	8.9	89	U
124-48-1	Dibromochloromethane		2.3	3.6	36	U
106-93-4	1,2-Dibromoethane		3.1	3.6	36	U
108-90-7	Chlorobenzene		1.9	3.6	36	U
100-41-4	Ethylbenzene		3.0	3.6	36	U

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SW 8260B

SA-PZ-138I1DL

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-13D59.d | Sampled: 10/12/10 12:46

Initial/Final: 5mL / 5mL | Lab ID: 1010082-13RE1 | Received: 10/14/10 10:30

Dilution: 7.14 | pH: 1 | Prepared: 10/21/10 13:01

% Moisture: NA | Analyzed: 10/21/10 16:35

Batch: 0102112 | Sequence: 0J21009 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		6.0	7.1	71	U
95-47-6	o-Xylene		1.8	3.6	36	U
100-42-5	Styrene		2.6	3.6	36	U
75-25-2	Bromoform		6.8	14	36	U
98-82-8	Isopropylbenzene	11	1.9	3.6	36	JD
79-34-5	1,1,2,2-Tetrachloroethane		4.6	14	36	U
541-73-1	1,3-Dichlorobenzene		2.6	3.6	36	U
106-46-7	1,4-Dichlorobenzene		2.1	3.6	36	U
95-50-1	1,2-Dichlorobenzene		2.5	3.6	36	U
96-12-8	1,2-Dibromo-3-chloropropane		6.5	14	36	U
120-82-1	1,2,4-Trichlorobenzene	13	3.4	3.6	36	JBD
91-20-3	Naphthalene		7.9	14	36	U
540-59-0	1,2-Dichloroethene (total)		3.1	3.6	36	U
1330-20-7	Xylenes (total)		1.8	3.6	36	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	49.82	100	85 - 115	
1,2-Dichloroethane-d4	50.00	51.08	102	70 - 120	
Toluene-d8	50.00	51.97	104	85 - 120	
Bromofluorobenzene	50.00	50.34	101	75 - 120	

CAS NO.	TICS	CONC. (ug/L)	Response	R.T.	% Match	Q
NA	Tentatively Identified Compounds	0.0				U

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ANALYSIS DATA SHEET

SW 8260B

SA-PZ-139

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-18R59.d | Sampled: 10/12/10 15:08

Initial/Final: 5mL / 5mL | Lab ID: 1010082-18 | Received: 10/14/10 10:30

Dilution: 1 | pH: 1 | Prepared: 10/21/10 13:01

% Moisture: NA | Analyzed: 10/21/10 14:46

Batch: 0102112 | Sequence: 0J21009 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane		0.55	2.0	5.0	U
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene		0.53	2.0	5.0	U
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride		0.49	0.50	5.0	U
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane	7.6	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane	0.92	0.32	0.50	5.0	J
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene		0.31	0.50	5.0	U
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

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ANALYSIS DATA SHEET

SW 8260B

SA-PZ-139

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-18R59.d | Sampled: 10/12/10 15:08

Initial/Final: 5mL / 5mL | Lab ID: 1010082-18 | Received: 10/14/10 10:30

Dilution: 1 | pH: 1 | Prepared: 10/21/10 13:01

% Moisture: NA | Analyzed: 10/21/10 14:46

Batch: 0102112 | Sequence: 0J21009 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene		0.36	0.50	5.0	U
106-46-7	1,4-Dichlorobenzene		0.30	0.50	5.0	U
95-50-1	1,2-Dichlorobenzene		0.35	0.50	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene	2.0	0.48	0.50	5.0	JB
91-20-3	Naphthalene	4.4	1.1	2.0	5.0	JB
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	51.11	102	85 - 115	
1,2-Dichloroethane-d4	50.00	50.65	101	70 - 120	
Toluene-d8	50.00	50.76	102	85 - 120	
Bromofluorobenzene	50.00	48.87	98	75 - 120	

CAS NO.	TICS	CONC. (ug/L)	Response	R.T.	% Match	Q
NA	Tentatively Identified Compounds	0.0				U

Environmental Testing Laboratories

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ANALYSIS DATA SHEET

SW 8260B

SA-PZ-149I1

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-17R59.d | Sampled: 10/12/10 14:57

Initial/Final: 5mL / 5mL | Lab ID: 1010082-17 | Received: 10/14/10 10:30

Dilution: 1 | pH: 1 | Prepared: 10/20/10 15:07

% Moisture: NA | Analyzed: 10/20/10 23:06

Batch: 0102012 | Sequence: 0J20005 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane		0.55	2.0	5.0	U
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene		0.53	2.0	5.0	U
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride		0.49	0.50	5.0	U
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane	3.6	0.27	0.50	5.0	J
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane		0.32	0.50	5.0	U
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene		0.31	0.50	5.0	U
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

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SW 8260B

SA-PZ-149I1

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-17R59.d | Sampled: 10/12/10 14:57

Initial/Final: 5mL / 5mL | Lab ID: 1010082-17 | Received: 10/14/10 10:30

Dilution: 1 | pH: 1 | Prepared: 10/20/10 15:07

% Moisture: NA | Analyzed: 10/20/10 23:06

Batch: 0102012 | Sequence: 0J20005 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene	1.0	0.36	0.50	5.0	J
106-46-7	1,4-Dichlorobenzene	4.7	0.30	0.50	5.0	J
95-50-1	1,2-Dichlorobenzene	1.2	0.35	0.50	5.0	J
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene		0.48	0.50	5.0	U
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	50.33	101	85 - 115	
1,2-Dichloroethane-d4	50.00	56.94	114	70 - 120	
Toluene-d8	50.00	56.68	113	85 - 120	
Bromofluorobenzene	50.00	55.23	110	75 - 120	

CAS NO.	TICS	CONC. (ug/L)	Response	R.T.	% Match	Q
NA	Tentatively Identified Compounds	0.0				U

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SW 8260B

SA-PZ-151I1

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-05R259.d | Sampled: 10/12/10 08:36

Initial/Final: 5mL / 5mL | Lab ID: 1010082-05 | Received: 10/14/10 10:30

Dilution: 1 | pH: 1 | Prepared: 10/20/10 15:07

% Moisture: NA | Analyzed: 10/20/10 20:23

Batch: 0102012 | Sequence: 0J20005 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane	91	0.55	2.0	5.0	
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene	14	0.53	2.0	5.0	
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride		0.49	0.50	5.0	U
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane	180	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane	36	0.32	0.50	5.0	
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene	1.3	0.28	0.50	5.0	J
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene	0.33	0.31	0.50	5.0	J
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

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SW 8260B

SA-PZ-151I1

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-05R259.d | Sampled: 10/12/10 08:36

Initial/Final: 5mL / 5mL | Lab ID: 1010082-05 | Received: 10/14/10 10:30

Dilution: 1 | pH: 1 | Prepared: 10/20/10 15:07

% Moisture: NA | Analyzed: 10/20/10 20:23

Batch: 0102012 | Sequence: 0J20005 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene	0.49	0.27	0.50	5.0	J
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene	2.5	0.36	0.50	5.0	J
106-46-7	1,4-Dichlorobenzene	11	0.30	0.50	5.0	
95-50-1	1,2-Dichlorobenzene	3.6	0.35	0.50	5.0	J
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene	1.8	0.48	0.50	5.0	J
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	51.33	103	85 - 115	
1,2-Dichloroethane-d4	50.00	57.48	115	70 - 120	
Toluene-d8	50.00	51.93	104	85 - 120	
Bromofluorobenzene	50.00	53.11	106	75 - 120	

CAS NO.	TICS	CONC. (ug/L)	Response	R.T.	% Match	Q
000135-98-8	Benzene, (1-methylpropyl)-	5.5	195730	15.056	87	JN

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SW 8260B

SA-PZ-155I

Client: TETRA TECH SDG 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water Preparation: SW 5030A/5030B File ID: 1010082-04R259.d Sampled: 10/12/10 08:35

Initial/Final: 5mL / 5mL Lab ID: 1010082-04 Received: 10/14/10 10:30

Dilution: 1 pH: 1 Prepared: 10/20/10 15:07

% Moisture: NA Analyzed: 10/20/10 19:56

Batch: 0102012 Sequence: 0J20005 Calibration: 0102201 Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane		0.55	2.0	5.0	U
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene	3.7	0.53	2.0	5.0	J
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride		0.49	0.50	5.0	U
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane	65	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane	15	0.32	0.50	5.0	
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene		0.31	0.50	5.0	U
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

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SW 8260B

SA-PZ-155I

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-04R259.d | Sampled: 10/12/10 08:35

Initial/Final: 5mL / 5mL | Lab ID: 1010082-04 | Received: 10/14/10 10:30

Dilution: 1 | pH: 1 | Prepared: 10/20/10 15:07

% Moisture: NA | Analyzed: 10/20/10 19:56

Batch: 0102012 | Sequence: 0J20005 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene		0.36	0.50	5.0	U
106-46-7	1,4-Dichlorobenzene		0.30	0.50	5.0	U
95-50-1	1,2-Dichlorobenzene		0.35	0.50	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene		0.48	0.50	5.0	U
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	46.61	93	85 - 115	
1,2-Dichloroethane-d4	50.00	51.07	102	70 - 120	
Toluene-d8	50.00	51.19	102	85 - 120	
Bromofluorobenzene	50.00	50.05	100	75 - 120	

CAS NO.	TICS	CONC. (ug/L)	Response	R.T.	% Match	Q
NA	Tentatively Identified Compounds	0.0				U

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SW 8260B

SA-PZ-157I

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-02R59.d | Sampled: 10/11/10 14:10

Initial/Final: 5mL / 5mL | Lab ID: 1010082-02 | Received: 10/14/10 10:30

Dilution: 1 | pH: 1 | Prepared: 10/19/10 13:13

% Moisture: NA | Analyzed: 10/19/10 14:44

Batch: 0101907 | Sequence: 0J19010 | Calibration: 0101505 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane	5.7	0.55	2.0	5.0	
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene	4.2	0.53	2.0	5.0	J
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride		0.49	0.50	5.0	U
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane	65	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane	15	0.32	0.50	5.0	
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene		0.31	0.50	5.0	U
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

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SW 8260B

SA-PZ-157I

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-02R59.d | Sampled: 10/11/10 14:10

Initial/Final: 5mL / 5mL | Lab ID: 1010082-02 | Received: 10/14/10 10:30

Dilution: 1 | pH: 1 | Prepared: 10/19/10 13:13

% Moisture: NA | Analyzed: 10/19/10 14:44

Batch: 0101907 | Sequence: 0J19010 | Calibration: 0101505 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene		0.36	0.50	5.0	U
106-46-7	1,4-Dichlorobenzene		0.30	0.50	5.0	U
95-50-1	1,2-Dichlorobenzene		0.35	0.50	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene	1.6	0.48	0.50	5.0	JB
91-20-3	Naphthalene	4.3	1.1	2.0	5.0	JB
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	55.93	112	85 - 115	
1,2-Dichloroethane-d4	50.00	56.00	112	70 - 120	
Toluene-d8	50.00	53.53	107	85 - 120	
Bromofluorobenzene	50.00	58.72	117	75 - 120	

CAS NO.	TICS	CONC. (ug/L)	Response	R.T.	% Match	Q
NA	Tentatively Identified Compounds	0.0				U

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ANALYSIS DATA SHEET

SW 8260B

SA-PZ-157I1

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-0359.d | Sampled: 10/11/10 15:09

Initial/Final: 5mL / 5mL | Lab ID: 1010082-03 | Received: 10/14/10 10:30

Dilution: 1 | pH: 1 | Prepared: 10/15/10 15:06

% Moisture: NA | Analyzed: 10/15/10 17:11

Batch: 0101505 | Sequence: 0J15007 | Calibration: UNASSIGNED | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane	57	0.55	2.0	5.0	
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene	17	0.53	2.0	5.0	
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride		0.49	0.50	5.0	U
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane	210	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane	48	0.32	0.50	5.0	
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene	0.84	0.28	0.50	5.0	J
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene		0.31	0.50	5.0	U
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

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ANALYSIS DATA SHEET

SW 8260B

SA-PZ-157I1

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-0359.d | Sampled: 10/11/10 15:09

Initial/Final: 5mL / 5mL | Lab ID: 1010082-03 | Received: 10/14/10 10:30

Dilution: 1 | pH: 1 | Prepared: 10/15/10 15:06

% Moisture: NA | Analyzed: 10/15/10 17:11

Batch: 0101505 | Sequence: 0J15007 | Calibration: UNASSIGNED | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene	1.3	0.36	0.50	5.0	J
106-46-7	1,4-Dichlorobenzene	6.1	0.30	0.50	5.0	
95-50-1	1,2-Dichlorobenzene	2.3	0.35	0.50	5.0	J
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene	2.4	0.48	0.50	5.0	JB
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	54.31	109	85 - 115	
1,2-Dichloroethane-d4	50.00	58.28	117	70 - 120	
Toluene-d8	50.00	54.30	109	85 - 120	
Bromofluorobenzene	50.00	60.61	121	75 - 120	*

CAS NO.	TICS	CONC. (ug/L)	Response	R.T.	% Match	Q
001074-17-5	Benzene, 1-methyl-2-propyl-	5.6	169245	15.065	91	JN

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SW 8260B

SA-PZ-157I1DL

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-03D59.d | Sampled: 10/11/10 15:09

Initial/Final: 5mL / 5mL | Lab ID: 1010082-03RE1 | Received: 10/14/10 10:30

Dilution: 1.67 | pH: 1 | Prepared: 10/19/10 13:13

% Moisture: NA | Analyzed: 10/19/10 15:11

Batch: 0101907 | Sequence: 0J19010 | Calibration: 0101505 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.53	0.84	8.4	U
74-87-3	Chloromethane		0.65	0.84	8.4	U
75-01-4	Vinyl chloride		0.80	0.84	8.4	U
74-83-9	Bromomethane		1.3	3.3	8.4	U
75-00-3	Chloroethane	54	0.92	3.3	8.4	D
75-69-4	Trichlorofluoromethane		0.82	0.84	8.4	U
75-35-4	1,1-Dichloroethene	18	0.89	3.3	8.4	D
67-64-1	Acetone		2.7	8.4	21	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		1.4	3.3	8.4	U
75-15-0	Carbon disulfide		0.27	0.84	8.4	U
79-20-9	Methyl acetate		1.4	3.3	8.4	U
75-09-2	Methylene chloride		0.82	0.84	8.4	U
156-60-5	trans-1,2-Dichloroethene		0.73	0.84	8.4	U
1634-04-4	Methyl tert-butyl ether		0.37	0.84	8.4	U
75-34-3	1,1-Dichloroethane	220	0.45	0.84	8.4	D
156-59-2	cis-1,2-Dichloroethene		1.1	3.3	8.4	U
78-93-3	2-Butanone		2.5	8.4	21	U
67-66-3	Chloroform		0.45	0.84	8.4	U
71-55-6	1,1,1-Trichloroethane	49	0.53	0.84	8.4	D
110-82-7	Cyclohexane		0.75	0.84	8.4	U
563-58-6	1,1-Dichloropropene		0.70	0.84	8.4	U
56-23-5	Carbon tetrachloride		0.52	0.84	8.4	U
107-06-2	1,2-Dichloroethane		0.38	0.84	8.4	U
71-43-2	Benzene		0.47	0.84	8.4	U
79-01-6	Trichloroethene		0.47	0.84	8.4	U
108-87-2	Methylcyclohexane		0.58	0.84	8.4	U
78-87-5	1,2-Dichloropropane		1.4	3.3	8.4	U
75-27-4	Bromodichloromethane		0.60	0.84	8.4	U
10061-01-5	cis-1,3-Dichloropropene		0.87	3.3	8.4	U
108-10-1	4-Methyl-2-pentanone		1.8	2.1	21	U
108-88-3	Toluene		0.52	0.84	8.4	U
10061-02-6	trans-1,3-Dichloropropene		0.75	0.84	8.4	U
79-00-5	1,1,2-Trichloroethane		0.85	3.3	8.4	U
127-18-4	Tetrachloroethene		0.70	0.84	8.4	U
591-78-6	2-Hexanone		2.0	2.1	21	U
124-48-1	Dibromochloromethane		0.53	0.84	8.4	U
106-93-4	1,2-Dibromoethane		0.73	0.84	8.4	U
108-90-7	Chlorobenzene		0.45	0.84	8.4	U
100-41-4	Ethylbenzene		0.70	0.84	8.4	U

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SW 8260B

SA-PZ-157I1DL

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-03D59.d | Sampled: 10/11/10 15:09

Initial/Final: 5mL / 5mL | Lab ID: 1010082-03RE1 | Received: 10/14/10 10:30

Dilution: 1.67 | pH: 1 | Prepared: 10/19/10 13:13

% Moisture: NA | Analyzed: 10/19/10 15:11

Batch: 0101907 | Sequence: 0J19010 | Calibration: 0101505 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		1.4	1.7	17	U
95-47-6	o-Xylene		0.42	0.84	8.4	U
100-42-5	Styrene		0.60	0.84	8.4	U
75-25-2	Bromoform		1.6	3.3	8.4	U
98-82-8	Isopropylbenzene		0.45	0.84	8.4	U
79-34-5	1,1,2,2-Tetrachloroethane		1.1	3.3	8.4	U
541-73-1	1,3-Dichlorobenzene		0.60	0.84	8.4	U
106-46-7	1,4-Dichlorobenzene		0.50	0.84	8.4	U
95-50-1	1,2-Dichlorobenzene	2.3	0.58	0.84	8.4	JD
96-12-8	1,2-Dibromo-3-chloropropane		1.5	3.3	8.4	U
120-82-1	1,2,4-Trichlorobenzene		0.80	0.84	8.4	U
91-20-3	Naphthalene		1.8	3.3	8.4	U
540-59-0	1,2-Dichloroethene (total)		0.73	0.84	8.4	U
1330-20-7	Xylenes (total)		0.42	0.84	8.4	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	56.21	112	85 - 115	
1.2-Dichloroethane-d4	50.00	56.93	114	70 - 120	
Toluene-d8	50.00	53.60	107	85 - 120	
Bromofluorobenzene	50.00	59.51	119	75 - 120	

CAS NO.	TICS	CONC. (ug/L)	Response	R.T.	% Match	Q
NA	Tentatively Identified Compounds	0.0				U

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ANALYSIS DATA SHEET

SW 8260B

SA-PZ-158I

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-10R259.d | Sampled: 10/11/10 14:13

Initial/Final: 5mL / 5mL | Lab ID: 1010082-10 | Received: 10/14/10 10:30

Dilution: 1 | pH: 1 | Prepared: 10/20/10 15:07

% Moisture: NA | Analyzed: 10/20/10 19:01

Batch: 0102012 | Sequence: 0J20005 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane		0.55	2.0	5.0	U
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene	2.6	0.53	2.0	5.0	J
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride		0.49	0.50	5.0	U
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane	43	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane	7.9	0.32	0.50	5.0	
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene		0.31	0.50	5.0	U
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

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SW 8260B

SA-PZ-158I

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-10R259.d | Sampled: 10/11/10 14:13

Initial/Final: 5mL / 5mL | Lab ID: 1010082-10 | Received: 10/14/10 10:30

Dilution: 1 | pH: 1 | Prepared: 10/20/10 15:07

% Moisture: NA | Analyzed: 10/20/10 19:01

Batch: 0102012 | Sequence: 0J20005 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene		0.36	0.50	5.0	U
106-46-7	1,4-Dichlorobenzene		0.30	0.50	5.0	U
95-50-1	1,2-Dichlorobenzene		0.35	0.50	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene		0.48	0.50	5.0	U
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	48.53	97	85 - 115	
1,2-Dichloroethane-d4	50.00	51.60	103	70 - 120	
Toluene-d8	50.00	51.68	103	85 - 120	
Bromofluorobenzene	50.00	50.88	102	75 - 120	

CAS NO.	TICS	CONC. (ug/L)	Response	R.T.	% Match	Q
NA	Tentatively Identified Compounds	0.0				U

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SW 8260B

SA-PZ-158I1

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-11R259.d | Sampled: 10/11/10 15:12

Initial/Final: 5mL / 5mL | Lab ID: 1010082-11 | Received: 10/14/10 10:30

Dilution: 1 | pH: 1 | Prepared: 10/20/10 15:07

% Moisture: NA | Analyzed: 10/20/10 19:29

Batch: 0102012 | Sequence: 0J20005 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane	27	0.55	2.0	5.0	
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene	12	0.53	2.0	5.0	
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride		0.49	0.50	5.0	U
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane	160	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane	39	0.32	0.50	5.0	
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene	0.51	0.28	0.50	5.0	J
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene		0.31	0.50	5.0	U
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

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SW 8260B

SA-PZ-158I1

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-11R259.d | Sampled: 10/11/10 15:12

Initial/Final: 5mL / 5mL | Lab ID: 1010082-11 | Received: 10/14/10 10:30

Dilution: 1 | pH: 1 | Prepared: 10/20/10 15:07

% Moisture: NA | Analyzed: 10/20/10 19:29

Batch: 0102012 | Sequence: 0J20005 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene	0.69	0.36	0.50	5.0	J
106-46-7	1,4-Dichlorobenzene	2.8	0.30	0.50	5.0	J
95-50-1	1,2-Dichlorobenzene	1.2	0.35	0.50	5.0	J
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene	1.4	0.48	0.50	5.0	J
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	45.96	92	85 - 115	
1,2-Dichloroethane-d4	50.00	49.97	100	70 - 120	
Toluene-d8	50.00	49.44	99	85 - 120	
Bromofluorobenzene	50.00	50.06	100	75 - 120	

CAS NO.	TICS	CONC. (ug/L)	Response	R.T.	% Match	Q
NA	Tentatively Identified Compounds	0.0				U

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SW 8260B

SA-PZ-159I

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-07R59.d | Sampled: 10/12/10 11:04

Initial/Final: 5mL / 5mL | Lab ID: 1010082-07 | Received: 10/14/10 10:30

Dilution: 1 | pH: 1 | Prepared: 10/20/10 15:07

% Moisture: NA | Analyzed: 10/20/10 20:50

Batch: 0102012 | Sequence: 0J20005 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane	3.3	0.55	2.0	5.0	J
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene	2.2	0.53	2.0	5.0	J
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride		0.49	0.50	5.0	U
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane	35	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane	5.6	0.32	0.50	5.0	
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene		0.31	0.50	5.0	U
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

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SW 8260B

SA-PZ-159I

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-07R59.d | Sampled: 10/12/10 11:04

Initial/Final: 5mL / 5mL | Lab ID: 1010082-07 | Received: 10/14/10 10:30

Dilution: 1 | pH: 1 | Prepared: 10/20/10 15:07

% Moisture: NA | Analyzed: 10/20/10 20:50

Batch: 0102012 | Sequence: 0J20005 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene		0.36	0.50	5.0	U
106-46-7	1,4-Dichlorobenzene		0.30	0.50	5.0	U
95-50-1	1,2-Dichlorobenzene		0.35	0.50	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene		0.48	0.50	5.0	U
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	45.83	92	85 - 115	
1,2-Dichloroethane-d4	50.00	50.71	101	70 - 120	
Toluene-d8	50.00	49.90	100	85 - 120	
Bromofluorobenzene	50.00	50.72	101	75 - 120	

CAS NO.	TICS	CONC. (ug/L)	Response	R.T.	% Match	Q
64-17-5	Ethanol $$ Ethyl alcohol $$ Alcohol $$ A	52	1925854	7.139	90	JN
NA	Unknown 13.253	25	861408	13.253	0	J

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SW 8260B

SA-PZ-159I1

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-0659.d | Sampled: 10/12/10 09:57

Initial/Final: 5mL / 5mL | Lab ID: 1010082-06 | Received: 10/14/10 10:30

Dilution: 1 | pH: 1 | Prepared: 10/15/10 15:06

% Moisture: NA | Analyzed: 10/15/10 18:33

Batch: 0101505 | Sequence: 0J15007 | Calibration: UNASSIGNED | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane	39	0.55	2.0	5.0	
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene	14	0.53	2.0	5.0	
67-64-1	Acetone	11	1.6	5.0	13	J
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride		0.49	0.50	5.0	U
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane	210	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane	44	0.32	0.50	5.0	
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene	0.52	0.28	0.50	5.0	J
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene		0.31	0.50	5.0	U
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

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SW 8260B

SA-PZ-159I1

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-0659.d | Sampled: 10/12/10 09:57

Initial/Final: 5mL / 5mL | Lab ID: 1010082-06 | Received: 10/14/10 10:30

Dilution: 1 | pH: 1 | Prepared: 10/15/10 15:06

% Moisture: NA | Analyzed: 10/15/10 18:33

Batch: 0101505 | Sequence: 0J15007 | Calibration: UNASSIGNED | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene		0.36	0.50	5.0	U
106-46-7	1,4-Dichlorobenzene		0.30	0.50	5.0	U
95-50-1	1,2-Dichlorobenzene		0.35	0.50	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene	1.3	0.48	0.50	5.0	JB
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	52.06	104	85 - 115	
1,2-Dichloroethane-d4	50.00	56.39	113	70 - 120	
Toluene-d8	50.00	54.78	110	85 - 120	
Bromofluorobenzene	50.00	62.13	124	75 - 120	*

CAS NO.	TICS	CONC. (ug/L)	Response	R.T.	% Match	Q
NA	Unknown 7.147	16	577758	7.147	0	J

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ANALYSIS DATA SHEET

SW 8260B

SA-PZ-159I1DL

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-06D59.d | Sampled: 10/12/10 09:57

Initial/Final: 5mL / 5mL | Lab ID: 1010082-06RE1 | Received: 10/14/10 10:30

Dilution: 1.67 | pH: 1 | Prepared: 10/21/10 13:01

% Moisture: NA | Analyzed: 10/21/10 15:40

Batch: 0102112 | Sequence: 0J21009 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.53	0.84	8.4	U
74-87-3	Chloromethane		0.65	0.84	8.4	U
75-01-4	Vinyl chloride		0.80	0.84	8.4	U
74-83-9	Bromomethane		1.3	3.3	8.4	U
75-00-3	Chloroethane	26	0.92	3.3	8.4	D
75-69-4	Trichlorofluoromethane		0.82	0.84	8.4	U
75-35-4	1,1-Dichloroethene	15	0.89	3.3	8.4	D
67-64-1	Acetone	14	2.7	8.4	21	JD
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		1.4	3.3	8.4	U
75-15-0	Carbon disulfide		0.27	0.84	8.4	U
79-20-9	Methyl acetate		1.4	3.3	8.4	U
75-09-2	Methylene chloride		0.82	0.84	8.4	U
156-60-5	trans-1,2-Dichloroethene		0.73	0.84	8.4	U
1634-04-4	Methyl tert-butyl ether		0.37	0.84	8.4	U
75-34-3	1,1-Dichloroethane	200	0.45	0.84	8.4	D
156-59-2	cis-1,2-Dichloroethene		1.1	3.3	8.4	U
78-93-3	2-Butanone		2.5	8.4	21	U
67-66-3	Chloroform		0.45	0.84	8.4	U
71-55-6	1,1,1-Trichloroethane	45	0.53	0.84	8.4	D
110-82-7	Cyclohexane		0.75	0.84	8.4	U
563-58-6	1,1-Dichloropropene		0.70	0.84	8.4	U
56-23-5	Carbon tetrachloride		0.52	0.84	8.4	U
107-06-2	1,2-Dichloroethane		0.38	0.84	8.4	U
71-43-2	Benzene	0.54	0.47	0.84	8.4	JD
79-01-6	Trichloroethene		0.47	0.84	8.4	U
108-87-2	Methylcyclohexane		0.58	0.84	8.4	U
78-87-5	1,2-Dichloropropane		1.4	3.3	8.4	U
75-27-4	Bromodichloromethane		0.60	0.84	8.4	U
10061-01-5	cis-1,3-Dichloropropene		0.87	3.3	8.4	U
108-10-1	4-Methyl-2-pentanone		1.8	2.1	21	U
108-88-3	Toluene		0.52	0.84	8.4	U
10061-02-6	trans-1,3-Dichloropropene		0.75	0.84	8.4	U
79-00-5	1,1,2-Trichloroethane		0.85	3.3	8.4	U
127-18-4	Tetrachloroethene		0.70	0.84	8.4	U
591-78-6	2-Hexanone		2.0	2.1	21	U
124-48-1	Dibromochloromethane		0.53	0.84	8.4	U
106-93-4	1,2-Dibromoethane		0.73	0.84	8.4	U
108-90-7	Chlorobenzene		0.45	0.84	8.4	U
100-41-4	Ethylbenzene		0.70	0.84	8.4	U

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SW 8260B

SA-PZ-159I1DL

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-06D59.d | Sampled: 10/12/10 09:57

Initial/Final: 5mL / 5mL | Lab ID: 1010082-06RE1 | Received: 10/14/10 10:30

Dilution: 1.67 | pH: 1 | Prepared: 10/21/10 13:01

% Moisture: NA | Analyzed: 10/21/10 15:40

Batch: 0102112 | Sequence: 0J21009 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		1.4	1.7	17	U
95-47-6	o-Xylene		0.42	0.84	8.4	U
100-42-5	Styrene		0.60	0.84	8.4	U
75-25-2	Bromoform		1.6	3.3	8.4	U
98-82-8	Isopropylbenzene		0.45	0.84	8.4	U
79-34-5	1,1,2,2-Tetrachloroethane		1.1	3.3	8.4	U
541-73-1	1,3-Dichlorobenzene		0.60	0.84	8.4	U
106-46-7	1,4-Dichlorobenzene		0.50	0.84	8.4	U
95-50-1	1,2-Dichlorobenzene		0.58	0.84	8.4	U
96-12-8	1,2-Dibromo-3-chloropropane		1.5	3.3	8.4	U
120-82-1	1,2,4-Trichlorobenzene		0.80	0.84	8.4	U
91-20-3	Naphthalene		1.8	3.3	8.4	U
540-59-0	1,2-Dichloroethene (total)		0.73	0.84	8.4	U
1330-20-7	Xylenes (total)		0.42	0.84	8.4	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	49.05	98	85 - 115	
1,2-Dichloroethane-d4	50.00	48.13	96	70 - 120	
Toluene-d8	50.00	49.71	99	85 - 120	
Bromofluorobenzene	50.00	48.76	98	75 - 120	

CAS NO.	TICS	CONC. (ug/L)	Response	R.T.	% Match	Q
64-17-5	Ethanol	19	508307	7.151	90	JDN

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SW 8260B

SA-PZ-160I

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-01R59.d | Sampled: 10/12/10 10:50

Initial/Final: 5mL / 5mL | Lab ID: 1010082-01 | Received: 10/14/10 10:30

Dilution: 1 | pH: 1 | Prepared: 10/21/10 13:01

% Moisture: NA | Analyzed: 10/21/10 17:02

Batch: 0102112 | Sequence: 0J21009 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane	13	0.55	2.0	5.0	J
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene	11	0.53	2.0	5.0	
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride		0.49	0.50	5.0	U
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane	150	0.27	0.50	5.0	J
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane	37	0.32	0.50	5.0	
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene	0.40	0.31	0.50	5.0	JB
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

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SW 8260B

SA-PZ-160I

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-01R59.d | Sampled: 10/12/10 10:50

Initial/Final: 5mL / 5mL | Lab ID: 1010082-01 | Received: 10/14/10 10:30

Dilution: 1 | pH: 1 | Prepared: 10/21/10 13:01

% Moisture: NA | Analyzed: 10/21/10 17:02

Batch: 0102112 | Sequence: 0J21009 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene		0.36	0.50	5.0	U
106-46-7	1,4-Dichlorobenzene		0.30	0.50	5.0	U
95-50-1	1,2-Dichlorobenzene		0.35	0.50	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene		0.48	0.50	5.0	U
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	49.12	98	85 - 115	
1,2-Dichloroethane-d4	50.00	51.73	103	70 - 120	
Toluene-d8	50.00	50.84	102	85 - 120	
Bromofluorobenzene	50.00	49.42	99	75 - 120	

CAS NO.	TICS	CONC. (ug/L)	Response	R.T.	% Match	Q
NA	Tentatively Identified Compounds	0.0				U

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SW 8260B

SA-PZ-160I1

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-1259.d | Sampled: 10/12/10 09:56

Initial/Final: 5mL / 5mL | Lab ID: 1010082-12 | Received: 10/14/10 10:30

Dilution: 1 | pH: 1 | Prepared: 10/15/10 15:06

% Moisture: NA | Analyzed: 10/15/10 22:11

Batch: 0101505 | Sequence: 0J15007 | Calibration: UNASSIGNED | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane	42	0.55	2.0	5.0	
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene	15	0.53	2.0	5.0	
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride		0.49	0.50	5.0	U
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane	220	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane	40	0.32	0.50	5.0	
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene	0.51	0.28	0.50	5.0	J
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene		0.31	0.50	5.0	U
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

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SW 8260B

SA-PZ-160I1

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-1259.d | Sampled: 10/12/10 09:56

Initial/Final: 5mL / 5mL | Lab ID: 1010082-12 | Received: 10/14/10 10:30

Dilution: 1 | pH: 1 | Prepared: 10/15/10 15:06

% Moisture: NA | Analyzed: 10/15/10 22:11

Batch: 0101505 | Sequence: 0J15007 | Calibration: UNASSIGNED | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene		0.36	0.50	5.0	U
106-46-7	1,4-Dichlorobenzene		0.30	0.50	5.0	U
95-50-1	1,2-Dichlorobenzene		0.35	0.50	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene		0.48	0.50	5.0	U
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	53.34	107	85 - 115	
1,2-Dichloroethane-d4	50.00	58.66	117	70 - 120	
Toluene-d8	50.00	55.22	110	85 - 120	
Bromofluorobenzene	50.00	64.18	128	75 - 120	*

CAS NO.	TICS	CONC. (ug/L)	Response	R.T.	% Match	Q
NA	Tentatively Identified Compounds	0.0				U

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ANALYSIS DATA SHEET

SW 8260B

SA-PZ-160I1DL

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-12D59.d | Sampled: 10/12/10 09:56

Initial/Final: 5mL / 5mL | Lab ID: 1010082-12RE1 | Received: 10/14/10 10:30

Dilution: 1.67 | pH: 1 | Prepared: 10/21/10 13:01

% Moisture: NA | Analyzed: 10/21/10 16:07

Batch: 0102112 | Sequence: 0J21009 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.53	0.84	8.4	U
74-87-3	Chloromethane		0.65	0.84	8.4	U
75-01-4	Vinyl chloride		0.80	0.84	8.4	U
74-83-9	Bromomethane		1.3	3.3	8.4	U
75-00-3	Chloroethane	24	0.92	3.3	8.4	D
75-69-4	Trichlorofluoromethane		0.82	0.84	8.4	U
75-35-4	1,1-Dichloroethene	15	0.89	3.3	8.4	D
67-64-1	Acetone		2.7	8.4	21	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		1.4	3.3	8.4	U
75-15-0	Carbon disulfide		0.27	0.84	8.4	U
79-20-9	Methyl acetate		1.4	3.3	8.4	U
75-09-2	Methylene chloride		0.82	0.84	8.4	U
156-60-5	trans-1,2-Dichloroethene		0.73	0.84	8.4	U
1634-04-4	Methyl tert-butyl ether		0.37	0.84	8.4	U
75-34-3	1,1-Dichloroethane	200	0.45	0.84	8.4	D
156-59-2	cis-1,2-Dichloroethene		1.1	3.3	8.4	U
78-93-3	2-Butanone		2.5	8.4	21	U
67-66-3	Chloroform		0.45	0.84	8.4	U
71-55-6	1,1,1-Trichloroethane	40	0.53	0.84	8.4	D
110-82-7	Cyclohexane		0.75	0.84	8.4	U
563-58-6	1,1-Dichloropropene		0.70	0.84	8.4	U
56-23-5	Carbon tetrachloride		0.52	0.84	8.4	U
107-06-2	1,2-Dichloroethane		0.38	0.84	8.4	U
71-43-2	Benzene		0.47	0.84	8.4	U
79-01-6	Trichloroethene		0.47	0.84	8.4	U
108-87-2	Methylcyclohexane		0.58	0.84	8.4	U
78-87-5	1,2-Dichloropropane		1.4	3.3	8.4	U
75-27-4	Bromodichloromethane		0.60	0.84	8.4	U
10061-01-5	cis-1,3-Dichloropropene		0.87	3.3	8.4	U
108-10-1	4-Methyl-2-pentanone		1.8	2.1	21	U
108-88-3	Toluene	0.84	0.52	0.84	8.4	JBD
10061-02-6	trans-1,3-Dichloropropene		0.75	0.84	8.4	U
79-00-5	1,1,2-Trichloroethane		0.85	3.3	8.4	U
127-18-4	Tetrachloroethene		0.70	0.84	8.4	U
591-78-6	2-Hexanone		2.0	2.1	21	U
124-48-1	Dibromochloromethane		0.53	0.84	8.4	U
106-93-4	1,2-Dibromoethane		0.73	0.84	8.4	U
108-90-7	Chlorobenzene		0.45	0.84	8.4	U
100-41-4	Ethylbenzene		0.70	0.84	8.4	U

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SW 8260B

SA-PZ-160I1DL

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-12D59.d | Sampled: 10/12/10 09:56

Initial/Final: 5mL / 5mL | Lab ID: 1010082-12RE1 | Received: 10/14/10 10:30

Dilution: 1.67 | pH: 1 | Prepared: 10/21/10 13:01

% Moisture: NA | Analyzed: 10/21/10 16:07

Batch: 0102112 | Sequence: 0J21009 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		1.4	1.7	17	U
95-47-6	o-Xylene		0.42	0.84	8.4	U
100-42-5	Styrene		0.60	0.84	8.4	U
75-25-2	Bromoform		1.6	3.3	8.4	U
98-82-8	Isopropylbenzene		0.45	0.84	8.4	U
79-34-5	1,1,2,2-Tetrachloroethane		1.1	3.3	8.4	U
541-73-1	1,3-Dichlorobenzene		0.60	0.84	8.4	U
106-46-7	1,4-Dichlorobenzene		0.50	0.84	8.4	U
95-50-1	1,2-Dichlorobenzene		0.58	0.84	8.4	U
96-12-8	1,2-Dibromo-3-chloropropane		1.5	3.3	8.4	U
120-82-1	1,2,4-Trichlorobenzene		0.80	0.84	8.4	U
91-20-3	Naphthalene		1.8	3.3	8.4	U
540-59-0	1,2-Dichloroethene (total)		0.73	0.84	8.4	U
1330-20-7	Xylenes (total)		0.42	0.84	8.4	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	51.20	102	85 - 115	
1,2-Dichloroethane-d4	50.00	52.69	105	70 - 120	
Toluene-d8	50.00	51.82	104	85 - 120	
Bromofluorobenzene	50.00	50.70	101	75 - 120	

CAS NO.	TICS	CONC. (ug/L)	Response	R.T.	% Match	Q
NA	Tentatively Identified Compounds	0.0				U

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ANALYSIS DATA SHEET

SW 8260B

SA-PZ-161I

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-16R59.d | Sampled: 10/12/10 13:54

Initial/Final: 5mL / 5mL | Lab ID: 1010082-16 | Received: 10/14/10 10:30

Dilution: 1 | pH: 1 | Prepared: 10/20/10 15:07

% Moisture: NA | Analyzed: 10/20/10 22:39

Batch: 0102012 | Sequence: 0J20005 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane	9.5	0.55	2.0	5.0	
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene	6.9	0.53	2.0	5.0	
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride		0.49	0.50	5.0	U
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane	110	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane	18	0.32	0.50	5.0	
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene	0.40	0.31	0.50	5.0	J
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

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ANALYSIS DATA SHEET

SW 8260B

SA-PZ-161I

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-16R59.d | Sampled: 10/12/10 13:54

Initial/Final: 5mL / 5mL | Lab ID: 1010082-16 | Received: 10/14/10 10:30

Dilution: 1 | pH: 1 | Prepared: 10/20/10 15:07

% Moisture: NA | Analyzed: 10/20/10 22:39

Batch: 0102012 | Sequence: 0J20005 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene		0.36	0.50	5.0	U
106-46-7	1,4-Dichlorobenzene		0.30	0.50	5.0	U
95-50-1	1,2-Dichlorobenzene		0.35	0.50	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene		0.48	0.50	5.0	U
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	47.91	96	85 - 115	
1,2-Dichloroethane-d4	50.00	55.64	111	70 - 120	
Toluene-d8	50.00	55.25	111	85 - 120	
Bromofluorobenzene	50.00	53.77	108	75 - 120	

CAS NO.	TICS	CONC. (ug/L)	Response	R.T.	% Match	Q
NA	Tentatively Identified Compounds	0.0				U

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ANALYSIS DATA SHEET

SW 8260B

SA-TB-01-20101011

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-09R259.d | Sampled: 10/11/10 13:30

Initial/Final: 5mL / 5mL | Lab ID: 1010082-09 | Received: 10/14/10 10:30

Dilution: 1 | pH: 1 | Prepared: 10/20/10 15:07

% Moisture: NA | Analyzed: 10/20/10 18:34

Batch: 0102012 | Sequence: 0J20005 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane		0.55	2.0	5.0	U
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene		0.53	2.0	5.0	U
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride		0.49	0.50	5.0	U
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane		0.27	0.50	5.0	U
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane		0.32	0.50	5.0	U
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene		0.31	0.50	5.0	U
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

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ANALYSIS DATA SHEET

SW 8260B

SA-TB-01-20101011

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1010082-09R259.d | Sampled: 10/11/10 13:30

Initial/Final: 5mL / 5mL | Lab ID: 1010082-09 | Received: 10/14/10 10:30

Dilution: 1 | pH: 1 | Prepared: 10/20/10 15:07

% Moisture: NA | Analyzed: 10/20/10 18:34

Batch: 0102012 | Sequence: 0J20005 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene		0.36	0.50	5.0	U
106-46-7	1,4-Dichlorobenzene		0.30	0.50	5.0	U
95-50-1	1,2-Dichlorobenzene		0.35	0.50	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene		0.48	0.50	5.0	U
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	49.12	98	85 - 115	
1,2-Dichloroethane-d4	50.00	51.99	104	70 - 120	
Toluene-d8	50.00	52.40	105	85 - 120	
Bromofluorobenzene	50.00	51.34	103	75 - 120	

CAS NO.	TICS	CONC. (ug/L)	Response	R.T.	% Match	Q
NA	Tentatively Identified Compounds	0.0				U

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ANALYSIS DATA SHEET

RSK 175 DOD

SA-DUP01

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: GC-RSK | File ID: 320t1010082-08.d | Sampled: 10/12/10 08:00

Initial/Final: 1mL / 1mL | Sulfur Cleanup: N | Lab ID: 1010082-08 | Received: 10/14/10 10:30

Dilution: 1 | pH: | Florisil Cleanup: N | Prepared: 10/20/10 09:20

% Moisture: NA | GPC Cleanup: N | GPC Cleanup Factor: N | Analyzed: 10/20/10 11:43

Batch: 0102005 | Sequence: 0J22017 | Calibration: 0070106 | Instrument: varian67

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
74-82-8	Methane	450	0.048	0.15	0.58	E
74-84-0	Ethane		0.14	0.27	1.1	U
74-85-1	Ethene		0.15	0.25	1.0	U

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ANALYSIS DATA SHEET

RSK 175 DOD

SA-DUP01DL

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: GC-RSK | File ID: 329t1010082-08.d | Sampled: 10/12/10 08:00

Initial/Final: 1mL / 1mL | Sulfur Cleanup: N | Lab ID: 1010082-08RE1 | Received: 10/14/10 10:30

Dilution: 10 | pH: | Florisil Cleanup: N | Prepared: 10/20/10 09:20

% Moisture: NA | GPC Cleanup: N | GPC Cleanup Factor: N | Analyzed: 10/20/10 13:55

Batch: 0102005 | Sequence: 0J22017 | Calibration: 0070106 | Instrument: varian67

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
74-82-8	Methane	300	0.48	1.5	5.8	D
74-84-0	Ethane		1.4	2.7	11	U
74-85-1	Ethene		1.5	2.5	10	U

ANALYSIS DATA SHEET

RSK 175 DOD

SA-PZ-151I1

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: GC-RSK | File ID: 317t1010082-05.d | Sampled: 10/12/10 08:36

Initial/Final: 1mL / 1mL | Sulfur Cleanup: N | Lab ID: 1010082-05 | Received: 10/14/10 10:30

Dilution: 1 | pH: | Florisil Cleanup: N | Prepared: 10/20/10 09:20

% Moisture: NA | GPC Cleanup: N | GPC Cleanup Factor: N | Analyzed: 10/20/10 11:10

Batch: 0102005 | Sequence: 0J22017 | Calibration: 0070106 | Instrument: varian67

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
74-82-8	Methane	400	0.048	0.15	0.58	E
74-84-0	Ethane		0.14	0.27	1.1	U
74-85-1	Ethene		0.15	0.25	1.0	U

ANALYSIS DATA SHEET

RSK 175 DOD

SA-PZ-151I1DL

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: GC-RSK | File ID: 326t1010082-05.d | Sampled: 10/12/10 08:36

Initial/Final: 1mL / 1mL | Sulfur Cleanup: N | Lab ID: 1010082-05RE1 | Received: 10/14/10 10:30

Dilution: 10 | pH: | Florisil Cleanup: N | Prepared: 10/20/10 09:20

% Moisture: NA | GPC Cleanup: N | GPC Cleanup Factor: N | Analyzed: 10/20/10 13:22

Batch: 0102005 | Sequence: 0J22017 | Calibration: 0070106 | Instrument: varian67

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
74-82-8	Methane	140	0.48	1.5	5.8	D
74-84-0	Ethane		1.4	2.7	11	U
74-85-1	Ethene		1.5	2.5	10	U

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ANALYSIS DATA SHEET

RSK 175 DOD

SA-PZ-155I

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: GC-RSK | File ID: 316t1010082-04.d | Sampled: 10/12/10 08:35

Initial/Final: 1mL / 1mL | Sulfur Cleanup: N | Lab ID: 1010082-04 | Received: 10/14/10 10:30

Dilution: 1 | pH: | Florisil Cleanup: N | Prepared: 10/20/10 09:20

% Moisture: NA | GPC Cleanup: N | GPC Cleanup Factor: N | Analyzed: 10/20/10 10:59

Batch: 0102005 | Sequence: 0J22017 | Calibration: 0070106 | Instrument: varian67

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
74-82-8	Methane	3.7	0.048	0.15	0.58	
74-84-0	Ethane		0.14	0.27	1.1	U
74-85-1	Ethene		0.15	0.25	1.0	U

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RSK 175 DOD

SA-PZ-157I

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: GC-RSK | File ID: 314t1010082-02.d | Sampled: 10/11/10 14:10

Initial/Final: 1mL / 1mL | Sulfur Cleanup: N | Lab ID: 1010082-02 | Received: 10/14/10 10:30

Dilution: 1 | pH: | Florisil Cleanup: N | Prepared: 10/20/10 09:20

% Moisture: NA | GPC Cleanup: N | GPC Cleanup Factor: N | Analyzed: 10/20/10 10:37

Batch: 0102005 | Sequence: 0J22017 | Calibration: 0070106 | Instrument: varian67

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
74-82-8	Methane	2.7	0.048	0.15	0.58	
74-84-0	Ethane		0.14	0.27	1.1	U
74-85-1	Ethene		0.15	0.25	1.0	U

ANALYSIS DATA SHEET

RSK 175 DOD

SA-PZ-157I1

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: GC-RSK | File ID: 315t1010082-03.d | Sampled: 10/11/10 15:09

Initial/Final: 1mL / 1mL | Sulfur Cleanup: N | Lab ID: 1010082-03 | Received: 10/14/10 10:30

Dilution: 1 | pH: | Florisil Cleanup: N | Prepared: 10/20/10 09:20

% Moisture: NA | GPC Cleanup: N | GPC Cleanup Factor: N | Analyzed: 10/20/10 10:48

Batch: 0102005 | Sequence: 0J22017 | Calibration: 0070106 | Instrument: varian67

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
74-82-8	Methane	220	0.048	0.15	0.58	E
74-84-0	Ethane		0.14	0.27	1.1	U
74-85-1	Ethene		0.15	0.25	1.0	U

ANALYSIS DATA SHEET

RSK 175 DOD

SA-PZ-157I1DL

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: GC-RSK | File ID: 325t1010082-03.d | Sampled: 10/11/10 15:09

Initial/Final: 1mL / 1mL | Sulfur Cleanup: N | Lab ID: 1010082-03RE1 | Received: 10/14/10 10:30

Dilution: 5 | pH: | Florisil Cleanup: N | Prepared: 10/20/10 09:20

% Moisture: NA | GPC Cleanup: N | GPC Cleanup Factor: N | Analyzed: 10/20/10 13:16

Batch: 0102005 | Sequence: 0J22017 | Calibration: 0070106 | Instrument: varian67

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
74-82-8	Methane	66	0.24	0.75	2.9	D
74-84-0	Ethane		0.70	1.4	5.5	U
74-85-1	Ethene		0.75	1.3	5.0	U

ANALYSIS DATA SHEET

RSK 175 DOD

SA-PZ-159I

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: GC-RSK | File ID: 319t1010082-07.d | Sampled: 10/12/10 11:04

Initial/Final: 1mL / 1mL | Sulfur Cleanup: N | Lab ID: 1010082-07 | Received: 10/14/10 10:30

Dilution: 1 | pH: | Florisil Cleanup: N | Prepared: 10/20/10 09:20

% Moisture: NA | GPC Cleanup: N | GPC Cleanup Factor: N | Analyzed: 10/20/10 11:32

Batch: 0102005 | Sequence: 0J22017 | Calibration: 0070106 | Instrument: varian67

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
74-82-8	Methane	77	0.048	0.15	0.58	E
74-84-0	Ethane		0.14	0.27	1.1	U
74-85-1	Ethene		0.15	0.25	1.0	U

ANALYSIS DATA SHEET

RSK 175 DOD

SA-PZ-159IDL

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: GC-RSK | File ID: 328t1010082-07.d | Sampled: 10/12/10 11:04

Initial/Final: 1mL / 1mL | Sulfur Cleanup: N | Lab ID: 1010082-07RE1 | Received: 10/14/10 10:30

Dilution: 2 | pH: | Florisil Cleanup: N | Prepared: 10/20/10 09:20

% Moisture: NA | GPC Cleanup: N | GPC Cleanup Factor: N | Analyzed: 10/20/10 13:44

Batch: 0102005 | Sequence: 0J22017 | Calibration: 0070106 | Instrument: varian67

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
74-82-8	Methane	29	0.096	0.30	1.2	D
74-84-0	Ethane		0.28	0.54	2.2	U
74-85-1	Ethene		0.30	0.50	2.0	U

ANALYSIS DATA SHEET

RSK 175 DOD

SA-PZ-159I1

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: GC-RSK | File ID: 318t1010082-06.d | Sampled: 10/12/10 09:57

Initial/Final: 1mL / 1mL | Sulfur Cleanup: N | Lab ID: 1010082-06 | Received: 10/14/10 10:30

Dilution: 1 | pH: | Florisil Cleanup: N | Prepared: 10/20/10 09:20

% Moisture: NA | GPC Cleanup: N | GPC Cleanup Factor: N | Analyzed: 10/20/10 11:21

Batch: 0102005 | Sequence: 0J22017 | Calibration: 0070106 | Instrument: varian67

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
74-82-8	Methane	120	0.048	0.15	0.58	E
74-84-0	Ethane		0.14	0.27	1.1	U
74-85-1	Ethene		0.15	0.25	1.0	U

ANALYSIS DATA SHEET

RSK 175 DOD

SA-PZ-159I1DL

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: GC-RSK | File ID: 327t1010082-06.d | Sampled: 10/12/10 09:57

Initial/Final: 1mL / 1mL | Sulfur Cleanup: N | Lab ID: 1010082-06RE1 | Received: 10/14/10 10:30

Dilution: 2 | pH: | Florisil Cleanup: N | Prepared: 10/20/10 09:20

% Moisture: NA | GPC Cleanup: N | GPC Cleanup Factor: N | Analyzed: 10/20/10 13:33

Batch: 0102005 | Sequence: 0J22017 | Calibration: 0070106 | Instrument: varian67

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
74-82-8	Methane	51	0.096	0.30	1.2	D
74-84-0	Ethane		0.28	0.54	2.2	U
74-85-1	Ethene		0.30	0.50	2.0	U

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ANALYSIS DATA SHEET

RSK 175 DOD

SA-PZ-160I

Client: TETRA TECH | SDG 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: GC-RSK | File ID: 313t1010082-01.d | Sampled: 10/12/10 10:50

Initial/Final: 1mL / 1mL | Sulfur Cleanup: N | Lab ID: 1010082-01 | Received: 10/14/10 10:30

Dilution: 1 | pH: | Florisil Cleanup: N | Prepared: 10/20/10 09:20

% Moisture: NA | GPC Cleanup: N | GPC Cleanup Factor: N | Analyzed: 10/20/10 10:31

Batch: 0102005 | Sequence: 0J22017 | Calibration: 0070106 | Instrument: varian67

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
74-82-8	Methane	6.4	0.048	0.15	0.58	
74-84-0	Ethane		0.14	0.27	1.1	U
74-85-1	Ethene		0.15	0.25	1.0	U

Appendix C

Region II Data Validation Forms

YES NO N/A

I. PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: CTO#WE08, SDG 1010082 LAB: CompuChem

SITE NAME: NWIRP Calverton

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? [✓] ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? [✓] ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? [✓] ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. VOLATILE ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? [✓] ___ ___

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? [ ] ___ [✓]

1.3 Sample Conditions/Problems

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ [✓] ___

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? ___ [✓] ___

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water [✓] ___ ___

b. Soil [ ] ___ [✓]

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water [✓] ___ ___

b. Soil [ ] ___ [✓]

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. [✓] ___ ___

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? [✓] ___ ___

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. [✓] ___ ___

If yes, were samples reanalyzed? [✓] ___ ___

Were method blanks reanalyzed? [ ] ___ [✓]

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] [✓] ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 <u>Laboratory Control Sample(Form III/Equivalent)</u>

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. [✓] ___ ___

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

		YES	NO	N/A
A.	Water	[✓]	___	___
B.	Soil	[ ]	___	✓
C.	Med Soil	[ ]	___	✓

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [ ] ___ ✓

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. [ ] ✓ ___

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	**Non-Detected Spiked Compounds**
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent)

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? [✓] ___ ___

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? [✓] ___ ___

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month [page 8000C, section 9.5.])

a. Water [✓] ___ ___

b. Waste [ ] ___ [✓]

c. Soil/Solid [ ] ___ [✓]

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7)for each matrix. [✓] ___ ___

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. [✓] ___ ___

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? [✓] ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? [✓] ___ ___

6.3 Has a method blank been analyzed for each GC/MS system used ? [✓] ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ® all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? [✓] ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. [✓] ___ ___

	YES	NO	N/A
TRIP			
7.2 Do any field/rinse blanks have positive volatile organic compound results?	___	✓	___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	> CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone

** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? [✓] ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. [✓] ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? [✓] ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? [✓] ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) [✓] ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? [✓] ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? [✓] ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ [✓] ___

9.7 Have the appropriate number of significant figures (two) been reported? [✓] ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. [✓] ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates [✓] ___ ___

c. Blanks [✓] ___ ___

d. Laboratory Control Samples [✓] ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) [✓] ___ ___

c. Blanks [✓] ___ ___

d. Laboratory Control Samples [✓] ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? [✓] ___ ___

	YES	NO	N/A
Resolution?	[✓]	___	___
Peak shape?	[✓]	___	___
Full-scale graph (attenuation)?	[ ]	___	✓

Other:_____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? [✓] ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? [✓] ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [✓] ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? [✓] ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? [ ] ___ ✓

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate [ ] ___ ✓

b. Blanks [ ] ___ ✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [ ] ___ ✓

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [ ] ___ ✓

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ ✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [ ] ✓ ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? [✓] ___ ___

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? [✓] ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39)qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? [ ] [✓] ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. [✓] [✓] ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > ~~20.0%~~ 15%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? [✓] ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) [ ] [✓] ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 <u>GC/MS Calibration Verification (CLP Form VII Equivalent)</u>

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? [✓] ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? [✓] ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? [✓] ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). [✓] ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? ✓ ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds is section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? ✓ ___ ___

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION:

1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.

2. Do not qualify non-detects when the associated IS are counts area > + 100%.

3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".

4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? [✓] ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? ✓ ___ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

Appendix D

Support Documentation

HOLDTIMES

SDG 1010082

SORT	UNITS	NSAMPLE	LAB_ID	QC_TYPE	SAMP_DATE	EXTR_DATE	ANAL_DATE	SMP_EXTR	EXTR_ANL	SMP_ANL
M	UG/L	SA-PZ-159I1-20101012	1010082-06	NM	10/12/2010	10/25/2010	10/28/2010	13	3	16
M	UG/L	SA-DUP01-20101012	1010082-08	NM	10/12/2010	10/25/2010	10/28/2010	13	3	16
M	UG/L	SA-PZ-151I1-20101012	1010082-05	NM	10/12/2010	10/25/2010	10/28/2010	13	3	16
M	UG/L	SA-PZ-155I-20101012	1010082-04	NM	10/12/2010	10/25/2010	10/28/2010	13	3	16
M	UG/L	SA-PZ-157I-20101011	1010082-02	NM	10/11/2010	10/25/2010	10/28/2010	14	3	17
M	UG/L	SA-PZ-159I-20101012	1010082-07	NM	10/12/2010	10/25/2010	10/28/2010	13	3	16
M	UG/L	SA-PZ-160I-20101012	1010082-01	NM	10/12/2010	10/25/2010	10/28/2010	13	3	16
M	UG/L	SA-PZ-157I1-20101011	1010082-03	NM	10/11/2010	10/25/2010	10/28/2010	14	3	17
TOC	MG/L	SA-PZ-157I-20101011	1010082-02	NM	10/11/2010	10/21/2010	10/22/2010	10	1	11
TOC	MG/L	SA-PZ-159I1-20101012	1010082-06	NM	10/12/2010	10/21/2010	10/22/2010	9	1	10
TOC	MG/L	SA-DUP01-20101012	1010082-08	NM	10/12/2010	10/21/2010	10/22/2010	9	1	10
TOC	MG/L	SA-PZ-157I1-20101011	1010082-03	NM	10/11/2010	10/21/2010	10/22/2010	10	1	11
TOC	MG/L	SA-PZ-155I-20101012	1010082-04	NM	10/12/2010	10/21/2010	10/22/2010	9	1	10
TOC	MG/L	SA-PZ-160I-20101012	1010082-01	NM	10/12/2010	10/21/2010	10/22/2010	9	1	10
TOC	MG/L	SA-PZ-151I1-20101012	1010082-05	NM	10/12/2010	10/21/2010	10/22/2010	9	1	10

SORT	UNITS	NSAMPLE	LAB_ID	QC_TYPE	SAMP_DATE	EXTR_DATE	ANAL_DATE	SMP_EXTR	EXTR_ANL	SMP_ANL
TOC	MG/L	SA-PZ-159I-20101012	1010082-07	NM	10/12/2010	10/21/2010	10/22/2010	9	1	10
OV	UG/L	SA-PZ-157I1-20101011	1010082-03	NM	10/11/2010	10/15/2010	10/15/2010	4	0	4
OV	UG/L	SA-PZ-139-20101012	1010082-18	NM	10/12/2010	10/21/2010	10/21/2010	9	0	9
OV	UG/L	SA-DUP01-20101012	1010082-08	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8
OV	UG/L	SA-DUP02-20101012	1010082-19	NM	10/12/2010	10/21/2010	10/21/2010	9	0	9
OV	UG/L	SA-PZ-133I-20101012	1010082-14	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8
OV	UG/L	SA-PZ-138I1-20101012	1010082-13	NM	10/12/2010	10/15/2010	10/15/2010	3	0	3
OV	UG/L	SA-PZ-138I1-20101012	1010082-13RE1	NM	10/12/2010	10/21/2010	10/21/2010	9	0	9
OV	UG/L	SA-PZ-138I-20101012	1010082-15	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8
OV	UG/L	SA-PZ-159I1-20101012	1010082-06	NM	10/12/2010	10/15/2010	10/15/2010	3	0	3
OV	UG/L	SA-TB-01-20101011	1010082-09	NM	10/11/2010	10/20/2010	10/20/2010	9	0	9
OV	UG/L	SA-PZ-161I-20101012	1010082-16	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8
OV	UG/L	SA-PZ-160I-20101012	1010082-01	NM	10/12/2010	10/21/2010	10/21/2010	9	0	9
OV	UG/L	SA-PZ-160I1-20101012	1010082-12RE1	NM	10/12/2010	10/21/2010	10/21/2010	9	0	9
OV	UG/L	SA-PZ-160I1-20101012	1010082-12	NM	10/12/2010	10/15/2010	10/15/2010	3	0	3
OV	UG/L	SA-PZ-151I1-20101012	1010082-05	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8
OV	UG/L	SA-PZ-159I1-20101012	1010082-06RE1	NM	10/12/2010	10/21/2010	10/21/2010	9	0	9
OV	UG/L	SA-PZ-149I1-20101012	1010082-17	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8

SORT	UNITS	NSAMPLE	LAB_ID	QC_TYPE	SAMP_DATE	EXTR_DATE	ANAL_DATE	SMP_EXTR	EXTR_ANL	SMP_ANL
OV	UG/L	SA-PZ-158I-20101011	1010082-10	NM	10/11/2010	10/20/2010	10/20/2010	9	0	9
OV	UG/L	SA-PZ-158I1-20101011	1010082-11	NM	10/11/2010	10/20/2010	10/20/2010	9	0	9
OV	UG/L	SA-PZ-157I-20101011	1010082-02	NM	10/11/2010	10/19/2010	10/19/2010	8	0	8
OV	UG/L	SA-PZ-157I1-20101011	1010082-03RE1	NM	10/11/2010	10/19/2010	10/19/2010	8	0	8
OV	UG/L	SA-PZ-155I-20101012	1010082-04	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8
OV	UG/L	SA-PZ-159I-20101012	1010082-07	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8
ETHA	UG/L	SA-PZ-151I1-20101012	1010082-05	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8
ETHA	UG/L	SA-PZ-159I-20101012	1010082-07	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8
ETHA	UG/L	SA-PZ-159I-20101012	1010082-07RE1	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8
ETHA	UG/L	SA-PZ-151I1-20101012	1010082-05RE1	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8
ETHA	UG/L	SA-PZ-155I-20101012	1010082-04	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8
ETHA	UG/L	SA-PZ-159I1-20101012	1010082-06RE1	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8
ETHA	UG/L	SA-DUP01-20101012	1010082-08RE1	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8
ETHA	UG/L	SA-PZ-160I-20101012	1010082-01	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8
ETHA	UG/L	SA-PZ-157I1-20101011	1010082-03	NM	10/11/2010	10/20/2010	10/20/2010	9	0	9
ETHA	UG/L	SA-PZ-157I1-20101011	1010082-03RE1	NM	10/11/2010	10/20/2010	10/20/2010	9	0	9
ETHA	UG/L	SA-PZ-157I-20101011	1010082-02	NM	10/11/2010	10/20/2010	10/20/2010	9	0	9
ETHA	UG/L	SA-PZ-159I1-20101012	1010082-06	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8

SORT	UNITS	NSAMPLE	LAB_ID	QC_TYPE	SAMP_DATE	EXTR_DATE	ANAL_DATE	SMP_EXTR	EXTR_ANL	SMP_ANL
ETHA	UG/L	SA-DUP01-20101012	1010082-08	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8
ETHE	UG/L	SA-PZ-159I-20101012	1010082-07RE1	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8
ETHE	UG/L	SA-PZ-157I1-20101011	1010082-03	NM	10/11/2010	10/20/2010	10/20/2010	9	0	9
ETHE	UG/L	SA-DUP01-20101012	1010082-08RE1	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8
ETHE	UG/L	SA-PZ-151I1-20101012	1010082-05	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8
ETHE	UG/L	SA-PZ-151I1-20101012	1010082-05RE1	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8
ETHE	UG/L	SA-PZ-155I-20101012	1010082-04	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8
ETHE	UG/L	SA-DUP01-20101012	1010082-08	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8
ETHE	UG/L	SA-PZ-157I1-20101011	1010082-03RE1	NM	10/11/2010	10/20/2010	10/20/2010	9	0	9
ETHE	UG/L	SA-PZ-157I-20101011	1010082-02	NM	10/11/2010	10/20/2010	10/20/2010	9	0	9
ETHE	UG/L	SA-PZ-159I1-20101012	1010082-06	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8
ETHE	UG/L	SA-PZ-159I-20101012	1010082-07	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8
ETHE	UG/L	SA-PZ-160I-20101012	1010082-01	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8
ETHE	UG/L	SA-PZ-159I1-20101012	1010082-06RE1	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8
METH	UG/L	SA-PZ-157I1-20101011	1010082-03	NM	10/11/2010	10/20/2010	10/20/2010	9	0	9
METH	UG/L	SA-DUP01-20101012	1010082-08	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8
METH	UG/L	SA-DUP01-20101012	1010082-08RE1	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8
METH	UG/L	SA-PZ-151I1-20101012	1010082-05	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8

SORT	UNITS	NSAMPLE	LAB_ID	QC_TYPE	SAMP_DATE	EXTR_DATE	ANAL_DATE	SMP_EXTR	EXTR_ANL	SMP_ANL
METH	UG/L	SA-PZ-155I-20101012	1010082-04	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8
METH	UG/L	SA-PZ-157I1-20101011	1010082-03RE1	NM	10/11/2010	10/20/2010	10/20/2010	9	0	9
METH	UG/L	SA-PZ-157I-20101011	1010082-02	NM	10/11/2010	10/20/2010	10/20/2010	9	0	9
METH	UG/L	SA-PZ-159I1-20101012	1010082-06	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8
METH	UG/L	SA-PZ-159I1-20101012	1010082-06RE1	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8
METH	UG/L	SA-PZ-159I-20101012	1010082-07	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8
METH	UG/L	SA-PZ-159I-20101012	1010082-07RE1	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8
METH	UG/L	SA-PZ-160I-20101012	1010082-01	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8
METH	UG/L	SA-PZ-151I1-20101012	1010082-05RE1	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8

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A division of Liberty Analytical Corporation
501 Madison Avenue
Cary, N.C. 27513
Tel: 919/379-4100 Fax: 919/379-4050

SDG NARRATIVE
SDG # 1010082
PROTOCOL: SW-846
CTO-WE08/112G02045
PM: DAVE BRAYACK

SAMPLE IDENTIFICATIONS:

SA-PZ-157I1	**SA-PZ-155I**	**SA-PZ-160I**	**SA-PZ-157I**
SA-PZ-159I	**SA-DUP01**	**SA-PZ-151I1**	**SA-PZ-159I1**
SA-PZ-158I1	**SA-PZ-160I1**	**SA-TB-01-20101011**	**SA-PZ-158I**
SA-PZ-138I	**SA-PZ-161I**	**SA-PZ-138I1**	**SA-PZ-133I**
SA-DUP02		**SA-PZ-149I1**	**SA-PZ-139**

The 19 aqueous samples listed above were received intact, refrigerated at 2.0°C, with proper documentation, in sealed shipping containers, on October 14, 2010. The samples were scheduled for the requested analyses of the volatile fraction. SW-846, 3rd Edition, Update 3, 8260B was used to prepare and analyze the samples, with the exceptions and/or additions requested by the client. All pertinent Quality Assurance notices are included in the narrative section, and all pertinent Laboratory notices for SDG 1010082 are included in the sample data sections.

Holding time requirements were met for all of these samples. The pH values of these samples were equal to 1. There were volatile Project/Target Compound List (TCL) analytes identified above the Contract Required Quantitation Limit (CRQL) in seventeen of these nineteen samples. All of the system monitoring compounds not previously mentioned met recovery criteria in the analyses of the samples, except for in the initial analysis of SA-PZ-157I1, SA-PZ-159I1, SA-PZ-160I1 and SA-PZ-138I1. All of the internal standards met response and retention time criteria in the analyses of the samples.

All Bromofluorobenzene (BFB) abundance criteria were met for tunes associated to this SDG. All QC criteria were met for all initial and continuing calibration standards associated to this SDG. Manual integrations were performed on one or more of the process files associated with this SDG. Please see the detailed Manual Integration Summary report that is located directly behind the narrative. The reasons have been coded with explanations provided in the notice included in the narrative section of the SDG. The associated method blanks met all quality control criteria. The associated Laboratory Control Samples (LCS/LCSD) met all accuracy criteria. SA-PZ-160I was used as the original to prepare the duplicate matrix spikes as requested. The associated duplicate matrix spikes met most of the advisory accuracy and precision criteria.

In the initial analyses of samples SA-PZ-157I1, SA-PZ-159I1, SA-PZ-160I1 and SA-PZ-138I1, the on-column amounts of some target compounds exceeded the instrument's analytical range as defined by the highest concentration level of the Initial Calibration and the recovery of the Surrogates failed quality control criteria. The samples were reanalyzed using a smaller aliquot of raw sample to bring the on-column amount into range and all QC criteria were met. We have reported both analyses of samples SA-PZ-157I1, SA-PZ-159I1, SA-PZ-160I1 and SA-PZ-138I1. There is no Continuing Calibration Data Sheet in the deliverables package for the batch analyzed on instrument 59 on 10/20/10 associated with the BFB injected at 1124. This batch included an initial calibration and the relevant relative response factors are all displayed on the appropriate Initial Calibration Data Sheet. The initial calibration met all acceptance criteria and therefore samples could be analyzed without having to inject a continuing calibration verification standard.

I certify that this data package complies with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Furthermore, I certify that the tests used in this report meet all requirements of the NELAC standards unless otherwise stated in the SDG narrative or QA notice. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on diskette has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Quentisha L. Forrester
Data Reviewer
October 28, 2010

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Manual Integration Summary

Client: TETRA TECH
Work Order: 1010082
Sdg: 1010082
Project: CTO-WE08/112G02045/N62467-04-D-0057
Case:

Analysis: VOA-8260B 5PPB D.O.D. **Sample Type:** Cal Standard
Lab Id: 0J06004-CAL1 **Client Id:** VSTD005 **Instrument:** 5972hp59

Analyte	Type	M Flag
Bromoform	TARGET	M
Bromomethane	TARGET	M

Sample Total: 2

Analysis: VOA-8260B 5PPB D.O.D. **Sample Type:** Cal Standard
Lab Id: 0J06004-CAL2 **Client Id:** VSTD010 **Instrument:** 5972hp59

Analyte	Type	M Flag
Bromomethane	TARGET	M

Sample Total: 1

Analysis: VOA-8260B 5PPB D.O.D. **Sample Type:** Cal Standard
Lab Id: 0J06004-CAL3 **Client Id:** VSTD020 **Instrument:** 5972hp59

Analyte	Type	M Flag
Bromomethane	TARGET	M

Sample Total: 1

Analysis: VOA-8260B 5PPB D.O.D. **Sample Type:** Cal Standard
Lab Id: 0J20005-CAL2 **Client Id:** VSTD010 **Instrument:** 5972hp59

Analyte	Type	M Flag
Bromomethane	TARGET	M

Sample Total: 1

Analysis: VOA-8260B 5PPB D.O.D. **Sample Type:** Field Sample
Lab Id: 1010082-03RE1 **Client Id:** SA-PZ-157I1 **Instrument:** 5972hp59

Analyte	Type	M Flag
Bromofluorobenzene	SURROGATE	M

Sample Total: 1

Client: TETRA TECH	**Project:** CTO-WE08/112G02045/N62467-04-D-0057
Work Order: 1010082	**Case:**
Sdg: 1010082	

Total Manual Integrations: 6

GC and GC/MS Column and Trap Specifications Table

SDG #: 1010082

COLUMNS

Columns Utilized	Brand Name	Coating Material	ID (mm)	Film Thickness (um)	Length (m)
	GC Laboratory				
	Restek	RTX-5	0.53	1.0	30
	Restek	RTX-SMS	0.53	1.0	30
√	Restek	clpest	0.32	0.5	30
√	Restek	clpest2	0.32	0.42	30
	J&W	DB-210	0.53	1.0	30
	J&W	GS-GASPRO	0.32	N/A	30
	GC Volatiles Laboratory				
	Restek	RTX-Volatiles	0.53	2.0	30
	GC/MS Volatiles Laboratory				
	Restek	RTX-VMS	0.18	1.0	20
√	Supelco	SPB-624	0.32	1.8	60
	Supelco	SPB-624	0.53	3.0	75
	Phenomonex	ZB-624	0.32	1.8	60
	GC/MS Semivolatiles Laboratory				
√	Restek	RTX-5MS	0.32	0.25	30
	Phenomonex	ZB-5MS	0.32	0.25	30
	HPLC Laboratory				
	Supelco	Supelcosil LC-PAH	4.6	5.0	15 cm
	Supelco	Discovery RP Amide C16	4.6	5.0	25 cm
	Restek	Pinnacle Cyano	4.6	5.0	25 cm
	Restek	Allure C18	4.6	5.0	25 cm

TRAPS

	GC and GC/MS Volatiles Laboratory	
	Supelco J (BETXTRAP™)	* 7.7 cm Carbopack C
		* 1.2 cm Carbopack B
√	Supelco K (Vocarb3000)	* 10 cm of Carbopack B (Graphitized Carbons)
		* 6 cm of Carboxen 1000 (Carbon molecular sieves)
		* 1 cm of Carboxen 1001 (Carbon molecular sieves)

Rev. 28

*This table contains the GC columns (and volatile organic trap) used for the analysis of volatiles, semi-volatiles, pesticides and Aroclors by the SOM01.2 SOW.
Please see the SDG Narrative(s) for the specific fraction(s) relative to this SDG.

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Notification Regarding Manual Editing/Integration Flags

In some instances, manual adjustments to the software output are necessary to provide accurate data. These manual integrations are performed by the data reviewers, GC/MS operators, or GC chemists. An Extracted Ion Current Profile (EICP) or a GC chromatographic peak has been provided for the manual integration performed on each compound to demonstrate the accuracy of that process. The manual integrations are flagged on the quantitation report in the far right column beyond the FINAL concentration for GC/MS analysis, and in the "Flags" column for GC analysis. The manual editing/integration flags are:

M - Denotes that a manual integration has been performed for this compound. The manual integration was performed in order to provide the most accurate area count possible for the peak.

H - Denotes that the data reviewer, GC/MS operator, or GC Chemist has chosen an alternate peak within the retention time window from that chosen by the software for that compound. No manual integration is performed in choosing an alternate peak. The software still performs the integration.

MH - Denotes that an alternate peak has been chosen within the retention time window from that chosen by the software for that compound and also a manual integration of the chosen peak has been performed. The manual integration was performed in order to provide the most accurate area count possible for the peak.

L - Denotes that a data reviewer or GC/MS operator has selected an alternate library search. This is typically done when an additional tentatively identified compound (TIC) has been added to the number of peaks searched. No manual integration is performed in choosing an alternate peak. The software still performs the integration.

ML - Denotes that an alternate library search has been selected and a manual integration has also been performed. This is typically done when an additional TIC has been added and the TIC peak also required a manual integration.

The EPA CLP SOW documents require additional explanations for manual editing/integration. In the accompanying raw data packages, additional codes have been applied to the "M" flag and carry the following meanings;

M1 - The compound was not found by the automatic integration routine.

M2 - The compound was incorrectly integrated by the automatic integration routine.

M3 - The co-eluting compounds were incorrectly integrated by the automatic integration routine.

These codes will appear in the GC/MS and GC raw data.

Revision 7 (12/6/2005)

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DATA REPORTING QUALIFIERS

On the Form I, under the column labeled "Q" for qualifier, each result is flagged with the specific data reporting qualifiers listed below, as appropriate. Up to five qualifiers may be reported on Form I for each compound. The qualifiers used are:

U : This flag indicates the compound was analyzed for but not detected. The Contract Required Quantitation Limit (CRQL), or reporting limit, will be adjusted to reflect any dilution and, for soils, the percent moisture.

J : This flag indicates an estimated value. The flag is used as detailed below:

1. When estimating a concentration for tentatively identified compounds (TICs) where a response factor of 1:1 is assumed for the TIC analyte,

2. When the mass spectral and retention time data indicate the presence of a compound that meets the volatile and semivolatile GC/MS identification criteria, and the result is less than the adjusted CRQL (or Reporting Limit) but greater than zero, and

3. When the retention time data indicate the presence of a compound that meets the pesticide and/or Aroclor or other GC or HPLC identification criteria, and the result is less than the adjusted CRQL (or Reporting Limit) but greater than zero. For example, if the CRQL (or Reporting Limit) is 10 µg/L, but a concentration of 3 µg/L is calculated, it is reported as 3J.

N : This flag indicates presumptive evidence of a compound. This flag is only used for TICs, where the identification is based on a mass spectral library search and must be used with the J flag. For generic characterization of a TIC such as "chlorinated hydrocarbon" (or for an "unknown," with no matches ≥85% in the SOM01.2 SOW document), the N flag is not used.

P : In the EPA's Contract Laboratory Program (CLP), this flag is used for a pesticide/Aroclor target analyte, when there is greater than 25% difference for detected concentrations between the two GC columns. The lower of the two values is reported on the Form I and flagged with a P.
For SW-846 GC and HPLC analyses, when the Relative Percent Difference (RPD) is greater than 40% and there is no evidence of chromatographic anomalies or interferences, then the lower of the two values is reported and flagged with a P. When the RPD is equal to or less than 40%, our policy is to also report the lower of the two values, although the choice could be a project specific issue. These SW-846 policies are consistent with Method 8000C. If Method 8000B is required, the higher of the two values is reported. For certain HPLC analyses, if one of the HPLC columns displays co-elution of target analytes, all results are reported from a primary column

displaying no co-elution. Results are still flagged with a P if the RPD between columns is greater than 40%.

C : This flag applies to GC or HPLC results where the identification has been confirmed by GC/MS. If GC/MS confirmation was attempted but was unsuccessful, this flag is not applied; a laboratory-defined flag is used instead (see the X/Y/Z qualifier.)

B : This flag is used when the analyte is found in the associated blank as well as in the sample. It indicates probable blank contamination and warns the data user to take appropriate action. This flag is used for a TIC as well as for a positively identified target compound. The combination of flags BU or UB is not an allowable policy. Blank contaminants are flagged B only when they are detected in the sample.

E : This flag identifies compounds whose concentrations exceed the upper level of the calibration range of the instrument for that specific analysis. If one or more compounds have a concentration greater than the upper level of the calibration range, the sample or extract will be diluted and reanalyzed. All such compounds with a concentration greater than the upper level of the calibration range will have the result flagged with an E on Form I for the original analysis.

D : If a sample or extract is reanalyzed at a higher dilution factor, for example when the concentration of an analyte exceeds the upper calibration range, the DL suffix is appended to the sample number on the Form I for the more diluted sample, and **all** reported concentrations on that Form I are flagged with the D flag. This flag alerts data users that any discrepancies between the reported concentrations may be due to dilution of the sample or extract.

NOTE 1: The D flag is not applied to compounds which are not detected in the sample analysis i.e. compounds reported with the CRQL (or Reporting Limit) and the U flag.

NOTE 2: Separate Forms I are used for reporting the original analysis (Client Sample No. XXXXX) and the more diluted sample analysis (Client Sample No. XXXXXDL) i.e. the results from both analyses <u>are not combined</u> on a single Form I.

A: This flag indicates that a TIC is a suspected aldol-condensation product.

S: In the SOM01.2 SOW document, this flag is used to indicate an estimated value for Aroclor target compounds where a valid 5-point initial calibration was not performed prior to the analytes detection in a sample. If an "S" flag is used for a specific Aroclor, then a reanalysis of the sample is required after a valid 5-point calibration is performed for the detected Aroclor.

X/Y/Z : Other specific flags may be required to properly define the results. If used, the flags will be fully described in the SDG Narrative. The laboratory-defined flags are limited to X, Y, and Z.

PREPARATION BATCH SUMMARY

SW 8260B

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Batch: 0101505 Matrix: Water Preparation: SW 5030A/5030B

SAMPLE NAME	LAB SAMPLE ID	DATE PREPARED	INITIAL VOL/WT (mL)	FINAL VOL/WT (mL)
VBLKIU	0101505-BLK1	10/15/10 15:06	5.00	5.00
VIULCS	0101505-BS1	10/15/10 15:06	5.00	5.00
SA-PZ-15711	1010082-03	10/15/10 15:06	5.00	5.00
SA-PZ-15911	1010082-06	10/15/10 15:06	5.00	5.00
SA-PZ-16011	1010082-12	10/15/10 15:06	5.00	5.00
SA-PZ-13811	1010082-13	10/15/10 15:06	5.00	5.00

PREPARATION BATCH SUMMARY

SW 8260B

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Batch: 0101907 Matrix: Water Preparation: SW 5030A/5030B

SAMPLE NAME	LAB SAMPLE ID	DATE PREPARED	INITIAL VOL/WT (mL)	FINAL VOL/WT (mL)
VBLKJC	0101907-BLK1	10/19/10 13:13	5.00	5.00
VJCLCS	0101907-BS1	10/19/10 13:13	5.00	5.00
VJCLCSD	0101907-BSD1	10/19/10 13:13	5.00	5.00
SA-PZ-1571	1010082-02	10/19/10 13:13	5.00	5.00
SA-PZ-15711DL	1010082-03RE1	10/19/10 13:13	5.00	5.00

PREPARATION BATCH SUMMARY

SW 8260B

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Batch: 0102012 Matrix: Water Preparation: SW 5030A/5030B

SAMPLE NAME	LAB SAMPLE ID	DATE PREPARED	INITIAL VOL/WT (mL)	FINAL VOL/WT (mL)
VBLKJD	0102012-BLK1	10/20/10 15:07	5.00	5.00
VJDLCS	0102012-BS1	10/20/10 15:07	5.00	5.00
VJDLCSD	0102012-BSD1	10/20/10 15:07	5.00	5.00
SA-PZ-155I	1010082-04	10/20/10 15:07	5.00	5.00
SA-PZ-151II	1010082-05	10/20/10 15:07	5.00	5.00
SA-PZ-159I	1010082-07	10/20/10 15:07	5.00	5.00
SA-DUP01	1010082-08	10/20/10 15:07	5.00	5.00
SA-TB-01-20101011	1010082-09	10/20/10 15:07	5.00	5.00
SA-PZ-158I	1010082-10	10/20/10 15:07	5.00	5.00
SA-PZ-158II	1010082-11	10/20/10 15:07	5.00	5.00
SA-PZ-133I	1010082-14	10/20/10 15:07	5.00	5.00
SA-PZ-138I	1010082-15	10/20/10 15:07	5.00	5.00
SA-PZ-161I	1010082-16	10/20/10 15:07	5.00	5.00
SA-PZ-149II	1010082-17	10/20/10 15:07	5.00	5.00

PREPARATION BATCH SUMMARY

SW 8260B

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Batch: 0102112 Matrix: Water Preparation: SW 5030A/5030B

SAMPLE NAME	LAB SAMPLE ID	DATE PREPARED	INITIAL VOL/WT (mL)	FINAL VOL/WT (mL)
VBLKJH	0102112-BLK1	10/21/10 13:01	5.00	5.00
VJHLCS	0102112-BS1	10/21/10 13:01	5.00	5.00
VJHLCSD	0102112-BSD1	10/21/10 13:01	5.00	5.00
SA-PZ-160IMS	0102112-MS1	10/21/10 13:01	5.00	5.00
SA-PZ-160IMSD	0102112-MSD1	10/21/10 13:01	5.00	5.00
SA-PZ-160I	1010082-01	10/21/10 13:01	5.00	5.00
SA-PZ-159I1DL	1010082-06RE1	10/21/10 13:01	5.00	5.00
SA-PZ-160I1DL	1010082-12RE1	10/21/10 13:01	5.00	5.00
SA-PZ-138I1DL	1010082-13RE1	10/21/10 13:01	5.00	5.00
SA-PZ-139	1010082-18	10/21/10 13:01	5.00	5.00
SA-DUP02	1010082-19	10/21/10 13:01	5.00	5.00

HOLDING TIME SUMMARY

SW 8260B

Client: TETRA TECH SDG: 1010082

Project: CTO-WE08/112G02045/N62467-04-D-0057

Sample Name	Date Collected	Date Received	Date Prepared	Days to Prep	Max Days to Prep	Date Analyzed	Days to Analysis	Max Days to Analysis	Q
SA-PZ-160I	10/12/10	10/14/10	10/21/10	N/A	14.00	10/21/10	9.26	14.00	
SA-PZ-157I	10/11/10	10/14/10	10/19/10	N/A	14.00	10/19/10	8.02	14.00	
SA-PZ-157I1	10/11/10	10/14/10	10/15/10	N/A	14.00	10/15/10	4.08	14.00	
SA-PZ-157I1DL	10/11/10	10/14/10	10/19/10	N/A	14.00	10/19/10	8.00	14.00	
SA-PZ-155I	10/12/10	10/14/10	10/20/10	N/A	14.00	10/20/10	8.47	14.00	
SA-PZ-151I1	10/12/10	10/14/10	10/20/10	N/A	14.00	10/20/10	8.49	14.00	
SA-PZ-159I1	10/12/10	10/14/10	10/15/10	N/A	14.00	10/15/10	3.36	14.00	
SA-PZ-159I1DL	10/12/10	10/14/10	10/21/10	N/A	14.00	10/21/10	9.24	14.00	
SA-PZ-159I	10/12/10	10/14/10	10/20/10	N/A	14.00	10/20/10	8.41	14.00	
SA-DUP01	10/12/10	10/14/10	10/20/10	N/A	14.00	10/20/10	8.55	14.00	
SA-TB-01-20101011	10/11/10	10/14/10	10/20/10	N/A	14.00	10/20/10	9.21	14.00	
SA-PZ-158I	10/11/10	10/14/10	10/20/10	N/A	14.00	10/20/10	9.20	14.00	
SA-PZ-158I1	10/11/10	10/14/10	10/20/10	N/A	14.00	10/20/10	9.18	14.00	
SA-PZ-160I1	10/12/10	10/14/10	10/15/10	N/A	14.00	10/15/10	3.51	14.00	
SA-PZ-160I1DL	10/12/10	10/14/10	10/21/10	N/A	14.00	10/21/10	9.26	14.00	
SA-PZ-138I1	10/12/10	10/14/10	10/15/10	N/A	14.00	10/15/10	3.41	14.00	
SA-PZ-138I1DL	10/12/10	10/14/10	10/21/10	N/A	14.00	10/21/10	9.16	14.00	
SA-PZ-133I	10/12/10	10/14/10	10/20/10	N/A	14.00	10/20/10	8.37	14.00	
SA-PZ-138I	10/12/10	10/14/10	10/20/10	N/A	14.00	10/20/10	8.36	14.00	
SA-PZ-161I	10/12/10	10/14/10	10/20/10	N/A	14.00	10/20/10	8.36	14.00	
SA-PZ-149I1	10/12/10	10/14/10	10/20/10	N/A	14.00	10/20/10	8.34	14.00	
SA-PZ-139	10/12/10	10/14/10	10/21/10	N/A	14.00	10/21/10	8.98	14.00	

HOLDING TIME SUMMARY

SW 8260B

Client: TETRA TECH

SDG: 1010082

Project: CTO-WE08/112G02045/N62467-04-D-0057

Sample Name	Date Collected	Date Received	Date Prepared	Days to Prep	Max Days to Prep	Date Analyzed	Days to Analysis	Max Days to Analysis	Q
SA-DUP02	10/12/10	10/14/10	10/21/10	N/A	14.00	10/21/10	9.13	14.00	

Environmental Testing Laboratories

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CHAIN OF CUSTODY

501 Madison Ave.
Cary, NC 27513
Phone: 919-379-4100 Fax 919-379-4040

Page 1 of 2

Courier FedEx
Airbill No. 8741 9938 1519
Sampling Complete? Y or N

Client/Reporting Information

Company Name: Tetra Tech
Address: 5700 Lake Wright Dr. Suite 309
City: Norfolk State: VA Zip: 23502
Project Contact: Dave Brayack
Phone #: 757-461-3824
Sampler's Name: Jacob Birkett Kristi Francisco

Project Information

Project Name: NWIRP Calverton EIAB 3-month
Sampling Location: Southern Area
Turnaround time: Standard
Batch QC or Project Specific? If Specific, which Sample ID?
Are aqueous samples field filtered for metals? Y or N
Are high concentrations expected? Y or N? If yes, which ID(s)?

Requested Analysis (include method and bottle type)

Matrices: GW - Ground water; WW - Waste water; SW - Surface water; SO - Soil/Sediment; TB - Trip Blank; RI - Rinsate; WP - Wipe; O - Other

CompuChem No (Lab Use)	Field ID	Collection Date	Collection Time	Matrix	# of bottles	HCl	NaOH	HNO3	H2SO4	MEOH	Other	VOC (3 40mL glass vials)	MEE (40mL glass vial)	TOC (40mL glass vial)	Metals (Fe+Mn) (250mL plastic bottle)							pH / Sample Info (Lab Use) TOC	Metals
1010082-09	SA-TB-01-20101011	10-11-10	1330	TB	3	3						3						Lab prepared					
1010082-02	SA-PZ-157I-20101011	10-11-10	1410	GW	8	5		1	2			3	2	2	1							<2	<2
-10	SA-PZ-158I-20101011	10-11-10	1413	GW	3	3						3											
1010082-03	SA-PZ-157I1-20101011	10-11-10	1509	GW	8	5		1	2			3	2	2	1							<2	<2
-11	SA-PZ-158I1-20101011	10-11-10	1512	GW	3	3						3											
1010082-04	SA-PZ-155I-20101012	10-12-10	0835	GW	8	5		1	2			3	2	2	1							<2	<2
-05	SA-PZ-151I1-20101012	10-12-10	0836	GW	8	5		1	2			3	2	2	1							<2	<2
-12	SA-PZ-160I1-20101012*	10-12-10	0956	GW	8	5		1	2			3	2 ⓪	2 ⓪	1 ⓪ *							—	—
-06	SA-PZ-159I1-20101012	10-12-10	0957	GW	8	5		1	2			3	2	2	1							<2	<2
1010082-01	SA-PZ-160I-20101012	10-12-10	1050	GW	~~8~~ 14	~~5~~ 11		1	2			9	2	2	1			Run MS/MSD on VOC				<2	<2

Lab Use Only

Sample Unpacked By: Diane Byrd
Sample Order Entry By:
Samples Received in Good Condition? Y or N
If no, explain:

Cyanide samples checked for sulfide & chlorine? Y or NA
625 & Phenol samples checked for chlorine? Y or NA
608 samples checked for pH between 5.0-9.0? Y or NA

Comments

* SA-PZ-160I1-20101012 Only received VOC containers. No containers for MEE, TOC, or Metals. DB 10/14/10

Sample Custody

Relinquished by: Jacob Birkett	Date/Time: 10-13-10 0930	Received by: Diane Byrd	Date/Time: 10/14/10 1030
Relinquished by:	Date/Time:	Received by:	Date/Time:
Subcontact? Y or N If yes, where?		Custody Seal(s) intact? Y or N	On Ice? Y or N — Cooler Temp: 2.0 °C

Samples stored 60 days after date report mailed at no extra charge.

White & Yellow copy to lab • Pink copy for customer

SNP010

CHAIN OF CUSTODY

22697

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501 Madison Ave.
Cary, NC 27513
Phone: 919-379-4100 Fax 919-379-4040

Courier: FedEx
Airbill No.: 8741 9933 1519
Sampling Complete? Y or N

Client/Reporting Information

Company Name: Tetra Tech
Address: 5700 Lake Wright Dr. Suite 309
City: Norfolk State: VA Zip: 23502
Project Contact: Dave Brayack
Phone #: 757-461-3824
Sampler's Name: Jacob Birkett Kristi Francisco

Project Information

Project Name: NWIRP Calverton EIAB 3-month
Sampling Location: Southern Area
Turnaround time: Standard
Batch QC or Project Specific? If Specific, which Sample ID?
Are aqueous samples field filtered for metals? Y or N
Are high concentrations expected? Y or N? If yes, which ID(s)?

Matrices: GW - Ground water; WW - Waste water; SW - Surface water; SO - Soil/Sediment; TB - Trip Blank; RI - Rinsate; WP - Wipe; O - Other

CompuChem No. (Lab Use)	Field ID	Collection Date	Collection Time	Matrix	# of bottles	HCl	NaOH	HNO3	H2SO4	MEOH	Other	VOC 40mL glass vial	MEE 40mL glass vial	TOC 40mL glass vial	Metals (Fe+Mn) 250 mL plastic bottle	pH / Sample Info (Lab Use): TOC	pH / Sample Info (Lab Use): Metals
1010082-07	SA-PZ-159I-20101012	10-12-10	1104	GW	8	5		1	2			3	2	2	1	<2	<2
-13	SA-PZ-138II-20101012	10-12-10	1246	GW	3	3						3					
-14	SA-PZ-133I-20101012	10-12-10	1250	GW	3	3						3					
-15	SA-PZ-138I-20101012	10-12-10	1336	GW	3	3						3					
-16	SA-PZ-161I-20101012	10-12-10	1354	GW	3	3						3					
-17	SA-PZ-149II-20101012	10-12-10	1457	GW	3	3						3					
-18	SA-PZ-139-20101012	10-12-10	1508	GW	3	3						3					
-08	SA-Dup01-20101012	10-12-10	0800	GW	8	5		1	2			3	2	2	1	<2	<2
-19	SA-Dup02-20101012	10-12-10	1200	GW	3	3						3					

Lab Use Only

Sample Unpacked By: Diane Byrd
Sample Order Entry By: [illegible]
Samples Received in Good Condition? Y or N
If no, explain:

Cyanide samples checked for sulfide & chlorine? Y or NA
625 & Phenol samples checked for chlorine? Y or NA
608 samples checked for pH between 5.0-9.0? Y or NA

Comments

Sample Custody

Relinquished by: Jacob Birkett	Date/Time: 10-13-10 0930	Received by: Diane Byrd	Date/Time: 10/14/10 1030
Relinquished by:	Date/Time:	Received by:	Date/Time:

Subcontact? Y or N If yes, where?
Custody Seal(s) intact? Y or N
On Ice? Y or N
Cooler Temp: 2.0 °C

Samples stored 60 days after date report mailed at no extra charge.

White & Yellow copy to lab • Pink copy for customer

SW2010

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Sample ID Cross Reference

LAB WO	Project	Sample #	Field ID	Sample Date	Rec Date	DueDate	Chain of Custody ID
1010082	CTO-WE08/112G02045/N62467-04-D-0057	1010082-01	SA-PZ-160I	10/12/2010	10/14/2010	10/31/2010	SA-PZ-160I-20101012
1010082	CTO-WE08/112G02045/N62467-04-D-0057	1010082-02	SA-PZ-157I	10/11/2010	10/14/2010	10/31/2010	SA-PZ-157I-20101011
1010082	CTO-WE08/112G02045/N62467-04-D-0057	1010082-03	SA-PZ-157I1	10/11/2010	10/14/2010	10/31/2010	SA-PZ-157I1-20101011
1010082	CTO-WE08/112G02045/N62467-04-D-0057	1010082-04	SA-PZ-155I	10/12/2010	10/14/2010	10/31/2010	SA-PZ-155I-20101012
1010082	CTO-WE08/112G02045/N62467-04-D-0057	1010082-05	SA-PZ-151I1	10/12/2010	10/14/2010	10/31/2010	SA-PZ-151I1-20101012
1010082	CTO-WE08/112G02045/N62467-04-D-0057	1010082-06	SA-PZ-159I1	10/12/2010	10/14/2010	10/31/2010	SA-PZ-159I1-20101012
1010082	CTO-WE08/112G02045/N62467-04-D-0057	1010082-07	SA-PZ-159I	10/12/2010	10/14/2010	10/31/2010	SA-PZ-159I-20101012
1010082	CTO-WE08/112G02045/N62467-04-D-0057	1010082-08	SA-DUP01	10/12/2010	10/14/2010	10/31/2010	SA-DUP01-20101012
1010082	CTO-WE08/112G02045/N62467-04-D-0057	1010082-09	SA-TB-01-20101011	10/11/2010	10/14/2010	10/31/2010	
1010082	CTO-WE08/112G02045/N62467-04-D-0057	1010082-10	SA-PZ-158I	10/11/2010	10/14/2010	10/31/2010	SA-PZ-158I-20101011
1010082	CTO-WE08/112G02045/N62467-04-D-0057	1010082-11	SA-PZ-158I1	10/11/2010	10/14/2010	10/31/2010	SA-PZ-158I1-20101011
1010082	CTO-WE08/112G02045/N62467-04-D-0057	1010082-12	SA-PZ-160I1	10/12/2010	10/14/2010	10/31/2010	SA-PZ-160I1-20101012
1010082	CTO-WE08/112G02045/N62467-04-D-0057	1010082-13	SA-PZ-138I1	10/12/2010	10/14/2010	10/31/2010	SA-PZ-138I1-20101012
1010082	CTO-WE08/112G02045/N62467-04-D-0057	1010082-14	SA-PZ-133I	10/12/2010	10/14/2010	10/31/2010	SA-PZ-133I1-20101012
1010082	CTO-WE08/112G02045/N62467-04-D-0057	1010082-15	SA-PZ-138I	10/12/2010	10/14/2010	10/31/2010	SA-PZ-138I-20101012
1010082	CTO-WE08/112G02045/N62467-04-D-0057	1010082-16	SA-PZ-161I	10/12/2010	10/14/2010	10/31/2010	SA-PZ-161I-20101012
1010082	CTO-WE08/112G02045/N62467-04-D-0057	1010082-17	SA-PZ-149I1	10/12/2010	10/14/2010	10/31/2010	SA-PZ-149I1-20101012

LAB WO	Project	Sample #	Field ID	Sample Date	Rec Date	DueDate	Chain of Custody ID
1010082	CTO-WE08/112G02045/N62467-04-D-0057	1010082-18	SA-PZ-139	10/12/2010	10/14/2010	10/31/2010	SA-PZ-139-20101012
1010082	CTO-WE08/112G02045/N62467-04-D-0057	1010082-19	SA-DUP02	10/12/2010	10/14/2010	10/31/2010	SA-DUP02-20101012

LCS / LCS DUPLICATE RECOVERY

SW 8260B

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 0101505-BS1 Matrix: Water Client ID: VIULCS Batch: 0101505

ANALYTE	SPIKE ADDED (ug/L)	LCS CONCENTRATION (ug/L)	LCS % REC.	Q	QC LIMITS REC.
Dichlorodifluoromethane	50.00	58.03	116		30 - 155
Chloromethane	50.00	58.83	118		40 - 125
Vinyl chloride	50.00	57.43	115		50 - 145
Bromomethane	50.00	38.79	78		30 - 145
Chloroethane	50.00	53.18	106		60 - 135
Trichlorofluoromethane	50.00	51.72	103		60 - 145
1,1-Dichloroethene	50.00	54.25	108		70 - 130
Acetone	125.0	117.4	94		40 - 140
1,1,2-Trichloro-1,2,2-trifluoroethane	50.00	53.11	106		50 - 150
Carbon disulfide	50.00	56.14	112		35 - 160
Methyl acetate	50.00	45.95	92		50 - 150
Methylene chloride	50.00	53.89	108		55 - 140
trans-1,2-Dichloroethene	50.00	53.79	108		60 - 140
Methyl tert-butyl ether	50.00	50.25	100		65 - 125
1,1-Dichloroethane	50.00	54.32	109		70 - 135
cis-1,2-Dichloroethene	50.00	51.07	102		70 - 125
2-Butanone	125.0	118.8	95		30 - 150
Chloroform	50.00	54.00	108		65 - 135
1,1,1-Trichloroethane	50.00	52.74	105		65 - 130
Cyclohexane	50.00	54.32	109		50 - 150
1,1-Dichloropropene	50.00	53.40	107		75 - 130
Carbon tetrachloride	50.00	51.26	103		65 - 140
1,2-Dichloroethane	50.00	50.87	102		70 - 130
Benzene	50.00	54.36	109		80 - 120
Trichloroethene	50.00	50.59	101		70 - 125
Methylcyclohexane	50.00	54.94	110		50 - 150
1,2-Dichloropropane	50.00	54.06	108		75 - 125
Bromodichloromethane	50.00	53.17	106		75 - 120
cis-1,3-Dichloropropene	50.00	52.78	106		70 - 130
4-Methyl-2-pentanone	125.0	119.3	95		60 - 135

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LCS / LCS DUPLICATE RECOVERY

SW 8260B

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 0101505-BS1 Matrix: Water Client ID: VIULCS Batch: 0101505

ANALYTE	SPIKE ADDED (ug/L)	LCS CONCENTRATION (ug/L)	LCS % REC.	Q	QC LIMITS REC.
Toluene	50.00	53.81 B	108	B	75 - 120
trans-1,3-Dichloropropene	50.00	52.19	104		55 - 140
1,1,2-Trichloroethane	50.00	52.18	104		75 - 125
Tetrachloroethene	50.00	47.65	95		45 - 150
2-Hexanone	125.0	115.7	93		55 - 130
Dibromochloromethane	50.00	50.57	101		50 - 150
1,2-Dibromoethane	50.00	50.98	102		80 - 120
Chlorobenzene	50.00	53.44	107		80 - 120
Ethylbenzene	50.00	53.80	108		75 - 125
m,p-Xylene	100.0	107.0	107		75 - 130
o-Xylene	50.00	53.64	107		80 - 120
Styrene	50.00	52.77	106		65 - 135
Bromoform	50.00	46.96	94		70 - 130
Isopropylbenzene	50.00	54.33	109		75 - 125
1,1,2,2-Tetrachloroethane	50.00	54.92	110		65 - 130
1,3-Dichlorobenzene	50.00	51.89	104		75 - 125
1,4-Dichlorobenzene	50.00	52.73	105		75 - 125
1,2-Dichlorobenzene	50.00	52.41	105		70 - 120
1,2-Dibromo-3-chloropropane	50.00	51.24	102		50 - 130
1,2,4-Trichlorobenzene	50.00	51.21 B	102	B	65 - 135
Naphthalene	50.00	49.92 B	100	B	55 - 140
1,2-Dichloroethene (total)	100.0	104.9	105		50 - 150
Xylenes (total)	150.0	160.6	107		50 - 150

LCS / LCS DUPLICATE RECOVERY

SW 8260B

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 0101907-BS1 Matrix: Water Client ID: VJCLCS Batch: 0101907

ANALYTE	SPIKE ADDED (ug/L)	LCS CONCENTRATION (ug/L)	LCS % REC.	Q	QC LIMITS REC.
Dichlorodifluoromethane	50.00	56.82	114		30 - 155
Chloromethane	50.00	54.67	109		40 - 125
Vinyl chloride	50.00	55.88	112		50 - 145
Bromomethane	50.00	51.92	104		30 - 145
Chloroethane	50.00	51.74	103		60 - 135
Trichlorofluoromethane	50.00	51.54	103		60 - 145
1,1-Dichloroethene	50.00	52.09	104		70 - 130
Acetone	125.0	121.3	97		40 - 140
1,1,2-Trichloro-1,2,2-trifluoroethane	50.00	52.68	105		50 - 150
Carbon disulfide	50.00	54.46	109		35 - 160
Methyl acetate	50.00	45.59	91		50 - 150
Methylene chloride	50.00	52.64	105		55 - 140
trans-1,2-Dichloroethene	50.00	52.07	104		60 - 140
Methyl tert-butyl ether	50.00	50.92	102		65 - 125
1,1-Dichloroethane	50.00	52.41	105		70 - 135
cis-1,2-Dichloroethene	50.00	51.24	102		70 - 125
2-Butanone	125.0	123.8	99		30 - 150
Chloroform	50.00	53.42	107		65 - 135
1,1,1-Trichloroethane	50.00	51.99	104		65 - 130
Cyclohexane	50.00	52.98	106		50 - 150
1,1-Dichloropropene	50.00	51.32	103		75 - 130
Carbon tetrachloride	50.00	50.63	101		65 - 140
1,2-Dichloroethane	50.00	50.32	101		70 - 130
Benzene	50.00	51.93	104		80 - 120
Trichloroethene	50.00	49.97	100		70 - 125
Methylcyclohexane	50.00	51.57	103		50 - 150
1,2-Dichloropropane	50.00	52.71	105		75 - 125
Bromodichloromethane	50.00	52.05	104		75 - 120
cis-1,3-Dichloropropene	50.00	49.39	99		70 - 130
4-Methyl-2-pentanone	125.0	122.4	98		60 - 135

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LCS / LCS DUPLICATE RECOVERY

SW 8260B

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 0101907-BS1 Matrix: Water Client ID: VJCLCS Batch: 0101907

ANALYTE	SPIKE ADDED (ug/L)	LCS CONCENTRATION (ug/L)	LCS % REC.	Q	QC LIMITS REC.
Toluene	50.00	50.16 B	100	B	75 - 120
trans-1,3-Dichloropropene	50.00	49.50	99		55 - 140
1,1,2-Trichloroethane	50.00	52.67	105		75 - 125
Tetrachloroethene	50.00	44.99	90		45 - 150
2-Hexanone	125.0	117.6	94		55 - 130
Dibromochloromethane	50.00	50.78	102		50 - 150
1,2-Dibromoethane	50.00	50.86	102		80 - 120
Chlorobenzene	50.00	49.70	99		80 - 120
Ethylbenzene	50.00	48.61	97		75 - 125
m,p-Xylene	100.0	96.23	96		75 - 130
o-Xylene	50.00	48.44	97		80 - 120
Styrene	50.00	47.96	96		65 - 135
Bromoform	50.00	46.10	92		70 - 130
Isopropylbenzene	50.00	48.51	97		75 - 125
1,1,2,2-Tetrachloroethane	50.00	54.56	109		65 - 130
1,3-Dichlorobenzene	50.00	46.08	92		75 - 125
1,4-Dichlorobenzene	50.00	46.45	93		75 - 125
1,2-Dichlorobenzene	50.00	48.25	96		70 - 120
1,2-Dibromo-3-chloropropane	50.00	50.03	100		50 - 130
1,2,4-Trichlorobenzene	50.00	42.05 B	84	B	65 - 135
Naphthalene	50.00	47.10 B	94	B	55 - 140
1,2-Dichloroethene (total)	100.0	103.3	103		50 - 150
Xylenes (total)	150.0	144.7	96		50 - 150

ANALYTE	SPIKE ADDED (ug/L)	LCSD CONCENTRATION (ug/L)	LCSD % REC. #	% RPD #	QC LIMITS RPD	Q	REC.
Dichlorodifluoromethane	50.00	54.99	110	3	30		30 - 155
Chloromethane	50.00	53.51	107	2	30		40 - 125
Vinyl chloride	50.00	54.35	109	3	30		50 - 145
Bromomethane	50.00	50.30	101	3	30		30 - 145

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LCS / LCS DUPLICATE RECOVERY

SW 8260B

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 0101907-BSD1 Matrix: Water Client ID: VJCLCSD Batch: 0101907

ANALYTE	SPIKE ADDED (ug/L)	LCSD CONCENTRATION (ug/L)	LCSD % REC. #	% RPD #	QC LIMITS RPD	Q	REC.
Chloroethane	50.00	49.28	99	5	30		60 - 135
Trichlorofluoromethane	50.00	50.33	101	2	30		60 - 145
1,1-Dichloroethene	50.00	50.46	101	3	30		70 - 130
Acetone	125.0	121.1	97	0.1	30		40 - 140
1,1,2-Trichloro-1,2,2-trifluoroethane	50.00	52.65	105	0.06	30		50 - 150
Carbon disulfide	50.00	52.74	105	3	30		35 - 160
Methyl acetate	50.00	45.39	91	0.4	30		50 - 150
Methylene chloride	50.00	52.17	104	0.9	30		55 - 140
trans-1,2-Dichloroethene	50.00	49.88	100	4	30		60 - 140
Methyl tert-butyl ether	50.00	50.27	101	1	30		65 - 125
1,1-Dichloroethane	50.00	51.71	103	1	30		70 - 135
cis-1,2-Dichloroethene	50.00	49.40	99	4	30		70 - 125
2-Butanone	125.0	118.1	94	5	30		30 - 150
Chloroform	50.00	52.57	105	2	30		65 - 135
1,1,1-Trichloroethane	50.00	50.91	102	2	30		65 - 130
Cyclohexane	50.00	53.82	108	2	30		50 - 150
1,1-Dichloropropene	50.00	50.55	101	2	30		75 - 130
Carbon tetrachloride	50.00	50.29	101	0.7	30		65 - 140
1,2-Dichloroethane	50.00	50.26	101	0.1	30		70 - 130
Benzene	50.00	51.28	103	1	30		80 - 120
Trichloroethene	50.00	47.51	95	5	30		70 - 125
Methylcyclohexane	50.00	52.96	106	3	30		50 - 150
1,2-Dichloropropane	50.00	52.65	105	0.1	30		75 - 125
Bromodichloromethane	50.00	51.50	103	1	30		75 - 120
cis-1,3-Dichloropropene	50.00	48.57	97	2	30		70 - 130
4-Methyl-2-pentanone	125.0	119.0	95	3	30		60 - 135
Toluene	50.00	48.81 B	98	3	30	B	75 - 120
trans-1,3-Dichloropropene	50.00	47.77	96	4	30		55 - 140
1,1,2-Trichloroethane	50.00	52.16	104	1	30		75 - 125
Tetrachloroethene	50.00	43.04	86	4	30		45 - 150
2-Hexanone	125.0	115.3	92	2	30		55 - 130

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LCS / LCS DUPLICATE RECOVERY

SW 8260B

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 0101907-BSD1 Matrix: Water Client ID: VJCLCSD Batch: 0101907

ANALYTE	SPIKE ADDED (ug/L)	LCSD CONCENTRATION (ug/L)	LCSD % REC. #	% RPD #	QC LIMITS RPD	Q	REC.
Dibromochloromethane	50.00	48.99	98	4	30		50 - 150
1,2-Dibromoethane	50.00	50.50	101	0.7	30		80 - 120
Chlorobenzene	50.00	47.93	96	4	30		80 - 120
Ethylbenzene	50.00	47.53	95	2	30		75 - 125
m,p-Xylene	100.0	93.47	93	3	30		75 - 130
o-Xylene	50.00	47.48	95	2	30		80 - 120
Styrene	50.00	46.48	93	3	30		65 - 135
Bromoform	50.00	45.01	90	2	30		70 - 130
Isopropylbenzene	50.00	47.93	96	1	30		75 - 125
1,1,2,2-Tetrachloroethane	50.00	55.88	112	2	30		65 - 130
1,3-Dichlorobenzene	50.00	44.22	88	4	30		75 - 125
1,4-Dichlorobenzene	50.00	44.14	88	5	30		75 - 125
1,2-Dichlorobenzene	50.00	47.21	94	2	30		70 - 120
1,2-Dibromo-3-chloropropane	50.00	48.08	96	4	30		50 - 130
1,2,4-Trichlorobenzene	50.00	37.46 B	75	12	30	B	65 - 135
Naphthalene	50.00	48.43 B	97	3	30	B	55 - 140
1,2-Dichloroethene (total)	100.0	99.28	99	4	30		50 - 150
Xylenes (total)	150.0	140.9	94	3	30		50 - 150

LCS / LCS DUPLICATE RECOVERY

SW 8260B

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 0102012-BS1 Matrix: Water Client ID: VJDLCS Batch: 0102012

ANALYTE	SPIKE ADDED (ug/L)	LCS CONCENTRATION (ug/L)	LCS % REC.	Q	QC LIMITS REC.
Dichlorodifluoromethane	50.00	49.96	100		30 - 155
Chloromethane	50.00	47.96	96		40 - 125
Vinyl chloride	50.00	49.88	100		50 - 145
Bromomethane	50.00	55.41	111		30 - 145
Chloroethane	50.00	47.22	94		60 - 135
Trichlorofluoromethane	50.00	49.00	98		60 - 145
1,1-Dichloroethene	50.00	47.93	96		70 - 130
Acetone	125.0	115.7	93		40 - 140
1,1,2-Trichloro-1,2,2-trifluoroethane	50.00	48.86	98		50 - 150
Carbon disulfide	50.00	49.17	98		35 - 160
Methyl acetate	50.00	50.05	100		50 - 150
Methylene chloride	50.00	54.24	108		55 - 140
trans-1,2-Dichloroethene	50.00	47.84	96		60 - 140
Methyl tert-butyl ether	50.00	50.93	102		65 - 125
1,1-Dichloroethane	50.00	49.92	100		70 - 135
cis-1,2-Dichloroethene	50.00	48.57	97		70 - 125
2-Butanone	125.0	125.2	100		30 - 150
Chloroform	50.00	50.39	101		65 - 135
1,1,1-Trichloroethane	50.00	48.43	97		65 - 130
Cyclohexane	50.00	49.51	99		50 - 150
1,1-Dichloropropene	50.00	49.62	99		75 - 130
Carbon tetrachloride	50.00	48.73	97		65 - 140
1,2-Dichloroethane	50.00	49.96	100		70 - 130
Benzene	50.00	48.94	98		80 - 120
Trichloroethene	50.00	47.73	95		70 - 125
Methylcyclohexane	50.00	49.91	100		50 - 150
1,2-Dichloropropane	50.00	49.67	99		75 - 125
Bromodichloromethane	50.00	50.47	101		75 - 120
cis-1,3-Dichloropropene	50.00	51.24	102		70 - 130
4-Methyl-2-pentanone	125.0	125.2	100		60 - 135

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LCS / LCS DUPLICATE RECOVERY

SW 8260B

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 0102012-BS1 Matrix: Water Client ID: VJDLCS Batch: 0102012

ANALYTE	SPIKE ADDED (ug/L)	LCS CONCENTRATION (ug/L)	LCS % REC.	Q	QC LIMITS REC.
Toluene	50.00	48.59	97		75 - 120
trans-1,3-Dichloropropene	50.00	51.44	103		55 - 140
1,1,2-Trichloroethane	50.00	51.93	104		75 - 125
Tetrachloroethene	50.00	47.55	95		45 - 150
2-Hexanone	125.0	127.4	102		55 - 130
Dibromochloromethane	50.00	51.22	102		50 - 150
1,2-Dibromoethane	50.00	50.56	101		80 - 120
Chlorobenzene	50.00	49.90	100		80 - 120
Ethylbenzene	50.00	49.73	99		75 - 125
m,p-Xylene	100.0	97.46	97		75 - 130
o-Xylene	50.00	49.18	98		80 - 120
Styrene	50.00	50.54	101		65 - 135
Bromoform	50.00	49.72	99		70 - 130
Isopropylbenzene	50.00	49.28	99		75 - 125
1,1,2,2-Tetrachloroethane	50.00	52.68	105		65 - 130
1,3-Dichlorobenzene	50.00	49.44	99		75 - 125
1,4-Dichlorobenzene	50.00	49.44	99		75 - 125
1,2-Dichlorobenzene	50.00	50.42	101		70 - 120
1,2-Dibromo-3-chloropropane	50.00	49.06	98		50 - 130
1,2,4-Trichlorobenzene	50.00	49.51	99		65 - 135
Naphthalene	50.00	51.73 B	103	B	55 - 140
1,2-Dichloroethene (total)	100.0	96.41	96		50 - 150
Xylenes (total)	150.0	146.6	98		50 - 150

ANALYTE	SPIKE ADDED (ug/L)	LCSD CONCENTRATION (ug/L)	LCSD % REC. #	% RPD #	QC LIMITS RPD	Q	REC.
Dichlorodifluoromethane	50.00	47.57	95	5	30		30 - 155
Chloromethane	50.00	46.05	92	4	30		40 - 125
Vinyl chloride	50.00	47.43	95	5	30		50 - 145
Bromomethane	50.00	52.60	105	5	30		30 - 145

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LCS / LCS DUPLICATE RECOVERY

SW 8260B

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 0102012-BSD1 Matrix: Water Client ID: VJDLCSD Batch: 0102012

ANALYTE	SPIKE ADDED (ug/L)	LCSD CONCENTRATION (ug/L)	LCSD % REC. #	% RPD #	QC LIMITS RPD	Q	REC.
Chloroethane	50.00	45.49	91	4	30		60 - 135
Trichlorofluoromethane	50.00	47.20	94	4	30		60 - 145
1,1-Dichloroethene	50.00	45.94	92	4	30		70 - 130
Acetone	125.0	113.1	90	2	30		40 - 140
1,1,2-Trichloro-1,2,2-trifluoroethane	50.00	46.50	93	5	30		50 - 150
Carbon disulfide	50.00	47.77	96	3	30		35 - 160
Methyl acetate	50.00	47.14	94	6	30		50 - 150
Methylene chloride	50.00	51.81	104	5	30		55 - 140
trans-1,2-Dichloroethene	50.00	46.41	93	3	30		60 - 140
Methyl tert-butyl ether	50.00	49.19	98	3	30		65 - 125
1,1-Dichloroethane	50.00	49.23	98	1	30		70 - 135
cis-1,2-Dichloroethene	50.00	47.34	95	3	30		70 - 125
2-Butanone	125.0	118.6	95	5	30		30 - 150
Chloroform	50.00	48.89	98	3	30		65 - 135
1,1,1-Trichloroethane	50.00	47.90	96	1	30		65 - 130
Cyclohexane	50.00	46.74	93	6	30		50 - 150
1,1-Dichloropropene	50.00	47.33	95	5	30		75 - 130
Carbon tetrachloride	50.00	46.96	94	4	30		65 - 140
1,2-Dichloroethane	50.00	49.17	98	2	30		70 - 130
Benzene	50.00	48.59	97	0.7	30		80 - 120
Trichloroethene	50.00	47.35	95	0.8	30		70 - 125
Methylcyclohexane	50.00	47.53	95	5	30		50 - 150
1,2-Dichloropropane	50.00	49.63	99	0.09	30		75 - 125
Bromodichloromethane	50.00	49.44	99	2	30		75 - 120
cis-1,3-Dichloropropene	50.00	49.72	99	3	30		70 - 130
4-Methyl-2-pentanone	125.0	121.1	97	3	30		60 - 135
Toluene	50.00	47.44	95	2	30		75 - 120
trans-1,3-Dichloropropene	50.00	50.50	101	2	30		55 - 140
1,1,2-Trichloroethane	50.00	50.19	100	3	30		75 - 125
Tetrachloroethene	50.00	45.02	90	5	30		45 - 150
2-Hexanone	125.0	119.8	96	6	30		55 - 130

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LCS / LCS DUPLICATE RECOVERY

SW 8260B

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 0102012-BSD1 Matrix: Water Client ID: VJDLCSD Batch: 0102012

ANALYTE	SPIKE ADDED (ug/L)	LCSD CONCENTRATION (ug/L)	LCSD % REC. #	% RPD #	QC LIMITS RPD	Q	REC.
Dibromochloromethane	50.00	50.07	100	2	30		50 - 150
1,2-Dibromoethane	50.00	49.30	99	3	30		80 - 120
Chlorobenzene	50.00	49.13	98	2	30		80 - 120
Ethylbenzene	50.00	47.72	95	4	30		75 - 125
m,p-Xylene	100.0	95.79	96	2	30		75 - 130
o-Xylene	50.00	48.64	97	1	30		80 - 120
Styrene	50.00	49.60	99	2	30		65 - 135
Bromoform	50.00	48.26	97	3	30		70 - 130
Isopropylbenzene	50.00	48.08	96	2	30		75 - 125
1,1,2,2-Tetrachloroethane	50.00	49.96	100	5	30		65 - 130
1,3-Dichlorobenzene	50.00	47.14	94	5	30		75 - 125
1,4-Dichlorobenzene	50.00	47.40	95	4	30		75 - 125
1,2-Dichlorobenzene	50.00	47.75	96	5	30		70 - 120
1,2-Dibromo-3-chloropropane	50.00	46.16	92	6	30		50 - 130
1,2,4-Trichlorobenzene	50.00	47.45	95	4	30		65 - 135
Naphthalene	50.00	50.64 B	101	2	30	B	55 - 140
1,2-Dichloroethene (total)	100.0	93.74	94	3	30		50 - 150
Xylenes (total)	150.0	144.4	96	2	30		50 - 150

LCS / LCS DUPLICATE RECOVERY

SW 8260B

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 0102112-BS1 Matrix: Water Client ID: VJHLCS Batch: 0102112

ANALYTE	SPIKE ADDED (ug/L)	LCS CONCENTRATION (ug/L)	LCS % REC.	Q	QC LIMITS REC.
Dichlorodifluoromethane	50.00	45.97	92		30 - 155
Chloromethane	50.00	42.98	86		40 - 125
Vinyl chloride	50.00	39.04	78		50 - 145
Bromomethane	50.00	37.16	74		30 - 145
Chloroethane	50.00	35.14	70		60 - 135
Trichlorofluoromethane	50.00	45.82	92		60 - 145
1,1-Dichloroethene	50.00	47.88	96		70 - 130
Acetone	125.0	108.1	87		40 - 140
1,1,2-Trichloro-1,2,2-trifluoroethane	50.00	48.33	97		50 - 150
Carbon disulfide	50.00	48.84	98		35 - 160
Methyl acetate	50.00	45.56	91		50 - 150
Methylene chloride	50.00	53.96 B	108	B	55 - 140
trans-1,2-Dichloroethene	50.00	47.52	95		60 - 140
Methyl tert-butyl ether	50.00	49.16	98		65 - 125
1,1-Dichloroethane	50.00	47.97	96		70 - 135
cis-1,2-Dichloroethene	50.00	47.72	95		70 - 125
2-Butanone	125.0	109.7	88		30 - 150
Chloroform	50.00	48.24	96		65 - 135
1,1,1-Trichloroethane	50.00	47.75	95		65 - 130
Cyclohexane	50.00	49.01	98		50 - 150
1,1-Dichloropropene	50.00	48.93	98		75 - 130
Carbon tetrachloride	50.00	48.48	97		65 - 140
1,2-Dichloroethane	50.00	46.79	94		70 - 130
Benzene	50.00	49.33	99		80 - 120
Trichloroethene	50.00	50.12	100		70 - 125
Methylcyclohexane	50.00	51.66	103		50 - 150
1,2-Dichloropropane	50.00	48.96	98		75 - 125
Bromodichloromethane	50.00	48.94	98		75 - 120
cis-1,3-Dichloropropene	50.00	50.15	100		70 - 130
4-Methyl-2-pentanone	125.0	107.4	86		60 - 135

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LCS / LCS DUPLICATE RECOVERY

SW 8260B

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 0102112-BS1 Matrix: Water Client ID: VJHLCS Batch: 0102112

ANALYTE	SPIKE ADDED (ug/L)	LCS CONCENTRATION (ug/L)	LCS % REC.	Q	QC LIMITS REC.
Toluene	50.00	46.91 B	94	B	75 - 120
trans-1,3-Dichloropropene	50.00	47.41	95		55 - 140
1,1,2-Trichloroethane	50.00	47.85	96		75 - 125
Tetrachloroethene	50.00	48.73	97		45 - 150
2-Hexanone	125.0	110.0	88		55 - 130
Dibromochloromethane	50.00	46.56	93		50 - 150
1,2-Dibromoethane	50.00	48.34	97		80 - 120
Chlorobenzene	50.00	50.27	101		80 - 120
Ethylbenzene	50.00	50.92	102		75 - 125
m,p-Xylene	100.0	101.5	102		75 - 130
o-Xylene	50.00	51.68	103		80 - 120
Styrene	50.00	52.20	104		65 - 135
Bromoform	50.00	48.12	96		70 - 130
Isopropylbenzene	50.00	51.25	102		75 - 125
1,1,2,2-Tetrachloroethane	50.00	45.77	92		65 - 130
1,3-Dichlorobenzene	50.00	49.79	100		75 - 125
1,4-Dichlorobenzene	50.00	49.05	98		75 - 125
1,2-Dichlorobenzene	50.00	50.12	100		70 - 120
1,2-Dibromo-3-chloropropane	50.00	48.48	97		50 - 130
1,2,4-Trichlorobenzene	50.00	50.41 B	101	B	65 - 135
Naphthalene	50.00	48.82 B	98	B	55 - 140
1,2-Dichloroethene (total)	100.0	95.24	95		50 - 150
Xylenes (total)	150.0	153.2	102		50 - 150

ANALYTE	SPIKE ADDED (ug/L)	LCSD CONCENTRATION (ug/L)	LCSD % REC. #	% RPD #	QC LIMITS RPD	Q	REC.
Dichlorodifluoromethane	50.00	46.09	92	0.3	30		30 - 155
Chloromethane	50.00	41.28	83	4	30		40 - 125
Vinyl chloride	50.00	39.84	80	2	30		50 - 145
Bromomethane	50.00	50.94	102	31	30		30 - 145

Environmental Testing Laboratories

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LCS / LCS DUPLICATE RECOVERY

SW 8260B

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 0102112-BSD1 Matrix: Water Client ID: VJHLCSD Batch: 0102112

ANALYTE	SPIKE ADDED (ug/L)	LCSD CONCENTRATION (ug/L)	LCSD % REC. #	% RPD #	QC LIMITS RPD	Q	REC.
Chloroethane	50.00	41.73	83	17	30		60 - 135
Trichlorofluoromethane	50.00	46.51	93	1	30		60 - 145
1,1-Dichloroethene	50.00	47.84	96	0.08	30		70 - 130
Acetone	125.0	108.9	87	0.7	30		40 - 140
1,1,2-Trichloro-1,2,2-trifluoroethane	50.00	49.96	100	3	30		50 - 150
Carbon disulfide	50.00	50.15	100	3	30		35 - 160
Methyl acetate	50.00	47.05	94	3	30		50 - 150
Methylene chloride	50.00	53.41 B	107	1	30	B	55 - 140
trans-1,2-Dichloroethene	50.00	48.78	98	3	30		60 - 140
Methyl tert-butyl ether	50.00	51.26	103	4	30		65 - 125
1,1-Dichloroethane	50.00	49.98	100	4	30		70 - 135
cis-1,2-Dichloroethene	50.00	49.22	98	3	30		70 - 125
2-Butanone	125.0	114.9	92	5	30		30 - 150
Chloroform	50.00	49.60	99	3	30		65 - 135
1,1,1-Trichloroethane	50.00	48.99	98	3	30		65 - 130
Cyclohexane	50.00	49.43	99	0.9	30		50 - 150
1,1-Dichloropropene	50.00	49.84	100	2	30		75 - 130
Carbon tetrachloride	50.00	50.12	100	3	30		65 - 140
1,2-Dichloroethane	50.00	47.42	95	1	30		70 - 130
Benzene	50.00	49.57	99	0.5	30		80 - 120
Trichloroethene	50.00	49.93	100	0.4	30		70 - 125
Methylcyclohexane	50.00	51.80	104	0.3	30		50 - 150
1,2-Dichloropropane	50.00	49.85	100	2	30		75 - 125
Bromodichloromethane	50.00	49.57	99	1	30		75 - 120
cis-1,3-Dichloropropene	50.00	51.70	103	3	30		70 - 130
4-Methyl-2-pentanone	125.0	112.6	90	5	30		60 - 135
Toluene	50.00	47.03 B	94	0.3	30	B	75 - 120
trans-1,3-Dichloropropene	50.00	49.43	99	4	30		55 - 140
1,1,2-Trichloroethane	50.00	50.43	101	5	30		75 - 125
Tetrachloroethene	50.00	48.92	98	0.4	30		45 - 150
2-Hexanone	125.0	113.0	90	3	30		55 - 130

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LCS / LCS DUPLICATE RECOVERY

SW 8260B

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 0102112-BSD1 Matrix: Water Client ID: VJHLCSD Batch: 0102112

ANALYTE	SPIKE ADDED (ug/L)	LCSD CONCENTRATION (ug/L)	LCSD % REC. #	% RPD #	QC LIMITS RPD	Q	REC.
Dibromochloromethane	50.00	49.72	99	7	30		50 - 150
1,2-Dibromoethane	50.00	50.43	101	4	30		80 - 120
Chlorobenzene	50.00	49.27	99	2	30		80 - 120
Ethylbenzene	50.00	49.43	99	3	30		75 - 125
m,p-Xylene	100.0	96.82	97	5	30		75 - 130
o-Xylene	50.00	49.21	98	5	30		80 - 120
Styrene	50.00	49.66	99	5	30		65 - 135
Bromoform	50.00	51.20	102	6	30		70 - 130
Isopropylbenzene	50.00	48.97	98	5	30		75 - 125
1,1,2,2-Tetrachloroethane	50.00	50.55	101	10	30		65 - 130
1,3-Dichlorobenzene	50.00	50.77	102	2	30		75 - 125
1,4-Dichlorobenzene	50.00	49.35	99	0.6	30		75 - 125
1,2-Dichlorobenzene	50.00	50.04	100	0.2	30		70 - 120
1,2-Dibromo-3-chloropropane	50.00	50.57	101	4	30		50 - 130
1,2,4-Trichlorobenzene	50.00	50.77 B	102	0.7	30	B	65 - 135
Naphthalene	50.00	51.63 B	103	6	30	B	55 - 140
1,2-Dichloroethene (total)	100.0	98.00	98	3	30		50 - 150
Xylenes (total)	150.0	146.0	97	5	30		50 - 150

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY

SW 8260B

SA-PZ-160IMS

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 0102112-MS1 % Solid: NA Matrix: Water Lab Source ID: 1010082-01 Source Sample: SA-PZ-160I

ANALYTE	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC.	Q	QC LIMITS REC.
Dichlorodifluoromethane	50.00	0.50 U	50.39	101		30 - 155
Chloromethane	50.00	0.50 U	49.12	98		40 - 125
Vinyl chloride	50.00	0.50 U	48.08	96		50 - 145
Bromomethane	50.00	2.0 U	53.92	108		30 - 145
Chloroethane	50.00	13	109.3	192	J	60 - 135
Trichlorofluoromethane	50.00	0.50 U	50.96	102		60 - 145
1,1-Dichloroethene	50.00	11	61.56	101		70 - 130
Acetone	125.0	5.0 U	109.1	87		40 - 140
1,1,2-Trichloro-1,2,2-trifluoroethane	50.00	2.0 U	52.14	104		50 - 150
Carbon disulfide	50.00	0.50 U	55.14	110		35 - 160
Methyl acetate	50.00	2.0 U	47.96	96		50 - 150
Methylene chloride	50.00	0.50 U	55.52 B	111		55 - 140
trans-1,2-Dichloroethene	50.00	0.50 U	51.62	103		60 - 140
Methyl tert-butyl ether	50.00	0.50 U	50.82	102		65 - 125
1,1-Dichloroethane	50.00	150	184.7	73		70 - 135
cis-1,2-Dichloroethene	50.00	2.0 U	51.65	103		70 - 125
2-Butanone	125.0	5.0 U	116.3	93		30 - 150
Chloroform	50.00	0.50 U	52.89	106		65 - 135
1,1,1-Trichloroethane	50.00	37	85.14	97		65 - 130
Cyclohexane	50.00	0.50 U	53.51	107		50 - 150
1,1-Dichloropropene	50.00	0.50 U	54.36	109		75 - 130
Carbon tetrachloride	50.00	0.50 U	52.21	104		65 - 140
1,2-Dichloroethane	50.00	0.50 U	51.83	104		70 - 130
Benzene	50.00	0.50 U	53.49	107		80 - 120
Trichloroethene	50.00	0.50 U	51.22	102		70 - 125
Methylcyclohexane	50.00	0.50 U	53.79	108		50 - 150
1,2-Dichloropropane	50.00	2.0 U	53.97	108		75 - 125
Bromodichloromethane	50.00	0.50 U	52.50	105		75 - 120
cis-1,3-Dichloropropene	50.00	2.0 U	53.29	107		70 - 130
4-Methyl-2-pentanone	125.0	1.3 U	116.3	93		60 - 135
Toluene	50.00	0.40 JB	51.93 B	103		75 - 120
trans-1,3-Dichloropropene	50.00	0.50 U	54.34	109		55 - 140
1,1,2-Trichloroethane	50.00	2.0 U	53.33	107		75 - 125
Tetrachloroethene	50.00	0.50 U	51.49	103		45 - 150

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MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY

SW 8260B

SA-PZ-160IMS

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 0102112-MS1 % Solid: NA Matrix: Water Lab Source ID: 1010082-01 Source Sample: SA-PZ-160I

ANALYTE	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC.	Q	QC LIMITS REC.
2-Hexanone	125.0	1.3 U	114.8	92		55 - 130
Dibromochloromethane	50.00	0.50 U	51.20	102		50 - 150
1,2-Dibromoethane	50.00	0.50 U	50.96	102		80 - 120
Chlorobenzene	50.00	0.50 U	54.17	108		80 - 120
Ethylbenzene	50.00	0.50 U	53.91	108		75 - 125
m,p-Xylene	100.0	1.0 U	105.5	106		75 - 130
o-Xylene	50.00	0.50 U	53.28	107		80 - 120
Styrene	50.00	0.50 U	52.19	104		65 - 135
Bromoform	50.00	2.0 U	50.37	101		70 - 130
Isopropylbenzene	50.00	0.50 U	53.48	107		75 - 125
1,1,2,2-Tetrachloroethane	50.00	2.0 U	51.19	102		65 - 130
1,3-Dichlorobenzene	50.00	0.50 U	52.24	104		75 - 125
1,4-Dichlorobenzene	50.00	0.50 U	52.47	105		75 - 125
1,2-Dichlorobenzene	50.00	0.50 U	52.08	104		70 - 120
1,2-Dibromo-3-chloropropane	50.00	2.0 U	46.59	93		50 - 130
1,2,4-Trichlorobenzene	50.00	0.50 U	51.22 B	102		65 - 135
Naphthalene	50.00	2.0 U	43.90 B	88		55 - 140
1,2-Dichloroethene (total)	100.0	0.50 U	103.3	103		50 - 150
Xylenes (total)	150.0	0.50 U	158.8	106		50 - 150

ANALYTE	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC. #	% RPD	Q	QC LIMITS RPD	QC LIMITS REC.
Dichlorodifluoromethane	50.00	50.46	101	0.1		30	30 - 155
Chloromethane	50.00	45.25	91	8		30	40 - 125
Vinyl chloride	50.00	44.51	89	8		30	50 - 145
Bromomethane	50.00	50.17	100	7		30	30 - 145
Chloroethane	50.00	55.69	85	65	*	30	60 - 135
Trichlorofluoromethane	50.00	51.04	102	0.1		30	60 - 145
1,1-Dichloroethene	50.00	61.44	101	0.2		30	70 - 130
Acetone	125.0	115.3	92	6		30	40 - 140
1,1,2-Trichloro-1,2,2-trifluoroethane	50.00	52.58	105	0.8		30	50 - 150

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MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY

SW 8260B

SA-PZ-160IMSD

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 0102112-MSD1 % Solid: NA Matrix: Water Lab Source ID: 1010082-01 Source Sample: SA-PZ-160I

ANALYTE	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC. #	% RPD	Q	QC LIMITS RPD	QC LIMITS REC.
Carbon disulfide	50.00	54.54	109	1		30	35 - 160
Methyl acetate	50.00	49.19	98	3		30	50 - 150
Methylene chloride	50.00	55.33 B	111	0.3		30	55 - 140
trans-1,2-Dichloroethene	50.00	52.20	104	1		30	60 - 140
Methyl tert-butyl ether	50.00	54.25	109	7		30	65 - 125
1,1-Dichloroethane	50.00	182.0	68	2	J	30	70 - 135
cis-1,2-Dichloroethene	50.00	51.34	103	0.6		30	70 - 125
2-Butanone	125.0	124.2	99	7		30	30 - 150
Chloroform	50.00	52.71	105	0.3		30	65 - 135
1,1,1-Trichloroethane	50.00	84.70	96	0.5		30	65 - 130
Cyclohexane	50.00	52.56	105	2		30	50 - 150
1,1-Dichloropropene	50.00	52.48	105	4		30	75 - 130
Carbon tetrachloride	50.00	52.78	106	1		30	65 - 140
1,2-Dichloroethane	50.00	51.91	104	0.1		30	70 - 130
Benzene	50.00	52.94	106	1		30	80 - 120
Trichloroethene	50.00	51.30	103	0.2		30	70 - 125
Methylcyclohexane	50.00	52.92	106	2		30	50 - 150
1,2-Dichloropropane	50.00	53.30	107	1		30	75 - 125
Bromodichloromethane	50.00	52.48	105	0.04		30	75 - 120
cis-1,3-Dichloropropene	50.00	54.16	108	2		30	70 - 130
4-Methyl-2-pentanone	125.0	123.0	98	6		30	60 - 135
Toluene	50.00	51.01 B	101	2		30	75 - 120
trans-1,3-Dichloropropene	50.00	54.19	108	0.3		30	55 - 140
1,1,2-Trichloroethane	50.00	53.31	107	0.04		30	75 - 125
Tetrachloroethene	50.00	51.49	103	0.007		30	45 - 150
2-Hexanone	125.0	123.7	99	7		30	55 - 130
Dibromochloromethane	50.00	52.46	105	2		30	50 - 150
1,2-Dibromoethane	50.00	53.04	106	4		30	80 - 120
Chlorobenzene	50.00	53.78	108	0.7		30	80 - 120
Ethylbenzene	50.00	52.56	105	3		30	75 - 125
m,p-Xylene	100.0	104.2	104	1		30	75 - 130
o-Xylene	50.00	52.55	105	1		30	80 - 120
Styrene	50.00	51.78	104	0.8		30	65 - 135
Bromoform	50.00	51.93	104	3		30	70 - 130
Isopropylbenzene	50.00	52.29	105	2		30	75 - 125

Environmental Testing Laboratories

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MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY

SW 8260B

SA-PZ-160IMSD

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 0102112-MSD1 % Solid: NA Matrix: Water Lab Source ID: 1010082-01 Source Sample: SA-PZ-160I

ANALYTE	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC. #	% RPD	Q	QC LIMITS RPD	QC LIMITS REC.
1,1,2,2-Tetrachloroethane	50.00	54.60	109	6		30	65 - 130
1,3-Dichlorobenzene	50.00	53.19	106	2		30	75 - 125
1,4-Dichlorobenzene	50.00	53.72	107	2		30	75 - 125
1,2-Dichlorobenzene	50.00	54.00	108	4		30	70 - 120
1,2-Dibromo-3-chloropropane	50.00	52.96	106	13		30	50 - 130
1,2,4-Trichlorobenzene	50.00	54.37 B	109	6		30	65 - 135
Naphthalene	50.00	52.71 B	105	18		30	55 - 140
1,2-Dichloroethene (total)	100.0	103.5	104	0.3		30	50 - 150
Xylenes (total)	150.0	156.7	104	1		30	50 - 150

SURROGATE STANDARD RECOVERY

SW 8260B

Client: TETRA TECH

Project: CTO-WE08/112G02045/N62467-04-D-0057

SDG: 1010082 Instrument: 5972hp59

Sequence: 0J15007 Calibration: UNASSIGNED

Surrogate Compound	Spike Level	% Recovery	Recovery Limits	Q
Blank (0101505-BLK1) ug/L Lab File ID: 0101505-BLK159.c Analyzed: 10/15/10 15:06				
Dibromofluoromethane	50.00	108	85 - 115	
1,2-Dichloroethane-d4	50.00	110	70 - 120	
Toluene-d8	50.00	109	85 - 120	
Bromofluorobenzene	50.00	116	75 - 120	
LCS (0101505-BS1) ug/L Lab File ID: 0101505-BS159.d Analyzed: 10/15/10 15:42				
Dibromofluoromethane	50.00	103	85 - 115	
1,2-Dichloroethane-d4	50.00	104	70 - 120	
Toluene-d8	50.00	107	85 - 120	
Bromofluorobenzene	50.00	114	75 - 120	
SA-PZ-157I1 (1010082-03) ug/L Lab File ID: 1010082-0359.d Analyzed: 10/15/10 17:11				
Dibromofluoromethane	50.00	109	85 - 115	
1,2-Dichloroethane-d4	50.00	117	70 - 120	
Toluene-d8	50.00	109	85 - 120	
Bromofluorobenzene	50.00	121	75 - 120	*
SA-PZ-159I1 (1010082-06) ug/L Lab File ID: 1010082-0659.d Analyzed: 10/15/10 18:33				
Dibromofluoromethane	50.00	104	85 - 115	
1,2-Dichloroethane-d4	50.00	113	70 - 120	
Toluene-d8	50.00	110	85 - 120	
Bromofluorobenzene	50.00	124	75 - 120	*
SA-PZ-160I1 (1010082-12) ug/L Lab File ID: 1010082-1259.d Analyzed: 10/15/10 22:11				
Dibromofluoromethane	50.00	107	85 - 115	
1,2-Dichloroethane-d4	50.00	117	70 - 120	
Toluene-d8	50.00	110	85 - 120	
Bromofluorobenzene	50.00	128	75 - 120	*

SURROGATE STANDARD RECOVERY

SW 8260B

Client: TETRA TECH

Project: CTO-WE08/112G02045/N62467-04-D-0057

SDG: 1010082 Instrument: 5972hp59

Sequence: 0J15007 Calibration: UNASSIGNED

Surrogate Compound	Spike Level	% Recovery	Recovery Limits	Q
SA-PZ-138I1 (1010082-13) ug/L Lab File ID: 1010082-1359.d Analyzed: 10/15/10 22:38				
Dibromofluoromethane	50.00	105	85 - 115	
1,2-Dichloroethane-d4	50.00	122	70 - 120	*
Toluene-d8	50.00	108	85 - 120	
Bromofluorobenzene	50.00	122	75 - 120	*

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SURROGATE STANDARD RECOVERY

SW 8260B

Client: TETRA TECH

Project: CTO-WE08/112G02045/N62467-04-D-0057

SDG: 1010082 Instrument: 5972hp59

Sequence: 0J19010 Calibration: 0101505

Surrogate Compound	Spike Level	% Recovery	Recovery Limits	Q
Blank (0101907-BLK1) ug/L Lab File ID: 0101907-BLK159.d Analyzed: 10/19/10 13:13				
Dibromofluoromethane	50.00	111	85 - 115	
1,2-Dichloroethane-d4	50.00	109	70 - 120	
Toluene-d8	50.00	106	85 - 120	
Bromofluorobenzene	50.00	116	75 - 120	
LCS (0101907-BS1) ug/L Lab File ID: 0101907-BS159.d Analyzed: 10/19/10 13:50				
Dibromofluoromethane	50.00	107	85 - 115	
1,2-Dichloroethane-d4	50.00	107	70 - 120	
Toluene-d8	50.00	107	85 - 120	
Bromofluorobenzene	50.00	116	75 - 120	
LCS Dup (0101907-BSD1) ug/L Lab File ID: 0101907-BSD159.d Analyzed: 10/19/10 14:17				
Dibromofluoromethane	50.00	108	85 - 115	
1,2-Dichloroethane-d4	50.00	105	70 - 120	
Toluene-d8	50.00	107	85 - 120	
Bromofluorobenzene	50.00	117	75 - 120	
SA-PZ-157I (1010082-02) ug/L Lab File ID: 1010082-02R59.d Analyzed: 10/19/10 14:44				
Dibromofluoromethane	50.00	112	85 - 115	
1,2-Dichloroethane-d4	50.00	112	70 - 120	
Toluene-d8	50.00	107	85 - 120	
Bromofluorobenzene	50.00	117	75 - 120	
SA-PZ-157I1 (1010082-03RE1) ug/L Lab File ID: 1010082-03D59.d Analyzed: 10/19/10 15:11				
Dibromofluoromethane	50.00	112	85 - 115	
1,2-Dichloroethane-d4	50.00	114	70 - 120	
Toluene-d8	50.00	107	85 - 120	
Bromofluorobenzene	50.00	119	75 - 120	

SURROGATE STANDARD RECOVERY

SW 8260B

Client: TETRA TECH

Project: CTO-WE08/112G02045/N62467-04-D-0057

SDG: 1010082 Instrument: 5972hp59

Sequence: 0J20005 Calibration: 0102201

Surrogate Compound	Spike Level	% Recovery	Recovery Limits	Q
Blank (0102012-BLK1) ug/L Lab File ID: 0102012-BLK159.c Analyzed: 10/20/10 15:07				
Dibromofluoromethane	50.00	109	85 - 115	
1,2-Dichloroethane-d4	50.00	110	70 - 120	
Toluene-d8	50.00	113	85 - 120	
Bromofluorobenzene	50.00	111	75 - 120	
LCS (0102012-BS1) ug/L Lab File ID: 0102012-BS1R59.d Analyzed: 10/20/10 16:16				
Dibromofluoromethane	50.00	100	85 - 115	
1,2-Dichloroethane-d4	50.00	104	70 - 120	
Toluene-d8	50.00	107	85 - 120	
Bromofluorobenzene	50.00	102	75 - 120	
LCS Dup (0102012-BSD1) ug/L Lab File ID: 0102012-BSD159.d Analyzed: 10/20/10 16:43				
Dibromofluoromethane	50.00	97	85 - 115	
1,2-Dichloroethane-d4	50.00	99	70 - 120	
Toluene-d8	50.00	105	85 - 120	
Bromofluorobenzene	50.00	98	75 - 120	
SA-TB-01-20101011 (1010082-09) ug/L Lab File ID: 1010082-09R259.d Analyzed: 10/20/10 18:34				
Dibromofluoromethane	50.00	98	85 - 115	
1,2-Dichloroethane-d4	50.00	104	70 - 120	
Toluene-d8	50.00	105	85 - 120	
Bromofluorobenzene	50.00	103	75 - 120	
SA-PZ-158I (1010082-10) ug/L Lab File ID: 1010082-10R259.d Analyzed: 10/20/10 19:01				
Dibromofluoromethane	50.00	97	85 - 115	
1,2-Dichloroethane-d4	50.00	103	70 - 120	
Toluene-d8	50.00	103	85 - 120	
Bromofluorobenzene	50.00	102	75 - 120	

SURROGATE STANDARD RECOVERY

SW 8260B

Client: TETRA TECH

Project: CTO-WE08/112G02045/N62467-04-D-0057

SDG: 1010082 Instrument: 5972hp59

Sequence: 0J20005 Calibration: 0102201

Surrogate Compound	Spike Level	% Recovery	Recovery Limits	Q
SA-PZ-158I1 (1010082-11) ug/L Lab File ID: 1010082-11R259.d Analyzed: 10/20/10 19:29				
Dibromofluoromethane	50.00	92	85 - 115	
1,2-Dichloroethane-d4	50.00	100	70 - 120	
Toluene-d8	50.00	99	85 - 120	
Bromofluorobenzene	50.00	100	75 - 120	
SA-PZ-155I (1010082-04) ug/L Lab File ID: 1010082-04R259.d Analyzed: 10/20/10 19:56				
Dibromofluoromethane	50.00	93	85 - 115	
1,2-Dichloroethane-d4	50.00	102	70 - 120	
Toluene-d8	50.00	102	85 - 120	
Bromofluorobenzene	50.00	100	75 - 120	
SA-PZ-151I1 (1010082-05) ug/L Lab File ID: 1010082-05R259.d Analyzed: 10/20/10 20:23				
Dibromofluoromethane	50.00	103	85 - 115	
1,2-Dichloroethane-d4	50.00	115	70 - 120	
Toluene-d8	50.00	104	85 - 120	
Bromofluorobenzene	50.00	106	75 - 120	
SA-PZ-159I (1010082-07) ug/L Lab File ID: 1010082-07R59.d Analyzed: 10/20/10 20:50				
Dibromofluoromethane	50.00	92	85 - 115	
1,2-Dichloroethane-d4	50.00	101	70 - 120	
Toluene-d8	50.00	100	85 - 120	
Bromofluorobenzene	50.00	101	75 - 120	
SA-DUP01 (1010082-08) ug/L Lab File ID: 1010082-08R59.d Analyzed: 10/20/10 21:18				
Dibromofluoromethane	50.00	97	85 - 115	
1,2-Dichloroethane-d4	50.00	107	70 - 120	
Toluene-d8	50.00	102	85 - 120	
Bromofluorobenzene	50.00	106	75 - 120	

SURROGATE STANDARD RECOVERY

SW 8260B

Client: TETRA TECH

Project: CTO-WE08/112G02045/N62467-04-D-0057

SDG: 1010082 Instrument: 5972hp59

Sequence: 0J20005 Calibration: 0102201

Surrogate Compound	Spike Level	% Recovery	Recovery Limits	Q
SA-PZ-133I (1010082-14) ug/L Lab File ID: 1010082-14R59.d Analyzed: 10/20/10 21:45				
Dibromofluoromethane	50.00	98	85 - 115	
1,2-Dichloroethane-d4	50.00	111	70 - 120	
Toluene-d8	50.00	108	85 - 120	
Bromofluorobenzene	50.00	107	75 - 120	
SA-PZ-138I (1010082-15) ug/L Lab File ID: 1010082-15R59.d Analyzed: 10/20/10 22:12				
Dibromofluoromethane	50.00	97	85 - 115	
1,2-Dichloroethane-d4	50.00	109	70 - 120	
Toluene-d8	50.00	108	85 - 120	
Bromofluorobenzene	50.00	108	75 - 120	
SA-PZ-161I (1010082-16) ug/L Lab File ID: 1010082-16R59.d Analyzed: 10/20/10 22:39				
Dibromofluoromethane	50.00	96	85 - 115	
1,2-Dichloroethane-d4	50.00	111	70 - 120	
Toluene-d8	50.00	111	85 - 120	
Bromofluorobenzene	50.00	108	75 - 120	
SA-PZ-149I1 (1010082-17) ug/L Lab File ID: 1010082-17R59.d Analyzed: 10/20/10 23:06				
Dibromofluoromethane	50.00	101	85 - 115	
1,2-Dichloroethane-d4	50.00	114	70 - 120	
Toluene-d8	50.00	113	85 - 120	
Bromofluorobenzene	50.00	110	75 - 120	

SURROGATE STANDARD RECOVERY

SW 8260B

Client: TETRA TECH

Project: CTO-WE08/112G02045/N62467-04-D-0057

SDG: 1010082 Instrument: 5972hp59

Sequence: 0J21009 Calibration: 0102201

Surrogate Compound	Spike Level	% Recovery	Recovery Limits	Q
Blank (0102112-BLK1) ug/L Lab File ID: 0102112-BLK159.c Analyzed: 10/21/10 13:01				
Dibromofluoromethane	50.00	102	85 - 115	
1,2-Dichloroethane-d4	50.00	99	70 - 120	
Toluene-d8	50.00	100	85 - 120	
Bromofluorobenzene	50.00	97	75 - 120	
LCS (0102112-BS1) ug/L Lab File ID: 0102112-BS159.d Analyzed: 10/21/10 13:52				
Dibromofluoromethane	50.00	95	85 - 115	
1,2-Dichloroethane-d4	50.00	92	70 - 120	
Toluene-d8	50.00	102	85 - 120	
Bromofluorobenzene	50.00	92	75 - 120	
LCS Dup (0102112-BSD1) ug/L Lab File ID: 0102112-BSD159.d Analyzed: 10/21/10 14:19				
Dibromofluoromethane	50.00	101	85 - 115	
1,2-Dichloroethane-d4	50.00	97	70 - 120	
Toluene-d8	50.00	102	85 - 120	
Bromofluorobenzene	50.00	99	75 - 120	
SA-PZ-139 (1010082-18) ug/L Lab File ID: 1010082-18R59.d Analyzed: 10/21/10 14:46				
Dibromofluoromethane	50.00	102	85 - 115	
1,2-Dichloroethane-d4	50.00	101	70 - 120	
Toluene-d8	50.00	102	85 - 120	
Bromofluorobenzene	50.00	98	75 - 120	
SA-DUP02 (1010082-19) ug/L Lab File ID: 1010082-19R59.d Analyzed: 10/21/10 15:13				
Dibromofluoromethane	50.00	104	85 - 115	
1,2-Dichloroethane-d4	50.00	102	70 - 120	
Toluene-d8	50.00	104	85 - 120	
Bromofluorobenzene	50.00	102	75 - 120	

SURROGATE STANDARD RECOVERY

SW 8260B

Client: TETRA TECH

Project: CTO-WE08/112G02045/N62467-04-D-0057

SDG: 1010082 Instrument: 5972hp59

Sequence: 0J21009 Calibration: 0102201

Surrogate Compound	Spike Level	% Recovery	Recovery Limits	Q
SA-PZ-159I1 (1010082-06RE1) ug/L Lab File ID: 1010082-06D59.d Analyzed: 10/21/10 15:40				
Dibromofluoromethane	50.00	98	85 - 115	
1,2-Dichloroethane-d4	50.00	96	70 - 120	
Toluene-d8	50.00	99	85 - 120	
Bromofluorobenzene	50.00	98	75 - 120	
SA-PZ-160I1 (1010082-12RE1) ug/L Lab File ID: 1010082-12D59.d Analyzed: 10/21/10 16:07				
Dibromofluoromethane	50.00	102	85 - 115	
1,2-Dichloroethane-d4	50.00	105	70 - 120	
Toluene-d8	50.00	104	85 - 120	
Bromofluorobenzene	50.00	101	75 - 120	
SA-PZ-138I1 (1010082-13RE1) ug/L Lab File ID: 1010082-13D59.d Analyzed: 10/21/10 16:35				
Dibromofluoromethane	50.00	100	85 - 115	
1,2-Dichloroethane-d4	50.00	102	70 - 120	
Toluene-d8	50.00	104	85 - 120	
Bromofluorobenzene	50.00	101	75 - 120	
SA-PZ-160I (1010082-01) ug/L Lab File ID: 1010082-01R59.d Analyzed: 10/21/10 17:02				
Dibromofluoromethane	50.00	98	85 - 115	
1,2-Dichloroethane-d4	50.00	103	70 - 120	
Toluene-d8	50.00	102	85 - 120	
Bromofluorobenzene	50.00	99	75 - 120	
Matrix Spike (0102112-MS1) ug/L Lab File ID: 0102112-MS159.d Analyzed: 10/21/10 17:29				
Dibromofluoromethane	50.00	97	85 - 115	
1,2-Dichloroethane-d4	50.00	98	70 - 120	
Toluene-d8	50.00	106	85 - 120	
Bromofluorobenzene	50.00	98	75 - 120	

SURROGATE STANDARD RECOVERY

SW 8260B

Client: TETRA TECH

Project: CTO-WE08/112G02045/N62467-04-D-0057

SDG: 1010082 Instrument: 5972hp59

Sequence: 0J21009 Calibration: 0102201

Surrogate Compound	Spike Level	% Recovery	Recovery Limits	Q
Matrix Spike Dup (0102112-MSD1) ug/L Lab File ID: 0102112-MSD159.(Analyzed: 10/21/10 17:56				
Dibromofluoromethane	50.00	101	85 - 115	
1,2-Dichloroethane-d4	50.00	98	70 - 120	
Toluene-d8	50.00	104	85 - 120	
Bromofluorobenzene	50.00	101	75 - 120	

INTERNAL STANDARD AREA AND RT SUMMARY
SW 8260B

Laboratory: COMPUCHEM
Client: TETRA TECH
Sequence: 0J15007

SDG: 1010082
Project: CTO-WE08/112G02045/N62467-04-D-0057
Instrument: 5972hp59
Calibration: UNASSIGNED

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
Calibration Check (0J15007-CCV1)			Lab File ID: 0J15007-CCV159.d			Analyzed: 10/15/10 14:26			
Fluorobenzene	1049575	11.22				50 - 200	11.2200	+/-0.06	
Chlorobenzene-d5	619907	13.576				50 - 200	13.5760	+/-0.06	
1,4-Dichlorobenzene-d4	262649	15.312				50 - 200	15.3120	+/-0.06	
Blank (0101505-BLK1)			Lab File ID: 0101505-BLK159.d			Analyzed: 10/15/10 15:06			
Fluorobenzene	1007316	11.218	1049575	11.22	96	50 - 200	-0.0020	+/-0.06	
Chlorobenzene-d5	581598	13.575	619907	13.576	94	50 - 200	-0.0010	+/-0.06	
1,4-Dichlorobenzene-d4	238854	15.31	262649	15.312	91	50 - 200	-0.0020	+/-0.06	
LCS (0101505-BS1)			Lab File ID: 0101505-BS159.d			Analyzed: 10/15/10 15:42			
Fluorobenzene	900147	11.22	1049575	11.22	86	50 - 200	0.0000	+/-0.06	
Chlorobenzene-d5	545192	13.577	619907	13.576	88	50 - 200	0.0010	+/-0.06	
1,4-Dichlorobenzene-d4	240188	15.313	262649	15.312	91	50 - 200	0.0010	+/-0.06	
SA-PZ-157I1 (1010082-03)			Lab File ID: 1010082-0359.d			Analyzed: 10/15/10 17:11			
Fluorobenzene	846735	11.219	1049575	11.22	81	50 - 200	-0.0010	+/-0.06	
Chlorobenzene-d5	491571	13.576	619907	13.576	79	50 - 200	0.0000	+/-0.06	
1,4-Dichlorobenzene-d4	193378	15.311	262649	15.312	74	50 - 200	-0.0010	+/-0.06	
SA-PZ-159I1 (1010082-06)			Lab File ID: 1010082-0659.d			Analyzed: 10/15/10 18:33			
Fluorobenzene	793993	11.21	1049575	11.22	76	50 - 200	-0.0100	+/-0.06	
Chlorobenzene-d5	486006	13.567	619907	13.576	78	50 - 200	-0.0090	+/-0.06	
1,4-Dichlorobenzene-d4	199715	15.302	262649	15.312	76	50 - 200	-0.0100	+/-0.06	
SA-PZ-160I1 (1010082-12)			Lab File ID: 1010082-1259.d			Analyzed: 10/15/10 22:11			
Fluorobenzene	833241	11.211	1049575	11.22	79	50 - 200	-0.0090	+/-0.06	
Chlorobenzene-d5	477017	13.568	619907	13.576	77	50 - 200	-0.0080	+/-0.06	
1,4-Dichlorobenzene-d4	183213	15.294	262649	15.312	70	50 - 200	-0.0180	+/-0.06	
SA-PZ-138I1 (1010082-13)			Lab File ID: 1010082-1359.d			Analyzed: 10/15/10 22:38			
Fluorobenzene	666017	11.209	1049575	11.22	63	50 - 200	-0.0110	+/-0.06	
Chlorobenzene-d5	412876	13.566	619907	13.576	67	50 - 200	-0.0100	+/-0.06	
1,4-Dichlorobenzene-d4	171289	15.292	262649	15.312	65	50 - 200	-0.0200	+/-0.06	

INTERNAL STANDARD AREA AND RT SUMMARY
SW 8260B

Laboratory:	COMPUCHEM	SDG:	1010082
Client:	TETRA TECH	Project:	CTO-WE08/112G02045/N62467-04-D-0057
Sequence:	0J19010	Instrument:	5972hp59
		Calibration:	0101505

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
Calibration Check (0J19010-CCV1)			Lab File ID: 0J19010-CCV159.d			Analyzed: 10/19/10 12:37			
Fluorobenzene	981078	11.215	1015920	11.197	97	50 - 200	0.0180	+/-0.06	
Chlorobenzene-d5	599615	13.572	632826	13.554	95	50 - 200	0.0180	+/-0.06	
1,4-Dichlorobenzene-d4	261748	15.297	293175	15.289	89	50 - 200	0.0080	+/-0.06	
Blank (0101907-BLK1)			Lab File ID: 0101907-BLK159.d			Analyzed: 10/19/10 13:13			
Fluorobenzene	949176	11.213	981078	11.215	97	50 - 200	-0.0020	+/-0.06	
Chlorobenzene-d5	574400	13.57	599615	13.572	96	50 - 200	-0.0020	+/-0.06	
1,4-Dichlorobenzene-d4	238087	15.306	261748	15.297	91	50 - 200	0.0090	+/-0.06	
LCS (0101907-BS1)			Lab File ID: 0101907-BS159.d			Analyzed: 10/19/10 13:50			
Fluorobenzene	944555	11.209	981078	11.215	96	50 - 200	-0.0060	+/-0.06	
Chlorobenzene-d5	568143	13.566	599615	13.572	95	50 - 200	-0.0060	+/-0.06	
1,4-Dichlorobenzene-d4	242237	15.302	261748	15.297	93	50 - 200	0.0050	+/-0.06	
LCS Dup (0101907-BSD1)			Lab File ID: 0101907-BSD159.d			Analyzed: 10/19/10 14:17			
Fluorobenzene	967725	11.218	981078	11.215	99	50 - 200	0.0030	+/-0.06	
Chlorobenzene-d5	582351	13.565	599615	13.572	97	50 - 200	-0.0070	+/-0.06	
1,4-Dichlorobenzene-d4	241092	15.3	261748	15.297	92	50 - 200	0.0030	+/-0.06	
SA-PZ-157I (1010082-02)			Lab File ID: 1010082-02R59.d			Analyzed: 10/19/10 14:44			
Fluorobenzene	956340	11.214	981078	11.215	97	50 - 200	-0.0010	+/-0.06	
Chlorobenzene-d5	579998	13.57	599615	13.572	97	50 - 200	-0.0020	+/-0.06	
1,4-Dichlorobenzene-d4	237801	15.306	261748	15.297	91	50 - 200	0.0090	+/-0.06	
SA-PZ-157I1 (1010082-03RE1)			Lab File ID: 1010082-03D59.d			Analyzed: 10/19/10 15:11			
Fluorobenzene	927976	11.218	981078	11.215	95	50 - 200	0.0030	+/-0.06	
Chlorobenzene-d5	559223	13.575	599615	13.572	93	50 - 200	0.0030	+/-0.06	
1,4-Dichlorobenzene-d4	226212	15.301	261748	15.297	86	50 - 200	0.0040	+/-0.06	

INTERNAL STANDARD AREA AND RT SUMMARY
SW 8260B

Laboratory: COMPUCHEM
Client: TETRA TECH
Sequence: 0J20005

SDG: 1010082
Project: CTO-WE08/112G02045/N62467-04-D-0057
Instrument: 5972hp59
Calibration: 0102201

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
Blank (0102012-BLK1)			Lab File ID: 0102012-BLK159.d			Analyzed: 10/20/10 15:07			
Fluorobenzene	1005585	11.215	982915	11.215	102	50 - 200	0.0000	+/-0.06	
Chlorobenzene-d5	595019	13.572	564135	13.572	105	50 - 200	0.0000	+/-0.06	
1,4-Dichlorobenzene-d4	245252	15.308	254338	15.298	96	50 - 200	0.0100	+/-0.06	
LCS (0102012-BS1)			Lab File ID: 0102012-BS1R59.d			Analyzed: 10/20/10 16:16			
Fluorobenzene	1025634	11.219	982915	11.215	104	50 - 200	0.0040	+/-0.06	
Chlorobenzene-d5	593999	13.576	564135	13.572	105	50 - 200	0.0040	+/-0.06	
1,4-Dichlorobenzene-d4	261243	15.301	254338	15.298	103	50 - 200	0.0030	+/-0.06	
LCS Dup (0102012-BSD1)			Lab File ID: 0102012-BSD159.d			Analyzed: 10/20/10 16:43			
Fluorobenzene	1039758	11.22	982915	11.215	106	50 - 200	0.0050	+/-0.06	
Chlorobenzene-d5	598183	13.577	564135	13.572	106	50 - 200	0.0050	+/-0.06	
1,4-Dichlorobenzene-d4	267188	15.302	254338	15.298	105	50 - 200	0.0040	+/-0.06	
SA-TB-01-20101011 (1010082-09)			Lab File ID: 1010082-09R259.d			Analyzed: 10/20/10 18:34			
Fluorobenzene	920774	11.214	982915	11.215	94	50 - 200	-0.0010	+/-0.06	
Chlorobenzene-d5	524993	13.571	564135	13.572	93	50 - 200	-0.0010	+/-0.06	
1,4-Dichlorobenzene-d4	216643	15.306	254338	15.298	85	50 - 200	0.0080	+/-0.06	
SA-PZ-158I (1010082-10)			Lab File ID: 1010082-10R259.d			Analyzed: 10/20/10 19:01			
Fluorobenzene	834263	11.218	982915	11.215	85	50 - 200	0.0030	+/-0.06	
Chlorobenzene-d5	511628	13.565	564135	13.572	91	50 - 200	-0.0070	+/-0.06	
1,4-Dichlorobenzene-d4	228098	15.3	254338	15.298	90	50 - 200	0.0020	+/-0.06	
SA-PZ-158I1 (1010082-11)			Lab File ID: 1010082-11R259.d			Analyzed: 10/20/10 19:29			
Fluorobenzene	971095	11.219	982915	11.215	99	50 - 200	0.0040	+/-0.06	
Chlorobenzene-d5	551256	13.575	564135	13.572	98	50 - 200	0.0030	+/-0.06	
1,4-Dichlorobenzene-d4	228681	15.301	254338	15.298	90	50 - 200	0.0030	+/-0.06	
SA-PZ-155I (1010082-04)			Lab File ID: 1010082-04R259.d			Analyzed: 10/20/10 19:56			
Fluorobenzene	873572	11.212	982915	11.215	89	50 - 200	-0.0030	+/-0.06	
Chlorobenzene-d5	496245	13.569	564135	13.572	88	50 - 200	-0.0030	+/-0.06	
1,4-Dichlorobenzene-d4	207774	15.305	254338	15.298	82	50 - 200	0.0070	+/-0.06	
SA-PZ-151I1 (1010082-05)			Lab File ID: 1010082-05R259.d			Analyzed: 10/20/10 20:23			
Fluorobenzene	835613	11.21	982915	11.215	85	50 - 200	-0.0050	+/-0.06	
Chlorobenzene-d5	506802	13.567	564135	13.572	90	50 - 200	-0.0050	+/-0.06	
1,4-Dichlorobenzene-d4	207943	15.302	254338	15.298	82	50 - 200	0.0040	+/-0.06	

INTERNAL STANDARD AREA AND RT SUMMARY
SW 8260B

Laboratory: COMPUCHEM
Client: TETRA TECH
Sequence: 0J20005

SDG: 1010082
Project: CTO-WE08/112G02045/N62467-04-D-0057
Instrument: 5972hp59
Calibration: 0102201

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
SA-PZ-159I (1010082-07)			Lab File ID: 1010082-07R59.d			Analyzed: 10/20/10 20:50			
Fluorobenzene	862931	11.212	982915	11.215	88	50 - 200	-0.0030	+/-0.06	
Chlorobenzene-d5	506832	13.569	564135	13.572	90	50 - 200	-0.0030	+/-0.06	
1,4-Dichlorobenzene-d4	214876	15.304	254338	15.298	84	50 - 200	0.0060	+/-0.06	
SA-DUP01 (1010082-08)			Lab File ID: 1010082-08R59.d			Analyzed: 10/20/10 21:18			
Fluorobenzene	784328	11.21	982915	11.215	80	50 - 200	-0.0050	+/-0.06	
Chlorobenzene-d5	465302	13.567	564135	13.572	82	50 - 200	-0.0050	+/-0.06	
1,4-Dichlorobenzene-d4	194891	15.303	254338	15.298	77	50 - 200	0.0050	+/-0.06	
SA-PZ-133I (1010082-14)			Lab File ID: 1010082-14R59.d			Analyzed: 10/20/10 21:45			
Fluorobenzene	867507	11.216	982915	11.215	88	50 - 200	0.0010	+/-0.06	
Chlorobenzene-d5	492500	13.573	564135	13.572	87	50 - 200	0.0010	+/-0.06	
1,4-Dichlorobenzene-d4	200273	15.299	254338	15.298	79	50 - 200	0.0010	+/-0.06	
SA-PZ-138I (1010082-15)			Lab File ID: 1010082-15R59.d			Analyzed: 10/20/10 22:12			
Fluorobenzene	888040	11.218	982915	11.215	90	50 - 200	0.0030	+/-0.06	
Chlorobenzene-d5	498729	13.565	564135	13.572	88	50 - 200	-0.0070	+/-0.06	
1,4-Dichlorobenzene-d4	202224	15.3	254338	15.298	80	50 - 200	0.0020	+/-0.06	
SA-PZ-161I (1010082-16)			Lab File ID: 1010082-16R59.d			Analyzed: 10/20/10 22:39			
Fluorobenzene	776193	11.214	982915	11.215	79	50 - 200	-0.0010	+/-0.06	
Chlorobenzene-d5	458252	13.57	564135	13.572	81	50 - 200	-0.0020	+/-0.06	
1,4-Dichlorobenzene-d4	196049	15.296	254338	15.298	77	50 - 200	-0.0020	+/-0.06	
SA-PZ-149I1 (1010082-17)			Lab File ID: 1010082-17R59.d			Analyzed: 10/20/10 23:06			
Fluorobenzene	795062	11.213	982915	11.215	81	50 - 200	-0.0020	+/-0.06	
Chlorobenzene-d5	445603	13.569	564135	13.572	79	50 - 200	-0.0030	+/-0.06	
1,4-Dichlorobenzene-d4	181596	15.305	254338	15.298	71	50 - 200	0.0070	+/-0.06	

INTERNAL STANDARD AREA AND RT SUMMARY
SW 8260B

Laboratory: COMPUCHEM
Client: TETRA TECH
Sequence: 0J21009

SDG: 1010082
Project: CTO-WE08/112G02045/N62467-04-D-0057
Instrument: 5972hp59
Calibration: 0102201

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
Calibration Check (0J21009-CCV1)			Lab File ID: 0J21009-CCV159.d			Analyzed: 10/21/10 11:51			
Fluorobenzene	1085205	11.218	982915	11.215	110	50 - 200	0.0030	+/-0.06	
Chlorobenzene-d5	659284	13.575	564135	13.572	117	50 - 200	0.0030	+/-0.06	
1,4-Dichlorobenzene-d4	304499	15.301	254338	15.298	120	50 - 200	0.0030	+/-0.06	
Blank (0102112-BLK1)			Lab File ID: 0102112-BLK159.d			Analyzed: 10/21/10 13:01			
Fluorobenzene	995617	11.215	1085205	11.218	92	50 - 200	-0.0030	+/-0.06	
Chlorobenzene-d5	626352	13.572	659284	13.575	95	50 - 200	-0.0030	+/-0.06	
1,4-Dichlorobenzene-d4	279475	15.307	304499	15.301	92	50 - 200	0.0060	+/-0.06	
LCS (0102112-BS1)			Lab File ID: 0102112-BS159.d			Analyzed: 10/21/10 13:52			
Fluorobenzene	890053	11.224	1085205	11.218	82	50 - 200	0.0060	+/-0.06	
Chlorobenzene-d5	557656	13.571	659284	13.575	85	50 - 200	-0.0040	+/-0.06	
1,4-Dichlorobenzene-d4	263982	15.306	304499	15.301	87	50 - 200	0.0050	+/-0.06	
LCS Dup (0102112-BSD1)			Lab File ID: 0102112-BSD159.d			Analyzed: 10/21/10 14:19			
Fluorobenzene	1044850	11.218	1085205	11.218	96	50 - 200	0.0000	+/-0.06	
Chlorobenzene-d5	633974	13.575	659284	13.575	96	50 - 200	0.0000	+/-0.06	
1,4-Dichlorobenzene-d4	278771	15.311	304499	15.301	92	50 - 200	0.0100	+/-0.06	
SA-PZ-139 (1010082-18)			Lab File ID: 1010082-18R59.d			Analyzed: 10/21/10 14:46			
Fluorobenzene	998574	11.218	1085205	11.218	92	50 - 200	0.0000	+/-0.06	
Chlorobenzene-d5	595242	13.575	659284	13.575	90	50 - 200	0.0000	+/-0.06	
1,4-Dichlorobenzene-d4	253874	15.31	304499	15.301	83	50 - 200	0.0090	+/-0.06	
SA-DUP02 (1010082-19)			Lab File ID: 1010082-19R59.d			Analyzed: 10/21/10 15:13			
Fluorobenzene	977358	11.225	1085205	11.218	90	50 - 200	0.0070	+/-0.06	
Chlorobenzene-d5	581503	13.582	659284	13.575	88	50 - 200	0.0070	+/-0.06	
1,4-Dichlorobenzene-d4	240613	15.308	304499	15.301	79	50 - 200	0.0070	+/-0.06	
SA-PZ-159I1 (1010082-06RE1)			Lab File ID: 1010082-06D59.d			Analyzed: 10/21/10 15:40			
Fluorobenzene	1070498	11.224	1085205	11.218	99	50 - 200	0.0060	+/-0.06	
Chlorobenzene-d5	633017	13.581	659284	13.575	96	50 - 200	0.0060	+/-0.06	
1,4-Dichlorobenzene-d4	266803	15.306	304499	15.301	88	50 - 200	0.0050	+/-0.06	
SA-PZ-160I1 (1010082-12RE1)			Lab File ID: 1010082-12D59.d			Analyzed: 10/21/10 16:07			
Fluorobenzene	972426	11.223	1085205	11.218	90	50 - 200	0.0050	+/-0.06	
Chlorobenzene-d5	573938	13.58	659284	13.575	87	50 - 200	0.0050	+/-0.06	
1,4-Dichlorobenzene-d4	240947	15.316	304499	15.301	79	50 - 200	0.0150	+/-0.06	

INTERNAL STANDARD AREA AND RT SUMMARY
SW 8260B

Laboratory: COMPUCHEM
Client: TETRA TECH
Sequence: 0J21009

SDG: 1010082
Project: CTO-WE08/112G02045/N62467-04-D-0057
Instrument: 5972hp59
Calibration: 0102201

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
SA-PZ-138I1 (1010082-13RE1)			Lab File ID: 1010082-13D59.d			Analyzed: 10/21/10 16:35			
Fluorobenzene	967134	11.219	1085205	11.218	89	50 - 200	0.0010	+/-0.06	
Chlorobenzene-d5	565289	13.576	659284	13.575	86	50 - 200	0.0010	+/-0.06	
1,4-Dichlorobenzene-d4	237842	15.312	304499	15.301	78	50 - 200	0.0110	+/-0.06	
SA-PZ-160I (1010082-01)			Lab File ID: 1010082-01R59.d			Analyzed: 10/21/10 17:02			
Fluorobenzene	916576	11.224	1085205	11.218	84	50 - 200	0.0060	+/-0.06	
Chlorobenzene-d5	537533	13.581	659284	13.575	82	50 - 200	0.0060	+/-0.06	
1,4-Dichlorobenzene-d4	225617	15.307	304499	15.301	74	50 - 200	0.0060	+/-0.06	
Matrix Spike (0102112-MS1)			Lab File ID: 0102112-MS159.d			Analyzed: 10/21/10 17:29			
Fluorobenzene	953425	11.225	1085205	11.218	88	50 - 200	0.0070	+/-0.06	
Chlorobenzene-d5	549251	13.581	659284	13.575	83	50 - 200	0.0060	+/-0.06	
1,4-Dichlorobenzene-d4	247981	15.307	304499	15.301	81	50 - 200	0.0060	+/-0.06	
Matrix Spike Dup (0102112-MSD1)			Lab File ID: 0102112-MSD159.d			Analyzed: 10/21/10 17:56			
Fluorobenzene	957063	11.223	1085205	11.218	88	50 - 200	0.0050	+/-0.06	
Chlorobenzene-d5	561405	13.58	659284	13.575	85	50 - 200	0.0050	+/-0.06	
1,4-Dichlorobenzene-d4	247514	15.305	304499	15.301	81	50 - 200	0.0040	+/-0.06	

ANALYSIS SEQUENCE SUMMARY

SW 8260B

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Sequence: 0J06004 Instrument: 5972hp59

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
BFB	0J06004-TUN1	0J06004-TUN159.d	10/06/10 11:53:00
VSTD020	0J06004-CAL3	0J06004-CAL359.d	10/06/10 12:17:00
VSTD010	0J06004-CAL2	0J06004-CAL259.d	10/06/10 12:44:00
VSTD005	0J06004-CAL1	0J06004-CAL159.d	10/06/10 13:11:00
VSTD050	0J06004-CAL4	0J06004-CAL459.d	10/06/10 13:38:00
VSTD100	0J06004-CAL5	0J06004-CAL559.d	10/06/10 14:06:00
VSTD200	0J06004-CAL6	0J06004-CAL659.d	10/06/10 14:33:00

MASS SPECTROMETER INSTRUMENT PERFORMANCE CHECK

SW 8260B

Laboratory:	COMPUCHEM	SDG:	1010082
Client:	TETRA TECH	Project:	CTO-WE08/112G02045/N62467-04-D-0057
Lab File ID:	0J06004-TUN159.d	Injection Date:	10/06/10
Instrument ID:	5972hp59	Injection Time:	11:53
Sequence:	0J06004	Lab Sample ID:	0J06004-TUN1

m/z	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE	
50	15 - 40% of 95	17	PASS
75	30 - 60% of 95	44.8	PASS
95	Base peak, 100% relative abundance	100	PASS
96	5 - 9% of 95	6.63	PASS
173	Less than 2% of 174	0	PASS
174	(Greater than 50% of 95)	80.7	PASS
175	5 - 9% of 174	7.45	PASS
176	(Greater than 95% but less then 101%)	99.8	PASS
177	5 - 9% of 176	6.57	PASS

INITIAL CALIBRATION DATA (Continued)

SW 8260B

Client: TETRA TECH SDG: 1010082

Project: CTO-WE08/112G02045/N62467-04-D-0057

Calibration: 0101505 Instrument: 5972hp59

Calibration Date: 10/6/2010 4:09:21PM

Compound	Mean RF	% RSD	Mean RT	RT RSD	Linear r	Quad COD	RSD LIMIT	Q
Dichlorodifluoromethane	0.4062945	7.884093	4.294667	0.1059667			CCC (15)	
Chloromethane	0.3478734	9.65978	4.8075	9.965596E-02			CCC (15)	
Vinyl chloride	0.2143718	8.936896	5.106667	0.0445494			CCC (30)	
Bromomethane	0.114877	14.03315	5.974333	8.441203E-02			CCC (15)	
Chloroethane	0.1020303	9.881619	6.211	4.110839E-02			CCC (15)	
Trichlorofluoromethane	0.3883111	7.170664	6.7355	4.047207E-02			CCC (15)	
1,1-Dichloroethene	0.2452616	9.904887	7.729833	5.376599E-02			CCC (30)	
Acetone	3.924303E-02	6.768748	7.816833	4.514895E-02			CCC (15)	
1,1,2-Trichloro-1,2,2-trifluoroethane	0.3235865	9.601043	7.673833	5.384931E-02			CCC (15)	
Carbon disulfide	0.9861328	12.09728	8.132167	4.181024E-02			CCC (15)	
Methyl acetate	0.1206635	5.075948	8.2985	5.786318E-02			CCC (15)	
Methylene chloride	0.310354	22.31406	8.525167	5.801173E-02	0.9994788		CCC (15)	
trans-1,2-Dichloroethene	0.2682907	10.84724	8.872167	3.716155E-02			CCC (15)	
Methyl tert-butyl ether	0.5227352	5.230109	8.817667	4.434628E-02			CCC (15)	
1,1-Dichloroethane	0.4684585	9.450704	9.434167	3.130262E-02			CCC (15)	
cis-1,2-Dichloroethene	0.2741675	10.25965	10.09467	3.283209E-02			CCC (15)	
2-Butanone	7.201049E-02	5.11394	10.052	3.978998E-02			CCC (15)	
Chloroform	0.4316181	8.99275	10.39533	4.149509E-02			CCC (30)	
1,1,1-Trichloroethane	0.3601317	9.884449	10.60233	4.000292E-02			CCC (15)	
Cyclohexane	0.4571668	11.52851	10.6355	4.410718E-02			CCC (15)	
1,1-Dichloropropene	0.3737974	12.34894	10.75033	3.849763E-02			CCC (15)	
Carbon tetrachloride	0.3061561	9.861444	10.752	5.013303E-02			CCC (15)	
1,2-Dichloroethane	0.2363211	6.002959	10.99217	2.808466E-02			CCC (15)	
Benzene	0.9776512	12.26238	10.95233	3.015382E-02			CCC (15)	
Trichloroethene	0.2554021	9.874071	11.5195	3.610431E-02			CCC (15)	
Methylcyclohexane	0.4597769	10.58679	11.66733	3.639533E-02			CCC (15)	
1,2-Dichloropropane	0.220748	10.11044	11.72667	3.445462E-02			CCC (30)	
Bromodichloromethane	0.3002782	5.890779	11.93217	2.154876E-02			CCC (15)	
cis-1,3-Dichloropropene	0.3711873	6.221602	12.27417	2.665995E-02			CCC (15)	
4-Methyl-2-pentanone	0.2344463	6.06224	12.32333	2.824332E-02			CCC (15)	

Environmental Testing Laboratories

CompuChem

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INITIAL CALIBRATION DATA (Continued)

SW 8260B

Client: TETRA TECH SDG: 1010082

Project: CTO-WE08/112G02045/N62467-04-D-0057

Calibration: 0101505 Instrument: 5972hp59

Calibration Date: 10/6/2010 4:09:21PM

Compound	Mean RF	% RSD	Mean RT	RT RSD	Linear r	Quad COD	RSD LIMIT	Q
Toluene	0.9230103	14.94611	12.522	3.232358E-02			CCC (30)	
trans-1,3-Dichloropropene	0.4631006	8.093172	12.67667	4.039993E-02			CCC (15)	
1,1,2-Trichloroethane	0.2316188	5.704023	12.82617	2.514343E-02			CCC (15)	
Tetrachloroethene	0.3020695	12.95386	12.93483	0.0294613			CCC (15)	
2-Hexanone	0.1662362	8.539814	12.91833	1.773601E-02			CCC (15)	
Dibromochloromethane	0.2938613	4.868894	13.13367	1.149073E-02			CCC (15)	
1,2-Dibromoethane	0.255229	5.88927	13.25017	1.658705E-02			CCC (15)	
Chlorobenzene	0.8508433	9.1745	13.57417	0.0294559			CCC (15)	
Ethylbenzene	0.4778114	11.06326	13.58867	0.0205467			CCC (30)	
m,p-Xylene	0.607156	10.95069	13.66267	2.929846E-02			CCC (15)	
o-Xylene	0.5934431	8.517931	13.9635	0.0172139			CCC (15)	
Styrene	0.9362549	11.37806	13.9735	1.161171E-02			CCC (15)	
Bromoform	0.1760576	3.93785	14.18217	3.250722E-02			CCC (15)	
Isopropylbenzene	1.539807	14.57288	14.19717	2.561507E-02			CCC (15)	
1,1,2,2-Tetrachloroethane	0.6633177	6.110359	14.43333	0.0189352			CCC (15)	
1,3-Dichlorobenzene	1.375106	10.04954	15.23567	2.026334E-02			CCC (15)	
1,4-Dichlorobenzene	1.31944	8.954472	15.30467	1.488688E-02			CCC (15)	
1,2-Dichlorobenzene	1.189809	8.554842	15.648	1.084258E-02			CCC (15)	
1,2-Dibromo-3-chloropropane	0.109887	8.071214	16.358	0.0144504			CCC (15)	
1,2,4-Trichlorobenzene	0.8624628	8.041678	17.2425	2.933492E-02			CCC (15)	
Naphthalene	1.4161	6.680819	17.59083	1.512312E-02			CCC (15)	
1,2-Dichloroethene (total)	0.2712291	10.5345	10.09467	3.283209E-02			CCC (15)	
Xylenes (total)	0.602585	10.14938	13.9635	0.0172139			CCC (15)	
Dibromofluoromethane	0.2526265	8.780784	10.5615	0.0295552			CCC (15)	
1,2-Dichloroethane-d4	0.2121199	10.07352	10.91817	3.997002E-02			CCC (15)	
Toluene-d8	1.2951	13.83487	12.4688	2.548785E-02			CCC (15)	
Bromofluorobenzene	1.006315	11.48492	14.376	1.985312E-02			CCC (15)	

ANALYSIS SEQUENCE SUMMARY

SW 8260B

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Sequence: 0J15007 Instrument: 5972hp59

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
BFB	0J15007-TUN1	0J15007-TUN159.d	10/15/10 13:54:00
VSTD050	0J15007-CCV1	0J15007-CCV159.d	10/15/10 14:26:00
VBLKIU	0101505-BLK1	0101505-BLK159.d	10/15/10 15:06:00
VIULCS	0101505-BS1	0101505-BS159.d	10/15/10 15:42:00
SA-PZ-157I1	1010082-03	1010082-0359.d	10/15/10 17:11:00
SA-PZ-159I1	1010082-06	1010082-0659.d	10/15/10 18:33:00
SA-PZ-160I1	1010082-12	1010082-1259.d	10/15/10 22:11:00
SA-PZ-138I1	1010082-13	1010082-1359.d	10/15/10 22:38:00

MASS SPECTROMETER INSTRUMENT PERFORMANCE CHECK

SW 8260B

Laboratory:	COMPUCHEM	SDG:	1010082
Client:	TETRA TECH	Project:	CTO-WE08/112G02045/N62467-04-D-0057
Lab File ID:	0J15007-TUN159.d	Injection Date:	10/15/10
Instrument ID:	5972hp59	Injection Time:	13:54
Sequence:	0J15007	Lab Sample ID:	0J15007-TUN1

m/z	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE	
50	15 - 40% of 95	18.1	PASS
75	30 - 60% of 95	44.9	PASS
95	Base peak, 100% relative abundance	100	PASS
96	5 - 9% of 95	6.78	PASS
173	Less than 2% of 174	0	PASS
174	(Greater than 50% of 95)	66.6	PASS
175	5 - 9% of 174	7.42	PASS
176	(Greater than 95% but less then 101%)	99.5	PASS
177	5 - 9% of 176	6.91	PASS

CONTINUING CALIBRATION CHECK

SW 8260B

Client: TETRA TECH SDG: 1010082

Project: CTO-WE08/112G02045/N62467-04-D-0057

Instrument ID: 5972hp59 Calibration: 0101505

Lab File ID: 0J15007-CCV159.d Calibration Date: 10/06/10 16:09

Sequence: 0J15007 Injection Date: 10/15/10

Lab Sample ID: 0J15007-CCV1 Injection Time: 14:26

		CONC. (ug/L)		RESPONSE FACTOR			% DIFF / DRIFT	
COMPOUND	TYPE	STD	CCV	ICAL	CCV	MIN (#)	CCV	LIMIT
Dichlorodifluoromethane	Avg	50.00	54.00	0.4062945	0.4447829	0.001	9.5	20
Chloromethane	Avg	50.00	54.00	0.3478734	0.4213782	0.1	21.1	20 *
Vinyl chloride	Avg	50.00	56.00	0.2143718	0.2725741	0.001	27.2	20 *
Bromomethane	Avg	50.00	50.00	0.114877	0.1386809	0.001	20.7	20 *
Chloroethane	Avg	50.00	54.00	0.1020303	0.1220923	0.001	19.7	20
Trichlorofluoromethane	Avg	50.00	50.00	0.3883111	0.3910621	0.001	0.7	20
1,1-Dichloroethene	Avg	50.00	52.00	0.2452616	0.2508072	0.001	2.3	20
Acetone	Avg	125.0	126.0	3.924303E-02	4.153148E-02	0.001	5.8	20
1,1,2-Trichloro-1,2,2-trifluoroethane	Avg	50.00	52.00	0.3235865	0.3328557	0.001	2.9	20
Carbon disulfide	Avg	50.00	54.00	0.9861328	1.069463	0.001	8.5	20
Methyl acetate	Avg	50.00	48.00	0.1206635	0.1308349	0.001	8.4	20
Methylene chloride	Lin	50.00	54.00	0.310354	0.2946459	0.001	8.0	20
trans-1,2-Dichloroethene	Avg	50.00	54.00	0.2682907	0.2809909	0.001	4.7	20
Methyl tert-butyl ether	Avg	50.00	52.00	0.5227352	0.5576476	0.001	6.7	20
1,1-Dichloroethane	Avg	50.00	52.00	0.4684585	0.5009323	0.1	6.9	20
cis-1,2-Dichloroethene	Avg	50.00	52.00	0.2741675	0.2774218	0.001	1.2	20
2-Butanone	Avg	125.0	124.0	7.201049E-02	7.741915E-02	0.001	7.5	20
Chloroform	Avg	50.00	52.00	0.4316181	0.4528014	0.001	4.9	20
1,1,1-Trichloroethane	Avg	50.00	50.00	0.3601317	0.3596198	0.001	-0.1	20
Cyclohexane	Avg	50.00	52.00	0.4571668	0.4919344	0.001	7.6	20
1,1-Dichloropropene	Avg	50.00	52.00	0.3737974	0.3887535	0.001	4.0	20
Carbon tetrachloride	Avg	50.00	50.00	0.3061561	0.3017926	0.001	-1.4	20
1,2-Dichloroethane	Avg	50.00	50.00	0.2363211	0.248594	0.001	5.2	20
Benzene	Avg	50.00	52.00	0.9776512	0.9907086	0.001	1.3	20
Trichloroethene	Avg	50.00	50.00	0.2554021	0.2466598	0.001	-3.4	20
Methylcyclohexane	Avg	50.00	52.00	0.4597769	0.4659724	0.001	1.3	20
1,2-Dichloropropane	Avg	50.00	52.00	0.220748	0.2375628	0.001	7.6	20

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CONTINUING CALIBRATION CHECK

SW 8260B

Client: TETRA TECH SDG: 1010082

Project: CTO-WE08/112G02045/N62467-04-D-0057

Instrument ID: 5972hp59 Calibration: 0101505

Lab File ID: 0J15007-CCV159.d Calibration Date: 10/06/10 16:09

Sequence: 0J15007 Injection Date: 10/15/10

Lab Sample ID: 0J15007-CCV1 Injection Time: 14:26

		CONC. (ug/L)		RESPONSE FACTOR			% DIFF / DRIFT	
COMPOUND	TYPE	STD	CCV	ICAL	CCV	MIN (#)	CCV	LIMIT
Bromodichloromethane	Avg	50.00	52.00	0.3002782	0.3171236	0.001	5.6	20
cis-1,3-Dichloropropene	Avg	50.00	52.00	0.3711873	0.386163	0.001	4.0	20
4-Methyl-2-pentanone	Avg	125.0	126.0	0.2344463	0.2707561	0.001	15.5	20
Toluene	Avg	50.00	52.00	0.9230103	0.9489682	0.001	2.8	20
trans-1,3-Dichloropropene	Avg	50.00	52.00	0.4631006	0.5090764	0.001	9.9	20
1,1,2-Trichloroethane	Avg	50.00	54.00	0.2316188	0.2606714	0.001	12.5	20
Tetrachloroethene	Avg	50.00	48.00	0.3020695	0.2786563	0.001	-7.8	20
2-Hexanone	Avg	125.0	124.0	0.1662362	0.1847535	0.001	11.1	20
Dibromochloromethane	Avg	50.00	52.00	0.2938613	0.3149634	0.001	7.2	20
1,2-Dibromoethane	Avg	50.00	52.00	0.255229	0.2706164	0.001	6.0	20
Chlorobenzene	Avg	50.00	50.00	0.8508433	0.8652249	0.3	1.7	20
Ethylbenzene	Avg	50.00	52.00	0.4778114	0.4862149	0.001	1.8	20
m,p-Xylene	Avg	100.0	100.0	0.607156	0.6025138	0.001	-0.8	20
o-Xylene	Avg	50.00	50.00	0.5934431	0.5958991	0.001	0.4	20
Styrene	Avg	50.00	50.00	0.9362549	0.9330996	0.001	-0.3	20
Bromoform	Avg	50.00	50.00	0.1760576	0.16984	0.1	-3.5	20
Isopropylbenzene	Avg	50.00	50.00	1.539807	1.534249	0.001	-0.4	20
1,1,2,2-Tetrachloroethane	Avg	50.00	58.00	0.6633177	0.8165613	0.3	23.1	20 *
1,3-Dichlorobenzene	Avg	50.00	52.00	1.375106	1.40577	0.001	2.2	20
1,4-Dichlorobenzene	Avg	50.00	50.00	1.31944	1.329074	0.001	0.7	20
1,2-Dichlorobenzene	Avg	50.00	52.00	1.189809	1.220854	0.001	2.6	20
1,2-Dibromo-3-chloropropane	Avg	50.00	54.00	0.109887	0.1149633	0.001	4.6	20
1,2,4-Trichlorobenzene	Avg	50.00	50.00	0.8624628	0.8340637	0.001	-3.3	20
Naphthalene	Avg	50.00	54.00	1.4161	1.579385	0.001	11.5	20
1,2-Dichloroethene (total)	Avg	100.0	106.0	0.2712291	0.2792063	0.001	2.9	20
Xylenes (total)	Avg	150.0	150.0	0.602585	0.6003089	0.001	-0.4	20
Dibromofluoromethane	Avg	50.00	54.00	0.2526265	0.2614725	0.001	3.5	20

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CONTINUING CALIBRATION CHECK

SW 8260B

Client:	TETRA TECH			SDG:	1010082
Project:	CTO-WE08/112G02045/N62467-04-D-0057				
Instrument ID:	5972hp59	Calibration:	0101505		
Lab File ID:	0J15007-CCV159.d	Calibration Date:	10/06/10 16:09		
Sequence:	0J15007	Injection Date:	10/15/10		
Lab Sample ID:	0J15007-CCV1	Injection Time:	14:26		

		CONC. (ug/L)		RESPONSE FACTOR			% DIFF / DRIFT	
COMPOUND	TYPE	STD	CCV	ICAL	CCV	MIN (#)	CCV	LIMIT
1,2-Dichloroethane-d4	Avg	50.00	52.00	0.2121199	0.2285935	0.001	7.8	20
Toluene-d8	Avg	50.00	52.00	1.2951	1.313886	0.001	1.5	20
Bromofluorobenzene	Avg	50.00	58.00	1.006315	1.194511	0.001	18.7	20

Column to be used to flag Response Factor and %Diff/Drift values with an asterisk

* Values outside of QC limits

ANALYSIS DATA SHEET

SW 8260B

VBLKIU

Client: TETRA TECH | SDG: 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: SW 5030A/5030B | File ID: 0101505-BLK159.d | QC Type: Blank

Initial/Final: 5mL / 5mL | Lab ID: 0101505-BLK1 | Column ID: SPB-624

Dilution: 1 | pH: | Prepared: 10/15/10 15:06

% Moisture: NA | Analyzed: 10/15/10 15:06

Batch: 0101505 | Sequence: 0J15007 | Calibration: UNASSIGNED | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC.(ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane		0.55	2.0	5.0	U
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene		0.53	2.0	5.0	U
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride		0.49	0.50	5.0	U
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane		0.27	0.50	5.0	U
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane		0.32	0.50	5.0	U
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene	0.58	0.31	0.50	5.0	J
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U

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ANALYSIS DATA SHEET

SW 8260B

VBLKIU

Client: TETRA TECH | SDG: 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: SW 5030A/5030B | File ID: 0101505-BLK159.d | QC Type: Blank

Initial/Final: 5mL / 5mL | Lab ID: 0101505-BLK1 | Column ID: SPB-624

Dilution: 1 | pH: | Prepared: 10/15/10 15:06

% Moisture: NA | Analyzed: 10/15/10 15:06

Batch: 0101505 | Sequence: 0J15007 | Calibration: UNASSIGNED | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC.(ug/L)	DL	LOD	LOQ	Q
100-41-4	Ethylbenzene		0.42	0.50	5.0	U
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene		0.36	0.50	5.0	U
106-46-7	1,4-Dichlorobenzene		0.30	0.50	5.0	U
95-50-1	1,2-Dichlorobenzene		0.35	0.50	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene	1.5	0.48	0.50	5.0	J
91-20-3	Naphthalene	4.7	1.1	2.0	5.0	J
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	54.18	108	85 - 115	
1,2-Dichloroethane-d4	50.00	55.07	110	70 - 120	
Toluene-d8	50.00	54.27	109	85 - 120	
Bromofluorobenzene	50.00	58.12	116	75 - 120	

CAS NO.	TICS	CONC.(ug/L)	Response	R.T.	% Match	Q
NA	Tentatively Identified Compounds	0.0				U

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ANALYSIS DATA SHEET

SW 8260B

VIULCS

Client: TETRA TECH | SDG: 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: SW 5030A/5030B | File ID: 0101505-BS159.d | QC Type: LCS

Initial/Final: 5mL / 5mL | Lab ID: 0101505-BS1 | Column ID: SPB-624

Dilution: 1 | pH: | Prepared: 10/15/10 15:06

% Moisture: NA | Analyzed: 10/15/10 15:42

Batch: 0101505 | Sequence: 0J15007 | Calibration: UNASSIGNED | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC.(ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane	58.03	0.32	0.50	5.0	
74-87-3	Chloromethane	58.83	0.39	0.50	5.0	
75-01-4	Vinyl chloride	57.43	0.48	0.50	5.0	
74-83-9	Bromomethane	38.79	0.76	2.0	5.0	
75-00-3	Chloroethane	53.18	0.55	2.0	5.0	
75-69-4	Trichlorofluoromethane	51.72	0.49	0.50	5.0	
75-35-4	1,1-Dichloroethene	54.25	0.53	2.0	5.0	
67-64-1	Acetone	117.4	1.6	5.0	13	
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	53.11	0.82	2.0	5.0	
75-15-0	Carbon disulfide	56.14	0.16	0.50	5.0	
79-20-9	Methyl acetate	45.95	0.86	2.0	5.0	
75-09-2	Methylene chloride	53.89	0.49	0.50	5.0	
156-60-5	trans-1,2-Dichloroethene	53.79	0.44	0.50	5.0	
1634-04-4	Methyl tert-butyl ether	50.25	0.22	0.50	5.0	
75-34-3	1,1-Dichloroethane	54.32	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene	51.07	0.65	2.0	5.0	
78-93-3	2-Butanone	118.8	1.5	5.0	13	
67-66-3	Chloroform	54.00	0.27	0.50	5.0	
71-55-6	1,1,1-Trichloroethane	52.74	0.32	0.50	5.0	
110-82-7	Cyclohexane	54.32	0.45	0.50	5.0	
563-58-6	1,1-Dichloropropene	53.40	0.42	0.50	5.0	
56-23-5	Carbon tetrachloride	51.26	0.31	0.50	5.0	
107-06-2	1,2-Dichloroethane	50.87	0.23	0.50	5.0	
71-43-2	Benzene	54.36	0.28	0.50	5.0	
79-01-6	Trichloroethene	50.59	0.28	0.50	5.0	
108-87-2	Methylcyclohexane	54.94	0.35	0.50	5.0	
78-87-5	1,2-Dichloropropane	54.06	0.86	2.0	5.0	
75-27-4	Bromodichloromethane	53.17	0.36	0.50	5.0	
10061-01-5	cis-1,3-Dichloropropene	52.78	0.52	2.0	5.0	
108-10-1	4-Methyl-2-pentanone	119.3	1.1	1.3	13	
108-88-3	Toluene	53.81	0.31	0.50	5.0	B
10061-02-6	trans-1,3-Dichloropropene	52.19	0.45	0.50	5.0	
79-00-5	1,1,2-Trichloroethane	52.18	0.51	2.0	5.0	
127-18-4	Tetrachloroethene	47.65	0.42	0.50	5.0	
591-78-6	2-Hexanone	115.7	1.2	1.3	13	
124-48-1	Dibromochloromethane	50.57	0.32	0.50	5.0	
106-93-4	1,2-Dibromoethane	50.98	0.44	0.50	5.0	
108-90-7	Chlorobenzene	53.44	0.27	0.50	5.0	
100-41-4	Ethylbenzene	53.80	0.42	0.50	5.0	

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ANALYSIS DATA SHEET

SW 8260B

VIULCS

Client: TETRA TECH | SDG: 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: SW 5030A/5030B | File ID: 0101505-BS159.d | QC Type: LCS

Initial/Final: 5mL / 5mL | Lab ID: 0101505-BS1 | Column ID: SPB-624

Dilution: 1 | pH: | Prepared: 10/15/10 15:06

% Moisture: NA | Analyzed: 10/15/10 15:42

Batch: 0101505 | Sequence: 0J15007 | Calibration: UNASSIGNED | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC.(ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene	107.0	0.84	1.0	10	
95-47-6	o-Xylene	53.64	0.25	0.50	5.0	
100-42-5	Styrene	52.77	0.36	0.50	5.0	
75-25-2	Bromoform	46.96	0.95	2.0	5.0	
98-82-8	Isopropylbenzene	54.33	0.27	0.50	5.0	
79-34-5	1,1,2,2-Tetrachloroethane	54.92	0.64	2.0	5.0	
541-73-1	1,3-Dichlorobenzene	51.89	0.36	0.50	5.0	
106-46-7	1,4-Dichlorobenzene	52.73	0.30	0.50	5.0	
95-50-1	1,2-Dichlorobenzene	52.41	0.35	0.50	5.0	
96-12-8	1,2-Dibromo-3-chloropropane	51.24	0.91	2.0	5.0	
120-82-1	1,2,4-Trichlorobenzene	51.21	0.48	0.50	5.0	B
91-20-3	Naphthalene	49.92	1.1	2.0	5.0	B
540-59-0	1,2-Dichloroethene (total)	104.9	0.44	0.50	5.0	
1330-20-7	Xylenes (total)	160.6	0.25	0.50	5.0	

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	51.31	103	85 - 115	
1,2-Dichloroethane-d4	50.00	52.19	104	70 - 120	
Toluene-d8	50.00	53.68	107	85 - 120	
Bromofluorobenzene	50.00	56.89	114	75 - 120	

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ANALYSIS SEQUENCE SUMMARY

SW 8260B

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Sequence: 0J19010 Instrument: 5972hp59

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
BFB	0J19010-TUN1	0J19010-TUN159.d	10/19/10 12:12:00
VSTD050	0J19010-CCV1	0J19010-CCV159.d	10/19/10 12:37:00
VBLKJC	0101907-BLK1	0101907-BLK159.d	10/19/10 13:13:00
VJCLCS	0101907-BS1	0101907-BS159.d	10/19/10 13:50:00
VJCLCSD	0101907-BSD1	0101907-BSD159.d	10/19/10 14:17:00
SA-PZ-157I	1010082-02	1010082-02R59.d	10/19/10 14:44:00
SA-PZ-157I1DL	1010082-03RE1	1010082-03D59.d	10/19/10 15:11:00

MASS SPECTROMETER INSTRUMENT PERFORMANCE CHECK

SW 8260B

Laboratory:	COMPUCHEM	SDG:	1010082
Client:	TETRA TECH	Project:	CTO-WE08/112G02045/N62467-04-D-0057
Lab File ID:	0J19010-TUN159.d	Injection Date:	10/19/10
Instrument ID:	5972hp59	Injection Time:	12:12
Sequence:	0J19010	Lab Sample ID:	0J19010-TUN1

m/z	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE	
50	15 - 40% of 95	18.6	PASS
75	30 - 60% of 95	45.1	PASS
95	Base peak, 100% relative abundance	100	PASS
96	5 - 9% of 95	6.93	PASS
173	Less than 2% of 174	0	PASS
174	(Greater than 50% of 95)	68.5	PASS
175	5 - 9% of 174	7.4	PASS
176	(Greater than 95% but less then 101%)	100	PASS
177	5 - 9% of 176	6.93	PASS

CONTINUING CALIBRATION CHECK

SW 8260B

Client: TETRA TECH SDG: 1010082

Project: CTO-WE08/112G02045/N62467-04-D-0057

Instrument ID: 5972hp59 Calibration: 0101505

Lab File ID: 0J19010-CCV159.d Calibration Date: 10/06/10 16:09

Sequence: 0J19010 Injection Date: 10/19/10

Lab Sample ID: 0J19010-CCV1 Injection Time: 12:37

COMPOUND	TYPE	CONC. (ug/L)		RESPONSE FACTOR			% DIFF / DRIFT	
		STD	CCV	ICAL	CCV	MIN (#)	CCV	LIMIT
Dichlorodifluoromethane	Avg	50.00	58.00	0.4062945	0.4738573	0.001	16.6	20
Chloromethane	Avg	50.00	54.00	0.3478734	0.4240101	0.1	21.9	20 *
Vinyl chloride	Avg	50.00	56.00	0.2143718	0.2739904	0.001	27.8	20 *
Bromomethane	Avg	50.00	52.00	0.114877	0.1445492	0.001	25.8	20 *
Chloroethane	Avg	50.00	52.00	0.1020303	0.1164403	0.001	14.1	20
Trichlorofluoromethane	Avg	50.00	56.00	0.3883111	0.4298262	0.001	10.7	20
1,1-Dichloroethene	Avg	50.00	56.00	0.2452616	0.2647058	0.001	7.9	20
Acetone	Avg	125.0	136.0	3.924303E-02	4.484699E-02	0.001	14.3	20
1,1,2-Trichloro-1,2,2-trifluoroethane	Avg	50.00	56.00	0.3235865	0.3596493	0.001	11.1	20
Carbon disulfide	Avg	50.00	56.00	0.9861328	1.093273	0.001	10.9	20
Methyl acetate	Avg	50.00	48.00	0.1206635	0.132176	0.001	9.5	20
Methylene chloride	Lin	50.00	54.00	0.310354	0.2990883	0.001	8.0	20
trans-1,2-Dichloroethene	Avg	50.00	54.00	0.2682907	0.2840274	0.001	5.9	20
Methyl tert-butyl ether	Avg	50.00	52.00	0.5227352	0.5744416	0.001	9.9	20
1,1-Dichloroethane	Avg	50.00	52.00	0.4684585	0.5164737	0.1	10.2	20
cis-1,2-Dichloroethene	Avg	50.00	52.00	0.2741675	0.2846287	0.001	3.8	20
2-Butanone	Avg	125.0	132.0	7.201049E-02	8.182754E-02	0.001	13.6	20
Chloroform	Avg	50.00	54.00	0.4316181	0.460732	0.001	6.7	20
1,1,1-Trichloroethane	Avg	50.00	54.00	0.3601317	0.3851029	0.001	6.9	20
Cyclohexane	Avg	50.00	54.00	0.4571668	0.5180128	0.001	13.3	20
1,1-Dichloropropene	Avg	50.00	54.00	0.3737974	0.4053449	0.001	8.4	20
Carbon tetrachloride	Avg	50.00	54.00	0.3061561	0.3270749	0.001	6.8	20
1,2-Dichloroethane	Avg	50.00	50.00	0.2363211	0.2528963	0.001	7.0	20
Benzene	Avg	50.00	54.00	0.9776512	1.029985	0.001	5.4	20
Trichloroethene	Avg	50.00	52.00	0.2554021	0.255205	0.001	-0.08	20
Methylcyclohexane	Avg	50.00	56.00	0.4597769	0.5045756	0.001	9.7	20
1,2-Dichloropropane	Avg	50.00	52.00	0.220748	0.2422774	0.001	9.8	20

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CONTINUING CALIBRATION CHECK

SW 8260B

Client: TETRA TECH SDG: 1010082

Project: CTO-WE08/112G02045/N62467-04-D-0057

Instrument ID: 5972hp59 Calibration: 0101505

Lab File ID: 0J19010-CCV159.d Calibration Date: 10/06/10 16:09

Sequence: 0J19010 Injection Date: 10/19/10

Lab Sample ID: 0J19010-CCV1 Injection Time: 12:37

		CONC. (ug/L)		RESPONSE FACTOR			% DIFF / DRIFT	
COMPOUND	TYPE	STD	CCV	ICAL	CCV	MIN (#)	CCV	LIMIT
Bromodichloromethane	Avg	50.00	54.00	0.3002782	0.3260352	0.001	8.6	20
cis-1,3-Dichloropropene	Avg	50.00	50.00	0.3711873	0.3830307	0.001	3.2	20
4-Methyl-2-pentanone	Avg	125.0	128.0	0.2344463	0.2737677	0.001	16.8	20
Toluene	Avg	50.00	50.00	0.9230103	0.9378751	0.001	1.6	20
trans-1,3-Dichloropropene	Avg	50.00	50.00	0.4631006	0.4849495	0.001	4.7	20
1,1,2-Trichloroethane	Avg	50.00	54.00	0.2316188	0.2626085	0.001	13.4	20
Tetrachloroethene	Avg	50.00	48.00	0.3020695	0.2782185	0.001	-7.9	20
2-Hexanone	Avg	125.0	126.0	0.1662362	0.1903922	0.001	14.5	20
Dibromochloromethane	Avg	50.00	54.00	0.2938613	0.3197919	0.001	8.8	20
1,2-Dibromoethane	Avg	50.00	54.00	0.255229	0.2773563	0.001	8.7	20
Chlorobenzene	Avg	50.00	50.00	0.8508433	0.8554723	0.3	0.5	20
Ethylbenzene	Avg	50.00	50.00	0.4778114	0.4735672	0.001	-0.9	20
m,p-Xylene	Avg	100.0	100.0	0.607156	0.6000125	0.001	-1.2	20
o-Xylene	Avg	50.00	50.00	0.5934431	0.5866231	0.001	-1.1	20
Styrene	Avg	50.00	48.00	0.9362549	0.9119318	0.001	-2.6	20
Bromoform	Avg	50.00	50.00	0.1760576	0.1735964	0.1	-1.4	20
Isopropylbenzene	Avg	50.00	50.00	1.539807	1.519733	0.001	-1.3	20
1,1,2,2-Tetrachloroethane	Avg	50.00	56.00	0.6633177	0.7975954	0.3	20.2	20 *
1,3-Dichlorobenzene	Avg	50.00	46.00	1.375106	1.286699	0.001	-6.4	20
1,4-Dichlorobenzene	Avg	50.00	46.00	1.31944	1.226749	0.001	-7.0	20
1,2-Dichlorobenzene	Avg	50.00	48.00	1.189809	1.164941	0.001	-2.1	20
1,2-Dibromo-3-chloropropane	Avg	50.00	52.00	0.109887	0.1111795	0.001	1.2	20
1,2,4-Trichlorobenzene	Avg	50.00	42.00	0.8624628	0.6791647	0.001	-21.3	20 *
Naphthalene	Avg	50.00	48.00	1.4161	1.375923	0.001	-2.8	20
1,2-Dichloroethene (total)	Avg	100.0	106.0	0.2712291	0.2843281	0.001	4.8	20
Xylenes (total)	Avg	150.0	150.0	0.602585	0.5955494	0.001	-1.2	20
Dibromofluoromethane	Avg	50.00	54.00	0.2526265	0.2684282	0.001	6.3	20

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CONTINUING CALIBRATION CHECK

SW 8260B

Client: TETRA TECH SDG: 1010082

Project: CTO-WE08/112G02045/N62467-04-D-0057

Instrument ID: 5972hp59 Calibration: 0101505

Lab File ID: 0J19010-CCV159.d Calibration Date: 10/06/10 16:09

Sequence: 0J19010 Injection Date: 10/19/10

Lab Sample ID: 0J19010-CCV1 Injection Time: 12:37

COMPOUND	TYPE	CONC. (ug/L)		RESPONSE FACTOR			% DIFF / DRIFT	
		STD	CCV	ICAL	CCV	MIN (#)	CCV	LIMIT
1,2-Dichloroethane-d4	Avg	50.00	54.00	0.2121199	0.2324637	0.001	9.6	20
Toluene-d8	Avg	50.00	52.00	1.2951	1.3174	0.001	1.7	20
Bromofluorobenzene	Avg	50.00	56.00	1.006315	1.157357	0.001	15.0	20

Column to be used to flag Response Factor and %Diff/Drift values with an asterisk

* Values outside of QC limits

ANALYSIS DATA SHEET

SW 8260B

VBLKJC

Client: TETRA TECH | SDG: 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: SW 5030A/5030B | File ID: 0101907-BLK159.d | QC Type: Blank

Initial/Final: 5mL / 5mL | Lab ID: 0101907-BLK1 | Column ID: SPB-624

Dilution: 1 | pH: | Prepared: 10/19/10 13:13

% Moisture: NA | Analyzed: 10/19/10 13:13

Batch: 0101907 | Sequence: 0J19010 | Calibration: 0101505 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC.(ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane		0.55	2.0	5.0	U
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene		0.53	2.0	5.0	U
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride		0.49	0.50	5.0	U
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane		0.27	0.50	5.0	U
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane		0.32	0.50	5.0	U
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene	0.49	0.31	0.50	5.0	J
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U

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ANALYSIS DATA SHEET

SW 8260B

VBLKJC

Client: TETRA TECH | SDG: 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: SW 5030A/5030B | File ID: 0101907-BLK159.d | QC Type: Blank

Initial/Final: 5mL / 5mL | Lab ID: 0101907-BLK1 | Column ID: SPB-624

Dilution: 1 | pH: | Prepared: 10/19/10 13:13

% Moisture: NA | Analyzed: 10/19/10 13:13

Batch: 0101907 | Sequence: 0J19010 | Calibration: 0101505 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC.(ug/L)	DL	LOD	LOQ	Q
100-41-4	Ethylbenzene		0.42	0.50	5.0	U
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene		0.36	0.50	5.0	U
106-46-7	1,4-Dichlorobenzene		0.30	0.50	5.0	U
95-50-1	1,2-Dichlorobenzene		0.35	0.50	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene	1.4	0.48	0.50	5.0	J
91-20-3	Naphthalene	4.3	1.1	2.0	5.0	J
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	55.38	111	85 - 115	
1,2-Dichloroethane-d4	50.00	54.68	109	70 - 120	
Toluene-d8	50.00	53.14	106	85 - 120	
Bromofluorobenzene	50.00	57.76	116	75 - 120	

CAS NO.	TICS	CONC.(ug/L)	Response	R.T.	% Match	Q
NA	Tentatively Identified Compounds	0.0				U

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ANALYSIS DATA SHEET

SW 8260B

VJCLCS

Client: TETRA TECH | SDG: 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: SW 5030A/5030B | File ID: 0101907-BS159.d | QC Type: LCS

Initial/Final: 5mL / 5mL | Lab ID: 0101907-BS1 | Column ID: SPB-624

Dilution: 1 | pH: | Prepared: 10/19/10 13:13

% Moisture: NA | Analyzed: 10/19/10 13:50

Batch: 0101907 | Sequence: 0J19010 | Calibration: 0101505 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC.(ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane	56.82	0.32	0.50	5.0	
74-87-3	Chloromethane	54.67	0.39	0.50	5.0	
75-01-4	Vinyl chloride	55.88	0.48	0.50	5.0	
74-83-9	Bromomethane	51.92	0.76	2.0	5.0	
75-00-3	Chloroethane	51.74	0.55	2.0	5.0	
75-69-4	Trichlorofluoromethane	51.54	0.49	0.50	5.0	
75-35-4	1,1-Dichloroethene	52.09	0.53	2.0	5.0	
67-64-1	Acetone	121.3	1.6	5.0	13	
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	52.68	0.82	2.0	5.0	
75-15-0	Carbon disulfide	54.46	0.16	0.50	5.0	
79-20-9	Methyl acetate	45.59	0.86	2.0	5.0	
75-09-2	Methylene chloride	52.64	0.49	0.50	5.0	
156-60-5	trans-1,2-Dichloroethene	52.07	0.44	0.50	5.0	
1634-04-4	Methyl tert-butyl ether	50.92	0.22	0.50	5.0	
75-34-3	1,1-Dichloroethane	52.41	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene	51.24	0.65	2.0	5.0	
78-93-3	2-Butanone	123.8	1.5	5.0	13	
67-66-3	Chloroform	53.42	0.27	0.50	5.0	
71-55-6	1,1,1-Trichloroethane	51.99	0.32	0.50	5.0	
110-82-7	Cyclohexane	52.98	0.45	0.50	5.0	
563-58-6	1,1-Dichloropropene	51.32	0.42	0.50	5.0	
56-23-5	Carbon tetrachloride	50.63	0.31	0.50	5.0	
107-06-2	1,2-Dichloroethane	50.32	0.23	0.50	5.0	
71-43-2	Benzene	51.93	0.28	0.50	5.0	
79-01-6	Trichloroethene	49.97	0.28	0.50	5.0	
108-87-2	Methylcyclohexane	51.57	0.35	0.50	5.0	
78-87-5	1,2-Dichloropropane	52.71	0.86	2.0	5.0	
75-27-4	Bromodichloromethane	52.05	0.36	0.50	5.0	
10061-01-5	cis-1,3-Dichloropropene	49.39	0.52	2.0	5.0	
108-10-1	4-Methyl-2-pentanone	122.4	1.1	1.3	13	
108-88-3	Toluene	50.16	0.31	0.50	5.0	B
10061-02-6	trans-1,3-Dichloropropene	49.50	0.45	0.50	5.0	
79-00-5	1,1,2-Trichloroethane	52.67	0.51	2.0	5.0	
127-18-4	Tetrachloroethene	44.99	0.42	0.50	5.0	
591-78-6	2-Hexanone	117.6	1.2	1.3	13	
124-48-1	Dibromochloromethane	50.78	0.32	0.50	5.0	
106-93-4	1,2-Dibromoethane	50.86	0.44	0.50	5.0	
108-90-7	Chlorobenzene	49.70	0.27	0.50	5.0	
100-41-4	Ethylbenzene	48.61	0.42	0.50	5.0	

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ANALYSIS DATA SHEET

SW 8260B

VJCLCS

Client: TETRA TECH | SDG: 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: SW 5030A/5030B | File ID: 0101907-BS159.d | QC Type: LCS

Initial/Final: 5mL / 5mL | Lab ID: 0101907-BS1 | Column ID: SPB-624

Dilution: 1 | pH: | Prepared: 10/19/10 13:13

% Moisture: NA | Analyzed: 10/19/10 13:50

Batch: 0101907 | Sequence: 0J19010 | Calibration: 0101505 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC.(ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene	96.23	0.84	1.0	10	
95-47-6	o-Xylene	48.44	0.25	0.50	5.0	
100-42-5	Styrene	47.96	0.36	0.50	5.0	
75-25-2	Bromoform	46.10	0.95	2.0	5.0	
98-82-8	Isopropylbenzene	48.51	0.27	0.50	5.0	
79-34-5	1,1,2,2-Tetrachloroethane	54.56	0.64	2.0	5.0	
541-73-1	1,3-Dichlorobenzene	46.08	0.36	0.50	5.0	
106-46-7	1,4-Dichlorobenzene	46.45	0.30	0.50	5.0	
95-50-1	1,2-Dichlorobenzene	48.25	0.35	0.50	5.0	
96-12-8	1,2-Dibromo-3-chloropropane	50.03	0.91	2.0	5.0	
120-82-1	1,2,4-Trichlorobenzene	42.05	0.48	0.50	5.0	B
91-20-3	Naphthalene	47.10	1.1	2.0	5.0	B
540-59-0	1,2-Dichloroethene (total)	103.3	0.44	0.50	5.0	
1330-20-7	Xylenes (total)	144.7	0.25	0.50	5.0	

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	53.51	107	85 - 115	
1,2-Dichloroethane-d4	50.00	53.67	107	70 - 120	
Toluene-d8	50.00	53.33	107	85 - 120	
Bromofluorobenzene	50.00	57.95	116	75 - 120	

Environmental Testing Laboratories

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ANALYSIS DATA SHEET

SW 8260B

VJCLCSD

Client: TETRA TECH | SDG: 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: SW 5030A/5030B | File ID: 0101907-BSD159.d | QC Type: LCS Dup

Initial/Final: 5mL / 5mL | Lab ID: 0101907-BSD1 | Column ID: SPB-624

Dilution: 1 | pH: | Prepared: 10/19/10 13:13

% Moisture: NA | Analyzed: 10/19/10 14:17

Batch: 0101907 | Sequence: 0J19010 | Calibration: 0101505 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC.(ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane	54.99	0.32	0.50	5.0	
74-87-3	Chloromethane	53.51	0.39	0.50	5.0	
75-01-4	Vinyl chloride	54.35	0.48	0.50	5.0	
74-83-9	Bromomethane	50.30	0.76	2.0	5.0	
75-00-3	Chloroethane	49.28	0.55	2.0	5.0	
75-69-4	Trichlorofluoromethane	50.33	0.49	0.50	5.0	
75-35-4	1,1-Dichloroethene	50.46	0.53	2.0	5.0	
67-64-1	Acetone	121.1	1.6	5.0	13	
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	52.65	0.82	2.0	5.0	
75-15-0	Carbon disulfide	52.74	0.16	0.50	5.0	
79-20-9	Methyl acetate	45.39	0.86	2.0	5.0	
75-09-2	Methylene chloride	52.17	0.49	0.50	5.0	
156-60-5	trans-1,2-Dichloroethene	49.88	0.44	0.50	5.0	
1634-04-4	Methyl tert-butyl ether	50.27	0.22	0.50	5.0	
75-34-3	1,1-Dichloroethane	51.71	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene	49.40	0.65	2.0	5.0	
78-93-3	2-Butanone	118.1	1.5	5.0	13	
67-66-3	Chloroform	52.57	0.27	0.50	5.0	
71-55-6	1,1,1-Trichloroethane	50.91	0.32	0.50	5.0	
110-82-7	Cyclohexane	53.82	0.45	0.50	5.0	
563-58-6	1,1-Dichloropropene	50.55	0.42	0.50	5.0	
56-23-5	Carbon tetrachloride	50.29	0.31	0.50	5.0	
107-06-2	1,2-Dichloroethane	50.26	0.23	0.50	5.0	
71-43-2	Benzene	51.28	0.28	0.50	5.0	
79-01-6	Trichloroethene	47.51	0.28	0.50	5.0	
108-87-2	Methylcyclohexane	52.96	0.35	0.50	5.0	
78-87-5	1,2-Dichloropropane	52.65	0.86	2.0	5.0	
75-27-4	Bromodichloromethane	51.50	0.36	0.50	5.0	
10061-01-5	cis-1,3-Dichloropropene	48.57	0.52	2.0	5.0	
108-10-1	4-Methyl-2-pentanone	119.0	1.1	1.3	13	
108-88-3	Toluene	48.81	0.31	0.50	5.0	B
10061-02-6	trans-1,3-Dichloropropene	47.77	0.45	0.50	5.0	
79-00-5	1,1,2-Trichloroethane	52.16	0.51	2.0	5.0	
127-18-4	Tetrachloroethene	43.04	0.42	0.50	5.0	
591-78-6	2-Hexanone	115.3	1.2	1.3	13	
124-48-1	Dibromochloromethane	48.99	0.32	0.50	5.0	
106-93-4	1,2-Dibromoethane	50.50	0.44	0.50	5.0	
108-90-7	Chlorobenzene	47.93	0.27	0.50	5.0	
100-41-4	Ethylbenzene	47.53	0.42	0.50	5.0	

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ANALYSIS DATA SHEET

SW 8260B

VJCLCSD

Client: TETRA TECH | SDG: 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: SW 5030A/5030B | File ID: 0101907-BSD159.d | QC Type: LCS Dup

Initial/Final: 5mL / 5mL | Lab ID: 0101907-BSD1 | Column ID: SPB-624

Dilution: 1 | pH: | Prepared: 10/19/10 13:13

% Moisture: NA | Analyzed: 10/19/10 14:17

Batch: 0101907 | Sequence: 0J19010 | Calibration: 0101505 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC.(ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene	93.47	0.84	1.0	10	
95-47-6	o-Xylene	47.48	0.25	0.50	5.0	
100-42-5	Styrene	46.48	0.36	0.50	5.0	
75-25-2	Bromoform	45.01	0.95	2.0	5.0	
98-82-8	Isopropylbenzene	47.93	0.27	0.50	5.0	
79-34-5	1,1,2,2-Tetrachloroethane	55.88	0.64	2.0	5.0	
541-73-1	1,3-Dichlorobenzene	44.22	0.36	0.50	5.0	
106-46-7	1,4-Dichlorobenzene	44.14	0.30	0.50	5.0	
95-50-1	1,2-Dichlorobenzene	47.21	0.35	0.50	5.0	
96-12-8	1,2-Dibromo-3-chloropropane	48.08	0.91	2.0	5.0	
120-82-1	1,2,4-Trichlorobenzene	37.46	0.48	0.50	5.0	B
91-20-3	Naphthalene	48.43	1.1	2.0	5.0	B
540-59-0	1,2-Dichloroethene (total)	99.28	0.44	0.50	5.0	
1330-20-7	Xylenes (total)	140.9	0.25	0.50	5.0	

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	53.92	108	85 - 115	
1,2-Dichloroethane-d4	50.00	52.48	105	70 - 120	
Toluene-d8	50.00	53.26	107	85 - 120	
Bromofluorobenzene	50.00	58.58	117	75 - 120	

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ANALYSIS SEQUENCE SUMMARY

SW 8260B

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Sequence: 0J20005 Instrument: 5972hp59

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
BFB	0J20005-TUN1	0J20005-TUN159.d	10/20/10 11:24:00
VSTD020	0J20005-CAL3	0J20005-CAL359.d	10/20/10 11:49:00
VSTD010	0J20005-CAL2	0J20005-CAL259.d	10/20/10 12:17:00
VSTD005	0J20005-CAL1	0J20005-CAL159.d	10/20/10 12:44:00
VSTD050	0J20005-CAL4	0J20005-CAL459.d	10/20/10 13:11:00
VSTD100	0J20005-CAL5	0J20005-CAL559.d	10/20/10 13:39:00
VSTD200	0J20005-CAL6	0J20005-CAL659.d	10/20/10 14:06:00
VBLKJD	0102012-BLK1	0102012-BLK159.d	10/20/10 15:07:00
VJDLCS	0102012-BS1	0102012-BS1R59.d	10/20/10 16:16:00
VJDLCSD	0102012-BSD1	0102012-BSD159.d	10/20/10 16:43:00
SA-TB-01-20101011	1010082-09	1010082-09R259.d	10/20/10 18:34:00
SA-PZ-158I	1010082-10	1010082-10R259.d	10/20/10 19:01:00
SA-PZ-158I1	1010082-11	1010082-11R259.d	10/20/10 19:29:00
SA-PZ-155I	1010082-04	1010082-04R259.d	10/20/10 19:56:00
SA-PZ-151I1	1010082-05	1010082-05R259.d	10/20/10 20:23:00
SA-PZ-159I	1010082-07	1010082-07R59.d	10/20/10 20:50:00
SA-DUP01	1010082-08	1010082-08R59.d	10/20/10 21:18:00
SA-PZ-133I	1010082-14	1010082-14R59.d	10/20/10 21:45:00
SA-PZ-138I	1010082-15	1010082-15R59.d	10/20/10 22:12:00
SA-PZ-161I	1010082-16	1010082-16R59.d	10/20/10 22:39:00
SA-PZ-149I1	1010082-17	1010082-17R59.d	10/20/10 23:06:00

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MASS SPECTROMETER INSTRUMENT PERFORMANCE CHECK

SW 8260B

Laboratory:	COMPUCHEM	SDG:	1010082
Client:	TETRA TECH	Project:	CTO-WE08/112G02045/N62467-04-D-0057
Lab File ID:	0J20005-TUN159.d	Injection Date:	10/20/10
Instrument ID:	5972hp59	Injection Time:	11:24
Sequence:	0J20005	Lab Sample ID:	0J20005-TUN1

m/z	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE	
50	15 - 40% of 95	16.5	PASS
75	30 - 60% of 95	41.3	PASS
95	Base peak, 100% relative abundance	100	PASS
96	5 - 9% of 95	6.95	PASS
173	Less than 2% of 174	0	PASS
174	(Greater than 50% of 95)	68.4	PASS
175	5 - 9% of 174	7.45	PASS
176	(Greater than 95% but less then 101%)	99.7	PASS
177	5 - 9% of 176	6.74	PASS

INITIAL CALIBRATION DATA (Continued)

SW 8260B

Client: TETRA TECH SDG: 1010082

Project: CTO-WE08/112G02045/N62467-04-D-0057

Calibration: 0102201 Instrument: 5972hp59

Calibration Date: 10/20/2010 11:49:05AM

Compound	Mean RF	% RSD	Mean RT	RT RSD	Linear r	Quad COD	RSD LIMIT	Q
Dichlorodifluoromethane	0.4384268	10.17656	4.303	0.1100247			CCC (15)	
Chloromethane	0.3917288	11.88231	4.820667	0.1155653			CCC (15)	
Vinyl chloride	0.2330308	8.85389	5.116667	0.1104534			CCC (30)	
Bromomethane	0.1167407	17.09988	5.987833	0.1145599			CCC (15)	*
Chloroethane	0.1027545	7.475597	6.222667	3.768521E-02			CCC (15)	
Trichlorofluoromethane	0.395673	9.488214	6.745333	3.604153E-02			CCC (15)	
1,1-Dichloroethene	0.2412505	9.121179	7.751333	2.931207E-02			CCC (30)	
Acetone	3.754068E-02	11.03242	7.837	7.013905E-02			CCC (15)	
1,1,2-Trichloro-1,2,2-trifluoroethane	0.3238385	8.708967	7.692333	8.770709E-02			CCC (15)	
Carbon disulfide	0.9758959	10.96687	8.148667	5.558859E-02			CCC (15)	
Methyl acetate	0.112192	7.232228	8.315	5.802626E-02			CCC (15)	
Methylene chloride	0.2894426	16.15704	8.543667	5.326639E-02	0.9982016		CCC (15)	
trans-1,2-Dichloroethene	0.2702878	11.16081	8.888667	5.074149E-02			CCC (15)	
Methyl tert-butyl ether	0.4908641	5.519019	8.836167	2.653636E-02			CCC (15)	
1,1-Dichloroethane	0.4958672	10.57811	9.455667	3.622451E-02			CCC (15)	
cis-1,2-Dichloroethene	0.2742063	11.02156	10.11617	3.183268E-02			CCC (15)	
2-Butanone	6.860298E-02	5.508597	10.0685	2.080986E-02			CCC (15)	
Chloroform	0.420937	10.73798	10.41367	0.0177301			CCC (30)	
1,1,1-Trichloroethane	0.3524778	9.140237	10.62067	2.199499E-02			CCC (15)	
Cyclohexane	0.4845764	10.2087	10.65367	4.300916E-02			CCC (15)	
1,1-Dichloropropene	0.3603707	11.55067	10.77033	0.0487106			CCC (15)	
Carbon tetrachloride	0.2847343	7.860691	10.77033	0.0487106			CCC (15)	
1,2-Dichloroethane	0.2410948	8.24404	11.01033	4.629279E-02			CCC (15)	
Benzene	0.9438247	11.39159	10.96933	4.237808E-02			CCC (15)	
Trichloroethene	0.2365717	9.154036	11.538	2.571751E-02			CCC (15)	
Methylcyclohexane	0.4349789	6.492674	11.68567	1.590231E-02			CCC (15)	
1,2-Dichloropropane	0.2417521	12.23697	11.74683	0.0431824			CCC (30)	
Bromodichloromethane	0.2907196	6.24543	11.95233	1.833652E-02			CCC (15)	
cis-1,3-Dichloropropene	0.3573666	6.907554	12.29067	3.849689E-02			CCC (15)	
4-Methyl-2-pentanone	0.248122	8.605616	12.3415	3.545771E-02			CCC (15)	

INITIAL CALIBRATION DATA (Continued)

SW 8260B

Client: TETRA TECH SDG: 1010082

Project: CTO-WE08/112G02045/N62467-04-D-0057

Calibration: 0102201 Instrument: 5972hp59

Calibration Date: 10/20/2010 11:49:05AM

Compound	Mean RF	% RSD	Mean RT	RT RSD	Linear r	Quad COD	RSD LIMIT	Q
Toluene	0.9859458	11.42472	12.54033	3.451675E-02			CCC (30)	
trans-1,3-Dichloropropene	0.4667326	7.910118	12.69167	0.0163322			CCC (15)	
1,1,2-Trichloroethane	0.25823	6.095921	12.84267	3.444821E-02			CCC (15)	
Tetrachloroethene	0.2763365	10.73417	12.95167	3.511812E-02			CCC (15)	
2-Hexanone	0.1686526	8.066369	12.93833	1.817937E-02			CCC (15)	
Dibromochloromethane	0.3022738	4.634402	13.15367	2.636927E-02			CCC (15)	
1,2-Dibromoethane	0.267583	6.40902	13.26833	3.313652E-02			CCC (15)	
Chlorobenzene	0.8634379	6.567236	13.591	3.682961E-02			CCC (15)	
Ethylbenzene	0.4879621	6.640322	13.60867	3.498906E-03			CCC (30)	
m,p-Xylene	0.618701	8.581652	13.681	3.246726E-02			CCC (15)	
o-Xylene	0.6108678	5.159628	13.98333	1.409267E-02			CCC (15)	
Styrene	0.9489756	7.769921	13.99167	2.979343E-02			CCC (15)	
Bromoform	0.1603618	3.663057	14.20033	1.694076E-02			CCC (15)	
Isopropylbenzene	1.572295	11.0767	14.217	2.842256E-02			CCC (15)	
1,1,2,2-Tetrachloroethane	0.7317735	8.652191	14.452	2.447044E-02			CCC (15)	
1,3-Dichlorobenzene	1.403113	7.184554	15.2555	2.028006E-02			CCC (15)	
1,4-Dichlorobenzene	1.354918	7.5297	15.3245	1.349318E-02			CCC (15)	
1,2-Dichlorobenzene	1.23008	6.010173	15.66633	2.711891E-02			CCC (15)	
1,2-Dibromo-3-chloropropane	0.1054809	6.788497	16.37467	3.741584E-02			CCC (15)	
1,2,4-Trichlorobenzene	0.8115315	2.765288	17.26233	0.0147554			CCC (15)	
Naphthalene	1.405538	5.851475	17.61233	1.383213E-02			CCC (15)	
1,2-Dichloroethene (total)	0.272247	11.08739	10.11617	3.183268E-02			CCC (15)	
Xylenes (total)	0.6160899	7.394153	13.98333	1.409267E-02			CCC (15)	
Dibromofluoromethane	0.2331007	8.84959	10.58133	2.621256E-02			CCC (15)	
1,2-Dichloroethane-d4	0.2013452	11.09235	10.93633	1.691277E-02			CCC (15)	
Toluene-d8	1.339733	12.06253	12.4842	2.218835E-02			CCC (15)	
Bromofluorobenzene	1.109142	10.13102	14.396	2.837642E-02			CCC (15)	

ANALYSIS DATA SHEET

SW 8260B

VBLKJD

Client: TETRA TECH | SDG: 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: SW 5030A/5030B | File ID: 0102012-BLK159.d | QC Type: Blank

Initial/Final: 5mL / 5mL | Lab ID: 0102012-BLK1 | Column ID: SPB-624

Dilution: 1 | pH: | Prepared: 10/20/10 15:07

% Moisture: NA | Analyzed: 10/20/10 15:07

Batch: 0102012 | Sequence: 0J20005 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC.(ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane		0.55	2.0	5.0	U
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene		0.53	2.0	5.0	U
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride		0.49	0.50	5.0	U
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane		0.27	0.50	5.0	U
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane		0.32	0.50	5.0	U
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene		0.31	0.50	5.0	U
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U

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ANALYSIS DATA SHEET

SW 8260B

VBLKJD

Client: TETRA TECH | SDG: 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: SW 5030A/5030B | File ID: 0102012-BLK159.d | QC Type: Blank

Initial/Final: 5mL / 5mL | Lab ID: 0102012-BLK1 | Column ID: SPB-624

Dilution: 1 | pH: | Prepared: 10/20/10 15:07

% Moisture: NA | Analyzed: 10/20/10 15:07

Batch: 0102012 | Sequence: 0J20005 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC.(ug/L)	DL	LOD	LOQ	Q
100-41-4	Ethylbenzene		0.42	0.50	5.0	U
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene		0.36	0.50	5.0	U
106-46-7	1,4-Dichlorobenzene		0.30	0.50	5.0	U
95-50-1	1,2-Dichlorobenzene		0.35	0.50	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene		0.48	0.50	5.0	U
91-20-3	Naphthalene	2.7	1.1	2.0	5.0	J
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	54.42	109	85 - 115	
1,2-Dichloroethane-d4	50.00	54.94	110	70 - 120	
Toluene-d8	50.00	56.31	113	85 - 120	
Bromofluorobenzene	50.00	55.51	111	75 - 120	

CAS NO.	TICS	CONC.(ug/L)	Response	R.T.	% Match	Q
NA	Tentatively Identified Compounds	0.0				U

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ANALYSIS DATA SHEET

SW 8260B

VJDLCS

Client: TETRA TECH | SDG: 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: SW 5030A/5030B | File ID: 0102012-BS1R59.d | QC Type: LCS

Initial/Final: 5mL / 5mL | Lab ID: 0102012-BS1 | Column ID: SPB-624

Dilution: 1 | pH: | Prepared: 10/20/10 15:07

% Moisture: NA | Analyzed: 10/20/10 16:16

Batch: 0102012 | Sequence: 0J20005 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC.(ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane	49.96	0.32	0.50	5.0	
74-87-3	Chloromethane	47.96	0.39	0.50	5.0	
75-01-4	Vinyl chloride	49.88	0.48	0.50	5.0	
74-83-9	Bromomethane	55.41	0.76	2.0	5.0	
75-00-3	Chloroethane	47.22	0.55	2.0	5.0	
75-69-4	Trichlorofluoromethane	49.00	0.49	0.50	5.0	
75-35-4	1,1-Dichloroethene	47.93	0.53	2.0	5.0	
67-64-1	Acetone	115.7	1.6	5.0	13	
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	48.86	0.82	2.0	5.0	
75-15-0	Carbon disulfide	49.17	0.16	0.50	5.0	
79-20-9	Methyl acetate	50.05	0.86	2.0	5.0	
75-09-2	Methylene chloride	54.24	0.49	0.50	5.0	
156-60-5	trans-1,2-Dichloroethene	47.84	0.44	0.50	5.0	
1634-04-4	Methyl tert-butyl ether	50.93	0.22	0.50	5.0	
75-34-3	1,1-Dichloroethane	49.92	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene	48.57	0.65	2.0	5.0	
78-93-3	2-Butanone	125.2	1.5	5.0	13	
67-66-3	Chloroform	50.39	0.27	0.50	5.0	
71-55-6	1,1,1-Trichloroethane	48.43	0.32	0.50	5.0	
110-82-7	Cyclohexane	49.51	0.45	0.50	5.0	
563-58-6	1,1-Dichloropropene	49.62	0.42	0.50	5.0	
56-23-5	Carbon tetrachloride	48.73	0.31	0.50	5.0	
107-06-2	1,2-Dichloroethane	49.96	0.23	0.50	5.0	
71-43-2	Benzene	48.94	0.28	0.50	5.0	
79-01-6	Trichloroethene	47.73	0.28	0.50	5.0	
108-87-2	Methylcyclohexane	49.91	0.35	0.50	5.0	
78-87-5	1,2-Dichloropropane	49.67	0.86	2.0	5.0	
75-27-4	Bromodichloromethane	50.47	0.36	0.50	5.0	
10061-01-5	cis-1,3-Dichloropropene	51.24	0.52	2.0	5.0	
108-10-1	4-Methyl-2-pentanone	125.2	1.1	1.3	13	
108-88-3	Toluene	48.59	0.31	0.50	5.0	
10061-02-6	trans-1,3-Dichloropropene	51.44	0.45	0.50	5.0	
79-00-5	1,1,2-Trichloroethane	51.93	0.51	2.0	5.0	
127-18-4	Tetrachloroethene	47.55	0.42	0.50	5.0	
591-78-6	2-Hexanone	127.4	1.2	1.3	13	
124-48-1	Dibromochloromethane	51.22	0.32	0.50	5.0	
106-93-4	1,2-Dibromoethane	50.56	0.44	0.50	5.0	
108-90-7	Chlorobenzene	49.90	0.27	0.50	5.0	
100-41-4	Ethylbenzene	49.73	0.42	0.50	5.0	

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ANALYSIS DATA SHEET

SW 8260B

VJDLCS

Client: TETRA TECH | SDG: 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: SW 5030A/5030B | File ID: 0102012-BS1R59.d | QC Type: LCS

Initial/Final: 5mL / 5mL | Lab ID: 0102012-BS1 | Column ID: SPB-624

Dilution: 1 | pH: | Prepared: 10/20/10 15:07

% Moisture: NA | Analyzed: 10/20/10 16:16

Batch: 0102012 | Sequence: 0J20005 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC.(ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene	97.46	0.84	1.0	10	
95-47-6	o-Xylene	49.18	0.25	0.50	5.0	
100-42-5	Styrene	50.54	0.36	0.50	5.0	
75-25-2	Bromoform	49.72	0.95	2.0	5.0	
98-82-8	Isopropylbenzene	49.28	0.27	0.50	5.0	
79-34-5	1,1,2,2-Tetrachloroethane	52.68	0.64	2.0	5.0	
541-73-1	1,3-Dichlorobenzene	49.44	0.36	0.50	5.0	
106-46-7	1,4-Dichlorobenzene	49.44	0.30	0.50	5.0	
95-50-1	1,2-Dichlorobenzene	50.42	0.35	0.50	5.0	
96-12-8	1,2-Dibromo-3-chloropropane	49.06	0.91	2.0	5.0	
120-82-1	1,2,4-Trichlorobenzene	49.51	0.48	0.50	5.0	
91-20-3	Naphthalene	51.73	1.1	2.0	5.0	B
540-59-0	1,2-Dichloroethene (total)	96.41	0.44	0.50	5.0	
1330-20-7	Xylenes (total)	146.6	0.25	0.50	5.0	

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	49.93	100	85 - 115	
1,2-Dichloroethane-d4	50.00	52.24	104	70 - 120	
Toluene-d8	50.00	53.53	107	85 - 120	
Bromofluorobenzene	50.00	50.97	102	75 - 120	

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ANALYSIS DATA SHEET

SW 8260B

VJDLCSD

Client: TETRA TECH | SDG: 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: SW 5030A/5030B | File ID: 0102012-BSD159.d | QC Type: LCS Dup

Initial/Final: 5mL / 5mL | Lab ID: 0102012-BSD1 | Column ID: SPB-624

Dilution: 1 | pH: | Prepared: 10/20/10 15:07

% Moisture: NA | Analyzed: 10/20/10 16:43

Batch: 0102012 | Sequence: 0J20005 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC.(ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane	47.57	0.32	0.50	5.0	
74-87-3	Chloromethane	46.05	0.39	0.50	5.0	
75-01-4	Vinyl chloride	47.43	0.48	0.50	5.0	
74-83-9	Bromomethane	52.60	0.76	2.0	5.0	
75-00-3	Chloroethane	45.49	0.55	2.0	5.0	
75-69-4	Trichlorofluoromethane	47.20	0.49	0.50	5.0	
75-35-4	1,1-Dichloroethene	45.94	0.53	2.0	5.0	
67-64-1	Acetone	113.1	1.6	5.0	13	
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	46.50	0.82	2.0	5.0	
75-15-0	Carbon disulfide	47.77	0.16	0.50	5.0	
79-20-9	Methyl acetate	47.14	0.86	2.0	5.0	
75-09-2	Methylene chloride	51.81	0.49	0.50	5.0	
156-60-5	trans-1,2-Dichloroethene	46.41	0.44	0.50	5.0	
1634-04-4	Methyl tert-butyl ether	49.19	0.22	0.50	5.0	
75-34-3	1,1-Dichloroethane	49.23	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene	47.34	0.65	2.0	5.0	
78-93-3	2-Butanone	118.6	1.5	5.0	13	
67-66-3	Chloroform	48.89	0.27	0.50	5.0	
71-55-6	1,1,1-Trichloroethane	47.90	0.32	0.50	5.0	
110-82-7	Cyclohexane	46.74	0.45	0.50	5.0	
563-58-6	1,1-Dichloropropene	47.33	0.42	0.50	5.0	
56-23-5	Carbon tetrachloride	46.96	0.31	0.50	5.0	
107-06-2	1,2-Dichloroethane	49.17	0.23	0.50	5.0	
71-43-2	Benzene	48.59	0.28	0.50	5.0	
79-01-6	Trichloroethene	47.35	0.28	0.50	5.0	
108-87-2	Methylcyclohexane	47.53	0.35	0.50	5.0	
78-87-5	1,2-Dichloropropane	49.63	0.86	2.0	5.0	
75-27-4	Bromodichloromethane	49.44	0.36	0.50	5.0	
10061-01-5	cis-1,3-Dichloropropene	49.72	0.52	2.0	5.0	
108-10-1	4-Methyl-2-pentanone	121.1	1.1	1.3	13	
108-88-3	Toluene	47.44	0.31	0.50	5.0	
10061-02-6	trans-1,3-Dichloropropene	50.50	0.45	0.50	5.0	
79-00-5	1,1,2-Trichloroethane	50.19	0.51	2.0	5.0	
127-18-4	Tetrachloroethene	45.02	0.42	0.50	5.0	
591-78-6	2-Hexanone	119.8	1.2	1.3	13	
124-48-1	Dibromochloromethane	50.07	0.32	0.50	5.0	
106-93-4	1,2-Dibromoethane	49.30	0.44	0.50	5.0	
108-90-7	Chlorobenzene	49.13	0.27	0.50	5.0	
100-41-4	Ethylbenzene	47.72	0.42	0.50	5.0	

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ANALYSIS DATA SHEET

SW 8260B

VJDLCSD

Client: TETRA TECH | SDG: 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: SW 5030A/5030B | File ID: 0102012-BSD159.d | QC Type: LCS Dup

Initial/Final: 5mL / 5mL | Lab ID: 0102012-BSD1 | Column ID: SPB-624

Dilution: 1 | pH: | Prepared: 10/20/10 15:07

% Moisture: NA | Analyzed: 10/20/10 16:43

Batch: 0102012 | Sequence: 0J20005 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC.(ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene	95.79	0.84	1.0	10	
95-47-6	o-Xylene	48.64	0.25	0.50	5.0	
100-42-5	Styrene	49.60	0.36	0.50	5.0	
75-25-2	Bromoform	48.26	0.95	2.0	5.0	
98-82-8	Isopropylbenzene	48.08	0.27	0.50	5.0	
79-34-5	1,1,2,2-Tetrachloroethane	49.96	0.64	2.0	5.0	
541-73-1	1,3-Dichlorobenzene	47.14	0.36	0.50	5.0	
106-46-7	1,4-Dichlorobenzene	47.40	0.30	0.50	5.0	
95-50-1	1,2-Dichlorobenzene	47.75	0.35	0.50	5.0	
96-12-8	1,2-Dibromo-3-chloropropane	46.16	0.91	2.0	5.0	
120-82-1	1,2,4-Trichlorobenzene	47.45	0.48	0.50	5.0	
91-20-3	Naphthalene	50.64	1.1	2.0	5.0	B
540-59-0	1,2-Dichloroethene (total)	93.74	0.44	0.50	5.0	
1330-20-7	Xylenes (total)	144.4	0.25	0.50	5.0	

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	48.69	97	85 - 115	
1,2-Dichloroethane-d4	50.00	49.68	99	70 - 120	
Toluene-d8	50.00	52.72	105	85 - 120	
Bromofluorobenzene	50.00	48.99	98	75 - 120	

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ANALYSIS SEQUENCE SUMMARY

SW 8260B

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Sequence: 0J21009 Instrument: 5972hp59

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
BFB	0J21009-TUN1	0J21009-TUN159.d	10/21/10 11:26:00
VSTD050	0J21009-CCV1	0J21009-CCV159.d	10/21/10 11:51:00
VBLKJH	0102112-BLK1	0102112-BLK159.d	10/21/10 13:01:00
VJHLCS	0102112-BS1	0102112-BS159.d	10/21/10 13:52:00
VJHLCSD	0102112-BSD1	0102112-BSD159.d	10/21/10 14:19:00
SA-PZ-139	1010082-18	1010082-18R59.d	10/21/10 14:46:00
SA-DUP02	1010082-19	1010082-19R59.d	10/21/10 15:13:00
SA-PZ-159I1DL	1010082-06RE1	1010082-06D59.d	10/21/10 15:40:00
SA-PZ-160I1DL	1010082-12RE1	1010082-12D59.d	10/21/10 16:07:00
SA-PZ-138I1DL	1010082-13RE1	1010082-13D59.d	10/21/10 16:35:00
SA-PZ-160I	1010082-01	1010082-01R59.d	10/21/10 17:02:00
SA-PZ-160IMS	0102112-MS1	0102112-MS159.d	10/21/10 17:29:00
SA-PZ-160IMSD	0102112-MSD1	0102112-MSD159.d	10/21/10 17:56:00

MASS SPECTROMETER INSTRUMENT PERFORMANCE CHECK

SW 8260B

Laboratory:	COMPUCHEM	SDG:	1010082
Client:	TETRA TECH	Project:	CTO-WE08/112G02045/N62467-04-D-0057
Lab File ID:	0J21009-TUN159.d	Injection Date:	10/21/10
Instrument ID:	5972hp59	Injection Time:	11:26
Sequence:	0J21009	Lab Sample ID:	0J21009-TUN1

m/z	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE	
50	15 - 40% of 95	15.8	PASS
75	30 - 60% of 95	41.1	PASS
95	Base peak, 100% relative abundance	100	PASS
96	5 - 9% of 95	7.25	PASS
173	Less than 2% of 174	0	PASS
174	(Greater than 50% of 95)	68.1	PASS
175	5 - 9% of 174	7.51	PASS
176	(Greater than 95% but less then 101%)	101	PASS
177	5 - 9% of 176	6.99	PASS

CONTINUING CALIBRATION CHECK

SW 8260B

Client: TETRA TECH SDG: 1010082

Project: CTO-WE08/112G02045/N62467-04-D-0057

Instrument ID: 5972hp59 Calibration: 0102201

Lab File ID: 0J21009-CCV159.d Calibration Date: 10/20/10 11:49

Sequence: 0J21009 Injection Date: 10/21/10

Lab Sample ID: 0J21009-CCV1 Injection Time: 11:51

COMPOUND	TYPE	CONC. (ug/L)		RESPONSE FACTOR			% DIFF / DRIFT	
		STD	CCV	ICAL	CCV	MIN (#)	CCV	LIMIT
Dichlorodifluoromethane	Avg	50.00	48.00	0.4384268	0.4174271	0.001	-4.8	20
Chloromethane	Avg	50.00	42.00	0.3917288	0.3343479	0.1	-14.6	20
Vinyl chloride	Avg	50.00	42.00	0.2330308	0.1999383	0.001	-14.2	20
Bromomethane	Avg	50.00	52.00	0.1167407	0.1199064	0.001	2.7	20
Chloroethane	Avg	50.00	42.00	0.1027545	8.647951E-02	0.001	-15.8	20
Trichlorofluoromethane	Avg	50.00	48.00	0.395673	0.3835755	0.001	-3.1	20
1,1-Dichloroethene	Avg	50.00	50.00	0.2412505	0.2429532	0.001	0.7	20
Acetone	Avg	125.0	138.0	3.754068E-02	4.129174E-02	0.001	10.0	20
1,1,2-Trichloro-1,2,2-trifluoroethane	Avg	50.00	52.00	0.3238385	0.3353882	0.001	3.6	20
Carbon disulfide	Avg	50.00	52.00	0.9758959	0.9967591	0.001	2.1	20
Methyl acetate	Avg	50.00	58.00	0.112192	0.131413	0.001	17.1	20
Methylene chloride	Lin	50.00	58.00	0.2894426	0.2889574	0.001	16.0	20
trans-1,2-Dichloroethene	Avg	50.00	50.00	0.2702878	0.2743611	0.001	1.5	20
Methyl tert-butyl ether	Avg	50.00	58.00	0.4908641	0.563394	0.001	14.8	20
1,1-Dichloroethane	Avg	50.00	50.00	0.4958672	0.4915956	0.1	-0.9	20
cis-1,2-Dichloroethene	Avg	50.00	50.00	0.2742063	0.277859	0.001	1.3	20
2-Butanone	Avg	125.0	148.0	6.860298E-02	8.111721E-02	0.001	18.2	20
Chloroform	Avg	50.00	50.00	0.420937	0.4225902	0.001	0.4	20
1,1,1-Trichloroethane	Avg	50.00	48.00	0.3524778	0.3451182	0.001	-2.1	20
Cyclohexane	Avg	50.00	50.00	0.4845764	0.4844522	0.001	-0.03	20
1,1-Dichloropropene	Avg	50.00	50.00	0.3603707	0.3607982	0.001	0.1	20
Carbon tetrachloride	Avg	50.00	50.00	0.2847343	0.2880866	0.001	1.2	20
1,2-Dichloroethane	Avg	50.00	52.00	0.2410948	0.2463249	0.001	2.2	20
Benzene	Avg	50.00	50.00	0.9438247	0.9497431	0.001	0.6	20
Trichloroethene	Avg	50.00	52.00	0.2365717	0.2488166	0.001	5.2	20
Methylcyclohexane	Avg	50.00	52.00	0.4349789	0.4549306	0.001	4.6	20
1,2-Dichloropropane	Avg	50.00	50.00	0.2417521	0.2404043	0.001	-0.6	20

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CONTINUING CALIBRATION CHECK

SW 8260B

Client: TETRA TECH SDG: 1010082

Project: CTO-WE08/112G02045/N62467-04-D-0057

Instrument ID: 5972hp59 Calibration: 0102201

Lab File ID: 0J21009-CCV159.d Calibration Date: 10/20/10 11:49

Sequence: 0J21009 Injection Date: 10/21/10

Lab Sample ID: 0J21009-CCV1 Injection Time: 11:51

COMPOUND	TYPE	CONC. (ug/L)		RESPONSE FACTOR			% DIFF / DRIFT	
		STD	CCV	ICAL	CCV	MIN (#)	CCV	LIMIT
Bromodichloromethane	Avg	50.00	52.00	0.2907196	0.2993232	0.001	3.0	20
cis-1,3-Dichloropropene	Avg	50.00	54.00	0.3573666	0.3865767	0.001	8.2	20
4-Methyl-2-pentanone	Avg	125.0	136.0	0.248122	0.2709357	0.001	9.2	20
Toluene	Avg	50.00	48.00	0.9859458	0.9347428	0.001	-5.2	20
trans-1,3-Dichloropropene	Avg	50.00	52.00	0.4667326	0.4908977	0.001	5.2	20
1,1,2-Trichloroethane	Avg	50.00	56.00	0.25823	0.28463	0.001	10.2	20
Tetrachloroethene	Avg	50.00	50.00	0.2763365	0.2805786	0.001	1.5	20
2-Hexanone	Avg	125.0	140.0	0.1686526	0.1886562	0.001	11.9	20
Dibromochloromethane	Avg	50.00	54.00	0.3022738	0.3283805	0.001	8.6	20
1,2-Dibromoethane	Avg	50.00	58.00	0.267583	0.3051432	0.001	14.0	20
Chlorobenzene	Avg	50.00	50.00	0.8634379	0.8677732	0.3	0.5	20
Ethylbenzene	Avg	50.00	48.00	0.4879621	0.47286	0.001	-3.1	20
m,p-Xylene	Avg	100.0	98.00	0.618701	0.6016618	0.001	-2.8	20
o-Xylene	Avg	50.00	48.00	0.6108678	0.5966382	0.001	-2.3	20
Styrene	Avg	50.00	50.00	0.9489756	0.9353389	0.001	-1.4	20
Bromoform	Avg	50.00	60.00	0.1603618	0.1923693	0.1	20.0	20
Isopropylbenzene	Avg	50.00	48.00	1.572295	1.510284	0.001	-3.9	20
1,1,2,2-Tetrachloroethane	Avg	50.00	56.00	0.7317735	0.8172736	0.3	11.7	20
1,3-Dichlorobenzene	Avg	50.00	48.00	1.403113	1.37229	0.001	-2.2	20
1,4-Dichlorobenzene	Avg	50.00	48.00	1.354918	1.312743	0.001	-3.1	20
1,2-Dichlorobenzene	Avg	50.00	50.00	1.23008	1.216766	0.001	-1.1	20
1,2-Dibromo-3-chloropropane	Avg	50.00	62.00	0.1054809	0.1290349	0.001	22.3	20 *
1,2,4-Trichlorobenzene	Avg	50.00	50.00	0.8115315	0.8194575	0.001	1.0	20
Naphthalene	Avg	50.00	52.00	1.405538	1.456937	0.001	3.7	20
1,2-Dichloroethene (total)	Avg	100.0	100.0	0.272247	0.27611	0.001	1.4	20
Xylenes (total)	Avg	150.0	146.0	0.6160899	0.5999873	0.001	-2.6	20
Dibromofluoromethane	Avg	50.00	52.00	0.2331007	0.2403408	0.001	3.1	20

Environmental Testing Laboratories

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CONTINUING CALIBRATION CHECK

SW 8260B

Client:	TETRA TECH			SDG:	1010082
Project:	CTO-WE08/112G02045/N62467-04-D-0057				
Instrument ID:	5972hp59	Calibration:	0102201		
Lab File ID:	0J21009-CCV159.d	Calibration Date:	10/20/10 11:49		
Sequence:	0J21009	Injection Date:	10/21/10		
Lab Sample ID:	0J21009-CCV1	Injection Time:	11:51		

		CONC. (ug/L)		RESPONSE FACTOR			% DIFF / DRIFT	
COMPOUND	TYPE	STD	CCV	ICAL	CCV	MIN (#)	CCV	LIMIT
1,2-Dichloroethane-d4	Avg	50.00	50.00	0.2013452	0.1992554	0.001	-1.0	20
Toluene-d8	Avg	50.00	50.00	1.339733	1.210521	0.001	-9.6	20
Bromofluorobenzene	Avg	50.00	46.00	1.109142	1.003908	0.001	-9.5	20

Column to be used to flag Response Factor and %Diff/Drift values with an asterisk

* Values outside of QC limits

ANALYSIS DATA SHEET

SW 8260B

VBLKJH

Client: TETRA TECH | SDG: 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: SW 5030A/5030B | File ID: 0102112-BLK159.d | QC Type: Blank

Initial/Final: 5mL / 5mL | Lab ID: 0102112-BLK1 | Column ID: SPB-624

Dilution: 1 | pH: | Prepared: 10/21/10 13:01

% Moisture: NA | Analyzed: 10/21/10 13:01

Batch: 0102112 | Sequence: 0J21009 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC.(ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane		0.55	2.0	5.0	U
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene		0.53	2.0	5.0	U
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride	1.4	0.49	0.50	5.0	J
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane		0.27	0.50	5.0	U
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane		0.32	0.50	5.0	U
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene	0.49	0.31	0.50	5.0	J
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U

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ANALYSIS DATA SHEET

SW 8260B

VBLKJH

Client: TETRA TECH | SDG: 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: SW 5030A/5030B | File ID: 0102112-BLK159.d | QC Type: Blank

Initial/Final: 5mL / 5mL | Lab ID: 0102112-BLK1 | Column ID: SPB-624

Dilution: 1 | pH: | Prepared: 10/21/10 13:01

% Moisture: NA | Analyzed: 10/21/10 13:01

Batch: 0102112 | Sequence: 0J21009 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC.(ug/L)	DL	LOD	LOQ	Q
100-41-4	Ethylbenzene		0.42	0.50	5.0	U
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene		0.36	0.50	5.0	U
106-46-7	1,4-Dichlorobenzene		0.30	0.50	5.0	U
95-50-1	1,2-Dichlorobenzene		0.35	0.50	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene	1.9	0.48	0.50	5.0	J
91-20-3	Naphthalene	4.4	1.1	2.0	5.0	J
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	50.89	102	85 - 115	
1,2-Dichloroethane-d4	50.00	49.41	99	70 - 120	
Toluene-d8	50.00	50.08	100	85 - 120	
Bromofluorobenzene	50.00	48.69	97	75 - 120	

CAS NO.	TICS	CONC.(ug/L)	Response	R.T.	% Match	Q
NA	Tentatively Identified Compounds	0.0				U

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ANALYSIS DATA SHEET

SW 8260B

VJHLCS

Client: TETRA TECH | SDG: 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: SW 5030A/5030B | File ID: 0102112-BS159.d | QC Type: LCS

Initial/Final: 5mL / 5mL | Lab ID: 0102112-BS1 | Column ID: SPB-624

Dilution: 1 | pH: | Prepared: 10/21/10 13:01

% Moisture: NA | Analyzed: 10/21/10 13:52

Batch: 0102112 | Sequence: 0J21009 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC.(ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane	45.97	0.32	0.50	5.0	
74-87-3	Chloromethane	42.98	0.39	0.50	5.0	
75-01-4	Vinyl chloride	39.04	0.48	0.50	5.0	
74-83-9	Bromomethane	37.16	0.76	2.0	5.0	
75-00-3	Chloroethane	35.14	0.55	2.0	5.0	
75-69-4	Trichlorofluoromethane	45.82	0.49	0.50	5.0	
75-35-4	1,1-Dichloroethene	47.88	0.53	2.0	5.0	
67-64-1	Acetone	108.1	1.6	5.0	13	
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	48.33	0.82	2.0	5.0	
75-15-0	Carbon disulfide	48.84	0.16	0.50	5.0	
79-20-9	Methyl acetate	45.56	0.86	2.0	5.0	
75-09-2	Methylene chloride	53.96	0.49	0.50	5.0	B
156-60-5	trans-1,2-Dichloroethene	47.52	0.44	0.50	5.0	
1634-04-4	Methyl tert-butyl ether	49.16	0.22	0.50	5.0	
75-34-3	1,1-Dichloroethane	47.97	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene	47.72	0.65	2.0	5.0	
78-93-3	2-Butanone	109.7	1.5	5.0	13	
67-66-3	Chloroform	48.24	0.27	0.50	5.0	
71-55-6	1,1,1-Trichloroethane	47.75	0.32	0.50	5.0	
110-82-7	Cyclohexane	49.01	0.45	0.50	5.0	
563-58-6	1,1-Dichloropropene	48.93	0.42	0.50	5.0	
56-23-5	Carbon tetrachloride	48.48	0.31	0.50	5.0	
107-06-2	1,2-Dichloroethane	46.79	0.23	0.50	5.0	
71-43-2	Benzene	49.33	0.28	0.50	5.0	
79-01-6	Trichloroethene	50.12	0.28	0.50	5.0	
108-87-2	Methylcyclohexane	51.66	0.35	0.50	5.0	
78-87-5	1,2-Dichloropropane	48.96	0.86	2.0	5.0	
75-27-4	Bromodichloromethane	48.94	0.36	0.50	5.0	
10061-01-5	cis-1,3-Dichloropropene	50.15	0.52	2.0	5.0	
108-10-1	4-Methyl-2-pentanone	107.4	1.1	1.3	13	
108-88-3	Toluene	46.91	0.31	0.50	5.0	B
10061-02-6	trans-1,3-Dichloropropene	47.41	0.45	0.50	5.0	
79-00-5	1,1,2-Trichloroethane	47.85	0.51	2.0	5.0	
127-18-4	Tetrachloroethene	48.73	0.42	0.50	5.0	
591-78-6	2-Hexanone	110.0	1.2	1.3	13	
124-48-1	Dibromochloromethane	46.56	0.32	0.50	5.0	
106-93-4	1,2-Dibromoethane	48.34	0.44	0.50	5.0	
108-90-7	Chlorobenzene	50.27	0.27	0.50	5.0	
100-41-4	Ethylbenzene	50.92	0.42	0.50	5.0	

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ANALYSIS DATA SHEET

SW 8260B

VJHLCS

Client: TETRA TECH | SDG: 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: SW 5030A/5030B | File ID: 0102112-BS159.d | QC Type: LCS

Initial/Final: 5mL / 5mL | Lab ID: 0102112-BS1 | Column ID: SPB-624

Dilution: 1 | pH: | Prepared: 10/21/10 13:01

% Moisture: NA | Analyzed: 10/21/10 13:52

Batch: 0102112 | Sequence: 0J21009 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC.(ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene	101.5	0.84	1.0	10	
95-47-6	o-Xylene	51.68	0.25	0.50	5.0	
100-42-5	Styrene	52.20	0.36	0.50	5.0	
75-25-2	Bromoform	48.12	0.95	2.0	5.0	
98-82-8	Isopropylbenzene	51.25	0.27	0.50	5.0	
79-34-5	1,1,2,2-Tetrachloroethane	45.77	0.64	2.0	5.0	
541-73-1	1,3-Dichlorobenzene	49.79	0.36	0.50	5.0	
106-46-7	1,4-Dichlorobenzene	49.05	0.30	0.50	5.0	
95-50-1	1,2-Dichlorobenzene	50.12	0.35	0.50	5.0	
96-12-8	1,2-Dibromo-3-chloropropane	48.48	0.91	2.0	5.0	
120-82-1	1,2,4-Trichlorobenzene	50.41	0.48	0.50	5.0	B
91-20-3	Naphthalene	48.82	1.1	2.0	5.0	B
540-59-0	1,2-Dichloroethene (total)	95.24	0.44	0.50	5.0	
1330-20-7	Xylenes (total)	153.2	0.25	0.50	5.0	

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	47.61	95	85 - 115	
1,2-Dichloroethane-d4	50.00	45.83	92	70 - 120	
Toluene-d8	50.00	50.86	102	85 - 120	
Bromofluorobenzene	50.00	46.01	92	75 - 120	

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SW 8260B

VJHLCSD

Client: TETRA TECH | SDG: 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: SW 5030A/5030B | File ID: 0102112-BSD159.d | QC Type: LCS Dup

Initial/Final: 5mL / 5mL | Lab ID: 0102112-BSD1 | Column ID: SPB-624

Dilution: 1 | pH: | Prepared: 10/21/10 13:01

% Moisture: NA | Analyzed: 10/21/10 14:19

Batch: 0102112 | Sequence: 0J21009 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC.(ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane	46.09	0.32	0.50	5.0	
74-87-3	Chloromethane	41.28	0.39	0.50	5.0	
75-01-4	Vinyl chloride	39.84	0.48	0.50	5.0	
74-83-9	Bromomethane	50.94	0.76	2.0	5.0	
75-00-3	Chloroethane	41.73	0.55	2.0	5.0	
75-69-4	Trichlorofluoromethane	46.51	0.49	0.50	5.0	
75-35-4	1,1-Dichloroethene	47.84	0.53	2.0	5.0	
67-64-1	Acetone	108.9	1.6	5.0	13	
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	49.96	0.82	2.0	5.0	
75-15-0	Carbon disulfide	50.15	0.16	0.50	5.0	
79-20-9	Methyl acetate	47.05	0.86	2.0	5.0	
75-09-2	Methylene chloride	53.41	0.49	0.50	5.0	B
156-60-5	trans-1,2-Dichloroethene	48.78	0.44	0.50	5.0	
1634-04-4	Methyl tert-butyl ether	51.26	0.22	0.50	5.0	
75-34-3	1,1-Dichloroethane	49.98	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene	49.22	0.65	2.0	5.0	
78-93-3	2-Butanone	114.9	1.5	5.0	13	
67-66-3	Chloroform	49.60	0.27	0.50	5.0	
71-55-6	1,1,1-Trichloroethane	48.99	0.32	0.50	5.0	
110-82-7	Cyclohexane	49.43	0.45	0.50	5.0	
563-58-6	1,1-Dichloropropene	49.84	0.42	0.50	5.0	
56-23-5	Carbon tetrachloride	50.12	0.31	0.50	5.0	
107-06-2	1,2-Dichloroethane	47.42	0.23	0.50	5.0	
71-43-2	Benzene	49.57	0.28	0.50	5.0	
79-01-6	Trichloroethene	49.93	0.28	0.50	5.0	
108-87-2	Methylcyclohexane	51.80	0.35	0.50	5.0	
78-87-5	1,2-Dichloropropane	49.85	0.86	2.0	5.0	
75-27-4	Bromodichloromethane	49.57	0.36	0.50	5.0	
10061-01-5	cis-1,3-Dichloropropene	51.70	0.52	2.0	5.0	
108-10-1	4-Methyl-2-pentanone	112.6	1.1	1.3	13	
108-88-3	Toluene	47.03	0.31	0.50	5.0	B
10061-02-6	trans-1,3-Dichloropropene	49.43	0.45	0.50	5.0	
79-00-5	1,1,2-Trichloroethane	50.43	0.51	2.0	5.0	
127-18-4	Tetrachloroethene	48.92	0.42	0.50	5.0	
591-78-6	2-Hexanone	113.0	1.2	1.3	13	
124-48-1	Dibromochloromethane	49.72	0.32	0.50	5.0	
106-93-4	1,2-Dibromoethane	50.43	0.44	0.50	5.0	
108-90-7	Chlorobenzene	49.27	0.27	0.50	5.0	
100-41-4	Ethylbenzene	49.43	0.42	0.50	5.0	

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SW 8260B

VJHLCSD

Client: TETRA TECH | SDG: 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: SW 5030A/5030B | File ID: 0102112-BSD159.d | QC Type: LCS Dup

Initial/Final: 5mL / 5mL | Lab ID: 0102112-BSD1 | Column ID: SPB-624

Dilution: 1 | pH: | Prepared: 10/21/10 13:01

% Moisture: NA | Analyzed: 10/21/10 14:19

Batch: 0102112 | Sequence: 0J21009 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC.(ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene	96.82	0.84	1.0	10	
95-47-6	o-Xylene	49.21	0.25	0.50	5.0	
100-42-5	Styrene	49.66	0.36	0.50	5.0	
75-25-2	Bromoform	51.20	0.95	2.0	5.0	
98-82-8	Isopropylbenzene	48.97	0.27	0.50	5.0	
79-34-5	1,1,2,2-Tetrachloroethane	50.55	0.64	2.0	5.0	
541-73-1	1,3-Dichlorobenzene	50.77	0.36	0.50	5.0	
106-46-7	1,4-Dichlorobenzene	49.35	0.30	0.50	5.0	
95-50-1	1,2-Dichlorobenzene	50.04	0.35	0.50	5.0	
96-12-8	1,2-Dibromo-3-chloropropane	50.57	0.91	2.0	5.0	
120-82-1	1,2,4-Trichlorobenzene	50.77	0.48	0.50	5.0	B
91-20-3	Naphthalene	51.63	1.1	2.0	5.0	B
540-59-0	1,2-Dichloroethene (total)	98.00	0.44	0.50	5.0	
1330-20-7	Xylenes (total)	146.0	0.25	0.50	5.0	

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	50.55	101	85 - 115	
1,2-Dichloroethane-d4	50.00	48.58	97	70 - 120	
Toluene-d8	50.00	50.79	102	85 - 120	
Bromofluorobenzene	50.00	49.53	99	75 - 120	

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SW 8260B

SA-PZ-160IMS

Client: TETRA TECH | SDG: 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: SW 5030A/5030B | File ID: 0102112-MS159.d | QC Type: Matrix Spike

Initial/Final: 5mL / 5mL | Lab ID: 0102112-MS1 | Column ID: SPB-624

Dilution: 1 | pH: 1 | Prepared: 10/21/10 13:01

% Moisture: NA | Analyzed: 10/21/10 17:29

Batch: 0102112 | Sequence: 0J21009 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC.(ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane	50.39	0.32	0.50	5.0	
74-87-3	Chloromethane	49.12	0.39	0.50	5.0	
75-01-4	Vinyl chloride	48.08	0.48	0.50	5.0	
74-83-9	Bromomethane	53.92	0.76	2.0	5.0	
75-00-3	Chloroethane	109.3	0.55	2.0	5.0	
75-69-4	Trichlorofluoromethane	50.96	0.49	0.50	5.0	
75-35-4	1,1-Dichloroethene	61.56	0.53	2.0	5.0	
67-64-1	Acetone	109.1	1.6	5.0	13	
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	52.14	0.82	2.0	5.0	
75-15-0	Carbon disulfide	55.14	0.16	0.50	5.0	
79-20-9	Methyl acetate	47.96	0.86	2.0	5.0	
75-09-2	Methylene chloride	55.52	0.49	0.50	5.0	B
156-60-5	trans-1,2-Dichloroethene	51.62	0.44	0.50	5.0	
1634-04-4	Methyl tert-butyl ether	50.82	0.22	0.50	5.0	
75-34-3	1,1-Dichloroethane	184.7	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene	51.65	0.65	2.0	5.0	
78-93-3	2-Butanone	116.3	1.5	5.0	13	
67-66-3	Chloroform	52.89	0.27	0.50	5.0	
71-55-6	1,1,1-Trichloroethane	85.14	0.32	0.50	5.0	
110-82-7	Cyclohexane	53.51	0.45	0.50	5.0	
563-58-6	1,1-Dichloropropene	54.36	0.42	0.50	5.0	
56-23-5	Carbon tetrachloride	52.21	0.31	0.50	5.0	
107-06-2	1,2-Dichloroethane	51.83	0.23	0.50	5.0	
71-43-2	Benzene	53.49	0.28	0.50	5.0	
79-01-6	Trichloroethene	51.22	0.28	0.50	5.0	
108-87-2	Methylcyclohexane	53.79	0.35	0.50	5.0	
78-87-5	1,2-Dichloropropane	53.97	0.86	2.0	5.0	
75-27-4	Bromodichloromethane	52.50	0.36	0.50	5.0	
10061-01-5	cis-1,3-Dichloropropene	53.29	0.52	2.0	5.0	
108-10-1	4-Methyl-2-pentanone	116.3	1.1	1.3	13	
108-88-3	Toluene	51.93	0.31	0.50	5.0	B
10061-02-6	trans-1,3-Dichloropropene	54.34	0.45	0.50	5.0	
79-00-5	1,1,2-Trichloroethane	53.33	0.51	2.0	5.0	
127-18-4	Tetrachloroethene	51.49	0.42	0.50	5.0	
591-78-6	2-Hexanone	114.8	1.2	1.3	13	
124-48-1	Dibromochloromethane	51.20	0.32	0.50	5.0	
106-93-4	1,2-Dibromoethane	50.96	0.44	0.50	5.0	
108-90-7	Chlorobenzene	54.17	0.27	0.50	5.0	
100-41-4	Ethylbenzene	53.91	0.42	0.50	5.0	

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SW 8260B

SA-PZ-160IMS

Client: TETRA TECH | SDG: 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: SW 5030A/5030B | File ID: 0102112-MS159.d | QC Type: Matrix Spike

Initial/Final: 5mL / 5mL | Lab ID: 0102112-MS1 | Column ID: SPB-624

Dilution: 1 | pH: 1 | Prepared: 10/21/10 13:01

% Moisture: NA | Analyzed: 10/21/10 17:29

Batch: 0102112 | Sequence: 0J21009 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC.(ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene	105.5	0.84	1.0	10	
95-47-6	o-Xylene	53.28	0.25	0.50	5.0	
100-42-5	Styrene	52.19	0.36	0.50	5.0	
75-25-2	Bromoform	50.37	0.95	2.0	5.0	
98-82-8	Isopropylbenzene	53.48	0.27	0.50	5.0	
79-34-5	1,1,2,2-Tetrachloroethane	51.19	0.64	2.0	5.0	
541-73-1	1,3-Dichlorobenzene	52.24	0.36	0.50	5.0	
106-46-7	1,4-Dichlorobenzene	52.47	0.30	0.50	5.0	
95-50-1	1,2-Dichlorobenzene	52.08	0.35	0.50	5.0	
96-12-8	1,2-Dibromo-3-chloropropane	46.59	0.91	2.0	5.0	
120-82-1	1,2,4-Trichlorobenzene	51.22	0.48	0.50	5.0	B
91-20-3	Naphthalene	43.90	1.1	2.0	5.0	B
540-59-0	1,2-Dichloroethene (total)	103.3	0.44	0.50	5.0	
1330-20-7	Xylenes (total)	158.8	0.25	0.50	5.0	

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	48.33	97	85 - 115	
1,2-Dichloroethane-d4	50.00	48.96	98	70 - 120	
Toluene-d8	50.00	53.15	106	85 - 120	
Bromofluorobenzene	50.00	49.20	98	75 - 120	

CAS NO.	TICS	CONC.(ug/L)	Response	R.T.	% Match	Q
NA	Tentatively Identified Compounds	0.000				U

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ANALYSIS DATA SHEET

SW 8260B

SA-PZ-160IMSD

Client: TETRA TECH | SDG: 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: SW 5030A/5030B | File ID: 0102112-MSD159.d | QC Type: Matrix Spike Dup

Initial/Final: 5mL / 5mL | Lab ID: 0102112-MSD1 | Column ID: SPB-624

Dilution: 1 | pH: 1 | Prepared: 10/21/10 13:01

% Moisture: NA | Analyzed: 10/21/10 17:56

Batch: 0102112 | Sequence: 0J21009 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC.(ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane	50.46	0.32	0.50	5.0	
74-87-3	Chloromethane	45.25	0.39	0.50	5.0	
75-01-4	Vinyl chloride	44.51	0.48	0.50	5.0	
74-83-9	Bromomethane	50.17	0.76	2.0	5.0	
75-00-3	Chloroethane	55.69	0.55	2.0	5.0	
75-69-4	Trichlorofluoromethane	51.04	0.49	0.50	5.0	
75-35-4	1,1-Dichloroethene	61.44	0.53	2.0	5.0	
67-64-1	Acetone	115.3	1.6	5.0	13	
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	52.58	0.82	2.0	5.0	
75-15-0	Carbon disulfide	54.54	0.16	0.50	5.0	
79-20-9	Methyl acetate	49.19	0.86	2.0	5.0	
75-09-2	Methylene chloride	55.33	0.49	0.50	5.0	B
156-60-5	trans-1,2-Dichloroethene	52.20	0.44	0.50	5.0	
1634-04-4	Methyl tert-butyl ether	54.25	0.22	0.50	5.0	
75-34-3	1,1-Dichloroethane	182.0	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene	51.34	0.65	2.0	5.0	
78-93-3	2-Butanone	124.2	1.5	5.0	13	
67-66-3	Chloroform	52.71	0.27	0.50	5.0	
71-55-6	1,1,1-Trichloroethane	84.70	0.32	0.50	5.0	
110-82-7	Cyclohexane	52.56	0.45	0.50	5.0	
563-58-6	1,1-Dichloropropene	52.48	0.42	0.50	5.0	
56-23-5	Carbon tetrachloride	52.78	0.31	0.50	5.0	
107-06-2	1,2-Dichloroethane	51.91	0.23	0.50	5.0	
71-43-2	Benzene	52.94	0.28	0.50	5.0	
79-01-6	Trichloroethene	51.30	0.28	0.50	5.0	
108-87-2	Methylcyclohexane	52.92	0.35	0.50	5.0	
78-87-5	1,2-Dichloropropane	53.30	0.86	2.0	5.0	
75-27-4	Bromodichloromethane	52.48	0.36	0.50	5.0	
10061-01-5	cis-1,3-Dichloropropene	54.16	0.52	2.0	5.0	
108-10-1	4-Methyl-2-pentanone	123.0	1.1	1.3	13	
108-88-3	Toluene	51.01	0.31	0.50	5.0	B
10061-02-6	trans-1,3-Dichloropropene	54.19	0.45	0.50	5.0	
79-00-5	1,1,2-Trichloroethane	53.31	0.51	2.0	5.0	
127-18-4	Tetrachloroethene	51.49	0.42	0.50	5.0	
591-78-6	2-Hexanone	123.7	1.2	1.3	13	
124-48-1	Dibromochloromethane	52.46	0.32	0.50	5.0	
106-93-4	1,2-Dibromoethane	53.04	0.44	0.50	5.0	
108-90-7	Chlorobenzene	53.78	0.27	0.50	5.0	
100-41-4	Ethylbenzene	52.56	0.42	0.50	5.0	

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ANALYSIS DATA SHEET

SW 8260B

SA-PZ-160IMSD

Client: TETRA TECH | SDG: 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: SW 5030A/5030B | File ID: 0102112-MSD159.d | QC Type: Matrix Spike Dup

Initial/Final: 5mL / 5mL | Lab ID: 0102112-MSD1 | Column ID: SPB-624

Dilution: 1 | pH: 1 | Prepared: 10/21/10 13:01

% Moisture: NA | Analyzed: 10/21/10 17:56

Batch: 0102112 | Sequence: 0J21009 | Calibration: 0102201 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC.(ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene	104.2	0.84	1.0	10	
95-47-6	o-Xylene	52.55	0.25	0.50	5.0	
100-42-5	Styrene	51.78	0.36	0.50	5.0	
75-25-2	Bromoform	51.93	0.95	2.0	5.0	
98-82-8	Isopropylbenzene	52.29	0.27	0.50	5.0	
79-34-5	1,1,2,2-Tetrachloroethane	54.60	0.64	2.0	5.0	
541-73-1	1,3-Dichlorobenzene	53.19	0.36	0.50	5.0	
106-46-7	1,4-Dichlorobenzene	53.72	0.30	0.50	5.0	
95-50-1	1,2-Dichlorobenzene	54.00	0.35	0.50	5.0	
96-12-8	1,2-Dibromo-3-chloropropane	52.96	0.91	2.0	5.0	
120-82-1	1,2,4-Trichlorobenzene	54.37	0.48	0.50	5.0	B
91-20-3	Naphthalene	52.71	1.1	2.0	5.0	B
540-59-0	1,2-Dichloroethene (total)	103.5	0.44	0.50	5.0	
1330-20-7	Xylenes (total)	156.7	0.25	0.50	5.0	

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	50.31	101	85 - 115	
1,2-Dichloroethane-d4	50.00	49.24	98	70 - 120	
Toluene-d8	50.00	52.10	104	85 - 120	
Bromofluorobenzene	50.00	50.26	101	75 - 120	

CAS NO.	TICS	CONC.(ug/L)	Response	R.T.	% Match	Q
NA	Tentatively Identified Compounds	0.000				U

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NWIRP CALVERTON
WATER DATA
1010082

FRACTION	CHEMICAL	SA-PZ-138I-20101012	UNITS	SA-DUP02-20101012	RPD	D
OV	1,1,1-TRICHLOROETHANE	8.1	UG/L	8.2	1.23	0.10
OV	1,1-DICHLOROETHANE	33	UG/L	32	3.08	1.00
OV	1,1-DICHLOROETHENE	1.7 J	UG/L	2 J	16.22	0.30

Current RPD Quality Control Limit: 30 %.
Shaded cells indicate RPDs that exceed the applicable quality control limit.

NWIRP CALVERTON
WATER DATA
1010082

FRACTION	CHEMICAL	SA-PZ-151I1-20101012	UNITS	SA-DUP01-20101012	RPD	D
OV	1,1,1-TRICHLOROETHANE	36	UG/L	35	2.82	1.00
OV	1,1-DICHLOROETHANE	180	UG/L	170	5.71	10.00
OV	1,1-DICHLOROETHENE	14	UG/L	13	7.41	1.00
OV	1,2,4-TRICHLOROBENZENE	1.8 J	UG/L	1.8 J	0.00	0.00
OV	1,2-DICHLOROBENZENE	3.6 J	UG/L	3.6 J	0.00	0.00
OV	1,3-DICHLOROBENZENE	2.5 J	UG/L	2.3 J	8.33	0.20
OV	1,4-DICHLOROBENZENE	11	UG/L	11	0.00	0.00
OV	BENZENE	1.3 J	UG/L	1.2 J	8.00	0.10
OV	CHLOROETHANE	91	UG/L	91	0.00	0.00
OV	ISOPROPYLBENZENE	0.49 J	UG/L	0.47 J	4.17	0.02
OV	TOLUENE	0.33 J	UG/L	0.38 J	14.08	0.05

Current RPD Quality Control Limit: 30 %.
Shaded cells indicate RPDs that exceed the applicable quality control limit.

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a division of Liberty Analytical Corporation
501 Madison Avenue
Cary, N.C. 27513
Tel: 919/379-4100 Fax: 919/379-4050

SDG NARRATIVE
SDG # 1010082
PROTOCOL: SW-846
PROJECT: CTO-WE08/112G02045
PM: DAVE BRAYACK

SAMPLE IDENTIFICATIONS: SA-PZ-160I, SA-PZ-157I, SA-PZ-157I1, SA-PZ-155I, SA-PZ-151I1, SA-PZ-159I1, SA-PZ-159I, SA-DUP01

The eight water samples listed above were received intact at 2.0°C, with proper documentation, in sealed shipping containers, on October 14, 2010. The samples were scheduled for the requested analysis by SW-846, 3rd Edition, Update 4, Method RSK-175 for Methane, Ethane, and Ethene. All pertinent Quality Assurance notices are included in the narrative section and all pertinent Laboratory notices for SDG # 1010082 included in the sample data sections.

The samples were prepped and analyzed within the method holding time.

Target analytes were present above the reporting limits in samples SA-DUP01, SA-PZ-151I1, SA-PZ-155I, SA-PZ-157I, SA-PZ-157I1, SA-PZ-159I, SA-PZ-159I1, and SA-PZ-160I. Samples SA-PZ-157I1, SA-PZ-151I1, SA-PZ-159I1, SA-PZ-159I, and SA-DUP01 are analyzed and reported at a dilution as well as neat or a lesser dilution, due to target analytes exceeding the calibration range.

All QC criteria were met for all initial and continuing calibration standards associated to this SDG.

The method blanks associated with the samples met all quality control criteria.

Duplicate matrix spikes were performed with sample SA-PZ-160I, and met recovery and precision criteria, with the exception of Methane. The Laboratory Control Sample (LCS) that were prepared and analyzed with the samples met recovery criteria.

I certify that the tests used in this report meet all requirements of the NELAC standards unless otherwise stated in the SDG narrative or QA notice.

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on CD has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Teresa Amentt Jennings

Teresa Amentt Jennings
GC/HPLC Data Reviewer
October 28, 2010

GC and GC/MS Column and Trap Specifications Table

SDG #:	1010082

COLUMNS

Columns Utilized	Brand Name	Coating Material	ID (mm)	Film Thickness (um)	Length (m)
	GC Laboratory				
	Restek	RTX-5	0.53	1.0	30
	Restek	RTX-SMS	0.53	1.0	30
	Restek	clpest	0.32	0.5	30
	Restek	clpest2	0.32	0.42	30
	J&W	DB-210	0.53	1.0	30
✓	J&W	GS-GASPRO	0.32	N/A	30
	GC Volatiles Laboratory				
	Restek	RTX-Volatiles	0.53	2.0	30
	GC/MS Volatiles Laboratory				
	Restek	RTX-VMS	0.18	1.0	20
	Supelco	SPB-624	0.32	1.8	60
	Supelco	SPB-624	0.53	3.0	75
	Phenomonex	ZB-624	0.32	1.8	60
	GC/MS Semivolatiles Laboratory				
	Restek	RTX-5MS	0.32	0.25	30
	Phenomonex	ZB-5MS	0.32	0.25	30
	HPLC Laboratory				
	Supelco	Supelcosil LC-PAH	4.6	5.0	15 cm
	Supelco	Discovery RP Amide C16	4.6	5.0	25 cm
	Restek	Pinnacle Cyano	4.6	5.0	25 cm
	Restek	Allure C18	4.6	5.0	25 cm

TRAPS

	GC and GC/MS Volatiles Laboratory	
	Supelco J (BETXTRAP™)	* 7.7 cm Carbopack C
		* 1.2 cm Carbopack B
	Supelco K (Vocarb3000)	* 10 cm of Carbopack B (Graphitized Carbons)
		* 6 cm of Carboxen 1000 (Carbon molecular sieves)
		* 1 cm of Carboxen 1001 (Carbon molecular sieves)

Rev. 28

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Notification Regarding Manual Editing/Integration Flags

In some instances, manual adjustments to the software output are necessary to provide accurate data. These manual integrations are performed by the data reviewers, GC/MS operators, or GC chemists. An Extracted Ion Current Profile (EICP) or a GC chromatographic peak has been provided for the manual integration performed on each compound to demonstrate the accuracy of that process. The manual integrations are flagged on the quantitation report in the far right column beyond the FINAL concentration for GC/MS analysis, and in the "Flags" column for GC analysis. The manual editing/integration flags are:

M - Denotes that a manual integration has been performed for this compound. The manual integration was performed in order to provide the most accurate area count possible for the peak.

H - Denotes that the data reviewer, GC/MS operator, or GC Chemist has chosen an alternate peak within the retention time window from that chosen by the software for that compound. No manual integration is performed in choosing an alternate peak. The software still performs the integration.

MH - Denotes that an alternate peak has been chosen within the retention time window from that chosen by the software for that compound and also a manual integration of the chosen peak has been performed. The manual integration was performed in order to provide the most accurate area count possible for the peak.

L - Denotes that a data reviewer or GC/MS operator has selected an alternate library search. This is typically done when an additional tentatively identified compound (TIC) has been added to the number of peaks searched. No manual integration is performed in choosing an alternate peak. The software still performs the integration.

ML - Denotes that an alternate library search has been selected and a manual integration has also been performed. This is typically done when an additional TIC has been added and the TIC peak also required a manual integration.

The EPA CLP SOW documents require additional explanations for manual editing/integration. In the accompanying raw data packages, additional codes have been applied to the "M" flag and carry the following meanings;

M1 - The compound was not found by the automatic integration routine.

M2 - The compound was incorrectly integrated by the automatic integration routine.

M3 - The co-eluting compounds were incorrectly integrated by the automatic integration routine.

These codes will appear in the GC/MS and GC raw data.

Revision 7 (12/6/2005)

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DATA REPORTING QUALIFIERS

On the Form I, under the column labeled "Q" for qualifier, each result is flagged with the specific data reporting qualifiers listed below, as appropriate. Up to five qualifiers may be reported on Form I for each compound. The qualifiers used are:

U: This flag indicates the compound was analyzed for but not detected. The Contract Required Quantitation Limit (CRQL), or reporting limit, will be adjusted to reflect any dilution and, for soils, the percent moisture.

J: This flag indicates an estimated value. The flag is used as detailed below:

1. When estimating a concentration for tentatively identified compounds (TICs) where a response factor of 1:1 is assumed for the TIC analyte,

2. When the mass spectral and retention time data indicate the presence of a compound that meets the volatile and semivolatile GC/MS identification criteria, and the result is less than the adjusted CRQL (or Reporting Limit) but greater than zero, and

3. When the retention time data indicate the presence of a compound that meets the pesticide and/or Aroclor or other GC or HPLC identification criteria, and the result is less than the adjusted CRQL (or Reporting Limit) but greater than zero. For example, if the CRQL (or Reporting Limit) is 10 µg/L, but a concentration of 3 µg/L is calculated, it is reported as 3J.

N: This flag indicates presumptive evidence of a compound. This flag is only used for TICs, where the identification is based on a mass spectral library search and must be used with the J flag. For generic characterization of a TIC such as "chlorinated hydrocarbon" (or for an "unknown," with no matches ≥85% in the SOM01.2 SOW document), the N flag is not used.

P: In the EPA's Contract Laboratory Program (CLP), this flag is used for a pesticide/Aroclor target analyte, when there is greater than 25% difference for detected concentrations between the two GC columns. The lower of the two values is reported on the Form I and flagged with a P.
For SW-846 GC and HPLC analyses, when the Relative Percent Difference (RPD) is greater than 40% and there is no evidence of chromatographic anomalies or interferences, then the lower of the two values is reported and flagged with a P. When the RPD is equal to or less than 40%, our policy is to also report the lower of the two values, although the choice could be a project specific issue. These SW-846 policies are consistent with Method 8000C. If Method 8000B is required, the higher of the two values is reported. For certain HPLC analyses, if one of the HPLC

columns displays co-elution of target analytes, all results are reported from a primary column displaying no co-elution. Results are still flagged with a P if the RPD between columns is greater than 40%.

C: This flag applies to GC or HPLC results where the identification has been confirmed by GC/MS. If GC/MS confirmation was attempted but was unsuccessful, this flag is not applied; a laboratory-defined flag is used instead (see the X/Y/Z qualifier.)

B: This flag is used when the analyte is found in the associated blank as well as in the sample. It indicates probable blank contamination and warns the data user to take appropriate action. This flag is used for a TIC as well as for a positively identified target compound. The combination of flags BU or UB is not an allowable policy. Blank contaminants are flagged B only when they are detected in the sample.

E: This flag identifies compounds whose concentrations exceed the upper level of the calibration range of the instrument for that specific analysis. If one or more compounds have a concentration greater than the upper level of the calibration range, the sample or extract will be diluted and reanalyzed. All such compounds with a concentration greater than the upper level of the calibration range will have the result flagged with an E on Form I for the original analysis.

D: If a sample or extract is reanalyzed at a higher dilution factor, for example when the concentration of an analyte exceeds the upper calibration range, the DL suffix is appended to the sample number on the Form I for the more diluted sample, and **all** reported concentrations on that Form I are flagged with the D flag. This flag alerts data users that any discrepancies between the reported concentrations may be due to dilution of the sample or extract.

NOTE 1: The D flag is not applied to compounds which are not detected in the sample analysis i.e. compounds reported with the CRQL (or Reporting Limit) and the U flag.

NOTE 2: Separate Forms I are used for reporting the original analysis (Client Sample No. XXXXX) and the more diluted sample analysis (Client Sample No. XXXXXDL) i.e. the results from both analyses <u>are not combined</u> on a single Form I.

A: This flag indicates that a TIC is a suspected aldol-condensation product.

S: In the SOM01.2 SOW document, this flag is used to indicate an estimated value for Aroclor target compounds where a valid 5-point initial calibration was not performed prior to the analytes detection in a sample. If an "S" flag is used for a specific Aroclor, then a reanalysis of the sample is required after a valid 5-point calibration is performed for the detected Aroclor.

X/Y/Z: Other specific flags may be required to properly define the results. If used, the flags will be fully described in the SDG Narrative. The laboratory-defined flags are limited to X, Y, and Z.

PREPARATION BATCH SUMMARY

RSK 175 DOD

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Batch: 0102005 Matrix: Water Preparation: GC-RSK

SAMPLE NAME	LAB SAMPLE ID	DATE PREPARED	INITIAL VOL/WT (mL)	FINAL VOL/WT (mL)
PBLKJO	0102005-BLK1	10/20/10 09:20	1.00	1.00
PLCSJO	0102005-BS1	10/20/10 09:20	1.00	1.00
SA-PZ-160IMS	0102005-MS1	10/20/10 09:20	1.00	1.00
SA-PZ-160IMSD	0102005-MSD1	10/20/10 09:20	1.00	1.00
SA-PZ-160I	1010082-01	10/20/10 09:20	1.00	1.00
SA-PZ-157I	1010082-02	10/20/10 09:20	1.00	1.00
SA-PZ-157I1	1010082-03	10/20/10 09:20	1.00	1.00
SA-PZ-157I1DL	1010082-03RE1	10/20/10 09:20	1.00	1.00
SA-PZ-155I	1010082-04	10/20/10 09:20	1.00	1.00
SA-PZ-151I1	1010082-05	10/20/10 09:20	1.00	1.00
SA-PZ-151I1DL	1010082-05RE1	10/20/10 09:20	1.00	1.00
SA-PZ-159I1	1010082-06	10/20/10 09:20	1.00	1.00
SA-PZ-159I1DL	1010082-06RE1	10/20/10 09:20	1.00	1.00
SA-PZ-159I	1010082-07	10/20/10 09:20	1.00	1.00
SA-PZ-159IDL	1010082-07RE1	10/20/10 09:20	1.00	1.00
SA-DUP0I	1010082-08	10/20/10 09:20	1.00	1.00
SA-DUP0IDL	1010082-08RE1	10/20/10 09:20	1.00	1.00

HOLDING TIME SUMMARY

RSK 175 DOD

Client: TETRA TECH SDG: 1010082

Project: CTO-WE08/112G02045/N62467-04-D-0057

Sample Name	Date Collected	Date Received	Date Prepared	Days to Prep	Max Days to Prep	Date Analyzed	Days to Analysis	Max Days to Analysis	Q
SA-PZ-160I	10/12/10	10/14/10	10/20/10	7.94	14.00	10/20/10	0.05		
SA-PZ-157I	10/11/10	10/14/10	10/20/10	8.80	14.00	10/20/10	0.05		
SA-PZ-157I1	10/11/10	10/14/10	10/20/10	8.76	14.00	10/20/10	0.06		
SA-PZ-157I1DL	10/11/10	10/14/10	10/20/10	8.76	14.00	10/20/10	0.16		
SA-PZ-155I	10/12/10	10/14/10	10/20/10	8.03	14.00	10/20/10	0.07		
SA-PZ-151I1	10/12/10	10/14/10	10/20/10	8.03	14.00	10/20/10	0.08		
SA-PZ-151I1DL	10/12/10	10/14/10	10/20/10	8.03	14.00	10/20/10	0.17		
SA-PZ-159I1	10/12/10	10/14/10	10/20/10	7.97	14.00	10/20/10	0.08		
SA-PZ-159I1DL	10/12/10	10/14/10	10/20/10	7.97	14.00	10/20/10	0.18		
SA-PZ-159I	10/12/10	10/14/10	10/20/10	7.93	14.00	10/20/10	0.09		
SA-PZ-159IDL	10/12/10	10/14/10	10/20/10	7.93	14.00	10/20/10	0.18		
SA-DUP01	10/12/10	10/14/10	10/20/10	8.06	14.00	10/20/10	0.10		
SA-DUP01DL	10/12/10	10/14/10	10/20/10	8.06	14.00	10/20/10	0.19		

ANALYSIS SEQUENCE SUMMARY

RSK 175 DOD

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Sequence: 0G01009 Instrument: varian67

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
CALFTA	0G01009-CAL6	001t0G01009-CAL6.d	07/01/10 11:40:00
CALETA	0G01009-CAL5	002t0G01009-CAL5.d	07/01/10 11:51:00
CALDTA	0G01009-CAL4	003t0G01009-CAL4.d	07/01/10 12:25:00
CALCTA	0G01009-CAL3	004t0G01009-CAL3.d	07/01/10 12:47:00
CALBTA	0G01009-CAL2	005t0G01009-CAL2.d	07/01/10 13:03:00
CALATA	0G01009-CAL1	006t0G01009-CAL1.d	07/01/10 13:26:00

INITIAL CALIBRATION DATA (Continued)

RSK 175 DOD

Client: TETRA TECH SDG: 1010082

Project: CTO-WE08/112G02045/N62467-04-D-0057

Calibration: 0070106 Instrument: varian67

Calibration Date: 7/1/2010 5:04:25PM

Compound	Mean RF	% RSD	Mean RT	RT RSD	Linear r	Quad COD	RSD LIMIT	Q
Methane	3042.173	17.2471	1.558	0.1945632			CCC (25)	
Ethane	2781.42	6.539148	1.754	0.1146778			CCC (25)	
Ethene	2808.29	6.131014	1.830833	0.1350503			CCC (25)	

ANALYSIS SEQUENCE SUMMARY

RSK 175 DOD

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Sequence: 0J22017 Instrument: varian67

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
CALDUK	0J22017-CCV1	309tSEQ-CCV1.d	10/20/10 09:43:00
PBLKJO	0102005-BLK1	310t0102005-BLK1.d	10/20/10 09:58:00
PLCSJO	0102005-BS1	311t0102005-BS1.d	10/20/10 10:04:00
SA-PZ-160I	1010082-01	313t1010082-01.d	10/20/10 10:31:00
SA-PZ-157I	1010082-02	314t1010082-02.d	10/20/10 10:37:00
SA-PZ-157I1	1010082-03	315t1010082-03.d	10/20/10 10:48:00
SA-PZ-155I	1010082-04	316t1010082-04.d	10/20/10 10:59:00
SA-PZ-151I1	1010082-05	317t1010082-05.d	10/20/10 11:10:00
SA-PZ-159I1	1010082-06	318t1010082-06.d	10/20/10 11:21:00
SA-PZ-159I	1010082-07	319t1010082-07.d	10/20/10 11:32:00
SA-DUP01	1010082-08	320t1010082-08.d	10/20/10 11:43:00
SA-PZ-157I1DL	1010082-03RE1	325t1010082-03.d	10/20/10 13:16:00
SA-PZ-151I1DL	1010082-05RE1	326t1010082-05.d	10/20/10 13:22:00
SA-PZ-159I1DL	1010082-06RE1	327t1010082-06.d	10/20/10 13:33:00
SA-PZ-159IDL	1010082-07RE1	328t1010082-07.d	10/20/10 13:44:00
SA-DUP01DL	1010082-08RE1	329t1010082-08.d	10/20/10 13:55:00
SA-PZ-160IMS	0102005-MS1	334t0102005-MS1.d	10/20/10 15:01:00
SA-PZ-160IMSD	0102005-MSD1	335t0102005-MSD1.d	10/20/10 15:12:00
CALDUL	0J22017-CCV2	338tSEQ-CCV2.d	10/20/10 15:58:00

CONTINUING CALIBRATION CHECK

RSK 175 DOD

Client:	TETRA TECH	SDG:	1010082
Project:	CTO-WE08/112G02045/N62467-04-D-0057		
Instrument ID:	varian67	Calibration:	0070106
Lab File ID:	309tSEQ-CCV1.d	Calibration Date:	07/01/10 17:04
Sequence:	0J22017	Injection Date:	10/20/10
Lab Sample ID:	0J22017-CCV1	Injection Time:	09:43

COMPOUND	TYPE	CONC. (ug/L)		RESPONSE FACTOR			% DIFF / DRIFT	
		STD	CCV	ICAL	CCV	MIN (#)	CCV	LIMIT
Methane	Avg	5.730	6.000	3042.173	3190.401		4.9	25
Ethane	Avg	10.74	12.00	2781.42	3108.38		11.8	25
Ethene	Avg	10.02	11.30	2808.29	3167.665		12.8	25

Column to be used to flag Response Factor and %Diff/Drift values with an asterisk

* Values outside of QC limits

ANALYSIS DATA SHEET

RSK 175 DOD

PBLKJO

Client: TETRA TECH | SDG: 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: GC-RSK | File ID: 310t0102005-BLK1.d | QC Type: Blank

Initial/Final: 1mL / 1mL | Sulfur Cleanup: N | Lab ID: 0102005-BLK1 | Column ID: GS-GASPRO

Dilution: 1 | pH: | Florisil Cleanup: N | Prepared: 10/20/10 09:20

% Moisture: NA | GPC Cleanup: N | GPC Cleanup Factor: N | Analyzed: 10/20/10 09:58

Batch: 0102005 | Sequence: 0J22017 | Calibration: 0070106 | Instrument: varian67

CAS NO.	COMPOUND	CONC.(ug/L)	DL	LOD	LOQ	Q
74-82-8	Methane		0.048	0.15	0.58	U
74-84-0	Ethane		0.14	0.27	1.1	U
74-85-1	Ethene		0.15	0.25	1.0	U

ANALYSIS DATA SHEET

RSK 175 DOD

PLCSJO

Client: TETRA TECH | SDG: 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: GC-RSK | File ID: 311t0102005-BS1.d | QC Type: LCS

Initial/Final: 1mL / 1mL | Sulfur Cleanup: N | Lab ID: 0102005-BS1 | Column ID: GS-GASPRO

Dilution: 1 | pH: | Florisil Cleanup: N | Prepared: 10/20/10 09:20

% Moisture: NA | GPC Cleanup: N | GPC Cleanup Factor: N | Analyzed: 10/20/10 10:04

Batch: 0102005 | Sequence: 0J22017 | Calibration: 0070106 | Instrument: varian67

CAS NO.	COMPOUND	CONC.(ug/L)	DL	LOD	LOQ	Q
74-82-8	Methane	4.743	0.048	0.15	0.58	
74-84-0	Ethane	9.201	0.14	0.27	1.1	
74-85-1	Ethene	8.409	0.15	0.25	1.0	

ANALYSIS DATA SHEET

RSK 175 DOD

SA-PZ-160IMS

Client: TETRA TECH | SDG: 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: GC-RSK | File ID: 334t0102005-MS1.d | QC Type: Matrix Spike

Initial/Final: 1mL / 1mL | Sulfur Cleanup: N | Lab ID: 0102005-MS1 | Column ID: GS-GASPRO

Dilution: 1 | pH: | Florisil Cleanup: N | Prepared: 10/20/10 09:20

% Moisture: NA | GPC Cleanup: N | GPC Cleanup Factor: N | Analyzed: 10/20/10 15:01

Batch: 0I02005 | Sequence: 0J22017 | Calibration: 0070106 | Instrument: varian67

CAS NO.	COMPOUND	CONC.(ug/L)	DL	LOD	LOQ	Q
74-82-8	Methane	8.764	0.048	0.15	0.58	
74-84-0	Ethane	9.854	0.14	0.27	1.1	
74-85-1	Ethene	9.014	0.15	0.25	1.0	

ANALYSIS DATA SHEET

RSK 175 DOD

SA-PZ-160IMSD

Client: TETRA TECH | SDG: 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: GC-RSK | File ID: 335t0102005-MSD1.d | QC Type: Matrix Spike Dup

Initial/Final: 1mL / 1mL | Sulfur Cleanup: N | Lab ID: 0102005-MSD1 | Column ID: GS-GASPRO

Dilution: 1 | pH: | Florisil Cleanup: N | Prepared: 10/20/10 09:20

% Moisture: NA | GPC Cleanup: N | GPC Cleanup Factor: N | Analyzed: 10/20/10 15:12

Batch: 0102005 | Sequence: 0J22017 | Calibration: 0070106 | Instrument: varian67

CAS NO.	COMPOUND	CONC.(ug/L)	DL	LOD	LOQ	Q
74-82-8	Methane	10.92	0.048	0.15	0.58	
74-84-0	Ethane	10.28	0.14	0.27	1.1	
74-85-1	Ethene	9.088	0.15	0.25	1.0	

CONTINUING CALIBRATION CHECK

RSK 175 DOD

Client:	TETRA TECH			SDG:	1010082
Project:	CTO-WE08/112G02045/N62467-04-D-0057				
Instrument ID:	varian67	Calibration:	0070106		
Lab File ID:	338tSEQ-CCV2.d	Calibration Date:	07/01/10 17:04		
Sequence:	0J22017	Injection Date:	10/20/10		
Lab Sample ID:	0J22017-CCV2	Injection Time:	15:58		

		CONC. (ug/L)		RESPONSE FACTOR			% DIFF / DRIFT	
COMPOUND	TYPE	STD	CCV	ICAL	CCV	MIN (#)	CCV	LIMIT
Methane	Avg	5.730	5.270	3042.173	2804.363		-7.8	25
Ethane	Avg	10.74	10.90	2781.42	2839.106		2.1	25
Ethene	Avg	10.02	10.30	2808.29	2876.447		2.4	25

Column to be used to flag Response Factor and %Diff/Drift values with an asterisk

* Values outside of QC limits

LCS / LCS DUPLICATE RECOVERY

RSK 175 DOD

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 0102005-BS1 Matrix: Water Client ID: PLCSJO Batch: 0102005

ANALYTE	SPIKE ADDED (ug/L)	LCS CONCENTRATION (ug/L)	LCS % REC.	Q	QC LIMITS REC.
Methane	5.730	4.743	83		58 - 120
Ethane	10.74	9.201	86		61 - 134
Ethene	10.02	8.409	84		58 - 129

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY

RSK 175 DOD

SA-PZ-160IMS

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 0102005-MS1 % Solid: NA Matrix: Water Lab Source ID: 1010082-01 Source Sample: SA-PZ-160I

ANALYTE	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC.	Q	QC LIMITS REC.
Methane	5.730	6.4	8.764	42	J	58 - 120
Ethane	10.74	0.27 U	9.854	92		61 - 134
Ethene	10.02	0.25 U	9.014	90		58 - 129

ANALYTE	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC. #	% RPD	Q	QC LIMITS RPD	QC LIMITS REC.
Methane	5.730	10.92	79	22	*	20	58 - 120
Ethane	10.74	10.28	96	4		20	61 - 134
Ethene	10.02	9.088	91	0.8		20	58 - 129

NWIRP CALVERTON
WATER DATA
1010082

FRACTION	CHEMICAL	SA-PZ-151I1-20101012DL	UNITS	SA-DUP01-20101012DL	RPD	D
OVG	METHANE	140 D	UG/L	300 D	72.73	160.00

Current RPD Quality Control Limit: 30 %.
Shaded cells indicate RPDs that exceed the applicable quality control limit.

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**D. BRAYACK**	**DATE:**	**December 1, 2010**
FROM:	**MEGAN CARSON**	**COPIES:**	**DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION – IRON, MANGANESE, AND TOTAL ORGANIC CARBON**
CTO WE08 NWIRP CALVERTON
SAMPLE DELIVERY GROUPS (SDG) – 1010082

SAMPLES: 8/Aqueous/

SA-DUP01-20101012	SA-PZ-151I1-20101012
SA-PZ-155I-20101012	SA-PZ-157I-20101011
SA-PZ-157I1-20101011	SA-PZ-159I-20101012
SA-PZ-159I1-20101012	SA-PZ-160I-20101012

Overview

The sample set for NWIRP Calverton, CTO WE08, SDG 1010082, consists of eight (8) aqueous environmental samples. This SDG contained one field duplicate pair: SA-DUP01-20101012/SA-PZ-151I1-20101012.

All samples were analyzed for iron, manganese, and total organic carbon. The samples were collected by Tetra Tech NUS on October 11th and 12th, 2010 and analyzed by CompuChem under Naval Facilities Engineering Service Center (NFESC) Quality Assurance / Quality Control (QA/QC) criteria. Metals analyses were conducted using SW-846 method 6010. Total organic carbon analyses were conducted using Standard Method 5310B.

These data were evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Initial and Continuing Calibration Verification Results
* • Laboratory Method / Preparation Blank Analyses
* • ICP Interference Results
* • Matrix Spike / Matrix Spike Duplicate Recoveries
* • Laboratory Duplicate Results
* • Laboratory Control Standard Results
* • ICP Serial Dilution Results
* • Detection Limits
* • Analyte Quantitation

* - All quality control criteria were met for this parameter.

Metals

All sample results were within quality control limits.

Miscellaneous Parameters

The following contaminant were detected in the laboratory method blanks at the following maximum concentrations:

Analyte	Maximum Concentration	Action Level
TOC	0.155 ug/L	0.776 ug/L

An action level of 5X the maximum contaminant level has been used to evaluate sample data for blank contamination. Sample aliquot, percent solids and dilution factors, if applicable, were taken into consideration when evaluating for blank contamination. The positive result less than the blank action level were qualified as nondetected (U) as a result of laboratory blank contamination.

Notes

The following contaminants were detected in the laboratory method/preparation blanks at the following maximum concentrations:

Analyte	Maximum Concentration	Action Level
Manganese	0.172 ug/L	0.86 ug/L

An action level of 5X the maximum contaminant level has been used to evaluate sample data for blank contamination. Sample aliquot, percent solids and dilution factors, if applicable, were taken into consideration when evaluating for blank contamination. No validation action was taken as sample results were greater than the blank action levels.

Sample SA-PZ-159I-20101012 was analyzed at a 2X dilution of TOC.

Positive results below the limit of quantitation (LOQ) and above the detection limit (DL) were qualified as estimated (J) due to uncertainty near the detection limit (DL).

A CRDL standard was not preformed with these samples; therefore samples were not qualified for CRDL standard non-compliances.

Executive Summary

Laboratory Performance: Laboratory blank contamination for TOC resulted in the qualification of several sample results.

Other Factors Affecting Data Quality: Positive results below the limit of quantitation (LOQ) and above the detection limit (DL) were qualified as estimated (J).

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Data Validation" as amended for Region II and the Department of Defense (DoD) document entitled "Quality Systems Manual (QSM) for Environmental Laboratories", January 2006.

The text of this report has been formulated to address only those problem areas affecting data quality.

Megan Carson

Tetra Tech NUS
Megan Carson
Chemist I/Data Validator

Edward Sedlmyer / for

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C – Region II Worksheets
3. Appendix D - Support Documentation

APPENDIX A

QUALIFIED ANALYTICAL RESULTS

Data Validation Qualifier Codes:

A	=	Lab Blank Contamination
B	=	Field Blank Contamination
C	=	Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01	=	GC/MS Tuning Noncompliance
D	=	MS/MSD Recovery Noncompliance
E	=	LCS/LCSD Recovery Noncompliance
F	=	Lab Duplicate Imprecision
G	=	Field Duplicate Imprecision
H	=	Holding Time Exceedance
I	=	ICP Serial Dilution Noncompliance
J	=	GFAA PDS - GFAA MSA's $r < 0.995$
K	=	ICP Interference - includes ICS % R Noncompliance
L	=	Instrument Calibration Range Exceedance
M	=	Sample Preservation Noncompliance
N	=	Internal Standard Noncompliance
N01	=	Internal Standard Recovery Noncompliance Dioxins
N02	=	Recovery Standard Noncompliance Dioxins
N03	=	Clean-up Standard Noncompliance Dioxins
O	=	Poor Instrument Performance (e.g. base-line drifting)
P	=	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q	=	Other problems (can be any number of issues; e.g. poor chromatography,interferences, etc.)
R	=	Surrogates Recovery Noncompliance
S	=	Pesticide/PCB Resolution
T	=	% Breakdown Noncompliance for DDT and Endrin
U	=	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
V	=	Non-linear calibrations; correlation coefficient $r < 0.995$
W	=	EMPC result
X	=	Signal to noise response drop
Y	=	Percent solids <30%
Z	=	Uncertainty at 2 sigma deviation is greater than sample activity

PROJ_NO: 02045	NSAMPLE	SA-DUP01-20101012			SA-PZ-151I1-20101012			SA-PZ-155I-20101012			SA-PZ-157I1-20101011		
SDG: 1010082	LAB_ID	1010082-08			1010082-05			1010082-04			1010082-03		
FRACTION: M	SAMP_DATE	10/12/2010			10/12/2010			10/12/2010			10/11/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
IRON		1020			1010			128	J	P	82.4	J	P
MANGANESE		5550			5460			571			5210		

PROJ_NO: 02045	NSAMPLE	SA-PZ-157I-20101011			SA-PZ-159I1-20101012			SA-PZ-159I-20101012			SA-PZ-160I-20101012		
SDG: 1010082	LAB_ID	1010082-02			1010082-06			1010082-07			1010082-01		
FRACTION: M	SAMP_DATE	10/11/2010			10/12/2010			10/12/2010			10/12/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
IRON		460	J	P	1180			7990			38.7	J	P
MANGANESE		889			6430			799			516		

PROJ_NO: 02045	NSAMPLE	SA-DUP01-20101012			SA-PZ-151I1-20101012			SA-PZ-155I-20101012			SA-PZ-157I1-20101011		
SDG: 1010082	LAB_ID	1010082-08			1010082-05			1010082-04			1010082-03		
FRACTION: MISC	SAMP_DATE	10/12/2010			10/12/2010			10/12/2010			10/11/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/L			MG/L			MG/L			MG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
TOTAL ORGANIC CARBON		1.33			1.1			0.36	U	A	0.94	J	P

PROJ_NO: 02045	NSAMPLE	SA-PZ-157I-20101011			SA-PZ-159I1-20101012			SA-PZ-159I-20101012			SA-PZ-160I-20101012		
SDG: 1010082	LAB_ID	1010082-02			1010082-06			1010082-07			1010082-01		
FRACTION: MISC	SAMP_DATE	10/11/2010			10/12/2010			10/12/2010			10/12/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/L			MG/L			MG/L			MG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
TOTAL ORGANIC CARBON		0.44	U	A	43.69			116.16			0.55	U	A

APPENDIX B

RESULTS AS REPORTED BY THE LABORATORY

ANALYSIS DATA SHEET

SA-DUP01

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 1010082-08 % Solid: Matrix: Water Sampled: 10/12/10 Received: 10/14/10

CAS NO.	Analyte	Conc. (ug/L)	DL	LOD	LOQ	D.F.	Q	Method	Sequence	Analyzed
7439-89-6	Iron	1020	12.2	50.0	500	1		EPA 6010C	0J29005	10/28/10 20:48:25
7439-96-5	Manganese	5550	0.164	5.00	10.0	1		EPA 6010C	0J29005	10/28/10 20:48:25

ANALYSIS DATA SHEET

SA-PZ-151I1

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 1010082-05 % Solid: Matrix: Water Sampled: 10/12/10 Received: 10/14/10

CAS NO.	Analyte	Conc. (ug/L)	DL	LOD	LOQ	D.F.	Q	Method	Sequence	Analyzed
7439-89-6	Iron	1010	12.2	50.0	500	1		EPA 6010C	0J29005	10/28/10 20:12:19
7439-96-5	Manganese	5460	0.164	5.00	10.0	1		EPA 6010C	0J29005	10/28/10 20:12:19

ANALYSIS DATA SHEET

SA-PZ-155I

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 1010082-04 % Solid: Matrix: Water Sampled: 10/12/10 Received: 10/14/10

CAS NO.	Analyte	Conc. (ug/L)	DL	LOD	LOQ	D.F.	Q	Method	Sequence	Analyzed
7439-89-6	Iron	128	12.2	50.0	500	1	J	EPA 6010C	0J29005	10/28/10 20:05:06
7439-96-5	Manganese	571	0.164	5.00	10.0	1		EPA 6010C	0J29005	10/28/10 20:05:06

ANALYSIS DATA SHEET

SA-PZ-157I

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 1010082-02 % Solid: Matrix: Water Sampled: 10/11/10 Received: 10/14/10

CAS NO.	Analyte	Conc. (ug/L)	DL	LOD	LOQ	D.F.	Q	Method	Sequence	Analyzed
7439-89-6	Iron	460	12.2	50.0	500	1	J	EPA 6010C	0J29005	10/28/10 19:50:41
7439-96-5	Manganese	889	0.164	5.00	10.0	1		EPA 6010C	0J29005	10/28/10 19:50:41

ANALYSIS DATA SHEET

SA-PZ-157I1

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 1010082-03 % Solid: Matrix: Water Sampled: 10/11/10 Received: 10/14/10

CAS NO.	Analyte	Conc. (ug/L)	DL	LOD	LOQ	D.F.	Q	Method	Sequence	Analyzed
7439-89-6	Iron	82.4	12.2	50.0	500	1	J	EPA 6010C	0J29005	10/28/10 19:57:54
7439-96-5	Manganese	5210	0.164	5.00	10.0	1		EPA 6010C	0J29005	10/28/10 19:57:54

ANALYSIS DATA SHEET

SA-PZ-159I

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 1010082-07 % Solid: Matrix: Water Sampled: 10/12/10 Received: 10/14/10

CAS NO.	Analyte	Conc. (ug/L)	DL	LOD	LOQ	D.F.	Q	Method	Sequence	Analyzed
7439-89-6	Iron	7990	12.2	50.0	500	1		EPA 6010C	0J29005	10/28/10 20:41:12
7439-96-5	Manganese	799	0.164	5.00	10.0	1		EPA 6010C	0J29005	10/28/10 20:41:12

ANALYSIS DATA SHEET

SA-PZ-159I1

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 1010082-06 % Solid: Matrix: Water Sampled: 10/12/10 Received: 10/14/10

CAS NO.	Analyte	Conc. (ug/L)	DL	LOD	LOQ	D.F.	Q	Method	Sequence	Analyzed
7439-89-6	Iron	1180	12.2	50.0	500	1		EPA 6010C	0J29005	10/28/10 20:33:59
7439-96-5	Manganese	6430	0.164	5.00	10.0	1		EPA 6010C	0J29005	10/28/10 20:33:59

ANALYSIS DATA SHEET

SA-PZ-160I

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 1010082-01 % Solid: Matrix: Water Sampled: 10/12/10 Received: 10/14/10

CAS NO.	Analyte	Conc. (ug/L)	DL	LOD	LOQ	D.F.	Q	Method	Sequence	Analyzed
7439-89-6	Iron	38.7	12.2	50.0	500	1	J	EPA 6010C	0J29005	10/28/10 19:29:04
7439-96-5	Manganese	516	0.164	5.00	10.0	1		EPA 6010C	0J29005	10/28/10 19:29:04

ANALYSIS DATA SHEET

SA-DUP01

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 1010082-08 % Solid: Matrix: Water Sampled: 10/12/10 Received: 10/14/10

CAS NO.	Analyte	Conc. (mg/L)	DL	LOD	LOQ	D.F.	Q	Method	Sequence	Analyzed
TOC	Total Organic Carbon	1.33	0.13	0.36	1.00	1		SM5310B		10/22/10 14:06

Environmental Testing Laboratories
CompuChem
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Liberty Analytical Corp.

ANALYSIS DATA SHEET

SA-PZ-151I1

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 1010082-05 % Solid: Matrix: Water Sampled: 10/12/10 Received: 10/14/10

CAS NO.	Analyte	Conc. (mg/L)	DL	LOD	LOQ	D.F.	Q	Method	Sequence	Analyzed
TOC	Total Organic Carbon	1.10	0.13	0.36	1.00	1		SM5310B		10/22/10 13:24

Environmental Testing Laboratories

CompuChem

A Division Of

Liberty Analytical Corp.

ANALYSIS DATA SHEET

SA-PZ-155I

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 1010082-04 % Solid: Matrix: Water Sampled: 10/12/10 Received: 10/14/10

CAS NO.	Analyte	Conc. (mg/L)	DL	LOD	LOQ	D.F.	Q	Method	Sequence	Analyzed
TOC	Total Organic Carbon	0.36	0.13	0.36	1.00	1	J	SM5310B		10/22/10 13:16

ANALYSIS DATA SHEET

SA-PZ-157I

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 1010082-02 % Solid: Matrix: Water Sampled: 10/11/10 Received: 10/14/10

CAS NO.	Analyte	Conc. (mg/L)	DL	LOD	LOQ	D.F.	Q	Method	Sequence	Analyzed
TOC	Total Organic Carbon	0.44	0.13	0.36	1.00	1	J	SM5310B		10/22/10 13:01

ANALYSIS DATA SHEET

SA-PZ-157I1

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 1010082-03 % Solid: Matrix: Water Sampled: 10/11/10 Received: 10/14/10

CAS NO.	Analyte	Conc. (mg/L)	DL	LOD	LOQ	D.F.	Q	Method	Sequence	Analyzed
TOC	Total Organic Carbon	0.94	0.13	0.36	1.00	1	J	SM5310B		10/22/10 13:08

Environmental Testing Laboratories
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ANALYSIS DATA SHEET

SA-PZ-159I

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 1010082-07 % Solid: Matrix: Water Sampled: 10/12/10 Received: 10/14/10

CAS NO.	Analyte	Conc. (mg/L)	DL	LOD	LOQ	D.F.	Q	Method	Sequence	Analyzed
TOC	Total Organic Carbon	116.16	0.26	0.72	2.00	2	D	SM5310B		10/22/10 19:55

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ANALYSIS DATA SHEET

SA-PZ-159I1

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 1010082-06 % Solid: Matrix: Water Sampled: 10/12/10 Received: 10/14/10

CAS NO.	Analyte	Conc. (mg/L)	DL	LOD	LOQ	D.F.	Q	Method	Sequence	Analyzed
TOC	Total Organic Carbon	43.69	0.13	0.36	1.00	1		SM5310B		10/22/10 13:32

Environmental Testing Laboratories

CompuChem

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Liberty Analytical Corp.

ANALYSIS DATA SHEET

SA-PZ-160I

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 1010082-01 % Solid: Matrix: Water Sampled: 10/12/10 Received: 10/14/10

CAS NO.	Analyte	Conc. (mg/L)	DL	LOD	LOQ	D.F.	Q	Method	Sequence	Analyzed
TOC	Total Organic Carbon	0.55	0.13	0.36	1.00	1	J	SM5310B		10/22/10 12:39

APPENDIX C

REGIONAL WORKSHEETS

Site: NWIRP Calverton

Case #:

SDG #: 1010082

Samples: **Soil** **Water**

SA-DUP01-20101012
SA-PZ-151I1-20101012
SA-PZ-155I-20101012
SA-PZ-157I-20101011
SA-PZ-157I1-20101011
SA-PZ-159I-20101012
SA-PZ-159I1-20101012
SA-PZ-160I-20101012

	YES	NO	N/A
A.I.I **Contract Compliance Screening Report**			
Present?	[ ]		X
ACTION: If no, contact RSCC/PO.			
A.I.2 **Record of Communication (from RSCC)**			
Present?	[ ]		X
ACTION: If no, request from the RSCC.			
A.1.3 **Sampling Trip Report**			
Present and complete?	[ ]		X
ACTION: If no, contact RSCC/PO.			
A.I.4 **Chain of Custody/Sample Traffic Report**			
Present?	[X]		
Legible?	[X]		
Signature of sample custodian present?	[X]		
ACTION: If no, contact RSCC/WAM/PO.			
A.I.5 **Cover Page**			
Present?	[X]		
Is the Cover Page properly filled in and the verbatim signed by the lab manager or the manager's designee?	[X]		
Do the sample identification numbers on the Cover Page agree with sample Identification numbers on:			
(a) Traffic Report Sheet?	[X]		

	YES	NO	N/A
(b) Form I's?	[X]	___	___
Is the number of samples on the Cover Page the same as the number of samples on the Traffic Report sheet and the Regional Record of Communication (ROC) for the data Case?	[X]	___	___

ACTION:
If no for any of the above, prepare Telephone Record Log and contact RSCC/PO for re-submittal of the corrected Cover Page from the laboratory.

A.1.6 **SDG Narrative, DC-1 & DC-2 Form**

Is the SDG Narrative present?	[X]	___	___
Is Sample Log-In Sheet(Form DC-1) present and complete?	[X]	___	___
Is Complete SDG Inventory Sheet(Form DC-2) present and complete?	[X]	___	___

ACTION:
If no, write in the Contract-Problems/ Non-Compliance Section of the Data Review Narrative.

A.1.7 **Form I to XV**

A.1.7.1 Are all the Form I through Form XV labeled with:

Laboratory Name?	[X]	___	___
Laboratory Code?	[ ]	___	X
RAS/Non-RAS Case No.?	[___]	___	X
SDG No.?	[X]	___	___

	YES	NO	N/A
Contract No.?	[ ]		X

ACTION:
If no for any of the above, note under Contract Problem/Non-Compliance Section of the "Data Review Narrative" and contact PO for corrected Form(s) from the laboratory.

A.1.7.2 After comparing values on Forms I-IX against the raw data, do any computation/ transcription errors exceed 10% of the reported values on the Forms for:

	YES	NO	N/A
(a) all analytes analyzed by ICP-AES?		[X]	
(b) all analytes analyzed by ICP-MS?		[ ]	X
(c) Mercury?		[ ]	X
(d) Cyanide?		[ ]	X

ACTION:
If yes, prepare Telephone Record Log and contact CLP PO/TOPO for the corrected data from the laboratory.

A.1.8 Raw Data

Data shall not be validated without the hard/electronic copies of the associated raw data for samples and QC samples.

A.1.8.1 Digestion/Distillation Log

	YES	NO	N/A
Digestion Log for ICP-AES (Form XII)present?	[X]		
Digestion Log for ICP-MS (Form XII) present?	[ ]		X
Digestion Log for mercury (Form XII) present?	[ ]		X
Distillation Log for cyanide (Form XII) present?	[ ]		X

Are pH values for metals and

	YES	NO	N/A
cyanide reported for each aqueous sample?	[ ]		X
Are percent solids calculations present for soils/sediments?	[ ]		X
Are preparation dates present on the sample preparation logs/bench sheets?	[X]		

NOTE:
Digestion/Distillation log must include weights, volumes, and dilutions used to obtain the reported results.

A.1.8.2 Is the analytical instrument real-time printouts present for:

	YES	NO	N/A
ICP-AES?	[X]		
ICP-MS?	[ ]		X
Mercury?	[ ]	X	
Cyanide?	[ ]		X

Are all laboratory bench sheets and instrument raw data printouts necessary to support all sample analyses and QC operations:

	YES	NO	N/A
Legible?	[X]		
Properly labeled?	[X]		

Are all field samples, QC samples and field QC samples present on:

	YES	NO	N/A
Digestion/Distillation log?	[X]		
Instrument Printouts?	[X]		

ACTION:
If no for any of the above questions in Section A.1.8.1 and Section A.1.8.2, write Telephone Record Log and contact TOPO/PO for re-submittal from the laboratory.

	YES	NO	N/A
A.1.9 Technical Holding Times: (Aqueous and soil samples) (Examine sample Traffic Reports and digestion/distillation logs to determine the holding time from the sample collection date to the sample preparation date.)			
A.1.9.1 Cyanide distillation(14 days)exceeded?	_	[_]	X
Mercury analysis(28 days) exceeded?	_	[_]	X
Other Metals analysis(180 days)exceeded?	_	[X]	_

ACTION:
If yes, reject (R) and red-line non-detects and flag as estimated (J)results ≥ MDL even if sample(s) was preserved properly.

NOTE:
In addition to qualifying the data, a list of all samples and analytes which exceeded the holding times must be prepared. Report for each sample the number of days that were exceeded. (Subtract the sample collection date from the sample preparation date). Attach this list to the data review narrative.

A.1.9.2 Is pH of aqueous samples for:			
Metals Analysis ≤ 2?	[X]	_	_
Cyanide Analysis ≥ 12?	[_]	_	X

ACTION:
If no for any of the above, flag non-detects as "R" and detects as "J".

A.1.9.3 Is the cooler temperature ≤ 10 C°?	[X]	_	_

ACTION:
If cooler temperature is >10°C , flag non-detects as "UJ" and detects as "J".

A.1.10 **Final Data Correctness - Form I**

A.1.10.1 Are Form I's for all samples

	YES	NO	N/A
present and complete?	[X]	___	___

ACTION:
If no, prepare Telephone Record Log and contact CLP PO/TOPO for submittal from the laboratory.

A.1.10.2 Verify there are no calculation and transcription errors in the results reported on Form I's. Circle on each Form I all results that are incorrect.

	YES	NO	N/A
Is the calculation error less than 10% of the correct result?	[X]	___	___
Are results on Form I's reported in correct units (ug/L for aqueous and MG/KG for soils)?	[X]	___	___
Are results on Form I'S reported by correct significant figures?	[X]	___	___
Are soil sample results on Form I's corrected for percent solids?	[___]	___	X
Are all "less than MDL" values reported by the CRQLs and coded with "U"?	[___]	___	X
Are values less than the CRQLs but greater than or equal to the MDLs flagged with "J"?	[X]	___	___
Are appropriate contractual quality control and Method qualifiers used?	[X]	___	___

ACTION:
If no for any of the above questions, prepare Telephone Record Log, and contact CLP PO/TOPO for corrected data.

A.1.10.3 Do EPA sample identification numbers and the corresponding laboratory sample identification numbers match on the Cover Page, Form I's and in the raw data? [___] ___ X

Was a brief physical description

	YES	NO	N/A
of the samples before and after digestion given on the Form I's?	[___]	___	X
Was any sample result outside the mercury/cyanide calibration range or the ICP-AES/ICP-MS linear range diluted and noted on the Form I?	[___]	___	X

ACTION:
If no for any of the above, note under the Contract-Problem/Non-Compliance Section of the Data Review Narrative.

A.1.11 **Initial Calibration**

	YES	NO	N/A
A.1.11.1 Is a record of at least 2 point (A blank and a standard)calibration present for ICP-AES analysis?	[X]	___	___
Is a record of at least 2 point (a blank and a standard)calibration present for ICP-MS analysis?	[___]	___	X
Is a record of at least 5 point calibration (a blank & 4 standards)present for Hg analysis?	[___]	___	X
Is a record of at least 4 point calibration (a blank & 4 standards)present for cyanide?	[___]	___	X

ACTION:
If incomplete or no initial calibration was performed, reject (R) and red-line the associated data (detects & non-detects).

	YES	NO	N/A
Is one initial calibration standard at the CRQL level for cyanide and mercury?	[___]	___	X

ACTION:
If no, write in the Contract Problem/ Non-Compliance Section of the Data Review Narrative.

A.1.11.2 Is the curve correlation coefficient $\geq$ 0.995 for:

		YES	NO	N/A
	Mercury Analysis?	[___]	___	X
	Cyanide Analysis?	[___]	___	X
	ICP-AES(more than 2 point Calib.)?	[X]	___	___
	ICP-MS (more than 2 point calib.)?	[___]	___	X

ACTION:
If no, qualify the associated sample results ≥ MDL as estimated "J" and non-detects as "UJ".

NOTE:
The correlation coefficient shall be calculated by the data validator using standard concentrations and the corresponding instrument response (e.g. absorbance, peak area, peak height, etc.).

A.1.12 **Initial and Continuing Calibration Verification- Form IIA**

A.1.12.1	Present and complete for every metal and cyanide?	[X]	___	___
	Present and complete for ICP-AES and ICP-MS when both these methods were used for the same analyte?	[___]	___	X

ACTION:
If no for any of the above, prepare a Telephone Record Log and contact PO/TOPO for re-submittal from the laboratory.

A.1.12.2	Was a Continuing Calibration Verification performed every 10 samples or every 2 hours whichever is more frequent?	[X]	___	___

ACTION:
If no for any of the above, write in the Contract-Problem/Non-Compliance Section of the Data Review Narrative.

A.1.12.3	Was an ICV or a mid-range standard distilled and analyzed with each batch of cyanide samples?	[___]	___	X

	YES	NO	N/A

ACTION:
If no for any of the above, write in the Contract-Problem/Non-Compliance Section of the Data Review Narrative and qualify results ≥ MDL as estimated (J).

A.1.12.2 Circle on each Form IIA all percent recoveries that are outside the contract windows.

Are ICV/CCVs within control limits for:

	YES	NO	N/A
Metals - 90-110%R?	[X]	___	___
Hg - 80-120%R?	[___]	___	X
Cyanide - 85-115%R?	[___]	___	X

ACTION:
If no, qualify all samples between a previous technically acceptable CCV standard and a subsequent technically acceptable CCV standard as follows as follows:

Qualify as estimated (J) all detects and non-detects, if the ICV/CCV %R is between 75-89%(65-79% for Hg; 70-84% for CN). Qualify only positive results(≥ MDL) as "J" if the ICV/CCV %R is between 111-125%(121-135% for Hg;116-130% for CN). Reject (R) and red-line only
detects if the recovery is greater than 125% (135% for Hg; 130% for CN). Reject (R) and red-line all associated results (hits and non-detects)if the recovery is less than 75%(65% for Hg;70% for CN).

NOTE:
For ICV that does not fall within the acceptance limits, qualify all samples reported from the analytical run.

A.1.12.3 Was the distilled ICV or mid-range standard for cyanide within acceptance limits (85-115%)? [___] ___ X

ACTION:
If no, Qualify all cyanide results ≥ MDL as "J".

A.1.13 **CRQL Standard Analysis - Form IIB**

A.1.13.1 For each ICP-AES run, was a CRI

	YES	NO	N/A	
(CRQL or MDL when MDL > CRQL) standard analyzed? (Note:CRI is not required for Al, Ba, Ca, Fe, Mg, Na and K.)	[___]	___	___	
For each ICP-MS run, was a CRI (CRQL or MDL when MDL > CRQL) standard analyzed for each mass/isotope used for the analysis?	[___]	___	___	X
For each mercury run, was a CRQL standard analyzed?	[___]	___	X	
For each cyanide run, was a CRQL standard analyzed?	[___]	___	X	

ACTION:
If no for any of the above, write this deficiency in the Contract Problems/ Non-Compliance Section of the Data Review Narrative, inform CLP PO and flag results in the affected ranges (detects <2xCRQL)as J and non-detects UJ.

The affected ranges are:
ICP-AES Analysis - *True Value ± CRQL
ICP-MS Analysis - *True Value ± CRQL
Mercury Analysis - *True Value ± CRQL
Cyanide Analysis - *True Value ± CRQL
* True value of the CRQL Standard

	YES	NO	N/A
A.1.13.2 Was a CRQL standard analyzed after the ICV/ICB, before the final CCV/CCB and once every 20 analytical samples in the analytical run for each analysis?	[___]	___	X

ACTION:
If no, write in the Contract Problem/ Non-Compliance Section of the "Data Review Narrative".

A.1.13.3 Circle on each Form IIB all percent recoveries that are outside the acceptance windows.

	YES	NO	N/A
Is the CRQL standard within control limits for:			
Metals(ICP-AES/ICP-MS)- 70 - 130%?	[___]	___	X
Mercury- 70 - 130%?	[___]	___	X
Cyanide - 70 - 130%?	[___]	___	X

ACTION:
If no, flag detects <2xCRQL as "J" and non-detects as "UJ" if the CRQL standard recovery is between 50-69%. Flag(J) only detects <2xCRQL if the recovery is between 131% and ≤180%. If the recovery is less than 150%, reject(R) and red-line non-detects and detects < 2xCRQL, and flag (J) detects between 2xCRQL and ICV/CCV. Reject and red-line only detects <2xCRQL and flag (J)detects ≥ 2xCRQL but < ICV/CCV if the recovery is > 180%.

NOTE:
1. Qualify all field samples analyzed between a previous technically acceptable analysis of the CRQL standard and a subsequent acceptable analysis of the CRQL standard
2. Flag (J) or reject (R) only the final sample results on Form I's when Sample raw data are within the affected ranges and the CRQL standard is outside the acceptance windows.
3. The samples and the CRQL standard must be analyzed in the same analytical run.

A.1.14 Initial and Continuing Calibration Blanks - Form III

A.1.14.1 Present and complete for all the instruments used for the metals and cyanide analyses?	[X]	___	___
Was an initial Calibration Blank analyzed after ICV?	[X]	___	___
Was a continuing Calibration Blank analyzed after every CCV and every 10 samples or every 2 hours, whichever is more frequent?	[X]	___	___

Were the ICB & CCB values ≥ MDL but < CRQL reported on Form III and flagged "J" by

		YES	NO	N/A
	using MDLs from direct analysis(Preparation Method "NP1")? (Check Form III against the raw data)	[X]	___	___
	ACTION: If no, inform CLP PO/TOPO and make a note in the Contract-Problems/Non-Compliance Section of the "Data Review Narrative".			
A.1.14.2	Circle with red pencil on each Form III all Calib. Blank values that are: ≥ MDL but ≤ CRQL; > CRQL			
A.1.14.2.1	When MDL < CRQL, is any Calib. Blank value ≥ MDL but ≤ CRQL?	X	[___]	___
	ACTION: If yes, change sample results ≥ MDL but ≤ CRQL to the CRQL with a "U". Do not qualify non-detects.			
A.1.14.2.2	When MDL < CRQL, is any Calib. Blank value > CRQL?	___	[X]	___
	ACTION: If yes, reject (R) and red line the associated sample results > CRQL but <ICB/CCB Blank Result. Flag as "J" detects > ICB/CCB blank value but < 10xICB/CCB value. Change the sample results ≥ MDL but ≤ the CRQL to CRQL with a "U".			
A.1.14.2.3	Is any Calibration Blank value below the negative CRQL?	___	[X]	___
	ACTION: If yes, flag (J) as estimated all associated sample results ≥ CRQL but <10xCRQL.			

NOTE:

1. For ICB that does not meet the technical QC Criteria, apply the action to all samples

	YES	NO	N/A

reported from the analytical run.
2. For CCBs that do not meet the technical QC criteria, apply the action to all samples analyzed between a previous technically acceptable analysis of CCB and a subsequent technically acceptable analysis of the CCB in the analytical run.,

A.1.15 **Preparation Blank - FORM III**

NOTE: The Preparation Blank for mercury is the same as the calibration blank.

A.1.15.1 Was one Preparation Blank prepared with and analyzed for:

	YES	NO	N/A
Each Sample Delivery Group (SDG)?	[X]		
Each batch of the SDG samples digested/distilled?	[X]		
Each matrix type?	[X]		
All instruments used for metals and cyanide analyses?	[X]		

ACTION:
If no for any of the above, flag as estimated (J) all the associated positive data <10xMDL for which the Preparation Blank was not analyzed.

NOTE:
If only one blank was analyzed for more than 20 samples, then the first 20 samples analyzed are not estimated(J),but all additional samples must be qualified (J).

A.1.15.2 Circle with red pencil on each Form III all Prep. Blank values that are:

≥ MDL but ≤ CRQL, and

> CRQL

A.1.15.2.1 When MDL < CRQL, is any preparation blank value ≥ MDL but ≤ CRQL? ___ [X] ___

ACTION:
If yes, change sample result ≥ MDL

		YES	NO	N/A
	but ≤ CRQL to CRQL with a "U".			
A.1.15.2.2	When the MDL ≤ CRQL, is any Preparation Blank value greater than its CRQL?	___	[X]	___
	If yes, is the Prep. Blank value greater than the value of the associated Field Blank collected and analyzed with the SDG samples?	___	[___]	X
	If yes, is the lowest concentration of that analyte in the associated samples less than 10 times the Preparation Blank value?	___	[___]	X

ACTION:
If yes, reject (R) and red-line all associated sample results greater than the CRQL but less than the Prep.Blank value. Flag as "J" detects > Prep. Blank value but <10xPrep.Blank. If the sample result ≥ MDL but ≤ CRQL, replace it with CRQL-U.

If the Prep. Blank value is less than the same analyte value in the Field Blank, do not qualify the sample results due to the Prep. Blank criteria.

NOTE:
Convert soil sample result to mg/Kg on wet weight basis to compare with the soil Prep. Blank result on Form III.

A.1.15.2.3	Is the Prep. Blank concentration below the negative CRQL?	___	[X]	___

ACTION:
If yes, flag (J) all associated sample results less than 10xCRQL. Qualify non-detects as estimated (UJ).

A.1.15.2.4	When the MDL is greater than the CRQL, is the preparation blank concentration on Form III greater than two times the MDL?	___	[X]	___

ACTION:

		YES	NO	N/A
	If yes, reject (R) and red-line all positive sample results with sample raw data less than 10 times the Preparation Blank value.			
A.1.16	**ICP-AES/ICP-MS Interference Check Sample (ICS) - Form IV** **NOTE:** Not required for CN, Hg, Al, Ca, Fe and Mg.			
A.1.16.1	Present and complete?	[X]	___	___
	Was ICS analyzed at the beginning and end of each analytical run, and once for every 20 analytical samples?	[X]	___	___
	Was ICS analyzed at the beginning of the ICP-MS analytical run?	[X]	___	___
	ACTION: If no, flag as estimated (J) all sample results.			
A.1.16.2	**ICP-AES Method**			
A.1.16.2.1	**ICSA Solution:** For ICP-AES, are the ICSA "Found" analyte values within the control limits ± of CRQL of the true/established mean value?	[___]	___	X
	If no for any of the above, is the sample concentration of Al, Ca, Fe, or Mg in the same units (ug/L or MG/KG) greater than or equal to its respective concentration in the ICSA Solution on Form IV?	[___]	___	X
	ACTION: If yes, apply the following action to all samples analyzed between a previous technically acceptable analysis of the ICS and a subsequent technically acceptable analysis of the ICS in the analytical run: Flag (J) as estimated only sample results ≥MDL			

	YES	NO	N/A
for which the ICSA "Found" value is greater than (True value+CRQL). Do not qualify non-detects. If the ICSA "Found" value is less than (True value-CRQL), flag non-detects as "UJ" and detects as "J".			
A.1.16.2.3 **ICSAB Solution** For ICP-AES, are all analyte results in ICSAB within the control limits of 80-120 of the true/established mean value?	[X]	___	~~X~~
If no for any of the above, is the sample concentration of Al, Ca, Fe, or Mg in the same units (ug/L or MG/KG) greater than or equal to its respective concentration in the ICSAB Solution on Form IV?	[___]	___	X

ACTION:
If yes, apply the following action to all samples analyzed between a previous technically acceptable analysis of the ICS and a subsequent technically acceptable analysis of the ICS in the analytical run:

Flag (J) as estimated those associated sample results ≥ MDL for which the ICSAB analyte recovery is greater than 120% but ≤ 150%. If the ICSAB recovery falls within 50-79%, qualify sample results ≥ MDL as "J" and non-detects as "UJ". Reject (R) and red-line all sample results (detects & non-detects) for which the ICSAB analyte recovery is less than 50%. If the recovery is above 150%, reject (R) and red-line only positive results.

A.1.16.3 **ICP-MS Method**

A.1.16.3.1 **ICSA Solution:** For ICP-MS, are the ICSA "Found" analyte values within the control limits of ±CRQL of the true/established mean value?	[___]	___	X

ACTION:
If no, apply the following action to all samples reported from the analytical run:

Flag (J) as estimated only sample results ≥ MDL if the ICSA "Found" value is greater than (True value+CRQL). Do not qualify non-detects. If the ICSA "Found" value is less than (True value-CRQL), flag the associated sample detects as "J" and non-detects as "UJ".

		YES	NO	N/A
A.1.16.3.3	**ICSAB Solution** For ICP-MS, are all analyte results in ICSAB within the control limits of 80-120% of the true/established mean value, whichever is greater?	[___]	___	X

ACTION:
If no, apply the following action to all samples reported from the analytical run:

Flag (J) as estimated those associated sample results ≥ MDL for which the ICSAB analyte recovery is greater than 120% but ≤ 150%. If the ICSAB recovery falls within 50-79% flag (J) as estimated the associated sample results ≥ MDL. Reject (R) and red-line those all sample detects and non-detects for which the ICSAB analyte recovery is less than 50%. If the recovery is above 150%,reject (R) and red-line only detects (≥ MDL).

A.1.17 **Spiked Sample Recovery: Pre-Digestion/Pre-Distillation)-Form V A**
Note:Not required for Ca,Mg,K,and Na(both matrices);Al and Fe (soil only)

A.1.17.1 Was Matrix Spike analysis performed:

	YES	NO	N/A
For each matrix type?	[X]	___	___
For each SDG?	[X]	___	___
On one of the SDG samples?	[X]	___	___
For each concentration range (i.e.,low, med., high)?	[X]	___	___
For each analytical Method (ICP-AES,ICP-MS, Hg, CN)used?	[X]	___	___
Was a spiked sample prepared and analyzed with the SDG samples?	[X]	___	___

ACTION:
If no for any of the above, flag as estimated(J)all the positive data for which a spiked sample was not analyzed.

NOTE:
If more than one spiked sample were analyzed for one SDG, then qualify the associated data based on the worst spiked sample analysis.

		YES	NO	N/A
A.1.17.2	Was a field blank or PE sample used for the spiked sample analysis?	___	[___]	X
	ACTION: If yes, flag (J) as estimated positive data of the associated SDG samples for which field blank or PE sample was used for the spiked sample analysis.			
A.1.17.3	Circle on each Form VA all spike recoveries that are outside the control limits (75-125%) that have sample concentrations less than four times the added spike concentrations.			
	Are all recoveries within the control limits when sample concentrations are less than or equal to four times the spike concentrations? NOTE: Disregard the out of control spike recoveries for analytes whose concentrations are greater than or equal to four times the spike added.	[___]	___	X
	Are results outside the control limits (75-125%)flagged with Lab Qualifier "N" on Form I's and Form VA?	[___]	___	X
	ACTION: If no for any of the above, write in the Contract - Problems/Non-Compliance Section of the Data Review Narrative.			
A.1.17.4	Aqueous			
	Are any spike recoveries:			
	(a) less than 30%?	___	[X]	___
	(b) between 30-74%?	___	[X]	___
	(c) between 126-150%?	___	[X]	___
	(d) greater than 150%?	___	[X]	___
	ACTION: If the matrix spike recovery is less than 30%,reject (R) and red-line all associated aqueous data (detects & non-detects). If between 30-74%, qualify all associated aqueous data ≥ MDL as "J" and non-detects			

	YES	NO	N/A
as "UJ". If between 126-150%, flag (J) all data ≥ MDL as "J". If greater than 150%, reject (R) and red-line all associated data ≥ MDL.			
(NOTE:Replace "N" with "J", "R" as appropriate.)			
A.1.17.5 **Soil/Sediment**			
Are any spike recoveries:			
(a) less than 10%?	___	[___]	X
(b) between 10-74%?	___	[___]	X
(c) between 126-200%?	___	[___]	X
(d) greater than 200%?	___	[___]	X
ACTION: If yes for any of the above, proceed as follows:			
If the matrix spike recovery is less than 10%,reject (R) and red-line all associated data (detects & non-detects); if between 10-74%,qualify all associated data ≥ MDL as "J" and non-detects as "UJ"; if between 126-200%, flag (J) all associated data ≥ MDL as "J" If greater than 200%, reject (R) and red-line all associated data ≥ MDL. (NOTE:Replace "N" with "J" or "R" as appropriate.)			
A.1.18 **Lab Duplicates) - Form VI**			
A.1.18.1 Was the lab duplicate analysis performed:			
For each SDG?	[___]	___	X
On one of the SDG samples?	[___]	___	X
For each matrix type?	[___]	___	X
For each concentration range (low or med.)?	[___]	___	X
For each analytical Method (ICP-AES/ICP-MS,Hg,CN)Used?	[___]	___	X
Was a lab duplicate prepared and analyzed with the SDG samples?	[___]	___	X

		YES	NO	N/A
	ACTION: If no for any of the above, flag (J) as estimated all the SDG sample results (detects & non-detects) for which the lab duplicate analysis was not performed.			
	NOTE: If more than one lab duplicate sample were analyzed for an SDG, then qualify the associated samples based on the worst lab duplicate analysis.			
A.1.18.2	Was a Field Blank or PE sample used for the Lab Duplicate analysis?	___	[___]	X
	ACTION: If yes, flag as estimated (J) all SDG sample results (hits & non-detects) for which Field Blank or PE sample was used for duplicate analysis.			
A.1.18.3	Circle on each Form VI all values that are:			
	RPD > 20%, or			
	Absolute Difference > CRQL			
	Are all values within control limits (RPD ≤ 20% or absolute difference ≤ ±CRQL)?	[___]	___	X
	If no, are all results outside the control limits flagged with an "*" (Lab Qualifier) on Form VI and on all Form I's?	[___]	___	X
	ACTION: If no, write in the Contract-Problems/ Non-Compliance Section of the Data Review Narrative.			
	NOTE: The laboratory is not required to report on Form VI the RPD when both values are non-detects.			
A.1.18.4	Aqueous			
A.1.18.4.1	When sample and duplicate values are both ≥ 5xCRQL (substitute MDL for CRQL when MDL > CRQL),			

	YES	NO	N/A
is any RPD > 20% but < 100%?	___	[___]	X
is any RPD ≥ 100%?	___	[___]	X

ACTION:
If the RPD is > 20% but < 100%, flag (J) as estimated the associated sample data ≥ CRQL. If the RPD is ≥ 100%, reject (R) and red-line the associated sample data ≥ CRQL.

(**NOTE:**Replace "*" with "J" or "R" as appropriate.)

A.1.18.4.2 When the sample and/or duplicate value <5xCRQL (substitute MDL for CRQL when MDL >CRQL), is the absolute difference between sample and duplicate values:

> ± CRQL?	___	[___]	X
> ± 2xCRQL?	___	[___]	X

ACTION:
If the absolute difference is > CRQL, flag as estimated all the associated sample results ≥ MDL but < 5xCRQL as "J" and non-detects as "UJ". If the absolute difference is > 2xCRQL, reject (R) and red-line all the associated non-detects and detects ≥ MDL but < 5xCRQL.

NOTE:
1. Replace "*" with "J", "UJ" or "R" as appropriate.)
2. If one value is >CRQL and the other value is non-detect, calculate the absolute difference between the value > CRQL and the MDL, and use this difference to qualify sample results.

A.1.18.5 **Soil/Sediment**

A.1.18.5.1 When sample and duplicate values are both ≥ 5xCRQL (substitute MDL for CRQL when MDL > CRQL),

is any RPD ≥ 35% but < 120%?	___	[___]	X
is any RPD ≥ 120%?	___	[___]	X

ACTION:
If the RPD is ≥ 35% and < 120%, flag (J) as estimated the associated sample

		YES	NO	N/A
	data ≥ CRQL. If the RPD is ≥ 120%, reject (R) and red-line the associated sample data ≥ CRQL.			
A.1.18.5.2	When the sample and/or duplicate value <5xCRQL (substitute MDL for CRQL when MDL > CRQL), is the absolute difference between sample and duplicate:			
	> ± 2 x CRQL?	___	[___]	X
	> ± 4 x CRQL	___	[___]	X

ACTION:
If the absolute difference is > 2 x CRQL, flag all the associated sample results ≥ MDL but < 5xCRQL as "J" and non-detects as "UJ". If the absolute difference is > 4xCRQL, reject (R) and red-line all the associated non-detects and detects ≥ MDL but <5xCRQL.

NOTE:
1. Replace "*" with "J", "UJ" or "R" as appropriate.)
2. If one value is >CRQL and the other value is non-detect, calculate the absolute difference between the value > CRQL and the MDL, and use this difference to qualify sample results.

A.1.19 **Field Duplicates**

Aqueous Field Duplicates

		YES	NO	N/A
A.1.19.1	Was an aqueous Field Duplicate pair collected and analyzed? (Check Sampling Trip Report)	[X]	___	___

ACTION:
If yes, prepare a Form (Appendix A.4) for each aqueous Field Duplicate pair. Report the sample and Field Duplicate results on Appendix A.4 from their respective Form I's. Calculate and report RPD on Appendix A.4 when sample and its Field Duplicate values are both > 5xCRQL. Calculate and report the absolute difference on Appendix A.4 when at least one value (sample or duplicate) is <5xCRQL. Evaluate the aqueous Field Duplicate analysis in accordance with the

		YES	NO	N/A
	QC criteria stated in Sections A.1.19.2 and A.1.19.3.			

NOTE:
1. Do not transfer "*" from Form I's to Appendix A.4.
2. Do not calculate RPD when both values are non-detects.
3. Substitute MDL for CRQL when MDL > CRQL.
4. If one value is >CRQL and the other value is non-detect, calculate the absolute difference between the value > CRQL and the MDL, and use this the criteria to qualify the results.

A.1.19.2 Circle all values on the Form (Appendix A.4) for Field Duplicates that have:

RPD ≥ 20% or

Difference > ± CRQL

When sample and duplicate values are both ≥5xCRQL (substitute MDL for CRQL when MDL > CRQL),

is any RPD ≥ 20%?	___	[___]	___
is any RPD ≥ 100%?	___	[___]	___

ACTION:
If the RPD is >20% but < 100%, flag (J) only the associated sample and its Field Duplicate results ≥ CRQL. If the RPD is ≥ 100%, reject(R) and red-line only the associated sample and its Field Duplicate result ≥ CRQL.

A.1.19.3 When the sample and/or duplicate value(s) <5xCRQL (substitute MDL for CRQL when MDL >CRQL), is the absolute difference between sample and duplicate:

> ± CRQL?	___	[___]	___
> ± 2 x CRQL?	___	[___]	___

ACTION:
If the absolute difference is > CRQL, flag detects ≥ MDL but < 5xCRQL as "J" and non-detects as "UJ". If the difference is > 2xCRQL,reject (R) and red-line non-detects

		YES	NO	N/A
	and results ≥ MDL but <5xCRQL of the sample and its Field Duplicate.			
	Soil/Sediment Field Duplicates			
A.1.19.4	Was a soil field duplicate pair collected and analyzed? (Check Sampling Trip Report)	[___]	___	X
	ACTION: If yes, for each soil Field Duplicate pair proceed as follows:			
	Prepare Appendix A.4 for each Field Duplicate pair. Report on Appendix A.4 all sample and its Field Duplicate results in MG/KG from their respective Form I's. Calculate and report RPD when sample and its duplicate values are both greater than 5xCRQL. Calculate and report the absolute difference when at least one value (sample or duplicate) is < 5xCRQL. Evaluate the Field Duplicate analysis in accordance with the QC Criteria stated in Sections A.1.19.5 and A.1.19.6.			
	NOTE: 1. Do not transfer "*" from Form I's to Appendix A.4. 2. Do not calculate RPD when both values are non-detects. 3. Substitute MDL for CRQL when MDL > CRQL. 4. If one value is >CRQL and the other value is non-detect, calculate the absolute difference between the value > CRQL and the MDL, and apply the criteria to qualify the results.			
A.1.19.5	Circle on each Appendix A.4 all values that have:			
	RPD ≥ 35%, or Difference > ± 2xCRQL When sample and duplicate values are both ≥ 5xCRQL (substitute MDL for CRQL when MDL > CRQL),			
	is any RPD ≥ 35% but < 120%?	___	[___]	X
	is any RPD ≥ 120%?	___	[___]	X
	ACTION: If the RPD is ≥ 35% but < 120%,			

		YES	NO	N/A
	flag only the associated sample and its Field Duplicate results ≥ CRQL as "J". If the RPD is ≥ 120%, reject (R) and red-line only the sample and its Field Duplicate results ≥ CRQL.			
A.1.19.6	When the sample and/or duplicate value(s) <5xCRQL (substitute MDL for CRQL when MDL > CRQL), is the absolute difference between sample and Field Duplicate:			
	> ± 2 x CRQL?	___	[___]	X
	> ± 4 x CRQL?	___	[___]	X
	ACTION: If the absolute difference is > 2xCRQL, flag Sample and its Field Duplicate resuts ≥ MDL but <5xCRQL as "J" and non-detects as "UJ". If the difference is >4xCRQL, reject(R) and red-line non-detects and detects ≥ MDL but <5xCRQL of the sample and its Field Duplicate.			
A.1.20	**Laboratory Control Sample (LCS)- Form VII**			
A.1.20.1	Was one LCS prepared and analyzed for:			
	Each SDG?	[X]	___	___
	Each matrix type?	[X]	___	___
	Each batch samples digested/distilled?	[X]	___	___
	For each Method(ICP-AES,ICP-MS,Hg,CN) used?	[X]	___	___
	Was an LCS prepared and analyzed with the samples?	[X]	___	___
	ACTION: If no for any of the above, prepare Telephone Record Log and contact CLP PO or TOPO for submittal of the LCS results. Flag (J) as estimated all the data for which an LCS was not analyzed.			
	NOTE: If only one LCS was analyzed for			

	YES	NO	N/A
more than 20 samples, then the first 20 samples analyzed are not flagged(J), but all additional samples must be qualified (J).			

A.1.20.2 Aqueous LCS

Circle on each Form VII the LCS percent recoveries outside control limits 80-120%.

NOTE: 1.Use digested ICV as LCS for aqueous mercury
2.Use distilled ICV as LCS for aqueous cyanide

Is any LCS recovery:

	YES	NO	N/A
Less than 50%?	___	[X]	___
Between 50% and 79%?	___	[X]	___
Between 121% and 150%?	___	[X]	___
Greater than 150%?	___	[X]	___

ACTION:
If the LCS recovery is less than 50%, reject (R) and red-line all associated sample data (detects & non-detects); for a recovery between 50-79%, flag detects as "J" all non-detects as "UJ". if the LCS recovery is between 121-150%, flag only detects as "J". if the recovery is greater than 150%, reject (R) and red-line all detects.

A.1.20.3 Solid LCS

If an analyte's MDL is equal to or greater than the true value of LCS, disregard the "Action" below for that analyte even though the LCS is out of control limits.

	YES	NO	N/A
Is the LCS "Found" value greater than the Upper Control Limit reported on Form VII?	___	[___]	X

ACTION:

		YES	NO	N/A
	If yes, flag (J) all the associated detects ≥ MDL as estimated (J).			
	Is the LCS "Found" value lower than the Lower Control Limit reported on Form VII?	___	[___]	X
	ACTION: If yes, flag detects as "J" and non-dectes as "UJ".			
A.1.21	**ICP-AES/ICP-MS Serial Dilution - Form VIII** **NOTE**: Serial dilution analysis is required only when the initial concentration is equal to or greater than 50 x MDL.			
A.1.21.1	Was a Serial Dilution analysis performed:			
	For each SDG?	[X]	___	___
	On one of the SDG samples?	[X]	___	___
	For each matrix type?	[X]	___	___
	For each concentration range (low or med.)?	[X]	___	___
	Was a Serial Dilution sample analyzed with the SDG samples?	[X]	___	___
	ACTION: If no for any of the above, flag as estimated (J) detects ≥ MDL of all the SDG samples for which the ICP Serial Dilution Analysis was not performed.			
A.1.21.2	Was a Field Blank or PE sample used for the Serial Dilution Analysis?	___	[___]	X
	ACTION: If yes, flag as estimated (J) detects ≥ MDL of all the SDG samples			
A.1.21.3	Circle on Form VIII the Percent Differences (%D) between sample results and its dilution results that are outside the control limits ± 10%			

		YES	NO	N/A
	when initial concentrations ≥ 50 x MDLs.			
	Are results outside the control limits flagged with an "E"(Lab Qualifier) on Form VIII and all Form I's?	[___]	___	X
	ACTION: If no, write in the Contract-Problem/ Non-Compliance Section of the Data Review Narrative.			
A.1.21.4	Are any %D values:			
	> 10%?	___	[X]	___
	≥ 100%?	___	[X]	___
	ACTION: If the Percent Difference (%D) is greater than 10%, flag (J) as estimated all associated samples whose **raw data** ≥ MDL; if the %D is ≥ 100%, reject (R) and red-line all associated samples with **raw data** ≥ MDL.			
	(**NOTE:**Replace "E" with "J" or "R" as appropriate.)			
A.1.22	Total/Dissolved or Inorganic/Total Analytes			
A.1.22.1	Were any analyses performed for dissolved as well as total analytes on the same sample(s)?	___	[___]	X
	Were any analyses performed for inorganic as well as total analytes on the same sample(s)?	___	[___]	X
	ACTION: If yes, prepare a Form (Appendix A.5) to compare the differences between dissolved (or inorganic) and total analyte concentrations. Compute each difference on Appendix A.5 as a percent of the total analyte only when both of the following conditions are fulfilled: (1) The dissolved(or inorganic)concentration is greater than total concentration, and (2) greater than or equal to 5xMDL.			
A.1.22.2	Is any dissolved (or inorganic) concentration greater than its total concentration by more than 20%?	___	[___]	X

		YES	NO	N/A
A.1.22.3	Is any dissolved(or inorganic) concentration greater than its total concentration by more than 50%?	___	[___]	X
	ACTION: If the percent difference is greater than 20%, flag (J) both dissolved/inorganic and total concentrations as estimated. If the difference is more than 50%, reject (R) and red-line both the values.			
A.1.23	**Field Blank - Form I** **NOTE: Designate "Field Blank" as such on Form I**			
A.1.23.1	Was a Field/Rinsate Bank collected and analyzed with the SDG samples?	[X]	___	___
	If yes, is any Field/Rinsate Blank absolute value of an analyte on Form I greater than its CRQL(or 2xMDL when MDL>CRQL)?	___	[X]	___
	If yes, circle the Field Blank value on Form I that is greater than the CRQL, (or 2 x MDL when MDL > CRQL).			
	Is any Field Blank value greater than CRQL also greater than the Preparation Blank value?	___	[X]	___
	If yes, is the Field Blank value (> CRQL and > the prep. blank value) already rejected due to other QC criteria?	[___]	___	X
	ACTION: If the Field Blank value was not rejected, reject all associated sample data (except the Field Blank results)greater than the CRQL but less than the Field Blank value. Reject on Form I's the soil sample results whose raw values in ug/L in the instrument printout are greater than the CRQL but less than the Field Blank value in ug/L. Flag as "J" detects between the Field Blank value and 10xField Blank value. If the sample result ≥ MDL but ≤ CRQL, replace it with CRQL-U.			
	If the Field Blank value is less than the			

	YES	NO	N/A
Prep.Blank value, do not qualify the sample results due to the Field Blank criteria.			

NOTE:
1. Field Blank result previously rejected due to other criteria cannot be used to qualify field samples.
2. Do not use Rinsate Blank associated with soils to qualify water samples and vice versa.

A.1.24 Verification of Instrumental Parameters - Form IX, XA, XB, XI

A.1.24.1 Is verification report present for:

	YES	NO	N/A
Method Detection Limits (Form IX-Annually)?	[___]	___	X
ICP-AES Interelement Correction Factors (Form XA & XB -Quarterly)?	[___]	___	X
ICP-AES & ICP-MS Linear Ranges (Form XI-Quarterly)?	[___]	___	X

ACTION:
If no, contact CLP PO/TOPO for submittal from the laboratory.

A.1.24.2 Method Detection Limits - Form IX

A.1.24.2.1 Are MDLs present on Form IX for:

	YES	NO	N/A
All the analytes?	[X]	___	___
All the instruments used?	[X]	___	___
Digested and undigested samples and Calib.Blanks?	[X]	___	___
ICP-AES and ICP-MS when both instruments are used for the same analyte?	[X]	___	___

ACTION:
If no for any of the above, prepare Telephone Record Log and contact CLP PO/TOPO for submittal of the MDLs from the laboratory. Report to CLP PO and write in the Contract Problems/ Non-Compliance Section of the Data Review Narrative if the MDL concentration is not less than ½ CRQL.

		YES	NO	N/A
A.1.24.2.2	Is MDL greater than the CRQL for any analyte?	___	[X]	___
	If yes, is the analyte concentration on Form I greater than 5 x MDL for the sample analyzed on the instrument whose MDL exceeds CRQL?	[___]	___	X
	ACTION: If no, flag as estimated (J) all values less than five times MDL for the analyte whose MDL exceeds the CRQL.			
A.1.24.3	**Linear Ranges - Form XI**			
A.1.24.3.1	Was any sample result higher than the high linear range for ICP-AES or ICP-MS?	___	[X]	___
	Was any sample result higher than the highest calibration standard for mercury or cyanide?	___	[X]	___
	If yes for any of the above, was the sample diluted to obtain the result reported on Form I?	[X]	___	___
	ACTION: If no, flag (J) as estimated the affected detects (≥ MDL) reported on Form I.			
A.1.25	**ICP-MS Tune Analysis - Form XIV**			
A.1.25.1	Was the ICP-MS instrument tuned prior to calibration?	[___]	___	X
	ACTION: If no, reject (R) and red-line all sample data for which tuning was not performed.			
A.1.25.2	Was the tuning solution analyzed or scanned at least five times consecutively?	[___]	___	X
	Were all the required isotopes spanning the analytical range present in the tuning solution?	[___]	___	X
	Was the mass resolution within			

		YES	NO	N/A
0.1 amu for each isotope in the tuning solution?		[___]	___	X
Was %RSD less than 5% for each isotope of each analyte in the tuning solution?		[___]	___	X

ACTION:
If no for any of the above, qualify all results ≥ MDL associated with that Tune as estimated "J", and all non-detects associated with that Tune as "UJ".

A.1.26 ICP-MS Internal Standards - Form XV

A.1.26.1	Were the Internal Standards added to all the samples and all QC samples and calibration standards (except the Tuning Solution)?	[___]	___	X
	Were all the target analyte masses bracketed by the masses of the five internal standards?	[___]	___	X

ACTION:
If none of the Internal Standards was added to the samples, reject (R) and red-line all the associated sample data (detects & non-detects). If internal standards were used but did not cover all the analyte masses, reject (R) and red-line only the analyte results not bracketed by the internal standard masses.

A.1.26.2	Was the intensity of an Internal Standard in each sample within 60-125% of the intensity of the same Internal Standard in the calibration blank?	[___]	___	X
	If no, was the original sample diluted two fold, Internal Standard added and the sample re-analyzed?	[___]	___	X
	Was the %RI for the two fold diluted sample within the acceptance limits (60-125%)?	[___]	___	X

ACTION:
If no for any of the above, flag detects as "J" and non-detects "UJ" of all the analytes with atomic masses between the

atomic mass of the internal standard lighter

than the affected internal standard, and the atomic mass of the internal standard heavier than the affected internal standard.

A.1.27 Percent Solids of Sediments

A.1.27.1 Are percent solids in sediment(s):

< 50%? ___ [___] X

ACTION:
If yes, qualify as estimated (J) all detects and non-detects of a sample that has percent solids less than 50%(i.e.,moisture content greater than 50%).

NOTE:
Flag(J) only the sample results that were not previously flagged due to other QC criteria.

Inorganic Data Review Narrative

Case# _____ Site: _____ Matrix: Soil ____

SDG# _____ Lab: _____ Water ____

Sampling Team: _____ Reviewer: _____ Other _____

A.2.1 Data Validation Flags:
The following flags may have been applied in red by the data validator and must be considered by the data user.

J - This flag indicates the result qualified as estimated

R and Red-Line - A red-line drawn through a sample result indicates unusable value. The red-lined data are known to contain significant errors based on documented information and must not be used by the data user.

U - This data validation qualifier is applied to sample results ≥ MDL when associated blank is contaminated

Fully Usable Data - The results that do not carry "J" or "red-line" are fully usable.

A.2.2 Laboratory Qualifiers:
The CLP laboratory applies a contractual qualifier on all

Form I'S and the QC Form when a QC analysis is outside the control limits. These qualifiers are not applied on the Lotus or XLS spreadsheets. These qualifiers and their meanings are as follows:

N: This qualifier indicates the lack of accuracy in the reported result, and is applied when matrix spiked sample recovery is outside the control limits.

E: This qualifier indicates the the presence of interference, and is applied when the ICP serial dilution is outside the control limits.

*: This qualifier indicate the lack of precision , and is pplied on Fom I'S and Form VI when the Lab Duplicate analysis is outside the control limits.

U: This is a concentration qualifier that laboratory applies to a non-detected result which is essentially less than the Method Detection Limit(MDL). A non-detected result of an analyte is indicated by the Contract Required Quantitation Limit (CRQL) of that analyte suffixed with "U".

J: This is also a concentration qualifier that laboratory applies to a positive result below the CRQL.

NOTE: The laboratory qualifiers are crossed out and replaced with the appropriate data validation qualifiers (J, R or U) by the data validator.

A.2.3.1 Data Case Description: See DV Report

A.2.3.2 CSF Audit:

A.2.3.3 Technical Review: See DV Report

A.2.3.4 Contract-Problem/Non-Compliance:

APPENDIX D

SUPPORT DOCUMENTATION

CompuChem
a Division of Liberty Analytical Corp.
501 Madison Avenue
Cary, NC 27513

SDG NARRATIVE

SDG # 1010082

Client: TETRA TECH

Project: CTO-WE08/112G02045

PM: Dave Brayack

The indicated Sample Delivery Group (SDG) consisting of eight (8) water samples was received into the laboratory information management system (LIMS) on October 14, 2010 intact and in good condition with the Chain of Custody (COC) Records in order, unless otherwise noted in any attachments or Quality Assurance Notices. The cooler temperature indicator bottle was found with the samples and the samples temperature was 2.0 degrees Celsius. Temperature was recorded by IR temperature gun.

The samples were prepared and analyzed in accordance with SW846 and DoD methodology for the requested metals iron and manganese.

EQUATIONS FOR LIQUID SAMPLE CALCULATIONS:

Equation for obtaining metals sample results in µg/L as presented on Analysis Data Sheet data sheets from ICP instrument acquired results in µg/L (ppb).

$$\frac{C \times F}{I}$$

Where

C = concentration (µg/L)

F = final volume in liters after sample preparation

I = initial volume in liters

Example: Iron result in µg/L from sample **SA-PZ-160I**

$$\frac{38.67713\ \mu g/L\ (C) \times 0.05\ L\ (F)}{0.05\ L\ (I)} = 38.677\ \mu g/L \text{ reported as } 38.7\ J\ \mu g/L$$

INSTRUMENTAL QUALITY CONTROL:

All calibration verification solutions (LLICV, LLCCV, ICV & CCV), blanks (ICB, & CCB), and interference check samples (ICSA & ICSAB) associated with this data were confirmed to be within SW-846 methodology and DoD QSM 4.1 allowable limits.

SAMPLE PREPARATION QUALITY CONTROL:

The sample preparation procedure verifications (LCSW, LCSWD, & PBW) were found to be within acceptable ranges and the field sample was prepared and analyzed within the contract specified holding times.

MATRIX RELATED QUALITY CONTROL:

No matrix spikes were requested for this sample.

A five-fold serial dilution of sample, CCN = SDI1010082-01 (SA-PZ-160IL) was performed in accordance with SW-846 requirements for ICP analysis.

The adjusted sample concentrations were inside control limits.

The ICP sample post digestion spike, CCN =0102517-PS1 (SA-PZ-160IA) was found to be inside control limits except for iron.

I certify that the tests used in this report meet all requirements of the NELAC standards unless otherwise stated in the SDG narrative or QA notice.

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on CD has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Susan W. Bass
Senior Chemist
October 29, 2010

CHAIN OF CUSTODY

CompuChem
a division of Liberty Analytical Corp.
501 Madison Ave.
Cary, NC 27513
Phone: 919-379-4100 Fax 919-379-4040

Page 1 of 2

Courier FedEx
Airbill No. 8741 9938 1519
Sampling Complete? Y or N

Client/Reporting Information

Company Name: Tetra Tech
Address: 5700 Lake Wright Dr. Suite 309
City: Norfolk State: VA Zip: 23502
Project Contact: Dave Brayack
Phone #: 757-461-3824
Sampler's Name: Jacob Birkett Kristi Francisco

Project Information

Project Name: NWIRP Calverton EIAB 3-month
Sampling Location: Southern Area
Turnaround time: Standard
Batch QC or Project Specific? If Specific, which Sample ID?
Are aqueous samples field filtered for metals? Y or N
Are high concentrations expected? Y or N? If yes, which ID(s)?

Requested Analysis (include method and bottle type)

CompuChem No (Lab Use)	Field ID	Collection Date	Collection Time	Matrix	# of bottles	Number of Preserved Bottles: HCl	NaOH	HNO3	H2SO4	MEOH	Other	VOC (3 40mL glass vials)	MEE (40mL glass vial)	TOC (40mL glass vial)	Metals (Fe+Mn) (250mL plastic bottle)						TOC	Metals
1010082-09	SA-TB-01-20101011	10-11-10	1330	TB	3	3						3						Lab prepared				
1010082-02	SA-PZ-157I-20101011	10-11-10	1410	GW	8	5		1	2			3	2	2	1						<2	<2
-10	SA-PZ-158I-20101011	10-11-10	1413	GW	3	3						3										
1010082-03	SA-PZ-157I1-20101011	10-11-10	1509	GW	8	5		1	2			3	2	2	1						<2	<2
-11	SA-PZ-158I1-20101011	10-11-10	1512	GW	3	3						3										
1010082-04	SA-PZ-155I-20101012	10-12-10	0835	GW	8	5		1	2			3	2	2	1						<2	<2
-05	SA-PZ-151I1-20101012	10-12-10	0836	GW	8	5		1	2			3	2	2	1						<2	<2
-17	SA-PZ-160I1-20101012*	10-12-10	0956	GW	8	5		1	2			3	2	2	1						—	—
-06	SA-PZ-159I1-20101012	10-12-10	0957	GW	8	5		1	2			3	2	2	1						<2	<2
1010082-01	SA-PZ-160I-20101012	10-12-10	1050	GW	~~8~~ 14	~~5~~ 11		1	2			9	2	2	1			Run MS/MSD on VOC			<2	<2

Matrices
GW - Ground water
WW - Waste water
SW - Surface water
SO - Soil/Sediment
TB - Trip Blank
RI - Rinsate
WP - Wipe
O - Other

pH / Sample Info (Lab Use)

Lab Use Only

Sample Unpacked By: Diane Byrd
Sample Order Entry By:
Samples Received in Good Condition? Y or N
If no, explain:
Cyanide samples checked for sulfide & chlorine? Y or NA
625 & Phenol samples checked for chlorine? Y or NA
608 samples checked for pH between 5.0-9.0? Y or NA

Comments:
*SA-PZ-160I1-20101012 Only received VOC containers No containers for MEE, TOC, or Metals. DB 10/14/10

Sample Custody

Relinquished by: Jacob Birkett	Date/Time: 10-13-10 0930	Received by: Diane Byrd	Date/Time: 10/14/10 1030
Relinquished by:	Date/Time:	Received by:	Date/Time:
Subcontact? Y or N If yes, where?	Custody Seal(s) intact? Y or N	On Ice? Y or N	Cooler Temp: 2.0 °C

Samples stored 60 days after date report mailed at no extra charge.

White & Yellow copy to lab • Pink copy for customer

SNP010

CompuChem
a division of Liberty Analytical Corp.

CHAIN OF CUSTODY

501 Madison Ave.
Cary, NC 27513
Phone: 919-379-4100 Fax 919-379-4040

Page 2 of 2 — 22697

Courier: FedEx
Airbill No.: 8741 9933 1519
Sampling Complete? Y or N

Client/Reporting Information

Company Name: Tetra Tech
Address: 5700 Lake Wright Dr. Suite 309
City: Norfolk State: VA Zip: 23502
Project Contact: Dave Brayack
Phone #: 757-461-3824
Sampler's Name: Jacob Birkett Kristi Francisco

Project Information

Project Name: NWIRP Calverton EIAB 3-month
Sampling Location: Southern Area
Turnaround time: Standard
Batch QC or Project Specific? If Specific, which Sample ID?
Are aqueous samples field filtered for metals? Y or N
Are high concentrations expected? Y or N? If yes, which ID(s)?

Requested Analysis (include method and bottle type)

CompuChem No (Lab Use)	Field ID	Collection Date	Collection Time	Matrix	# of bottles	HCl	NaOH	HNO3	H2SO4	MEOH	Other	VOC 40mL glass vial	MEE 40mL glass vial	TOC 40mL glass vial	Metals (Fe+Mn) 250 mL plastic bottle	pH / Sample Info (Lab Use): TOC	pH / Sample Info (Lab Use): Metals
1010082-07	SA-PZ-159I-20101012	10-12-10	1104	GW	8	5		1	2			3	2	2	1	<2	<2
-13	SA-PZ-138II-20101012	10-12-10	1246	GW	3	3						3					
-14	SA-PZ-133I-20101012	10-12-10	1250	GW	3	3						3					
-15	SA-PZ-138I-20101012	10-12-10	1336	GW	3	3						3					
-16	SA-PZ-161I-20101012	10-12-10	1354	GW	3	3						3					
-17	SA-PZ-149II-20101012	10-12-10	1457	GW	3	3						3					
-18	SA-PZ-139-20101012	10-12-10	1508	GW	3	3						3					
-08	SA-Dup01-20101012	10-12-10	0800	GW	8	5		1	2			3	2	2	1	<2	<2
-19	SA-Dup02-20101012	10-12-10	1200	GW	3	3						3					

Matrices
GW - Ground water
WW - Waste water
SW - Surface water
SO - Soil/Sediment
TB - Trip Blank
RI - Rinsate
WP - Wipe
O - Other

Lab Use Only

Sample Unpacked By: Dia Byrd
Sample Order Entry By:
Samples Received in Good Condition? Y or N
If no, explain:
Cyanide samples checked for sulfide & chlorine? Y or NA
625 & Phenol samples checked for chlorine? Y or NA
608 samples checked for pH between 5.0-9.0? Y or NA

Comments

Sample Custody

Relinquished by: Jacob Birkett — Date/Time: 10-13-10 0930 — Received by: Diane Byrd — Date/Time: 10/14/10 1030
Relinquished by: — Date/Time: — Received by: — Date/Time:
Subcontact? Y or N If yes, where? — Custody Seal(s) intact? Y or N — On Ice? Y or N — Cooler Temp: 2.0 °C

Samples stored 60 days after date report mailed at no extra charge.

White & Yellow copy to lab • Pink copy for customer

SN2010

ANALYSIS REPORT 10/28/10 08:48:22 PM PAGE 1

METHOD: ALT-P4Q3 SAMPLE NAME: 1010082-07 OPERATOR:
RUN TIME: 10/28/10 20:41:12
COMMENT: SDG:1010082 CLIENTID:SA-PZ-159I 1:1
MODE: CONC CORR. FACTOR: 1

SA-PZ-159I-20101012

ELEM	AG3280	AL3082	BA4934	BE3130	CA3179	CD2265	CO2286
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
AVGE	-.444946	6.777128	31.53717	.0451703	12947.84	.6266440	2.580615
SDEV	.547910	4.286563	.20712	.0117567	26.90	.3803917	1.229346
%RSD	123.1408	63.25044	.6567501	26.02737	.2077623	60.70300	47.63772
#1	.0689352	3.995640	31.77632	.0581327	12978.85	1.049314	3.891639
#2	-1.02150	11.71359	31.41566	.0421822	12930.74	.5187997	2.396486
#3	-.382277	4.622153	31.41953	.0351961	12933.93	.3118182	1.453718
ERRORS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS
HIGH	4000.000	700000.0	50000.00	5000.000	600000.0	10000.00	50000.00
LOW	-4000.00	-700000.	-50000.0	-5000.00	-600000.	-10000.0	-50000.0

ELEM	CR2677	CU3247	FE2714	K_7664	MG2790	MN2576	NA3302
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
AVGE	-.154507	.5989533	7994.059	1205.479	3784.922	799.0136	9451.459
SDEV	.858117	.2826168	33.405	10.367	20.737	2.6158	180.131
%RSD	555.3892	47.18512	.4178769	.8599557	.5478746	.3273839	1.905850
#1	-.510993	.5063218	8013.408	1216.410	3804.130	801.9468	9623.789
#2	.8243934	.9162614	8013.282	1195.789	3787.700	798.1715	9264.429
#3	-.776923	.3742768	7955.485	1204.238	3762.937	796.9226	9466.160
ERRORS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS
HIGH	60000.00	40000.00	700000.0	100000.0	700000.0	20000.00	700000.0
LOW	-60000.0	-40000.0	-700000.	-100000.	-700000.	-20000.0	-700000.

reported as 7990 ug/L

ELEM	NI2316	TL1908	V_2924	ZN2062	PB2203	SE1960	SB2068
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
AVGE	-.070345	-.356196	.2107208	1.930650	-.381425	1.118220	2.755342
SDEV	.469211	.890939	.4257675	.150795	.404319	1.824390	1.126034
%RSD	667.0124	250.1264	202.0530	7.810564	106.0023	163.1513	40.86730
#1	.0571950	-1.37396	.6015792	1.829406	-.839832	-.517446	2.023884
#2	.3219103	.0227306	-.242972	2.103956	-.228847	.7863364	4.052027
#3	-.590141	.2826432	.2735555	1.858588	-.075596	3.085769	2.190116
ERRORS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS
HIGH	60000.00	60000.00	50000.00	60000.00	60000.00	40000.00	40000.00
LOW	-60000.0	-60000.0	-50000.0	-60000.0	-60000.0	-40000.0	-40000.0

ELEM	AS1890	22031	22032	19601	19602	SN1899	BI2230
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
AVGE	11.18651	.7586902	-.952810	-4.04735	3.695497	-1.23205	-1.29947
SDEV	.38479	4.612027	2.612122	7.96099	3.880333	1.42584	2.32148
%RSD	3.439725	607.8933	274.1494	196.6962	105.0016	115.7291	178.6482
#1	11.37170	3.839477	-3.17824	-1.38323	-.086847	-.116093	-.401805
#2	11.44369	-4.54367	1.923078	-12.9987	7.666906	-2.83835	-3.93575
#3	10.74415	2.980259	-1.60327	2.239917	3.506432	-.741693	.4391426
ERRORS	LC PASS	NOCHECK	NOCHECK	NOCHECK	NOCHECK	LC PASS	LC PASS
HIGH	20000.00					40000.00	40000.00
LOW	-20000.0					-40000.0	-40000.0

ELEM	MO2020	TI3349	Y_3710
UNITS	UG/L	UG/L	PPM
AVGE	.1653237	-.304612	7472.444
SDEV	.6075737	.211914	34.031
%RSD	367.5054	69.56864	.4554259
#1	.8594695	-.511742	7437.600
#2	-.269880	-.088217	7474.133
#3	-.093619	-.313877	7505.600
ERRORS	LC PASS	LC PASS	NOCHECK
HIGH	20000.00	40000.00	
LOW	-20000.0	-40000.0	

NWIRP CALVERTON
WATER DATA
1010082

FRACTION	CHEMICAL	SA-DUP01-20101012	UNITS	SA-PZ-151I1-20101012	RPD	D
M	IRON	1020	UG/L	1010	0.99	10.00
M	MANGANESE	5550	UG/L	5460	1.63	90.00

Current RPD Quality Control Limit: 30 %.
Shaded cells indicate RPDs that exceed the applicable quality control limit.

NWIRP CALVERTON
WATER DATA
1010082

FRACTION	CHEMICAL	SA-DUP01-20101012	UNITS	SA-PZ-151I1-20101012	RPD	D
MISC	TOTAL ORGANIC CARBON	1.33	MG/L	1.1	18.93	0.23

Current RPD Quality Control Limit: 30 %.
Shaded cells indicate RPDs that exceed the applicable quality control limit.

HOLDTIMES

SDG 1010082

SORT	UNITS	NSAMPLE	LAB_ID	QC_TYPE	SAMP_DATE	EXTR_DATE	ANAL_DATE	SMP_EXTR	EXTR_ANL	SMP_ANL
M	UG/L	SA-PZ-159I1-20101012	1010082-06	NM	10/12/2010	10/25/2010	10/28/2010	13	3	16
M	UG/L	SA-DUP01-20101012	1010082-08	NM	10/12/2010	10/25/2010	10/28/2010	13	3	16
M	UG/L	SA-PZ-151I1-20101012	1010082-05	NM	10/12/2010	10/25/2010	10/28/2010	13	3	16
M	UG/L	SA-PZ-155I-20101012	1010082-04	NM	10/12/2010	10/25/2010	10/28/2010	13	3	16
M	UG/L	SA-PZ-157I-20101011	1010082-02	NM	10/11/2010	10/25/2010	10/28/2010	14	3	17
M	UG/L	SA-PZ-159I-20101012	1010082-07	NM	10/12/2010	10/25/2010	10/28/2010	13	3	16
M	UG/L	SA-PZ-160I-20101012	1010082-01	NM	10/12/2010	10/25/2010	10/28/2010	13	3	16
M	UG/L	SA-PZ-157I1-20101011	1010082-03	NM	10/11/2010	10/25/2010	10/28/2010	14	3	17
TOC	MG/L	SA-PZ-157I-20101011	1010082-02	NM	10/11/2010	10/21/2010	10/22/2010	10	1	11
TOC	MG/L	SA-PZ-159I1-20101012	1010082-06	NM	10/12/2010	10/21/2010	10/22/2010	9	1	10
TOC	MG/L	SA-DUP01-20101012	1010082-08	NM	10/12/2010	10/21/2010	10/22/2010	9	1	10
TOC	MG/L	SA-PZ-157I1-20101011	1010082-03	NM	10/11/2010	10/21/2010	10/22/2010	10	1	11
TOC	MG/L	SA-PZ-155I-20101012	1010082-04	NM	10/12/2010	10/21/2010	10/22/2010	9	1	10
TOC	MG/L	SA-PZ-160I-20101012	1010082-01	NM	10/12/2010	10/21/2010	10/22/2010	9	1	10
TOC	MG/L	SA-PZ-151I1-20101012	1010082-05	NM	10/12/2010	10/21/2010	10/22/2010	9	1	10

SORT	UNITS	NSAMPLE	LAB_ID	QC_TYPE	SAMP_DATE	EXTR_DATE	ANAL_DATE	SMP_EXTR	EXTR_ANL	SMP_ANL
TOC	MG/L	SA-PZ-159I-20101012	1010082-07	NM	10/12/2010	10/21/2010	10/22/2010	9	1	10
OV	UG/L	SA-PZ-157I1-20101011	1010082-03	NM	10/11/2010	10/15/2010	10/15/2010	4	0	4
OV	UG/L	SA-PZ-139-20101012	1010082-18	NM	10/12/2010	10/21/2010	10/21/2010	9	0	9
OV	UG/L	SA-DUP01-20101012	1010082-08	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8
OV	UG/L	SA-DUP02-20101012	1010082-19	NM	10/12/2010	10/21/2010	10/21/2010	9	0	9
OV	UG/L	SA-PZ-133I-20101012	1010082-14	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8
OV	UG/L	SA-PZ-138I1-20101012	1010082-13	NM	10/12/2010	10/15/2010	10/15/2010	3	0	3
OV	UG/L	SA-PZ-138I1-20101012	1010082-13RE1	NM	10/12/2010	10/21/2010	10/21/2010	9	0	9
OV	UG/L	SA-PZ-138I-20101012	1010082-15	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8
OV	UG/L	SA-PZ-159I1-20101012	1010082-06	NM	10/12/2010	10/15/2010	10/15/2010	3	0	3
OV	UG/L	SA-TB-01-20101011	1010082-09	NM	10/11/2010	10/20/2010	10/20/2010	9	0	9
OV	UG/L	SA-PZ-161I-20101012	1010082-16	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8
OV	UG/L	SA-PZ-160I-20101012	1010082-01	NM	10/12/2010	10/21/2010	10/21/2010	9	0	9
OV	UG/L	SA-PZ-160I1-20101012	1010082-12RE1	NM	10/12/2010	10/21/2010	10/21/2010	9	0	9
OV	UG/L	SA-PZ-160I1-20101012	1010082-12	NM	10/12/2010	10/15/2010	10/15/2010	3	0	3
OV	UG/L	SA-PZ-151I1-20101012	1010082-05	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8
OV	UG/L	SA-PZ-159I1-20101012	1010082-06RE1	NM	10/12/2010	10/21/2010	10/21/2010	9	0	9
OV	UG/L	SA-PZ-149I1-20101012	1010082-17	NM	10/12/2010	10/20/2010	10/20/2010	8	0	8

METHOD DETECTION AND REPORTING LIMITS

EPA 6010C

Laboratory: COMPUCHEM **SDG:** 1010082

Client: TETRA TECH **Project:** CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water **Instrument:** P4

Analyte	DL	LOQ	Units	Method
Iron	12.200	500.00	ug/L	EPA 6010C
Manganese	0.164	10.00	ug/L	EPA 6010C

ICP-AES AND ICP-MS LINEAR RANGES (QUARTERLY)

Client: TETRA TECH

Project: CTO-WE08/112G02045/N62467-04-D-0057

SDG: 1010082 Instrument: P4

Analyte	Concentration ug/L	LR Date
Iron	700000	07/15/2010
Manganese	20000	07/15/2010

ICP-AES INTERELEMENT CORRECTION FACTORS

Client: TETRA TECH

Project: CTO-WE08/112G02045/N62467-04-D-0057

SDG No.: 1010082 Instrument: P4 Date: 7/15/10

Analyte	Wave-length (nm)	Interelement Correction Factors for:				
		Al	Ca	Fe	Mg	Ag
Iron	271.44				-0.00107	
Manganese	257.61				0.00003	

Comments:

ICP-AES INTERELEMENT CORRECTION FACTORS

Client: TETRA TECH

Project: CTO-WE08/112G02045/N62467-04-D-0057

SDG No.: 1010082 Instrument: P4 Date: 7/15/10

Analyte	Wave-length (nm)	Interelement Correction Factors for:				
		As	B	Ba	Be	Cd
Iron	271.44					
Manganese	257.61					

Comments:

ICP-AES INTERELEMENT CORRECTION FACTORS

Client: TETRA TECH

Project: CTO-WE08/112G02045/N62467-04-D-0057

SDG No.: 1010082 Instrument: P4 Date: 7/15/10

Analyte	Wave-length (nm)	Interelement Correction Factors for:				
		Co	Cr	Cu	K	Mn
Iron	271.44	0.06996	0.00575			
Manganese	257.61					

Comments:

ICP-AES INTERELEMENT CORRECTION FACTORS

Client: TETRA TECH

Project: CTO-WE08/112G02045/N62467-04-D-0057

SDG No.: 1010082 Instrument: P4 Date: 7/15/10

Analyte	Wave-length (nm)	Interelement Correction Factors for:				
		Mo	Na	Ni	Pb	Sb
Iron	271.44					
Manganese	257.61					

Comments:

ICP-AES INTERELEMENT CORRECTION FACTORS

Client: TETRA TECH

Project: CTO-WE08/112G02045/N62467-04-D-0057

SDG No.: 1010082 Instrument: P4 Date: 7/15/10

Analyte	Wave-length (nm)	Interelement Correction Factors for:				
		Se	Sn	Ti	Tl	V
Iron	271.44					
Manganese	257.61					

Comments:

ICP-AES INTERELEMENT CORRECTION FACTORS

Client: TETRA TECH

Project: CTO-WE08/112G02045/N62467-04-D-0057

SDG No.: 1010082 Instrument: P4 Date: 7/15/10

Analyte	Wave-length (nm)	Interelement Correction Factors for: Zn				
Iron	271.44					
Manganese	257.61					

Comments:

PREPARATION BATCH SUMMARY

EPA 6010C

Client: TETRA TECH

SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Batch: 0102517

Matrix: Water Preparation: EPA 3010A

SAMPLE NAME	LAB SAMPLE ID	DATE PREPARED	INITIAL VOL/WT (mL)	FINAL VOL/WT (mL)
PBW	0102517-BLK1	10/25/10 12:20	50.0	50.0
LCSW	0102517-BS1	10/25/10 12:20	50.0	50.0
LCSWD	0102517-BSD1	10/25/10 12:20	50.0	50.0
SA-PZ-160IA	0102517-PS1	10/25/10 12:20	50.0	50.0
SA-PZ-160I	1010082-01	10/25/10 12:20	50.0	50.0
SA-PZ-157I	1010082-02	10/25/10 12:20	50.0	50.0
SA-PZ-157II	1010082-03	10/25/10 12:20	50.0	50.0
SA-PZ-155I	1010082-04	10/25/10 12:20	50.0	50.0
SA-PZ-151II	1010082-05	10/25/10 12:20	50.0	50.0
SA-PZ-159II	1010082-06	10/25/10 12:20	50.0	50.0
SA-PZ-159I	1010082-07	10/25/10 12:20	50.0	50.0
SA-DUP01	1010082-08	10/25/10 12:20	50.0	50.0

SERIAL DILUTION

EPA 6010C

SA-PZ-160IL

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 0J29005-SRD3 Matrix: Water Lab Source ID: 1010082-01 Source Sample: SA-PZ-160I

Sequence: 0J29005

Analyte	Initial Sample Result (I)	Serial Dilution Result (S)	% Difference	Q	Method	QC Limits % Difference
Iron	38.7 J	250 U			EPA 6010C	10
Manganese	516	512	0.869		EPA 6010C	10

LCS / LCS DUPLICATE RECOVERY

EPA 6010C

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 0102517-BS1 Matrix: Water Client ID: LCSW Batch: 0102517

ANALYTE	SPIKE ADDED (ug/L)	LCS CONCENTRATION (ug/L)	LCS % REC.	Q	QC LIMITS REC.
Iron	10000	10200	102		80 - 120
Manganese	1500	1570	104		80 - 120

ANALYTE	SPIKE ADDED (ug/L)	LCSD CONCENTRATION (ug/L)	LCSD % REC. #	% RPD #	QC LIMITS		
					RPD	Q	REC.
Iron	10000	10200	102	0.141	20		80 - 120
Manganese	1500	1580	105	0.716	20		80 - 120

POST DIGEST SPIKE SAMPLE RECOVERY

EPA 6010C

SA-PZ-160IA

Laboratory: COMPUCHEM
Client: TETRA TECH
Matrix: Water
Batch: 0102517
Preparation: EPA 3010A

SDG: 1010082
Project: CTO-WE08/112G02045/N62467-04-D-0057
Laboratory ID: 0102517-PS1
Lab Source ID: 1010082-01
Initial/Final: 50 mL / 50 mL

Analyte	Spike Sample Result (SSR) (ug/L)	Sample Result (SR) (ug/L)	Spike Added (SA) (ug/L)	%R	Control Limit %R
Iron	184	**38.7 J**	**200.0**	**72.8**	**75 - 125**
Manganese	535	516	20.00	96.2	75 - 125

No action for Postdigestion Spike noncompliances

ANALYSIS SEQUENCE SUMMARY

EPA 6010C

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Sequence: 0J29005 Instrument: P4

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
S0	0J29005-CAL1	P41028_P-001	10/28/10 14:37:20
S	0J29005-CAL2	P41028_P-002	10/28/10 14:44:33
S	0J29005-CAL4	P41028_P-003	10/28/10 14:51:47
S	0J29005-CAL3	P41028_P-004	10/28/10 14:57:27
S	0J29005-CAL5	P41028_P-005	10/28/10 15:03:54
LLICV	0J29005-CRL1	P41028_P-006	10/28/10 15:09:34
ICV1	0J29005-ICV1	P41028_P-007	10/28/10 15:21:00
ICB	0J29005-ICB1	P41028_P-008	10/28/10 15:28:13
ICSA	0J29005-IFA1	P41028_P-009	10/28/10 15:35:26
ICSAB	0J29005-IFB1	P41028_P-010	10/28/10 15:42:38
LLCCV	0J29005-CRL2	P41028_P-011	10/28/10 15:49:51
CCV	0J29005-CCV1	P41028_P-012	10/28/10 15:57:04
CCB	0J29005-CCB1	P41028_P-013	10/28/10 16:04:17
LLCCV	0J29005-CRL3	P41028_P-014	10/28/10 16:17:02
CCV	0J29005-CCV2	P41028_P-024	10/28/10 17:29:53
CCB	0J29005-CCB2	P41028_P-025	10/28/10 17:37:07
LLCCV	0J29005-CRL4	P41028_P-034	10/28/10 18:42:01
CCV1	0J29005-CCV3	P41028_P-035	10/28/10 18:49:15
CCB1	0J29005-CCB3	P41028_P-036	10/28/10 18:56:29
PBW	0102517-BLK1	P41028_P-037	10/28/10 19:07:27
LCSW	0102517-BS1	P41028_P-038	10/28/10 19:14:39
LCSWD	0102517-BSD1	P41028_P-039	10/28/10 19:21:52
SA-PZ-160I	1010082-01	P41028_P-040	10/28/10 19:29:04
SA-PZ-160IL	0J29005-SRD3	P41028_P-041	10/28/10 19:36:16
SA-PZ-160IA	0102517-PS1	P41028_P-042	10/28/10 19:43:29
SA-PZ-157I	1010082-02	P41028_P-043	10/28/10 19:50:41
SA-PZ-157I1	1010082-03	P41028_P-044	10/28/10 19:57:54
SA-PZ-155I	1010082-04	P41028_P-045	10/28/10 20:05:06
SA-PZ-151I1	1010082-05	P41028_P-046	10/28/10 20:12:19
CCV1	0J29005-CCV4	P41028_P-047	10/28/10 20:19:32
CCB1	0J29005-CCB4	P41028_P-048	10/28/10 20:26:46
SA-PZ-159I1	1010082-06	P41028_P-049	10/28/10 20:33:59

ANALYSIS SEQUENCE SUMMARY

EPA 6010C

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Sequence: 0J29005 Instrument: P4

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
SA-PZ-159I	1010082-07	P41028_P-050	10/28/10 20:41:12
SA-DUP01	1010082-08	P41028_P-051	10/28/10 20:48:25
LLCCV	0J29005-CRL5	P41028_P-054	10/28/10 21:10:03
CCV1	0J29005-CCV5	P41028_P-055	10/28/10 21:17:16
CCB1	0J29005-CCB5	P41028_P-056	10/28/10 21:24:30

INITIAL AND CONTINUING CALIBRATION CHECK

EPA 6010C

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Sequence: 0J29005 Instrument ID: P4

Client ID	Lab Sample ID	Analyte	True	Found	%R	Units	Q	Control Limit
ICV1	0J29005-ICV1	Iron	5082	5070	100	ug/L		+/-10 %
ICV1	0J29005-ICV1	Manganese	499.0	515	103	ug/L		+/-10 %
CCV	0J29005-CCV1	Iron	25000	24600	98	ug/L		+/-10 %
CCV	0J29005-CCV1	Manganese	1000	1020	102	ug/L		+/-10 %
CCV	0J29005-CCV2	Iron	25000	24500	98	ug/L		+/-10 %
CCV	0J29005-CCV2	Manganese	1000	1010	101	ug/L		+/-10 %
CCV1	0J29005-CCV3	Iron	25000	24900	100	ug/L		+/-10 %
CCV1	0J29005-CCV3	Manganese	1000	1020	102	ug/L		+/-10 %
CCV1	0J29005-CCV4	Iron	25000	25500	102	ug/L		+/-10 %
CCV1	0J29005-CCV4	Manganese	1000	1050	105	ug/L		+/-10 %
CCV1	0J29005-CCV5	Iron	25000	25700	103	ug/L		+/-10 %
CCV1	0J29005-CCV5	Manganese	1000	1050	105	ug/L		+/-10 %

BLANKS

EPA 6010C

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Sequence: 0J29005 Instrument ID: P4

Client ID	Lab Sample ID	Analyte	Found	DL	LOD	LOQ	Units	Q	Method
ICB	0J29005-ICB1	Iron	-8.85	12.2	50.0	500	ug/L	*U*	EPA 6010C
ICB	0J29005-ICB1	Manganese	-0.0963	0.164	5.00	10.0	ug/L	*U*	EPA 6010C
CCB	0J29005-CCB1	Iron	0.467	12.2	50.0	500	ug/L	*U*	EPA 6010C
CCB	0J29005-CCB1	Manganese	-0.157	0.164	5.00	10.0	ug/L	*U*	EPA 6010C
CCB	0J29005-CCB2	Iron	10.4	12.2	50.0	500	ug/L	*U*	EPA 6010C
CCB	0J29005-CCB2	Manganese	-0.0387	0.164	5.00	10.0	ug/L	*U*	EPA 6010C
CCB1	0J29005-CCB3	Iron	-11.9	12.2	50.0	500	ug/L	*U*	EPA 6010C
CCB1	0J29005-CCB3	Manganese	-0.0555	0.164	5.00	10.0	ug/L	*U*	EPA 6010C
PBW	0102517-BLK1	Iron		12.2	50.0	500	ug/L	*U*	EPA 6010C
PBW	0102517-BLK1	Manganese	0.172	0.164	5.00	10.0	ug/L	*J*	EPA 6010C
CCB1	0J29005-CCB4	Iron	4.22	12.2	50.0	500	ug/L	*U*	EPA 6010C
CCB1	0J29005-CCB4	Manganese	-0.0888	0.164	5.00	10.0	ug/L	*U*	EPA 6010C
CCB1	0J29005-CCB5	Iron	-16.7 X	12.2	50.0	500	ug/L	*J*	EPA 6010C
CCB1	0J29005-CCB5	Manganese	-0.0839	0.164	5.00	10.0	ug/L	*U*	EPA 6010C

ICP INTERFERENCE CHECK SAMPLE

EPA 6010C

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Sequence: 0J29005 Instrument ID: P4

Client ID	Lab Sample ID	Analyte	True	Found	%R	Units
ICSA	0J29005-IFA1	Iron	95600	101976.30	107	ug/L
ICSA	0J29005-IFA1	Manganese	19.00	19.78	104	ug/L
ICSAB	0J29005-IFB1	Iron	94800	95306.57	101	ug/L
ICSAB	0J29005-IFB1	Manganese	502.0	512.19	102	ug/L

*The absence of an entry in the "True" column denotes the lack of a true value for that analyte.
The entry in the "%R" column represents a Control Limit, established as +/- the analyte's Limit of Detection (LOD).

CompuChem

A Division Of

Liberty Analytical Corp.

SDG NARRATIVE
SDG # 1010082
CTO-WE08/112G02045
PM: DAVE BRAYACK

The 8 aqueous samples were received intact, at 2.0°C, with proper documentations, in sealed shipping containers, on October 14th, 2010. The samples were scheduled for the requested analysis of the Wet Chemistry fraction. The samples were analyzed, in accordance with current EPA methods, for the analytes requested as per the COC, with the exceptions and/or additions requested by the client.

SAMPLE IDs:

The cover page contained in this package lists the client ID's and the associated CompuChem numbers which are part of this SDG.

INSTRUMENTAL QUALITY CONTROL:

All calibration verification solutions (ICV & CCV), Blanks (ICB, & CCB), associated with this data were confirmed to be within allowable limits.

SAMPLE PREPARATION QUALITY CONTROL:

The sample preparation procedure verifications (LCS & Blank) were found to be within acceptable ranges. All field samples were prepared and analyzed within the contract specified holding times.

MATRIX RELATED QUALITY CONTROL:

SA-PZ-160I *(1010082-01)* was requested to use as the original to prepare the matrix spike and matrix spike duplicate. The associated matrix spike and matrix spike duplicate were found to be inside control limits.

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Furthermore, I certify that the tests used in this report meet all requirements of the NELAC standards unless otherwise stated in the SDG narrative or QA notice. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on diskette has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Preeti Khare
Data Reviewer I
October 25th, 2010

METHOD DETECTION AND REPORTING LIMITS

SM5310B

Laboratory: COMPUCHEM **SDG:** 1010082

Client: TETRA TECH **Project:** CTO-WE08/112G02045/N62467-04-D-0057

Matrix: WATER **Instrument:**

Analyte	DL	LOQ	Units	Method
Total Organic Carbon	0.130	1.00	mg/L	SM5310B

TOC Run Log

TOC 9060 Quad

Printed: 10/25/2010 11:12:46

Analyst(s): JM

Analysis: TTL ORGNC CRBN (TOC) SM5310B D

File Name: TOC_2010_10_21

Date/Time 10-21-10 / 09:30

Instrument: TOC

Units: ppm

SDG	Matrix	Comments
1010046	Water	See TOC+DOC dilutions (#01, 03, 04 + 7)
1010080	Water	
1010082	Water	See #07 dilution
1010091	Water	

Batch
0101808
0101823
0102140

Cup	Sample ID	Client ID	Sample Type	DF	Date	Time	Results	Comments
	ICAL	ICAL	CALIB STD	1.00	10/21/2010	9:38:19 PM	0.000	
	ICAL	ICAL	CALIB STD	1.00	10/21/2010	9:46:51 PM	1.000	
	ICAL	ICAL	CALIB STD	1.00	10/21/2010	9:55:32 PM	5.000	
	ICAL	ICAL	CALIB STD	1.00	10/21/2010	10:02:48 PM	25.00	
	ICAL	ICAL	CALIB STD	1.00	10/21/2010	10:09:55 PM	50.00	
	ICAL	ICAL	CALIB STD	1.00	10/21/2010	10:16:34 PM	100.0	
N	ICV	ICV	ICV	1.00	10/21/2010	10:25:55 PM	75.93	
N	ICB	ICB	ICB	1.00	10/21/2010	10:35:13 PM	0.1630	
N	CCV	CCV	CCV	1.00	10/21/2010	10:44:51 PM	49.51	
N	CCB	CCB	CCB	1.00	10/21/2010	10:52:12 PM	0.1351	
N	0101808-BLK1	Blank	BLANK	1.00	10/21/2010	10:59:45 PM	0.1072	
N	0101808-BS1	LCS	LCS	1.00	10/21/2010	11:08:32 PM	74.34	
N	0101808-BSD1	LCS Dup	LCS DUP	1.00	10/21/2010	11:14:18 PM	76.22	
N	1010046-01	B-21-1010	SAMPLE	1.00	10/21/2010	11:25:23 PM	403.3	
N	1010046-01	B-21-1010	SAMPLE	1.00	10/21/2010	11:31:25 PM	406.0	
N	1010046-01	B-21-1010	SAMPLE	1.00	10/21/2010	11:37:32 PM	410.1	
N	1010046-01	B-21-1010	SAMPLE	1.00	10/21/2010	11:43:36 PM	405.2	
N	1010046-03	B-23-1010	SAMPLE	1.00	10/21/2010	11:54:21 PM	157.7	
N	1010046-03	B-23-1010	SAMPLE	1.00	10/21/2010	11:59:55 PM	157.6	
N	1010046-03	B-23-1010	SAMPLE	1.00	10/22/2010	12:05:32 AM	158.0	
N	1010046-03	B-23-1010	SAMPLE	1.00	10/22/2010	12:11:07 AM	157.9	
N	1010046-04	B-22-1010	SAMPLE	1.00	10/22/2010	12:22:17 AM	372.0	
N	1010046-04	B-22-1010	SAMPLE	1.00	10/22/2010	12:28:21 AM	371.1	

The presence of the Chemist's/Analyst's employee ID number, or signature, on this run log attests that strict compliance with the method's SOP has occurred. Any SOP deviations require documentation by the responsible chemist/analyst together with the chemist's/analyst's initials and the initials of the lab supervisor and a QA department representative, signifying approval of the deviation.

Reviewed By: [signature] Date: 10-25-10

Cup	Sample ID	Client ID	Sample Type	DF	Date	Time	Results	Comments
N	1010046-04	B-22-1010	SAMPLE	1.00	10/22/2010	12:34:25 AM	372.1	
N	1010046-04	B-22-1010	SAMPLE	1.00	10/22/2010	12:40:26 AM	371.3	
N	1010046-06	INJ-MW4-1010	SAMPLE	1.00	10/22/2010	12:50:58 AM	49.24	
N	1010046-06	INJ-MW4-1010	SAMPLE	1.00	10/22/2010	12:56:29 AM	47.98	
N	1010046-06	INJ-MW4-1010	SAMPLE	1.00	10/22/2010	1:01:59 AM	49.53	
N	1010046-06	INJ-MW4-1010	SAMPLE	1.00	10/22/2010	1:07:20 AM	48.83	
N	1010046-07	B-10R-1010	SAMPLE	1.00	10/22/2010	1:19:20 AM	440.3	
N	1010046-07	B-10R-1010	SAMPLE	1.00	10/22/2010	1:25:34 AM	439.8	
N	1010046-07	B-10R-1010	SAMPLE	1.00	10/22/2010	1:31:57 AM	436.0	
N	1010046-07	B-10R-1010	SAMPLE	1.00	10/22/2010	1:36:59 AM	1.195	
N	CCV	CCV	CCV	1.00	10/22/2010	1:46:27 AM	50.09	
N	CCB	CCB	CCB	1.00	10/22/2010	1:53:56 AM	0.4207	
N	0101808-BLK1	Blank	BLANK	1.00	10/22/2010	2:01:15 AM	0.1267	
N	0101808-BS1	LCS	LCS	1.00	10/22/2010	2:10:04 AM	74.84	
N	0101808-BSD1	LCS Dup	LCS DUP	1.00	10/22/2010	2:16:12 AM	76.85	
N	1010046-01	B-21-1010	SAMPLE	1.00	10/22/2010	2:27:27 AM	394.6	
N	1010046-01	B-21-1010	SAMPLE	1.00	10/22/2010	2:33:34 AM	396.7	
N	1010046-01	B-21-1010	SAMPLE	1.00	10/22/2010	2:39:40 AM	396.0	
N	1010046-01	B-21-1010	SAMPLE	1.00	10/22/2010	2:45:43 AM	394.6	
N	1010046-03	B-23-1010	SAMPLE	1.00	10/22/2010	2:56:32 AM	156.3	
N	1010046-03	B-23-1010	SAMPLE	1.00	10/22/2010	3:02:14 AM	156.5	
N	1010046-03	B-23-1010	SAMPLE	1.00	10/22/2010	3:07:52 AM	157.2	
N	1010046-03	B-23-1010	SAMPLE	1.00	10/22/2010	3:13:32 AM	156.8	
N	1010046-04	B-22-1010	SAMPLE	1.00	10/22/2010	3:24:45 AM	367.7	
N	1010046-04	B-22-1010	SAMPLE	1.00	10/22/2010	3:30:53 AM	371.1	
N	1010046-04	B-22-1010	SAMPLE	1.00	10/22/2010	3:36:58 AM	370.9	
N	1010046-04	B-22-1010	SAMPLE	1.00	10/22/2010	3:43:05 AM	370.9	
N	1010046-06	INJ-MW4-1010	SAMPLE	1.00	10/22/2010	3:53:37 AM	48.23	
N	1010046-06	INJ-MW4-1010	SAMPLE	1.00	10/22/2010	3:59:17 AM	48.69	
N	1010046-06	INJ-MW4-1010	SAMPLE	1.00	10/22/2010	4:04:52 AM	48.93	

The presence of the Chemist's/Analyst's employee ID number, or signature, on this run log attests that strict compliance with the method's SOP has occurred. Any SOP deviations require documentation by the responsible chemist/analyst together with the chemist's/analyst's initials and the initials of the lab supervisor and a QA department representative, signifying approval of the deviation.

Reviewed By: _____ Date: 10/25/10

Cup	Sample ID	Client ID	Sample Type	DF	Date	Time	Results	Comments
N	1010046-06	INJ-MW4-1010	SAMPLE	1.00	10/22/2010	4:10:21 AM	48.79	
N	1010046-07	B-10R-1010	SAMPLE	1.00	10/22/2010	4:22:22 AM	409.4	
N	1010046-07	B-10R-1010	SAMPLE	1.00	10/22/2010	4:28:28 AM	412.2	
N	1010046-07	B-10R-1010	SAMPLE	1.00	10/22/2010	4:34:34 AM	409.9	
N	1010046-07	B-10R-1010	SAMPLE	1.00	10/22/2010	4:40:46 AM	411.6	
N	CCV	CCV	CCV	1.00	10/22/2010	4:50:11 AM	50.07	
N	CCB	CCB	CCB	1.00	10/22/2010	4:57:26 AM	0.1744	
N	0101823-BLK1	Blank	BLANK	1.00	10/22/2010	5:04:57 AM	0.1551	
N	0101823-BS1	LCS	LCS	1.00	10/22/2010	5:13:48 AM	74.78	
N	1010080-01	MNA MW-21	SAMPLE	1.00	10/22/2010	5:21:26 AM	0.9531	
N	1010080-01	MNA MW-21	SAMPLE	1.00	10/22/2010	5:25:55 AM	0.9962	
N	1010080-01	MNA MW-21	SAMPLE	1.00	10/22/2010	5:30:26 AM	0.9568	
N	1010080-01	MNA MW-21	SAMPLE	1.00	10/22/2010	5:35:08 AM	0.9725	
N	0101823-MS1	MNA MW-21MS	MATRIX SPIKE	1.00	10/22/2010	5:43:50 AM	48.95	
N	0101823-MS1	MNA MW-21MS	MATRIX SPIKE	1.00	10/22/2010	5:49:32 AM	49.65	
N	0101823-MS1	MNA MW-21MS	MATRIX SPIKE	1.00	10/22/2010	5:55:12 AM	49.99	
N	0101823-MS1	MNA MW-21MS	MATRIX SPIKE	1.00	10/22/2010	6:00:43 AM	49.88	
N	0101823-MSD1	MNA MW-21MSD	MATRIX SPIKE	1.00	10/22/2010	6:06:31 AM	50.07	
N	0101823-MSD1	MNA MW-21MSD	MATRIX SPIKE	1.00	10/22/2010	6:12:10 AM	49.83	
N	0101823-MSD1	MNA MW-21MSD	MATRIX SPIKE	1.00	10/22/2010	6:17:47 AM	49.94	
N	0101823-MSD1	MNA MW-21MSD	MATRIX SPIKE	1.00	10/22/2010	6:23:18 AM	49.70	
N	1010080-02	MNA MW-19	SAMPLE	1.00	10/22/2010	6:30:45 AM	0.6767	
N	1010080-02	MNA MW-19	SAMPLE	1.00	10/22/2010	6:35:11 AM	0.6128	
N	1010080-02	MNA MW-19	SAMPLE	1.00	10/22/2010	6:39:45 AM	0.6123	
N	1010080-02	MNA MW-19	SAMPLE	1.00	10/22/2010	6:44:12 AM	0.6216	
N	1010080-03	MNA MW-14	SAMPLE	1.00	10/22/2010	6:51:42 AM	0.6215	
N	1010080-03	MNA MW-14	SAMPLE	1.00	10/22/2010	6:56:22 AM	0.6187	
N	1010080-03	MNA MW-14	SAMPLE	1.00	10/22/2010	7:00:42 AM	0.6775	
N	1010080-03	MNA MW-14	SAMPLE	1.00	10/22/2010	7:05:11 AM	0.6491	
N	ICV	ICV	ICV	1.00	10/22/2010	7:14:46 AM	76.57	

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Reviewed By: _____ Date: 10-25-10

Cup	Sample ID	Client ID	Sample Type	DF	Date	Time	Results	Comments
N	1010080-04	MNA MW-13	SAMPLE	1.00	10/22/2010	7:22:21 AM	0.6979	
N	1010080-04	MNA MW-13	SAMPLE	1.00	10/22/2010	7:26:51 AM	0.6160	
N	1010080-04	MNA MW-13	SAMPLE	1.00	10/22/2010	7:31:22 AM	0.6460	
N	1010080-04	MNA MW-13	SAMPLE	1.00	10/22/2010	7:35:57 AM	0.6342	
N	1010080-05	MNA MW-20	SAMPLE	1.00	10/22/2010	7:43:20 AM	0.6552	
N	1010080-05	MNA MW-20	SAMPLE	1.00	10/22/2010	7:48:01 AM	0.8342	
N	1010080-05	MNA MW-20	SAMPLE	1.00	10/22/2010	7:52:32 AM	0.9124	
N	1010080-05	MNA MW-20	SAMPLE	1.00	10/22/2010	7:56:52 AM	0.8039	
N	CCV	CCV	CCV	1.00	10/22/2010	8:06:35 AM	49.51	
N	CCB	CCB	CCB	1.00	10/22/2010	8:13:50 AM	0.1149	
N	1010080-06	MNA MW-18	SAMPLE	1.00	10/22/2010	8:21:52 AM	1.183	
N	1010080-06	MNA MW-18	SAMPLE	1.00	10/22/2010	8:26:33 AM	1.580	
N	1010080-06	MNA MW-18	SAMPLE	1.00	10/22/2010	8:31:30 AM	1.088	
N	1010080-06	MNA MW-18	SAMPLE	1.00	10/22/2010	8:36:18 AM	0.8853	
N	1010080-07	MNA MW-15	SAMPLE	1.00	10/22/2010	8:43:35 AM	0.4169	
N	1010080-07	MNA MW-15	SAMPLE	1.00	10/22/2010	8:48:41 AM	0.5038	
N	1010080-07	MNA MW-15	SAMPLE	1.00	10/22/2010	8:52:57 AM	0.4363	
N	1010080-07	MNA MW-15	SAMPLE	1.00	10/22/2010	8:57:27 AM	0.4244	
N	1010080-08	MNA MW-9D	SAMPLE	1.00	10/22/2010	9:04:52 AM	0.3100	
N	1010080-08	MNA MW-9D	SAMPLE	1.00	10/22/2010	9:09:41 AM	0.4472	
N	1010080-08	MNA MW-9D	SAMPLE	1.00	10/22/2010	9:14:40 AM	0.6004	
N	1010080-08	MNA MW-9D	SAMPLE	1.00	10/22/2010	9:19:00 AM	0.5757	
N	1010080-09	MNA MW-4S	SAMPLE	1.00	10/22/2010	9:26:36 AM	0.4053	
N	1010080-09	MNA MW-4S	SAMPLE	1.00	10/22/2010	9:31:20 AM	0.3767	
N	1010080-09	MNA MW-4S	SAMPLE	1.00	10/22/2010	9:36:12 AM	0.3585	
N	1010080-09	MNA MW-4S	SAMPLE	1.00	10/22/2010	9:40:34 AM	0.3355	
N	1010080-10	MNA MW-4D	SAMPLE	1.00	10/22/2010	9:48:11 AM	0.3437	
N	1010080-10	MNA MW-4D	SAMPLE	1.00	10/22/2010	9:52:57 AM	0.3471	
N	1010080-10	MNA MW-4D	SAMPLE	1.00	10/22/2010	9:57:41 AM	0.3720	
N	1010080-10	MNA MW-4D	SAMPLE	1.00	10/22/2010	10:02:28 AM	0.3422	

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Reviewed By: _____ Date: 10-25-10

Cup	Sample ID	Client ID	Sample Type	DF	Date	Time	Results	Comments
N	1010080-11	MNA MW-7S	SAMPLE	1.00	10/22/2010	10:10:12 AM	0.6596	
N	1010080-11	MNA MW-7S	SAMPLE	1.00	10/22/2010	10:17:27 AM	1.011	
N	1010080-11	MNA MW-7S	SAMPLE	1.00	10/22/2010	10:22:37 AM	0.8456	
N	1010080-11	MNA MW-7S	SAMPLE	1.00	10/22/2010	10:27:18 AM	0.6923	
N	1010080-12	MNA MW-7D	SAMPLE	1.00	10/22/2010	10:34:47 AM	0.4701	
N	1010080-12	MNA MW-7D	SAMPLE	1.00	10/22/2010	10:40:28 AM	0.5409	
N	1010080-12	MNA MW-7D	SAMPLE	1.00	10/22/2010	10:45:06 AM	0.4522	
N	1010080-12	MNA MW-7D	SAMPLE	1.00	10/22/2010	10:49:32 AM	0.4159	
N	1010091-01	MNA-MW-5S	SAMPLE	1.00	10/22/2010	11:00:02 AM	3.754	
N	1010091-01	MNA-MW-5S	SAMPLE	1.00	10/22/2010	11:04:38 AM	0.4547	
N	1010091-01	MNA-MW-5S	SAMPLE	1.00	10/22/2010	11:09:41 AM	0.5079	
N	1010091-01	MNA-MW-5S	SAMPLE	1.00	10/22/2010	11:14:01 AM	0.5314	
N	1010091-02	MNA-MW-11S	SAMPLE	1.00	10/22/2010	11:21:24 AM	0.2963	
N	1010091-02	MNA-MW-11S	SAMPLE	1.00	10/22/2010	11:26:06 AM	0.2778	
N	1010091-02	MNA-MW-11S	SAMPLE	1.00	10/22/2010	11:31:12 AM	0.3953	
N	1010091-02	MNA-MW-11S	SAMPLE	1.00	10/22/2010	11:35:20 AM	0.3095	
N	1010091-03	MNA-MW-3S	SAMPLE	1.00	10/22/2010	11:43:27 AM	0.3216	
N	1010091-03	MNA-MW-3S	SAMPLE	1.00	10/22/2010	11:48:11 AM	0.3142	
N	1010091-03	MNA-MW-3S	SAMPLE	1.00	10/22/2010	11:52:53 AM	0.4450	
N	1010091-03	MNA-MW-3S	SAMPLE	1.00	10/22/2010	11:57:26 AM	0.2991	
N	CCV	CCV	CCV	1.00	10/22/2010	12:07:13 PM	49.10	
N	CCB	CCB	CCB	1.00	10/22/2010	12:14:43 PM	0.1279	
N	0102140-BLK1	Blank	BLANK	1.00	10/22/2010	12:22:11 PM	0.09369	
N	0102140-BS1	LCS	LCS	1.00	10/22/2010	12:31:34 PM	74.07	
N	1010082-01	SA-PZ-160I	SAMPLE	1.00	10/22/2010	12:39:17 PM	0.5477	
N	0102140-MS1	SA-PZ-160IMS	MATRIX SPIKE	1.00	10/22/2010	12:48:07 PM	49.70	
N	0102140-MSD1	SA-PZ-160IMSD	MATRIX SPIKE	1.00	10/22/2010	12:53:44 PM	50.82	
N	1010082-02	SA-PZ-157I	SAMPLE	1.00	10/22/2010	1:01:14 PM	0.4357	
N	1010082-03	SA-PZ-157I1	SAMPLE	1.00	10/22/2010	1:08:56 PM	0.9391	
N	1010082-04	SA-PZ-155I	SAMPLE	1.00	10/22/2010	1:16:16 PM	0.3580	

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Reviewed By: _____ Date: 10/25/10

Cup	Sample ID	Client ID	Sample Type	DF	Date	Time	Results	Comments
N	1010082-05	SA-PZ-151I1	SAMPLE	1.00	10/22/2010	1:24:05 PM	1.095	
N	1010082-06	SA-PZ-159I1	SAMPLE	1.00	10/22/2010	1:32:15 PM	43.69	
N	CCV	CCV	CCV	1.00	10/22/2010	1:41:46 PM	49.83	
N	CCB	CCB	CCB	1.00	10/22/2010	1:49:04 PM	0.1272	
N	1010082-07	SA-PZ-159I	SAMPLE	1.00	10/22/2010	1:58:28 PM	117.5	
N	1010082-08	SA-DUP01	SAMPLE	1.00	10/22/2010	2:06:10 PM	1.331	
N	CCV	CCV	CCV	1.00	10/22/2010	2:15:39 PM	49.56	
N	CCB	CCB	CCB	1.00	10/22/2010	2:22:58 PM	0.1556	
N	ICV	ICV	ICV	1.00	10/22/2010	3:38:18 PM	75.72	
N	ICB	ICB	ICB	1.00	10/22/2010	3:47:23 PM	0.1204	
N	CCV	CCV	CCV	1.00	10/22/2010	3:57:36 PM	49.90	
N	CCB	CCB	CCB	1.00	10/22/2010	4:04:58 PM	0.1201	
N	1010046-01	B-21-1010	SAMPLE	1.00	10/22/2010	4:16:03 PM	37.38	
N	1010046-01	B-21-1010	SAMPLE	1.00	10/22/2010	4:21:29 PM	37.79	
N	1010046-01	B-21-1010	SAMPLE	1.00	10/22/2010	4:26:50 PM	37.91	
N	1010046-01	B-21-1010	SAMPLE	1.00	10/22/2010	4:32:19 PM	37.66	
N	1010046-03	B-23-1010	SAMPLE	1.00	10/22/2010	4:42:54 PM	78.50	
N	1010046-03	B-23-1010	SAMPLE	1.00	10/22/2010	4:48:35 PM	78.07	
N	1010046-03	B-23-1010	SAMPLE	1.00	10/22/2010	4:54:01 PM	77.61	
N	1010046-03	B-23-1010	SAMPLE	1.00	10/22/2010	4:59:41 PM	78.43	
N	1010046-04	B-22-1010	SAMPLE	1.00	10/22/2010	5:10:39 PM	34.76	
N	1010046-04	B-22-1010	SAMPLE	1.00	10/22/2010	5:16:03 PM	34.71	
N	1010046-04	B-22-1010	SAMPLE	1.00	10/22/2010	5:21:34 PM	35.29	
N	1010046-04	B-22-1010	SAMPLE	1.00	10/22/2010	5:27:29 PM	35.31	
N	1010046-07	B-10R-1010	SAMPLE	1.00	10/22/2010	5:38:54 PM	38.61	
N	1010046-07	B-10R-1010	SAMPLE	1.00	10/22/2010	5:44:24 PM	39.07	
N	1010046-07	B-10R-1010	SAMPLE	1.00	10/22/2010	5:50:29 PM	39.04	
N	1010046-07	B-10R-1010	SAMPLE	1.00	10/22/2010	5:56:06 PM	38.90	
N	1010046-01	B-21-1010	SAMPLE	1.00	10/22/2010	6:06:39 PM	37.67	
N	1010046-01	B-21-1010	SAMPLE	1.00	10/22/2010	6:12:32 PM	37.84	

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Reviewed By: _____ Date: 10/25/10

Cup	Sample ID	Client ID	Sample Type	DF	Date	Time	Results	Comments
N	1010046-01	B-21-1010	SAMPLE	1.00	10/22/2010	6:18:02 PM	37.76	
N	1010046-01	B-21-1010	SAMPLE	1.00	10/22/2010	6:23:27 PM	37.78	
N	1010046-03	B-23-1010	SAMPLE	1.00	10/22/2010	6:34:14 PM	65.47	
N	1010046-03	B-23-1010	SAMPLE	1.00	10/22/2010	6:39:37 PM	65.40	
N	1010046-03	B-23-1010	SAMPLE	1.00	10/22/2010	6:45:13 PM	65.43	
N	1010046-03	B-23-1010	SAMPLE	1.00	10/22/2010	6:50:46 PM	65.43	
N	1010046-04	B-22-1010	SAMPLE	1.00	10/22/2010	7:01:18 PM	35.00	
N	1010046-04	B-22-1010	SAMPLE	1.00	10/22/2010	7:07:26 PM	35.20	
N	1010046-04	B-22-1010	SAMPLE	1.00	10/22/2010	7:12:56 PM	35.00	
N	1010046-04	B-22-1010	SAMPLE	1.00	10/22/2010	7:18:22 PM	35.25	
N	1010046-07	B-10R-1010	SAMPLE	1.00	10/22/2010	7:29:58 PM	39.27	
N	1010046-07	B-10R-1010	SAMPLE	1.00	10/22/2010	7:35:43 PM	39.51	
N	1010046-07	B-10R-1010	SAMPLE	1.00	10/22/2010	7:41:09 PM	39.50	
N	1010046-07	B-10R-1010	SAMPLE	1.00	10/22/2010	7:46:56 PM	39.72	
N	1010082-07	SA-PZ-159I	SAMPLE	1.00	10/22/2010	7:55:29 PM	58.08	
N	CCV	CCV	CCV	1.00	10/22/2010	8:04:49 PM	49.95	
N	CCB	CCB	CCB	1.00	10/22/2010	8:12:07 PM	0.1628	

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Reviewed By: _____ Date: 10-25-10

Standards/QC Preparation for Total Organic Carbon (TOC) in Water

COMPUCHEM, a Division of Liberty Analytical Corporation WORKSHEET 1G(8) 1 Sequence Filename: TOC_2010_10_21

STANDARDS AND REAGENTS TRACEABILITY	*REF #:	MANUFACTURER	LOT#	EXPIRATION DATE
TOC Calibration Stock Standard (2000 ppm)	1u(6)1-18-18	NSI Solutions	020910	02/12
TOC 2nd Source Stock Standard (1000 ppm)	1U(6)1-16-8	Specpure	84-087714G	12/31/11
Concentrated Phosphoric Acid (H_2PO_4)	1U(6) 1-14-10	Sigma-Aldrich	11917KD	8/31/11
Concentrated Sulfuric Acid (H_2SO_4)	1M2-182-3	Caledon	160220	3/11/11

REAGENT/STANDARD LOT NUMBER**	PREPARATION INSTRUCTIONS
Calibration Standard – 10 21 10 jm (100 ppm)	Place in a 100 mL volumetric flask: A 100 ppm standard is prepared by adding 5-mL of the TOC Calibration Stock Standard (2000 ppm) to 100-mL of reagent water and adding approximately 100-µL of concentrated sulfuric as a preservative. Dilute to volume with reagent water. Prepare fresh each calibration day.
TOC-ICV/LCS – 10 21 10 jm (75 ppm)	Place in a 100 mL volumetric flask: Add 7.5-mL of the 1,000 ppm TOC 2nd Source Standard into a 100-mL volumetric flask. Dilute to volume with reagent water
TOC CCV – 10 21 10 jm (50ppm)	Place in a 40 mL vial: Perform a 2x dilution on the 100ppm cal standard to a final volume of 40 mls. Add approximately 100-µL of concentrated sulfuric as a preservative and dilute to volume with reagent water. Prepare fresh each calibration day.
TOC 1 PPM - 10 21 10 jm (1ppm)	Auto Dilute the 100 ppm Calibration Standard to 10 and set the dilution factor to .1 Prepare fresh each calibration day.
TOC MS / MSDs - 10 21 10 jm (yields 50ppm)	Add approximately 500-µL of TOC Calibration Stock standard into 20 mLs of the original qc sample

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Standard Solutions Prepared and Entered By: JM Date: 10/21/10

Reviewed By: [signature] Date: 102810

032210: jjm

PREPARATION BATCH SUMMARY

SM5310B

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Batch: 0102140 Matrix: Water Preparation: NO PREP

SAMPLE NAME	LAB SAMPLE ID	DATE PREPARED	INITIAL VOL/WT (mL)	FINAL VOL/WT (mL)
Blank	0102140-BLK1	10/21/10 21:11	1.00	1.00
LCS	0102140-BS1	10/21/10 21:11	1.00	1.00
SA-PZ-160IMS	0102140-MS1	10/21/10 21:11	1.00	1.00
SA-PZ-160IMSD	0102140-MSD1	10/21/10 21:11	1.00	1.00
SA-PZ-160I	1010082-01	10/21/10 21:11	1.00	1.00
SA-PZ-157I	1010082-02	10/21/10 21:11	1.00	1.00
SA-PZ-157I1	1010082-03	10/21/10 21:11	1.00	1.00
SA-PZ-155I	1010082-04	10/21/10 21:11	1.00	1.00
SA-PZ-151I1	1010082-05	10/21/10 21:11	1.00	1.00
SA-PZ-159I1	1010082-06	10/21/10 21:11	1.00	1.00
SA-PZ-159I	1010082-07	10/21/10 21:11	1.00	1.00
SA-DUP01	1010082-08	10/21/10 21:11	1.00	1.00

ANALYSIS DATA SHEET

SM5310B

Blank

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water Extraction: NO PREP File ID: TOC_2010_10_21_P-117 QC Type: Blank

Initial/Final: 1mL / 1mL Lab ID: 0102140-BLK1 Column ID:

Dilution: 1 pH: Prepared: 10/21/10 21:11

% Moisture: NA Analyzed: 10/22/10 12:22

Batch: 0102140 Sequence: Calibration: Instrument: TOC

CAS NO.	COMPOUND	CONC.(mg/L)	DL	LOD	LOQ	Q
TOC	Total Organic Carbon		0.13	0.36	1.00	U

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LCS / LCS DUPLICATE RECOVERY

SM5310B

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 0102140-BS1 Matrix: Water Client ID: LCS Batch: 0102140

ANALYTE	SPIKE ADDED (mg/L)	LCS CONCENTRATION (mg/L)	LCS % REC.	Q	QC LIMITS REC.
Total Organic Carbon	75.00	74.07	98.8		90 - 110

Environmental Testing Laboratories

CompuChem

A Division Of

Liberty Analytical Corp.

ANALYSIS DATA SHEET

SM5310B

LCS

Client: TETRA TECH | SDG: 1010082 | Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water | Extraction: NO PREP | File ID: TOC_2010_10_21_P-118 | QC Type: LCS

Initial/Final: 1mL / 1mL | Lab ID: 0102140-BS1 | Column ID:

Dilution: 1 | pH: | Prepared: 10/21/10 21:11

% Moisture: NA | Analyzed: 10/22/10 12:31

Batch: 0102140 | Sequence: | Calibration: | Instrument: TOC

CAS NO.	COMPOUND	CONC.(mg/L)	DL	LOD	LOQ	Q
TOC	Total Organic Carbon	74.07	0.13	0.36	1.00	

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MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY

SM5310B

SA-PZ-160IMS

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Lab ID: 0102140-MS1 % Solid: NA Matrix: Water Lab Source ID: 1010082-01 Source Sample: SA-PZ-160I

ANALYTE	SPIKE ADDED (mg/L)	SAMPLE CONCENTRATION (mg/L)	MS CONCENTRATION (mg/L)	MS % REC.	Q	QC LIMITS REC.
Total Organic Carbon	50.00	0.55 J	49.70	98.3		75 - 125

ANALYTE	SPIKE ADDED (mg/L)	MSD CONCENTRATION (mg/L)	MSD % REC. #	% RPD	Q	QC LIMITS RPD	QC LIMITS REC.
Total Organic Carbon	50.00	50.82	101	2.23		20	75 - 125

ANALYSIS DATA SHEET

SM5310B

SA-PZ-160IMS

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water Extraction: NO PREP File ID: TOC_2010_10_21_P-120 QC Type: Matrix Spike

Initial/Final: 1mL / 1mL Lab ID: 0102140-MS1 Column ID:

Dilution: 1 pH: Prepared: 10/21/10 21:11

% Moisture: NA Analyzed: 10/22/10 12:48

Batch: 0102140 Sequence: Calibration: Instrument: TOC

CAS NO.	COMPOUND	CONC.(mg/L)	DL	LOD	LOQ	Q
TOC	Total Organic Carbon	49.70	0.13	0.36	1.00	

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ANALYSIS DATA SHEET

SM5310B

SA-PZ-160IMSD

Client: TETRA TECH SDG: 1010082 Project: CTO-WE08/112G02045/N62467-04-D-0057

Matrix: Water Extraction: NO PREP File ID: TOC_2010_10_21_P-121 QC Type: Matrix Spike Dup

Initial/Final: 1mL / 1mL Lab ID: 0102140-MSD1 Column ID:

Dilution: 1 pH: Prepared: 10/21/10 21:11

% Moisture: NA Analyzed: 10/22/10 12:53

Batch: 0102140 Sequence: Calibration: Instrument: TOC

CAS NO.	COMPOUND	CONC.(mg/L)	DL	LOD	LOQ	Q
TOC	Total Organic Carbon	50.82	0.13	0.36	1.00	

Environmental Testing Laboratories

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Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**D. BRAYACK**	**DATE:**	**FEBRUARY 7, 2010**
FROM:	**JOSEPH KALINYAK**	**COPIES:**	**DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION – VOC / OVG**
NWIRP CALVERTON CTO WE08
SDG 1012127

SAMPLES: 21 / Aqueous / VOC

SA-PZ-133I-20101215	SA-PZ-135I-20101214	SA-PZ-136I-20101214
SA-PZ-138I-20101215	SA-PZ-138I1-20101215	SA-PZ-139I-20101215
SA-PZ-149I1-20101215	SA-PZ-151I1-20101215	SA-PZ-155I-20101215
SA-PZ-157I-20101214	SA-PZ-157I1-20101214	SA-PZ-158I-20101213
SA-PZ-158I1-20101213	SA-PZ-159I-20101214	SA-PZ-159I1-20101214
SA-PZ-160I-2010216	SA-PZ-160I1-20101213	SA-PZ-161I-2010214
SA-PZ-DUP01-20101214	SA-PZ-DUP02-20101215	SA-PZ-TB01-20101213

8 / Aqueous / OVG

SA-PZ-151I1-20101215	SA-PZ-155I-20101215	SA-PZ-157I-20101214
SA-PZ-157I1-20101214	SA-PZ-159I-20101214	SA-PZ-159I1-20101214
SA-PZ-160I-2010216	SA-PZ-DUP01-20101214	

Overview

The sample set for NWIRP Calverton, SDG 1012127 consisted of twenty-one (21) aqueous environmental samples including one (1) trip blank. All aqueous samples were analyzed for volatile organic compounds (VOC) and eight (8) samples were analyzed for organic volatile gases (OVG). Two (2) field duplicate pairs were included in this Sample Delivery Group (SDG): SA-PZ-DUP01-20101214 / SA-PZ-157I1-20101214 and SA-PZ-DUP02-20101215 / SA-PZ-133I-20101215.

The samples were collected by Tetra Tech on December 13, 14, and 15, 2010 and analyzed by CompuChem, a division of Liberty Analytical Corporation. All analyses were conducted in accordance with EPA Method SW-846 8260B and RSK-175 analytical and reporting protocols. The data contained in this SDG were validated with regard to the following parameters:

*	•	Data completeness
*	•	Hold times
*	•	GC/MS System Tuning and Performance
	•	Initial/continuing calibrations
*	•	Laboratory Control Sample Recoveries
	•	Blank Results
*	•	Matrix Spike/Matrix Spike Duplicate Recoveries
*	•	Surrogate Spike Recoveries
*	•	Internal Standard Recoveries
*	•	Field Duplicate Precision
*	•	Compound Identification
*	•	Compound Quantitation
*	•	Detection Limits

The symbol (*) indicates that all quality control criteria were met for this parameter. Qualified analytical results are presented in Appendix A, results as reported by the laboratory are presented in Appendix B, Region II data validation forms are presented in Appendix C, and documentation supporting these findings is presented in Appendix D.

VOC

The initial and continuing calibration relative response factors (RRF) were less than the 0.05 quality control limit for acetone for instrument 5972hp59 on 12/20/10, 12/21/10, and 12/22/10 affecting all the samples. The positive acetone sample results were qualified estimated, (J), and the non-detected sample acetone results were qualified rejected, (UR).

The following analytes were detected in the associated method blanks or the trip blank SA-PZ-TB01-20101213 (for the common laboratory contaminant methylene chloride) at the maximum concentrations as indicated below affecting all samples:

Compound	Maximum Conc. (µg/L)	Action Level (µg/L)
Methylene Chloride (1)	1.5	15.0
1,2,4-Trichlorobenzene (2)	1.0	5.0
Naphthalene (2)	2.9	14.5

(1) Trip blank SA-PZ-TB01-20101213 affecting all samples for the common laboratory contaminant methylene chloride except the trip blank.

(2) Method blank VBLKHL affecting samples SA-PZ-135I-20101214, SA-PZ-136I-20101214, SA-PZ-138I-20101215, SA-PZ-138I1-20101215, SA-PZ-139I-20101215, SA-PZ-149I1-20101215, SA-PZ-151I1-20101215, SA-PZ-157I-20101214, SA-PZ-157I1-20101214, SA-PZ-158I-20101213, SA-PZ-159I1-20101214, SA-PZ-160I-2010216, SA-PZ-160I1-20101213, SA-PZ-161I-2010214, SA-PZ-DUP01-20101214, and SA-PZ-DUP02-20101215.

An action level of 10X the maximum contaminant concentration for the common laboratory contaminant compound methylene chloride, and 5X for other contaminant compounds was established to evaluate laboratory contamination for the aforementioned compounds. Dilution factors and sample aliquots were taken into consideration during the application of all action levels. Positive results less than the action level were qualified as non-detected, (U), as a result of laboratory blank contamination and the results were reported to the Limit of Detection (LOD).

OVG

The continuing calibration verifications were greater than the 15% quality control limit ethane and ethene for instrument varian67 on 12/21/10 @ 14:03 affecting all samples. All samples non-detected ethane and ethene results were qualified estimated, (UJ).

Additional Comments

Positive results below the Limit of Detection and above the detection limit were qualified as estimated, (J), due to uncertainty near the detection limit.

Form I results for VOCs and OVGs had abbreviated sample names listed by the laboratory on the forms. Most of the other laboratory forms also abbreviated the sample names dropping both pre-fixes and suffixes from the sample name.

The following samples were analyzed for VOCs at a dilution due to a pre-screening analysis by the laboratory. The minimum detection limits (MDL) and reporting limits (RL) for the non-detected sample results were higher as a result of the dilution analyses.

Sample	Dilution
SA-PZ-138I1-20101215	10X
SA-PZ-151I1-20101215	1.67X
SA-PZ-159I1-20101214	1.67X
SA-PZ-160I1-20101213	1.25X

Sample SA-PZ-158I1-20101213 was analyzed both undiluted and at a 1.43X dilution due to the 1,1-dichloroethane result exceeding the highest calibration level in the undiluted sample analysis. Only the 1,1-dichloroethane result was reported from the dilution analysis for sample SA-PZ-159I1-20100708.

The following samples were analyzed for OVGs both undiluted and at a dilution due to methane exceeding the highest calibration level in the undiluted sample analysis.

Sample	Dilution
SA-PZ-151I1-20101215	1X, 10X
SA-PZ-157I1-20101214	1X, 5X
SA-PZ-159I1-20101214	1X, 5X
SA-PZ-DUP01-20101214	1X, 5X

EXECUTIVE SUMMARY

Laboratory Performance Issues: Method blank and trip blank contamination resulted in sample data qualifications. Acetone results were qualified due to initial and continuing calibration RRF quality control limit non-compliances. The ethane and ethene OVG non-detected sample results were qualified due to a continuing calibration verification quality control limit non-compliance.

Other Factors Affecting Data Quality: Positive results below the Limit of Detection (LOD) and above the detection limit were qualified as estimated, (J), due to uncertainty near the detection limit.

The data for these analyses were reviewed with reference to the SOP #HW-24 Revision #2, October 2006, USEPA Region II Hazardous Waste Support Branch Validating Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry SW-846 Method 8260B (October 2006) and the Department of Defense (DoD) document entitled "Quality Systems Manual (QSM) for Environmental Laboratories" (January 2006).

TetraTech NUS
Joseph Kalinyak
Chemist/Data Validator

TetraTech NUS
Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:
1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C – Region II Data Validation Forms
4. Appendix D - Support Documentation

Appendix A

Qualified Analytical Results

Value Qualifier Key (Val Qual)

J – The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

UJ – The result is an estimated non-detected quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

U - Value is a non-detect as reported by the laboratory.

UR – Non-detected result is considered rejected, (UR), as a result of technical non-compliances.

DATA QUALIFICATION CODE (QUAL CODE)

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$ / ICP PDS Recovery Noncompliance
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (e.g. base-line drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient $r < 0.995$
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is greater than sample activity

PROJ_NO: 02045	NSAMPLE	SA-PZ-133I-20101215			SA-PZ-135I-20101214			SA-PZ-136I-20101214			SA-PZ-138I1-20101215		
SDG: 1012127	LAB_ID	1012127-15			1012127-16			1012127-17			1012127-20		
FRACTION: OV	SAMP_DATE	12/15/2010			12/14/2010			12/14/2010			12/15/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
1,1,1-TRICHLOROETHANE		18			12			0.5	U		260		
1,1,2,2-TETRACHLOROETHANE		2	U		2	U		2	U		20	U	
1,1,2-TRICHLOROETHANE		2	U		2	U		2	U		20	U	
1,1,2-TRICHLOROTRIFLUOROETHANE		2	U		2	U		2	U		20	U	
1,1-DICHLOROETHANE		130			54			1.5	J	P	1100		
1,1-DICHLOROETHENE		6.9			3.3	J	P	2	U		63		
1,1-DICHLOROPROPENE		0.5	U		0.5	U		0.5	U		5	U	
1,2,4-TRICHLOROBENZENE		0.5	U		0.5	U		0.5	U		5	U	
1,2-DIBROMO-3-CHLOROPROPANE		2	U		2	U		2	U		20	U	
1,2-DIBROMOETHANE		0.5	U		0.5	U		0.5	U		5	U	
1,2-DICHLOROBENZENE		0.5	U		0.5	U		0.5	U		5	U	
1,2-DICHLOROETHANE		0.5	U		0.5	U		0.5	U		5	U	
1,2-DICHLOROPROPANE		2	U		2	U		2	U		20	U	
1,3-DICHLOROBENZENE		0.5	U		0.5	U		0.5	U		5	U	
1,4-DICHLOROBENZENE		0.5	U		0.5	U		0.5	U		5	U	
2-BUTANONE		5	U		5	U		5	U		50	U	
2-HEXANONE		1.3	U		1.3	U		1.3	U		13	U	
4-METHYL-2-PENTANONE		1.3	U		1.3	U		1.3	U		13	U	
ACETONE		5	UR	C	5	UR	C	5	UR	C	50	UR	C
BENZENE		0.35	J	P	0.5	U		0.5	U		5	U	
BROMODICHLOROMETHANE		0.5	U		0.5	U		0.5	U		5	U	
BROMOFORM		2	U		2	U		2	U		20	U	
BROMOMETHANE		2	U		2	U		2	U		20	U	
CARBON DISULFIDE		0.5	U		0.5	U		0.5	U		5	U	
CARBON TETRACHLORIDE		0.5	U		0.5	U		0.5	U		5	U	
CHLOROBENZENE		0.5	U		0.5	U		0.5	U		5	U	
CHLORODIBROMOMETHANE		0.5	U		0.5	U		0.5	U		5	U	
CHLOROETHANE		33			5.4			2	U		320		
CHLOROFORM		0.5	U		0.5	U		0.5	U		5	U	
CHLOROMETHANE		0.5	U		0.5	U		0.5	U		5	U	
CIS-1,2-DICHLOROETHENE		2	U		2	U		2	U		20	U	
CIS-1,3-DICHLOROPROPENE		2	U		2	U		2	U		20	U	
CYCLOHEXANE		0.5	U		0.5	U		0.5	U		5	U	
DICHLORODIFLUOROMETHANE		0.5	U		0.5	U		0.5	U		5	U	
ETHYLBENZENE		0.5	U		0.5	U		0.5	U		5	U	

PROJ_NO: 02045	NSAMPLE	SA-PZ-138I-20101215			SA-PZ-139I-20101215			SA-PZ-149I1-20101215			SA-PZ-151I1-20101215		
SDG: 1012127	LAB_ID	1012127-21			1012127-19			1012127-23			1012127-06		
FRACTION: OV	SAMP_DATE	12/15/2010			12/15/2010			12/15/2010			12/15/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
1,1,1-TRICHLOROETHANE		5.6			1.3	J	P	0.5	U		32		
1,1,2,2-TETRACHLOROETHANE		2	U		2	U		2	U		3.3	U	
1,1,2-TRICHLOROETHANE		2	U		2	U		2	U		3.3	U	
1,1,2-TRICHLOROTRIFLUOROETHANE		2	U		2	U		2	U		3.3	U	
1,1-DICHLOROETHANE		20			9.2			6.7			190		
1,1-DICHLOROETHENE		1.2	J	P	2	U		0.82	J	P	13		
1,1-DICHLOROPROPENE		0.5	U		0.5	U		0.5	U		0.84	U	
1,2,4-TRICHLOROBENZENE		0.5	U		0.5	U		0.69	U	A	4.1	U	A
1,2-DIBROMO-3-CHLOROPROPANE		2	U		2	U		2	U		3.3	U	
1,2-DIBROMOETHANE		0.5	U		0.5	U		0.5	U		0.84	U	
1,2-DICHLOROBENZENE		0.5	U		0.5	U		3	J	P	5.8	J	P
1,2-DICHLOROETHANE		0.5	U		0.5	U		0.5	U		0.84	U	
1,2-DICHLOROPROPANE		2	U		2	U		2	U		3.3	U	
1,3-DICHLOROBENZENE		0.5	U		0.5	U		2.7	J	P	4	J	P
1,4-DICHLOROBENZENE		0.5	U		0.5	U		13			22		
2-BUTANONE		5	U		5	U		5	U		8.4	U	
2-HEXANONE		1.3	U		1.3	U		1.3	U		2.1	U	
4-METHYL-2-PENTANONE		1.3	U		1.3	U		1.3	U		2.1	U	
ACETONE		5	UR	C	5	UR	C	5	UR	C	8.4	UR	C
BENZENE		0.5	U		0.5	U		0.5	U		1.6	J	P
BROMODICHLOROMETHANE		0.5	U		0.5	U		0.5	U		0.84	U	
BROMOFORM		2	U		2	U		2	U		3.3	U	
BROMOMETHANE		2	U		2	U		2	U		3.3	U	
CARBON DISULFIDE		0.5	U		0.5	U		0.5	U		0.84	U	
CARBON TETRACHLORIDE		0.5	U		0.5	U		0.5	U		0.84	U	
CHLOROBENZENE		0.5	U		0.5	U		0.5	U		0.84	U	
CHLORODIBROMOMETHANE		0.5	U		0.5	U		0.5	U		0.84	U	
CHLOROETHANE		2	U		2	U		10			140		
CHLOROFORM		0.5	U		0.5	U		0.5	U		0.84	U	
CHLOROMETHANE		0.5	U		0.5	U		0.5	U		0.84	U	
CIS-1,2-DICHLOROETHENE		2	U		2	U		2	U		3.3	U	
CIS-1,3-DICHLOROPROPENE		2	U		2	U		2	U		3.3	U	
CYCLOHEXANE		0.5	U		0.5	U		0.5	U		0.84	U	
DICHLORODIFLUOROMETHANE		0.5	U		0.5	U		0.5	U		0.84	U	
ETHYLBENZENE		0.5	U		0.5	U		0.5	U		0.84	U	

PROJ_NO: 02045	NSAMPLE	SA-PZ-155I-20101215			SA-PZ-157I1-20101214			SA-PZ-157I-20101214			SA-PZ-158I1-20101213		
SDG: 1012127	LAB_ID	1012127-07			1012127-03			1012127-02			1012127-12		
FRACTION: OV	SAMP_DATE	12/15/2010			12/14/2010			12/14/2010			12/13/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
1,1,1-TRICHLOROETHANE		16			20			17			49		
1,1,2,2-TETRACHLOROETHANE		2	U		2	U		2	U		2	U	
1,1,2-TRICHLOROETHANE		2	U		2	U		2	U		2	U	
1,1,2-TRICHLOROTRIFLUOROETHANE		2	U		2	U		2	U		2	U	
1,1-DICHLOROETHANE		70			100			75					
1,1-DICHLOROETHENE		3.4	J	P	7.6			4.1	J	P	15		
1,1-DICHLOROPROPENE		0.5	U		0.5	U		0.5	U		0.5	U	
1,2,4-TRICHLOROBENZENE		0.5	U		2.5	U	A	0.5	U		2	J	P
1,2-DIBROMO-3-CHLOROPROPANE		2	U		2	U		2	U		2	U	
1,2-DIBROMOETHANE		0.5	U		0.5	U		0.5	U		0.5	U	
1,2-DICHLOROBENZENE		0.5	U		2.1	J	P	0.5	U		2.1	J	P
1,2-DICHLOROETHANE		0.5	U		0.5	U		0.5	U		0.5	U	
1,2-DICHLOROPROPANE		2	U		2	U		2	U		2	U	
1,3-DICHLOROBENZENE		0.5	U		1.4	J	P	0.5	U		1.3	J	P
1,4-DICHLOROBENZENE		0.5	U		7.3			0.5	U		6.4		
2-BUTANONE		5	U		5	U		5	U		5	U	
2-HEXANONE		1.3	U		1.3	U		1.3	U		1.3	U	
4-METHYL-2-PENTANONE		1.3	U		1.3	U		1.3	U		1.3	U	
ACETONE		5	UR	C	8.1	J	CP	5	UR	C	5	UR	C
BENZENE		0.5	U		0.5	U		0.5	U		0.77	J	P
BROMODICHLOROMETHANE		0.5	U		0.5	U		0.5	U		0.5	U	
BROMOFORM		2	U		2	U		2	U		2	U	
BROMOMETHANE		2	U		2	U		2	U		2	U	
CARBON DISULFIDE		0.5	U		0.5	U		0.5	U		0.5	U	
CARBON TETRACHLORIDE		0.5	U		0.5	U		0.5	U		0.5	U	
CHLOROBENZENE		0.5	U		0.73	J	P	0.5	U		0.7	J	P
CHLORODIBROMOMETHANE		0.5	U		0.5	U		0.5	U		0.5	U	
CHLOROETHANE		2	U		49			7.6			62		
CHLOROFORM		0.5	U		0.5	U		0.5	U		0.5	U	
CHLOROMETHANE		0.5	U		0.5	U		0.5	U		0.5	U	
CIS-1,2-DICHLOROETHENE		2	U		2	U		2	U		2	U	
CIS-1,3-DICHLOROPROPENE		2	U		2	U		2	U		2	U	
CYCLOHEXANE		0.5	U		0.5	U		0.5	U		0.5	U	
DICHLORODIFLUOROMETHANE		0.5	U		0.5	U		0.5	U		0.5	U	
ETHYLBENZENE		0.5	U		0.5	U		0.5	U		0.5	U	

PROJ_NO: 02045	NSAMPLE	SA-PZ-158I1-20101213RE			SA-PZ-158I-20101213			SA-PZ-159I1-20101214			SA-PZ-159I-20101214		
SDG: 1012127	LAB_ID	1012127-12RE1			1012127-13			1012127-01			1012127-05		
FRACTION: OV	SAMP_DATE	12/13/2010			12/13/2010			12/14/2010			12/14/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
1,1,1-TRICHLOROETHANE					9.4			38			25		
1,1,2,2-TETRACHLOROETHANE					2	U		3.3	U		2	U	
1,1,2-TRICHLOROETHANE					2	U		3.3	U		2	U	
1,1,2-TRICHLOROTRIFLUOROETHANE					2	U		3.3	U		2	U	
1,1-DICHLOROETHANE		200			42			180			100		
1,1-DICHLOROETHENE					2.1	J	P	12			6.7		
1,1-DICHLOROPROPENE					0.5	U		0.84	U		0.5	U	
1,2,4-TRICHLOROBENZENE					0.5	U		0.84	U		0.5	U	
1,2-DIBROMO-3-CHLOROPROPANE					2	U		3.3	U		2	U	
1,2-DIBROMOETHANE					0.5	U		0.84	U		0.5	U	
1,2-DICHLOROBENZENE					0.5	U		1.9	J	P	0.5	U	
1,2-DICHLOROETHANE					0.5	U		0.84	U		0.5	U	
1,2-DICHLOROPROPANE					2	U		3.3	U		2	U	
1,3-DICHLOROBENZENE					0.5	U		0.84	U		0.5	U	
1,4-DICHLOROBENZENE					0.5	U		5.4	J	P	0.5	U	
2-BUTANONE					5	U		8.4	U		5	U	
2-HEXANONE					1.3	U		2.1	U		1.3	U	
4-METHYL-2-PENTANONE					1.3	U		2.1	U		1.3	U	
ACETONE					5	UR	C	8.4	UR	C	5	UR	C
BENZENE					0.5	U		0.84	U		0.5	U	
BROMODICHLOROMETHANE					0.5	U		0.84	U		0.5	U	
BROMOFORM					2	U		3.3	U		2	U	
BROMOMETHANE					2	U		3.3	U		2	U	
CARBON DISULFIDE					0.5	U		0.84	U		0.5	U	
CARBON TETRACHLORIDE					0.5	U		0.84	U		0.5	U	
CHLOROBENZENE					0.5	U		0.84	U		0.5	U	
CHLORODIBROMOMETHANE					0.5	U		0.84	U		0.5	U	
CHLOROETHANE					2	U		50			9.7		
CHLOROFORM					0.5	U		0.84	U		0.5	U	
CHLOROMETHANE					0.5	U		0.84	U		0.5	U	
CIS-1,2-DICHLOROETHENE					2	U		3.3	U		2	U	
CIS-1,3-DICHLOROPROPENE					2	U		3.3	U		2	U	
CYCLOHEXANE					0.5	U		0.84	U		0.5	U	
DICHLORODIFLUOROMETHANE					0.5	U		0.84	U		0.5	U	
ETHYLBENZENE					0.5	U		0.84	U		0.5	U	

PROJ_NO: 02045	NSAMPLE	SA-PZ-160I1-20101213			SA-PZ-160I-2010216			SA-PZ-161I-2010214			SA-PZ-DUP01-20101214		
SDG: 1012127	LAB_ID	1012127-14			1012127-10			1012127-18			1012127-04		
FRACTION: OV	SAMP_DATE	12/13/2010			12/16/2010			12/14/2010			12/14/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF										SA-PZ-157I1-20101214		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
1,1,1-TRICHLOROETHANE		39			41			16			21		
1,1,2,2-TETRACHLOROETHANE		2.5	U		2	U		2	U		2	U	
1,1,2-TRICHLOROETHANE		2.5	U		2	U		2	U		2	U	
1,1,2-TRICHLOROTRIFLUOROETHANE		2.5	U		2	U		2	U		2	U	
1,1-DICHLOROETHANE		180			160			97			100		
1,1-DICHLOROETHENE		13			11			5.9			7.9		
1,1-DICHLOROPROPENE		0.63	U		0.5	U		0.5	U		0.5	U	
1,2,4-TRICHLOROBENZENE		0.63	U		0.5	U		0.5	U		2.6	U	A
1,2-DIBROMO-3-CHLOROPROPANE		2.5	U		2	U		2	U		2	U	
1,2-DIBROMOETHANE		0.63	U		0.5	U		0.5	U		0.5	U	
1,2-DICHLOROBENZENE		0.63	U		0.5	U		0.5	U		2.2	J	P
1,2-DICHLOROETHANE		0.63	U		0.5	U		0.5	U		0.5	U	
1,2-DICHLOROPROPANE		2.5	U		2	U		2	U		2	U	
1,3-DICHLOROBENZENE		0.63	U		0.5	U		0.5	U		1.4	J	P
1,4-DICHLOROBENZENE		0.63	U		0.5	U		0.5	U		7.4		
2-BUTANONE		6.3	U		5	U		5	U		5	U	
2-HEXANONE		1.6	U		1.3	U		1.3	U		1.3	U	
4-METHYL-2-PENTANONE		1.6	U		1.3	U		1.3	U		1.3	U	
ACETONE		6.3	UR	C	22	J	C	5	UR	C	7.3	J	CP
BENZENE		0.63	U		0.5	U		0.5	U		0.5	U	
BROMODICHLOROMETHANE		0.63	U		0.5	U		0.5	U		0.5	U	
BROMOFORM		2.5	U		2	U		2	U		2	U	
BROMOMETHANE		2.5	U		2	U		2	U		2	U	
CARBON DISULFIDE		0.63	U		0.5	U		0.5	U		0.5	U	
CARBON TETRACHLORIDE		0.63	U		0.5	U		0.5	U		0.5	U	
CHLOROBENZENE		0.63	U		0.5	U		0.5	U		0.5	U	
CHLORODIBROMOMETHANE		0.63	U		0.5	U		0.5	U		0.5	U	
CHLOROETHANE		33			21			8			49		
CHLOROFORM		0.63	U		0.5	U		0.5	U		0.5	U	
CHLOROMETHANE		0.63	U		0.5	U		0.5	U		0.5	U	
CIS-1,2-DICHLOROETHENE		2.5	U		2	U		2	U		2	U	
CIS-1,3-DICHLOROPROPENE		2.5	U		2	U		2	U		2	U	
CYCLOHEXANE		0.63	U		0.5	U		0.5	U		0.5	U	
DICHLORODIFLUOROMETHANE		0.63	U		0.5	U		0.5	U		0.5	U	
ETHYLBENZENE		0.63	U		0.5	U		0.5	U		0.5	U	

PROJ_NO: 02045	NSAMPLE	SA-PZ-DUP02-20101215			SA-PZ-TB01-20101213		
SDG: 1012127	LAB_ID	1012127-22			1012127-11		
FRACTION: OV	SAMP_DATE	12/15/2010			12/13/2010		
MEDIA: WATER	QC_TYPE	NM			NM		
	UNITS	UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0		
	DUP_OF	SA-PZ-133I-20101215					
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
1,1,1-TRICHLOROETHANE		17			0.5	U	
1,1,2,2-TETRACHLOROETHANE		2	U		2	U	
1,1,2-TRICHLOROETHANE		2	U		2	U	
1,1,2-TRICHLOROTRIFLUOROETHANE		2	U		2	U	
1,1-DICHLOROETHANE		130			0.5	U	
1,1-DICHLOROETHENE		6.7			2	U	
1,1-DICHLOROPROPENE		0.5	U		0.5	U	
1,2,4-TRICHLOROBENZENE		0.5	U		0.5	U	
1,2-DIBROMO-3-CHLOROPROPANE		2	U		2	U	
1,2-DIBROMOETHANE		0.5	U		0.5	U	
1,2-DICHLOROBENZENE		0.5	U		0.5	U	
1,2-DICHLOROETHANE		0.5	U		0.5	U	
1,2-DICHLOROPROPANE		2	U		2	U	
1,3-DICHLOROBENZENE		0.5	U		0.5	U	
1,4-DICHLOROBENZENE		0.5	U		0.5	U	
2-BUTANONE		5	U		5	U	
2-HEXANONE		1.3	U		1.3	U	
4-METHYL-2-PENTANONE		1.3	U		1.3	U	
ACETONE		5	UR	C	5	UR	C
BENZENE		0.5	U		0.5	U	
BROMODICHLOROMETHANE		0.5	U		0.5	U	
BROMOFORM		2	U		2	U	
BROMOMETHANE		2	U		2	U	
CARBON DISULFIDE		0.5	U		0.5	U	
CARBON TETRACHLORIDE		0.5	U		0.5	U	
CHLOROBENZENE		0.5	U		0.5	U	
CHLORODIBROMOMETHANE		0.5	U		0.5	U	
CHLOROETHANE		34			2	U	
CHLOROFORM		0.5	U		0.5	U	
CHLOROMETHANE		0.5	U		0.5	U	
CIS-1,2-DICHLOROETHENE		2	U		2	U	
CIS-1,3-DICHLOROPROPENE		2	U		2	U	
CYCLOHEXANE		0.5	U		0.5	U	
DICHLORODIFLUOROMETHANE		0.5	U		0.5	U	
ETHYLBENZENE		0.5	U		0.5	U	

PROJ_NO: 02045	NSAMPLE	SA-PZ-133I-20101215			SA-PZ-135I-20101214			SA-PZ-136I-20101214			SA-PZ-138I1-20101215		
SDG: 1012127	LAB_ID	1012127-15			1012127-16			1012127-17			1012127-20		
FRACTION: OV	SAMP_DATE	12/15/2010			12/14/2010			12/14/2010			12/15/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ISOPROPYLBENZENE		0.5	U		0.5	U		0.5	U		8.3	J	P
M+P-XYLENES		1	U		1	U		1	U		10	U	
METHYL ACETATE		2	U		2	U		2	U		20	U	
METHYL CYCLOHEXANE		0.5	U		0.5	U		0.5	U		5	U	
METHYL TERT-BUTYL ETHER		0.5	U		0.5	U		0.5	U		5	U	
METHYLENE CHLORIDE		0.5	U		1.1	U	B	0.5	U		20	U	B
NAPHTHALENE		2	U		2	U		2	U		20	U	
O-XYLENE		0.5	U		0.5	U		0.5	U		5	U	
STYRENE		0.5	U		0.5	U		0.5	U		5	U	
TETRACHLOROETHENE		0.5	U		0.5	U		0.5	U		5	U	
TOLUENE		0.5	U		0.5	U		0.5	U		5	U	
TOTAL 1,2-DICHLOROETHENE		0.5	U		0.5	U		0.5	U		5	U	
TOTAL XYLENES		0.5	U		0.5	U		0.5	U		5	U	
TRANS-1,2-DICHLOROETHENE		0.5	U		0.5	U		0.5	U		5	U	
TRANS-1,3-DICHLOROPROPENE		0.5	U		0.5	U		0.5	U		5	U	
TRICHLOROETHENE		0.5	U		0.5	U		0.5	U		5	U	
TRICHLOROFLUOROMETHANE		0.5	U		0.5	U		0.5	U		5	U	
VINYL CHLORIDE		0.5	U		0.5	U		0.5	U		5	U	

PROJ_NO: 02045	NSAMPLE	SA-PZ-138I-20101215			SA-PZ-139I-20101215			SA-PZ-149I1-20101215			SA-PZ-151I1-20101215		
SDG: 1012127	LAB_ID	1012127-21			1012127-19			1012127-23			1012127-06		
FRACTION: OV	SAMP_DATE	12/15/2010			12/15/2010			12/15/2010			12/15/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ISOPROPYLBENZENE		0.5	U		0.5	U		0.39	J	P	1.1	J	P
M+P-XYLENES		1	U		1	U		1	U		1.7	U	
METHYL ACETATE		2	U		2	U		2	U		3.3	U	
METHYL CYCLOHEXANE		0.5	U		0.5	U		0.5	U		0.84	U	
METHYL TERT-BUTYL ETHER		0.5	U		0.5	U		0.5	U		0.84	U	
METHYLENE CHLORIDE		0.5	U		0.5	U		0.5	U		3.9	U	B
NAPHTHALENE		2	U		2	U		2	U		3.3	U	
O-XYLENE		0.5	U		0.5	U		0.5	U		0.84	U	
STYRENE		0.5	U		0.5	U		0.5	U		0.84	U	
TETRACHLOROETHENE		0.5	U		0.5	U		0.5	U		0.84	U	
TOLUENE		0.5	U		0.5	U		0.5	U		0.84	U	
TOTAL 1,2-DICHLOROETHENE		0.5	U		0.5	U		0.5	U		0.84	U	
TOTAL XYLENES		0.5	U		0.5	U		0.5	U		0.84	U	
TRANS-1,2-DICHLOROETHENE		0.5	U		0.5	U		0.5	U		0.84	U	
TRANS-1,3-DICHLOROPROPENE		0.5	U		0.5	U		0.5	U		0.84	U	
TRICHLOROETHENE		0.5	U		0.5	U		0.5	U		0.84	U	
TRICHLOROFLUOROMETHANE		0.5	U		0.5	U		0.5	U		0.84	U	
VINYL CHLORIDE		0.5	U		0.5	U		0.5	U		0.84	U	

PROJ_NO: 02045	NSAMPLE	SA-PZ-155I-20101215			SA-PZ-157I1-20101214			SA-PZ-157I-20101214			SA-PZ-158I1-20101213		
SDG: 1012127	LAB_ID	1012127-07			1012127-03			1012127-02			1012127-12		
FRACTION: OV	SAMP_DATE	12/15/2010			12/14/2010			12/14/2010			12/13/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ISOPROPYLBENZENE		0.5	U		0.5	U		0.5	U		0.5	U	
M+P-XYLENES		1	U		1	U		1	U		1	U	
METHYL ACETATE		2	U		2	U		2	U		2	U	
METHYL CYCLOHEXANE		0.5	U		0.5	U		0.5	U		0.5	U	
METHYL TERT-BUTYL ETHER		0.5	U		0.5	U		0.5	U		0.5	U	
METHYLENE CHLORIDE		1.3	U	B	1.8	U	B	1.1	U	B	0.98	U	B
NAPHTHALENE		2	U		2	U		2	U		2	U	
O-XYLENE		0.5	U		0.5	U		0.5	U		0.5	U	
STYRENE		0.5	U		0.5	U		0.5	U		0.5	U	
TETRACHLOROETHENE		0.5	U		0.5	U		0.5	U		0.5	U	
TOLUENE		0.5	U		0.5	U		0.5	U		0.5	U	
TOTAL 1,2-DICHLOROETHENE		0.5	U		0.5	U		0.5	U		0.5	U	
TOTAL XYLENES		0.5	U		0.5	U		0.5	U		0.5	U	
TRANS-1,2-DICHLOROETHENE		0.5	U		0.5	U		0.5	U		0.5	U	
TRANS-1,3-DICHLOROPROPENE		0.5	U		0.5	U		0.5	U		0.5	U	
TRICHLOROETHENE		0.5	U		0.5	U		0.5	U		0.5	U	
TRICHLOROFLUOROMETHANE		0.5	U		0.5	U		0.5	U		0.5	U	
VINYL CHLORIDE		0.5	U		0.5	U		0.5	U		0.5	U	

PROJ_NO: 02045	NSAMPLE	SA-PZ-158I1-20101213RE			SA-PZ-158I-20101213			SA-PZ-159I1-20101214			SA-PZ-159I-20101214		
SDG: 1012127	LAB_ID	1012127-12RE1			1012127-13			1012127-01			1012127-05		
FRACTION: OV	SAMP_DATE	12/13/2010			12/13/2010			12/14/2010			12/14/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ISOPROPYLBENZENE					0.5	U		0.84	U		0.5	U	
M+P-XYLENES					1	U		1.7	U		1	U	
METHYL ACETATE					2	U		3.3	U		2	U	
METHYL CYCLOHEXANE					0.5	U		0.84	U		0.5	U	
METHYL TERT-BUTYL ETHER					0.5	U		0.84	U		0.5	U	
METHYLENE CHLORIDE					2.2	U	B	4.2	U	B	1.1	U	B
NAPHTHALENE					2	U		3.3	U		2	U	
O-XYLENE					0.5	U		0.84	U		0.5	U	
STYRENE					0.5	U		0.84	U		0.5	U	
TETRACHLOROETHENE					0.5	U		0.84	U		0.5	U	
TOLUENE					0.5	U		0.84	U		0.5	U	
TOTAL 1,2-DICHLOROETHENE					0.5	U		0.84	U		0.5	U	
TOTAL XYLENES					0.5	U		0.84	U		0.5	U	
TRANS-1,2-DICHLOROETHENE					0.5	U		0.84	U		0.5	U	
TRANS-1,3-DICHLOROPROPENE					0.5	U		0.84	U		0.5	U	
TRICHLOROETHENE					0.5	U		0.84	U		0.5	U	
TRICHLOROFLUOROMETHANE					0.5	U		0.84	U		0.5	U	
VINYL CHLORIDE					0.5	U		0.84	U		0.5	U	

PROJ_NO: 02045	NSAMPLE	SA-PZ-160I1-20101213			SA-PZ-160I-2010216			SA-PZ-161I-2010214			SA-PZ-DUP01-20101214		
SDG: 1012127	LAB_ID	1012127-14			1012127-10			1012127-18			1012127-04		
FRACTION: OV	SAMP_DATE	12/13/2010			12/16/2010			12/14/2010			12/14/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF										SA-PZ-157I1-20101214		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ISOPROPYLBENZENE		0.63	U		0.5	U		0.5	U		0.5	U	
M+P-XYLENES		1.3	U		1	U		1	U		1	U	
METHYL ACETATE		2.5	U		2	U		2	U		2	U	
METHYL CYCLOHEXANE		0.63	U		0.5	U		0.5	U		0.5	U	
METHYL TERT-BUTYL ETHER		0.63	U		0.5	U		0.5	U		0.5	U	
METHYLENE CHLORIDE		3.2	U	B	1.2	U	B	1.1	U	B	2	U	B
NAPHTHALENE		2.5	U		2	U		2	U		2	U	
O-XYLENE		0.63	U		0.5	U		0.5	U		0.5	U	
STYRENE		0.63	U		0.5	U		0.5	U		0.5	U	
TETRACHLOROETHENE		0.63	U		0.5	U		0.5	U		0.5	U	
TOLUENE		0.63	U		0.5	U		0.5	U		0.5	U	
TOTAL 1,2-DICHLOROETHENE		0.63	U		0.5	U		0.5	U		0.5	U	
TOTAL XYLENES		0.63	U		0.5	U		0.5	U		0.5	U	
TRANS-1,2-DICHLOROETHENE		0.63	U		0.5	U		0.5	U		0.5	U	
TRANS-1,3-DICHLOROPROPENE		0.63	U		0.5	U		0.5	U		0.5	U	
TRICHLOROETHENE		0.63	U		0.5	U		0.5	U		0.5	U	
TRICHLOROFLUOROMETHANE		0.63	U		0.5	U		0.5	U		0.5	U	
VINYL CHLORIDE		0.63	U		0.5	U		0.5	U		0.5	U	

PROJ_NO: 02045	NSAMPLE	SA-PZ-DUP02-20101215			SA-PZ-TB01-20101213		
SDG: 1012127	LAB_ID	1012127-22			1012127-11		
FRACTION: OV	SAMP_DATE	12/15/2010			12/13/2010		
MEDIA: WATER	QC_TYPE	NM			NM		
	UNITS	UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0		
	DUP_OF	SA-PZ-133I-20101215					
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
ISOPROPYLBENZENE		0.5	U		0.5	U	
M+P-XYLENES		1	U		1	U	
METHYL ACETATE		2	U		2	U	
METHYL CYCLOHEXANE		0.5	U		0.5	U	
METHYL TERT-BUTYL ETHER		0.5	U		0.5	U	
METHYLENE CHLORIDE		1	U	B	1.5	J	P
NAPHTHALENE		2	U		2	U	
O-XYLENE		0.5	U		0.5	U	
STYRENE		0.5	U		0.5	U	
TETRACHLOROETHENE		0.5	U		0.5	U	
TOLUENE		0.5	U		0.5	U	
TOTAL 1,2-DICHLOROETHENE		0.5	U		0.5	U	
TOTAL XYLENES		0.5	U		0.5	U	
TRANS-1,2-DICHLOROETHENE		0.5	U		0.5	U	
TRANS-1,3-DICHLOROPROPENE		0.5	U		0.5	U	
TRICHLOROETHENE		0.5	U		0.5	U	
TRICHLOROFLUOROMETHANE		0.5	U		0.5	U	
VINYL CHLORIDE		0.5	U		0.5	U	

PROJ_NO: 02045	NSAMPLE	SA-PZ-151I1-20101215			SA-PZ-151I1-20101215DL			SA-PZ-155I-20101215			SA-PZ-157I1-20101214		
SDG: 1012127	LAB_ID	1012127-06			1012127-06RE1			1012127-07			1012127-03		
FRACTION: OVG	SAMP_DATE	12/15/2010			12/15/2010			12/15/2010			12/14/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ETHANE		0.27	UJ	C				0.27	UJ	C	0.27	UJ	C
ETHENE		0.25	UJ	C				0.25	UJ	C	0.25	UJ	C
METHANE					210			2.5					

PROJ_NO: 02045	NSAMPLE	SA-PZ-157I1-20101214DL			SA-PZ-157I-20101214			SA-PZ-159I1-20101214			SA-PZ-159I1-20101214DL		
SDG: 1012127	LAB_ID	1012127-03RE1			1012127-02			1012127-01			1012127-01RE1		
FRACTION: OVG	SAMP_DATE	12/14/2010			12/14/2010			12/14/2010			12/14/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ETHANE					0.27	UJ	C	0.27	UJ	C			
ETHENE					0.25	UJ	C	0.25	UJ	C			
METHANE		78			12						53		

PROJ_NO: 02045	NSAMPLE	SA-PZ-159I-20101214			SA-PZ-160I-2010216			SA-PZ-DUP01-20101214			SA-PZ-DUP01-20101214DL		
SDG: 1012127	LAB_ID	1012127-05			1012127-10			1012127-04			1012127-04RE1		
FRACTION: OVG	SAMP_DATE	12/14/2010			12/16/2010			12/14/2010			12/14/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF							SA-PZ-157I1-20101214			SA-PZ-157I1-20101214		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ETHANE		0.27	UJ	C	0.27	UJ	C	0.27	UJ	C			
ETHENE		0.25	UJ	C	0.25	UJ	C	0.25	UJ	C			
METHANE		2.4			15						90		

Appendix B

Results as Reported by the Laboratory

ANALYSIS DATA SHEET

SW 8260B

SA-PZ-133I

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-1559.d | Sampled: 12/15/10 09:10

Initial/Final: 5mL / 5mL | Lab ID: 1012127-15 | Received: 12/16/10 12:38

Dilution: 1 | pH: 1 | Prepared: 12/21/10 11:30

% Moisture: NA | Analyzed: 12/21/10 18:46

Batch: 0122107 | Sequence: 0L21006 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane	33	0.55	2.0	5.0	
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene	6.9	0.53	2.0	5.0	
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride		0.49	0.50	5.0	U
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane	130	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane	18	0.32	0.50	5.0	
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene	0.35	0.28	0.50	5.0	J
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene		0.31	0.50	5.0	U
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

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ANALYSIS DATA SHEET

SW 8260B

SA-PZ-133I

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-1559.d | Sampled: 12/15/10 09:10

Initial/Final: 5mL / 5mL | Lab ID: 1012127-15 | Received: 12/16/10 12:38

Dilution: 1 | pH: 1 | Prepared: 12/21/10 11:30

% Moisture: NA | Analyzed: 12/21/10 18:46

Batch: 0122107 | Sequence: 0L21006 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene		0.36	0.50	5.0	U
106-46-7	1,4-Dichlorobenzene		0.30	0.50	5.0	U
95-50-1	1,2-Dichlorobenzene		0.35	0.50	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene		0.48	0.50	5.0	U
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	48.55	97	85 - 115	
1,2-Dichloroethane-d4	50.00	47.77	96	70 - 120	
Toluene-d8	50.00	50.05	100	85 - 120	
Bromofluorobenzene	50.00	48.89	98	75 - 120	

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ANALYSIS DATA SHEET

SW 8260B

SA-PZ-135I

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-1659.d | Sampled: 12/14/10 08:57

Initial/Final: 5mL / 5mL | Lab ID: 1012127-16 | Received: 12/16/10 12:38

Dilution: 1 | pH: 1 | Prepared: 12/22/10 12:02

% Moisture: NA | Analyzed: 12/22/10 17:49

Batch: 0122204 | Sequence: 0L22003 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane	5.4	0.55	2.0	5.0	
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene	3.3	0.53	2.0	5.0	J
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride	1.1	0.49	0.50	5.0	J
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane	54	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane	12	0.32	0.50	5.0	
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene		0.31	0.50	5.0	U
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

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ANALYSIS DATA SHEET

SW 8260B

SA-PZ-135I

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-1659.d | Sampled: 12/14/10 08:57

Initial/Final: 5mL / 5mL | Lab ID: 1012127-16 | Received: 12/16/10 12:38

Dilution: 1 | pH: 1 | Prepared: 12/22/10 12:02

% Moisture: NA | Analyzed: 12/22/10 17:49

Batch: 0122204 | Sequence: 0L22003 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene		0.36	0.50	5.0	U
106-46-7	1,4-Dichlorobenzene		0.30	0.50	5.0	U
95-50-1	1,2-Dichlorobenzene		0.35	0.50	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene		0.48	0.50	5.0	U
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	49.63	99	85 - 115	
1,2-Dichloroethane-d4	50.00	47.65	95	70 - 120	
Toluene-d8	50.00	50.49	101	85 - 120	
Bromofluorobenzene	50.00	47.19	94	75 - 120	

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SW 8260B

SA-PZ-136I

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-1759.d | Sampled: 12/14/10 09:08

Initial/Final: 5mL / 5mL | Lab ID: 1012127-17 | Received: 12/16/10 12:38

Dilution: 1 | pH: 1 | Prepared: 12/22/10 12:02

% Moisture: NA | Analyzed: 12/22/10 18:17

Batch: 0122204 | Sequence: 0L22003 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane		0.55	2.0	5.0	U
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene		0.53	2.0	5.0	U
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride		0.49	0.50	5.0	U
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane	1.5	0.27	0.50	5.0	J
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane		0.32	0.50	5.0	U
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene		0.31	0.50	5.0	U
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

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ANALYSIS DATA SHEET

SW 8260B

SA-PZ-136I

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-1759.d | Sampled: 12/14/10 09:08

Initial/Final: 5mL / 5mL | Lab ID: 1012127-17 | Received: 12/16/10 12:38

Dilution: 1 | pH: 1 | Prepared: 12/22/10 12:02

% Moisture: NA | Analyzed: 12/22/10 18:17

Batch: 0122204 | Sequence: 0L22003 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene		0.36	0.50	5.0	U
106-46-7	1,4-Dichlorobenzene		0.30	0.50	5.0	U
95-50-1	1,2-Dichlorobenzene		0.35	0.50	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene		0.48	0.50	5.0	U
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	53.13	106	85 - 115	
1,2-Dichloroethane-d4	50.00	51.73	103	70 - 120	
Toluene-d8	50.00	52.42	105	85 - 120	
Bromofluorobenzene	50.00	50.63	101	75 - 120	

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ANALYSIS DATA SHEET

SW 8260B

SA-PZ-138I

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-2159.d | Sampled: 12/15/10 11:54

Initial/Final: 5mL / 5mL | Lab ID: 1012127-21 | Received: 12/16/10 12:38

Dilution: 1 | pH: 1 | Prepared: 12/22/10 12:02

% Moisture: NA | Analyzed: 12/22/10 20:06

Batch: 0122204 | Sequence: 0L22003 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane		0.55	2.0	5.0	U
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene	1.2	0.53	2.0	5.0	J
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride		0.49	0.50	5.0	U
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane	20	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane	5.6	0.32	0.50	5.0	
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene		0.31	0.50	5.0	U
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

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ANALYSIS DATA SHEET

SW 8260B

SA-PZ-138I

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-2159.d | Sampled: 12/15/10 11:54

Initial/Final: 5mL / 5mL | Lab ID: 1012127-21 | Received: 12/16/10 12:38

Dilution: 1 | pH: 1 | Prepared: 12/22/10 12:02

% Moisture: NA | Analyzed: 12/22/10 20:06

Batch: 0122204 | Sequence: 0L22003 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene		0.36	0.50	5.0	U
106-46-7	1,4-Dichlorobenzene		0.30	0.50	5.0	U
95-50-1	1,2-Dichlorobenzene		0.35	0.50	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene		0.48	0.50	5.0	U
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	53.26	107	85 - 115	
1,2-Dichloroethane-d4	50.00	53.17	106	70 - 120	
Toluene-d8	50.00	55.87	112	85 - 120	
Bromofluorobenzene	50.00	53.74	107	75 - 120	

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SW 8260B

SA-PZ-138I1

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-2059.d | Sampled: 12/15/10 10:47

Initial/Final: 5mL / 5mL | Lab ID: 1012127-20 | Received: 12/16/10 12:38

Dilution: 10 | pH: 1 | Prepared: 12/22/10 12:02

% Moisture: NA | Analyzed: 12/22/10 19:38

Batch: 0122204 | Sequence: 0L22003 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		3.2	5.0	50	U
74-87-3	Chloromethane		3.9	5.0	50	U
75-01-4	Vinyl chloride		4.8	5.0	50	U
74-83-9	Bromomethane		7.6	20	50	U
75-00-3	Chloroethane	320	5.5	20	50	D
75-69-4	Trichlorofluoromethane		4.9	5.0	50	U
75-35-4	1,1-Dichloroethene	63	5.3	20	50	D
67-64-1	Acetone		16	50	130	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		8.2	20	50	U
75-15-0	Carbon disulfide		1.6	5.0	50	U
79-20-9	Methyl acetate		8.6	20	50	U
75-09-2	Methylene chloride	20	4.9	5.0	50	JD
156-60-5	trans-1,2-Dichloroethene		4.4	5.0	50	U
1634-04-4	Methyl tert-butyl ether		2.2	5.0	50	U
75-34-3	1,1-Dichloroethane	1100	2.7	5.0	50	D
156-59-2	cis-1,2-Dichloroethene		6.5	20	50	U
78-93-3	2-Butanone		15	50	130	U
67-66-3	Chloroform		2.7	5.0	50	U
71-55-6	1,1,1-Trichloroethane	260	3.2	5.0	50	D
110-82-7	Cyclohexane		4.5	5.0	50	U
563-58-6	1,1-Dichloropropene		4.2	5.0	50	U
56-23-5	Carbon tetrachloride		3.1	5.0	50	U
107-06-2	1,2-Dichloroethane		2.3	5.0	50	U
71-43-2	Benzene		2.8	5.0	50	U
79-01-6	Trichloroethene		2.8	5.0	50	U
108-87-2	Methylcyclohexane		3.5	5.0	50	U
78-87-5	1,2-Dichloropropane		8.6	20	50	U
75-27-4	Bromodichloromethane		3.6	5.0	50	U
10061-01-5	cis-1,3-Dichloropropene		5.2	20	50	U
108-10-1	4-Methyl-2-pentanone		11	13	130	U
108-88-3	Toluene		3.1	5.0	50	U
10061-02-6	trans-1,3-Dichloropropene		4.5	5.0	50	U
79-00-5	1,1,2-Trichloroethane		5.1	20	50	U
127-18-4	Tetrachloroethene		4.2	5.0	50	U
591-78-6	2-Hexanone		12	13	130	U
124-48-1	Dibromochloromethane		3.2	5.0	50	U
106-93-4	1,2-Dibromoethane		4.4	5.0	50	U
108-90-7	Chlorobenzene		2.7	5.0	50	U
100-41-4	Ethylbenzene		4.2	5.0	50	U

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SW 8260B

SA-PZ-138I1

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-2059.d | Sampled: 12/15/10 10:47

Initial/Final: 5mL / 5mL | Lab ID: 1012127-20 | Received: 12/16/10 12:38

Dilution: 10 | pH: 1 | Prepared: 12/22/10 12:02

% Moisture: NA | Analyzed: 12/22/10 19:38

Batch: 0122204 | Sequence: 0L22003 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		8.4	10	100	U
95-47-6	o-Xylene		2.5	5.0	50	U
100-42-5	Styrene		3.6	5.0	50	U
75-25-2	Bromoform		9.5	20	50	U
98-82-8	Isopropylbenzene	8.3	2.7	5.0	50	JD
79-34-5	1,1,2,2-Tetrachloroethane		6.4	20	50	U
541-73-1	1,3-Dichlorobenzene		3.6	5.0	50	U
106-46-7	1,4-Dichlorobenzene		3.0	5.0	50	U
95-50-1	1,2-Dichlorobenzene		3.5	5.0	50	U
96-12-8	1,2-Dibromo-3-chloropropane		9.1	20	50	U
120-82-1	1,2,4-Trichlorobenzene		4.8	5.0	50	U
91-20-3	Naphthalene		11	20	50	U
540-59-0	1,2-Dichloroethene (total)		4.4	5.0	50	U
1330-20-7	Xylenes (total)		2.5	5.0	50	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	51.45	103	85 - 115	
1,2-Dichloroethane-d4	50.00	49.16	98	70 - 120	
Toluene-d8	50.00	53.42	107	85 - 120	
Bromofluorobenzene	50.00	51.93	104	75 - 120	

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SW 8260B

SA-PZ-139I

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-1959.d | Sampled: 12/15/10 10:35

Initial/Final: 5mL / 5mL | Lab ID: 1012127-19 | Received: 12/16/10 12:38

Dilution: 1 | pH: 1 | Prepared: 12/22/10 12:02

% Moisture: NA | Analyzed: 12/22/10 19:11

Batch: 0122204 | Sequence: 0L22003 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane		0.55	2.0	5.0	U
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene		0.53	2.0	5.0	U
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride		0.49	0.50	5.0	U
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane	9.2	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane	1.3	0.32	0.50	5.0	J
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene		0.31	0.50	5.0	U
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

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ANALYSIS DATA SHEET

SW 8260B

SA-PZ-139I

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-1959.d | Sampled: 12/15/10 10:35

Initial/Final: 5mL / 5mL | Lab ID: 1012127-19 | Received: 12/16/10 12:38

Dilution: 1 | pH: 1 | Prepared: 12/22/10 12:02

% Moisture: NA | Analyzed: 12/22/10 19:11

Batch: 0122204 | Sequence: 0L22003 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene		0.36	0.50	5.0	U
106-46-7	1,4-Dichlorobenzene		0.30	0.50	5.0	U
95-50-1	1,2-Dichlorobenzene		0.35	0.50	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene		0.48	0.50	5.0	U
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	54.31	109	85 - 115	
1,2-Dichloroethane-d4	50.00	53.62	107	70 - 120	
Toluene-d8	50.00	53.45	107	85 - 120	
Bromofluorobenzene	50.00	50.33	101	75 - 120	

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SW 8260B

SA-PZ-149I1

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-2359.d | Sampled: 12/15/10 13:00

Initial/Final: 5mL / 5mL | Lab ID: 1012127-23 | Received: 12/16/10 12:38

Dilution: 1 | pH: 1 | Prepared: 12/22/10 12:02

% Moisture: NA | Analyzed: 12/22/10 21:00

Batch: 0122204 | Sequence: 0L22003 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane	10	0.55	2.0	5.0	
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene	0.82	0.53	2.0	5.0	J
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride		0.49	0.50	5.0	U
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane	6.7	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane		0.32	0.50	5.0	U
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene		0.31	0.50	5.0	U
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

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ANALYSIS DATA SHEET

SW 8260B

SA-PZ-149I1

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-2359.d | Sampled: 12/15/10 13:00

Initial/Final: 5mL / 5mL | Lab ID: 1012127-23 | Received: 12/16/10 12:38

Dilution: 1 | pH: 1 | Prepared: 12/22/10 12:02

% Moisture: NA | Analyzed: 12/22/10 21:00

Batch: 0122204 | Sequence: 0L22003 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene	0.39	0.27	0.50	5.0	J
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene	2.7	0.36	0.50	5.0	J
106-46-7	1,4-Dichlorobenzene	13	0.30	0.50	5.0	
95-50-1	1,2-Dichlorobenzene	3.0	0.35	0.50	5.0	J
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene	0.69	0.48	0.50	5.0	JB
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	53.58	107	85 - 115	
1,2-Dichloroethane-d4	50.00	53.30	107	70 - 120	
Toluene-d8	50.00	54.51	109	85 - 120	
Bromofluorobenzene	50.00	53.48	107	75 - 120	

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ANALYSIS DATA SHEET
SW 8260B

PZ-151I1

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-0659.d | Sampled: 12/15/10 12:05

Initial/Final: 5mL / 5mL | Lab ID: 1012127-06 | Received: 12/16/10 12:38

Dilution: 1.67 | pH: 1 | Prepared: 12/22/10 12:02

% Moisture: NA | Analyzed: 12/22/10 17:22

Batch: 0122204 | Sequence: 0L22003 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.53	0.84	8.4	U
74-87-3	Chloromethane		0.65	0.84	8.4	U
75-01-4	Vinyl chloride		0.80	0.84	8.4	U
74-83-9	Bromomethane		1.3	3.3	8.4	U
75-00-3	Chloroethane	140	0.92	3.3	8.4	D
75-69-4	Trichlorofluoromethane		0.82	0.84	8.4	U
75-35-4	1,1-Dichloroethene	13	0.89	3.3	8.4	D
67-64-1	Acetone		2.7	8.4	21	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		1.4	3.3	8.4	U
75-15-0	Carbon disulfide		0.27	0.84	8.4	U
79-20-9	Methyl acetate		1.4	3.3	8.4	U
75-09-2	Methylene chloride	3.9	0.82	0.84	8.4	JD
156-60-5	trans-1,2-Dichloroethene		0.73	0.84	8.4	U
1634-04-4	Methyl tert-butyl ether		0.37	0.84	8.4	U
75-34-3	1,1-Dichloroethane	190	0.45	0.84	8.4	D
156-59-2	cis-1,2-Dichloroethene		1.1	3.3	8.4	U
78-93-3	2-Butanone		2.5	8.4	21	U
67-66-3	Chloroform		0.45	0.84	8.4	U
71-55-6	1,1,1-Trichloroethane	32	0.53	0.84	8.4	D
110-82-7	Cyclohexane		0.75	0.84	8.4	U
563-58-6	1,1-Dichloropropene		0.70	0.84	8.4	U
56-23-5	Carbon tetrachloride		0.52	0.84	8.4	U
107-06-2	1,2-Dichloroethane		0.38	0.84	8.4	U
71-43-2	Benzene	1.6	0.47	0.84	8.4	JD
79-01-6	Trichloroethene		0.47	0.84	8.4	U
108-87-2	Methylcyclohexane		0.58	0.84	8.4	U
78-87-5	1,2-Dichloropropane		1.4	3.3	8.4	U
75-27-4	Bromodichloromethane		0.60	0.84	8.4	U
10061-01-5	cis-1,3-Dichloropropene		0.87	3.3	8.4	U
108-10-1	4-Methyl-2-pentanone		1.8	2.1	21	U
108-88-3	Toluene		0.52	0.84	8.4	U
10061-02-6	trans-1,3-Dichloropropene		0.75	0.84	8.4	U
79-00-5	1,1,2-Trichloroethane		0.85	3.3	8.4	U
127-18-4	Tetrachloroethene		0.70	0.84	8.4	U
591-78-6	2-Hexanone		2.0	2.1	21	U
124-48-1	Dibromochloromethane		0.53	0.84	8.4	U
106-93-4	1,2-Dibromoethane		0.73	0.84	8.4	U
108-90-7	Chlorobenzene		0.45	0.84	8.4	U
100-41-4	Ethylbenzene		0.70	0.84	8.4	U

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ANALYSIS DATA SHEET
SW 8260B

PZ-151I1

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-0659.d | Sampled: 12/15/10 12:05

Initial/Final: 5mL / 5mL | Lab ID: 1012127-06 | Received: 12/16/10 12:38

Dilution: 1.67 | pH: 1 | Prepared: 12/22/10 12:02

% Moisture: NA | Analyzed: 12/22/10 17:22

Batch: 0122204 | Sequence: 0L22003 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		1.4	1.7	17	U
95-47-6	o-Xylene		0.42	0.84	8.4	U
100-42-5	Styrene		0.60	0.84	8.4	U
75-25-2	Bromoform		1.6	3.3	8.4	U
98-82-8	Isopropylbenzene	1.1	0.45	0.84	8.4	JD
79-34-5	1,1,2,2-Tetrachloroethane		1.1	3.3	8.4	U
541-73-1	1,3-Dichlorobenzene	4.0	0.60	0.84	8.4	JD
106-46-7	1,4-Dichlorobenzene	22	0.50	0.84	8.4	D
95-50-1	1,2-Dichlorobenzene	5.8	0.58	0.84	8.4	JD
96-12-8	1,2-Dibromo-3-chloropropane		1.5	3.3	8.4	U
120-82-1	1,2,4-Trichlorobenzene	4.1	0.80	0.84	8.4	JBD
91-20-3	Naphthalene		1.8	3.3	8.4	U
540-59-0	1,2-Dichloroethene (total)		0.73	0.84	8.4	U
1330-20-7	Xylenes (total)		0.42	0.84	8.4	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	53.47	107	85 - 115	
1.2-Dichloroethane-d4	50.00	53.09	106	70 - 120	
Toluene-d8	50.00	54.18	108	85 - 120	
Bromofluorobenzene	50.00	54.36	109	75 - 120	

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ANALYSIS DATA SHEET

SW 8260B

PZ-155I

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-0759.d | Sampled: 12/15/10 13:35

Initial/Final: 5mL / 5mL | Lab ID: 1012127-07 | Received: 12/16/10 12:38

Dilution: 1 | pH: 1 | Prepared: 12/21/10 11:30

% Moisture: NA | Analyzed: 12/21/10 19:13

Batch: 0122107 | Sequence: 0L21006 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane		0.55	2.0	5.0	U
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene	3.4	0.53	2.0	5.0	J
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride	1.3	0.49	0.50	5.0	J
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane	70	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane	16	0.32	0.50	5.0	
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene		0.31	0.50	5.0	U
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

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ANALYSIS DATA SHEET

SW 8260B

PZ-155I

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-0759.d | Sampled: 12/15/10 13:35

Initial/Final: 5mL / 5mL | Lab ID: 1012127-07 | Received: 12/16/10 12:38

Dilution: 1 | pH: 1 | Prepared: 12/21/10 11:30

% Moisture: NA | Analyzed: 12/21/10 19:13

Batch: 0122107 | Sequence: 0L21006 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene		0.36	0.50	5.0	U
106-46-7	1,4-Dichlorobenzene		0.30	0.50	5.0	U
95-50-1	1,2-Dichlorobenzene		0.35	0.50	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene		0.48	0.50	5.0	U
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	49.79	100	85 - 115	
1.2-Dichloroethane-d4	50.00	48.94	98	70 - 120	
Toluene-d8	50.00	50.37	101	85 - 120	
Bromofluorobenzene	50.00	50.61	101	75 - 120	

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ANALYSIS DATA SHEET

SW 8260B

PZ-157I

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-0259.d | Sampled: 12/14/10 14:55

Initial/Final: 5mL / 5mL | Lab ID: 1012127-02 | Received: 12/16/10 12:38

Dilution: 1 | pH: 1 | Prepared: 12/22/10 12:02

% Moisture: NA | Analyzed: 12/22/10 16:00

Batch: 0122204 | Sequence: 0L22003 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane	7.6	0.55	2.0	5.0	
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene	4.1	0.53	2.0	5.0	J
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride	1.1	0.49	0.50	5.0	J
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane	75	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane	17	0.32	0.50	5.0	
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene		0.31	0.50	5.0	U
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

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ANALYSIS DATA SHEET

SW 8260B

PZ-157I

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-0259.d | Sampled: 12/14/10 14:55

Initial/Final: 5mL / 5mL | Lab ID: 1012127-02 | Received: 12/16/10 12:38

Dilution: 1 | pH: 1 | Prepared: 12/22/10 12:02

% Moisture: NA | Analyzed: 12/22/10 16:00

Batch: 0122204 | Sequence: 0L22003 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene		0.36	0.50	5.0	U
106-46-7	1,4-Dichlorobenzene		0.30	0.50	5.0	U
95-50-1	1,2-Dichlorobenzene		0.35	0.50	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene		0.48	0.50	5.0	U
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	50.17	100	85 - 115	
1.2-Dichloroethane-d4	50.00	48.65	97	70 - 120	
Toluene-d8	50.00	47.13	94	85 - 120	
Bromofluorobenzene	50.00	48.51	97	75 - 120	

CAS NO.	TICS	CONC. (ug/L)	Response	R.T.	% Match	Q
64-17-5	Ethanol	44	1371877	7.157	83	J

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ANALYSIS DATA SHEET

SW 8260B

PZ-157I1

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-0359.d | Sampled: 12/14/10 12:53

Initial/Final: 5mL / 5mL | Lab ID: 1012127-03 | Received: 12/16/10 12:38

Dilution: 1 | pH: 1 | Prepared: 12/22/10 12:02

% Moisture: NA | Analyzed: 12/22/10 16:28

Batch: 0122204 | Sequence: 0L22003 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane	49	0.55	2.0	5.0	
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene	7.6	0.53	2.0	5.0	
67-64-1	Acetone	8.1	1.6	5.0	13	J
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride	1.8	0.49	0.50	5.0	J
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane	100	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane	20	0.32	0.50	5.0	
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene		0.31	0.50	5.0	U
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene	0.73	0.27	0.50	5.0	J
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

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ANALYSIS DATA SHEET
SW 8260B

PZ-15711

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-0359.d | Sampled: 12/14/10 12:53

Initial/Final: 5mL / 5mL | Lab ID: 1012127-03 | Received: 12/16/10 12:38

Dilution: 1 | pH: 1 | Prepared: 12/22/10 12:02

% Moisture: NA | Analyzed: 12/22/10 16:28

Batch: 0122204 | Sequence: 0L22003 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene	1.4	0.36	0.50	5.0	J
106-46-7	1,4-Dichlorobenzene	7.3	0.30	0.50	5.0	
95-50-1	1,2-Dichlorobenzene	2.1	0.35	0.50	5.0	J
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene	2.5	0.48	0.50	5.0	JB
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	48.60	97	85 - 115	
1,2-Dichloroethane-d4	50.00	48.92	98	70 - 120	
Toluene-d8	50.00	46.34	93	85 - 120	
Bromofluorobenzene	50.00	44.89	90	75 - 120	

CAS NO.	TICS	CONC. (ug/L)	Response	R.T.	% Match	Q
64-17-5	Ethanol	52	1296049	7.159	83	J

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ANALYSIS DATA SHEET

SW 8260B

SA-PZ-158I

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-13R59.d | Sampled: 12/13/10 13:39

Initial/Final: 5mL / 5mL | Lab ID: 1012127-13 | Received: 12/16/10 12:38

Dilution: 1 | pH: 1 | Prepared: 12/22/10 12:02

% Moisture: NA | Analyzed: 12/22/10 14:38

Batch: 0122204 | Sequence: 0L22003 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane		0.55	2.0	5.0	U
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene	2.1	0.53	2.0	5.0	J
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride	2.2	0.49	0.50	5.0	J
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane	42	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane	9.4	0.32	0.50	5.0	
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene		0.31	0.50	5.0	U
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

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ANALYSIS DATA SHEET

SW 8260B

SA-PZ-158I

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-13R59.d | Sampled: 12/13/10 13:39

Initial/Final: 5mL / 5mL | Lab ID: 1012127-13 | Received: 12/16/10 12:38

Dilution: 1 | pH: 1 | Prepared: 12/22/10 12:02

% Moisture: NA | Analyzed: 12/22/10 14:38

Batch: 0122204 | Sequence: 0L22003 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene		0.36	0.50	5.0	U
106-46-7	1,4-Dichlorobenzene		0.30	0.50	5.0	U
95-50-1	1,2-Dichlorobenzene		0.35	0.50	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene		0.48	0.50	5.0	U
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	53.00	106	85 - 115	
1,2-Dichloroethane-d4	50.00	51.19	102	70 - 120	
Toluene-d8	50.00	49.38	99	85 - 120	
Bromofluorobenzene	50.00	50.79	102	75 - 120	

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ANALYSIS DATA SHEET

SW 8260B

SA-PZ-158I1

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-1259.d | Sampled: 12/13/10 13:35

Initial/Final: 5mL / 5mL | Lab ID: 1012127-12 | Received: 12/16/10 12:38

Dilution: 1 | pH: 1 | Prepared: 12/21/10 11:30

% Moisture: NA | Analyzed: 12/21/10 20:35

Batch: 0122107 | Sequence: 0L21006 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane	62	0.55	2.0	5.0	
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene	15	0.53	2.0	5.0	
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride	0.98	0.49	0.50	5.0	J
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane	200	0.27	0.50	5.0	E
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane	49	0.32	0.50	5.0	
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene	0.77	0.28	0.50	5.0	J
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene		0.31	0.50	5.0	U
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene	0.70	0.27	0.50	5.0	J
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

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ANALYSIS DATA SHEET
SW 8260B

SA-PZ-158I1

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-1259.d | Sampled: 12/13/10 13:35

Initial/Final: 5mL / 5mL | Lab ID: 1012127-12 | Received: 12/16/10 12:38

Dilution: 1 | pH: 1 | Prepared: 12/21/10 11:30

% Moisture: NA | Analyzed: 12/21/10 20:35

Batch: 0122107 | Sequence: 0L21006 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene	1.3	0.36	0.50	5.0	J
106-46-7	1,4-Dichlorobenzene	6.4	0.30	0.50	5.0	
95-50-1	1,2-Dichlorobenzene	2.1	0.35	0.50	5.0	J
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene	2.0	0.48	0.50	5.0	J
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	46.79	94	85 - 115	
1,2-Dichloroethane-d4	50.00	47.21	94	70 - 120	
Toluene-d8	50.00	47.28	95	85 - 120	
Bromofluorobenzene	50.00	47.51	95	75 - 120	

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ANALYSIS DATA SHEET

SW 8260B

SA-PZ-158I1DL

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-12D59.d | Sampled: 12/13/10 13:35

Initial/Final: 5mL / 5mL | Lab ID: 1012127-12RE1 | Received: 12/16/10 12:38

Dilution: 1.43 | pH: 1 | Prepared: 12/22/10 12:02

% Moisture: NA | Analyzed: 12/22/10 14:11

Batch: 0122204 | Sequence: 0L22003 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.46	0.72	7.2	U
74-87-3	Chloromethane		0.56	0.72	7.2	U
75-01-4	Vinyl chloride		0.69	0.72	7.2	U
74-83-9	Bromomethane		1.1	2.9	7.2	U
75-00-3	Chloroethane	58	0.79	2.9	7.2	D
75-69-4	Trichlorofluoromethane		0.70	0.72	7.2	U
75-35-4	1,1-Dichloroethene	16	0.76	2.9	7.2	D
67-64-1	Acetone		2.3	7.2	18	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		1.2	2.9	7.2	U
75-15-0	Carbon disulfide		0.23	0.72	7.2	U
79-20-9	Methyl acetate		1.2	2.9	7.2	U
75-09-2	Methylene chloride	3.5	0.70	0.72	7.2	JD
156-60-5	trans-1,2-Dichloroethene		0.63	0.72	7.2	U
1634-04-4	Methyl tert-butyl ether		0.31	0.72	7.2	U
75-34-3	1,1-Dichloroethane	200	0.39	0.72	7.2	D
156-59-2	cis-1,2-Dichloroethene		0.93	2.9	7.2	U
78-93-3	2-Butanone		2.1	7.2	18	U
67-66-3	Chloroform		0.39	0.72	7.2	U
71-55-6	1,1,1-Trichloroethane	49	0.46	0.72	7.2	D
110-82-7	Cyclohexane		0.64	0.72	7.2	U
563-58-6	1,1-Dichloropropene		0.60	0.72	7.2	U
56-23-5	Carbon tetrachloride		0.44	0.72	7.2	U
107-06-2	1,2-Dichloroethane		0.33	0.72	7.2	U
71-43-2	Benzene		0.40	0.72	7.2	U
79-01-6	Trichloroethene		0.40	0.72	7.2	U
108-87-2	Methylcyclohexane		0.50	0.72	7.2	U
78-87-5	1,2-Dichloropropane		1.2	2.9	7.2	U
75-27-4	Bromodichloromethane		0.51	0.72	7.2	U
10061-01-5	cis-1,3-Dichloropropene		0.74	2.9	7.2	U
108-10-1	4-Methyl-2-pentanone		1.6	1.8	18	U
108-88-3	Toluene		0.44	0.72	7.2	U
10061-02-6	trans-1,3-Dichloropropene		0.64	0.72	7.2	U
79-00-5	1,1,2-Trichloroethane		0.73	2.9	7.2	U
127-18-4	Tetrachloroethene		0.60	0.72	7.2	U
591-78-6	2-Hexanone		1.7	1.8	18	U
124-48-1	Dibromochloromethane		0.46	0.72	7.2	U
106-93-4	1,2-Dibromoethane		0.63	0.72	7.2	U
108-90-7	Chlorobenzene	0.77	0.39	0.72	7.2	JD
100-41-4	Ethylbenzene		0.60	0.72	7.2	U

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ANALYSIS DATA SHEET

SW 8260B

SA-PZ-158I1DL

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-12D59.d | Sampled: 12/13/10 13:35

Initial/Final: 5mL / 5mL | Lab ID: 1012127-12RE1 | Received: 12/16/10 12:38

Dilution: 1.43 | pH: 1 | Prepared: 12/22/10 12:02

% Moisture: NA | Analyzed: 12/22/10 14:11

Batch: 0122204 | Sequence: 0L22003 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		1.2	1.4	14	U
95-47-6	o-Xylene		0.36	0.72	7.2	U
100-42-5	Styrene		0.51	0.72	7.2	U
75-25-2	Bromoform		1.4	2.9	7.2	U
98-82-8	Isopropylbenzene		0.39	0.72	7.2	U
79-34-5	1,1,2,2-Tetrachloroethane		0.92	2.9	7.2	U
541-73-1	1,3-Dichlorobenzene	1.7	0.51	0.72	7.2	JD
106-46-7	1,4-Dichlorobenzene	7.1	0.43	0.72	7.2	JD
95-50-1	1,2-Dichlorobenzene	2.5	0.50	0.72	7.2	JD
96-12-8	1,2-Dibromo-3-chloropropane		1.3	2.9	7.2	U
120-82-1	1,2,4-Trichlorobenzene	2.8	0.69	0.72	7.2	JBD
91-20-3	Naphthalene		1.6	2.9	7.2	U
540-59-0	1,2-Dichloroethene (total)		0.63	0.72	7.2	U
1330-20-7	Xylenes (total)		0.36	0.72	7.2	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	52.78	106	85 - 115	
1.2-Dichloroethane-d4	50.00	49.94	100	70 - 120	
Toluene-d8	50.00	53.29	107	85 - 120	
Bromofluorobenzene	50.00	51.70	103	75 - 120	

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ANALYSIS DATA SHEET

SW 8260B

PZ-159I

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-0559.d | Sampled: 12/14/10 14:20

Initial/Final: 5mL / 5mL | Lab ID: 1012127-05 | Received: 12/16/10 12:38

Dilution: 1 | pH: 1 | Prepared: 12/21/10 11:30

% Moisture: NA | Analyzed: 12/21/10 18:19

Batch: 0122107 | Sequence: 0L21006 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane	9.7	0.55	2.0	5.0	
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene	6.7	0.53	2.0	5.0	
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride	1.1	0.49	0.50	5.0	J
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane	100	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane	25	0.32	0.50	5.0	
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene		0.31	0.50	5.0	U
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

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SW 8260B

PZ-159I

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-0559.d | Sampled: 12/14/10 14:20

Initial/Final: 5mL / 5mL | Lab ID: 1012127-05 | Received: 12/16/10 12:38

Dilution: 1 | pH: 1 | Prepared: 12/21/10 11:30

% Moisture: NA | Analyzed: 12/21/10 18:19

Batch: 0122107 | Sequence: 0L21006 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene		0.36	0.50	5.0	U
106-46-7	1,4-Dichlorobenzene		0.30	0.50	5.0	U
95-50-1	1,2-Dichlorobenzene		0.35	0.50	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene		0.48	0.50	5.0	U
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	48.06	96	85 - 115	
1,2-Dichloroethane-d4	50.00	48.41	97	70 - 120	
Toluene-d8	50.00	48.37	97	85 - 120	
Bromofluorobenzene	50.00	47.16	94	75 - 120	

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SW 8260B

PZ-159I1

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-0159.d | Sampled: 12/14/10 12:35

Initial/Final: 5mL / 5mL | Lab ID: 1012127-01 | Received: 12/16/10 12:38

Dilution: 1.67 | pH: 1 | Prepared: 12/22/10 12:02

% Moisture: NA | Analyzed: 12/22/10 15:33

Batch: 0122204 | Sequence: 0L22003 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.53	0.84	8.4	U
74-87-3	Chloromethane		0.65	0.84	8.4	U
75-01-4	Vinyl chloride		0.80	0.84	8.4	U
74-83-9	Bromomethane		1.3	3.3	8.4	U
75-00-3	Chloroethane	50	0.92	3.3	8.4	D
75-69-4	Trichlorofluoromethane		0.82	0.84	8.4	U
75-35-4	1,1-Dichloroethene	12	0.89	3.3	8.4	D
67-64-1	Acetone		2.7	8.4	21	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		1.4	3.3	8.4	U
75-15-0	Carbon disulfide		0.27	0.84	8.4	U
79-20-9	Methyl acetate		1.4	3.3	8.4	U
75-09-2	Methylene chloride	4.2	0.82	0.84	8.4	JD
156-60-5	trans-1,2-Dichloroethene		0.73	0.84	8.4	U
1634-04-4	Methyl tert-butyl ether		0.37	0.84	8.4	U
75-34-3	1,1-Dichloroethane	180	0.45	0.84	8.4	D
156-59-2	cis-1,2-Dichloroethene		1.1	3.3	8.4	U
78-93-3	2-Butanone		2.5	8.4	21	U
67-66-3	Chloroform		0.45	0.84	8.4	U
71-55-6	1,1,1-Trichloroethane	38	0.53	0.84	8.4	D
110-82-7	Cyclohexane		0.75	0.84	8.4	U
563-58-6	1,1-Dichloropropene		0.70	0.84	8.4	U
56-23-5	Carbon tetrachloride		0.52	0.84	8.4	U
107-06-2	1,2-Dichloroethane		0.38	0.84	8.4	U
71-43-2	Benzene		0.47	0.84	8.4	U
79-01-6	Trichloroethene		0.47	0.84	8.4	U
108-87-2	Methylcyclohexane		0.58	0.84	8.4	U
78-87-5	1,2-Dichloropropane		1.4	3.3	8.4	U
75-27-4	Bromodichloromethane		0.60	0.84	8.4	U
10061-01-5	cis-1,3-Dichloropropene		0.87	3.3	8.4	U
108-10-1	4-Methyl-2-pentanone		1.8	2.1	21	U
108-88-3	Toluene		0.52	0.84	8.4	U
10061-02-6	trans-1,3-Dichloropropene		0.75	0.84	8.4	U
79-00-5	1,1,2-Trichloroethane		0.85	3.3	8.4	U
127-18-4	Tetrachloroethene		0.70	0.84	8.4	U
591-78-6	2-Hexanone		2.0	2.1	21	U
124-48-1	Dibromochloromethane		0.53	0.84	8.4	U
106-93-4	1,2-Dibromoethane		0.73	0.84	8.4	U
108-90-7	Chlorobenzene		0.45	0.84	8.4	U
100-41-4	Ethylbenzene		0.70	0.84	8.4	U

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SW 8260B

PZ-159I1

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-0159.d | Sampled: 12/14/10 12:35

Initial/Final: 5mL / 5mL | Lab ID: 1012127-01 | Received: 12/16/10 12:38

Dilution: 1.67 | pH: 1 | Prepared: 12/22/10 12:02

% Moisture: NA | Analyzed: 12/22/10 15:33

Batch: 0122204 | Sequence: 0L22003 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		1.4	1.7	17	U
95-47-6	o-Xylene		0.42	0.84	8.4	U
100-42-5	Styrene		0.60	0.84	8.4	U
75-25-2	Bromoform		1.6	3.3	8.4	U
98-82-8	Isopropylbenzene		0.45	0.84	8.4	U
79-34-5	1,1,2,2-Tetrachloroethane		1.1	3.3	8.4	U
541-73-1	1,3-Dichlorobenzene		0.60	0.84	8.4	U
106-46-7	1,4-Dichlorobenzene	5.4	0.50	0.84	8.4	JD
95-50-1	1,2-Dichlorobenzene	1.9	0.58	0.84	8.4	JD
96-12-8	1,2-Dibromo-3-chloropropane		1.5	3.3	8.4	U
120-82-1	1,2,4-Trichlorobenzene		0.80	0.84	8.4	U
91-20-3	Naphthalene		1.8	3.3	8.4	U
540-59-0	1,2-Dichloroethene (total)		0.73	0.84	8.4	U
1330-20-7	Xylenes (total)		0.42	0.84	8.4	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	52.04	104	85 - 115	
1,2-Dichloroethane-d4	50.00	50.21	100	70 - 120	
Toluene-d8	50.00	50.60	101	85 - 120	
Bromofluorobenzene	50.00	49.47	99	75 - 120	

CAS NO.	TICS	CONC. (ug/L)	Response	R.T.	% Match	Q
NA	Unknown 7.157	12	221729	7.157	0	JD

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SW 8260B

PZ-160I

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-1059.d | Sampled: 12/13/10 15:02

Initial/Final: 5mL / 5mL | Lab ID: 1012127-10 | Received: 12/16/10 12:38

Dilution: 1 | pH: 1 | Prepared: 12/21/10 11:30

% Moisture: NA | Analyzed: 12/21/10 19:40

Batch: 0122107 | Sequence: 0L21006 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane	21	0.55	2.0	5.0	
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene	11	0.53	2.0	5.0	
67-64-1	Acetone	22	1.6	5.0	13	
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride	1.2	0.49	0.50	5.0	J
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane	160	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane	41	0.32	0.50	5.0	
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene		0.31	0.50	5.0	U
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

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SW 8260B

PZ-160I

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-1059.d | Sampled: 12/13/10 15:02

Initial/Final: 5mL / 5mL | Lab ID: 1012127-10 | Received: 12/16/10 12:38

Dilution: 1 | pH: 1 | Prepared: 12/21/10 11:30

% Moisture: NA | Analyzed: 12/21/10 19:40

Batch: 0122107 | Sequence: 0L21006 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene		0.36	0.50	5.0	U
106-46-7	1,4-Dichlorobenzene		0.30	0.50	5.0	U
95-50-1	1,2-Dichlorobenzene		0.35	0.50	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene		0.48	0.50	5.0	U
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	50.26	101	85 - 115	
1,2-Dichloroethane-d4	50.00	50.19	100	70 - 120	
Toluene-d8	50.00	49.48	99	85 - 120	
Bromofluorobenzene	50.00	50.13	100	75 - 120	

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SW 8260B

SA-PZ-160I1

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-14D59.d | Sampled: 12/13/10 14:55

Initial/Final: 5mL / 5mL | Lab ID: 1012127-14 | Received: 12/16/10 12:38

Dilution: 1.25 | pH: 1 | Prepared: 12/22/10 12:02

% Moisture: NA | Analyzed: 12/22/10 15:06

Batch: 0122204 | Sequence: 0L22003 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.40	0.63	6.3	U
74-87-3	Chloromethane		0.49	0.63	6.3	U
75-01-4	Vinyl chloride		0.60	0.63	6.3	U
74-83-9	Bromomethane		0.95	2.5	6.3	U
75-00-3	Chloroethane	33	0.69	2.5	6.3	D
75-69-4	Trichlorofluoromethane		0.61	0.63	6.3	U
75-35-4	1,1-Dichloroethene	13	0.66	2.5	6.3	D
67-64-1	Acetone		2.0	6.3	16	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		1.0	2.5	6.3	U
75-15-0	Carbon disulfide		0.20	0.63	6.3	U
79-20-9	Methyl acetate		1.1	2.5	6.3	U
75-09-2	Methylene chloride	3.2	0.61	0.63	6.3	JD
156-60-5	trans-1,2-Dichloroethene		0.55	0.63	6.3	U
1634-04-4	Methyl tert-butyl ether		0.28	0.63	6.3	U
75-34-3	1,1-Dichloroethane	180	0.34	0.63	6.3	D
156-59-2	cis-1,2-Dichloroethene		0.81	2.5	6.3	U
78-93-3	2-Butanone		1.9	6.3	16	U
67-66-3	Chloroform		0.34	0.63	6.3	U
71-55-6	1,1,1-Trichloroethane	39	0.40	0.63	6.3	D
110-82-7	Cyclohexane		0.56	0.63	6.3	U
563-58-6	1,1-Dichloropropene		0.53	0.63	6.3	U
56-23-5	Carbon tetrachloride		0.39	0.63	6.3	U
107-06-2	1,2-Dichloroethane		0.29	0.63	6.3	U
71-43-2	Benzene		0.35	0.63	6.3	U
79-01-6	Trichloroethene		0.35	0.63	6.3	U
108-87-2	Methylcyclohexane		0.44	0.63	6.3	U
78-87-5	1,2-Dichloropropane		1.1	2.5	6.3	U
75-27-4	Bromodichloromethane		0.45	0.63	6.3	U
10061-01-5	cis-1,3-Dichloropropene		0.65	2.5	6.3	U
108-10-1	4-Methyl-2-pentanone		1.4	1.6	16	U
108-88-3	Toluene		0.39	0.63	6.3	U
10061-02-6	trans-1,3-Dichloropropene		0.56	0.63	6.3	U
79-00-5	1,1,2-Trichloroethane		0.64	2.5	6.3	U
127-18-4	Tetrachloroethene		0.53	0.63	6.3	U
591-78-6	2-Hexanone		1.5	1.6	16	U
124-48-1	Dibromochloromethane		0.40	0.63	6.3	U
106-93-4	1,2-Dibromoethane		0.55	0.63	6.3	U
108-90-7	Chlorobenzene		0.34	0.63	6.3	U
100-41-4	Ethylbenzene		0.53	0.63	6.3	U

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SW 8260B

SA-PZ-160I1

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-14D59.d | Sampled: 12/13/10 14:55

Initial/Final: 5mL / 5mL | Lab ID: 1012127-14 | Received: 12/16/10 12:38

Dilution: 1.25 | pH: 1 | Prepared: 12/22/10 12:02

% Moisture: NA | Analyzed: 12/22/10 15:06

Batch: 0122204 | Sequence: 0L22003 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		1.1	1.3	13	U
95-47-6	o-Xylene		0.31	0.63	6.3	U
100-42-5	Styrene		0.45	0.63	6.3	U
75-25-2	Bromoform		1.2	2.5	6.3	U
98-82-8	Isopropylbenzene		0.34	0.63	6.3	U
79-34-5	1,1,2,2-Tetrachloroethane		0.80	2.5	6.3	U
541-73-1	1,3-Dichlorobenzene		0.45	0.63	6.3	U
106-46-7	1,4-Dichlorobenzene		0.38	0.63	6.3	U
95-50-1	1,2-Dichlorobenzene		0.44	0.63	6.3	U
96-12-8	1,2-Dibromo-3-chloropropane		1.1	2.5	6.3	U
120-82-1	1,2,4-Trichlorobenzene		0.60	0.63	6.3	U
91-20-3	Naphthalene		1.4	2.5	6.3	U
540-59-0	1,2-Dichloroethene (total)		0.55	0.63	6.3	U
1330-20-7	Xylenes (total)		0.31	0.63	6.3	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	52.74	105	85 - 115	
1,2-Dichloroethane-d4	50.00	51.87	104	70 - 120	
Toluene-d8	50.00	53.28	107	85 - 120	
Bromofluorobenzene	50.00	52.58	105	75 - 120	

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SW 8260B

SA-PZ-161I

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-1859.d | Sampled: 12/14/10 10:45

Initial/Final: 5mL / 5mL | Lab ID: 1012127-18 | Received: 12/16/10 12:38

Dilution: 1 | pH: 1 | Prepared: 12/22/10 12:02

% Moisture: NA | Analyzed: 12/22/10 18:44

Batch: 0122204 | Sequence: 0L22003 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane	8.0	0.55	2.0	5.0	
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene	5.9	0.53	2.0	5.0	
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride	1.1	0.49	0.50	5.0	J
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane	97	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane	16	0.32	0.50	5.0	
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene		0.31	0.50	5.0	U
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

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SW 8260B

SA-PZ-161I

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-1859.d | Sampled: 12/14/10 10:45

Initial/Final: 5mL / 5mL | Lab ID: 1012127-18 | Received: 12/16/10 12:38

Dilution: 1 | pH: 1 | Prepared: 12/22/10 12:02

% Moisture: NA | Analyzed: 12/22/10 18:44

Batch: 0122204 | Sequence: 0L22003 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene		0.36	0.50	5.0	U
106-46-7	1,4-Dichlorobenzene		0.30	0.50	5.0	U
95-50-1	1,2-Dichlorobenzene		0.35	0.50	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene		0.48	0.50	5.0	U
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	54.01	108	85 - 115	
1,2-Dichloroethane-d4	50.00	53.17	106	70 - 120	
Toluene-d8	50.00	54.37	109	85 - 120	
Bromofluorobenzene	50.00	52.50	105	75 - 120	

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SW 8260B

DUP01-20101214

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-0459.d | Sampled: 12/14/10 12:00

Initial/Final: 5mL / 5mL | Lab ID: 1012127-04 | Received: 12/16/10 12:38

Dilution: 1 | pH: 1 | Prepared: 12/22/10 12:02

% Moisture: NA | Analyzed: 12/22/10 16:55

Batch: 0122204 | Sequence: 0L22003 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane	49	0.55	2.0	5.0	
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene	7.9	0.53	2.0	5.0	
67-64-1	Acetone	7.3	1.6	5.0	13	J
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride	2.0	0.49	0.50	5.0	J
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane	100	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane	21	0.32	0.50	5.0	
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene		0.31	0.50	5.0	U
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

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SW 8260B

DUP01-20101214

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-0459.d | Sampled: 12/14/10 12:00

Initial/Final: 5mL / 5mL | Lab ID: 1012127-04 | Received: 12/16/10 12:38

Dilution: 1 | pH: 1 | Prepared: 12/22/10 12:02

% Moisture: NA | Analyzed: 12/22/10 16:55

Batch: 0122204 | Sequence: 0L22003 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene	1.4	0.36	0.50	5.0	J
106-46-7	1,4-Dichlorobenzene	7.4	0.30	0.50	5.0	
95-50-1	1,2-Dichlorobenzene	2.2	0.35	0.50	5.0	J
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene	2.6	0.48	0.50	5.0	JB
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	49.56	99	85 - 115	
1,2-Dichloroethane-d4	50.00	49.46	99	70 - 120	
Toluene-d8	50.00	48.48	97	85 - 120	
Bromofluorobenzene	50.00	48.40	97	75 - 120	

CAS NO.	TICS	CONC. (ug/L)	Response	R.T.	% Match	Q
64-17-5	Ethanol	55	1455016	7.16	83	J

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SW 8260B

DUP02-20101215

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-2259.d | Sampled: 12/15/10 12:00

Initial/Final: 5mL / 5mL | Lab ID: 1012127-22 | Received: 12/16/10 12:38

Dilution: 1 | pH: 1 | Prepared: 12/22/10 12:02

% Moisture: NA | Analyzed: 12/22/10 20:33

Batch: 0122204 | Sequence: 0L22003 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane	34	0.55	2.0	5.0	
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene	6.7	0.53	2.0	5.0	
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride	1.0	0.49	0.50	5.0	J
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane	130	0.27	0.50	5.0	
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane	17	0.32	0.50	5.0	
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene		0.31	0.50	5.0	U
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

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SW 8260B

DUP02-20101215

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-2259.d | Sampled: 12/15/10 12:00

Initial/Final: 5mL / 5mL | Lab ID: 1012127-22 | Received: 12/16/10 12:38

Dilution: 1 | pH: 1 | Prepared: 12/22/10 12:02

% Moisture: NA | Analyzed: 12/22/10 20:33

Batch: 0122204 | Sequence: 0L22003 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene		0.36	0.50	5.0	U
106-46-7	1,4-Dichlorobenzene		0.30	0.50	5.0	U
95-50-1	1,2-Dichlorobenzene		0.35	0.50	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene		0.48	0.50	5.0	U
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	53.73	107	85 - 115	
1,2-Dichloroethane-d4	50.00	54.56	109	70 - 120	
Toluene-d8	50.00	54.96	110	85 - 120	
Bromofluorobenzene	50.00	53.33	107	75 - 120	

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ANALYSIS DATA SHEET

SW 8260B

TB01-20101213

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-1159.d | Sampled: 12/13/10 12:00

Initial/Final: 5mL / 5mL | Lab ID: 1012127-11 | Received: 12/16/10 12:38

Dilution: 1 | pH: 1 | Prepared: 12/21/10 11:30

% Moisture: NA | Analyzed: 12/21/10 20:08

Batch: 0122107 | Sequence: 0L21006 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane		0.55	2.0	5.0	U
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene		0.53	2.0	5.0	U
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride	1.5	0.49	0.50	5.0	J
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane		0.27	0.50	5.0	U
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane		0.32	0.50	5.0	U
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene		0.31	0.50	5.0	U
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U
100-41-4	Ethylbenzene		0.42	0.50	5.0	U

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SW 8260B

TB01-20101213

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Preparation: SW 5030A/5030B | File ID: 1012127-1159.d | Sampled: 12/13/10 12:00

Initial/Final: 5mL / 5mL | Lab ID: 1012127-11 | Received: 12/16/10 12:38

Dilution: 1 | pH: 1 | Prepared: 12/21/10 11:30

% Moisture: NA | Analyzed: 12/21/10 20:08

Batch: 0122107 | Sequence: 0L21006 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene		0.36	0.50	5.0	U
106-46-7	1,4-Dichlorobenzene		0.30	0.50	5.0	U
95-50-1	1,2-Dichlorobenzene		0.35	0.50	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene		0.48	0.50	5.0	U
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	50.04	100	85 - 115	
1.2-Dichloroethane-d4	50.00	51.03	102	70 - 120	
Toluene-d8	50.00	50.29	101	85 - 120	
Bromofluorobenzene	50.00	49.93	100	75 - 120	

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ANALYSIS DATA SHEET

RSK 175 DOD

PZ-151I1

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Extraction: GC-RSK | File ID: 486t1012127-06.d | Sampled: 12/15/10 12:05

Initial/Final: 1mL / 1mL | Sulfur Cleanup: N | Lab ID: 1012127-06 | Received: 12/16/10 12:38

Dilution: 1 | pH: | Florisil Cleanup: N | Prepared: 12/21/10 09:32

% Moisture: NA | GPC Cleanup: N | GPC Cleanup Factor: N | Analyzed: 12/21/10 11:19

Batch: 0122108 | Sequence: 0L21011 | Calibration: 0070106 | Instrument: varian67

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
74-82-8	Methane	390	0.048	0.15	0.58	E
74-84-0	Ethane		0.14	0.27	1.1	U
74-85-1	Ethene		0.15	0.25	1.0	U

ANALYSIS DATA SHEET

RSK 175 DOD

PZ-15111DL

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Extraction: GC-RSK | File ID: 492t1012127-06.d | Sampled: 12/15/10 12:05

Initial/Final: 1mL / 1mL | Sulfur Cleanup: N | Lab ID: 1012127-06RE1 | Received: 12/16/10 12:38

Dilution: 10 | pH: | Florisil Cleanup: N | Prepared: 12/21/10 09:32

% Moisture: NA | GPC Cleanup: N | GPC Cleanup Factor: N | Analyzed: 12/21/10 13:25

Batch: 0122108 | Sequence: 0L21011 | Calibration: 0070106 | Instrument: varian67

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
74-82-8	Methane	210	0.48	1.5	5.8	D
74-84-0	Ethane		1.4	2.7	11	U
74-85-1	Ethene		1.5	2.5	10	U

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RSK 175 DOD

PZ-155I

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Extraction: GC-RSK | File ID: 487t1012127-07.d | Sampled: 12/15/10 13:35

Initial/Final: 1mL / 1mL | Sulfur Cleanup: N | Lab ID: 1012127-07 | Received: 12/16/10 12:38

Dilution: 1 | pH: | Florisil Cleanup: N | Prepared: 12/21/10 09:32

% Moisture: NA | GPC Cleanup: N | GPC Cleanup Factor: N | Analyzed: 12/21/10 11:30

Batch: 0122108 | Sequence: 0L21011 | Calibration: 0070106 | Instrument: varian67

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
74-82-8	Methane	2.5	0.048	0.15	0.58	
74-84-0	Ethane		0.14	0.27	1.1	U
74-85-1	Ethene		0.15	0.25	1.0	U

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ANALYSIS DATA SHEET

RSK 175 DOD

PZ-157I

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Extraction: GC-RSK | File ID: 482t1012127-02.d | Sampled: 12/14/10 14:55

Initial/Final: 1mL / 1mL | Sulfur Cleanup: N | Lab ID: 1012127-02 | Received: 12/16/10 12:38

Dilution: 1 | pH: | Florisil Cleanup: N | Prepared: 12/21/10 09:32

% Moisture: NA | GPC Cleanup: N | GPC Cleanup Factor: N | Analyzed: 12/21/10 10:35

Batch: 0122108 | Sequence: 0L21011 | Calibration: 0070106 | Instrument: varian67

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
74-82-8	Methane	12	0.048	0.15	0.58	
74-84-0	Ethane		0.14	0.27	1.1	U
74-85-1	Ethene		0.15	0.25	1.0	U

ANALYSIS DATA SHEET

RSK 175 DOD

PZ-157I1

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Extraction: GC-RSK | File ID: 483t1012127-03.d | Sampled: 12/14/10 12:53

Initial/Final: 1mL / 1mL | Sulfur Cleanup: N | Lab ID: 1012127-03 | Received: 12/16/10 12:38

Dilution: 1 | pH: | Florisil Cleanup: N | Prepared: 12/21/10 09:32

% Moisture: NA | GPC Cleanup: N | GPC Cleanup Factor: N | Analyzed: 12/21/10 10:46

Batch: 0122108 | Sequence: 0L21011 | Calibration: 0070106 | Instrument: varian67

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
74-82-8	Methane	190	0.048	0.15	0.58	E
74-84-0	Ethane		0.14	0.27	1.1	U
74-85-1	Ethene		0.15	0.25	1.0	U

ANALYSIS DATA SHEET

RSK 175 DOD

PZ-157I1DL

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Extraction: GC-RSK | File ID: 490t1012127-03.d | Sampled: 12/14/10 12:53

Initial/Final: 1mL / 1mL | Sulfur Cleanup: N | Lab ID: 1012127-03RE1 | Received: 12/16/10 12:38

Dilution: 5 | pH: | Florisil Cleanup: N | Prepared: 12/21/10 09:32

% Moisture: NA | GPC Cleanup: N | GPC Cleanup Factor: N | Analyzed: 12/21/10 13:03

Batch: 0122108 | Sequence: 0L21011 | Calibration: 0070106 | Instrument: varian67

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
74-82-8	Methane	78	0.24	0.75	2.9	D
74-84-0	Ethane		0.70	1.4	5.5	U
74-85-1	Ethene		0.75	1.3	5.0	U

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RSK 175 DOD

PZ-159I

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Extraction: GC-RSK | File ID: 485t1012127-05.d | Sampled: 12/14/10 14:20

Initial/Final: 1mL / 1mL | Sulfur Cleanup: N | Lab ID: 1012127-05 | Received: 12/16/10 12:38

Dilution: 1 | pH: | Florisil Cleanup: N | Prepared: 12/21/10 09:32

% Moisture: NA | GPC Cleanup: N | GPC Cleanup Factor: N | Analyzed: 12/21/10 11:08

Batch: 0122108 | Sequence: 0L21011 | Calibration: 0070106 | Instrument: varian67

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
74-82-8	Methane	2.4	0.048	0.15	0.58	
74-84-0	Ethane		0.14	0.27	1.1	U
74-85-1	Ethene		0.15	0.25	1.0	U

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ANALYSIS DATA SHEET

RSK 175 DOD

PZ-159I1

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Extraction: GC-RSK | File ID: 481t1012127-01.d | Sampled: 12/14/10 12:35

Initial/Final: 1mL / 1mL | Sulfur Cleanup: N | Lab ID: 1012127-01 | Received: 12/16/10 12:38

Dilution: 1 | pH: | Florisil Cleanup: N | Prepared: 12/21/10 09:32

% Moisture: NA | GPC Cleanup: N | GPC Cleanup Factor: N | Analyzed: 12/21/10 10:29

Batch: 0122108 | Sequence: 0L21011 | Calibration: 0070106 | Instrument: varian67

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
74-82-8	Methane	140	0.048	0.15	0.58	E
74-84-0	Ethane		0.14	0.27	1.1	U
74-85-1	Ethene		0.15	0.25	1.0	U

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ANALYSIS DATA SHEET

RSK 175 DOD

PZ-159I1DL

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Extraction: GC-RSK | File ID: 489t1012127-01.d | Sampled: 12/14/10 12:35

Initial/Final: 1mL / 1mL | Sulfur Cleanup: N | Lab ID: 1012127-01RE1 | Received: 12/16/10 12:38

Dilution: 5 | pH: | Florisil Cleanup: N | Prepared: 12/21/10 09:32

% Moisture: NA | GPC Cleanup: N | GPC Cleanup Factor: N | Analyzed: 12/21/10 12:57

Batch: 0122108 | Sequence: 0L21011 | Calibration: 0070106 | Instrument: varian67

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
74-82-8	Methane	53	0.24	0.75	2.9	D
74-84-0	Ethane		0.70	1.4	5.5	U
74-85-1	Ethene		0.75	1.3	5.0	U

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ANALYSIS DATA SHEET

RSK 175 DOD

PZ-160I

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Extraction: GC-RSK | File ID: 488t1012127-10.d | Sampled: 12/13/10 15:02

Initial/Final: 1mL / 1mL | Sulfur Cleanup: N | Lab ID: 1012127-10 | Received: 12/16/10 12:38

Dilution: 1 | pH: | Florisil Cleanup: N | Prepared: 12/21/10 09:32

% Moisture: NA | GPC Cleanup: N | GPC Cleanup Factor: N | Analyzed: 12/21/10 11:41

Batch: 0122108 | Sequence: 0L21011 | Calibration: 0070106 | Instrument: varian67

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
74-82-8	Methane	15	0.048	0.15	0.58	
74-84-0	Ethane		0.14	0.27	1.1	U
74-85-1	Ethene		0.15	0.25	1.0	U

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ANALYSIS DATA SHEET

RSK 175 DOD

DUP01-20101214

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Extraction: GC-RSK | File ID: 484t1012127-04.d | Sampled: 12/14/10 12:00

Initial/Final: 1mL / 1mL | Sulfur Cleanup: N | Lab ID: 1012127-04 | Received: 12/16/10 12:38

Dilution: 1 | pH: | Florisil Cleanup: N | Prepared: 12/21/10 09:32

% Moisture: NA | GPC Cleanup: N | GPC Cleanup Factor: N | Analyzed: 12/21/10 10:57

Batch: 0122108 | Sequence: 0L21011 | Calibration: 0070106 | Instrument: varian67

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
74-82-8	Methane	190	0.048	0.15	0.58	E
74-84-0	Ethane		0.14	0.27	1.1	U
74-85-1	Ethene		0.15	0.25	1.0	U

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ANALYSIS DATA SHEET

RSK 175 DOD

DUP01-20101214DL

Client: TETRA TECH | SDG 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Extraction: GC-RSK | File ID: 491t1012127-04.d | Sampled: 12/14/10 12:00

Initial/Final: 1mL / 1mL | Sulfur Cleanup: N | Lab ID: 1012127-04RE1 | Received: 12/16/10 12:38

Dilution: 5 | pH: | Florisil Cleanup: N | Prepared: 12/21/10 09:32

% Moisture: NA | GPC Cleanup: N | GPC Cleanup Factor: N | Analyzed: 12/21/10 13:14

Batch: 0122108 | Sequence: 0L21011 | Calibration: 0070106 | Instrument: varian67

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
74-82-8	Methane	90	0.24	0.75	2.9	D
74-84-0	Ethane		0.70	1.4	5.5	U
74-85-1	Ethene		0.75	1.3	5.0	U

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Appendix C

Region II Data Validation Forms

YES NO N/A

I. PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: 02045 SDG 1012127 LAB: CompuChem

SITE NAME: NWIRP Calverton

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? [✓] ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? [✓] ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? [✓] ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. VOLATILE ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? [✓] ___ ___

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? [ ] ___ [✓]

1.3 Sample Conditions/Problems

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ [✓] ___

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? ___ [✓] ___

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C,then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water [✓] ___ ___

b. Soil [ ] ___ ✓

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water [✓] ___ ___

b. Soil [ ] ___ ✓

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal,make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, sectiom 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. [✓] ___ ___

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? [ ] ___ ✓

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. [ ] ✓ ___

If yes, were samples reanalyzed? [ ] ___ ✓

Were method blanks reanalyzed? [ ] ___ ✓

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] ✓ ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. [✓] ___ ___

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water [✓] ___ ___

B. Soil [ ] ___ ✓

C. Med Soil [ ] ___ ✓

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [ ] ___ ✓

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. [ ] ✓ ___

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	**Non-Detected Spiked Compounds**
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent)

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? [✓] ___ ___

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? [✓] ___ ___

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month [page 8000C, section 9.5.])

a. Water [✓] ___ ___

b. Waste [ ] ___ ✓

c. Soil/Solid [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7) for each matrix. [✓] ___ ___

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. [ ] ✓ ___

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD resuts in conjunction with other QC criteria to determine the need for some qualificatios.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as welll as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determned that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	**Non-Detected Spiked Compounds**
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

	YES	NO	N/A
6.0 Blank (CLP Form IV Equivalent)			
6.1 Is the Method Blank Summary form present?	[✓]	___	___
6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch?	[✓]	___	___
6.3 Has a method blank been analyzed for each GC/MS system used ?	[✓]	___	___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject (R) all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.			
Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds?	[✓]	___	___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary.	[✓]	___	___

	YES	NO	N/A
7.2 Do any field/rinse blanks have positive volatile organic compound results? TripBlk	/	[ ]	

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified forsurrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	> CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or quanity the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone

** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists (e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

	YES	NO	N/A
7.3 Are there field/rinse/equipment blanks associated with every sample?	[✓]	___	___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

	YES	NO	N/A
8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used.	[✓]	___	___

NOTE: For the analysis of volatiles, the method requires requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

	YES	NO	N/A
9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed?	[✓]	___	___
9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift?	[✓]	___	___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) [✓] ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? [✓] ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? [✓] ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ [✓] ___

9.7 Have the appropriate number of significant figures (two) been reported? [✓] ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. [✓] ___ ___

ACTION: Use professional judgement to determine wheather associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates [ ] ___ ___

c. Blanks [✓] ___ ___

d. Laboratory Control Samples [✓] ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) [✓] ___ ___

c. Blanks [✓] ___ ___

d. Laboratory Control Samples [✓] ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? [ ] ___ ___

	YES	NO	N/A
Resolution?	[✓]	___	___
Peak shape?	[✓]	___	___
Full-scale graph (attenuation)?	[✓]	___	___

Other:_____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? [✓] ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab.

10.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? [✓] ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [✓] ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? [✓] ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? [ ] ___ ___

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate [ ] ___ ___

b. Blanks [ ] ___ ___

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [ ] ___ ✓

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [ ] ___ ✓

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ ✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [ ] ✓ ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? [✓] ___ ___

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC exceedance dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? [✓] ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39)qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? [ ] ✓ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. [✓] ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? [✓] ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) [ ] ___ ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 <u>GC/MS Calibration Verification (CLP Form VII Equivalent)</u>

	YES	NO	N/A
15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest?	[✓]	___	___
15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument?	[✓]	___	___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

	YES	NO	N/A
15.3 Was the % D determined from the calibration verification determined using RRF or CF?	[✓]	___	___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

	YES	NO	N/A
15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2).	[ ]	✓	___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? [✓] ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05; or < the the requirements for the 5 compounds is section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? [✓] ___ ___

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION:

1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.

2. Do not qualify non-detects when the associated IS are counts area > + 100%.

3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".

4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? [✓] ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

	YES	NO	N/A
17.0 Field Duplicates			
17.1 Were any field duplicates submitted for volatile analysis?	[✓]	___	___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

Appendix D

Support Documentation

SORT	UNITS	NSAMPLE	LAB_ID	QC_TYPE	SAMP_DATE	EXTR_DATE	ANAL_DATE	SMP_EXTR	EXTR_ANL	SMP_ANL
TOC	MG/L	SA-PZ-159I1-20101214	1012127-01	NM	12/14/2010	12/20/2010	12/28/2010	6	8	14
TOC	MG/L	SA-PZ-157I-20101214	1012127-02	NM	12/14/2010	12/20/2010	12/28/2010	6	8	14
TOC	MG/L	SA-PZ-157I1-20101214	1012127-03	NM	12/14/2010	12/20/2010	12/28/2010	6	8	14
TOC	MG/L	SA-PZ-155I-20101215	1012127-07	NM	12/15/2010	12/20/2010	12/28/2010	5	8	13
TOC	MG/L	SA-PZ-151I1-20101215	1012127-06	NM	12/15/2010	12/20/2010	12/28/2010	5	8	13
TOC	MG/L	SA-DUP01-20101214	1012127-04	NM	12/14/2010	12/20/2010	12/28/2010	6	8	14
TOC	MG/L	SA-PZ-160I-2010216	1012127-08	NM	12/16/2010	12/20/2010	12/28/2010	4	8	12
OV	UG/L	SA-PZ-151I1-20101215	1012127-06	NM	12/15/2010	12/22/2010	12/22/2010	7	0	7
OV	UG/L	SA-TB01-20101213	1012127-11	NM	12/13/2010	12/21/2010	12/21/2010	8	0	8
OV	UG/L	SA-PZ-161I-2010214	1012127-18	NM	12/14/2010	12/22/2010	12/22/2010	8	0	8
OV	UG/L	SA-PZ-160I-2010216	1012127-10	NM	12/16/2010	12/21/2010	12/21/2010	5	0	5
OV	UG/L	SA-PZ-160I1-20101213	1012127-14	NM	12/13/2010	12/22/2010	12/22/2010	9	0	9
OV	UG/L	SA-PZ-159I-20101214	1012127-05	NM	12/14/2010	12/21/2010	12/21/2010	7	0	7
OV	UG/L	SA-PZ-159I1-20101214	1012127-01	NM	12/14/2010	12/22/2010	12/22/2010	8	0	8
OV	UG/L	SA-PZ-158I-20101213	1012127-13	NM	12/13/2010	12/22/2010	12/22/2010	9	0	9
OV	UG/L	SA-PZ-158I1-20101213	1012127-12RE1	NM	12/13/2010	12/22/2010	12/22/2010	9	0	9
OV	UG/L	SA-PZ-158I1-20101213	1012127-12	NM	12/13/2010	12/21/2010	12/21/2010	8	0	8
OV	UG/L	SA-PZ-157I-20101214	1012127-02	NM	12/14/2010	12/22/2010	12/22/2010	8	0	8

SORT	UNITS	NSAMPLE	LAB_ID	QC_TYPE	SAMP_DATE	EXTR_DATE	ANAL_DATE	SMP_EXTR	EXTR_ANL	SMP_ANL
OV	UG/L	SA-DUP01-20101214	1012127-04	NM	12/14/2010	12/22/2010	12/22/2010	8	0	8
OV	UG/L	SA-PZ-155I-20101215	1012127-07	NM	12/15/2010	12/21/2010	12/21/2010	6	0	6
OV	UG/L	SA-DUP02-20101215	1012127-22	NM	12/15/2010	12/22/2010	12/22/2010	7	0	7
OV	UG/L	SA-PZ-149I1-20101215	1012127-23	NM	12/15/2010	12/22/2010	12/22/2010	7	0	7
OV	UG/L	SA-PZ-139I-20101215	1012127-19	NM	12/15/2010	12/22/2010	12/22/2010	7	0	7
OV	UG/L	SA-PZ-138I-20101215	1012127-21	NM	12/15/2010	12/22/2010	12/22/2010	7	0	7
OV	UG/L	SA-PZ-138I1-20101215	1012127-20	NM	12/15/2010	12/22/2010	12/22/2010	7	0	7
OV	UG/L	SA-PZ-136I-20101214	1012127-17	NM	12/14/2010	12/22/2010	12/22/2010	8	0	8
OV	UG/L	SA-PZ-135I-20101214	1012127-16	NM	12/14/2010	12/22/2010	12/22/2010	8	0	8
OV	UG/L	SA-PZ-133I-20101215	1012127-15	NM	12/15/2010	12/21/2010	12/21/2010	6	0	6
OV	UG/L	SA-PZ-157I1-20101214	1012127-03	NM	12/14/2010	12/22/2010	12/22/2010	8	0	8
ETHA	UG/L	SA-PZ-160I-2010216	1012127-10	NM	12/16/2010	12/21/2010	12/21/2010	5	0	5
ETHA	UG/L	SA-PZ-159I-20101214	1012127-05	NM	12/14/2010	12/21/2010	12/21/2010	7	0	7
ETHA	UG/L	SA-PZ-159I1-20101214	1012127-01RE1	NM	12/14/2010	12/21/2010	12/21/2010	7	0	7
ETHA	UG/L	SA-DUP01-20101214	1012127-04	NM	12/14/2010	12/21/2010	12/21/2010	7	0	7
ETHA	UG/L	SA-PZ-157I1-20101214	1012127-03RE1	NM	12/14/2010	12/21/2010	12/21/2010	7	0	7
ETHA	UG/L	SA-PZ-157I1-20101214	1012127-03	NM	12/14/2010	12/21/2010	12/21/2010	7	0	7
ETHA	UG/L	SA-PZ-155I-20101215	1012127-07	NM	12/15/2010	12/21/2010	12/21/2010	6	0	6

SORT	UNITS	NSAMPLE	LAB_ID	QC_TYPE	SAMP_DATE	EXTR_DATE	ANAL_DATE	SMP_EXTR	EXTR_ANL	SMP_ANL
ETHA	UG/L	SA-PZ-151I1-20101215	1012127-06RE1	NM	12/15/2010	12/21/2010	12/21/2010	6	0	6
ETHA	UG/L	SA-DUP01-20101214	1012127-04RE1	NM	12/14/2010	12/21/2010	12/21/2010	7	0	7
ETHA	UG/L	SA-PZ-159I1-20101214	1012127-01	NM	12/14/2010	12/21/2010	12/21/2010	7	0	7
ETHA	UG/L	SA-PZ-157I-20101214	1012127-02	NM	12/14/2010	12/21/2010	12/21/2010	7	0	7
ETHA	UG/L	SA-PZ-151I1-20101215	1012127-06	NM	12/15/2010	12/21/2010	12/21/2010	6	0	6
ETHE	UG/L	SA-PZ-157I-20101214	1012127-02	NM	12/14/2010	12/21/2010	12/21/2010	7	0	7
ETHE	UG/L	SA-DUP01-20101214	1012127-04	NM	12/14/2010	12/21/2010	12/21/2010	7	0	7
ETHE	UG/L	SA-DUP01-20101214	1012127-04RE1	NM	12/14/2010	12/21/2010	12/21/2010	7	0	7
ETHE	UG/L	SA-PZ-151I1-20101215	1012127-06	NM	12/15/2010	12/21/2010	12/21/2010	6	0	6
ETHE	UG/L	SA-PZ-151I1-20101215	1012127-06RE1	NM	12/15/2010	12/21/2010	12/21/2010	6	0	6
ETHE	UG/L	SA-PZ-155I-20101215	1012127-07	NM	12/15/2010	12/21/2010	12/21/2010	6	0	6
ETHE	UG/L	SA-PZ-157I1-20101214	1012127-03RE1	NM	12/14/2010	12/21/2010	12/21/2010	7	0	7
ETHE	UG/L	SA-PZ-159I1-20101214	1012127-01	NM	12/14/2010	12/21/2010	12/21/2010	7	0	7
ETHE	UG/L	SA-PZ-159I1-20101214	1012127-01RE1	NM	12/14/2010	12/21/2010	12/21/2010	7	0	7
ETHE	UG/L	SA-PZ-159I-20101214	1012127-05	NM	12/14/2010	12/21/2010	12/21/2010	7	0	7
ETHE	UG/L	SA-PZ-160I-2010216	1012127-10	NM	12/16/2010	12/21/2010	12/21/2010	5	0	5
ETHE	UG/L	SA-PZ-157I1-20101214	1012127-03	NM	12/14/2010	12/21/2010	12/21/2010	7	0	7
METH	UG/L	SA-PZ-151I1-20101215	1012127-06RE1	NM	12/15/2010	12/21/2010	12/21/2010	6	0	6

SORT	UNITS	NSAMPLE	LAB_ID	QC_TYPE	SAMP_DATE	EXTR_DATE	ANAL_DATE	SMP_EXTR	EXTR_ANL	SMP_ANL
METH	UG/L	SA-DUP01-20101214	1012127-04	NM	12/14/2010	12/21/2010	12/21/2010	7	0	7
METH	UG/L	SA-PZ-151I1-20101215	1012127-06	NM	12/15/2010	12/21/2010	12/21/2010	6	0	6
METH	UG/L	SA-PZ-155I-20101215	1012127-07	NM	12/15/2010	12/21/2010	12/21/2010	6	0	6
METH	UG/L	SA-PZ-157I1-20101214	1012127-03	NM	12/14/2010	12/21/2010	12/21/2010	7	0	7
METH	UG/L	SA-PZ-157I1-20101214	1012127-03RE1	NM	12/14/2010	12/21/2010	12/21/2010	7	0	7
METH	UG/L	SA-PZ-157I-20101214	1012127-02	NM	12/14/2010	12/21/2010	12/21/2010	7	0	7
METH	UG/L	SA-PZ-159I1-20101214	1012127-01	NM	12/14/2010	12/21/2010	12/21/2010	7	0	7
METH	UG/L	SA-PZ-159I1-20101214	1012127-01RE1	NM	12/14/2010	12/21/2010	12/21/2010	7	0	7
METH	UG/L	SA-PZ-159I-20101214	1012127-05	NM	12/14/2010	12/21/2010	12/21/2010	7	0	7
METH	UG/L	SA-PZ-160I-2010216	1012127-10	NM	12/16/2010	12/21/2010	12/21/2010	5	0	5
METH	UG/L	SA-DUP01-20101214	1012127-04RE1	NM	12/14/2010	12/21/2010	12/21/2010	7	0	7

(**) ALL Sulfide pH (>9), ALL TOC pH (<2), ALL TAL Metals pH (<2)

TETRA TECH NUS, INC. JD 12/22/10 CHAIN OF CUSTODY | NUMBER 27293 | PAGE 1 OF 2

109

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
112G02045	NWIRP Calverton	Dave Brayack	757-461-3824	Cathy Dover CompuChem
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER: Vince Shickora	PHONE NUMBER: 757-814-9916	ADDRESS: 501 Madison Av.
		CARRIER/WAYBILL NUMBER: FedEx 8741 9938 1493		CITY, STATE: Cary, NC 27513

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

rec'd @ 0.1 °C
SN0015 0.2°C

DATE YEAR 2010	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	VOC	MEE	Nitrate/Nitrite	Fluoride/Chloride	Sulfide (**)	TOC (**)	TAL Metals (**)	COMMENTS
		CONTAINER TYPE PLASTIC (P) or GLASS (G)							G	G	P	P	G	P		
		PRESERVATIVE USED							HCl	HCl	NA	ZnAcetate NaOH	H_2SO_4	HNO_3		
12-13	1200	SA-TB01-20101213	—	—	—	QC	I	3	3						1012127-11	Lab prepared
12-13	1335	SA-PZ158I1-20101213	—	—	—	GW	G	3	3							1012127-12
12-13	*1337	SA-PZ-158I-20101213	—	—	—	GW	G	3	3	*container ID: SA-PZ-158I-20101213 time 1329 (actual 1339 per Reb)						-13
12-13	1455	SA-PZ160I1-20101213	—	—	—	GW	G	3	3							-14
12-13	*1502	SA-PZ-160I-20101213	—	—	—	GW	G	5	3	2	*no time on containers					15-10
12-14	0857	SA-PZ-135I-20101214	—	—	—	GW	G	3	3							-16
12-14	0908	SA-PZ136I-20101214	—	—	—	GW	G	3	3							-17
12-14	1045	SA-PZ-161I-20101214	—	—	—	GW	G	3	3							-18
12-14	1200	SA-Dup01-20101214	—	—	—	GW	G	10	3	2	1 (*)	1 (*)	2	1	1012127-04	
12-14	1235	SA-PZ-159I1-20101214	—	—	—	GW	G	18	9	2	1	1	2	3	1012127-01	Run MS/MSD for VOC + TAL Metal Only
12-14	1253	SA-PZ-157I1-20101214	—	—	—	GW	G	10	3	2	1 (*)	1 (*)	2	1	1012127-03	a = missing containers
12-14	1420	SA-PZ-159I-20101214	—	—	—	GW	G	8	3	2	~~*~~ JD 12/16/10		2	1	~~rec'd~~ JD 12/16/10	1012127-05
12-14	1455	SA-PZ-157I-20101214	—	—	—	GW	G	10	3	2	1	1	2		(*VOC, MEE, TOC time 1455) MTL, Sulfide NO2/NO3 time 1255	1012127-02

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY	12-15-10	1700	1. RECEIVED BY Jennifer Dover	12/16/10	1238
2. RELINQUISHED BY			2. RECEIVED BY		
3. RELINQUISHED BY			3. RECEIVED BY		

COMMENTS (*) the Dup "SA-DUP01-20101214" changed to "SA-PZ-157I1-20101214" for NO2/NO3/Fl/Chl & sulfide only →

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TINUS-001

(**) ALL TOC pH (<2), ALL TAL Metals (<2)

TETRA TECH NUS, INC. JD 12/22/10 CHAIN OF CUSTODY | NUMBER 27280 | PAGE 2 OF 2

110

PROJECT NO: 2045 112G02750	FACILITY: NWIRP Calverton	PROJECT MANAGER: Dave Brayack	PHONE NUMBER: 757-461-3824
LABORATORY NAME AND CONTACT: Cathy Dover CompuChem	SAMPLERS (SIGNATURE): Jacob Birkett	FIELD OPERATIONS LEADER: Jacob Birkett	PHONE NUMBER: 757-814-9916
ADDRESS: 501 Madison Av	CARRIER/WAYBILL NUMBER: FedEx 8741 9938 1493	CITY, STATE: Cary, NC 27513	

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G G G P

PRESERVATIVE USED: HCl HCl H_2SO_4 HNO_3

TYPE OF ANALYSIS: VOC, MEE, TOC (**), TAL Metals (**)

DATE YEAR 2010	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	VOC	MEE	TOC (**)	TAL Metals (**)				COMMENTS
		rec'd @ 0.1°C 0.2°C SN0015														
12-15	0910	SA-PZ-133I-20101215	—	—	—	GW	G	3	3							1012127-15
12-15	1035	SA-PZ-139I-20101215	—	—	—	GW	G	3	3							-19
12-15	1047	SA-PZ-138II-20101215	—	—	—	GW	G	3	3							-20
12-15	1154	SA-PZ-138I-20101215	—	—	—	GW	G	3	3							12/16/10 -21
12-15	1200	SA-PZ-Dup02-20101215	—	—	—	GW	G	3	3							1012127-22
12-15	1205	SA-PZ-157JI-20101215	—	—	—	GW	G	8	3	2	2	1	*container ID: SA-PZ-151II-20101215 (correct ID)			1012127-06
12-15	1300	SA-PZ-149II-20101215	—	—	—	GW	G	3	3							12/16/10 1012127-32
12-15	1335	SA-PZ-155I-20101215	—	—	—	GW	G	8	3	2	2	1				1012127-07

1. RELINQUISHED BY: Jacob Birkett	DATE: 12-15-10	TIME: 1700	1. RECEIVED BY: Jennifer Dover	DATE: 12/16/10	TIME: 1238
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TINUS-001

CompuChem
A Division Of
Liberty Analytical Corp.

Sample ID Cross Reference

Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Work Order	Sample #	Field ID	Sample Date	Rec Date	DueDate	Chain of Custody ID
1012127	1012127-01	PZ-159I1	12/14/2010	12/16/2010	01/03/2011	SA-PZ-159I1-20101214
1012127	1012127-02	PZ-157I	12/14/2010	12/16/2010	01/03/2011	SA-PZ-157I-20101214
1012127	1012127-03	PZ-157I1	12/14/2010	12/16/2010	01/03/2011	SA-PZ-157I1-20101214
1012127	1012127-04	DUP01-20101214	12/14/2010	12/16/2010	01/03/2011	SA-DUP01-20101214
1012127	1012127-05	PZ-159I	12/14/2010	12/16/2010	01/03/2011	SA-PZ-159I-20101214
1012127	1012127-06	PZ-151I1	12/15/2010	12/16/2010	01/03/2011	SA-PZ-151I1-20101215
1012127	1012127-07	PZ-155I	12/15/2010	12/16/2010	01/03/2011	SA-PZ-155I-20101215
1012127	1012127-08	PZ-160I	12/16/2010	12/17/2010	01/03/2011	SA-PZ-160I-2010216
1012127	1012127-09	PZ-159I1	12/16/2010	12/17/2010	01/03/2011	SA-PZ-159I1-20101216
1012127	1012127-10	PZ-160I	12/13/2010	12/16/2010	01/03/2011	SA-PZ-160I-20101213
1012127	1012127-11	TB01-20101213	12/13/2010	12/16/2010	01/03/2011	SA-TB01-20101213
1012127	1012127-12	SA-PZ-158I1	12/13/2010	12/16/2010	01/03/2011	SA-PZ-158I1-20101213
1012127	1012127-13	SA-PZ-158I	12/13/2010	12/16/2010	01/03/2011	SA-PZ-158I-20101213
1012127	1012127-14	SA-PZ-160I1	12/13/2010	12/16/2010	01/03/2011	SA-PZ-160I1-20101213
1012127	1012127-15	SA-PZ-133I	12/15/2010	12/16/2010	01/03/2011	SA-PZ-133I-20101215
1012127	1012127-16	SA-PZ-135I	12/14/2010	12/16/2010	01/03/2011	SA-PZ-135I-20101214
1012127	1012127-17	SA-PZ-136I	12/14/2010	12/16/2010	01/03/2011	SA-PZ-136I-20101214

Work Order	Sample #	Field ID	Sample Date	Rec Date	DueDate	Chain of Custody ID
1012127	1012127-18	SA-PZ-161I	12/14/2010	12/16/2010	01/03/2011	SA-PZ-161I-2010214
1012127	1012127-19	SA-PZ-139I	12/15/2010	12/16/2010	01/03/2011	SA-PZ-139I-20101215
1012127	1012127-20	SA-PZ-138I1	12/15/2010	12/16/2010	01/03/2011	SA-PZ-138I1-20101215
1012127	1012127-21	SA-PZ-138I	12/15/2010	12/16/2010	01/03/2011	SA-PZ-138I-20101215
1012127	1012127-22	DUP02-20101215	12/15/2010	12/16/2010	01/03/2011	SA-DUP02-20101215
1012127	1012127-23	SA-PZ-149I1	12/15/2010	12/16/2010	01/03/2011	SA-PZ-149I1-20101215

Cathy Dover

From: Sok, Rob [Rob.Sok@tetratech.com]
Sent: Friday, December 17, 2010 10:11 AM
To: Cathy Dover; Brayack, David
Subject: RE: Calverton Sampling - CTO-WE08

Cathy,

I talked with Dave this morning and he agreed that the NO2/NO3 and sulfide from the duplicate sample (Dup01) should be reported with the parent sample SA-PZ-157I1 and leave the VOC, MEE, TOC, and TAL metals reported as/with the duplicate.

Thanks,
Rob

Robert Sok, P.G. | Project Manager | Geologist
Tetra Tech NUS, Inc. | 5700 Lake Wright Drive | Suite 309 | Norfolk, VA 23502
Direct: 757-466-4904 | Mobile: 757-618-2104 | Fax: 757-461-4148
rob.sok@tetratech.com | www.ttnus.com

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From: Cathy Dover [mailto:cdover@compuchemlabs.com]
Sent: Thursday, December 16, 2010 3:51 PM
To: Sok, Rob; Brayack, David
Subject: RE: Calverton Sampling - CTO-WE08

Thanks, Rob! Yes, all of the other issues are resolved.

Oh! The wet chem. supervisor was able to make the 48 hr. holding times on PZ-157I (since we now know the official sampling time is 1455).

Have a great night!

Cathy

Cathy Dover
Supervisor of Project Management
Compuchem
501 Madison Ave.
Cary, N.C. 27513
(919)379-4089 office
(919)379-4050 fax

From: Sok, Rob [mailto:Rob.Sok@tetratech.com]
Sent: Thursday, December 16, 2010 3:42 PM
To: Cathy Dover; Brayack, David
Subject: RE: Calverton Sampling - CTO-WE08

Cathy,

As per our phone conversation, I will discuss with Dave tomorrow morning about the NO2/NO3 and Sulfide duplicate sample for PZ-157I1 and get back to you ASAP. I think we covered all the other issues from your emails and have them resolved.

Thanks,
Rob

Robert Sok, P.G. | Project Manager | Geologist
Tetra Tech NUS, Inc. | 5700 Lake Wright Drive | Suite 309 | Norfolk, VA 23502
Direct: 757-466-4904 | Mobile: 757-618-2104 | Fax: 757-461-4148
rob.sok@tetratech.com | www.ttnus.com

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From: Cathy Dover [mailto:cdover@compuchemlabs.com]
Sent: Thursday, December 16, 2010 2:25 PM
To: Sok, Rob; Brayack, David
Subject: RE: Calverton Sampling - CTO-WE08
Importance: High

Hey Rob & Dave,

There are a few more items I need your input on...

1. Please verify the time for SA-PZ-158I-20101213 VOC; COC has 1337 & the containers have 1329 for the time.
2. Also missing the sulfide for SA-PZ-157I1-20101214 (along with the NO2/NO3/FL/CHL container mentioned on previous e-mail)
3. Please verify the time for SA-PZ157I-20101214, the COC has 1455 for the time; the VOC, MEE, & TOC vials have the time of 1455; the MTL, sulfide, NO2/NO3/Fl/Chl containers have 1255 for the time.
4. Please verify sample ID for COC VOC sample SA-PZ-157I1-20101215; the container ID is SA-PZ-151I1-20101215

I have attached the COC copies for COC 27293 & 27280 with all the receiving notes.

The separate VOC only COCs 27291 & 27292 were great. No issues...

Thanks,

Cathy

Cathy Dover
Supervisor of Project Management
Compuchem
501 Madison Ave.
Cary, N.C. 27513
(919)379-4089 office
(919)379-4050 fax

From: Cathy Dover
Sent: Thursday, December 16, 2010 1:37 PM
To: 'Sok, Rob'; Brayack, David
Subject: RE: Calverton Sampling - CTO-WE08
Importance: High

Hi Rob,

We have gone through all of the coolers and we are missing the Nitrate/Nitrite/Fluoride/Chloride container for 2 of the sample IDs:

SA-PZ-159I1-20101214
SA-PZ-157I1-20101214

We have the Nitrate/Nitrite/Fluoride/Chloride container for the other two samples: SA-DUP01-20101214 & SA-PZ-157I-20101214.

I have attached the one page of COC that has the additional parameters...

We will go ahead and analyze the two we have because they are already out of the 48 hr. analytical holding time. These were collected on the 14th and they will be a couple of hours out of holding time by the time they are analyzed. The weather here has been bad and FED-EX was late today. If they would have gotten here at the normal time, we may have been able to barely make the holding time.

Let me know if SA-DUP01-20101214 is a duplicate of one of the ones we do not have the container for. If so, I can split the volume and analyze the sample for the "parent" sample ID if you would like.

Please let me know if the two sample containers I am missing may have been left in the field.

Thanks,

Cathy

Cathy Dover
Supervisor of Project Management
Compuchem
501 Madison Ave.
Cary, N.C. 27513
(919)379-4089 office
(919)379-4050 fax

From: Sok, Rob [mailto:Rob.Sok@tetratech.com]
Sent: Thursday, December 16, 2010 10:14 AM
To: Cathy Dover
Subject: RE: Calverton Sampling - CTO-WE08

Cathy – Yes, you should get the NO2/NO3 samples today. I do believe that all the Saturday samples should be just VOCs.

Thanks,
Rob

From: Cathy Dover [mailto:cdover@compuchemlabs.com]
Sent: Thursday, December 16, 2010 10:14 AM
To: Sok, Rob
Subject: RE: Calverton Sampling - CTO-WE08

Hey Rob,

Thanks for the heads-up on the shipment!

Are all of the samples that have the NO2/NO3 analysis in the shipment for today?

Also, with our weather overnight and now, FED-EX is running behind today.

I will let you know when they arrive.

Cathy

Cathy Dover
Supervisor of Project Management
Compuchem
501 Madison Ave.
Cary, N.C. 27513
(919)379-4089 office
(919)379-4050 fax

From: Sok, Rob [mailto:Rob.Sok@tetratech.com]
Sent: Thursday, December 16, 2010 10:06 AM
To: Cathy Dover
Subject: Calverton Sampling - CTO-WE08

Cathy,

You should receive samples from Calverton this morning. Please let me know if you receive the shipment. We have had some issues with Fed Ex lately. Including a lost cooler on one project, which is frustrating (re-sampling inevitable). I am not sure how many samples is in this shipment, but would guess around 20.

We will be shipping around 7-10 samples tomorrow for Saturday delivery. This will wrap up the sampling this week and likely for the year.

Thanks,
Rob

Robert Sok, P.G. | Project Manager | Geologist
Tetra Tech NUS, Inc. | 5700 Lake Wright Drive | Suite 309 | Norfolk, VA 23502
Direct: 757-466-4904 | Mobile: 757-618-2104 | Fax: 757-461-4148
rob.sok@tetratech.com | www.ttnus.com

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CompuChem
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Sample ID Cross Reference

Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Work Order	Sample #	Field ID	Sample Date	Rec Date	DueDate	Chain of Custody ID
1012127	1012127-01	PZ-159I1	12/14/2010	12/16/2010	01/03/2011	SA-PZ-159I1-20101214
1012127	1012127-02	PZ-157I	12/14/2010	12/16/2010	01/03/2011	SA-PZ-157I-20101214
1012127	1012127-03	PZ-157I1	12/14/2010	12/16/2010	01/03/2011	SA-PZ-157I1-20101214
1012127	1012127-04	DUP01-20101214	12/14/2010	12/16/2010	01/03/2011	SA-DUP01-20101214
1012127	1012127-05	PZ-159I	12/14/2010	12/16/2010	01/03/2011	SA-PZ-159I-20101214
1012127	1012127-06	PZ-151I1	12/15/2010	12/16/2010	01/03/2011	SA-PZ-151I1-20101215
1012127	1012127-07	PZ-155I	12/15/2010	12/16/2010	01/03/2011	SA-PZ-155I-20101215
1012127	1012127-08	PZ-160I	12/16/2010	12/17/2010	01/03/2011	SA-PZ-160I-2010216
1012127	1012127-09	PZ-159I1	12/16/2010	12/17/2010	01/03/2011	SA-PZ-159I1-20101216
1012127	1012127-10	PZ-160I	12/13/2010	12/16/2010	01/03/2011	SA-PZ-160I-20101213
1012127	1012127-11	TB01-20101213	12/13/2010	12/16/2010	01/03/2011	SA-TB01-20101213
1012127	1012127-12	SA-PZ-158I1	12/13/2010	12/16/2010	01/03/2011	SA-PZ-158I1-20101213
1012127	1012127-13	SA-PZ-158I	12/13/2010	12/16/2010	01/03/2011	SA-PZ-158I-20101213
1012127	1012127-14	SA-PZ-160I1	12/13/2010	12/16/2010	01/03/2011	SA-PZ-160I1-20101213
1012127	1012127-15	SA-PZ-133I	12/15/2010	12/16/2010	01/03/2011	SA-PZ-133I-20101215
1012127	1012127-16	SA-PZ-135I	12/14/2010	12/16/2010	01/03/2011	SA-PZ-135I-20101214
1012127	1012127-17	SA-PZ-136I	12/14/2010	12/16/2010	01/03/2011	SA-PZ-136I-20101214

Work Order	Sample #	Field ID	Sample Date	Rec Date	DueDate	Chain of Custody ID
1012127	1012127-18	SA-PZ-161I	12/14/2010	12/16/2010	01/03/2011	SA-PZ-161I-2010214
1012127	1012127-19	SA-PZ-139I	12/15/2010	12/16/2010	01/03/2011	SA-PZ-139I-20101215
1012127	1012127-20	SA-PZ-138I1	12/15/2010	12/16/2010	01/03/2011	SA-PZ-138I1-20101215
1012127	1012127-21	SA-PZ-138I	12/15/2010	12/16/2010	01/03/2011	SA-PZ-138I-20101215
1012127	1012127-22	DUP02-20101215	12/15/2010	12/16/2010	01/03/2011	SA-DUP02-20101215
1012127	1012127-23	SA-PZ-149I1	12/15/2010	12/16/2010	01/03/2011	SA-PZ-149I1-20101215

11/30/2010

VOA Internal Chain of Custody Sheet

Matrix Water **Batch**: 0121720 **Status**: Batched **Analysis**: VOA-8260B 5PPB D.O.D.

Lab Id	Client Id	Received	Container	Extraction
1012127-01 A	PZ-159I1	12/16/10	01b_40mL VOA, cool, H	SW 5030A/5030B
1012127-02 A	PZ-157I	12/16/10	01b_40mL VOA, cool, H	SW 5030A/5030B
1012127-03 A	PZ-157I1	12/16/10	01b_40mL VOA, cool, H	SW 5030A/5030B
1012127-04 A	DUP01-20101214	12/16/10	01b_40mL VOA, cool, H	SW 5030A/5030B
1012127-05 A	PZ-159I	12/16/10	3i_250mL Plastic, HNO3	SW 5030A/5030B
1012127-06 A	PZ-151I1	12/16/10	01b_40mL VOA, cool, H	SW 5030A/5030B
1012127-07 A	PZ-155I	12/16/10	01b_40mL VOA, cool, H	SW 5030A/5030B
1012127-10 A	PZ-160I	12/16/10	01b_40mL VOA, cool, H	SW 5030A/5030B
1012127-11 A	TB01-20101213	12/16/10	01b_40mL VOA, cool, H	SW 5030A/5030B
1012127-12 A	SA-PZ-158I1	12/16/10	01b_40mL VOA, cool, H	SW 5030A/5030B
1012127-13 A	SA-PZ-158I	12/16/10	01b_40mL VOA, cool, H	SW 5030A/5030B
1012127-14 A	SA-PZ-160I1	12/16/10	01b_40mL VOA, cool, H	SW 5030A/5030B
1012127-15 A	SA-PZ-133I	12/16/10	01b_40mL VOA, cool, H	SW 5030A/5030B
1012127-16 A	SA-PZ-135I	12/16/10	01b_40mL VOA, cool, H	SW 5030A/5030B
1012127-17 A	SA-PZ-136I	12/16/10	01b_40mL VOA, cool, H	SW 5030A/5030B
1012127-18 A	SA-PZ-161I	12/16/10	01b_40mL VOA, cool, H	SW 5030A/5030B
1012127-19 A	SA-PZ-139I	12/16/10	01b_40mL VOA, cool, H	SW 5030A/5030B
1012127-20 A	SA-PZ-138I1	12/16/10	01b_40mL VOA, cool, H	SW 5030A/5030B
1012127-21 A	SA-PZ-138I	12/16/10	01b_40mL VOA, cool, H	SW 5030A/5030B
1012127-22 A	DUP02-20101215	12/16/10	01b_40mL VOA, cool, H	SW 5030A/5030B
1012127-23 A	SA-PZ-149I1	12/16/10	01b_40mL VOA, cool, H	SW 5030A/5030B

Relinquished By	Date/Time	Received By	Date/Time
#2B	12-21-10	JAD	12-21-10
JAD	12-21-10	#2B	12-21-10
#2B	12-22-10	JAD	12-22-10
JAD	12-22-10	#2B	12-22-10

PM 12-29-10

WORK ORDER

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1012127

COMPUCHEM

Client:	**TETRA TECH**	**Project Manager:**	**Cathy Dover**
Project:	**CTO-WE08/112G02750.PT.PT/N62467-04-D-0057**	**Project Number:**	**CTO-WE08/112G02750.PT.PT/N62467-04-D-00**
SDG:	**1012127** **CASE:**	**Status:**	**Received**

Report To:
TETRA TECH
DAVE BRAYACK
5700 LAKE WRIGHT ROAD
NORFOLK, VA 23502
Phone: (412) 921-8506
Fax: (412) 921-4040

Invoice To:
TETRA TECH
DAVE BRAYACK
5700 LAKE WRIGHT ROAD
NORFOLK, VA 23502
Phone :(412) 921-8506
Fax: (412) 921-4040

Date Due:	01/03/2011 00:00 (17 day TAT)		
Received By:	Cathy Dover	Date Received:	12/17/2010 10:20
Logged In By:	Cathy Dover	Date Logged In:	12/17/2010 14:56

J & B Flags?: **YES** Metals ND to? **LOD**	TICS?:**10 VOA - 20 SVOA** Spike Level: **FULL Spike**	Deliverable: **Style 9 CD Only Bk Mark**	EDD : **56) TETRA TECH ADR**

DOD QSM4.1*USE 1012127-01 FOR VOC & MTL QC (LCS/LCSD FOR OTHERS)*VOC 8260B 5ML=NEWTETRA.SUB*TAL MTL 6010C*RSK175=MEE*IC=NO2/NO3/FL/CHL*SULFIDE*TOC SM5310B*CASE NARRATIVE NEEDS: CTO-WE08/112G02750 CALVERTON & PM: DAVE BRAYACK*SUMMARY PKG. NEEDS ALL FORMS

Analysis	Due	TAT	Expires	Received	Comments
1012127-01 PZ-159I1 [Water] Sampled 12/14/2010 12:35 Eastern					**USE FOR VOC & TAL METALS QC**
6010C METALS TAL-Invoice	01/03/2011 16:00	17	06/12/2011 12:35	12/16/2010 12:38	
6010 METALS DOD	01/03/2011 16:00	17	06/12/2011 12:35	12/16/2010 12:38	
VOA-8260B 5PPB D.O.D.	01/03/2011 16:00	17	12/28/2010 12:35	12/16/2010 12:38	SubList = VOA- NEWTETRA (12-16-10)
TTL ORGNC CRBN (TOC) SM5310B	01/03/2011 16:00	17	01/11/2011 12:35	12/16/2010 12:38	
SULFIDE SM4500S-2-F WATER DOD	01/03/2011 16:00	17	12/21/2010 12:35	12/16/2010 12:38	
GC-RSK-175 DOD	01/03/2011 16:00	17	12/28/2010 12:35	12/16/2010 12:38	SubList = GC- RSK MEE (12-16-10)
7470A/7471B Mercury DOD	01/03/2011 16:00	17	01/11/2011 12:35	12/16/2010 12:38	
1012127-02 PZ-157I [Water] Sampled 12/14/2010 14:55 Eastern					
VOA-8260B 5PPB D.O.D.	01/03/2011 16:00	17	12/28/2010 14:55	12/16/2010 12:38	SubList = VOA- NEWTETRA (12-16-10)
TTL ORGNC CRBN (TOC) SM5310B	01/03/2011 16:00	17	01/11/2011 14:55	12/16/2010 12:38	
SULFIDE SM4500S-2-F WATER DOD	01/03/2011 16:00	17	12/21/2010 14:55	12/16/2010 12:38	
IC 300 Anions DOD	01/03/2011 16:00	17	01/11/2011 14:55	12/16/2010 12:38	
GC-RSK-175 DOD	01/03/2011 16:00	17	12/28/2010 14:55	12/16/2010 12:38	SubList = GC- RSK MEE (12-16-10)
6010C METALS TAL-Invoice	01/03/2011 16:00	17	06/12/2011 14:55	12/16/2010 12:38	
7470A/7471B Mercury DOD	01/03/2011 16:00	17	01/11/2011 14:55	12/16/2010 12:38	
6010 METALS DOD	01/03/2011 16:00	17	06/12/2011 14:55	12/16/2010 12:38	

WORK ORDER

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1012127

COMPUCHEM

Client:	TETRA TECH	Project Manager:	Cathy Dover
Project:	CTO-WE08/112G02750.PT.PT/N62467-04-D-0057	Project Number:	CTO-WE08/112G02750.PT.PT/N62467-04-D-00
SDG:	1012127 CASE:	Status:	Batched

Analysis	Due	TAT	Expires		Comments
1012127-03 PZ-157I1 [Water] Sampled 12/14/2010 12:53 Eastern					
7470A/7471B Mercury DOD	01/03/2011 16:00	17	01/11/2011 12:53	12/16/2010 12:38	
GC-RSK-175 DOD	01/03/2011 16:00	17	12/28/2010 12:53	12/16/2010 12:38	SubList = GC- RSK MEE (12-16-10)
IC 300 Anions DOD	01/03/2011 16:00	17	01/11/2011 12:53	12/16/2010 12:38	
SULFIDE SM4500S-2-F WATER DOD	01/03/2011 16:00	17	12/21/2010 12:53	12/16/2010 12:38	
TTL ORGNC CRBN (TOC) SM5310B	01/03/2011 16:00	17	01/11/2011 12:53	12/16/2010 12:38	
VOA-8260B 5PPB D.O.D.	01/03/2011 16:00	17	12/28/2010 12:53	12/16/2010 12:38	SubList = VOA- NEWTETRA (12-16-10)
6010C METALS TAL-Invoice	01/03/2011 16:00	17	06/12/2011 12:53	12/16/2010 12:38	
6010 METALS DOD	01/03/2011 16:00	17	06/12/2011 12:53	12/16/2010 12:38	
1012127-04 DUP01-20101214 [Water] Sampled 12/14/2010 12:00 Eastern					
GC-RSK-175 DOD	01/03/2011 16:00	17	12/28/2010 12:00	12/16/2010 12:38	SubList = GC- RSK MEE (12-16-10)
6010 METALS DOD	01/03/2011 16:00	17	06/12/2011 12:00	12/16/2010 12:38	
TTL ORGNC CRBN (TOC) SM5310B	01/03/2011 16:00	17	01/11/2011 12:00	12/16/2010 12:38	
VOA-8260B 5PPB D.O.D.	01/03/2011 16:00	17	12/28/2010 12:00	12/16/2010 12:38	SubList = VOA- NEWTETRA (12-16-10)
7470A/7471B Mercury DOD	01/03/2011 16:00	17	01/11/2011 12:00	12/16/2010 12:38	
6010C METALS TAL-Invoice	01/03/2011 16:00	17	06/12/2011 12:00	12/16/2010 12:38	
1012127-05 PZ-159I [Water] Sampled 12/14/2010 14:20 Eastern					
GC-RSK-175 DOD	01/03/2011 16:00	17	12/28/2010 14:20	12/16/2010 12:38	SubList = GC- RSK MEE (12-16-10)
6010 METALS DOD	01/03/2011 16:00	17	06/12/2011 14:20	12/16/2010 12:38	
TTL ORGNC CRBN (TOC) SM5310B	01/03/2011 16:00	17	01/11/2011 14:20	12/16/2010 12:38	
6010C METALS TAL-Invoice	01/03/2011 16:00	17	06/12/2011 14:20	12/16/2010 12:38	
VOA-8260B 5PPB D.O.D.	01/03/2011 16:00	17	12/28/2010 14:20	12/16/2010 12:38	SubList = VOA- NEWTETRA (12-16-10)
1012127-06 PZ-151I1 [Water] Sampled 12/15/2010 12:05 Eastern					
GC-RSK-175 DOD	01/03/2011 16:00	17	12/29/2010 12:05	12/16/2010 12:38	SubList = GC- RSK MEE (12-16-10)
6010 METALS DOD	01/03/2011 16:00	17	06/13/2011 12:05	12/16/2010 12:38	
TTL ORGNC CRBN (TOC) SM5310B	01/03/2011 16:00	17	01/12/2011 12:05	12/16/2010 12:38	
VOA-8260B 5PPB D.O.D.	01/03/2011 16:00	17	12/29/2010 12:05	12/16/2010 12:38	SubList = VOA- NEWTETRA (12-16-10)
6010C METALS TAL-Invoice	01/03/2011 16:00	17	06/13/2011 12:05	12/16/2010 12:38	
7470A/7471B Mercury DOD	01/03/2011 16:00	17	01/12/2011 12:05	12/16/2010 12:38	

WORK ORDER

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1012127

COMPUCHEM

Client:	TETRA TECH	Project Manager:	Cathy Dover
Project:	CTO-WE08/112G02750.PT.PT/N62467-04-D-0057	Project Number:	CTO-WE08/112G02750.PT.PT/N62467-04-D-00
SDG:	1012127 CASE:	Status:	Received

Analysis	Due	TAT	Expires	Comments	
1012127-07 PZ-155I [Water] Sampled 12/15/2010 13:35 Eastern					
TTL ORGNC CRBN (TOC) SM5310B	01/03/2011 16:00	17	01/12/2011 13:35	12/16/2010 12:38	
VOA-8260B 5PPB D.O.D.	01/03/2011 16:00	17	12/29/2010 13:35	12/16/2010 12:38	SubList = VOA- NEWTETRA (12-16-10)
6010 METALS DOD	01/03/2011 16:00	17	06/13/2011 13:35	12/16/2010 12:38	
6010C METALS TAL-Invoice	01/03/2011 16:00	17	06/13/2011 13:35	12/16/2010 12:38	
GC-RSK-175 DOD	01/03/2011 16:00	17	12/29/2010 13:35	12/16/2010 12:38	SubList = GC- RSK MEE (12-16-10)
7470A/7471B Mercury DOD	01/03/2011 16:00	17	01/12/2011 13:35	12/16/2010 12:38	
1012127-08 PZ-160I [Water] Sampled 12/16/2010 15:41 Eastern					
7470A/7471B Mercury DOD	01/03/2011 16:00	17	01/13/2011 15:41	12/17/2010 10:20	
6010C METALS TAL-Invoice	01/03/2011 16:00	17	06/14/2011 15:41	12/17/2010 10:20	
6010 METALS DOD	01/03/2011 16:00	17	06/14/2011 15:41	12/17/2010 10:20	
TTL ORGNC CRBN (TOC) SM5310B	01/03/2011 16:00	17	01/13/2011 15:41	12/17/2010 10:20	
1012127-09 PZ-159I1 [Water] Sampled 12/16/2010 15:35 Eastern					
SULFIDE SM4500S-2-F WATER DOD	01/03/2011 16:00	17	12/23/2010 15:35	12/17/2010 10:20	
IC 300 Anions DOD	01/03/2011 16:00	17	01/13/2011 15:35	12/17/2010 10:20	
1012127-10 PZ-160I [Water] Sampled 12/13/2010 15:02 Eastern					
VOA-8260B 5PPB D.O.D.	01/03/2011 16:00	17	12/27/2010 15:02	12/16/2010 12:38	SubList = VOA- NEWTETRA (12-16-10)
GC-RSK-175 DOD	01/03/2011 16:00	17	12/27/2010 15:02	12/16/2010 12:38	SubList = GC- RSK MEE (12-16-10)
1012127-11 TB01-20101213 [Water] Sampled 12/13/2010 12:00 Eastern				**TRIP BLK**	
VOA-8260B 5PPB D.O.D.	01/03/2011 16:00	17	12/27/2010 12:00	12/16/2010 12:38	SubList = VOA- NEWTETRA (12-16-10)
1012127-12 SA-PZ-158I1 [Water] Sampled 12/13/2010 13:35 Eastern					
VOA-8260B 5PPB D.O.D.	01/03/2011 16:00	17	12/27/2010 13:35	12/16/2010 12:38	SubList = VOA- NEWTETRA (12-16-10)
1012127-13 SA-PZ-158I [Water] Sampled 12/13/2010 13:39 Eastern					
VOA-8260B 5PPB D.O.D.	01/03/2011 16:00	17	12/27/2010 13:39	12/16/2010 12:38	SubList = VOA- NEWTETRA (12-16-10)
1012127-14 SA-PZ-160I1 [Water] Sampled 12/13/2010 14:55 Eastern					
VOA-8260B 5PPB D.O.D.	01/03/2011 16:00	17	12/27/2010 14:55	12/16/2010 12:38	SubList = VOA- NEWTETRA (12-16-10)
1012127-15 SA-PZ-133I [Water] Sampled 12/15/2010 09:10 Eastern					
VOA-8260B 5PPB D.O.D.	01/03/2011 16:00	17	12/29/2010 09:10	12/16/2010 12:38	SubList = VOA- NEWTETRA (12-16-10)
1012127-16 SA-PZ-135I [Water] Sampled 12/14/2010 08:57 Eastern					
VOA-8260B 5PPB D.O.D.	01/03/2011 16:00	17	12/28/2010 08:57	12/16/2010 12:38	SubList = VOA- NEWTETRA (12-16-10)

WORK ORDER

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1012127

COMPUCHEM

Client:	TETRA TECH	Project Manager:	Cathy Dover
Project:	CTO-WE08/112G02750.PT.PT/N62467-04-D-0057	Project Number:	CTO-WE08/112G02750.PT.PT/N62467-04-D-00
SDG:	1012127 CASE:	Status:	Received

Analysis	Due	TAT	Expires		Comments
1012127-17 SA-PZ-136I [Water] Sampled 12/14/2010 09:08 Eastern					
VOA-8260B 5PPB D.O.D.	01/03/2011 16:00	17	12/28/2010 09:08	12/16/2010 12:38	SubList = VOA- NEWTETRA (12-16-10)
1012127-18 SA-PZ-161I [Water] Sampled 12/14/2010 10:45 Eastern					
VOA-8260B 5PPB D.O.D.	01/03/2011 16:00	17	12/28/2010 10:45	12/16/2010 12:38	SubList = VOA- NEWTETRA (12-16-10)
1012127-19 SA-PZ-139I [Water] Sampled 12/15/2010 10:35 Eastern					
VOA-8260B 5PPB D.O.D.	01/03/2011 16:00	17	12/29/2010 10:35	12/16/2010 12:38	SubList = VOA- NEWTETRA (12-16-10)
1012127-20 SA-PZ-138I1 [Water] Sampled 12/15/2010 10:47 Eastern					
VOA-8260B 5PPB D.O.D.	01/03/2011 16:00	17	12/29/2010 10:47	12/16/2010 12:38	SubList = VOA- NEWTETRA (12-16-10)
1012127-21 SA-PZ-138I [Water] Sampled 12/15/2010 11:54 Eastern					
VOA-8260B 5PPB D.O.D.	01/03/2011 16:00	17	12/29/2010 11:54	12/16/2010 12:38	SubList = VOA- NEWTETRA (12-16-10)
1012127-22 DUP02-20101215 [Water] Sampled 12/15/2010 12:00 Eastern					
VOA-8260B 5PPB D.O.D.	01/03/2011 16:00	17	12/29/2010 12:00	12/16/2010 12:38	SubList = VOA- NEWTETRA (12-16-10)
1012127-23 SA-PZ-149I1 [Water] Sampled 12/15/2010 13:00 Eastern					
VOA-8260B 5PPB D.O.D.	01/03/2011 16:00	17	12/29/2010 13:00	12/16/2010 12:38	SubList = VOA- NEWTETRA (12-16-10)

CompuChem

A division of Liberty Analytical Corporation
501 Madison Avenue
Cary, N.C. 27513
Tel: 919/379-4100 Fax: 919/379-4050

SDG NARRATIVE
SDG # 1012127
PROTOCOL: SW-846
CTO-WE08/112G02750 CALVERTON
PM: DAVE BRAYACK

SAMPLE IDENTIFICATIONS: PZ-159I1, PZ-157I, PZ-157I1, DUP01-20101214, PZ-159I, PZ-151I1, PZ-155I, PZ-160I, TB01-20101213, SA-PZ-158I1, SA-PZ-158I, SA-PZ-160I1, SA-PZ-133I, SA-PZ-135I, SA-PZ-136I, SA-PZ-161I, SA-PZ-139I, SA-PZ-138I1, SA-PZ-138I, DUP02-20101215, SA-PZ-149I1

The 21 aqueous samples listed above were received intact, refrigerated at 0.1°C and 0.2°C, with proper documentations, in sealed shipping containers, on December 16, 2010. The samples were scheduled for the requested analyses of the volatile fraction. SW-846, 3rd Edition, Update 3, 8260B was used to prepare and analyze the samples, with the exceptions and/or additions requested by the client. All pertinent Quality Assurance notices are included in the narrative section, and all pertinent Laboratory notices for SDG 1012127 are included in the sample data sections.

Analysis holding time requirements were met for the samples. The pH values of the samples were equal to 1. There were volatile Project/Target Compound List (TCL) analytes above the Contract Required Quantitation Limit (CRQL) identified in the samples. The system monitoring compounds (SMCs) met recovery criteria in the analysis of the samples, and all of the internal standards met retention time and response criteria in the analysis of the samples.

Due to the results of a screen samples PZ-159I1, SA-PZ-160I1, PZ-151I1 and SA-PZ-138I1 were initially analyzed using a dilution of raw sample. The screen Reconstructed Ion Chromatogram (RIC) is included in the sample data package immediately following the RIC for the sample's reportable run.

In the initial analysis of sample SA-PZ-158I, the on-column amount of some target compounds exceeded the instrument's analytical range as defined by the highest concentration level of the Initial Calibration. The sample was reanalyzed using a smaller aliquot of raw sample to bring the on-column amount into range. We have reported both analyses of sample SA-PZ-158I.

All Bromofluorobenzene (BFB) abundance criteria were met for tunes associated to this SDG. Overall QC criteria were met for all initial and continuing calibration standards associated to this SDG. The associated method blanks met all quality control criteria. The associated Laboratory Control Samples met all quality control criteria. PZ-159I1 was used as the original to prepare the duplicate matrix spikes as requested. The associated duplicate matrix spikes met all of the advisory accuracy and precision criteria.

I certify that this data package complies with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Furthermore, I certify that the tests used in this report meet all requirements of the NELAC standards unless otherwise stated in the SDG narrative or QA notice. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on diskette has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Patricia A Murphy

Patricia A. Murphy
Senior Scientist
December 29, 2010

GC and GC/MS Column and Trap Specifications Table

SDG #:	1012127

Columns Utilized	Brand Name	Coating Material	ID (mm)	Film Thickness (um)	Length (m)
	COLUMNS				
	GC Laboratory				
	Restek	RTX-5	0.53	1.0	30
	Restek	RTX-SMS	0.53	1.0	30
√	Restek	clpest	0.32	0.5	30
√	Restek	clpest2	0.32	0.42	30
	J&W	DB-210	0.53	1.0	30
	J&W	GS-GASPRO	0.32	N/A	30
	GC Volatiles Laboratory				
	Restek	RTX-Volatiles	0.53	2.0	30
	GC/MS Volatiles Laboratory				
	Restek	RTX-VMS	0.18	1.0	20
√	Supelco	SPB-624	0.32	1.8	60
	Supelco	SPB-624	0.53	3.0	75
	Phenomonex	ZB-624	0.32	1.8	60
	GC/MS Semivolatiles Laboratory				
√	Restek	RTX-5MS	0.32	0.25	30
	Phenomonex	ZB-5MS	0.32	0.25	30
	HPLC Laboratory				
	Supelco	Supelcosil LC-PAH	4.6	5.0	15 cm
	Supelco	Discovery RP Amide C16	4.6	5.0	25 cm
	Restek	Pinnacle Cyano	4.6	5.0	25 cm
	Restek	Allure C18	4.6	5.0	25 cm
	TRAPS				
	GC and GC/MS Volatiles Laboratory				
	Supelco J (BETXTRAP™)	* 7.7 cm Carbopack C			
		* 1.2 cm Carbopack B			
√	Supelco K (Vocarb3000)	* 10 cm of Carbopack B (Graphitized Carbons)			
		* 6 cm of Carboxen 1000 (Carbon molecular sieves)			
		* 1 cm of Carboxen 1001 (Carbon molecular sieves)			
					Rev. 28

*This table contains the GC columns (and volatile organic trap) used for the analysis of volatiles, semi-volatiles, pesticides and Aroclors by the SOM01.2 SOW.
Please see the SDG Narrative(s) for the specific fraction(s) relative to this SDG.

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CompuChem's Pagination Convention

As required by the EPA CLP Statement of Work (SOW) documents, data to be delivered must be paginated (by machine or hand). In the event that the initial numbering is incorrect (a page numbered twice or a page skipped, for example), it is CompuChem's policy to add an alphabetic suffix to a page number when necessary (e.g., 100A, 100B, etc.).

Revision 6 (12/6/2005)

CompuChem

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Notification Regarding Manual Editing/Integration Flags

In some instances, manual adjustments to the software output are necessary to provide accurate data. These manual integrations are performed by the data reviewers, GC/MS operators, or GC chemists. An Extracted Ion Current Profile (EICP) or a GC chromatographic peak has been provided for the manual integration performed on each compound to demonstrate the accuracy of that process. The manual integrations are flagged on the quantitation report in the far right column beyond the FINAL concentration for GC/MS analysis, and in the "Flags" column for GC analysis. The manual editing/integration flags are:

M - Denotes that a manual integration has been performed for this compound. The manual integration was performed in order to provide the most accurate area count possible for the peak.

H - Denotes that the data reviewer, GC/MS operator, or GC Chemist has chosen an alternate peak within the retention time window from that chosen by the software for that compound. No manual integration is performed in choosing an alternate peak. The software still performs the integration.

MH - Denotes that an alternate peak has been chosen within the retention time window from that chosen by the software for that compound and also a manual integration of the chosen peak has been performed. The manual integration was performed in order to provide the most accurate area count possible for the peak.

L - Denotes that a data reviewer or GC/MS operator has selected an alternate library search. This is typically done when an additional tentatively identified compound (TIC) has been added to the number of peaks searched. No manual integration is performed in choosing an alternate peak. The software still performs the integration.

ML - Denotes that an alternate library search has been selected and a manual integration has also been performed. This is typically done when an additional TIC has been added and the TIC peak also required a manual integration.

The EPA CLP SOW documents require additional explanations for manual editing/integration. In the accompanying raw data packages, additional codes have been applied to the "M" flag and carry the following meanings;

M1 - The compound was not found by the automatic integration routine.

M2 - The compound was incorrectly integrated by the automatic integration routine.

M3 - The co-eluting compounds were incorrectly integrated by the automatic integration routine.

These codes will appear in the GC/MS and GC raw data.

Revision 7 (12/6/2005)

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DATA REPORTING QUALIFIERS

On the Form I, under the column labeled "Q" for qualifier, each result is flagged with the specific data reporting qualifiers listed below, as appropriate. Up to five qualifiers may be reported on Form I for each compound. The qualifiers used are:

U : This flag indicates the compound was analyzed for but not detected. The Contract Required Quantitation Limit (CRQL), or reporting limit, will be adjusted to reflect any dilution and, for soils, the percent moisture.

J : This flag indicates an estimated value. The flag is used as detailed below:

1. When estimating a concentration for tentatively identified compounds (TICs) where a response factor of 1:1 is assumed for the TIC analyte,

2. When the mass spectral and retention time data indicate the presence of a compound that meets the volatile and semivolatile GC/MS identification criteria, and the result is less than the adjusted CRQL (or Reporting Limit) but greater than zero, and

3. When the retention time data indicate the presence of a compound that meets the pesticide and/or Aroclor or other GC or HPLC identification criteria, and the result is less than the adjusted CRQL (or Reporting Limit) but greater than zero. For example, if the CRQL (or Reporting Limit) is 10 µg/L, but a concentration of 3 µg/L is calculated, it is reported as 3J.

N : This flag indicates presumptive evidence of a compound. This flag is only used for TICs, where the identification is based on a mass spectral library search and must be used with the J flag. For generic characterization of a TIC such as "chlorinated hydrocarbon" (or for an "unknown," with no matches ≥85% in the SOM01.2 SOW document), the N flag is not used.

P : In the EPA's Contract Laboratory Program (CLP), this flag is used for a pesticide/Aroclor target analyte, when there is greater than 25% difference for detected concentrations between the two GC columns. The lower of the two values is reported on the Form I and flagged with a P.
For SW-846 GC and HPLC analyses, when the Relative Percent Difference (RPD) is greater than 40% and there is no evidence of chromatographic anomalies or interferences, then the lower of the two values is reported and flagged with a P. When the RPD is equal to or less than 40%, our policy is to also report the lower of the two values, although the choice could be a project specific issue. These SW-846 policies are consistent with Method 8000C. If Method 8000B is required, the higher of the two values is reported. For certain HPLC analyses, if one of the HPLC columns displays co-elution of target analytes, all results are reported from a primary column

displaying no co-elution. Results are still flagged with a P if the RPD between columns is greater than 40%.

C : This flag applies to GC or HPLC results where the identification has been confirmed by GC/MS. If GC/MS confirmation was attempted but was unsuccessful, this flag is not applied; a laboratory-defined flag is used instead (see the X/Y/Z qualifier.)

B : This flag is used when the analyte is found in the associated blank as well as in the sample. It indicates probable blank contamination and warns the data user to take appropriate action. This flag is used for a TIC as well as for a positively identified target compound. The combination of flags BU or UB is not an allowable policy. Blank contaminants are flagged B only when they are detected in the sample.

E : This flag identifies compounds whose concentrations exceed the upper level of the calibration range of the instrument for that specific analysis. If one or more compounds have a concentration greater than the upper level of the calibration range, the sample or extract will be diluted and reanalyzed. All such compounds with a concentration greater than the upper level of the calibration range will have the result flagged with an E on Form I for the original analysis.

D : If a sample or extract is reanalyzed at a higher dilution factor, for example when the concentration of an analyte exceeds the upper calibration range, the DL suffix is appended to the sample number on the Form I for the more diluted sample, and **all** reported concentrations on that Form I are flagged with the D flag. This flag alerts data users that any discrepancies between the reported concentrations may be due to dilution of the sample or extract.

NOTE 1: The D flag is not applied to compounds which are not detected in the sample analysis i.e. compounds reported with the CRQL (or Reporting Limit) and the U flag.

NOTE 2: Separate Forms I are used for reporting the original analysis (Client Sample No. XXXXX) and the more diluted sample analysis (Client Sample No. XXXXXDL) i.e. the results from both analyses <u>are not combined</u> on a single Form I.

A: This flag indicates that a TIC is a suspected aldol-condensation product.

S: In the SOM01.2 SOW document, this flag is used to indicate an estimated value for Aroclor target compounds where a valid 5-point initial calibration was not performed prior to the analytes detection in a sample. If an "S" flag is used for a specific Aroclor, then a reanalysis of the sample is required after a valid 5-point calibration is performed for the detected Aroclor.

X/Y/Z : Other specific flags may be required to properly define the results. If used, the flags will be fully described in the SDG Narrative. The laboratory-defined flags are limited to X, Y, and Z.

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Client: TETRA TECH **Work:** 1012127

Project CTO-WE08/112G02750.PT.PT/N62467-04-D-0057 **Sdg:** 1012127

Lab ID	Client ID	Matrix	Date Sampled	Date Received
1012127-01	PZ-159I1	Water	12/14/2010 12:35	12/16/2010 12:38
1012127-02	PZ-157I	Water	12/14/2010 14:55	12/16/2010 12:38
1012127-03	PZ-157I1	Water	12/14/2010 12:53	12/16/2010 12:38
1012127-04	DUP01-20101214	Water	12/14/2010 12:00	12/16/2010 12:38
1012127-05	PZ-159I	Water	12/14/2010 14:20	12/16/2010 12:38
1012127-06	PZ-151I1	Water	12/15/2010 12:05	12/16/2010 12:38
1012127-07	PZ-155I	Water	12/15/2010 13:35	12/16/2010 12:38
1012127-08	PZ-160I	Water	12/16/2010 15:41	12/17/2010 10:20
1012127-09	PZ-159I1	Water	12/16/2010 15:35	12/17/2010 10:20
1012127-10	PZ-160I	Water	12/13/2010 15:02	12/16/2010 12:38
1012127-11	TB01-20101213	Water	12/13/2010 12:00	12/16/2010 12:38
1012127-12	SA-PZ-158I1	Water	12/13/2010 13:35	12/16/2010 12:38
1012127-13	SA-PZ-158I	Water	12/13/2010 13:39	12/16/2010 12:38
1012127-14	SA-PZ-160I1	Water	12/13/2010 14:55	12/16/2010 12:38
1012127-15	SA-PZ-133I	Water	12/15/2010 09:10	12/16/2010 12:38
1012127-16	SA-PZ-135I	Water	12/14/2010 08:57	12/16/2010 12:38
1012127-17	SA-PZ-136I	Water	12/14/2010 09:08	12/16/2010 12:38
1012127-18	SA-PZ-161I	Water	12/14/2010 10:45	12/16/2010 12:38
1012127-19	SA-PZ-139I	Water	12/15/2010 10:35	12/16/2010 12:38
1012127-20	SA-PZ-138I1	Water	12/15/2010 10:47	12/16/2010 12:38
1012127-21	SA-PZ-138I	Water	12/15/2010 11:54	12/16/2010 12:38
1012127-22	DUP02-20101215	Water	12/15/2010 12:00	12/16/2010 12:38
1012127-23	SA-PZ-149I1	Water	12/15/2010 13:00	12/16/2010 12:38

ANALYSES DATA PACKAGE COVER PAGE

Client: TETRA TECH

Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Laboratory: COMPUCHEM

SDG: 1012127

Client Sample Id:	Lab Sample Id:
PZ-159I1	1012127-01
PZ-157I	1012127-02
PZ-157I1	1012127-03
DUP01-20101214	1012127-04
PZ-159I	1012127-05
PZ-151I1	1012127-06
PZ-155I	1012127-07
PZ-160I	1012127-10
TB01-20101213	1012127-11
SA-PZ-158I1	1012127-12
SA-PZ-158I1	1012127-12RE1
SA-PZ-158I	1012127-13
SA-PZ-160I1	1012127-14
SA-PZ-133I	1012127-15
SA-PZ-135I	1012127-16
SA-PZ-136I	1012127-17
SA-PZ-161I	1012127-18
SA-PZ-139I	1012127-19
SA-PZ-138I1	1012127-20
SA-PZ-138I	1012127-21
DUP02-20101215	1012127-22
SA-PZ-149I1	1012127-23

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the Electronic Data Deliverable has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: Patricia A Murphy

Name: Patricia A Murphy

Date: 12-29-10

Title: Senior Scientist

Environmental Testing Laboratories
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HOLDING TIME SUMMARY

SW 8260B

Client: TETRA TECH SDG: 1012127

Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Sample Name	Date Collected	Date Received	Date Prepared	Days to Prep	Max Days to Prep	Date Analyzed	Days to Analysis	Max Days to Analysis	Q
PZ-159I1	12/14/10	12/16/10	12/22/10	N/A	14.00	12/22/10	8.12	14.00	
PZ-157I	12/14/10	12/16/10	12/22/10	N/A	14.00	12/22/10	8.05	14.00	
PZ-157I1	12/14/10	12/16/10	12/22/10	N/A	14.00	12/22/10	8.15	14.00	
DUP01-20101214	12/14/10	12/16/10	12/22/10	N/A	14.00	12/22/10	8.20	14.00	
PZ-159I	12/14/10	12/16/10	12/21/10	N/A	14.00	12/21/10	7.17	14.00	
PZ-151I1	12/15/10	12/16/10	12/22/10	N/A	14.00	12/22/10	7.22	14.00	
PZ-155I	12/15/10	12/16/10	12/21/10	N/A	14.00	12/21/10	6.23	14.00	
PZ-160I	12/13/10	12/16/10	12/21/10	N/A	14.00	12/21/10	8.19	14.00	
TB01-20101213	12/13/10	12/16/10	12/21/10	N/A	14.00	12/21/10	8.34	14.00	
SA-PZ-158I1	12/13/10	12/16/10	12/21/10	N/A	14.00	12/21/10	8.29	14.00	
SA-PZ-158I1DL	12/13/10	12/16/10	12/22/10	N/A	14.00	12/22/10	9.03	14.00	
SA-PZ-158I	12/13/10	12/16/10	12/22/10	N/A	14.00	12/22/10	9.04	14.00	
SA-PZ-160I1	12/13/10	12/16/10	12/22/10	N/A	14.00	12/22/10	9.01	14.00	
SA-PZ-133I	12/15/10	12/16/10	12/21/10	N/A	14.00	12/21/10	6.40	14.00	
SA-PZ-135I	12/14/10	12/16/10	12/22/10	N/A	14.00	12/22/10	8.37	14.00	
SA-PZ-136I	12/14/10	12/16/10	12/22/10	N/A	14.00	12/22/10	8.38	14.00	
SA-PZ-161I	12/14/10	12/16/10	12/22/10	N/A	14.00	12/22/10	8.33	14.00	
SA-PZ-139I	12/15/10	12/16/10	12/22/10	N/A	14.00	12/22/10	7.36	14.00	
SA-PZ-138I1	12/15/10	12/16/10	12/22/10	N/A	14.00	12/22/10	7.37	14.00	
SA-PZ-138I	12/15/10	12/16/10	12/22/10	N/A	14.00	12/22/10	7.34	14.00	
DUP02-20101215	12/15/10	12/16/10	12/22/10	N/A	14.00	12/22/10	7.36	14.00	
SA-PZ-149I1	12/15/10	12/16/10	12/22/10	N/A	14.00	12/22/10	7.33	14.00	

ANALYSIS SEQUENCE SUMMARY

SW 8260B

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Sequence: 0L20010 Instrument: 5972hp59

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
BFB	0L20010-TUN1	0L20010-TUN159.d	12/20/10 19:12:00
VSTD020	0L20010-CAL3	0L20010-CAL359.d	12/20/10 19:36:00
VSTD010	0L20010-CAL2	0L20010-CAL259.d	12/20/10 20:03:00
VSTD005	0L20010-CAL1	0L20010-CAL159.d	12/20/10 20:30:00
VSTD050	0L20010-CAL4	0L20010-CAL459.d	12/20/10 20:57:00
VSTD100	0L20010-CAL5	0L20010-CAL559.d	12/20/10 21:25:00
VSTD200	0L20010-CAL6	0L20010-CAL659.d	12/20/10 21:52:00

MASS SPECTROMETER INSTRUMENT PERFORMANCE CHECK

SW 8260B

Laboratory:	COMPUCHEM	SDG:	1012127
Client:	TETRA TECH	Project:	CTO-WE08/112G02750.PT.PT/N62467-04-D-0057
Lab File ID:	0L20010-TUN159.d	Injection Date:	12/20/10
Instrument ID:	5972hp59	Injection Time:	19:12
Sequence:	0L20010	Lab Sample ID:	0L20010-TUN1

m/z	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE	
50	15 - 40% of 95	18.5	PASS
75	30 - 60% of 95	43.6	PASS
95	Base peak, 100% relative abundance	100	PASS
96	5 - 9% of 95	6.96	PASS
173	Less than 2% of 174	0	PASS
174	(Greater than 50% of 95)	74	PASS
175	5 - 9% of 174	7.73	PASS
176	(Greater than 95% but less then 101%)	100	PASS
177	5 - 9% of 176	6.92	PASS

INITIAL CALIBRATION DATA (Continued)

SW 8260B

Client: TETRA TECH SDG: 1012127

Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Calibration: 0122202 Instrument: 5972hp59

Calibration Date: 12/20/2010 7:36:11PM

Compound	Mean RF	% RSD	Mean RT	RT RSD	Linear r	Quad COD	RSD LIMIT	Q
Dichlorodifluoromethane	0.4713774	12.89144	4.296167	7.251883E-02			CCC (15)	
Chloromethane	0.3646265	9.838642	4.805667	8.199896E-02			CCC (15)	
Vinyl chloride	0.2452635	5.3434	5.105	5.844527E-02			CCC (30)	
Bromomethane	0.1819012	12.4664	5.974333	0.1163528			CCC (15)	
Chloroethane	0.1203973	6.597414	6.212667	4.522977E-02			CCC (15)	
Trichlorofluoromethane	0.4071588	11.61491	6.728667	5.937296E-02			CCC (15)	
1,1-Dichloroethene	0.238588	10.11365	7.733	4.940565E-02			CCC (30)	
Acetone	3.996388E-02	10.80369	7.8215	4.738581E-02			CCC (15)	
1,1,2-Trichloro-1,2,2-trifluoroethane	0.3492392	12.22708	7.675333	4.672825E-02			CCC (15)	
Carbon disulfide	0.9398163	12.49228	8.130667	3.909331E-02			CCC (15)	
Methyl acetate	0.1153314	8.338106	8.303333	6.064521E-02			CCC (15)	
Methylene chloride	0.2642836	10.58734	8.528167	0.0538482			CCC (15)	
trans-1,2-Dichloroethene	0.2596914	9.39774	8.875333	3.402092E-02			CCC (15)	
Methyl tert-butyl ether	0.4992108	6.766163	8.820833	3.356751E-02			CCC (15)	
1,1-Dichloroethane	0.4746428	11.09287	9.439	4.098645E-02			CCC (15)	
cis-1,2-Dichloroethene	0.2659083	9.91747	10.10267	0.0291358			CCC (15)	
2-Butanone	7.088383E-02	8.457285	10.05833	2.592259E-02			CCC (15)	
Chloroform	0.4530555	10.5723	10.39867	3.079933E-02			CCC (30)	
1,1,1-Trichloroethane	0.3861116	10.6316	10.60567	3.085314E-02			CCC (15)	
Cyclohexane	0.4666985	11.91678	10.64033	2.214903E-02			CCC (15)	
1,1-Dichloropropene	0.355036	12.2474	10.75867	2.566018E-02			CCC (15)	
Carbon tetrachloride	0.3299956	10.63763	10.75867	2.566018E-02			CCC (15)	
1,2-Dichloroethane	0.2649945	7.285566	10.99533	2.211049E-02			CCC (15)	
Benzene	0.9404337	11.87554	10.95733	0.0330584			CCC (15)	
Trichloroethene	0.2552195	7.929532	11.52267	2.974882E-02			CCC (15)	
Methylcyclohexane	0.4502666	9.213587	11.67233	3.069549E-02			CCC (15)	
1,2-Dichloropropane	0.225051	12.89161	11.73317	0.0280491			CCC (30)	
Bromodichloromethane	0.3162706	8.922524	11.937	1.683646E-02			CCC (15)	
cis-1,3-Dichloropropene	0.3543573	6.803878	12.27733	2.390585E-02			CCC (15)	
4-Methyl-2-pentanone	0.2360902	8.110948	12.3315	2.508906E-02			CCC (15)	

Environmental Testing Laboratories

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INITIAL CALIBRATION DATA (Continued)

SW 8260B

Client: TETRA TECH SDG: 1012127

Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Calibration: 0122202 Instrument: 5972hp59

Calibration Date: 12/20/2010 7:36:11PM

Compound	Mean RF	% RSD	Mean RT	RT RSD	Linear r	Quad COD	RSD LIMIT	Q
Toluene	0.8891573	9.607109	12.52867	2.485138E-02			CCC (30)	
trans-1,3-Dichloropropene	0.4357911	6.451686	12.6815	1.855096E-02			CCC (15)	
1,1,2-Trichloroethane	0.2436398	6.030037	12.831	3.033115E-02			CCC (15)	
Tetrachloroethene	0.2884593	11.3095	12.94267	2.268285E-02			CCC (15)	
2-Hexanone	0.1626722	9.996717	12.92833	2.345135E-02			CCC (15)	
Dibromochloromethane	0.3132078	3.62449	13.14017	0.0176132			CCC (15)	
1,2-Dibromoethane	0.2523245	4.355069	13.25833	2.073489E-02			CCC (15)	
Chlorobenzene	0.8186293	8.369553	13.58033	2.659294E-02			CCC (15)	
Ethylbenzene	0.4495885	9.477237	13.597	2.850081E-02			CCC (30)	
m,p-Xylene	0.5627541	9.159916	13.671	2.670279E-02			CCC (15)	
o-Xylene	0.5612836	6.754656	13.97333	1.327163E-02			CCC (15)	
Styrene	0.8588518	8.678982	13.98167	2.195094E-02			CCC (15)	
Bromoform	0.177898	5.341453	14.19033	1.414494E-02			CCC (15)	
Isopropylbenzene	1.463496	11.67684	14.20517	1.599999E-02			CCC (15)	
1,1,2,2-Tetrachloroethane	0.6945276	11.44474	14.44167	2.447973E-02			CCC (15)	
1,3-Dichlorobenzene	1.39147	9.65538	15.24367	1.870857E-02			CCC (15)	
1,4-Dichlorobenzene	1.319089	6.159105	15.311	2.016347E-02			CCC (15)	
1,2-Dichlorobenzene	1.227991	8.962601	15.65467	1.562057E-02			CCC (15)	
1,2-Dibromo-3-chloropropane	9.936417E-02	9.635275	16.36133	2.378961E-02			CCC (15)	
1,2,4-Trichlorobenzene	0.8541074	5.704247	17.249	1.673898E-02			CCC (15)	
Naphthalene	1.437124	6.547506	17.59733	1.820866E-02			CCC (15)	
1,2-Dichloroethene (total)	0.2627998	9.637979	10.10267	0.0291358			CCC (15)	
Xylenes (total)	0.5622639	8.34466	13.97333	1.327163E-02			CCC (15)	
Dibromofluoromethane	0.2636567	11.42799	10.56633	2.827415E-02			CCC (15)	
1,2-Dichloroethane-d4	0.2386685	14.39679	10.9268	0.0242149			CCC (15)	
Toluene-d8	1.14332	12.63143	12.4748	1.860371E-02			CCC (15)	
Bromofluorobenzene	1.02534	14.19036	14.38417	2.233318E-02			CCC (15)	

INITIAL CALIBRATION DATA

SW 8260B

Client: TETRA TECH SDG: 1012127

Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Calibration: 0122202 Instrument: 5972hp59

Calibration Date: 12/20/2010 7:36:11PM

Compound	Level 01		Level 02		Level 03		Level 04		Level 05		Level 06	
		RF		RF		RF		RF		RF		RF
Dichlorodifluoromethane	5	0.5443949	10	0.5307195	20	0.4848974	50	0.4589568	100	0.4182044	200	0.3910914
Chloromethane	5	0.4200911	10	0.3888474	20	0.355286	50	0.3666029	100	0.3341896	200	0.3227421
Vinyl chloride	5	0.2573707	10	0.2643691	20	0.2383893	50	0.2445694	100	0.2365945	200	0.2302882
Bromomethane	5	0.2109174	10	0.207847	20	0.1744241	50	0.1786556	100	0.1621269	200	0.1574362
Chloroethane	5	0.1305855	10	0.1279926	20	0.111986	50	0.1232215	100	0.11496	200	0.1136381
Trichlorofluoromethane	5	0.418068	10	0.46773	20	0.4331691	50	0.4227914	100	0.3444724	200	0.3567219
1,1-Dichloroethene	5	0.2674303	10	0.2632463	20	0.2375873	50	0.239745	100	0.2156009	200	0.2079184
Acetone	12.5	4.683775E-02	25	4.053182E-02	50	4.208385E-02	125	3.777842E-02	250	3.841571E-02	500	3.413574E-02
1,1,2-Trichloro-1,2,2-trifluoroethar	5	0.4127364	10	0.3811114	20	0.3486609	50	0.3439572	100	0.3086875	200	0.3002821
Carbon disulfide	5	1.077769	10	1.05847	20	0.9298375	50	0.9485843	100	0.8509737	200	0.7732631
Methyl acetate	5	0.1269528	10	0.1157273	20	0.120501	50	0.1149092	100	0.1158861	200	9.801214E-02
Methylene chloride	5	0.2974416	10	0.2931593	20	0.2674688	50	0.2596733	100	0.2415026	200	0.226456
trans-1,2-Dichloroethene	5	0.2883991	10	0.2827186	20	0.263598	50	0.2590094	100	0.2391997	200	0.2252236
Methyl tert-butyl ether	5	0.5325245	10	0.5128937	20	0.5204291	50	0.5032441	100	0.4888859	200	0.4372876
1,1-Dichloroethane	5	0.5360789	10	0.5275614	20	0.4756981	50	0.4759053	100	0.4317531	200	0.4008599
cis-1,2-Dichloroethene	5	0.2924788	10	0.2947464	20	0.2696396	50	0.2645397	100	0.2483152	200	0.2257299
2-Butanone	12.5	7.836247E-02	25	7.001833E-02	50	7.304017E-02	125	7.075371E-02	250	7.292913E-02	500	6.019919E-02
Chloroform	5	0.5038881	10	0.5002343	20	0.4542283	50	0.4607573	100	0.4206896	200	0.3785353
1,1,1-Trichloroethane	5	0.4273117	10	0.4301134	20	0.3857774	50	0.3955882	100	0.3501534	200	0.3277256
Cyclohexane	5	0.5414329	10	0.5076896	20	0.4646954	50	0.4760355	100	0.4215536	200	0.3887842
1,1-Dichloropropene	5	0.4007766	10	0.3973932	20	0.3610851	50	0.3593129	100	0.3241117	200	0.2875365
Carbon tetrachloride	5	0.3722407	10	0.3660496	20	0.3224077	50	0.3346538	100	0.3011784	200	0.2834434
1,2-Dichloroethane	5	0.2877061	10	0.2742592	20	0.2689048	50	0.2705533	100	0.2576318	200	0.2309118
Benzene	5	1.076036	10	1.037292	20	0.9423506	50	0.9536906	100	0.8599386	200	0.7732943
Trichloroethene	5	0.2682239	10	0.2752633	20	0.2579357	50	0.2674411	100	0.2404159	200	0.2220371
Methylcyclohexane	5	0.4890445	10	0.4852373	20	0.4492024	50	0.474135	100	0.4199709	200	0.3840098
1,2-Dichloropropane	5	0.2581642	10	0.2518771	20	0.2249182	50	0.2294795	100	0.2053808	200	0.1804863
Bromodichloromethane	5	0.3512608	10	0.3370759	20	0.3148172	50	0.3229107	100	0.3002513	200	0.2713078
cis-1,3-Dichloropropene	5	0.3636006	10	0.3766252	20	0.3543687	50	0.3718265	100	0.3501087	200	0.3096142
4-Methyl-2-pentanone	12.5	0.2537486	25	0.240282	50	0.2485782	125	0.2327078	250	0.2413192	500	0.1999056

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INITIAL CALIBRATION DATA

SW 8260B

Client: TETRA TECH SDG: 1012127

Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Calibration: 0122202 Instrument: 5972hp59

Calibration Date: 12/20/2010 7:36:11PM

Compound	Level 01		Level 02		Level 03		Level 04		Level 05		Level 06	
		RF		RF		RF		RF		RF		RF
Toluene	5	1.007704	10	0.9535054	20	0.8820631	50	0.8970376	100	0.8229017	200	0.7717322
trans-1,3-Dichloropropene	5	0.4679046	10	0.4423461	20	0.4527755	50	0.434577	100	0.4320931	200	0.3850501
1,1,2-Trichloroethane	5	0.261755	10	0.2500718	20	0.2455455	50	0.2442587	100	0.2431276	200	0.2170803
Tetrachloroethene	5	0.3229011	10	0.32378	20	0.2947692	50	0.2868146	100	0.2573832	200	0.2451076
2-Hexanone	12.5	0.1812119	25	0.1600051	50	0.171283	125	0.1627294	250	0.1676669	500	0.1331372
Dibromochloromethane	5	0.3120695	10	0.3232848	20	0.3171549	50	0.3218112	100	0.3129757	200	0.2919504
1,2-Dibromoethane	5	0.2568633	10	0.2582707	20	0.2587674	50	0.2528534	100	0.2568942	200	0.2302983
Chlorobenzene	5	0.8743969	10	0.8828008	20	0.8297301	50	0.8466817	100	0.7756795	200	0.7024869
Ethylbenzene	5	0.50391	10	0.472495	20	0.4532754	50	0.4663037	100	0.4172526	200	0.3842944
m,p-Xylene	10	0.615487	20	0.6019185	40	0.580079	100	0.5755547	200	0.5247911	400	0.4786944
o-Xylene	5	0.5999135	10	0.5907365	20	0.5651564	50	0.5775974	100	0.5351807	200	0.4991173
Styrene	5	0.9164088	10	0.910969	20	0.8901357	50	0.8923005	100	0.818794	200	0.724503
Bromoform	5	0.1887791	10	0.177143	20	0.1834758	50	0.1748466	100	0.1818684	200	0.1612753
Isopropylbenzene	5	1.650161	10	1.595667	20	1.496626	50	1.50515	100	1.348545	200	1.184825
1,1,2,2-Tetrachloroethane	5	0.8175096	10	0.7143917	20	0.6781665	50	0.7029208	100	0.6846971	200	0.56948
1,3-Dichlorobenzene	5	1.553995	10	1.486081	20	1.389031	50	1.43794	100	1.301589	200	1.180183
1,4-Dichlorobenzene	5	1.382605	10	1.381657	20	1.321053	50	1.380401	100	1.265413	200	1.183406
1,2-Dichlorobenzene	5	1.354102	10	1.334476	20	1.170297	50	1.268133	100	1.171758	200	1.069181
1,2-Dibromo-3-chloropropane	5	8.339665E-02	10	9.541149E-02	20	0.1022437	50	0.1062281	100	0.1107982	200	9.810689E-02
1,2,4-Trichlorobenzene	5	0.8907874	10	0.8926729	20	0.8394154	50	0.8989449	100	0.8264697	200	0.7763542
Naphthalene	5	1.573639	10	1.483077	20	1.338472	50	1.449063	100	1.456564	200	1.321931
1,2-Dichloroethene (total)	10	0.290439	20	0.2887325	40	0.2666188	100	0.2617745	200	0.2437574	400	0.2254768
Xylenes (total)	15	0.6102958	30	0.5981912	60	0.5751048	150	0.5762356	300	0.5282543	600	0.485502
Dibromofluoromethane	5	0.3168791	10	0.2784322	20	0.2552511	50	0.2521768	100	0.2476165	200	0.2315847
1,2-Dichloroethane-d4	5	0.2969163	10	0.2419115	20	0.2237175	50	0.2179269	100	0.2128705	200	~~0.1941762~~
Toluene-d8	5	~~1.635919~~	10	1.332916	20	1.209834	50	1.156182	100	1.066785	200	0.9508829
Bromofluorobenzene	5	1.3021	10	1.049961	20	0.9606375	50	0.9956322	100	0.9547216	200	0.8889868

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ANALYSIS SEQUENCE SUMMARY

SW 8260B

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Sequence: 0L21006 Instrument: 5972hp59

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
BFB	0L21006-TUN1	0L21006-TUN159.d	12/21/10 09:56:00
VSTD050	0L21006-CCV1	0L21006-CCV159.d	12/21/10 10:24:00
VBLKHK	0122107-BLK1	0122107-BLK159.d	12/21/10 11:30:00
VHKLCS	0122107-BS1	0122107-BS159.d	12/21/10 13:00:00
PZ-159I	1012127-05	1012127-0559.d	12/21/10 18:19:00
SA-PZ-133I	1012127-15	1012127-1559.d	12/21/10 18:46:00
PZ-155I	1012127-07	1012127-0759.d	12/21/10 19:13:00
PZ-160I	1012127-10	1012127-1059.d	12/21/10 19:40:00
TB01-20101213	1012127-11	1012127-1159.d	12/21/10 20:08:00
SA-PZ-158I1	1012127-12	1012127-1259.d	12/21/10 20:35:00

MASS SPECTROMETER INSTRUMENT PERFORMANCE CHECK

SW 8260B

Laboratory:	COMPUCHEM	SDG:	1012127
Client:	TETRA TECH	Project:	CTO-WE08/112G02750.PT.PT/N62467-04-D-0057
Lab File ID:	0L21006-TUN159.d	Injection Date:	12/21/10
Instrument ID:	5972hp59	Injection Time:	09:56
Sequence:	0L21006	Lab Sample ID:	0L21006-TUN1

m/z	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE	
50	15 - 40% of 95	18.9	PASS
75	30 - 60% of 95	45.6	PASS
95	Base peak, 100% relative abundance	100	PASS
96	5 - 9% of 95	6.95	PASS
173	Less than 2% of 174	0	PASS
174	(Greater than 50% of 95)	72.1	PASS
175	5 - 9% of 174	7.5	PASS
176	(Greater than 95% but less then 101%)	99.2	PASS
177	5 - 9% of 176	6.86	PASS

CONTINUING CALIBRATION CHECK

SW 8260B

Client: TETRA TECH SDG: 1012127

Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Instrument ID: 5972hp59 Calibration: 0122202

Lab File ID: 0L21006-CCV159.d Calibration Date: 12/20/10 19:36

Sequence: 0L21006 Injection Date: 12/21/10

Lab Sample ID: 0L21006-CCV1 Injection Time: 10:24

COMPOUND	TYPE	CONC. (ug/L)		RESPONSE FACTOR			% DIFF / DRIFT	
		STD	CCV	ICAL	CCV	MIN (#)	CCV	LIMIT
Dichlorodifluoromethane	Avg	50.00	48.00	0.4713774	0.4497585	0.001	-4.6	20
Chloromethane	Avg	50.00	52.00	0.3646265	0.3758896	0.1	3.1	20
Vinyl chloride	Avg	50.00	50.00	0.2452635	0.2485951	0.001	1.4	20
Bromomethane	Avg	50.00	48.00	0.1819012	0.1732504	0.001	-4.8	20
Chloroethane	Avg	50.00	50.00	0.1203973	0.1218034	0.001	1.2	20
Trichlorofluoromethane	Avg	50.00	46.00	0.4071588	0.3816008	0.001	-6.3	20
1,1-Dichloroethene	Avg	50.00	48.00	0.238588	0.2263934	0.001	-5.1	20
Acetone	Avg	125.0	130.0	3.996388E-02	4.166123E-02	0.001	4.2	20
1,1,2-Trichloro-1,2,2-trifluoroethane	Avg	50.00	48.00	0.3492392	0.3301181	0.001	-5.5	20
Carbon disulfide	Avg	50.00	48.00	0.9398163	0.911837	0.001	-3.0	20
Methyl acetate	Avg	50.00	56.00	0.1153314	0.1270345	0.001	10.1	20
Methylene chloride	Avg	50.00	50.00	0.2642836	0.2600995	0.001	-1.6	20
trans-1,2-Dichloroethene	Avg	50.00	50.00	0.2596914	0.2557001	0.001	-1.5	20
Methyl tert-butyl ether	Avg	50.00	52.00	0.4992108	0.518256	0.001	3.8	20
1,1-Dichloroethane	Avg	50.00	48.00	0.4746428	0.4621734	0.1	-2.6	20
cis-1,2-Dichloroethene	Avg	50.00	50.00	0.2659083	0.2659984	0.001	0.03	20
2-Butanone	Avg	125.0	138.0	7.088383E-02	7.783264E-02	0.001	9.8	20
Chloroform	Avg	50.00	50.00	0.4530555	0.4529313	0.001	-0.03	20
1,1,1-Trichloroethane	Avg	50.00	48.00	0.3861116	0.3761658	0.001	-2.6	20
Cyclohexane	Avg	50.00	48.00	0.4666985	0.4464595	0.001	-4.3	20
1,1-Dichloropropene	Avg	50.00	48.00	0.355036	0.3456356	0.001	-2.6	20
Carbon tetrachloride	Avg	50.00	48.00	0.3299956	0.3210141	0.001	-2.7	20
1,2-Dichloroethane	Avg	50.00	52.00	0.2649945	0.2711475	0.001	2.3	20
Benzene	Avg	50.00	50.00	0.9404337	0.9362233	0.001	-0.4	20
Trichloroethene	Avg	50.00	50.00	0.2552195	0.2512177	0.001	-1.6	20
Methylcyclohexane	Avg	50.00	50.00	0.4502666	0.4521847	0.001	0.4	20
1,2-Dichloropropane	Avg	50.00	50.00	0.225051	0.2211687	0.001	-1.7	20

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CONTINUING CALIBRATION CHECK

SW 8260B

Client: TETRA TECH SDG: 1012127

Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Instrument ID: 5972hp59 Calibration: 0122202

Lab File ID: 0L21006-CCV159.d Calibration Date: 12/20/10 19:36

Sequence: 0L21006 Injection Date: 12/21/10

Lab Sample ID: 0L21006-CCV1 Injection Time: 10:24

		CONC. (ug/L)		RESPONSE FACTOR			% DIFF / DRIFT	
COMPOUND	TYPE	STD	CCV	ICAL	CCV	MIN (#)	CCV	LIMIT
Bromodichloromethane	Avg	50.00	52.00	0.3162706	0.325695	0.001	3.0	20
cis-1,3-Dichloropropene	Avg	50.00	52.00	0.3543573	0.361699	0.001	2.1	20
4-Methyl-2-pentanone	Avg	125.0	140.0	0.2360902	0.2659149	0.001	12.6	20
Toluene	Avg	50.00	50.00	0.8891573	0.8774246	0.001	-1.3	20
trans-1,3-Dichloropropene	Avg	50.00	50.00	0.4357911	0.4350141	0.001	-0.2	20
1,1,2-Trichloroethane	Avg	50.00	52.00	0.2436398	0.2581726	0.001	6.0	20
Tetrachloroethene	Avg	50.00	46.00	0.2884593	0.2670314	0.001	-7.4	20
2-Hexanone	Avg	125.0	142.0	0.1626722	0.1841902	0.001	13.2	20
Dibromochloromethane	Avg	50.00	52.00	0.3132078	0.3277182	0.001	4.6	20
1,2-Dibromoethane	Avg	50.00	54.00	0.2523245	0.2701811	0.001	7.1	20
Chlorobenzene	Avg	50.00	50.00	0.8186293	0.8137668	0.3	-0.6	20
Ethylbenzene	Avg	50.00	48.00	0.4495885	0.4384409	0.001	-2.5	20
m,p-Xylene	Avg	100.0	98.00	0.5627541	0.5527273	0.001	-1.8	20
o-Xylene	Avg	50.00	50.00	0.5612836	0.5573486	0.001	-0.7	20
Styrene	Avg	50.00	50.00	0.8588518	0.8637437	0.001	0.6	20
Bromoform	Avg	50.00	52.00	0.177898	0.1864103	0.1	4.8	20
Isopropylbenzene	Avg	50.00	48.00	1.463496	1.420263	0.001	-3.0	20
1,1,2,2-Tetrachloroethane	Avg	50.00	54.00	0.6945276	0.7362983	0.3	6.0	20
1,3-Dichlorobenzene	Avg	50.00	46.00	1.39147	1.272283	0.001	-8.6	20
1,4-Dichlorobenzene	Avg	50.00	48.00	1.319089	1.257776	0.001	-4.6	20
1,2-Dichlorobenzene	Avg	50.00	48.00	1.227991	1.195939	0.001	-2.6	20
1,2-Dibromo-3-chloropropane	Avg	50.00	58.00	9.936417E-02	0.1135049	0.001	14.2	20
1,2,4-Trichlorobenzene	Avg	50.00	42.00	0.8541074	0.7166176	0.001	-16.1	20
Naphthalene	Avg	50.00	48.00	1.437124	1.357752	0.001	-5.5	20
1,2-Dichloroethene (total)	Avg	100.0	100.0	0.2627998	0.2608493	0.001	-0.7	20
Xylenes (total)	Avg	150.0	148.0	0.5622639	0.5542677	0.001	-1.4	20
Dibromofluoromethane	Avg	50.00	50.00	0.2636567	0.2601664	0.001	-1.3	20

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CONTINUING CALIBRATION CHECK

SW 8260B

Client:	TETRA TECH			SDG:	1012127
Project:	CTO-WE08/112G02750.PT.PT/N62467-04-D-0057				
Instrument ID:	5972hp59	Calibration:	0122202		
Lab File ID:	0L21006-CCV159.d	Calibration Date:	12/20/10 19:36		
Sequence:	0L21006	Injection Date:	12/21/10		
Lab Sample ID:	0L21006-CCV1	Injection Time:	10:24		

		CONC. (ug/L)		RESPONSE FACTOR			% DIFF / DRIFT	
COMPOUND	TYPE	STD	CCV	ICAL	CCV	MIN (#)	CCV	LIMIT
1,2-Dichloroethane-d4	Avg	50.00	48.00	0.2386685	0.2307194	0.001	-3.3	20
Toluene-d8	Avg	50.00	52.00	1.14332	1.171931	0.001	2.5	20
Bromofluorobenzene	Avg	50.00	46.00	1.02534	0.9471923	0.001	-7.6	20

Column to be used to flag Response Factor and %Diff/Drift values with an asterisk

* Values outside of QC limits

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ANALYSIS DATA SHEET

SW 8260B

VBLKHK

Client: TETRA TECH | SDG: 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Extraction: SW 5030A/5030B | File ID: 0122107-BLK159.d | QC Type: Blank

Initial/Final: 5mL / 5mL | Lab ID: 0122107-BLK1 | Column ID: SPB-624

Dilution: 1 | pH: | Prepared: 12/21/10 11:30

% Moisture: NA | Analyzed: 12/21/10 11:30

Batch: 0122107 | Sequence: 0L21006 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC.(ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane		0.55	2.0	5.0	U
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene		0.53	2.0	5.0	U
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride		0.49	0.50	5.0	U
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane		0.27	0.50	5.0	U
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane		0.32	0.50	5.0	U
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene		0.31	0.50	5.0	U
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U

ANALYSIS DATA SHEET

SW 8260B

VBLKHK

Client: TETRA TECH | SDG: 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Extraction: SW 5030A/5030B | File ID: 0122107-BLK159.d | QC Type: Blank

Initial/Final: 5mL / 5mL | Lab ID: 0122107-BLK1 | Column ID: SPB-624

Dilution: 1 | pH: | Prepared: 12/21/10 11:30

% Moisture: NA | Analyzed: 12/21/10 11:30

Batch: 0122107 | Sequence: 0L21006 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC.(ug/L)	DL	LOD	LOQ	Q
100-41-4	Ethylbenzene		0.42	0.50	5.0	U
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene		0.36	0.50	5.0	U
106-46-7	1,4-Dichlorobenzene		0.30	0.50	5.0	U
95-50-1	1,2-Dichlorobenzene		0.35	0.50	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene		0.48	0.50	5.0	U
91-20-3	Naphthalene		1.1	2.0	5.0	U
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	52.58	105	85 - 115	
1,2-Dichloroethane-d4	50.00	50.48	101	70 - 120	
Toluene-d8	50.00	53.06	106	85 - 120	
Bromofluorobenzene	50.00	52.57	105	75 - 120	

CAS NO.	TICS	CONC.(ug/L)	Response	R.T.	% Match	Q
NA	Laboratory Artifact	11	344333	14.48	0	J

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LCS / LCS DUPLICATE RECOVERY

SW 8260B

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Lab ID: 0122107-BS1 Matrix: Water Client ID: VHKLCS Batch: 0122107

ANALYTE	SPIKE ADDED (ug/L)	LCS CONCENTRATION (ug/L)	LCS % REC.	Q	QC LIMITS REC.
Dichlorodifluoromethane	50.00	44.77	90		30 - 155
Chloromethane	50.00	48.38	97		40 - 125
Vinyl chloride	50.00	49.35	99		50 - 145
Bromomethane	50.00	47.69	95		30 - 145
Chloroethane	50.00	49.75	99		60 - 135
Trichlorofluoromethane	50.00	39.70	79		60 - 145
1,1-Dichloroethene	50.00	46.53	93		70 - 130
Acetone	125.0	116.1	93		40 - 140
1,1,2-Trichloro-1,2,2-trifluoroethane	50.00	45.26	91		50 - 150
Carbon disulfide	50.00	46.80	94		35 - 160
Methyl acetate	50.00	49.12	98		50 - 150
Methylene chloride	50.00	50.10	100		55 - 140
trans-1,2-Dichloroethene	50.00	47.36	95		60 - 140
Methyl tert-butyl ether	50.00	48.95	98		65 - 125
1,1-Dichloroethane	50.00	47.85	96		70 - 135
cis-1,2-Dichloroethene	50.00	47.60	95		70 - 125
2-Butanone	125.0	121.8	97		30 - 150
Chloroform	50.00	49.29	99		65 - 135
1,1,1-Trichloroethane	50.00	48.74	97		65 - 130
Cyclohexane	50.00	46.44	93		50 - 150
1,1-Dichloropropene	50.00	48.68	97		75 - 130
Carbon tetrachloride	50.00	47.49	95		65 - 140
1,2-Dichloroethane	50.00	50.88	102		70 - 130
Benzene	50.00	48.74	97		80 - 120
Trichloroethene	50.00	48.20	96		70 - 125
Methylcyclohexane	50.00	47.49	95		50 - 150
1,2-Dichloropropane	50.00	49.62	99		75 - 125
Bromodichloromethane	50.00	49.83	100		75 - 120
cis-1,3-Dichloropropene	50.00	51.24	102		70 - 130
4-Methyl-2-pentanone	125.0	123.7	99		60 - 135
Toluene	50.00	46.87	94		75 - 120

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LCS / LCS DUPLICATE RECOVERY

SW 8260B

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Lab ID: 0122107-BS1 Matrix: Water Client ID: VHKLCS Batch: 0122107

ANALYTE	SPIKE ADDED (ug/L)	LCS CONCENTRATION (ug/L)	LCS % REC.	Q	QC LIMITS REC.
trans-1,3-Dichloropropene	50.00	50.82	102		55 - 140
1,1,2-Trichloroethane	50.00	50.25	100		75 - 125
Tetrachloroethene	50.00	45.20	90		45 - 150
2-Hexanone	125.0	127.6	102		55 - 130
Dibromochloromethane	50.00	49.86	100		50 - 150
1,2-Dibromoethane	50.00	49.64	99		80 - 120
Chlorobenzene	50.00	50.07	100		80 - 120
Ethylbenzene	50.00	48.62	97		75 - 125
m,p-Xylene	100.0	97.42	97		75 - 130
o-Xylene	50.00	49.17	98		80 - 120
Styrene	50.00	50.70	101		65 - 135
Bromoform	50.00	45.85	92		70 - 130
Isopropylbenzene	50.00	49.30	99		75 - 125
1,1,2,2-Tetrachloroethane	50.00	51.42	103		65 - 130
1,3-Dichlorobenzene	50.00	49.35	99		75 - 125
1,4-Dichlorobenzene	50.00	51.34	103		75 - 125
1,2-Dichlorobenzene	50.00	50.51	101		70 - 120
1,2-Dibromo-3-chloropropane	50.00	50.04	100		50 - 130
1,2,4-Trichlorobenzene	50.00	50.02	100		65 - 135
Naphthalene	50.00	51.67	103		55 - 140
1,2-Dichloroethene (total)	100.0	94.96	95		50 - 150
Xylenes (total)	150.0	146.6	98		50 - 150

ANALYSIS SEQUENCE SUMMARY

SW 8260B

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Sequence: 0L22003 Instrument: 5972hp59

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
BFB	0L22003-TUN1	0L22003-TUN159.d	12/22/10 11:02:00
VSTD050	0L22003-CCV1	0L22003-CCV159.d	12/22/10 11:26:00
VBLKHL	0122204-BLK1	0122204-BLK159.d	12/22/10 12:02:00
VHLLCS	0122204-BS1	0122204-BS159.d	12/22/10 12:38:00
VHLLCSD	0122204-BSD1	0122204-BSD159.d	12/22/10 13:05:00
SA-PZ-158I1DL	1012127-12RE1	1012127-12D59.d	12/22/10 14:11:00
SA-PZ-158I	1012127-13	1012127-13R59.d	12/22/10 14:38:00
SA-PZ-160I1	1012127-14	1012127-14D59.d	12/22/10 15:06:00
PZ-159I1	1012127-01	1012127-0159.d	12/22/10 15:33:00
PZ-157I	1012127-02	1012127-0259.d	12/22/10 16:00:00
PZ-157I1	1012127-03	1012127-0359.d	12/22/10 16:28:00
DUP01-20101214	1012127-04	1012127-0459.d	12/22/10 16:55:00
PZ-151I1	1012127-06	1012127-0659.d	12/22/10 17:22:00
SA-PZ-135I	1012127-16	1012127-1659.d	12/22/10 17:49:00
SA-PZ-136I	1012127-17	1012127-1759.d	12/22/10 18:17:00
SA-PZ-161I	1012127-18	1012127-1859.d	12/22/10 18:44:00
SA-PZ-139I	1012127-19	1012127-1959.d	12/22/10 19:11:00
SA-PZ-138I1	1012127-20	1012127-2059.d	12/22/10 19:38:00
SA-PZ-138I	1012127-21	1012127-2159.d	12/22/10 20:06:00
DUP02-20101215	1012127-22	1012127-2259.d	12/22/10 20:33:00
SA-PZ-149I1	1012127-23	1012127-2359.d	12/22/10 21:00:00
PZ-159I1MS	0122204-MS1	0122204-MS159.d	12/22/10 21:27:00
PZ-159I1MSD	0122204-MSD1	0122204-MSD159.d	12/22/10 21:54:00

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MASS SPECTROMETER INSTRUMENT PERFORMANCE CHECK

SW 8260B

Laboratory:	COMPUCHEM	SDG:	1012127
Client:	TETRA TECH	Project:	~~CTO-WE~~08/112G02750.PT.PT/N62467-04-D-0057
Lab File ID:	0L22003-TUN159.d	Injection Date:	12/22/10
Instrument ID:	5972hp59	Injection Time:	11:02
Sequence:	0L22003	Lab Sample ID:	0L22003-TUN1

m/z	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE	
50	15 - 40% of 95	17.9	PASS
75	30 - 60% of 95	44.5	PASS
95	Base peak, 100% relative abundance	100	PASS
96	5 - 9% of 95	6.95	PASS
173	Less than 2% of 174	0	PASS
174	(Greater than 50% of 95)	77.5	PASS
175	5 - 9% of 174	7.79	PASS
176	(Greater than 95% but less then 101%)	101	PASS
177	5 - 9% of 176	6.49	PASS

CONTINUING CALIBRATION CHECK

SW 8260B

Client: TETRA TECH SDG: 1012127

Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Instrument ID: 5972hp59 Calibration: 0122202

Lab File ID: 0L22003-CCV159.d Calibration Date: 12/20/10 19:36

Sequence: 0L22003 Injection Date: 12/22/10

Lab Sample ID: 0L22003-CCV1 Injection Time: 11:26

COMPOUND	TYPE	CONC. (ug/L)		RESPONSE FACTOR			% DIFF / DRIFT	
		STD	CCV	ICAL	CCV	MIN (#)	CCV	LIMIT
Dichlorodifluoromethane	Avg	50.00	46.00	0.4713774	0.4259098	0.001	-9.6	20
Chloromethane	Avg	50.00	46.00	0.3646265	0.339335	0.1	-6.9	20
Vinyl chloride	Avg	50.00	46.00	0.2452635	0.2295744	0.001	-6.4	20
Bromomethane	Avg	50.00	46.00	0.1819012	0.1676475	0.001	-7.8	20
Chloroethane	Avg	50.00	48.00	0.1203973	0.115313	0.001	-4.2	20
Trichlorofluoromethane	Avg	50.00	44.00	0.4071588	0.3567775	0.001	-12.4	20
1,1-Dichloroethene	Avg	50.00	48.00	0.238588	0.2260191	0.001	-5.3	20
Acetone	Avg	125.0	124.0	3.996388E-02	3.957483E-02	0.001	-1.0	20
1,1,2-Trichloro-1,2,2-trifluoroethane	Avg	50.00	48.00	0.3492392	0.3366062	0.001	-3.6	20
Carbon disulfide	Avg	50.00	48.00	0.9398163	0.9053487	0.001	-3.7	20
Methyl acetate	Avg	50.00	50.00	0.1153314	0.1175502	0.001	1.9	20
Methylene chloride	Avg	50.00	50.00	0.2642836	0.259897	0.001	-1.7	20
trans-1,2-Dichloroethene	Avg	50.00	50.00	0.2596914	0.2558548	0.001	-1.5	20
Methyl tert-butyl ether	Avg	50.00	50.00	0.4992108	0.503561	0.001	0.9	20
1,1-Dichloroethane	Avg	50.00	48.00	0.4746428	0.4502114	0.1	-5.1	20
cis-1,2-Dichloroethene	Avg	50.00	50.00	0.2659083	0.2619102	0.001	-1.5	20
2-Butanone	Avg	125.0	124.0	7.088383E-02	7.036186E-02	0.001	-0.7	20
Chloroform	Avg	50.00	50.00	0.4530555	0.4451997	0.001	-1.7	20
1,1,1-Trichloroethane	Avg	50.00	48.00	0.3861116	0.3730197	0.001	-3.4	20
Cyclohexane	Avg	50.00	46.00	0.4666985	0.4379074	0.001	-6.2	20
1,1-Dichloropropene	Avg	50.00	48.00	0.355036	0.3391509	0.001	-4.5	20
Carbon tetrachloride	Avg	50.00	48.00	0.3299956	0.3224846	0.001	-2.3	20
1,2-Dichloroethane	Avg	50.00	50.00	0.2649945	0.2657958	0.001	0.3	20
Benzene	Avg	50.00	50.00	0.9404337	0.9242991	0.001	-1.7	20
Trichloroethene	Avg	50.00	50.00	0.2552195	0.2506407	0.001	-1.8	20
Methylcyclohexane	Avg	50.00	48.00	0.4502666	0.4335325	0.001	-3.7	20
1,2-Dichloropropane	Avg	50.00	48.00	0.225051	0.2180992	0.001	-3.1	20

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CONTINUING CALIBRATION CHECK

SW 8260B

Client: TETRA TECH SDG: 1012127

Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Instrument ID: 5972hp59 Calibration: 0122202

Lab File ID: 0L22003-CCV159.d Calibration Date: 12/20/10 19:36

Sequence: 0L22003 Injection Date: 12/22/10

Lab Sample ID: 0L22003-CCV1 Injection Time: 11:26

COMPOUND	TYPE	CONC. (ug/L)		RESPONSE FACTOR			% DIFF / DRIFT	
		STD	CCV	ICAL	CCV	MIN (#)	CCV	LIMIT
Bromodichloromethane	Avg	50.00	50.00	0.3162706	0.3181886	0.001	0.6	20
cis-1,3-Dichloropropene	Avg	50.00	52.00	0.3543573	0.3639269	0.001	2.7	20
4-Methyl-2-pentanone	Avg	125.0	124.0	0.2360902	0.23317	0.001	-1.2	20
Toluene	Avg	50.00	48.00	0.8891573	0.8397419	0.001	-5.6	20
trans-1,3-Dichloropropene	Avg	50.00	50.00	0.4357911	0.4400997	0.001	1.0	20
1,1,2-Trichloroethane	Avg	50.00	50.00	0.2436398	0.2458021	0.001	0.9	20
Tetrachloroethene	Avg	50.00	48.00	0.2884593	0.2747415	0.001	-4.8	20
2-Hexanone	Avg	125.0	126.0	0.1626722	0.1635707	0.001	0.6	20
Dibromochloromethane	Avg	50.00	50.00	0.3132078	0.318254	0.001	1.6	20
1,2-Dibromoethane	Avg	50.00	52.00	0.2523245	0.26289	0.001	4.2	20
Chlorobenzene	Avg	50.00	50.00	0.8186293	0.8090738	0.3	-1.2	20
Ethylbenzene	Avg	50.00	48.00	0.4495885	0.4345232	0.001	-3.4	20
m,p-Xylene	Avg	100.0	96.00	0.5627541	0.5381389	0.001	-4.4	20
o-Xylene	Avg	50.00	48.00	0.5612836	0.5415904	0.001	-3.5	20
Styrene	Avg	50.00	50.00	0.8588518	0.8583632	0.001	-0.06	20
Bromoform	Avg	50.00	50.00	0.177898	0.1800072	0.1	1.2	20
Isopropylbenzene	Avg	50.00	48.00	1.463496	1.398466	0.001	-4.4	20
1,1,2,2-Tetrachloroethane	Avg	50.00	50.00	0.6945276	0.6919361	0.3	-0.4	20
1,3-Dichlorobenzene	Avg	50.00	50.00	1.39147	1.36448	0.001	-1.9	20
1,4-Dichlorobenzene	Avg	50.00	48.00	1.319089	1.288426	0.001	-2.3	20
1,2-Dichlorobenzene	Avg	50.00	48.00	1.227991	1.198096	0.001	-2.4	20
1,2-Dibromo-3-chloropropane	Avg	50.00	52.00	9.936417E-02	0.1043202	0.001	5.0	20
1,2,4-Trichlorobenzene	Avg	50.00	48.00	0.8541074	0.8248378	0.001	-3.4	20
Naphthalene	Avg	50.00	46.00	1.437124	1.343326	0.001	-6.5	20
1,2-Dichloroethene (total)	Avg	100.0	100.0	0.2627998	0.2588825	0.001	-1.5	20
Xylenes (total)	Avg	150.0	144.0	0.5622639	0.5392894	0.001	-4.1	20
Dibromofluoromethane	Avg	50.00	48.00	0.2636567	0.2559359	0.001	-2.9	20

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CONTINUING CALIBRATION CHECK

SW 8260B

Client:	TETRA TECH	SDG:	1012127
Project:	CTO-WE08/112G02750.PT.PT/N62467-04-D-0057		
Instrument ID:	5972hp59	Calibration:	0122202
Lab File ID:	0L22003-CCV159.d	Calibration Date:	12/20/10 19:36
Sequence:	0L22003	Injection Date:	12/22/10
Lab Sample ID:	0L22003-CCV1	Injection Time:	11:26

COMPOUND	TYPE	CONC. (ug/L)		RESPONSE FACTOR			% DIFF / DRIFT	
		STD	CCV	ICAL	CCV	MIN (#)	CCV	LIMIT
1,2-Dichloroethane-d4	Avg	50.00	46.00	0.2386685	0.2174944	0.001	-8.9	20
Toluene-d8	Avg	50.00	48.00	1.14332	1.104827	0.001	-3.4	20
Bromofluorobenzene	Avg	50.00	46.00	1.02534	0.9249315	0.001	-9.8	20

Column to be used to flag Response Factor and %Diff/Drift values with an asterisk

* Values outside of QC limits

PREPARATION BATCH SUMMARY

SW 8260B

Client: TETRA TECH

Batch: 0122107

SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water Preparation: SW 5030A/5030B

SAMPLE NAME	LAB SAMPLE ID	DATE PREPARED	INITIAL VOL/WT (mL)	FINAL VOL/WT (mL)
VBLKHK	0122107-BLK1	12/21/10 11:30	5.00	5.00
VHKLCS	0122107-BS1	12/21/10 11:30	5.00	5.00
PZ-159I	1012127-05	12/21/10 11:30	5.00	5.00
PZ-155I	1012127-07	12/21/10 11:30	5.00	5.00
PZ-160I	1012127-10	12/21/10 11:30	5.00	5.00
TB01-20101213	1012127-11	12/21/10 11:30	5.00	5.00
SA-PZ-158I1	1012127-12	12/21/10 11:30	5.00	5.00
SA-PZ-133I	1012127-15	12/21/10 11:30	5.00	5.00

PREPARATION BATCH SUMMARY

SW 8260B

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Batch: 0122204 Matrix: Water Preparation: SW 5030A/5030B

SAMPLE NAME	LAB SAMPLE ID	DATE PREPARED	INITIAL VOL/WT (mL)	FINAL VOL/WT (mL)
VBLKHL	0122204-BLK1	12/22/10 12:02	5.00	5.00
VHLLCS	0122204-BS1	12/22/10 12:02	5.00	5.00
VHLLCSD	0122204-BSD1	12/22/10 12:02	5.00	5.00
PZ-159I1MS	0122204-MS1	12/22/10 12:02	5.00	5.00
PZ-159I1MSD	0122204-MSD1	12/22/10 12:02	5.00	5.00
PZ-159I1	1012127-01	12/22/10 12:02	5.00	5.00
PZ-157I	1012127-02	12/22/10 12:02	5.00	5.00
PZ-157I1	1012127-03	12/22/10 12:02	5.00	5.00
DUP01-20101214	1012127-04	12/22/10 12:02	5.00	5.00
PZ-151I1	1012127-06	12/22/10 12:02	5.00	5.00
SA-PZ-158I1DL	1012127-12RE1	12/22/10 12:02	5.00	5.00
SA-PZ-158I	1012127-13	12/22/10 12:02	5.00	5.00
SA-PZ-160I1	1012127-14	12/22/10 12:02	5.00	5.00
SA-PZ-135I	1012127-16	12/22/10 12:02	5.00	5.00
SA-PZ-136I	1012127-17	12/22/10 12:02	5.00	5.00
SA-PZ-161I	1012127-18	12/22/10 12:02	5.00	5.00
SA-PZ-139I	1012127-19	12/22/10 12:02	5.00	5.00
SA-PZ-138I1	1012127-20	12/22/10 12:02	5.00	5.00
SA-PZ-138I	1012127-21	12/22/10 12:02	5.00	5.00
DUP02-20101215	1012127-22	12/22/10 12:02	5.00	5.00
SA-PZ-149I1	1012127-23	12/22/10 12:02	5.00	5.00

ANALYSIS DATA SHEET

SW 8260B

VBLKHL

Client: TETRA TECH | SDG: 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Extraction: SW 5030A/5030B | File ID: 0122204-BLK159.d | QC Type: Blank

Initial/Final: 5mL / 5mL | Lab ID: 0122204-BLK1 | Column ID: SPB-624

Dilution: 1 | pH: | Prepared: 12/22/10 12:02

% Moisture: NA | Analyzed: 12/22/10 12:02

Batch: 0122204 | Sequence: 0L22003 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC.(ug/L)	DL	LOD	LOQ	Q
75-71-8	Dichlorodifluoromethane		0.32	0.50	5.0	U
74-87-3	Chloromethane		0.39	0.50	5.0	U
75-01-4	Vinyl chloride		0.48	0.50	5.0	U
74-83-9	Bromomethane		0.76	2.0	5.0	U
75-00-3	Chloroethane		0.55	2.0	5.0	U
75-69-4	Trichlorofluoromethane		0.49	0.50	5.0	U
75-35-4	1,1-Dichloroethene		0.53	2.0	5.0	U
67-64-1	Acetone		1.6	5.0	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.82	2.0	5.0	U
75-15-0	Carbon disulfide		0.16	0.50	5.0	U
79-20-9	Methyl acetate		0.86	2.0	5.0	U
75-09-2	Methylene chloride		0.49	0.50	5.0	U
156-60-5	trans-1,2-Dichloroethene		0.44	0.50	5.0	U
1634-04-4	Methyl tert-butyl ether		0.22	0.50	5.0	U
75-34-3	1,1-Dichloroethane		0.27	0.50	5.0	U
156-59-2	cis-1,2-Dichloroethene		0.65	2.0	5.0	U
78-93-3	2-Butanone		1.5	5.0	13	U
67-66-3	Chloroform		0.27	0.50	5.0	U
71-55-6	1,1,1-Trichloroethane		0.32	0.50	5.0	U
110-82-7	Cyclohexane		0.45	0.50	5.0	U
563-58-6	1,1-Dichloropropene		0.42	0.50	5.0	U
56-23-5	Carbon tetrachloride		0.31	0.50	5.0	U
107-06-2	1,2-Dichloroethane		0.23	0.50	5.0	U
71-43-2	Benzene		0.28	0.50	5.0	U
79-01-6	Trichloroethene		0.28	0.50	5.0	U
108-87-2	Methylcyclohexane		0.35	0.50	5.0	U
78-87-5	1,2-Dichloropropane		0.86	2.0	5.0	U
75-27-4	Bromodichloromethane		0.36	0.50	5.0	U
10061-01-5	cis-1,3-Dichloropropene		0.52	2.0	5.0	U
108-10-1	4-Methyl-2-pentanone		1.1	1.3	13	U
108-88-3	Toluene		0.31	0.50	5.0	U
10061-02-6	trans-1,3-Dichloropropene		0.45	0.50	5.0	U
79-00-5	1,1,2-Trichloroethane		0.51	2.0	5.0	U
127-18-4	Tetrachloroethene		0.42	0.50	5.0	U
591-78-6	2-Hexanone		1.2	1.3	13	U
124-48-1	Dibromochloromethane		0.32	0.50	5.0	U
106-93-4	1,2-Dibromoethane		0.44	0.50	5.0	U
108-90-7	Chlorobenzene		0.27	0.50	5.0	U

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ANALYSIS DATA SHEET

SW 8260B

VBLKHL

Client: TETRA TECH | SDG: 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Extraction: SW 5030A/5030B | File ID: 0122204-BLK159.d | QC Type: Blank

Initial/Final: 5mL / 5mL | Lab ID: 0122204-BLK1 | Column ID: SPB-624

Dilution: 1 | pH: | Prepared: 12/22/10 12:02

% Moisture: NA | Analyzed: 12/22/10 12:02

Batch: 0122204 | Sequence: 0L22003 | Calibration: 0122202 | Instrument: 5972hp59

CAS NO.	COMPOUND	CONC.(ug/L)	DL	LOD	LOQ	Q
100-41-4	Ethylbenzene		0.42	0.50	5.0	U
179601-23-1	m,p-Xylene		0.84	1.0	10	U
95-47-6	o-Xylene		0.25	0.50	5.0	U
100-42-5	Styrene		0.36	0.50	5.0	U
75-25-2	Bromoform		0.95	2.0	5.0	U
98-82-8	Isopropylbenzene		0.27	0.50	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.64	2.0	5.0	U
541-73-1	1,3-Dichlorobenzene		0.36	0.50	5.0	U
106-46-7	1,4-Dichlorobenzene		0.30	0.50	5.0	U
95-50-1	1,2-Dichlorobenzene		0.35	0.50	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane		0.91	2.0	5.0	U
120-82-1	1,2,4-Trichlorobenzene	1.0	0.48	0.50	5.0	J
91-20-3	Naphthalene	2.9	1.1	2.0	5.0	J
540-59-0	1,2-Dichloroethene (total)		0.44	0.50	5.0	U
1330-20-7	Xylenes (total)		0.25	0.50	5.0	U

SURROGATE RECOVERY RESULTS	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Dibromofluoromethane	50.00	52.44	105	85 - 115	
1,2-Dichloroethane-d4	50.00	50.16	100	70 - 120	
Toluene-d8	50.00	51.37	103	85 - 120	
Bromofluorobenzene	50.00	48.23	96	75 - 120	

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LCS / LCS DUPLICATE RECOVERY

SW 8260B

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Lab ID: 0122204-BS1 Matrix: Water Client ID: VHLLCS Batch: 0122204

ANALYTE	SPIKE ADDED (ug/L)	LCS CONCENTRATION (ug/L)	LCS % REC.	Q	QC LIMITS REC.
Dichlorodifluoromethane	50.00	44.41	89		30 - 155
Chloromethane	50.00	47.01	94		40 - 125
Vinyl chloride	50.00	48.00	96		50 - 145
Bromomethane	50.00	46.96	94		30 - 145
Chloroethane	50.00	48.78	98		60 - 135
Trichlorofluoromethane	50.00	41.55	83		60 - 145
1,1-Dichloroethene	50.00	46.12	92		70 - 130
Acetone	125.0	112.6	90		40 - 140
1,1,2-Trichloro-1,2,2-trifluoroethane	50.00	46.73	93		50 - 150
Carbon disulfide	50.00	46.88	94		35 - 160
Methyl acetate	50.00	49.78	100		50 - 150
Methylene chloride	50.00	48.87	98		55 - 140
trans-1,2-Dichloroethene	50.00	48.42	97		60 - 140
Methyl tert-butyl ether	50.00	48.34	97		65 - 125
1,1-Dichloroethane	50.00	47.09	94		70 - 135
cis-1,2-Dichloroethene	50.00	48.51	97		70 - 125
2-Butanone	125.0	115.8	93		30 - 150
Chloroform	50.00	48.21	96		65 - 135
1,1,1-Trichloroethane	50.00	47.70	95		65 - 130
Cyclohexane	50.00	46.19	92		50 - 150
1,1-Dichloropropene	50.00	48.37	97		75 - 130
Carbon tetrachloride	50.00	47.98	96		65 - 140
1,2-Dichloroethane	50.00	49.48	99		70 - 130
Benzene	50.00	48.94	98		80 - 120
Trichloroethene	50.00	49.08	98		70 - 125
Methylcyclohexane	50.00	48.49	97		50 - 150
1,2-Dichloropropane	50.00	48.80	98		75 - 125
Bromodichloromethane	50.00	50.11	100		75 - 120
cis-1,3-Dichloropropene	50.00	50.38	101		70 - 130
4-Methyl-2-pentanone	125.0	119.5	96		60 - 135
Toluene	50.00	47.24	94		75 - 120

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LCS / LCS DUPLICATE RECOVERY

SW 8260B

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Lab ID: 0122204-BS1 Matrix: Water Client ID: VHLLCS Batch: 0122204

ANALYTE	SPIKE ADDED (ug/L)	LCS CONCENTRATION (ug/L)	LCS % REC.	Q	QC LIMITS REC.
trans-1,3-Dichloropropene	50.00	50.53	101		55 - 140
1,1,2-Trichloroethane	50.00	49.20	98		75 - 125
Tetrachloroethene	50.00	46.61	93		45 - 150
2-Hexanone	125.0	119.0	95		55 - 130
Dibromochloromethane	50.00	50.79	102		50 - 150
1,2-Dibromoethane	50.00	50.11	100		80 - 120
Chlorobenzene	50.00	50.19	100		80 - 120
Ethylbenzene	50.00	49.01	98		75 - 125
m,p-Xylene	100.0	96.86	97		75 - 130
o-Xylene	50.00	49.33	99		80 - 120
Styrene	50.00	50.67	101		65 - 135
Bromoform	50.00	48.24	96		70 - 130
Isopropylbenzene	50.00	48.63	97		75 - 125
1,1,2,2-Tetrachloroethane	50.00	49.36	99		65 - 130
1,3-Dichlorobenzene	50.00	48.76	98		75 - 125
1,4-Dichlorobenzene	50.00	50.46	101		75 - 125
1,2-Dichlorobenzene	50.00	48.68	97		70 - 120
1,2-Dibromo-3-chloropropane	50.00	52.77	106		50 - 130
1,2,4-Trichlorobenzene	50.00	47.22	94		65 - 135
Naphthalene	50.00	46.58	93		55 - 140
1,2-Dichloroethene (total)	100.0	96.93	97		50 - 150
Xylenes (total)	150.0	146.2	97		50 - 150

ANALYTE	SPIKE ADDED (ug/L)	LCSD CONCENTRATION (ug/L)	LCSD % REC. #	% RPD #	QC LIMITS RPD	Q	REC.
Dichlorodifluoromethane	50.00	41.56	83	7	30		30 - 155
Chloromethane	50.00	45.24	90	4	30		40 - 125
Vinyl chloride	50.00	45.83	92	5	30		50 - 145
Bromomethane	50.00	46.34	93	1	30		30 - 145
Chloroethane	50.00	49.06	98	0.6	30		60 - 135

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LCS / LCS DUPLICATE RECOVERY

SW 8260B

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Lab ID: 0122204-BSD1 Matrix: Water Client ID: VHLLCSD Batch: 0122204

ANALYTE	SPIKE ADDED (ug/L)	LCSD CONCENTRATION (ug/L)	LCSD % REC. #	% RPD #	QC LIMITS RPD	Q	REC.
Trichlorofluoromethane	50.00	39.90	80	4	30		60 - 145
1,1-Dichloroethene	50.00	44.44	89	4	30		70 - 130
Acetone	125.0	116.7	93	4	30		40 - 140
1,1,2-Trichloro-1,2,2-trifluoroethane	50.00	44.32	89	5	30		50 - 150
Carbon disulfide	50.00	44.93	90	4	30		35 - 160
Methyl acetate	50.00	48.96	98	2	30		50 - 150
Methylene chloride	50.00	48.15	96	1	30		55 - 140
trans-1,2-Dichloroethene	50.00	46.98	94	3	30		60 - 140
Methyl tert-butyl ether	50.00	47.53	95	2	30		65 - 125
1,1-Dichloroethane	50.00	45.55	91	3	30		70 - 135
cis-1,2-Dichloroethene	50.00	47.69	95	2	30		70 - 125
2-Butanone	125.0	117.0	94	1	30		30 - 150
Chloroform	50.00	47.36	95	2	30		65 - 135
1,1,1-Trichloroethane	50.00	46.58	93	2	30		65 - 130
Cyclohexane	50.00	44.23	88	4	30		50 - 150
1,1-Dichloropropene	50.00	46.44	93	4	30		75 - 130
Carbon tetrachloride	50.00	46.74	93	3	30		65 - 140
1,2-Dichloroethane	50.00	48.43	97	2	30		70 - 130
Benzene	50.00	47.84	96	2	30		80 - 120
Trichloroethene	50.00	46.99	94	4	30		70 - 125
Methylcyclohexane	50.00	46.05	92	5	30		50 - 150
1,2-Dichloropropane	50.00	47.91	96	2	30		75 - 125
Bromodichloromethane	50.00	49.37	99	1	30		75 - 120
cis-1,3-Dichloropropene	50.00	48.94	98	3	30		70 - 130
4-Methyl-2-pentanone	125.0	122.8	98	3	30		60 - 135
Toluene	50.00	46.47	93	2	30		75 - 120
trans-1,3-Dichloropropene	50.00	51.06	102	1	30		55 - 140
1,1,2-Trichloroethane	50.00	50.15	100	2	30		75 - 125
Tetrachloroethene	50.00	44.07	88	6	30		45 - 150
2-Hexanone	125.0	119.8	96	0.6	30		55 - 130
Dibromochloromethane	50.00	50.14	100	1	30		50 - 150

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LCS / LCS DUPLICATE RECOVERY

SW 8260B

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Lab ID: 0122204-BSD1 Matrix: Water Client ID: VHLLCSD Batch: 0122204

ANALYTE	SPIKE ADDED (ug/L)	LCSD CONCENTRATION (ug/L)	LCSD % REC. #	% RPD #	QC LIMITS RPD	Q	REC.
1,2-Dibromoethane	50.00	49.85	100	0.5	30		80 - 120
Chlorobenzene	50.00	49.27	99	2	30		80 - 120
Ethylbenzene	50.00	47.56	95	3	30		75 - 125
m,p-Xylene	100.0	95.51	96	1	30		75 - 130
o-Xylene	50.00	48.03	96	3	30		80 - 120
Styrene	50.00	49.85	100	2	30		65 - 135
Bromoform	50.00	47.34	95	2	30		70 - 130
Isopropylbenzene	50.00	47.57	95	2	30		75 - 125
1,1,2,2-Tetrachloroethane	50.00	50.40	101	2	30		65 - 130
1,3-Dichlorobenzene	50.00	48.49	97	0.6	30		75 - 125
1,4-Dichlorobenzene	50.00	48.98	98	3	30		75 - 125
1,2-Dichlorobenzene	50.00	49.19	98	1	30		70 - 120
1,2-Dibromo-3-chloropropane	50.00	50.16	100	5	30		50 - 130
1,2,4-Trichlorobenzene	50.00	48.25	96	2	30		65 - 135
Naphthalene	50.00	49.79	100	7	30		55 - 140
1,2-Dichloroethene (total)	100.0	94.67	95	2	30		50 - 150
Xylenes (total)	150.0	143.5	96	2	30		50 - 150

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY

SW 8260B

PZ-159I1MS

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Lab ID: 0122204-MS1 % Solid: NA Matrix: Water Lab Source ID: 1012127-01 Source Sample: PZ-159I1

ANALYTE	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC.	Q	QC LIMITS REC.
Dichlorodifluoromethane	83.50	0.84 U	83.01 D	99		30 - 155
Chloromethane	83.50	0.84 U	103.8 D	124		40 - 125
Vinyl chloride	83.50	0.84 U	98.16 D	118		50 - 145
Bromomethane	83.50	3.3 U	81.08 D	97		30 - 145
Chloroethane	83.50	50 D	147.5 D	117		60 - 135
Trichlorofluoromethane	83.50	0.84 U	91.46 D	110		60 - 145
1,1-Dichloroethene	83.50	12 D	95.21 D	99		70 - 130
Acetone	208.8	8.4 U	191.8 D	92		40 - 140
1,1,2-Trichloro-1,2,2-trifluoroethane	83.50	3.3 U	82.39 D	99		50 - 150
Carbon disulfide	83.50	0.84 U	87.10 D	104		35 - 160
Methyl acetate	83.50	3.3 U	79.65 D	95		50 - 150
Methylene chloride	83.50	4.2 JD	84.59 D	96		55 - 140
trans-1,2-Dichloroethene	83.50	0.84 U	86.54 D	104		60 - 140
Methyl tert-butyl ether	83.50	0.84 U	74.86 D	90		65 - 125
1,1-Dichloroethane	83.50	180 D	260.3 D	97		70 - 135
cis-1,2-Dichloroethene	83.50	3.3 U	85.48 D	102		70 - 125
2-Butanone	208.8	8.4 U	184.6 D	88		30 - 150
Chloroform	83.50	0.84 U	89.21 D	107		65 - 135
1,1,1-Trichloroethane	83.50	38 D	122.8 D	101		65 - 130
Cyclohexane	83.50	0.84 U	84.15 D	101		50 - 150
1,1-Dichloropropene	83.50	0.84 U	88.61 D	106		75 - 130
Carbon tetrachloride	83.50	0.84 U	84.89 D	102		65 - 140
1,2-Dichloroethane	83.50	0.84 U	87.04 D	104		70 - 130
Benzene	83.50	0.84 U	91.67 D	110		80 - 120
Trichloroethene	83.50	0.84 U	80.36 D	96		70 - 125
Methylcyclohexane	83.50	0.84 U	85.67 D	103		50 - 150
1,2-Dichloropropane	83.50	3.3 U	91.87 D	110		75 - 125
Bromodichloromethane	83.50	0.84 U	88.34 D	106		75 - 120
cis-1,3-Dichloropropene	83.50	3.3 U	83.98 D	101		70 - 130
4-Methyl-2-pentanone	208.8	2.1 U	196.3 D	94		60 - 135
Toluene	83.50	0.84 U	85.67 D	103		75 - 120
trans-1,3-Dichloropropene	83.50	0.84 U	84.00 D	101		55 - 140
1,1,2-Trichloroethane	83.50	3.3 U	81.81 D	98		75 - 125
Tetrachloroethene	83.50	0.84 U	75.72 D	91		45 - 150

Environmental Testing Laboratories CompuChem A Division Of Liberty Analytical Corp.

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY

SW 8260B

PZ-159I1MS

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Lab ID: 0122204-MS1 % Solid: NA Matrix: Water Lab Source ID: 1012127-01 Source Sample: PZ-159I1

ANALYTE	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC.	Q	QC LIMITS REC.
2-Hexanone	208.8	2.1 U	196.0 D	94		55 - 130
Dibromochloromethane	83.50	0.84 U	79.11 D	95		50 - 150
1,2-Dibromoethane	83.50	0.84 U	77.82 D	93		80 - 120
Chlorobenzene	83.50	0.84 U	89.65 D	107		80 - 120
Ethylbenzene	83.50	0.84 U	87.85 D	105		75 - 125
m,p-Xylene	167.0	1.7 U	177.8 D	106		75 - 130
o-Xylene	83.50	0.84 U	89.83 D	108		80 - 120
Styrene	83.50	0.84 U	91.13 D	109		65 - 135
Bromoform	83.50	3.3 U	70.34 D	84		70 - 130
Isopropylbenzene	83.50	0.84 U	89.50 D	107		75 - 125
1,1,2,2-Tetrachloroethane	83.50	3.3 U	81.63 D	98		65 - 130
1,3-Dichlorobenzene	83.50	0.84 U	84.40 D	101		75 - 125
1,4-Dichlorobenzene	83.50	5.4 JD	90.93 D	102		75 - 125
1,2-Dichlorobenzene	83.50	1.9 JD	85.17 D	100		70 - 120
1,2-Dibromo-3-chloropropane	83.50	3.3 U	75.53 D	90		50 - 130
1,2,4-Trichlorobenzene	83.50	0.84 U	77.34 BD	93		65 - 135
Naphthalene	83.50	3.3 U	72.35 BD	87		55 - 140
1,2-Dichloroethene (total)	167.0	0.84 U	172.0 D	103		50 - 150
Xylenes (total)	250.5	0.84 U	267.6 D	107		50 - 150

ANALYTE	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC. #	% RPD	Q	QC LIMITS RPD	QC LIMITS REC.
Dichlorodifluoromethane	83.50	82.42 D	99	0.7		30	30 - 155
Chloromethane	83.50	97.46 D	117	6		30	40 - 125
Vinyl chloride	83.50	101.6 D	122	3		30	50 - 145
Bromomethane	83.50	90.41 D	108	11		30	30 - 145
Chloroethane	83.50	144.9 D	114	2		30	60 - 135
Trichlorofluoromethane	83.50	93.54 D	112	2		30	60 - 145
1,1-Dichloroethene	83.50	96.78 D	101	2		30	70 - 130
Acetone	208.8	206.5 D	99	7		30	40 - 140
1,1,2-Trichloro-1,2,2-trifluoroethane	83.50	83.34 D	100	1		30	50 - 150

Environmental Testing Laboratories

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MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY

SW 8260B

PZ-159I1MSD

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Lab ID: 0122204-MSD1 % Solid: NA Matrix: Water Lab Source ID: 1012127-01 Source Sample: PZ-159I1

ANALYTE	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC. #	% RPD	Q	QC LIMITS RPD	QC LIMITS REC.
Carbon disulfide	83.50	87.70 D	105	0.7		30	35 - 160
Methyl acetate	83.50	86.76 D	104	9		30	50 - 150
Methylene chloride	83.50	89.06 D	102	5		30	55 - 140
trans-1,2-Dichloroethene	83.50	87.46 D	105	1		30	60 - 140
Methyl tert-butyl ether	83.50	83.25 D	100	11		30	65 - 125
1,1-Dichloroethane	83.50	252.9 D	89	3		30	70 - 135
cis-1,2-Dichloroethene	83.50	88.50 D	106	3		30	70 - 125
2-Butanone	208.8	203.2 D	97	10		30	30 - 150
Chloroform	83.50	89.66 D	107	0.5		30	65 - 135
1,1,1-Trichloroethane	83.50	123.2 D	101	0.3		30	65 - 130
Cyclohexane	83.50	85.84 D	103	2		30	50 - 150
1,1-Dichloropropene	83.50	88.49 D	106	0.1		30	75 - 130
Carbon tetrachloride	83.50	85.03 D	102	0.2		30	65 - 140
1,2-Dichloroethane	83.50	89.66 D	107	3		30	70 - 130
Benzene	83.50	90.17 D	108	2		30	80 - 120
Trichloroethene	83.50	81.39 D	97	1		30	70 - 125
Methylcyclohexane	83.50	82.82 D	99	3		30	50 - 150
1,2-Dichloropropane	83.50	91.32 D	109	0.6		30	75 - 125
Bromodichloromethane	83.50	88.32 D	106	0.02		30	75 - 120
cis-1,3-Dichloropropene	83.50	86.97 D	104	3		30	70 - 130
4-Methyl-2-pentanone	208.8	218.6 D	105	11		30	60 - 135
Toluene	83.50	83.30 D	100	3		30	75 - 120
trans-1,3-Dichloropropene	83.50	84.61 D	101	0.7		30	55 - 140
1,1,2-Trichloroethane	83.50	88.18 D	106	7		30	75 - 125
Tetrachloroethene	83.50	69.28 D	83	9		30	45 - 150
2-Hexanone	208.8	218.2 D	105	11		30	55 - 130
Dibromochloromethane	83.50	82.97 D	99	5		30	50 - 150
1,2-Dibromoethane	83.50	84.44 D	101	8		30	80 - 120
Chlorobenzene	83.50	81.44 D	98	10		30	80 - 120
Ethylbenzene	83.50	78.13 D	94	12		30	75 - 125
m,p-Xylene	167.0	153.0 D	92	15		30	75 - 130
o-Xylene	83.50	76.49 D	92	16		30	80 - 120
Styrene	83.50	77.17 D	92	17		30	65 - 135
Bromoform	83.50	73.84 D	88	5		30	70 - 130
Isopropylbenzene	83.50	75.01 D	90	18		30	75 - 125

Environmental Testing Laboratories CompuChem A Division Of Liberty Analytical Corp.

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY

SW 8260B

PZ-159I1MSD

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Lab ID: 0122204-MSD1 % Solid: NA Matrix: Water Lab Source ID: 1012127-01 Source Sample: PZ-159I1

ANALYTE	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC. #	% RPD	Q	QC LIMITS RPD	QC LIMITS REC.
1,1,2,2-Tetrachloroethane	83.50	90.12 D	108	10		30	65 - 130
1,3-Dichlorobenzene	83.50	69.22 D	83	20		30	75 - 125
1,4-Dichlorobenzene	83.50	72.08 D	80	23		30	75 - 125
1,2-Dichlorobenzene	83.50	72.69 D	85	16		30	70 - 120
1,2-Dibromo-3-chloropropane	83.50	77.80 D	93	3		30	50 - 130
1,2,4-Trichlorobenzene	83.50	62.24 BD	75	22		30	65 - 135
Naphthalene	83.50	71.79 BD	86	0.8		30	55 - 140
1,2-Dichloroethene (total)	167.0	176.0 D	105	2		30	50 - 150
Xylenes (total)	250.5	229.5 D	92	15		30	50 - 150

SURROGATE STANDARD RECOVERY

SW 8260B

Client: TETRA TECH

Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

SDG: 1012127 Instrument: 5972hp59

Sequence: 0L21006 Calibration: 0122202

Surrogate Compound	Spike Level	% Recovery	Recovery Limits	Q
Blank (0122107-BLK1) ug/L				
Lab File ID: 0122107-BLK159.d Analyzed: 12/21/10 11:30				
Dibromofluoromethane	50.00	105	85 - 115	
1,2-Dichloroethane-d4	50.00	101	70 - 120	
Toluene-d8	50.00	106	85 - 120	
Bromofluorobenzene	50.00	105	75 - 120	
LCS (0122107-BS1) ug/L				
Lab File ID: 0122107-BS159.d Analyzed: 12/21/10 13:00				
Dibromofluoromethane	50.00	93	85 - 115	
1,2-Dichloroethane-d4	50.00	90	70 - 120	
Toluene-d8	50.00	99	85 - 120	
Bromofluorobenzene	50.00	96	75 - 120	
PZ-159I (1012127-05) ug/L				
Lab File ID: 1012127-0559.d Analyzed: 12/21/10 18:19				
Dibromofluoromethane	50.00	96	85 - 115	
1,2-Dichloroethane-d4	50.00	97	70 - 120	
Toluene-d8	50.00	97	85 - 120	
Bromofluorobenzene	50.00	94	75 - 120	
SA-PZ-133I (1012127-15) ug/L				
Lab File ID: 1012127-1559.d Analyzed: 12/21/10 18:46				
Dibromofluoromethane	50.00	97	85 - 115	
1,2-Dichloroethane-d4	50.00	96	70 - 120	
Toluene-d8	50.00	100	85 - 120	
Bromofluorobenzene	50.00	98	75 - 120	
PZ-155I (1012127-07) ug/L				
Lab File ID: 1012127-0759.d Analyzed: 12/21/10 19:13				
Dibromofluoromethane	50.00	100	85 - 115	
1,2-Dichloroethane-d4	50.00	98	70 - 120	
Toluene-d8	50.00	101	85 - 120	
Bromofluorobenzene	50.00	101	75 - 120	

SURROGATE STANDARD RECOVERY

SW 8260B

Client: TETRA TECH

Project: CTO-WE08/112G0275[redacted].PT/N62467-04-D-0057

SDG: 1012127 Instrument: 5972hp59

Sequence: 0L21006 Calibration: 0122202

Surrogate Compound	Spike Level	% Recovery	Recovery Limits	Q
PZ-160I (1012127-10) ug/L				
Lab File ID: 1012127-1059.d Analyzed: 12/21/10 19:40				
Dibromofluoromethane	50.00	101	85 - 115	
1,2-Dichloroethane-d4	50.00	100	70 - 120	
Toluene-d8	50.00	99	85 - 120	
Bromofluorobenzene	50.00	100	75 - 120	
TB01-20101213 (1012127-11) ug/L				
Lab File ID: 1012127-1159.d Analyzed: 12/21/10 20:08				
Dibromofluoromethane	50.00	100	85 - 115	
1,2-Dichloroethane-d4	50.00	102	70 - 120	
Toluene-d8	50.00	101	85 - 120	
Bromofluorobenzene	50.00	100	75 - 120	
SA-PZ-158I1 (1012127-12) ug/L				
Lab File ID: 1012127-1259.d Analyzed: 12/21/10 20:35				
Dibromofluoromethane	50.00	94	85 - 115	
1,2-Dichloroethane-d4	50.00	94	70 - 120	
Toluene-d8	50.00	95	85 - 120	
Bromofluorobenzene	50.00	95	75 - 120	

SURROGATE STANDARD RECOVERY

SW 8260B

Client: TETRA TECH

Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

SDG: 1012127 Instrument: 5972hp59

Sequence: 0L22003 Calibration: 0122202

Surrogate Compound	Spike Level	% Recovery	Recovery Limits	Q
Blank (0122204-BLK1) ug/L Lab File ID: 0122204-BLK159.d Analyzed: 12/22/10 12:02				
Dibromofluoromethane	50.00	105	85 - 115	
1,2-Dichloroethane-d4	50.00	100	70 - 120	
Toluene-d8	50.00	103	85 - 120	
Bromofluorobenzene	50.00	96	75 - 120	
LCS (0122204-BS1) ug/L Lab File ID: 0122204-BS159.d Analyzed: 12/22/10 12:38				
Dibromofluoromethane	50.00	96	85 - 115	
1,2-Dichloroethane-d4	50.00	93	70 - 120	
Toluene-d8	50.00	100	85 - 120	
Bromofluorobenzene	50.00	93	75 - 120	
LCS Dup (0122204-BSD1) ug/L Lab File ID: 0122204-BSD159.d Analyzed: 12/22/10 13:05				
Dibromofluoromethane	50.00	96	85 - 115	
1,2-Dichloroethane-d4	50.00	90	70 - 120	
Toluene-d8	50.00	101	85 - 120	
Bromofluorobenzene	50.00	94	75 - 120	
SA-PZ-158I1 (1012127-12RE1) ug/L Lab File ID: 1012127-12D59.d Analyzed: 12/22/10 14:11				
Dibromofluoromethane	50.00	106	85 - 115	
1,2-Dichloroethane-d4	50.00	100	70 - 120	
Toluene-d8	50.00	107	85 - 120	
Bromofluorobenzene	50.00	103	75 - 120	
SA-PZ-158I (1012127-13) ug/L Lab File ID: 1012127-13R59.d Analyzed: 12/22/10 14:38				
Dibromofluoromethane	50.00	106	85 - 115	
1,2-Dichloroethane-d4	50.00	102	70 - 120	
Toluene-d8	50.00	99	85 - 120	
Bromofluorobenzene	50.00	102	75 - 120	

SURROGATE STANDARD RECOVERY

SW 8260B

Client: TETRA TECH

Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

SDG: 1012127 Instrument: 5972hp59

Sequence: 0L22003 Calibration: 0122202

Surrogate Compound	Spike Level	% Recovery	Recovery Limits	Q
SA-PZ-160I1 (1012127-14) ug/L				
Lab File ID: 1012127-14D59.d Analyzed: 12/22/10 15:06				
Dibromofluoromethane	50.00	105	85 - 115	
1,2-Dichloroethane-d4	50.00	104	70 - 120	
Toluene-d8	50.00	107	85 - 120	
Bromofluorobenzene	50.00	105	75 - 120	
PZ-159I1 (1012127-01) ug/L				
Lab File ID: 1012127-0159.d Analyzed: 12/22/10 15:33				
Dibromofluoromethane	50.00	104	85 - 115	
1,2-Dichloroethane-d4	50.00	100	70 - 120	
Toluene-d8	50.00	101	85 - 120	
Bromofluorobenzene	50.00	99	75 - 120	
PZ-157I (1012127-02) ug/L				
Lab File ID: 1012127-0259.d Analyzed: 12/22/10 16:00				
Dibromofluoromethane	50.00	100	85 - 115	
1,2-Dichloroethane-d4	50.00	97	70 - 120	
Toluene-d8	50.00	94	85 - 120	
Bromofluorobenzene	50.00	97	75 - 120	
PZ-157I1 (1012127-03) ug/L				
Lab File ID: 1012127-0359.d Analyzed: 12/22/10 16:28				
Dibromofluoromethane	50.00	97	85 - 115	
1,2-Dichloroethane-d4	50.00	98	70 - 120	
Toluene-d8	50.00	93	85 - 120	
Bromofluorobenzene	50.00	90	75 - 120	
DUP01-20101214 (1012127-04) ug/L				
Lab File ID: 1012127-0459.d Analyzed: 12/22/10 16:55				
Dibromofluoromethane	50.00	99	85 - 115	
1,2-Dichloroethane-d4	50.00	99	70 - 120	
Toluene-d8	50.00	97	85 - 120	
Bromofluorobenzene	50.00	97	75 - 120	

SURROGATE STANDARD RECOVERY

SW 8260B

Client: TETRA TECH

Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

SDG: 1012127 Instrument: 5972hp59

Sequence: 0L22003 Calibration: 0122202

Surrogate Compound	Spike Level	% Recovery	Recovery Limits	Q
PZ-151I1 (1012127-06) ug/L Lab File ID: 1012127-0659.d Analyzed: 12/22/10 17:22				
Dibromofluoromethane	50.00	107	85 - 115	
1,2-Dichloroethane-d4	50.00	106	70 - 120	
Toluene-d8	50.00	108	85 - 120	
Bromofluorobenzene	50.00	109	75 - 120	
SA-PZ-135I (1012127-16) ug/L Lab File ID: 1012127-1659.d Analyzed: 12/22/10 17:49				
Dibromofluoromethane	50.00	99	85 - 115	
1,2-Dichloroethane-d4	50.00	95	70 - 120	
Toluene-d8	50.00	101	85 - 120	
Bromofluorobenzene	50.00	94	75 - 120	
SA-PZ-136I (1012127-17) ug/L Lab File ID: 1012127-1759.d Analyzed: 12/22/10 18:17				
Dibromofluoromethane	50.00	106	85 - 115	
1,2-Dichloroethane-d4	50.00	103	70 - 120	
Toluene-d8	50.00	105	85 - 120	
Bromofluorobenzene	50.00	101	75 - 120	
SA-PZ-161I (1012127-18) ug/L Lab File ID: 1012127-1859.d Analyzed: 12/22/10 18:44				
Dibromofluoromethane	50.00	108	85 - 115	
1,2-Dichloroethane-d4	50.00	106	70 - 120	
Toluene-d8	50.00	109	85 - 120	
Bromofluorobenzene	50.00	105	75 - 120	
SA-PZ-139I (1012127-19) ug/L Lab File ID: 1012127-1959.d Analyzed: 12/22/10 19:11				
Dibromofluoromethane	50.00	109	85 - 115	
1,2-Dichloroethane-d4	50.00	107	70 - 120	
Toluene-d8	50.00	107	85 - 120	
Bromofluorobenzene	50.00	101	75 - 120	

SURROGATE STANDARD RECOVERY

SW 8260B

Client: TETRA TECH

Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

SDG: 1012127 Instrument: 5972hp59

Sequence: 0L22003 Calibration: 0122202

Surrogate Compound	Spike Level	% Recovery	Recovery Limits	Q
SA-PZ-138I1 (1012127-20) ug/L Lab File ID: 1012127-2059.d Analyzed: 12/22/10 19:38				
Dibromofluoromethane	50.00	103	85 - 115	
1,2-Dichloroethane-d4	50.00	98	70 - 120	
Toluene-d8	50.00	107	85 - 120	
Bromofluorobenzene	50.00	104	75 - 120	
SA-PZ-138I (1012127-21) ug/L Lab File ID: 1012127-2159.d Analyzed: 12/22/10 20:06				
Dibromofluoromethane	50.00	107	85 - 115	
1,2-Dichloroethane-d4	50.00	106	70 - 120	
Toluene-d8	50.00	112	85 - 120	
Bromofluorobenzene	50.00	107	75 - 120	
DUP02-20101215 (1012127-22) ug/L Lab File ID: 1012127-2259.d Analyzed: 12/22/10 20:33				
Dibromofluoromethane	50.00	107	85 - 115	
1,2-Dichloroethane-d4	50.00	109	70 - 120	
Toluene-d8	50.00	110	85 - 120	
Bromofluorobenzene	50.00	107	75 - 120	
SA-PZ-149I1 (1012127-23) ug/L Lab File ID: 1012127-2359.d Analyzed: 12/22/10 21:00				
Dibromofluoromethane	50.00	107	85 - 115	
1,2-Dichloroethane-d4	50.00	107	70 - 120	
Toluene-d8	50.00	109	85 - 120	
Bromofluorobenzene	50.00	107	75 - 120	
Matrix Spike (0122204-MS1) ug/L Lab File ID: 0122204-MS159.d Analyzed: 12/22/10 21:27				
Dibromofluoromethane	50.00	99	85 - 115	
1,2-Dichloroethane-d4	50.00	98	70 - 120	
Toluene-d8	50.00	107	85 - 120	
Bromofluorobenzene	50.00	102	75 - 120	

SURROGATE STANDARD RECOVERY

SW 8260B

Client: TETRA TECH

Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

SDG: 1012127 Instrument: 5972hp59

Sequence: 0L22003 Calibration: 0122202

Surrogate Compound	Spike Level	% Recovery	Recovery Limits	Q
Matrix Spike Dup (0122204-MSD1) ug/L Lab File ID: 0122204-MSD159.ı Analyzed: 12/22/10 21:54				
Dibromofluoromethane	50.00	99	85 - 115	
1,2-Dichloroethane-d4	50.00	97	70 - 120	
Toluene-d8	50.00	101	85 - 120	
Bromofluorobenzene	50.00	90	75 - 120	

INTERNAL STANDARD AREA AND RT SUMMARY
SW 8260B

Laboratory: COMPUCHEM
Client: TETRA TECH
Sequence: 0L21006

SDG: 1012127
Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057
Instrument: 5972hp59
Calibration: 0122202

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
Calibration Check (0L21006-CCV1)			Lab File ID: 0L21006-CCV159.d			Analyzed: 12/21/10 10:24			
Fluorobenzene	926953	11.203	1041112	11.203	89	50 - 200	0.0000	+/-0.06	
Chlorobenzene-d5	609902	13.56	685036	13.56	89	50 - 200	0.0000	+/-0.06	
1,4-Dichlorobenzene-d4	279107	15.286	317599	15.286	88	50 - 200	0.0000	+/-0.06	
Blank (0122107-BLK1)			Lab File ID: 0122107-BLK159.d			Analyzed: 12/21/10 11:30			
Fluorobenzene	835079	11.196	926953	11.203	90	50 - 200	-0.0070	+/-0.06	
Chlorobenzene-d5	566098	13.553	609902	13.56	93	50 - 200	-0.0070	+/-0.06	
1,4-Dichlorobenzene-d4	244570	15.289	279107	15.286	88	50 - 200	0.0030	+/-0.06	
LCS (0122107-BS1)			Lab File ID: 0122107-BS159.d			Analyzed: 12/21/10 13:00			
Fluorobenzene	846751	11.206	926953	11.203	91	50 - 200	0.0030	+/-0.06	
Chlorobenzene-d5	556602	13.563	609902	13.56	91	50 - 200	0.0030	+/-0.06	
1,4-Dichlorobenzene-d4	246004	15.298	279107	15.286	88	50 - 200	0.0120	+/-0.06	
PZ-159I (1012127-05)			Lab File ID: 1012127-0559.d			Analyzed: 12/21/10 18:19			
Fluorobenzene	746399	11.203	926953	11.203	81	50 - 200	0.0000	+/-0.06	
Chlorobenzene-d5	497290	13.56	609902	13.56	82	50 - 200	0.0000	+/-0.06	
1,4-Dichlorobenzene-d4	213899	15.296	279107	15.286	77	50 - 200	0.0100	+/-0.06	
SA-PZ-133I (1012127-15)			Lab File ID: 1012127-1559.d			Analyzed: 12/21/10 18:46			
Fluorobenzene	669545	11.201	926953	11.203	72	50 - 200	-0.0020	+/-0.06	
Chlorobenzene-d5	458278	13.557	609902	13.56	75	50 - 200	-0.0030	+/-0.06	
1,4-Dichlorobenzene-d4	200901	15.293	279107	15.286	72	50 - 200	0.0070	+/-0.06	
PZ-155I (1012127-07)			Lab File ID: 1012127-0759.d			Analyzed: 12/21/10 19:13			
Fluorobenzene	714281	11.209	926953	11.203	77	50 - 200	0.0060	+/-0.06	
Chlorobenzene-d5	466267	13.566	609902	13.56	76	50 - 200	0.0060	+/-0.06	
1,4-Dichlorobenzene-d4	196552	15.291	279107	15.286	70	50 - 200	0.0050	+/-0.06	
PZ-160I (1012127-10)			Lab File ID: 1012127-1059.d			Analyzed: 12/21/10 19:40			
Fluorobenzene	767114	11.205	926953	11.203	83	50 - 200	0.0020	+/-0.06	
Chlorobenzene-d5	507627	13.561	609902	13.56	83	50 - 200	0.0010	+/-0.06	
1,4-Dichlorobenzene-d4	213207	15.297	279107	15.286	76	50 - 200	0.0110	+/-0.06	
TB01-20101213 (1012127-11)			Lab File ID: 1012127-1159.d			Analyzed: 12/21/10 20:08			
Fluorobenzene	706490	11.21	926953	11.203	76	50 - 200	0.0070	+/-0.06	
Chlorobenzene-d5	468689	13.557	609902	13.56	77	50 - 200	-0.0030	+/-0.06	
1,4-Dichlorobenzene-d4	196958	15.293	279107	15.286	71	50 - 200	0.0070	+/-0.06	

Environmental Testing Laboratories
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INTERNAL STANDARD AREA AND RT SUMMARY
SW 8260B

Laboratory:	COMPUCHEM	SDG:	1012127
Client:	TETRA TECH	Project:	CTO-WE08/112G02750.PT.PT/N62467-04-D-0057
Sequence:	0L21006	Instrument:	5972hp59
		Calibration:	0122202

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
SA-PZ-158I1 (1012127-12)			Lab File ID: 1012127-1259.d			Analyzed: 12/21/10 20:35			
Fluorobenzene	743204	11.21	926953	11.203	80	50 - 200	0.0070	+/-0.06	
Chlorobenzene-d5	488567	13.567	609902	13.56	80	50 - 200	0.0070	+/-0.06	
1,4-Dichlorobenzene-d4	206428	15.293	279107	15.286	74	50 - 200	0.0070	+/-0.06	

INTERNAL STANDARD AREA AND RT SUMMARY
SW 8260B

Laboratory: COMPUCHEM
Client: TETRA TECH
Sequence: 0L22003

SDG: 1012127
Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057
Instrument: 5972hp59
Calibration: 0122202

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
Calibration Check (0L22003-CCV1)			Lab File ID: 0L22003-CCV159.d			Analyzed: 12/22/10 11:26			
Fluorobenzene	874758	11.219	1041112	11.203	84	50 - 200	0.0160	+/-0.06	
Chlorobenzene-d5	594104	13.575	685036	13.56	87	50 - 200	0.0150	+/-0.06	
1,4-Dichlorobenzene-d4	273044	15.301	317599	15.286	86	50 - 200	0.0150	+/-0.06	
Blank (0122204-BLK1)			Lab File ID: 0122204-BLK159.d			Analyzed: 12/22/10 12:02			
Fluorobenzene	755364	11.215	874758	11.219	86	50 - 200	-0.0040	+/-0.06	
Chlorobenzene-d5	541921	13.571	594104	13.575	91	50 - 200	-0.0040	+/-0.06	
1,4-Dichlorobenzene-d4	255481	15.307	273044	15.301	94	50 - 200	0.0060	+/-0.06	
LCS (0122204-BS1)			Lab File ID: 0122204-BS159.d			Analyzed: 12/22/10 12:38			
Fluorobenzene	844603	11.22	874758	11.219	97	50 - 200	0.0010	+/-0.06	
Chlorobenzene-d5	564249	13.576	594104	13.575	95	50 - 200	0.0010	+/-0.06	
1,4-Dichlorobenzene-d4	255214	15.302	273044	15.301	93	50 - 200	0.0010	+/-0.06	
LCS Dup (0122204-BSD1)			Lab File ID: 0122204-BSD159.d			Analyzed: 12/22/10 13:05			
Fluorobenzene	847343	11.221	874758	11.219	97	50 - 200	0.0020	+/-0.06	
Chlorobenzene-d5	559989	13.568	594104	13.575	94	50 - 200	-0.0070	+/-0.06	
1,4-Dichlorobenzene-d4	252200	15.303	273044	15.301	92	50 - 200	0.0020	+/-0.06	
SA-PZ-158I1 (1012127-12RE1)			Lab File ID: 1012127-12D59.d			Analyzed: 12/22/10 14:11			
Fluorobenzene	791413	11.22	874758	11.219	90	50 - 200	0.0010	+/-0.06	
Chlorobenzene-d5	524365	13.577	594104	13.575	88	50 - 200	0.0020	+/-0.06	
1,4-Dichlorobenzene-d4	228106	15.312	273044	15.301	84	50 - 200	0.0110	+/-0.06	
SA-PZ-158I (1012127-13)			Lab File ID: 1012127-13R59.d			Analyzed: 12/22/10 14:38			
Fluorobenzene	682985	11.216	874758	11.219	78	50 - 200	-0.0030	+/-0.06	
Chlorobenzene-d5	478028	13.573	594104	13.575	80	50 - 200	-0.0020	+/-0.06	
1,4-Dichlorobenzene-d4	216763	15.308	273044	15.301	79	50 - 200	0.0070	+/-0.06	
SA-PZ-160I1 (1012127-14)			Lab File ID: 1012127-14D59.d			Analyzed: 12/22/10 15:06			
Fluorobenzene	762456	11.22	874758	11.219	87	50 - 200	0.0010	+/-0.06	
Chlorobenzene-d5	502153	13.577	594104	13.575	85	50 - 200	0.0020	+/-0.06	
1,4-Dichlorobenzene-d4	215900	15.302	273044	15.301	79	50 - 200	0.0010	+/-0.06	
PZ-159I1 (1012127-01)			Lab File ID: 1012127-0159.d			Analyzed: 12/22/10 15:33			
Fluorobenzene	713683	11.22	874758	11.219	82	50 - 200	0.0010	+/-0.06	
Chlorobenzene-d5	498336	13.567	594104	13.575	84	50 - 200	-0.0080	+/-0.06	
1,4-Dichlorobenzene-d4	230129	15.303	273044	15.301	84	50 - 200	0.0020	+/-0.06	

INTERNAL STANDARD AREA AND RT SUMMARY
SW 8260B

Laboratory: COMPUCHEM
Client: TETRA TECH
Sequence: 0L22003

SDG: 1012127
Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057
Instrument: 5972hp59
Calibration: 0122202

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
PZ-157I (1012127-02)			Lab File ID: 1012127-0259.d			Analyzed: 12/22/10 16:00			
Fluorobenzene	717409	11.22	874758	11.219	82	50 - 200	0.0010	+/-0.06	
Chlorobenzene-d5	489150	13.577	594104	13.575	82	50 - 200	0.0020	+/-0.06	
1,4-Dichlorobenzene-d4	208010	15.302	273044	15.301	76	50 - 200	0.0010	+/-0.06	
PZ-157I1 (1012127-03)			Lab File ID: 1012127-0359.d			Analyzed: 12/22/10 16:28			
Fluorobenzene	580596	11.212	874758	11.219	66	50 - 200	-0.0070	+/-0.06	
Chlorobenzene-d5	429060	13.569	594104	13.575	72	50 - 200	-0.0060	+/-0.06	
1,4-Dichlorobenzene-d4	203706	15.305	273044	15.301	75	50 - 200	0.0040	+/-0.06	
DUP01-20101214 (1012127-04)			Lab File ID: 1012127-0459.d			Analyzed: 12/22/10 16:55			
Fluorobenzene	610334	11.213	874758	11.219	70	50 - 200	-0.0060	+/-0.06	
Chlorobenzene-d5	443379	13.57	594104	13.575	75	50 - 200	-0.0050	+/-0.06	
1,4-Dichlorobenzene-d4	205545	15.305	273044	15.301	75	50 - 200	0.0040	+/-0.06	
PZ-151I1 (1012127-06)			Lab File ID: 1012127-0659.d			Analyzed: 12/22/10 17:22			
Fluorobenzene	733572	11.211	874758	11.219	84	50 - 200	-0.0080	+/-0.06	
Chlorobenzene-d5	482697	13.568	594104	13.575	81	50 - 200	-0.0070	+/-0.06	
1,4-Dichlorobenzene-d4	204661	15.304	273044	15.301	75	50 - 200	0.0030	+/-0.06	
SA-PZ-135I (1012127-16)			Lab File ID: 1012127-1659.d			Analyzed: 12/22/10 17:49			
Fluorobenzene	743934	11.216	874758	11.219	85	50 - 200	-0.0030	+/-0.06	
Chlorobenzene-d5	490627	13.573	594104	13.575	83	50 - 200	-0.0020	+/-0.06	
1,4-Dichlorobenzene-d4	213377	15.308	273044	15.301	78	50 - 200	0.0070	+/-0.06	
SA-PZ-136I (1012127-17)			Lab File ID: 1012127-1759.d			Analyzed: 12/22/10 18:17			
Fluorobenzene	745646	11.21	874758	11.219	85	50 - 200	-0.0090	+/-0.06	
Chlorobenzene-d5	489830	13.567	594104	13.575	82	50 - 200	-0.0080	+/-0.06	
1,4-Dichlorobenzene-d4	212180	15.302	273044	15.301	78	50 - 200	0.0010	+/-0.06	
SA-PZ-161I (1012127-18)			Lab File ID: 1012127-1859.d			Analyzed: 12/22/10 18:44			
Fluorobenzene	702529	11.209	874758	11.219	80	50 - 200	-0.0100	+/-0.06	
Chlorobenzene-d5	465032	13.566	594104	13.575	78	50 - 200	-0.0090	+/-0.06	
1,4-Dichlorobenzene-d4	196651	15.302	273044	15.301	72	50 - 200	0.0010	+/-0.06	
SA-PZ-139I (1012127-19)			Lab File ID: 1012127-1959.d			Analyzed: 12/22/10 19:11			
Fluorobenzene	710962	11.21	874758	11.219	81	50 - 200	-0.0090	+/-0.06	
Chlorobenzene-d5	475092	13.567	594104	13.575	80	50 - 200	-0.0080	+/-0.06	
1,4-Dichlorobenzene-d4	201680	15.303	273044	15.301	74	50 - 200	0.0020	+/-0.06	

INTERNAL STANDARD AREA AND RT SUMMARY
SW 8260B

Laboratory: COMPUCHEM
Client: TETRA TECH
Sequence: 0L22003

SDG: 1012127
Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057
Instrument: 5972hp59
Calibration: 0122202

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
SA-PZ-138I1 (1012127-20)			Lab File ID: 1012127-2059.d			Analyzed: 12/22/10 19:38			
Fluorobenzene	736536	11.209	874758	11.219	84	50 - 200	-0.0100	+/-0.06	
Chlorobenzene-d5	477358	13.565	594104	13.575	80	50 - 200	-0.0100	+/-0.06	
1,4-Dichlorobenzene-d4	203863	15.301	273044	15.301	75	50 - 200	0.0000	+/-0.06	
SA-PZ-138I (1012127-21)			Lab File ID: 1012127-2159.d			Analyzed: 12/22/10 20:06			
Fluorobenzene	661986	11.22	874758	11.219	76	50 - 200	0.0010	+/-0.06	
Chlorobenzene-d5	443360	13.567	594104	13.575	75	50 - 200	-0.0080	+/-0.06	
1,4-Dichlorobenzene-d4	188450	15.302	273044	15.301	69	50 - 200	0.0010	+/-0.06	
DUP02-20101215 (1012127-22)			Lab File ID: 1012127-2259.d			Analyzed: 12/22/10 20:33			
Fluorobenzene	693558	11.22	874758	11.219	79	50 - 200	0.0010	+/-0.06	
Chlorobenzene-d5	459505	13.577	594104	13.575	77	50 - 200	0.0020	+/-0.06	
1,4-Dichlorobenzene-d4	192535	15.302	273044	15.301	71	50 - 200	0.0010	+/-0.06	
SA-PZ-149I1 (1012127-23)			Lab File ID: 1012127-2359.d			Analyzed: 12/22/10 21:00			
Fluorobenzene	704905	11.219	874758	11.219	81	50 - 200	0.0000	+/-0.06	
Chlorobenzene-d5	462638	13.576	594104	13.575	78	50 - 200	0.0010	+/-0.06	
1,4-Dichlorobenzene-d4	185711	15.311	273044	15.301	68	50 - 200	0.0100	+/-0.06	
Matrix Spike (0122204-MS1)			Lab File ID: 0122204-MS159.d			Analyzed: 12/22/10 21:27			
Fluorobenzene	671341	11.216	874758	11.219	77	50 - 200	-0.0030	+/-0.06	
Chlorobenzene-d5	459752	13.572	594104	13.575	77	50 - 200	-0.0030	+/-0.06	
1,4-Dichlorobenzene-d4	212276	15.308	273044	15.301	78	50 - 200	0.0070	+/-0.06	
Matrix Spike Dup (0122204-MSD1)			Lab File ID: 0122204-MSD159.d			Analyzed: 12/22/10 21:54			
Fluorobenzene	769370	11.22	874758	11.219	88	50 - 200	0.0010	+/-0.06	
Chlorobenzene-d5	507934	13.567	594104	13.575	85	50 - 200	-0.0080	+/-0.06	
1,4-Dichlorobenzene-d4	217554	15.302	273044	15.301	80	50 - 200	0.0010	+/-0.06	

CompuChem

a division of Liberty Analytical Corporation
501 Madison Avenue
Cary, N.C. 27513
Tel: 919/379-4100 Fax: 919/379-4050

SDG NARRATIVE
SDG # 1012127
PROTOCOL: SW-846
PROJECT: CTO-WE08/112G02750
CALVERTON
PM: DAVE BRAYACK

SAMPLE IDENTIFICATIONS: PZ-159I1, PZ-157I, PZ-157I1, DUP01-20101214, PZ-159I, PZ-151I1, PZ-155I, PZ-160I

The eight water samples listed above were received intact at 0.1 and 0.2°C, with proper documentation, in sealed shipping containers, on December 15th and 17th, 2010. The samples were scheduled for the requested analysis by SW-846, 3rd Edition, Update 4, Method RSK-175 for Methane, Ethane, and Ethene. All pertinent Quality Assurance notices are included in the narrative section and all pertinent Laboratory notices for SDG # 1012127 included in the sample data sections.

The samples were prepped and analyzed within the method holding time.

Target analytes were present above the reporting limits in samples DUP01-20101214, PZ-151I1, PZ-155I, PZ-157I, PZ-157I1, PZ-159I, PZ-159I1, and PZ-160I. Samples PZ-159I1, PZ-157I1, DUP01-20101214, and PZ-151I1 were analyzed and reported at a dilution, as well as neat or a lesser dilution, due to target analytes exceeding the calibration range.

All QC criteria were met for all initial and continuing calibration standards associated to this SDG.

The method blanks associated with the samples met all quality control criteria.

Per client's request, duplicate matrix spikes were not performed with this SDG. The Laboratory Control Samples (LCS/LCSD) that were prepared and analyzed with the samples met recovery and precision criteria.

I certify that the tests used in this report meet all requirements of the NELAC standards unless otherwise stated in the SDG narrative or QA notice.

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on CD has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Teresa Amentt Jennings

Teresa Amentt Jennings
GC/HPLC Data Reviewer
December 22, 2010

CompuChem, a division of Liberty Analytical

Client: TETRA TECH **Work:** 1012127

Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057 **Sdg:** 1012127

Lab ID	Client ID	Matrix	Date Sampled	Date Received
1012127-01	PZ-159I1	Water	12/14/2010 12:35	12/16/2010 12:38
1012127-02	PZ-157I	Water	12/14/2010 14:55	12/16/2010 12:38
1012127-03	PZ-157I1	Water	12/14/2010 12:53	12/16/2010 12:38
1012127-04	DUP01-20101214	Water	12/14/2010 12:00	12/16/2010 12:38
1012127-05	PZ-159I	Water	12/14/2010 14:20	12/16/2010 12:38
1012127-06	PZ-151I1	Water	12/15/2010 12:05	12/16/2010 12:38
1012127-07	PZ-155I	Water	12/15/2010 13:35	12/16/2010 12:38
1012127-08	PZ-160I	Water	12/16/2010 15:41	12/17/2010 10:20
1012127-09	PZ-159I1	Water	12/16/2010 15:35	12/17/2010 10:20
1012127-10	PZ-160I	Water	12/13/2010 15:02	12/16/2010 12:38
1012127-11	TB01-20101213	Water	12/13/2010 12:00	12/16/2010 12:38
1012127-12	SA-PZ-158I1	Water	12/13/2010 13:35	12/16/2010 12:38
1012127-13	SA-PZ-158I	Water	12/13/2010 13:39	12/16/2010 12:38
1012127-14	SA-PZ-160I1	Water	12/13/2010 14:55	12/16/2010 12:38
1012127-15	SA-PZ-133I	Water	12/15/2010 09:10	12/16/2010 12:38
1012127-16	SA-PZ-135I	Water	12/14/2010 08:57	12/16/2010 12:38
1012127-17	SA-PZ-136I	Water	12/14/2010 09:08	12/16/2010 12:38
1012127-18	SA-PZ-161I	Water	12/14/2010 10:45	12/16/2010 12:38
1012127-19	SA-PZ-139I	Water	12/15/2010 10:35	12/16/2010 12:38
1012127-20	SA-PZ-138I1	Water	12/15/2010 10:47	12/16/2010 12:38
1012127-21	SA-PZ-138I	Water	12/15/2010 11:54	12/16/2010 12:38
1012127-22	DUP02-20101215	Water	12/15/2010 12:00	12/16/2010 12:38
1012127-23	SA-PZ-149I1	Water	12/15/2010 13:00	12/16/2010 12:38

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Manual Integration Summary

Client: TETRA TECH
Work Order: 1012127
Sdg: 1012127

Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057
Case:

Analysis: GC-RSK-175 DOD
Sample Type: Cal Standard
Lab Id: 0G01009-CAL1
Client Id: CALATA
Instrument: varian67

Analyte	Type	M Flag
Ethane	TARGET	M
Ethene	TARGET	M
Methane	TARGET	M

Sample Total: 3

Total Manual Integrations: 3

DoD ORGANIC DATA REPORTING QUALIFIERS

On the Form I, under the column labeled "Q" for qualifier, each result is flagged with the specific data reporting qualifiers listed below, as appropriate. Up to five qualifiers may be reported on Form I for each compound. The qualifiers used are:

U : This flag indicates the compound was analyzed for, not detected and is reported as less than the Limit of Detection (LOD) (or as defined by the client). The reporting limit (RL), or Limit of Quantitation (LOQ), and the LOD will be adjusted to reflect any dilution or concentration of the sample and, for soils, the percent moisture.

J : This flag indicates the reported result is an estimated value. The flag is used as detailed below:

1. When estimating a concentration for tentatively identified compounds (TICs) where a response factor of 1:1 is assumed for the TIC analyte,

2. When the mass spectral and retention time data indicate the presence of a compound that meets the volatile and semivolatile GC/MS identification criteria, and the result is less than the adjusted RL/LOQ but equal to or greater than the Detection Limit (DL), and

3. When the retention time data indicate the presence of a compound that meets the pesticide and/or Aroclor or other GC or HPLC identification criteria, and the result is less than the adjusted RL/LOQ but equal to or greater than the DL.

4. When an analyte fails quality control acceptance criteria in an MS and/or MSD. The J flag is applied to the specific analyte(s) in the parent sample.

N : This flag indicates presumptive evidence of a compound. This flag is only used for TICs, where the identification is based on a mass spectral library search and must be used with the J flag. For generic characterization of a TIC such as "chlorinated hydrocarbon" (or for an "unknown," with no matches ≥85%), the N flag is not used.

P : In the EPA's Contract Laboratory Program (CLP), this flag is used for a pesticide/Aroclor target analyte, when there is greater than 25% difference for detected concentrations between the two GC columns. The lower of the two values is reported on the Form I and flagged with a P.
For SW-846 GC and HPLC analyses, when the Relative Percent Difference (RPD) is greater than 40% and there is no evidence of chromatographic anomalies or interferences, then the lower of the two values is reported and flagged with a P. When the RPD is equal to or less than 40%, our policy is to also report the lower of the two values, although the choice could be a project specific issue. These SW-846 policies are consistent with Method 8000C. If Method 8000B is required, the higher of the two values is reported. For certain HPLC analyses, if one of the HPLC columns displays co-elution of target analytes, all results are reported from a primary column displaying no co-elution. Results are still flagged with a P if the RPD between columns is greater than 40%.

C : This flag applies to GC or HPLC results where the identification has been confirmed by GC/MS. If GC/MS confirmation was attempted but was unsuccessful, this flag is not applied; a laboratory-defined flag is used instead (see the X/Y/Z qualifier.)

DATA REPORTING QUALIFIERS (continued)

Q : This flag denotes that one or more quality control criteria have failed (e.g., LCS recovery, surrogate spike recovery or Continuing Calibration Verification, CCV), and reanalyses can't be performed. The Q flag is applied to all specific analyte(s) in all samples associated with the failed quality control criteria.

B : This flag is used when the analyte is found in the associated blank as well as in the sample. It indicates probable blank contamination and warns the data user to take appropriate action. This flag is used for a TIC as well as for a positively identified target compound. The combination of flags BU or UB is not an allowable policy. Blank contaminants are flagged B only when they are detected in the sample.

E : This flag identifies compounds whose concentrations exceed the upper level of the calibration range of the instrument for that specific analysis. If one or more compounds have a concentration greater than the upper level of the calibration range, the sample or extract will be diluted and reanalyzed. All such compounds with a concentration greater than the upper level of the calibration range will have the result flagged with an E on the Form I for the original analysis.

D : If a sample or extract is reanalyzed at a higher dilution factor, for example when the concentration of an analyte exceeds the upper calibration range, the DL suffix is appended to the sample number on the Form I for the more diluted sample, and **all** reported concentrations on that Form I are flagged with the D flag. This flag alerts data users that any discrepancies between the reported concentrations may be due to dilution of the sample or extract.

NOTE 1: The D flag is not applied to compounds which are not detected in the sample analysis i.e. compounds reported with the RL/LOQ and the U flag.

NOTE 2: Separate Forms I are used for reporting the original analysis (Client Sample No. XXXXX) and the more diluted sample analysis (Client Sample No. XXXXXDL) i.e. the results from both analyses <u>are not combined</u> on a single Form I.

A: This flag indicates that a TIC is a suspected aldol-condensation product.

X/Y/Z : Other specific flags may be required to properly define the results. If used, the flags will be fully described in the SDG Narrative. The laboratory-defined flags are limited to X, Y, and Z.

Revision 0 (08-16-2010)

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CompuChem's Pagination Convention

As required by the EPA CLP Statement of Work (SOW) documents, data to be delivered must be paginated (by machine or hand). In the event that the initial numbering is incorrect (a page numbered twice or a page skipped, for example), it is CompuChem's policy to add an alphabetic suffix to a page number when necessary (e.g., 100A, 100B, etc.).

Revision 6 (12/6/2005)

CompuChem

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Notification Regarding Manual Editing/Integration Flags

In some instances, manual adjustments to the software output are necessary to provide accurate data. These manual integrations are performed by the data reviewers, GC/MS operators, or GC chemists. An Extracted Ion Current Profile (EICP) or a GC chromatographic peak has been provided for the manual integration performed on each compound to demonstrate the accuracy of that process. The manual integrations are flagged on the quantitation report in the far right column beyond the FINAL concentration for GC/MS analysis, and in the "Flags" column for GC analysis. The manual editing/integration flags are:

M - Denotes that a manual integration has been performed for this compound. The manual integration was performed in order to provide the most accurate area count possible for the peak.

H - Denotes that the data reviewer, GC/MS operator, or GC Chemist has chosen an alternate peak within the retention time window from that chosen by the software for that compound. No manual integration is performed in choosing an alternate peak. The software still performs the integration.

MH - Denotes that an alternate peak has been chosen within the retention time window from that chosen by the software for that compound and also a manual integration of the chosen peak has been performed. The manual integration was performed in order to provide the most accurate area count possible for the peak.

L - Denotes that a data reviewer or GC/MS operator has selected an alternate library search. This is typically done when an additional tentatively identified compound (TIC) has been added to the number of peaks searched. No manual integration is performed in choosing an alternate peak. The software still performs the integration.

ML - Denotes that an alternate library search has been selected and a manual integration has also been performed. This is typically done when an additional TIC has been added and the TIC peak also required a manual integration.

The EPA CLP SOW documents require additional explanations for manual editing/integration. In the accompanying raw data packages, additional codes have been applied to the "M" flag and carry the following meanings;

M1 - The compound was not found by the automatic integration routine.

M2 - The compound was incorrectly integrated by the automatic integration routine.

M3 - The co-eluting compounds were incorrectly integrated by the automatic integration routine.

These codes will appear in the GC/MS and GC raw data.

Revision 7 (12/6/2005)

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DATA REPORTING QUALIFIERS

On the Form I, under the column labeled "Q" for qualifier, each result is flagged with the specific data reporting qualifiers listed below, as appropriate. Up to five qualifiers may be reported on Form I for each compound. The qualifiers used are:

U: This flag indicates the compound was analyzed for but not detected. The Contract Required Quantitation Limit (CRQL), or reporting limit, will be adjusted to reflect any dilution and, for soils, the percent moisture.

J: This flag indicates an estimated value. The flag is used as detailed below:

1. When estimating a concentration for tentatively identified compounds (TICs) where a response factor of 1:1 is assumed for the TIC analyte,

2. When the mass spectral and retention time data indicate the presence of a compound that meets the volatile and semivolatile GC/MS identification criteria, and the result is less than the adjusted CRQL (or Reporting Limit) but greater than zero, and

3. When the retention time data indicate the presence of a compound that meets the pesticide and/or Aroclor or other GC or HPLC identification criteria, and the result is less than the adjusted CRQL (or Reporting Limit) but greater than zero. For example, if the CRQL (or Reporting Limit) is 10 µg/L, but a concentration of 3 µg/L is calculated, it is reported as 3J.

N: This flag indicates presumptive evidence of a compound. This flag is only used for TICs, where the identification is based on a mass spectral library search and must be used with the J flag. For generic characterization of a TIC such as "chlorinated hydrocarbon" (or for an "unknown," with no matches ≥85% in the SOM01.2 SOW document), the N flag is not used.

P: In the EPA's Contract Laboratory Program (CLP), this flag is used for a pesticide/Aroclor target analyte, when there is greater than 25% difference for detected concentrations between the two GC columns. The lower of the two values is reported on the Form I and flagged with a P.
For SW-846 GC and HPLC analyses, when the Relative Percent Difference (RPD) is greater than 40% and there is no evidence of chromatographic anomalies or interferences, then the lower of the two values is reported and flagged with a P. When the RPD is equal to or less than 40%, our policy is to also report the lower of the two values, although the choice could be a project specific issue. These SW-846 policies are consistent with Method 8000C. If Method 8000B is required, the higher of the two values is reported. For certain HPLC analyses, if one of the HPLC

columns displays co-elution of target analytes, all results are reported from a primary column displaying no co-elution. Results are still flagged with a P if the RPD between columns is greater than 40%.

C: This flag applies to GC or HPLC results where the identification has been confirmed by GC/MS. If GC/MS confirmation was attempted but was unsuccessful, this flag is not applied; a laboratory-defined flag is used instead (see the X/Y/Z qualifier.)

B: This flag is used when the analyte is found in the associated blank as well as in the sample. It indicates probable blank contamination and warns the data user to take appropriate action. This flag is used for a TIC as well as for a positively identified target compound. The combination of flags BU or UB is not an allowable policy. Blank contaminants are flagged B only when they are detected in the sample.

E: This flag identifies compounds whose concentrations exceed the upper level of the calibration range of the instrument for that specific analysis. If one or more compounds have a concentration greater than the upper level of the calibration range, the sample or extract will be diluted and reanalyzed. All such compounds with a concentration greater than the upper level of the calibration range will have the result flagged with an E on Form I for the original analysis.

D : If a sample or extract is reanalyzed at a higher dilution factor, for example when the concentration of an analyte exceeds the upper calibration range, the DL suffix is appended to the sample number on the Form I for the more diluted sample, and **all** reported concentrations on that Form I are flagged with the D flag. This flag alerts data users that any discrepancies between the reported concentrations may be due to dilution of the sample or extract.

NOTE 1: The D flag is not applied to compounds which are not detected in the sample analysis i.e. compounds reported with the CRQL (or Reporting Limit) and the U flag.

NOTE 2: Separate Forms I are used for reporting the original analysis (Client Sample No. XXXXX) and the more diluted sample analysis (Client Sample No. XXXXXDL) i.e. the results from both analyses <u>are not combined</u> on a single Form I.

A: This flag indicates that a TIC is a suspected aldol-condensation product.

S: In the SOM01.2 SOW document, this flag is used to indicate an estimated value for Aroclor target compounds where a valid 5-point initial calibration was not performed prior to the analytes detection in a sample. If an "S" flag is used for a specific Aroclor, then a reanalysis of the sample is required after a valid 5-point calibration is performed for the detected Aroclor.

X/Y/Z: Other specific flags may be required to properly define the results. If used, the flags will be fully described in the SDG Narrative. The laboratory-defined flags are limited to X, Y, and Z.

ANALYSIS SEQUENCE SUMMARY

RSK 175 DOD

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Sequence: 0G01009 Instrument: varian67

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
CALFTA	0G01009-CAL6	001t0G01009-CAL6.d	07/01/10 11:40:00
CALETA	0G01009-CAL5	002t0G01009-CAL5.d	07/01/10 11:51:00
CALDTA	0G01009-CAL4	003t0G01009-CAL4.d	07/01/10 12:25:00
CALCTA	0G01009-CAL3	004t0G01009-CAL3.d	07/01/10 12:47:00
CALBTA	0G01009-CAL2	005t0G01009-CAL2.d	07/01/10 13:03:00
CALATA	0G01009-CAL1	006t0G01009-CAL1.d	07/01/10 13:26:00

INITIAL CALIBRATION DATA (Continued)

RSK 175 DOD

Client: TETRA TECH SDG: 1012127

Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Calibration: 0070106 Instrument: varian67

Calibration Date: 7/1/2010 5:04:25PM

Compound	Mean RF	% RSD	Mean RT	RT RSD	Linear r	Quad COD	RSD LIMIT	Q
Methane	3042.173	17.2471	1.558	0.1945632			CCC (25)	
Ethane	2781.42	6.539148	1.754	0.1146778			CCC (25)	
Ethene	2808.29	6.131014	1.830833	0.1350503			CCC (25)	

INITIAL CALIBRATION DATA

RSK 175 DOD

Client: TETRA TECH SDG: 1012127

Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Calibration: 0070106 Instrument: varian67

Calibration Date: 7/1/2010 5:04:25PM

Compound	Level 01		Level 02		Level 03		Level 04		Level 05		Level 06	
		RF		RF		RF		RF		RF		RF
Methane	0.573	3984.293	1.146	3235.602	2.865	3009.773	5.73	2542.583	28.65	2837.068	57.3	2643.717
Ethane	1.074	3012.104	2.148	2776.071	5.37	2797.393	10.74	2501.49	53.7	2928.79	107.4	2672.672
Ethene	1.002	2994.012	2.004	2809.381	5.01	2830.339	10.02	2533.034	50.1	2974.292	100.2	2708.683

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ANALYSIS SEQUENCE SUMMARY

RSK 175 DOD

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Sequence: 0L21011 Instrument: varian67

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
CALDUY	0L21011-CCV1	477tSEQ-CCV1.d	12/21/10 09:24:00
PBLKFO	0122108-BLK1	478t0122108-BLK1.d	12/21/10 09:41:00
PLCSFO	0122108-BS1	479t0122108-BS1.d	12/21/10 09:47:00
PLCSDFO	0122108-BSD1	480t0122108-BSD1.d	12/21/10 09:58:00
PZ-159I1	1012127-01	481t1012127-01.d	12/21/10 10:29:00
PZ-157I	1012127-02	482t1012127-02.d	12/21/10 10:35:00
PZ-157I1	1012127-03	483t1012127-03.d	12/21/10 10:46:00
DUP01-20101214	1012127-04	484t1012127-04.d	12/21/10 10:57:00
PZ-159I	1012127-05	485t1012127-05.d	12/21/10 11:08:00
PZ-151I1	1012127-06	486t1012127-06.d	12/21/10 11:19:00
PZ-155I	1012127-07	487t1012127-07.d	12/21/10 11:30:00
PZ-160I	1012127-10	488t1012127-10.d	12/21/10 11:41:00
PZ-159I1DL	1012127-01RE1	489t1012127-01.d	12/21/10 12:57:00
PZ-157I1DL	1012127-03RE1	490t1012127-03.d	12/21/10 13:03:00
DUP01-20101214DL	1012127-04RE1	491t1012127-04.d	12/21/10 13:14:00
PZ-151I1DL	1012127-06RE1	492t1012127-06.d	12/21/10 13:25:00
CALDUZ	0L21011-CCV2	493tSEQ-CCV2.d	12/21/10 14:03:00

CONTINUING CALIBRATION CHECK

RSK 175 DOD

Client: TETRA TECH SDG: 1012127

Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Instrument ID: varian67 Calibration: 0070106

Lab File ID: 477tSEQ-CCV1.d Calibration Date: 07/01/10 17:04

Sequence: 0L21011 Injection Date: 12/21/10

Lab Sample ID: 0L21011-CCV1 Injection Time: 09:24

COMPOUND	TYPE	CONC. (ug/L)		RESPONSE FACTOR			% DIFF / DRIFT	
		STD	CCV	ICAL	CCV	MIN (#)	CCV	LIMIT
Methane	Avg	5.730	5.820	3042.173	3092.67		1.7	25
Ethane	Avg	10.74	11.50	2781.42	2984.916		7.3	25
Ethene	Avg	10.02	11.00	2808.29	3069.561		9.3	25

Column to be used to flag Response Factor and %Diff/Drift values with an asterisk

* Values outside of QC limits

CONTINUING CALIBRATION CHECK

RSK 175 DOD

Client: TETRA TECH SDG: 1012127

Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Instrument ID: varian67 Calibration: 0070106

Lab File ID: 493tSEQ-CCV2.d Calibration Date: 07/01/10 17:04

Sequence: 0L21011 Injection Date: 12/21/10

Lab Sample ID: 0L21011-CCV2 Injection Time: 14:03

COMPOUND	TYPE	CONC. (ug/L)		RESPONSE FACTOR			% DIFF / DRIFT	
		STD	CCV	ICAL	CCV	MIN (#)	CCV	LIMIT
Methane	Avg	5.730	6.060	3042.173	3219.895		5.8	25
Ethane	Avg	10.74	12.60	2781.42	3262.849		17.3	25
Ethene	Avg	10.02	11.70	2808.29	3260.778		16.1	25

Column to be used to flag Response Factor and %Diff/Drift values with an asterisk

* Values outside of QC limits

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PREPARATION BATCH SUMMARY

RSK 175 DOD

Client: TETRA TECH

Batch: 0122108

SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water Preparation: GC-RSK

SAMPLE NAME	LAB SAMPLE ID	DATE PREPARED	INITIAL VOL/WT (mL)	FINAL VOL/WT (mL)
PBLKFO	0122108-BLK1	12/21/10 09:32	1.00	1.00
PLCSFO	0122108-BS1	12/21/10 09:32	1.00	1.00
PLCSDFO	0122108-BSD1	12/21/10 09:32	1.00	1.00
PZ-159I1	1012127-01	12/21/10 09:32	1.00	1.00
PZ-159I1DL	1012127-01RE1	12/21/10 09:32	1.00	1.00
PZ-157I	1012127-02	12/21/10 09:32	1.00	1.00
PZ-157I1	1012127-03	12/21/10 09:32	1.00	1.00
PZ-157I1DL	1012127-03RE1	12/21/10 09:32	1.00	1.00
DUP01-20101214	1012127-04	12/21/10 09:32	1.00	1.00
DUP01-20101214DL	1012127-04RE1	12/21/10 09:32	1.00	1.00
PZ-159I	1012127-05	12/21/10 09:32	1.00	1.00
PZ-151I1	1012127-06	12/21/10 09:32	1.00	1.00
PZ-151I1DL	1012127-06RE1	12/21/10 09:32	1.00	1.00
PZ-155I	1012127-07	12/21/10 09:32	1.00	1.00
PZ-160I	1012127-10	12/21/10 09:32	1.00	1.00

ANALYSIS DATA SHEET

RSK 175 DOD

PBLKFO

Client: TETRA TECH | SDG: 1012127 | Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water | Extraction: GC-RSK | File ID: 478t0122108-BLK1.d | QC Type: Blank

Initial/Final: 1mL / 1mL | Sulfur Cleanup: N | Lab ID: 0122108-BLK1 | Column ID: GS-GASPRO

Dilution: 1 | pH: | Florisil Cleanup: N | Prepared: 12/21/10 09:32

% Moisture: NA | GPC Cleanup: N | GPC Cleanup Factor: N | Analyzed: 12/21/10 09:41

Batch: 0122108 | Sequence: 0L21011 | Calibration: 0070106 | Instrument: varian67

CAS NO.	COMPOUND	CONC.(ug/L)	DL	LOD	LOQ	Q
74-82-8	Methane		0.048	0.15	0.58	U
74-84-0	Ethane		0.14	0.27	1.1	U
74-85-1	Ethene		0.15	0.25	1.0	U

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LCS / LCS DUPLICATE RECOVERY

RSK 175 DOD

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Lab ID: 0122108-BS1 Matrix: Water Client ID: PLCSFO Batch: 0122108

ANALYTE	SPIKE ADDED (ug/L)	LCS CONCENTRATION (ug/L)	LCS % REC.	Q	QC LIMITS REC.
Methane	5.730	4.869	85		58 - 120
Ethane	10.74	9.376	87		61 - 134
Ethene	10.02	8.536	85		58 - 129

ANALYTE	SPIKE ADDED (ug/L)	LCSD CONCENTRATION (ug/L)	LCSD % REC. #	% RPD #	QC LIMITS RPD	Q	REC.
Methane	5.730	4.941	86	1	20		58 - 120
Ethane	10.74	9.808	91	5	20		61 - 134
Ethene	10.02	8.661	86	1	20		58 - 129

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TETRA TECH NUS, INC. **CALCULATION WORKSHEET** PAGE 1 OF 1

CLIENT NWIRP Calverton	JOB NUMBER 02045
SUBJECT Calculation Check SDG 1012127	
BASED ON	DRAWING NUMBER
BY J. Kalinyak / CHECKED BY	APPROVED BY / DATE 02/07/11

VOC - 1,1-dichloroethane Sample - SA-PZ-138I1-20101215

$$\frac{792854 \times 250\,ng \times 10\,df}{736536 \times 0.4746 \times 5\,ml} \simeq 1134\ ng/ml \text{ or } \mu g/l$$

OVG - Methane Sample - SA-PZ-151I1-20101215

$$\frac{63075}{3042.73} \times 10\,df \simeq 207\ \mu g/l$$

Data File: /chem/5972hp59.i/DF101222A59.b/1012127-2059.d
Report Date: 27-Dec-2010 14:59

CompuChem

SW846 UPDATE III METHOD 8260B QUANT & RATIO REPORT

Data file : /chem/5972hp59.i/DF101222A59.b/1012127-2059.d
Lab Smp Id: 1012127-20 Client Smp ID: SA-PZ-138I1
Inj Date : 22-DEC-2010 19:38
Operator : JAO Inst ID: 5972hp59.i
Smp Info : 1012127-20:JAO
Misc Info : SA-PZ-138I1
Comment :
Method : /chem/5972hp59.i/DF101222A59.b/W8260B_5MLv3.m
Meth Date : 27-Dec-2010 13:04 ron Quant Type: ISTD
Cal Date : 20-DEC-2010 21:52 Cal File: 0L20010-CAL659.d
Als bottle: 19
Dil Factor: 10.00000
~~Integrator: HP RTE~~ Compound Sublist: NEWTETRA-DOD.sub
Target Version: 3.50

Concentration Formula: Amt * DF * 1/(Vo) * CpndVariable

Name	Value	Description
DF	10.00000	Dilution Factor
Vo	5.00000	volume of water
DF	10.00000	dilution factor

Cpnd Variable Local Compound Variable

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ng)	FINAL (ug/L)
* 1 Fluorobenzene	96	11.209	11.219	(1.000)	736536	250.000	
* 2 Chlorobenzene-d5	117	13.565	13.575	(1.000)	477358	250.000	
* 3 1,4-Dichlorobenzene-d4	152	15.301	15.301	(1.000)	203863	250.000	
$ 4 Dibromofluoromethane	113	10.578	10.578	(0.944)	199835	257.264	510
$ 5 1,2-Dichloroethane-d4	65	10.933	10.943	(0.975)	172845	245.815	490
$ 6 Toluene-d8	98	12.481	12.491	(0.920)	583061	267.080	530
$ 7 Bromofluorobenzene	95	14.394	14.394	(0.941)	217108	259.663	520
8 Dichlorodifluoromethane	85	Compound Not Detected.					
9 Chloromethane	50	Compound Not Detected.					
10 Vinyl Chloride	62	Compound Not Detected.					
11 Bromomethane	94	Compound Not Detected.					
12 Chloroethane	64	6.229	6.229	(0.556)	55974	157.803	320
13 Trichlorofluoromethane	101	Compound Not Detected.					
17 1,1-Dichloroethene	96	7.747	7.748	(0.691)	22275	31.6895	63
18 Acetone	43	Compound Not Detected.					
16 1,1,2-trichloro-1,2,2-trifluo	101	Compound Not Detected.					

MIB 12-27-10

Data File: /chem/5972hp59.i/DF101222A59.b/1012127-2059.d
Report Date: 27-Dec-2010 14:59

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ng)	CONCENTRATIONS FINAL (ug/L)
20 Carbon disulfide	76	Compound Not Detected.					
23 Methyl acetate	43	Compound Not Detected.					
24 Methylene Chloride	84	8.536	8.546	(0.762)	7699	9.88804	20(a)
28 trans-1,2-Dichloroethene	96	Compound Not Detected.					
29 trans-1,2-DCE (part of total)	96	Compound Not Detected.					
26 Methyl tert butyl ether	73	Compound Not Detected.					
32 1,1-Dichloroethane	63	9.453	9.454	(0.843)	792854	566.986	1100
35 2-Butanone	43	Compound Not Detected.					
37 cis-1,2-Dichloroethene	96	Compound Not Detected.					
38 cis-1,2-DCE (part of total)	96	Compound Not Detected.					
42 Chloroform	83	Compound Not Detected.					
43 1,1,1-Trichloroethane	97	10.617	10.617	(0.947)	145854	128.219	260
44 Cyclohexane	56	Compound Not Detected.					
46 1,1-dichloropropene	75	Compound Not Detected.					
48 Carbon Tetrachloride	117	Compound Not Detected.					
50 1,2-Dichloroethane	62	Compound Not Detected.					
49 Benzene	78	Compound Not Detected.					
51 Trichloroethene	130	Compound Not Detected.					
52 Methylcyclohexane	83	Compound Not Detected.					
54 1,2-Dichloropropane	63	Compound Not Detected.					
57 Bromodichloromethane	83	Compound Not Detected.					
58 cis-1,3-Dichloropropene	75	Compound Not Detected.					
59 4-Methyl-2-pentanone	43	Compound Not Detected.					
60 Toluene	92	Compound Not Detected.					
62 trans-1,3-Dichloropropene	75	Compound Not Detected.					
63 1,1,2-Trichloroethane	97	Compound Not Detected.					
64 2-hexanone	43	Compound Not Detected.					
67 Tetrachloroethene	164	Compound Not Detected.					
68 Dibromochloromethane	129	Compound Not Detected.					
69 1,2-Dibromoethane	107	Compound Not Detected.					
71 Chlorobenzene	112	Compound Not Detected.					
72 Ethylbenzene	106	Compound Not Detected.					
75 m,p-Xylene (part of total)	106	Compound Not Detected.					
77 o-Xylene (part of total)	106	Compound Not Detected.					
78 Styrene	104	Compound Not Detected.					
79 Bromoform	173	Compound Not Detected.					
80 Isopropyl Benzene	105	14.216	14.216	(1.048)	11619	4.15789	8.3(a)
81 1,1,2,2-Tetrachloroethane	83	Compound Not Detected.					
94 1,3-Dichlorobenzene	146	Compound Not Detected.					
95 1,4-Dichlorobenzene	146	Compound Not Detected.					
97 1,2-Dichlorobenzene	146	Compound Not Detected.					
98 1,2-Dibromo-3-Chloropropane	157	Compound Not Detected.					
99 1,2,4-Trichlorobenzene	180	Compound Not Detected.					
101 Naphthalene	128	Compound Not Detected.					
M 103 1,2-Dichloroethene (total)	96	Compound Not Detected.					
M 104 Xylene (total)	106	Compound Not Detected.					

INITIAL CALIBRATION DATA (Continued)

SW 8260B

Client: TETRA TECH SDG: 1012127

Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Calibration: 0122202 Instrument: 5972hp59

Calibration Date: 12/20/2010 7:36:11PM

Compound	Mean RF	% RSD	Mean RT	RT RSD	Linear r	Quad COD	RSD LIMIT	Q
Dichlorodifluoromethane	0.4713774	12.89144	4.296167	7.251883E-02			CCC (15)	
Chloromethane	0.3646265	9.838642	4.805667	8.199896E-02			CCC (15)	
Vinyl chloride	0.2452635	5.3434	5.105	5.844527E-02			CCC (30)	
Bromomethane	0.1819012	12.4664	5.974333	0.1163528			CCC (15)	
Chloroethane	0.1203973	6.597414	6.212667	4.522977E-02			CCC (15)	
Trichlorofluoromethane	0.4071588	11.61491	6.728667	5.937296E-02			CCC (15)	
1,1-Dichloroethene	0.238588	10.11365	7.733	4.940565E-02			CCC (30)	
Acetone	3.996388E-02	10.80369	7.8215	4.738581E-02			CCC (15)	
1,1,2-Trichloro-1,2,2-trifluoroethane	0.3492392	12.22708	7.675333	4.672825E-02			CCC (15)	
Carbon disulfide	0.9398163	12.49228	8.130667	3.909331E-02			CCC (15)	
Methyl acetate	0.1153314	8.338106	8.303333	6.064521E-02			CCC (15)	
Methylene chloride	0.2642836	10.58734	8.528167	0.0538482			CCC (15)	
trans-1,2-Dichloroethene	0.2596914	9.39774	8.875333	3.402092E-02			CCC (15)	
Methyl tert-butyl ether	0.4992108	6.766163	8.820833	3.356751E-02			CCC (15)	
1,1-Dichloroethane	0.4746428	11.09287	9.439	4.098645E-02			CCC (15)	
cis-1,2-Dichloroethene	0.2659083	9.91747	10.10267	0.0291358			CCC (15)	
2-Butanone	7.088383E-02	8.457285	10.05833	2.592259E-02			CCC (15)	
Chloroform	0.4530555	10.5723	10.39867	3.079933E-02			CCC (30)	
1,1,1-Trichloroethane	0.3861116	10.6316	10.60567	3.085314E-02			CCC (15)	
Cyclohexane	0.4666985	11.91678	10.64033	2.214903E-02			CCC (15)	
1,1-Dichloropropene	0.355036	12.2474	10.75867	2.566018E-02			CCC (15)	
Carbon tetrachloride	0.3299956	10.63763	10.75867	2.566018E-02			CCC (15)	
1,2-Dichloroethane	0.2649945	7.285566	10.99533	2.211049E-02			CCC (15)	
Benzene	0.9404337	11.87554	10.95733	0.0330584			CCC (15)	
Trichloroethene	0.2552195	7.929532	11.52267	2.974882E-02			CCC (15)	
Methylcyclohexane	0.4502666	9.213587	11.67233	3.069549E-02			CCC (15)	
1,2-Dichloropropane	0.225051	12.89161	11.73317	0.0280491			CCC (30)	
Bromodichloromethane	0.3162706	8.922524	11.937	1.683646E-02			CCC (15)	
cis-1,3-Dichloropropene	0.3543573	6.803878	12.27733	2.390585E-02			CCC (15)	
4-Methyl-2-pentanone	0.2360902	8.110948	12.3315	2.508906E-02			CCC (15)	

Environmental Testing Laboratories

CompuChem

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CompuChem

Lab Smp Id : 1012127-06RE1 Client Smp Id : PZ-151I1DL
Sample Type : SAMPLE Sublist : MEE
Inj Date : 21-DEC-2010 13:25 Inst ID : VARIAN67
Operator : BWL
Method : /chem/varian67.i/t100701zy.b/RSK175_v3.m
Misc. Info : PZ-151I1DL

Method Type: undefined

RT	RT WINDOW		AREA	QUANT RF	COMPOUND	CONCENTRATIONS ON-COLUMN (Ng)	CONCENTRATIONS FINAL (ug/L)	ADJUSTED PQL (ug/L)	% REC	RECOVERY LIMITS	FLAGS
1.08			71								
1.55	1.46	1.66	63075	3047	Methane	20.70263	207.0263	5.000000			

KEH 12/21/10

INITIAL CALIBRATION DATA (Continued)

RSK 175 DOD

Client: TETRA TECH SDG: 1012127

Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Calibration: 0070106 Instrument: varian67

Calibration Date: 7/1/2010 5:04:25PM

Compound	Mean RF	% RSD	Mean RT	RT RSD	Linear r	Quad COD	RSD LIMIT	Q
Methane	3042.173	17.2471	1.558	0.1945632			CCC (25)	
Ethane	2781.42	6.539148	1.754	0.1146778			CCC (25)	
Ethene	2808.29	6.131014	1.830833	0.1350503			CCC (25)	

NWIRP CALVERTON
WATER DATA
1012127

FRACTION	CHEMICAL	SA-PZ-DUP01-20101214	UNITS	SA-PZ-157I1-20101214	RPD	D
OV	1,1,1-TRICHLOROETHANE	21	UG/L	20	4.88	1.00
OV	1,1-DICHLOROETHANE	100	UG/L	100	0.00	0.00
OV	1,1-DICHLOROETHENE	7.9	UG/L	7.6	3.87	0.30
OV	1,2-DICHLOROBENZENE	2.2 J	UG/L	2.1 J	4.65	0.10
OV	1,3-DICHLOROBENZENE	1.4 J	UG/L	1.4 J	0.00	0.00
OV	1,4-DICHLOROBENZENE	7.4	UG/L	7.3	1.36	0.10
OV	ACETONE	7.3 J	UG/L	8.1 J	10.39	0.80
OV	CHLOROBENZENE	ND	UG/L	0.73 J	200.00	0.73 N/A<2XRL
OV	CHLOROETHANE	49	UG/L	49	0.00	0.00

Current RPD Quality Control Limit: 30 %.
Shaded cells indicate RPDs that exceed the applicable quality control limit.

NWIRP CALVERTON
WATER DATA
1012127

FRACTION	CHEMICAL	SA-PZ-DUP02-20101215	UNITS	SA-PZ-133I-20101215	RPD	D
OV	1,1,1-TRICHLOROETHANE	17	UG/L	18	5.71	1.00
OV	1,1-DICHLOROETHANE	130	UG/L	130	0.00	0.00
OV	1,1-DICHLOROETHENE	6.7	UG/L	6.9	2.94	0.20
OV	BENZENE	ND	UG/L	0.35 J	200.00	0.35 N/A <2xR.L.
OV	CHLOROETHANE	34	UG/L	33	2.99	1.00

Current RPD Quality Control Limit: 30 %.
Shaded cells indicate RPDs that exceed the applicable quality control limit.

NWIRP CALVERTON
WATER DATA
1012127

FRACTION	CHEMICAL	A-PZ-DUP01-20101214D	UNITS	A-PZ-157I1-20101214D	RPD	D
OVG	METHANE	90	UG/L	78	14.29	12.00

Current RPD Quality Control Limit: 30 %.
Shaded cells indicate RPDs that exceed the applicable quality control limit.

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**D. BRAYACK**	**DATE:**	**FEBRUARY 10, 2011**
FROM:	**TERRI L. SOLOMON**	**COPIES:**	**DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION – TAL METALS, CHLORIDE, FLUORIDE, NITRATE, NITRITE, SULFIDE AND TOTAL ORGANIC CARBON**
CTO WE08 NWIRP CALVERTON
SAMPLE DELIVERY GROUPS (SDG) – 1012127

SAMPLES: 8/Aqueous/

SA-PZ-151I1-20101215	SA-PZ-155I-20101215
SA-PZ-157I1-20101214	SA-PZ-157I-20101214
SA-PZ-159I1-20101214	SA-PZ-159I-20101214
SA-PZ-160I-2010216	SA-PZ-DUP01-20101214

Overview

The sample set for NWIRP Calverton, CTO WE08, SDG 1012127, consists of eight (8) aqueous environmental samples. One (1) field duplicate pair (SA-PZ-157I1-20101214 / SA-PZ-DUP01-20101214) was included in this SDG.

All samples were analyzed for total analyte list (TAL) metals, chloride, fluoride, nitrate, nitrite, sulfide and total organic carbon. The samples were collected by Tetra Tech on December 14, 15 and 16, 2010, 2009 and analyzed by CompuChem under Naval Facilities Engineering Service Center (NFESC) Quality Assurance / Quality Control (QA/QC) criteria. Metals analyses were conducted using SW-846 method 6010C. Mercury analyses were conducted using SW-846 method 7470A. Chloride, nitrate, nitrite and fluoride analyses were conducted using EPA method 300.0. Sulfide analyses were conducted using Standard Method 4500S-2F. Total organic carbon analyses were conducted using Standard Method 5310B.

These data were evaluated based on the following parameters:

* • Data Completeness
• Holding Times
• Initial and Continuing Calibration Verification Results
• Laboratory Method / Preparation Blank Analyses
* • ICP Interference Results
* • Matrix Spike / Matrix Spike Duplicate Recoveries
* • Laboratory Duplicate Results
* • Laboratory Control Standard Results
• ICP Serial Dilution Results
• Field Duplicate Results
* • Detection Limits
* • Analyte Quantitation

* - All quality control criteria were met for this parameter.

Metals

A contract required detection limit (CRDL) standard was not analyzed for the mercury analyses. The nondetected results reported for the mercury analyses were qualified as estimated, "UJ".

The following contaminants were detected in the laboratory method/preparation blanks at the following maximum concentrations:

Analyte	Maximum Concentration	Action Level
Antimony[1]	3.0 ug/L	15.0 ug/L
Cadmium	1.96 ug/L	9.8 ug/L
Cobalt	5.03 ug/L	25.15 ug/L
Lead	1.8 ug/L	9.0 ug/L
Iron[1]	18.8 ug/L	94.0 ug/L
Magnesium	16.6 ug/L	83.0 ug/L
Manganese	0.293 ug/L	1.465 ug/L
Potassium	46.3 ug/L	231.5 ug/L
Silver	0.998 ug/L	4.99 ug/L
Sodium	1030 ug/L	5150 ug/L
Zinc[1]	5.11 ug/L	25.55 ug/L

[1] Maximum concentration present in a preparation blank.

An action level of 5X the maximum contaminant level has been used to evaluate sample data for blank contamination. Sample aliquot and dilution factors, if applicable, were taken into consideration when evaluating for blank contamination. The positive results less than the blank action level for antimony, cadmium, copper, lead, silver and zinc were qualified "U" as a result of laboratory blank contamination.

The ICP serial dilution percent difference (results > 50X MDL) was > 10% quality control limit for potassium. The positive results reported for potassium were qualified as estimated, "J".

Miscellaneous Parameters

The 48 hour hold time was exceeded by one day for the nitrate and nitrite analyses for sample SA-PZ-259I1-20101214. The nondetected results reported for nitrate and nitrite in the affected sample were qualified as estimated, "UJ".

Field duplicate imprecision (range > 2X limit of quantitation) was present for total organic carbon. The positive and nondetected results were qualified as estimated, "J" and "UJ", respectively.

Notes

Positive results less than the limit of quantitation (LOQ) but greater than the detection limit (DL) were qualified as estimated, "J".

Nondetected results are reported to the limit of detection (LOD).

Executive Summary

Laboratory Performance: A contract required detection limit (CRDL) standard was not analyzed for the mercury analyses. Several contaminants were present in the laboratory method / preparation blanks. The 48 hour hold time was exceeded by one day for the nitrate and nitrite analyses for sample SA-PZ-259I1-20101214

Other Factors Affecting Data Quality: Field duplicate imprecision was present for total organic carbon.

The data for these analyses were reviewed with reference to the Region II "Validation of Metals for the Contract Laboratory Program (CLP) based on ILMO5.3 (SOP Revision 13)",September 2006 and the Department of Defense (DoD) document entitled "Quality Systems Manual (QSM) for Environmental Laboratories", January 2006.

The text of this report has been formulated to address only those problem areas affecting data quality.

Tetra Tech NUS
Terri L. Solomon
Environmental Scientist

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C – Region II Worksheets
3. Appendix D - Support Documentation

APPENDIX A
QUALIFIED ANALYTICAL RESULTS

Data Validation Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS-GFAA MSA's r < 0.995 / ICP PDS Recovery Noncompliance
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O - Poor Instrument Performance (e.g. base-line drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DOT and Endrin
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient r < 0.995
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is greater than sample activity

PROJ_NO: 02045 SDG: 1012127 FRACTION: M MEDIA: WATER	NSAMPLE	SA-PZ-151I1-20101215			SA-PZ-155I-20101215			SA-PZ-157I1-20101214			SA-PZ-157I-20101214		
	LAB_ID	1012127-06			1012127-07			1012127-03			1012127-02		
	SAMP_DATE	12/15/2010			12/15/2010			12/14/2010			12/14/2010		
	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ALUMINUM		100	U		100	U		100	U		100	U	
ANTIMONY		2.48	U	A	4.07	U	A	3.49	U	A	4.07	U	A
ARSENIC		7.03	J	P	12.1			5.32	J	P	2.97	J	P
BARIUM		30.6	J	P	22.7	J	P	21.4	J	P	25.5	J	P
BERYLLIUM		2.5	U		2.5	U		2.5	U		2.5	U	
CADMIUM		0.872	U	A	2.5	U		0.892	U	A	0.747	U	A
CALCIUM		15700			5830			14800			9500		
CHROMIUM		0.765	J	P	0.868	J	P	5	U		5	U	
COBALT		2.5	U		2.5	U		1.64	U	A	2.37	U	A
COPPER		2.5	U		2.5	U		2.5	U		2.5	U	
IRON		1170			2080			2610			10600		
LEAD		5	U		1.99	U	A	2.01	U	A	5	U	
MAGNESIUM		987	J	P	1800	J	P	1150	J	P	2730	J	P
MANGANESE		5580			484			5540			1400		
MERCURY		0.18	UJ	C	0.18	UJ	C	0.18	UJ	C	0.18	UJ	C
NICKEL		2.5	U		3.58	J	P	2.5	U		2.5	U	
POTASSIUM		3100	J	IP	930	J	IP	2520	J	IP	1170	J	IP
SELENIUM		2.5	U		2.5	U		2.21	J	P	2.5	U	
SILVER		1.42	U	A	2.5	U		2.5	U		2.5	U	
SODIUM		8170			9940			7920			10300		
THALLIUM		5	U		5	U		5	U		5	U	
VANADIUM		10	U		1.77	J	P	10	U		10	U	
ZINC		10	U		10	U		10	U		10.8	U	A

PROJ_NO: 02045	NSAMPLE	SA-PZ-159I1-20101214			SA-PZ-159I-20101214			SA-PZ-160I-2010216			SA-PZ-DUP01-20101214		
SDG: 1012127	LAB_ID	1012127-01			1012127-05			1012127-08			1012127-04		
FRACTION: M	SAMP_DATE	12/14/2010			12/14/2010			12/16/2010			12/14/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF										SA-PZ-157I1-20101214		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ALUMINUM		100	U		100	U		100	U		100	U	
ANTIMONY		5.1	U	A	6.97	U	A	3.59	U	A	5	U	
ARSENIC		3.43	J	P	13.9			7.42	J	P	3.63	J	P
BARIUM		21.8	J	P	24.7	J	P	28.5	J	P	21.5	J	P
BERYLLIUM		2.5	U		2.5	U		2.5	U		2.5	U	
CADMIUM		2.5	U		1.32	U	A	2.5	U		0.908	U	A
CALCIUM		16800			7670			8360			14800		
CHROMIUM		1.43	J	P	1.06	J	P	5	U		1.08	J	P
COBALT		2.5	U		5.91	U	A	2.5	U		2.5	U	
COPPER		2.5	U		2.5	U		12.8			2.5	U	
IRON		2370			9680			3340			2580		
LEAD		2.6	U	A	1.66	U	A	3.37	U	A	5	U	
MAGNESIUM		1180	J	P	2800	J	P	2220	J	P	1140	J	P
MANGANESE		6480			1090			662			5510		
MERCURY		0.18	UJ	C	0.18	UJ	C	0.18	UJ	C	0.18	UJ	C
NICKEL		0.91	J	P	1.1	J	P	2.5	U		2.5	U	
POTASSIUM		2710	J	IP	972	J	IP	1190	J	IP	2530	J	IP
SELENIUM		2.17	J	P	2.5	U		2.5	U		2.5	U	
SILVER		0.672	U	A	2.5	U		2.5	U		2.5	U	
SODIUM		7240			10500			9780			7740		
THALLIUM		5	U		5	U		5	U		5	U	
VANADIUM		10	U		10	U		10	U		10	U	
ZINC		10	U		10	U		10	U		10	U	

PROJ_NO: 02045 SDG: 1012127 FRACTION: MISC MEDIA: WATER	NSAMPLE	SA-PZ-151I1-20101215			SA-PZ-155I-20101215			SA-PZ-157I1-20101214			SA-PZ-157I-20101214		
	LAB_ID	1012127-06			1012127-07			1012127-03			1012127-02		
	SAMP_DATE	12/15/2010			12/15/2010			12/14/2010			12/14/2010		
	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/L			MG/L			MG/L			MG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CHLORIDE								6.65			4.12		
FLUORIDE								0.028	J	P	0.02	U	
NITRATE-N								0.1	U		0.074	J	P
NITRITE-N								0.05	U		0.05	U	
SULFIDE								0.9	U		0.9	U	
TOTAL ORGANIC CARBON		1.31	J	G	0.3	UJ	G	107	J	G	122	J	G

PROJ_NO: 02045	NSAMPLE	SA-PZ-159I1-20101214			SA-PZ-159I-20101214			SA-PZ-160I-2010216			SA-PZ-DUP01-20101214		
SDG: 1012127	LAB_ID	1012127-01			1012127-05			1012127-08			1012127-04		
FRACTION: MISC	SAMP_DATE	12/14/2010			12/14/2010			12/16/2010			12/14/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/L			MG/L			MG/L			MG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF										SA-PZ-157I1-20101214		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CHLORIDE		3.54	J	P									
FLUORIDE		0.02	U										
NITRATE-N		0.1	UJ	H									
NITRITE-N		0.05	UJ	H									
SULFIDE		0.9	U										
TOTAL ORGANIC CARBON		31.3	J	G	4.7	J	G	16.8	J	G	0.3	UJ	G

APPENDIX B
RESULTS AS REPORTED BY THE LABORATORY

ANALYSIS DATA SHEET

PZ-151I1

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Lab ID: 1012127-06 % Solid: Matrix: Water Sampled: 12/15/10 Received: 12/16/10

CAS NO.	Analyte	Conc. (ug/L)	DL	LOD	LOQ	D.F.	Q	Method	Sequence	Analyzed
7429-90-5	Aluminum		31.0	100	200	1	U	EPA 6010C	0L29002	12/28/10 18:21
7440-36-0	Antimony	2.48	1.97	5.00	30.0	1	J	EPA 6010C	0L29002	12/28/10 18:21
7440-38-2	Arsenic	7.03	2.44	5.00	10.0	1	J	EPA 6010C	0L29002	12/28/10 18:21
7440-39-3	Barium	30.6	15.2	100	200	1	J	EPA 6010C	0L29002	12/28/10 18:21
7440-41-7	Beryllium		0.723	2.50	5.00	1	U	EPA 6010C	0L29002	12/28/10 18:21
7440-43-9	Cadmium	0.872	0.635	2.50	5.00	1	J	EPA 6010C	0L29002	12/28/10 18:21
7440-70-2	Calcium	15700	122	2500	5000	1		EPA 6010C	0L29002	12/28/10 18:21
7440-47-3	Chromium	0.765	0.750	5.00	10.0	1	J	EPA 6010C	0L29002	12/28/10 18:21
7440-48-4	Cobalt		1.45	2.50	20.0	1	U	EPA 6010C	0L29002	12/28/10 18:21
7440-50-8	Copper		1.00	2.50	5.00	1	U	EPA 6010C	0L29002	12/28/10 18:21
7439-89-6	Iron	1170	12.2	50.0	200	1		EPA 6010C	0L29002	12/28/10 18:21
7439-92-1	Lead		1.60	5.00	10.0	1	U	EPA 6010C	0L29002	12/28/10 18:21
7439-95-4	Magnesium	987	7.73	2500	5000	1	J	EPA 6010C	0L29002	12/28/10 18:21
7439-96-5	Manganese	5580	0.164	5.00	10.0	1		EPA 6010C	0L29002	12/28/10 18:21
7439-97-6	Mercury		0.0910	0.180	0.200	1	U	EPA 7470A	0L29003	12/21/10 12:21
7440-02-0	Nickel		0.627	2.50	10.0	1	U	EPA 6010C	0L29002	12/28/10 18:21
7440-09-7	Potassium	3100	30.9	2500	5000	1	J	EPA 6010C	0L29002	12/28/10 18:21
7782-49-2	Selenium		2.01	2.50	10.0	1	U	EPA 6010C	0L29002	12/28/10 18:21
7440-22-4	Silver	1.42	0.637	2.50	5.00	1	J	EPA 6010C	0L29002	12/28/10 18:21
7440-23-5	Sodium	8170	156	2500	5000	1		EPA 6010C	0L29002	12/28/10 18:21
7440-28-0	Thallium		2.92	5.00	30.0	1	U	EPA 6010C	0L29002	12/28/10 18:21
7440-62-2	Vanadium		1.50	10.0	20.0	1	U	EPA 6010C	0L29002	12/28/10 18:21
7440-66-6	Zinc		4.17	10.0	30.0	1	U	EPA 6010C	0L29002	12/28/10 18:21

ANALYSIS DATA SHEET

PZ-155I

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Lab ID: 1012127-07 % Solid: Matrix: Water Sampled: 12/15/10 Received: 12/16/10

CAS NO.	Analyte	Conc. (ug/L)	DL	LOD	LOQ	D.F.	Q	Method	Sequence	Analyzed
7429-90-5	Aluminum		31.0	100	200	1	U	EPA 6010C	0L29002	12/28/10 18:28
7440-36-0	Antimony	4.07	1.97	5.00	30.0	1	J	EPA 6010C	0L29002	12/28/10 18:28
7440-38-2	Arsenic	12.1	2.44	5.00	10.0	1		EPA 6010C	0L29002	12/28/10 18:28
7440-39-3	Barium	22.7	15.2	100	200	1	J	EPA 6010C	0L29002	12/28/10 18:28
7440-41-7	Beryllium		0.723	2.50	5.00	1	U	EPA 6010C	0L29002	12/28/10 18:28
7440-43-9	Cadmium		0.635	2.50	5.00	1	U	EPA 6010C	0L29002	12/28/10 18:28
7440-70-2	Calcium	5830	122	2500	5000	1		EPA 6010C	0L29002	12/28/10 18:28
7440-47-3	Chromium	0.868	0.750	5.00	10.0	1	J	EPA 6010C	0L29002	12/28/10 18:28
7440-48-4	Cobalt		1.45	2.50	20.0	1	U	EPA 6010C	0L29002	12/28/10 18:28
7440-50-8	Copper		1.00	2.50	5.00	1	U	EPA 6010C	0L29002	12/28/10 18:28
7439-89-6	Iron	2080	12.2	50.0	200	1		EPA 6010C	0L29002	12/28/10 18:28
7439-92-1	Lead	1.99	1.60	5.00	10.0	1	J	EPA 6010C	0L29002	12/28/10 18:28
7439-95-4	Magnesium	1800	7.73	2500	5000	1	J	EPA 6010C	0L29002	12/28/10 18:28
7439-96-5	Manganese	484	0.164	5.00	10.0	1		EPA 6010C	0L29002	12/28/10 18:28
7439-97-6	Mercury		0.0910	0.180	0.200	1	U	EPA 7470A	0L29003	12/21/10 12:24
7440-02-0	Nickel	3.58	0.627	2.50	10.0	1	J	EPA 6010C	0L29002	12/28/10 18:28
7440-09-7	Potassium	930	30.9	2500	5000	1	J	EPA 6010C	0L29002	12/28/10 18:28
7782-49-2	Selenium		2.01	2.50	10.0	1	U	EPA 6010C	0L29002	12/28/10 18:28
7440-22-4	Silver		0.637	2.50	5.00	1	U	EPA 6010C	0L29002	12/28/10 18:28
7440-23-5	Sodium	9940	156	2500	5000	1		EPA 6010C	0L29002	12/28/10 18:28
7440-28-0	Thallium		2.92	5.00	30.0	1	U	EPA 6010C	0L29002	12/28/10 18:28
7440-62-2	Vanadium	1.77	1.50	10.0	20.0	1	J	EPA 6010C	0L29002	12/28/10 18:28
7440-66-6	Zinc		4.17	10.0	30.0	1	U	EPA 6010C	0L29002	12/28/10 18:28

ANALYSIS DATA SHEET

PZ-157I

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Lab ID: 1012127-02 % Solid: Matrix: Water Sampled: 12/14/10 Received: 12/16/10

CAS NO.	Analyte	Conc. (ug/L)	DL	LOD	LOQ	D.F.	Q	Method	Sequence	Analyzed
7429-90-5	Aluminum		31.0	100	200	1	U	EPA 6010C	0L29002	12/28/10 17:38
7440-36-0	Antimony	4.07	1.97	5.00	30.0	1	J	EPA 6010C	0L29002	12/28/10 17:38
7440-38-2	Arsenic	2.97	2.44	5.00	10.0	1	J	EPA 6010C	0L29002	12/28/10 17:38
7440-39-3	Barium	25.5	15.2	100	200	1	J	EPA 6010C	0L29002	12/28/10 17:38
7440-41-7	Beryllium		0.723	2.50	5.00	1	U	EPA 6010C	0L29002	12/28/10 17:38
7440-43-9	Cadmium	0.747	0.635	2.50	5.00	1	J	EPA 6010C	0L29002	12/28/10 17:38
7440-70-2	Calcium	9500	122	2500	5000	1		EPA 6010C	0L29002	12/28/10 17:38
7440-47-3	Chromium		0.750	5.00	10.0	1	U	EPA 6010C	0L29002	12/28/10 17:38
7440-48-4	Cobalt	2.37	1.45	2.50	20.0	1	J	EPA 6010C	0L29002	12/28/10 17:38
7440-50-8	Copper		1.00	2.50	5.00	1	U	EPA 6010C	0L29002	12/28/10 17:38
7439-89-6	Iron	10600	12.2	50.0	200	1		EPA 6010C	0L29002	12/28/10 17:38
7439-92-1	Lead		1.60	5.00	10.0	1	U	EPA 6010C	0L29002	12/28/10 17:38
7439-95-4	Magnesium	2730	7.73	2500	5000	1	J	EPA 6010C	0L29002	12/28/10 17:38
7439-96-5	Manganese	1400	0.164	5.00	10.0	1		EPA 6010C	0L29002	12/28/10 17:38
7439-97-6	Mercury		0.0910	0.180	0.200	1	U	EPA 7470A	0L29003	12/21/10 12:11
7440-02-0	Nickel		0.627	2.50	10.0	1	U	EPA 6010C	0L29002	12/28/10 17:38
7440-09-7	Potassium	1170	30.9	2500	5000	1	J	EPA 6010C	0L29002	12/28/10 17:38
7782-49-2	Selenium		2.01	2.50	10.0	1	U	EPA 6010C	0L29002	12/28/10 17:38
7440-22-4	Silver		0.637	2.50	5.00	1	U	EPA 6010C	0L29002	12/28/10 17:38
7440-23-5	Sodium	10300	156	2500	5000	1		EPA 6010C	0L29002	12/28/10 17:38
7440-28-0	Thallium		2.92	5.00	30.0	1	U	EPA 6010C	0L29002	12/28/10 17:38
7440-62-2	Vanadium		1.50	10.0	20.0	1	U	EPA 6010C	0L29002	12/28/10 17:38
7440-66-6	Zinc	10.8	4.17	10.0	30.0	1	J	EPA 6010C	0L29002	12/28/10 17:38

ANALYSIS DATA SHEET

PZ-157I1

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Lab ID: 1012127-03 % Solid: Matrix: Water Sampled: 12/14/10 Received: 12/16/10

CAS NO.	Analyte	Conc. (ug/L)	DL	LOD	LOQ	D.F.	Q	Method	Sequence	Analyzed
7429-90-5	Aluminum		31.0	100	200	1	U	EPA 6010C	0L29002	12/28/10 18:00
7440-36-0	Antimony	3.49	1.97	5.00	30.0	1	J	EPA 6010C	0L29002	12/28/10 18:00
7440-38-2	Arsenic	5.32	2.44	5.00	10.0	1	J	EPA 6010C	0L29002	12/28/10 18:00
7440-39-3	Barium	21.4	15.2	100	200	1	J	EPA 6010C	0L29002	12/28/10 18:00
7440-41-7	Beryllium		0.723	2.50	5.00	1	U	EPA 6010C	0L29002	12/28/10 18:00
7440-43-9	Cadmium	0.892	0.635	2.50	5.00	1	J	EPA 6010C	0L29002	12/28/10 18:00
7440-70-2	Calcium	14800	122	2500	5000	1		EPA 6010C	0L29002	12/28/10 18:00
7440-47-3	Chromium		0.750	5.00	10.0	1	U	EPA 6010C	0L29002	12/28/10 18:00
7440-48-4	Cobalt	1.64	1.45	2.50	20.0	1	J	EPA 6010C	0L29002	12/28/10 18:00
7440-50-8	Copper		1.00	2.50	5.00	1	U	EPA 6010C	0L29002	12/28/10 18:00
7439-89-6	Iron	2610	12.2	50.0	200	1		EPA 6010C	0L29002	12/28/10 18:00
7439-92-1	Lead	2.01	1.60	5.00	10.0	1	J	EPA 6010C	0L29002	12/28/10 18:00
7439-95-4	Magnesium	1150	7.73	2500	5000	1	J	EPA 6010C	0L29002	12/28/10 18:00
7439-96-5	Manganese	5540	0.164	5.00	10.0	1		EPA 6010C	0L29002	12/28/10 18:00
7439-97-6	Mercury		0.0910	0.180	0.200	1	U	EPA 7470A	0L29003	12/21/10 12:13
7440-02-0	Nickel		0.627	2.50	10.0	1	U	EPA 6010C	0L29002	12/28/10 18:00
7440-09-7	Potassium	2520	30.9	2500	5000	1	J	EPA 6010C	0L29002	12/28/10 18:00
7782-49-2	Selenium	2.21	2.01	2.50	10.0	1	J	EPA 6010C	0L29002	12/28/10 18:00
7440-22-4	Silver		0.637	2.50	5.00	1	U	EPA 6010C	0L29002	12/28/10 18:00
7440-23-5	Sodium	7920	156	2500	5000	1		EPA 6010C	0L29002	12/28/10 18:00
7440-28-0	Thallium		2.92	5.00	30.0	1	U	EPA 6010C	0L29002	12/28/10 18:00
7440-62-2	Vanadium		1.50	10.0	20.0	1	U	EPA 6010C	0L29002	12/28/10 18:00
7440-66-6	Zinc		4.17	10.0	30.0	1	U	EPA 6010C	0L29002	12/28/10 18:00

ANALYSIS DATA SHEET

PZ-159I

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Lab ID: 1012127-05 % Solid: Matrix: Water Sampled: 12/14/10 Received: 12/16/10

CAS NO.	Analyte	Conc. (ug/L)	DL	LOD	LOQ	D.F.	Q	Method	Sequence	Analyzed
7429-90-5	Aluminum		31.0	100	200	1	U	EPA 6010C	0L29002	12/28/10 18:14
7440-36-0	Antimony	6.97	1.97	5.00	30.0	1	J	EPA 6010C	0L29002	12/28/10 18:14
7440-38-2	Arsenic	13.9	2.44	5.00	10.0	1		EPA 6010C	0L29002	12/28/10 18:14
7440-39-3	Barium	24.7	15.2	100	200	1	J	EPA 6010C	0L29002	12/28/10 18:14
7440-41-7	Beryllium		0.723	2.50	5.00	1	U	EPA 6010C	0L29002	12/28/10 18:14
7440-43-9	Cadmium	1.32	0.635	2.50	5.00	1	J	EPA 6010C	0L29002	12/28/10 18:14
7440-70-2	Calcium	7670	122	2500	5000	1		EPA 6010C	0L29002	12/28/10 18:14
7440-47-3	Chromium	1.06	0.750	5.00	10.0	1	J	EPA 6010C	0L29002	12/28/10 18:14
7440-48-4	Cobalt	5.91	1.45	2.50	20.0	1	J	EPA 6010C	0L29002	12/28/10 18:14
7440-50-8	Copper		1.00	2.50	5.00	1	U	EPA 6010C	0L29002	12/28/10 18:14
7439-89-6	Iron	9680	12.2	50.0	200	1		EPA 6010C	0L29002	12/28/10 18:14
7439-92-1	Lead	1.66	1.60	5.00	10.0	1	J	EPA 6010C	0L29002	12/28/10 18:14
7439-95-4	Magnesium	2800	7.73	2500	5000	1	J	EPA 6010C	0L29002	12/28/10 18:14
7439-96-5	Manganese	1090	0.164	5.00	10.0	1		EPA 6010C	0L29002	12/28/10 18:14
7439-97-6	Mercury		0.0910	0.180	0.200	1	U	EPA 7470A	0L30006	12/30/10 10:55
7440-02-0	Nickel	1.10	0.627	2.50	10.0	1	J	EPA 6010C	0L29002	12/28/10 18:14
7440-09-7	Potassium	972	30.9	2500	5000	1	J	EPA 6010C	0L29002	12/28/10 18:14
7782-49-2	Selenium		2.01	2.50	10.0	1	U	EPA 6010C	0L29002	12/28/10 18:14
7440-22-4	Silver		0.637	2.50	5.00	1	U	EPA 6010C	0L29002	12/28/10 18:14
7440-23-5	Sodium	10500	156	2500	5000	1		EPA 6010C	0L29002	12/28/10 18:14
7440-28-0	Thallium		2.92	5.00	30.0	1	U	EPA 6010C	0L29002	12/28/10 18:14
7440-62-2	Vanadium		1.50	10.0	20.0	1	U	EPA 6010C	0L29002	12/28/10 18:14
7440-66-6	Zinc		4.17	10.0	30.0	1	U	EPA 6010C	0L29002	12/28/10 18:14

ANALYSIS DATA SHEET

PZ-159I1

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Lab ID: 1012127-01 % Solid: Matrix: Water Sampled: 12/14/10 Received: 12/16/10

CAS NO.	Analyte	Conc. (ug/L)	DL	LOD	LOQ	D.F.	Q	Method	Sequence	Analyzed
7429-90-5	Aluminum		31.0	100	200	1	U	EPA 6010C	0L29002	12/28/10 16:55
7440-36-0	Antimony	5.10	1.97	5.00	30.0	1	J	EPA 6010C	0L29002	12/28/10 16:55
7440-38-2	Arsenic	3.43	2.44	5.00	10.0	1	J	EPA 6010C	0L29002	12/28/10 16:55
7440-39-3	Barium	21.8	15.2	100	200	1	J	EPA 6010C	0L29002	12/28/10 16:55
7440-41-7	Beryllium		0.723	2.50	5.00	1	U	EPA 6010C	0L29002	12/28/10 16:55
7440-43-9	Cadmium		0.635	2.50	5.00	1	U	EPA 6010C	0L29002	12/28/10 16:55
7440-70-2	Calcium	16800	122	2500	5000	1		EPA 6010C	0L29002	12/28/10 16:55
7440-47-3	Chromium	1.43	0.750	5.00	10.0	1	J	EPA 6010C	0L29002	12/28/10 16:55
7440-48-4	Cobalt		1.45	2.50	20.0	1	U	EPA 6010C	0L29002	12/28/10 16:55
7440-50-8	Copper		1.00	2.50	5.00	1	U	EPA 6010C	0L29002	12/28/10 16:55
7439-89-6	Iron	2370	12.2	50.0	200	1		EPA 6010C	0L29002	12/28/10 16:55
7439-92-1	Lead	2.60	1.60	5.00	10.0	1	J	EPA 6010C	0L29002	12/28/10 16:55
7439-95-4	Magnesium	1180	7.73	2500	5000	1	J	EPA 6010C	0L29002	12/28/10 16:55
7439-96-5	Manganese	6480	0.164	5.00	10.0	1	J	EPA 6010C	0L29002	12/28/10 16:55
7439-97-6	Mercury		0.0910	0.180	0.200	1	U	EPA 7470A	0L29003	12/21/10 12:01
7440-02-0	Nickel	0.910	0.627	2.50	10.0	1	J	EPA 6010C	0L29002	12/28/10 16:55
7440-09-7	Potassium	2710	30.9	2500	5000	1	J	EPA 6010C	0L29002	12/28/10 16:55
7782-49-2	Selenium	2.17	2.01	2.50	10.0	1	J J	EPA 6010C	0L29002	12/28/10 16:55
7440-22-4	Silver	0.672	0.637	2.50	5.00	1	J	EPA 6010C	0L29002	12/28/10 16:55
7440-23-5	Sodium	7240	156	2500	5000	1		EPA 6010C	0L29002	12/28/10 16:55
7440-28-0	Thallium		2.92	5.00	30.0	1	U J	EPA 6010C	0L29002	12/28/10 16:55
7440-62-2	Vanadium		1.50	10.0	20.0	1	U	EPA 6010C	0L29002	12/28/10 16:55
7440-66-6	Zinc		4.17	10.0	30.0	1	U	EPA 6010C	0L29002	12/28/10 16:55

ANALYSIS DATA SHEET

PZ-160I

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Lab ID: 1012127-08 % Solid: Matrix: Water Sampled: 12/16/10 Received: 12/17/10

CAS NO.	Analyte	Conc. (ug/L)	DL	LOD	LOQ	D.F.	Q	Method	Sequence	Analyzed
7429-90-5	Aluminum		31.0	100	200	1	U	EPA 6010C	0L29002	12/28/10 18:36
7440-36-0	Antimony	3.59	1.97	5.00	30.0	1	J	EPA 6010C	0L29002	12/28/10 18:36
7440-38-2	Arsenic	7.42	2.44	5.00	10.0	1	J	EPA 6010C	0L29002	12/28/10 18:36
7440-39-3	Barium	28.5	15.2	100	200	1	J	EPA 6010C	0L29002	12/28/10 18:36
7440-41-7	Beryllium		0.723	2.50	5.00	1	U	EPA 6010C	0L29002	12/28/10 18:36
7440-43-9	Cadmium		0.635	2.50	5.00	1	U	EPA 6010C	0L29002	12/28/10 18:36
7440-70-2	Calcium	8360	122	2500	5000	1		EPA 6010C	0L29002	12/28/10 18:36
7440-47-3	Chromium		0.750	5.00	10.0	1	U	EPA 6010C	0L29002	12/28/10 18:36
7440-48-4	Cobalt		1.45	2.50	20.0	1	U	EPA 6010C	0L29002	12/28/10 18:36
7440-50-8	Copper	12.8	1.00	2.50	5.00	1		EPA 6010C	0L29002	12/28/10 18:36
7439-89-6	Iron	3340	12.2	50.0	200	1		EPA 6010C	0L29002	12/28/10 18:36
7439-92-1	Lead	3.37	1.60	5.00	10.0	1	J	EPA 6010C	0L29002	12/28/10 18:36
7439-95-4	Magnesium	2220	7.73	2500	5000	1	J	EPA 6010C	0L29002	12/28/10 18:36
7439-96-5	Manganese	662	0.164	5.00	10.0	1		EPA 6010C	0L29002	12/28/10 18:36
7439-97-6	Mercury		0.0910	0.180	0.200	1	U	EPA 7470A	0L29003	12/21/10 12:26
7440-02-0	Nickel		0.627	2.50	10.0	1	U	EPA 6010C	0L29002	12/28/10 18:36
7440-09-7	Potassium	1190	30.9	2500	5000	1	J	EPA 6010C	0L29002	12/28/10 18:36
7782-49-2	Selenium		2.01	2.50	10.0	1	U	EPA 6010C	0L29002	12/28/10 18:36
7440-22-4	Silver		0.637	2.50	5.00	1	U	EPA 6010C	0L29002	12/28/10 18:36
7440-23-5	Sodium	9780	156	2500	5000	1		EPA 6010C	0L29002	12/28/10 18:36
7440-28-0	Thallium		2.92	5.00	30.0	1	U	EPA 6010C	0L29002	12/28/10 18:36
7440-62-2	Vanadium		1.50	10.0	20.0	1	U	EPA 6010C	0L29002	12/28/10 18:36
7440-66-6	Zinc		4.17	10.0	30.0	1	U	EPA 6010C	0L29002	12/28/10 18:36

ANALYSIS DATA SHEET

DUP01-20101214

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Lab ID: 1012127-04 % Solid: Matrix: Water Sampled: 12/14/10 Received: 12/16/10

CAS NO.	Analyte	Conc. (ug/L)	DL	LOD	LOQ	D.F.	Q	Method	Sequence	Analyzed
7429-90-5	Aluminum		31.0	100	200	1	U	EPA 6010C	0L29002	12/28/10 18:07
7440-36-0	Antimony		1.97	5.00	30.0	1	U	EPA 6010C	0L29002	12/28/10 18:07
7440-38-2	Arsenic	3.63	2.44	5.00	10.0	1	J	EPA 6010C	0L29002	12/28/10 18:07
7440-39-3	Barium	21.5	15.2	100	200	1	J	EPA 6010C	0L29002	12/28/10 18:07
7440-41-7	Beryllium		0.723	2.50	5.00	1	U	EPA 6010C	0L29002	12/28/10 18:07
7440-43-9	Cadmium	0.908	0.635	2.50	5.00	1	J	EPA 6010C	0L29002	12/28/10 18:07
7440-70-2	Calcium	14800	122	2500	5000	1		EPA 6010C	0L29002	12/28/10 18:07
7440-47-3	Chromium	1.08	0.750	5.00	10.0	1	J	EPA 6010C	0L29002	12/28/10 18:07
7440-48-4	Cobalt		1.45	2.50	20.0	1	U	EPA 6010C	0L29002	12/28/10 18:07
7440-50-8	Copper		1.00	2.50	5.00	1	U	EPA 6010C	0L29002	12/28/10 18:07
7439-89-6	Iron	2580	12.2	50.0	200	1		EPA 6010C	0L29002	12/28/10 18:07
7439-92-1	Lead		1.60	5.00	10.0	1	U	EPA 6010C	0L29002	12/28/10 18:07
7439-95-4	Magnesium	1140	7.73	2500	5000	1	J	EPA 6010C	0L29002	12/28/10 18:07
7439-96-5	Manganese	5510	0.164	5.00	10.0	1		EPA 6010C	0L29002	12/28/10 18:07
7439-97-6	Mercury		0.0910	0.180	0.200	1	U	EPA 7470A	0L29003	12/21/10 12:15
7440-02-0	Nickel		0.627	2.50	10.0	1	U	EPA 6010C	0L29002	12/28/10 18:07
7440-09-7	Potassium	2530	30.9	2500	5000	1	J	EPA 6010C	0L29002	12/28/10 18:07
7782-49-2	Selenium		2.01	2.50	10.0	1	U	EPA 6010C	0L29002	12/28/10 18:07
7440-22-4	Silver		0.637	2.50	5.00	1	U	EPA 6010C	0L29002	12/28/10 18:07
7440-23-5	Sodium	7740	156	2500	5000	1		EPA 6010C	0L29002	12/28/10 18:07
7440-28-0	Thallium		2.92	5.00	30.0	1	U	EPA 6010C	0L29002	12/28/10 18:07
7440-62-2	Vanadium		1.50	10.0	20.0	1	U	EPA 6010C	0L29002	12/28/10 18:07
7440-66-6	Zinc		4.17	10.0	30.0	1	U	EPA 6010C	0L29002	12/28/10 18:07

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TETRA TECH	Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057	
5700 LAKE WRIGHT ROAD	Project Number: CTO-WE08/112G02750.PT.PT/N62467-04-D-00	**Reported:**
NORFOLK VA, 23502	Project Manager: DAVE BRAYACK	12/28/2010 18:04

PZ-151I1
1012127-06 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
COMPUCHEM								
WET CHEMISTRY PARAMETERS								
Total Organic Carbon	**1.31**	1.00	mg/L	1	0122011	12/20/2010 10:38	12/28/2010 15:16	SM5310B

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TETRA TECH	Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057	
5700 LAKE WRIGHT ROAD	Project Number: CTO-WE08/112G02750.PT.PT/N62467-04-D-00	**Reported:**
NORFOLK VA, 23502	Project Manager: DAVE BRAYACK	12/28/2010 18:04

PZ-155I
1012127-07 (Water)

Analyte	Result		Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
COMPUCHEM									
WET CHEMISTRY PARAMETERS									
Total Organic Carbon	ND	U	1.00	mg/L	1	0122011	12/20/2010 10:38	12/28/2010 15:24	SM5310B

COMPUCHEM

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TETRA TECH	Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057	
5700 LAKE WRIGHT ROAD	Project Number: CTO-WE08/112G02750.PT.PT/N62467-04-D-00	**Reported:**
NORFOLK VA, 23502	Project Manager: DAVE BRAYACK	12/28/2010 18:04

PZ-157I
1012127-02 (Water)

Analyte	Result		Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
COMPUCHEM									
INORGANIC ANIONS BY IC									
Chloride	**4.12**		4.00	mg/L	1	0121718	12/16/2010 15:27	12/16/2010 15:27	EPA 300
Fluoride	ND	U	0.400	mg/L	1	0121718	12/16/2010 15:27	12/16/2010 15:27	EPA 300
Nitrate as N	**0.0740**	J	0.400	mg/L	1	0121718	12/16/2010 15:27	12/16/2010 15:27	EPA 300
Nitrite as N	ND	U	0.400	mg/L	1	0121718	12/16/2010 15:27	12/16/2010 15:27	EPA 300
WET CHEMISTRY PARAMETERS									
Sulfide, total	ND	U	1.00	mg/L	1	0122010	12/21/2010 11:00	12/21/2010 11:00	SM4500S-2 -F
Total Organic Carbon	**122**	D	2.00	mg/L	2	0122011	12/20/2010 10:38	12/28/2010 16:21	SM5310B

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TETRA TECH	Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057	
5700 LAKE WRIGHT ROAD	Project Number: CTO-WE08/112G02750.PT.PT/N62467-04-D-00	**Reported:**
NORFOLK VA, 23502	Project Manager: DAVE BRAYACK	12/28/2010 18:04

PZ-157I1
1012127-03 (Water)

Analyte	Result		Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
			COMPUCHEM						
INORGANIC ANIONS BY IC									
Chloride	**6.65**		4.00	mg/L	1	0121718	12/16/2010 15:44	12/16/2010 15:44	EPA 300
Fluoride	**0.0280**	J	0.400	mg/L	1	0121718	12/16/2010 15:44	12/16/2010 15:44	EPA 300
Nitrite as N	ND	U	0.400	mg/L	1	0121718	12/16/2010 15:44	12/16/2010 15:44	EPA 300
Nitrate as N	ND	U	0.400	mg/L	1	0121718	12/16/2010 15:44	12/16/2010 15:44	EPA 300
WET CHEMISTRY PARAMETERS									
Sulfide, total	ND	U	1.00	mg/L	1	0122010	12/21/2010 11:00	12/21/2010 11:00	SM4500S-2 -F
Total Organic Carbon	**107**	D	2.00	mg/L	2	0122011	12/20/2010 10:38	12/28/2010 16:30	SM5310B

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TETRA TECH	Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057	
5700 LAKE WRIGHT ROAD	Project Number: CTO-WE08/112G02750.PT.PT/N62467-04-D-00	**Reported:**
NORFOLK VA, 23502	Project Manager: DAVE BRAYACK	12/28/2010 18:04

PZ-159I

1012127-05 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
COMPUCHEM								
WET CHEMISTRY PARAMETERS								
Total Organic Carbon	**4.70**	1.00	mg/L	1	0122011	12/20/2010 10:38	12/28/2010 15:07	SM5310B

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TETRA TECH	Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057	
5700 LAKE WRIGHT ROAD	Project Number: CTO-WE08/112G02750.PT.PT/N62467-04-D-00	**Reported:**
NORFOLK VA, 23502	Project Manager: DAVE BRAYACK	12/28/2010 18:04

PZ-159I1
1012127-09 (Water)

Analyte	Result		Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
COMPUCHEM									
INORGANIC ANIONS BY IC									
Chloride	**3.54**	J	4.00	mg/L	1	0121719	12/17/2010 18:42	12/17/2010 18:42	EPA 300
Fluoride	ND	U	0.400	mg/L	1	0121719	12/17/2010 18:42	12/17/2010 18:42	EPA 300
Nitrate as N	ND	U	0.400	mg/L	1	0121719	12/17/2010 18:42	12/17/2010 18:42	EPA 300
Nitrite as N	ND	U	0.400	mg/L	1	0121719	12/17/2010 18:42	12/17/2010 18:42	EPA 300
WET CHEMISTRY PARAMETERS									
Sulfide, total	ND	U	1.00	mg/L	1	0122010	12/21/2010 11:00	12/21/2010 11:00	SM4500S-2 -F

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TETRA TECH	Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057	
5700 LAKE WRIGHT ROAD	Project Number: CTO-WE08/112G02750.PT.PT/N62467-04-D-00	**Reported:**
NORFOLK VA, 23502	Project Manager: DAVE BRAYACK	12/28/2010 18:04

PZ-159I1
1012127-01 (Water)

Analyte	Result		Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
COMPUCHEM									
WET CHEMISTRY PARAMETERS									
Sulfide, total	ND	U	1.00	mg/L	1	0122010	12/21/2010 11:00	12/21/2010 11:00	SM4500S-2 -F
Total Organic Carbon	**31.3**		1.00	mg/L	1	0122011	12/20/2010 10:38	12/28/2010 14:33	SM5310B

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TETRA TECH 5700 LAKE WRIGHT ROAD NORFOLK VA, 23502	Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057 Project Number: CTO-WE08/112G02750.PT.PT/N62467-04-D-00 Project Manager: DAVE BRAYACK	**Reported:** 12/28/2010 18:04

PZ-160I
1012127-08 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
COMPUCHEM								
WET CHEMISTRY PARAMETERS								
Total Organic Carbon	**16.8**	1.00	mg/L	1	0122011	12/20/2010 10:38	12/28/2010 15:50	SM5310B

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TETRA TECH	Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057	
5700 LAKE WRIGHT ROAD	Project Number: CTO-WE08/112G02750.PT.PT/N62467-04-D-00.	**Reported:**
NORFOLK VA, 23502	Project Manager: DAVE BRAYACK	12/28/2010 18:04

DUP01-20101214
1012127-04 (Water)

Analyte	Result		Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
COMPUCHEM									
WET CHEMISTRY PARAMETERS									
Total Organic Carbon	ND	U	1.00	mg/L	1	0122011	12/20/2010 10:38	12/28/2010 14:59	SM5310B

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Joe Mohn For Cathy Dover, Project Manager

APPENDIX C
REGION II WORKSHEETS

	YES	NO	N/A
A.I.I **Contract Compliance Screening Report**			
Present?	[ ]	___	___
ACTION: If no, contact RSCC/PO.			
A.I.2 **Record of Communication (from RSCC)**			
Present?	[ ]	___	___
ACTION: If no, request from the RSCC.			
A.1.3 **Sampling Trip Report**			
Present and complete?	[ ]	___	___
ACTION: If no, contact RSCC/PO.			
A.I.4 **Chain of Custody/Sample Traffic Report**			
Present?	[✓]	___	___
Legible?	[✓]	___	___
Signature of sample custodian present?	[✓]	___	___
ACTION: If no, contact RSCC/WAM/PO.			
A.I.5 **Cover Page**			
Present?	[✓]	___	___
Is the Cover Page properly filled in and the verbatim signed by the lab manager or the manager's designee?	[✓]	___	___
Do the sample identification numbers on the Cover Page agree with sample Identification numbers on:			
(a) Traffic Report Sheet?	[✓]	___	___

	YES	NO	N/A
(b) Form I's?	[✓]	___	___
Is the number of samples on the Cover Page the same as the number of samples on the Traffic Report sheet and the Regional Record of Communication (ROC) for the data Case?	[___]	___	___

ACTION:
If no for any of the above, prepare Telephone Record Log and contact RSCC/PO for re-submittal of the corrected Cover Page from the laboratory.

A.1.6 **SDG Narrative, DC-1 & DC-2 Form**

Is the SDG Narrative present?	[✓]	___	___
Is Sample Log-In Sheet(Form DC-1) present and complete?	[✓]	___	___
Is Complete SDG Inventory Sheet(Form DC-2) present and complete?	[___]	___	___

ACTION:
If no, write in the Contract-Problems/ Non-Compliance Section of the Data Review Narrative.

A.1.7 **Form I to XV**

A.1.7.1 Are all the Form I through Form XV labeled with:

Laboratory Name?	[✓]	___	___
Laboratory Code?	[___]	___	___
RAS/Non-RAS Case No.?	[___]	___	___
SDG No.?	[✓]	___	___

	YES	NO	N/A
Contract No.?	[ ]		

ACTION:
If no for any of the above, note under Contract Problem/Non-Compliance Section of the "Data Review Narrative" and contact PO for corrected Form(s) from the laboratory.

A.1.7.2 After comparing values on Forms I-IX against the raw data, do any computation/ transcription errors exceed 10% of the reported values on the Forms for:

	YES	NO	N/A
(a) all analytes analyzed by ICP-AES?		[✓]	
(b) all analytes analyzed by ICP-MS?		[ ]	✓
(c) Mercury?		[✓]	
(d) Cyanide?		[ ]	✓

ACTION:
If yes, prepare Telephone Record Log and contact CLP PO/TOPO for the corrected data from the laboratory.

A.1.8 Raw Data

Data shall not be validated without the hard/electronic copies of the associated raw data for samples and QC samples.

A.1.8.1 Digestion/Distillation Log

	YES	NO	N/A
Digestion Log for ICP-AES (Form XII)present?	[✓]		
Digestion Log for ICP-MS (Form XII) present?	[ ]		✓
Digestion Log for mercury (Form XII) present?	[✓]		
Distillation Log for cyanide (Form XII) present?	[ ]		✓

Are pH values for metals and

	YES	NO	N/A
cyanide reported for each aqueous sample?	[✓]	_	_
Are percent solids calculations present for soils/sediments?	[ ]	_	✓
Are preparation dates present on the sample preparation logs/bench sheets?	[✓]	_	_

NOTE:
Digestion/Distillation log must include weights, volumes, and dilutions used to obtain the reported results.

A.1.8.2 Is the analytical instrument real-time printouts present for:

	YES	NO	N/A
ICP-AES?	[✓]	_	_
ICP-MS?	[ ]	_	✓
Mercury?	[✓]	_	_
Cyanide?	[ ]	_	✓

Are all laboratory bench sheets and instrument raw data printouts necessary to support all sample analyses and QC operations:

	YES	NO	N/A
Legible?	[✓]	_	_
Properly labeled?	[✓]	_	_

Are all field samples, QC samples and field QC samples present on:

	YES	NO	N/A
Digestion/Distillation log?	[✓]	_	_
Instrument Printouts?	[✓]	_	_

ACTION:
If no for any of the above questions in Section A.1.8.1 and Section A.1.8.2, write Telephone Record Log and contact TOPO/PO for re-submittal from the laboratory.

	YES	NO	N/A
A.1.9 **Technical Holding Times**: (Aqueous and soil samples) (Examine sample Traffic Reports and digestion/distillation logs to determine the holding time from the sample collection date to the sample preparation date.)			
A.1.9.1 Cyanide distillation(14 days)exceeded?	_	[ ]	✓
Mercury analysis(28 days) exceeded?	_	[✓]	_
Other Metals analysis(180 days)exceeded?	_	[✓]	_

ACTION:
If yes, reject (R) and red-line non-detects and flag as estimated (J)results ≥ MDL even if sample(s) was preserved properly.

NOTE:
In addition to qualifying the data, a list of all samples and analytes which exceeded the holding times must be prepared. Report for each sample the number of days that were exceeded. (Subtract the sample collection date from the sample preparation date). Attach this list to the data review narrative.

	YES	NO	N/A
A.1.9.2 Is pH of aqueous samples for:			
Metals Analysis ≤ 2?	[✓]	_	_
Cyanide Analysis ≥ 12?	[ ]	_	✓

ACTION:
If no for any of the above, flag non-detects as "R" and detects as "J".

A.1.9.3 Is the cooler temperature ≤ 10 C°?	[✓]	_	_

ACTION:
If cooler temperature is >10°C , flag non-detects as "UJ" and detects as "J".

A.1.10 **Final Data Correctness - Form I**

A.1.10.1 Are Form I's for all samples

	YES	NO	N/A
present and complete?	[✓]	___	___

ACTION:
If no, prepare Telephone Record Log and contact CLP PO/TOPO for submittal from the laboratory.

A.1.10.2 Verify there are no calculation and transcription errors in the results reported on Form I's. Circle on each Form I all results that are incorrect.

	YES	NO	N/A
Is the calculation error less than 10% of the correct result?	[✓]	___	___
Are results on Form I's reported in correct units (ug/L for aqueous and MG/KG for soils)?	[✓]	___	___
Are results on Form I'S reported by correct significant figures?	[✓]	___	___
Are soil sample results on Form I's corrected for percent solids?	[___]	___	✓
Are all "less than MDL" values reported by the CRQLs and coded with "U"?	[___]	___	___
Are values less than the CRQLs but greater than or equal to the MDLs flagged with "J"?	[✓]	___	___
Are appropriate contractual quality control and Method qualifiers used?	[___]	___	___

ACTION:
If no for any of the above questions, prepare Telephone Record Log, and contact CLP PO/TOPO for corrected data.

A.1.10.3 Do EPA sample identification numbers and the corresponding laboratory sample identification numbers match on the Cover Page, Form I's and in the raw data? [✓] ___ ___

Was a brief physical description

	YES	NO	N/A
of the samples before and after digestion given on the Form I's?	[___]	___	___
Was any sample result outside the mercury/cyanide calibration range or the ICP-AES/ICP-MS linear range diluted and noted on the Form I?	[___]	___	✓

ACTION:
If no for any of the above, note under the Contract-Problem/Non-Compliance Section of the Data Review Narrative.

A.1.11 **Initial Calibration**

	YES	NO	N/A
A.1.11.1 Is a record of at least 2 point (A blank and a standard)calibration present for ICP-AES analysis?	[✓]	___	___
Is a record of at least 2 point (a blank and a standard)calibration present for ICP-MS analysis?	[___]	___	✓
Is a record of at least 5 point calibration (a blank & 4 standards)present for Hg analysis?	[✓]	___	___
Is a record of at least 4 point calibration (a blank & 4 standards)present for cyanide?	[___]	___	✓

ACTION:
If incomplete or no initial calibration was performed, reject (R) and red-line the associated data (detects & non-detects).

	YES	NO	N/A
Is one initial calibration standard at the CRQL level for cyanide and mercury?	[___]	___	___

ACTION:
If no, write in the Contract Problem/ Non-Compliance Section of the Data Review Narrative.

A.1.11.2 Is the curve correlation coefficient $\geq$ 0.995 for:

		YES	NO	N/A
	Mercury Analysis?	[✓]	___	___
	Cyanide Analysis?	[___]	___	✓
	ICP-AES(more than 2 point Calib.)?	[___]	___	✓
	ICP-MS (more than 2 point calib.)?	[___]	___	✓

ACTION:
If no, qualify the associated sample results ≥ MDL as estimated "J" and non-detects as "UJ".

NOTE:
The correlation coefficient shall be calculated by the data validator using standard concentrations and the corresponding instrument response (e.g. absorbance, peak area, peak height, etc.).

A.1.12 **Initial and Continuing Calibration Verification- Form IIA**

A.1.12.1	Present and complete for every metal and cyanide?	[✓]	___	___
	Present and complete for ICP-AES and ICP-MS when both these methods were used for the same analyte?	[___]	___	___

ACTION:
If no for any of the above, prepare a Telephone Record Log and contact PO/TOPO for re-submittal from the laboratory.

A.1.12.2	Was a Continuing Calibration Verification performed every 10 samples or every 2 hours whichever is more frequent?	[✓]	___	___

ACTION:
If no for any of the above, write in the Contract-Problem/Non-Compliance Section of the Data Review Narrative.

A.1.12.3	Was an ICV or a mid-range standard distilled and analyzed with each batch of cyanide samples?	[___]	___	✓

	YES	NO	N/A

ACTION:
If no for any of the above, write in the Contract-Problem/Non-Compliance Section of the Data Review Narrative and qualify results ≥ MDL as estimated (J).

A.1.12.2 Circle on each Form IIA all percent recoveries that are outside the contract windows.

Are ICV/CCVs within control limits for:

	YES	NO	N/A
Metals - 90-110%R?	[✓]	___	___
Hg - 80-120%R?	[✓]	___	___
Cyanide - 85-115%R?	[___]	___	✓

ACTION:
If no, qualify all samples between a previous technically acceptable CCV standard and a subsequent technically acceptable CCV standard as follows as follows:

Qualify as estimated (J) all detects and non-detects, if the ICV/CCV %R is between 75-89%(65-79% for Hg; 70-84% for CN). Qualify only positive results(≥ MDL) as "J" if the ICV/CCV %R is between 111-125%(121-135% for Hg;116-130% for CN). Reject (R) and red-line only
detects if the recovery is greater than 125% (135% for Hg; 130% for CN). Reject (R) and red-line all associated results (hits and non-detects)if the recovery is less than 75%(65% for Hg;70% for CN).

NOTE:
For ICV that does not fall within the acceptance limits, qualify all samples reported from the analytical run.

A.1.12.3 Was the distilled ICV or mid-range standard for cyanide within acceptance limits (85-115%)? [___] ___ ✓

ACTION:
If no, Qualify all cyanide results ≥ MDL as "J".

A.1.13 **CRQL Standard Analysis - Form IIB**

A.1.13.1 For each ICP-AES run, was a CRI

	YES	NO	N/A
(CRQL or MDL when MDL > CRQL) standard analyzed? (Note:CRI is not required for Al, Ba, Ca, Fe, Mg, Na and K.)	[✓]	___	___
For each ICP-MS run, was a CRI (CRQL or MDL when MDL > CRQL) standard analyzed for each mass/isotope used for the analysis?	[___]	___	✓
For each mercury run, was a CRQL standard analyzed?	[___]	✓	___
For each cyanide run, was a CRQL standard analyzed?	[___]	___	✓

ACTION:
If no for any of the above, write this deficiency in the Contract Problems/ Non-Compliance Section of the Data Review Narrative, inform CLP PO and flag results in the affected ranges (detects <2xCRQL)as J and non-detects UJ.

The affected ranges are:
ICP-AES Analysis - *True Value ± CRQL
ICP-MS Analysis - *True Value ± CRQL
Mercury Analysis - *True Value ± CRQL
Cyanide Analysis - *True Value ± CRQL
* True value of the CRQL Standard

A.1.13.2 Was a CRQL standard analyzed after the ICV/ICB, before the final CCV/CCB and once every 20 analytical samples in the analytical run for each analysis? [✓] ___ ___

ACTION:
If no, write in the Contract Problem/ Non-Compliance Section of the "Data Review Narrative".

A.1.13.3 Circle on each Form IIB all percent recoveries that are outside the acceptance windows.

	YES	NO	N/A
Is the CRQL standard within control limits for:			
Metals(ICP-AES/ICP-MS)- 70 - 130%?	[✓]	___	___
Mercury- 70 - 130%?	[___]	___	✓
Cyanide - 70 - 130%?	[___]	___	✓

ACTION:
If no, flag detects <2xCRQL as "J" and non-detects as "UJ" if the CRQL standard recovery is between 50-69%. Flag(J) only detects <2xCRQL if the recovery is between 131% and ≤180%. If the recovery is less than 150%, reject(R) and red-line non-detects and detects < 2xCRQL, and flag (J) detects between 2xCRQL and ICV/CCV. Reject and red-line only detects <2xCRQL and flag (J)detects ≥ 2xCRQL but < ICV/CCV if the recovery is > 180%.

NOTE:
1. Qualify all field samples analyzed between a previous technically acceptable analysis of the CRQL standard and a subsequent acceptable analysis of the CRQL standard
2. Flag (J) or reject (R) only the final sample results on Form I's when Sample raw data are within the affected ranges and the CRQL standard is outside the acceptance windows.
3. The samples and the CRQL standard must be analyzed in the same analytical run.

A.1.14 Initial and Continuing Calibration Blanks - Form III

	YES	NO	N/A
A.1.14.1 Present and complete for all the instruments used for the metals and cyanide analyses?	[✓]	___	___
Was an initial Calibration Blank analyzed after ICV?	[✓]	___	___
Was a continuing Calibration Blank analyzed after every CCV and every 10 samples or every 2 hours, whichever is more frequent?	[✓]	___	___

Were the ICB & CCB values ≥ MDL but < CRQL reported on Form III and flagged "J" by

		YES	NO	N/A
	using MDLs from direct analysis(Preparation Method "NP1")? (Check Form III against the raw data)	[✓]	___	___
	ACTION: If no, inform CLP PO/TOPO and make a note in the Contract-Problems/Non-Compliance Section of the "Data Review Narrative".			
A.1.14.2	Circle with red pencil on each Form III all Calib. Blank values that are: ≥ MDL but ≤ CRQL; > CRQL			
A.1.14.2.1	When MDL < CRQL, is any Calib. Blank value ≥ MDL but ≤ CRQL?	✓	[___]	___
	ACTION: If yes, change sample results ≥ MDL but ≤ CRQL to the CRQL with a "U". Do not qualify non-detects.			
A.1.14.2.2	When MDL < CRQL, is any Calib. Blank value > CRQL?	___	[✓]	___
	ACTION: If yes, reject (R) and red line the associated sample results > CRQL but <ICB/CCB Blank Result. Flag as "J" detects > ICB/CCB blank value but < 10xICB/CCB value. Change the sample results ≥ MDL but ≤ the CRQL to CRQL with a "U".			
A.1.14.2.3	Is any Calibration Blank value below the negative CRQL?	___	[✓]	___
	ACTION: If yes, flag (J) as estimated all associated sample results ≥ CRQL but <10xCRQL.			

NOTE:

1. For ICB that does not meet the technical QC Criteria, apply the action to all samples

	YES	NO	N/A

reported from the analytical run.
2. For CCBs that do not meet the technical QC criteria, apply the action to all samples analyzed between a previous technically acceptable analysis of CCB and a subsequent technically acceptable analysis of the CCB in the analytical run.,

A.1.15 **Preparation Blank - FORM III**

NOTE: The Preparation Blank for mercury is the same as the calibration blank.

	YES	NO	N/A
A.1.15.1 Was one Preparation Blank prepared with and analyzed for:			
Each Sample Delivery Group (SDG)?	[✓]	___	___
Each batch of the SDG samples digested/distilled?	[✓]	___	___
Each matrix type?	[✓]	___	___
All instruments used for metals and cyanide analyses?	[✓]	___	___

ACTION:
If no for any of the above, flag as estimated (J) all the associated positive data <10xMDL for which the Preparation Blank was not analyzed.

NOTE:
If only one blank was analyzed for more than 20 samples, then the first 20 samples analyzed are not estimated(J),but all additional samples must be qualified (J).

A.1.15.2 Circle with red pencil on each Form III all Prep. Blank values that are:

≥ MDL but ≤ CRQL, and

> CRQL

	YES	NO	N/A
A.1.15.2.1 When MDL < CRQL, is any preparation blank value ≥ MDL but ≤ CRQL?	___	[✓]	___

ACTION:
If yes, change sample result ≥ MDL

		YES	NO	N/A
	but ≤ CRQL to CRQL with a "U".			
A.1.15.2.2	When the MDL ≤ CRQL, is any Preparation Blank value greater than its CRQL?	___	[✓]	___
	If yes, is the Prep. Blank value greater than the value of the associated Field Blank collected and analyzed with the SDG samples?	___	[___]	___
	If yes, is the lowest concentration of that analyte in the associated samples less than 10 times the Preparation Blank value?	___	[___]	___

ACTION:
If yes, reject (R) and red-line all associated sample results greater than the CRQL but less than the Prep.Blank value. Flag as "J" detects > Prep. Blank value but <10xPrep.Blank. If the sample result ≥ MDL but ≤ CRQL, replace it with CRQL-U.

If the Prep. Blank value is less than the same analyte value in the Field Blank, do not qualify the sample results due to the Prep. Blank criteria.

NOTE:
Convert soil sample result to mg/Kg on wet weight basis to compare with the soil Prep. Blank result on Form III.

A.1.15.2.3	Is the Prep. Blank concentration below the negative CRQL?	___	[✓]	___

ACTION:
If yes, flag (J) all associated sample results less than 10xCRQL. Qualify non-detects as estimated (UJ).

A.1.15.2.4	When the MDL is greater than the CRQL, is the preparation blank concentration on Form III greater than two times the MDL?	___	[___]	✓

ACTION:

		YES	NO	N/A
	If yes, reject (R) and red-line all positive sample results with sample raw data less than 10 times the Preparation Blank value.			
A.1.16	**ICP-AES/ICP-MS Interference Check Sample (ICS) - Form IV** NOTE: Not required for CN, Hg, Al, Ca, Fe and Mg.			
A.1.16.1	Present and complete?	[___]	___	___
	Was ICS analyzed at the beginning and end of each analytical run, and once for every 20 analytical samples?	[___]	___	___
	Was ICS analyzed at the beginning of the ICP-MS analytical run?	[___]	___	___
	ACTION: If no, flag as estimated (J) all sample results.			
A.1.16.2	**ICP-AES Method**			
A.1.16.2.1	**ICSA Solution:** For ICP-AES, are the ICSA "Found" analyte values within the control limits ± of CRQL of the true/established mean value?	[✓]	___	___
	If no for any of the above, is the sample concentration of Al, Ca, Fe, or Mg in the same units (ug/L or MG/KG) greater than or equal to its respective concentration in the ICSA Solution on Form IV?	[___]	___	___
	ACTION: If yes, apply the following action to all samples analyzed between a previous technically acceptable analysis of the ICS and a subsequent technically acceptable analysis of the ICS in the analytical run: Flag (J) as estimated only sample results ≥MDL			

		YES	NO	N/A
	for which the ICSA "Found" value is greater than (True value+CRQL). Do not qualify non-detects. If the ICSA "Found" value is less than (True value-CRQL), flag non-detects as "UJ" and detects as "J".			
A.1.16.2.3	**ICSAB Solution** For ICP-AES, are all analyte results in ICSAB within the control limits of 80-120 of the true/established mean value?	[✓]	___	___
	If no for any of the above, is the sample concentration of Al, Ca, Fe, or Mg in the same units (ug/L or MG/KG) greater than or equal to its respective concentration in the ICSAB Solution on Form IV?	[___]	___	___
	ACTION: If yes, apply the following action to all samples analyzed between a previous technically acceptable analysis of the ICS and a subsequent technically acceptable analysis of the ICS in the analytical run:			
	Flag (J) as estimated those associated sample results ≥ MDL for which the ICSAB analyte recovery is greater than 120% but ≤ 150%. If the ICSAB recovery falls within 50-79%, qualify sample results ≥ MDL as "J" and non-detects as "UJ". Reject (R) and red-line all sample results (detects & non-detects) for which the ICSAB analyte recovery is less than 50%. If the recovery is above 150%, reject (R) and red-line only positive results.			
A.1.16.3	ICP-MS Method			
A.1.16.3.1	**ICSA Solution:** For ICP-MS, are the ICSA "Found" analyte values within the control limits of ±CRQL of the true/established mean value?	[___]	___	✓
	ACTION: If no, apply the following action to all samples reported from the analytical run:			
	Flag (J) as estimated only sample results ≥ MDL if the ICSA "Found" value is greater than (True value+CRQL). Do not qualify non-detects. If the ICSA "Found" value is less than (True value-CRQL), flag the associated sample detects as "J" and non-detects as "UJ".			

		YES	NO	N/A
A.1.16.3.3	**ICSAB Solution** For ICP-MS, are all analyte results in ICSAB within the control limits of 80-120% of the true/established mean value, whichever is greater?	[ ]		✓

ACTION:
If no, apply the following action to all samples reported from the analytical run:

Flag (J) as estimated those associated sample results ≥ MDL for which the ICSAB analyte recovery is greater than 120% but ≤ 150%. If the ICSAB recovery falls within 50-79% flag (J) as estimated the associated sample results ≥ MDL. Reject (R) and red-line those all sample detects and non-detects for which the ICSAB analyte recovery is less than 50%. If the recovery is above 150%, reject (R) and red-line only detects (≥ MDL).

A.1.17 **Spiked Sample Recovery: Pre-Digestion/Pre-Distillation)-Form V A**
Note: Not required for Ca, Mg, K, and Na (both matrices); Al and Fe (soil only)

		YES	NO	N/A
A.1.17.1	Was Matrix Spike analysis performed:			
	For each matrix type?	[✓]		
	For each SDG?	[✓]		
	On one of the SDG samples?	[✓]		
	For each concentration range (i.e., low, med., high)?	[✓]		
	For each analytical Method (ICP-AES, ICP-MS, Hg, CN) used?	[✓]		
	Was a spiked sample prepared and analyzed with the SDG samples?	[✓]		

ACTION:
If no for any of the above, flag as estimated (J) all the positive data for which a spiked sample was not analyzed.

NOTE:
If more than one spiked sample were analyzed for one SDG, then qualify the associated data based on the worst spiked sample analysis.

		YES	NO	N/A
A.1.17.2	Was a field blank or PE sample used for the spiked sample analysis?	___	[✓]	___
	ACTION: If yes, flag (J) as estimated positive data of the associated SDG samples for which field blank or PE sample was used for the spiked sample analysis.			
A.1.17.3	Circle on each Form VA all spike recoveries that are outside the control limits (75-125%) that have sample concentrations less than four times the added spike concentrations.			
	Are all recoveries within the control limits when sample concentrations are less than or equal to four times the spike concentrations?	[✓]	___	___
	NOTE: Disregard the out of control spike recoveries for analytes whose concentrations are greater than or equal to four times the spike added.			
	Are results outside the control limits (75-125%) flagged with Lab Qualifier "N" on Form I's and Form VA?	[___]	___	✓
	ACTION: If no for any of the above, write in the Contract - Problems/Non-Compliance Section of the Data Review Narrative.			
A.1.17.4	**Aqueous**			
	Are any spike recoveries:			
	(a) less than 30%?	___	[✓]	___
	(b) between 30-74%?	___	[✓]	___
	(c) between 126-150%?	___	[✓]	___
	(d) greater than 150%?	___	[✓]	___
	ACTION: If the matrix spike recovery is less than 30%, reject (R) and red-line all associated aqueous data (detects & non-detects). If between 30-74%, qualify all associated aqueous data ≥ MDL as "J" and non-detects			

		YES	NO	N/A
	as "UJ". If between 126-150%, flag (J) all data ≥ MDL as "J". If greater than 150%, reject (R) and red-line all associated data ≥ MDL.			
	(NOTE:Replace "N" with "J", "R" as appropriate.)			
A.1.17.5	Soil/Sediment			
	Are any spike recoveries:			
	(a) less than 10%?	___	[___]	✓
	(b) between 10-74%?	___	[___]	✓
	(c) between 126-200%?	___	[___]	✓
	(d) greater than 200%?	___	[___]	✓
	ACTION: If yes for any of the above, proceed as follows:			
	If the matrix spike recovery is less than 10%,reject (R) and red-line all associated data (detects & non-detects); if between 10-74%,qualify all associated data ≥ MDL as "J" and non-detects as "UJ"; if between 126-200%, flag (J) all associated data ≥ MDL as "J" If greater than 200%, reject (R) and red-line all associated data ≥ MDL. (NOTE:Replace "N" with "J" or "R" as appropriate.)			
A.1.18	Lab Duplicates) - Form VI			
A.1.18.1	Was the lab duplicate analysis performed:			
	For each SDG?	[✓]	___	___
	On one of the SDG samples?	[✓]	___	___
	For each matrix type?	[✓]	___	___
	For each concentration range (low or med.)?	[✓]	___	___
	For each analytical Method (ICP-AES/ICP-MS,Hg,CN)Used?	[✓]	___	___
	Was a lab duplicate prepared and analyzed with the SDG samples?	[✓]	___	___

		YES	NO	N/A
	ACTION: If no for any of the above, flag (J) as estimated all the SDG sample results (detects & non-detects) for which the lab duplicate analysis was not performed.			
	NOTE: If more than one lab duplicate sample were analyzed for an SDG, then qualify the associated samples based on the worst lab duplicate analysis.			
A.1.18.2	Was a Field Blank or PE sample used for the Lab Duplicate analysis?	___	[✓]	___
	ACTION: If yes, flag as estimated (J) all SDG sample results (hits & non-detects) for which Field Blank or PE sample was used for duplicate analysis.			
A.1.18.3	Circle on each Form VI all values that are: RPD > 20%, or Absolute Difference > CRQL			
	Are all values within control limits (RPD ≤ 20% or absolute difference ≤ ±CRQL)?	[✓]	___	___
	If no, are all results outside the control limits flagged with an "*" (Lab Qualifier) on Form VI and on all Form I's?	[___]	___	___
	ACTION: If no, write in the Contract-Problems/ Non-Compliance Section of the Data Review Narrative.			
	NOTE: The laboratory is not required to report on Form VI the RPD when both values are non-detects.			
A.1.18.4	Aqueous			
A.1.18.4.1	When sample and duplicate values are both ≥ 5xCRQL (substitute MDL for CRQL when MDL > CRQL),			

	YES	NO	N/A
is any RPD > 20% but < 100%?	___	[✓]	___
is any RPD ≥ 100%?	___	[✓]	___

ACTION:
If the RPD is > 20% but < 100%, flag (J) as estimated the associated sample data ≥ CRQL. If the RPD is ≥ 100%, reject (R) and red-line the associated sample data ≥ CRQL.

(**NOTE:** Replace "*" with "J" or "R" as appropriate.)

A.1.18.4.2 When the sample and/or duplicate value <5xCRQL (substitute MDL for CRQL when MDL >CRQL), is the absolute difference between sample and duplicate values:

> ± CRQL?	___	[✓]	___
> ± 2xCRQL?	___	[✓]	___

ACTION:
If the absolute difference is > CRQL, flag as estimated all the associated sample results ≥ MDL but < 5xCRQL as "J" and non-detects as "UJ". If the absolute difference is > 2xCRQL, reject (R) and red-line all the associated non-detects and detects ≥ MDL but < 5xCRQL.

NOTE:
1. Replace "*" with "J", "UJ" or "R" as appropriate.)
2. If one value is >CRQL and the other value is non-detect, calculate the absolute difference between the value > CRQL and the MDL, and use this difference to qualify sample results.

A.1.18.5 **Soil/Sediment**

A.1.18.5.1 When sample and duplicate values are both ≥ 5xCRQL (substitute MDL for CRQL when MDL > CRQL),

is any RPD ≥ 35% but < 120%?	___	[___]	✓
is any RPD ≥ 120%?	___	[___]	✓

ACTION:
If the RPD is ≥ 35% and < 120%, flag (J) as estimated the associated sample

		YES	NO	N/A
	data ≥ CRQL. If the RPD is ≥ 120%, reject (R)and red-line the associated sample data ≥ CRQL.			
A.1.18.5.2	When the sample and/or duplicate value <5xCRQL(substitute MDL for CRQL when MDL > CRQL), is the absolute difference between sample and duplicate:			
	> ± 2 x CRQL?	___	[___]	✓
	> ± 4 x CRQL	___	[___]	✓

ACTION:
If the absolute difference is > 2 x CRQL, flag all the associated sample results ≥ MDL but < 5xCRQL as "J" and non-detects as "UJ". If the absolute difference is > 4xCRQL, reject (R) and red-line all the associated non-detects and detects ≥ MDL but <5xCRQL.

NOTE:
1. Replace "*" with "J", "UJ" or "R" as appropriate.)
2. If one value is >CRQL and the other value is non-detect, calculate the absolute difference between the value > CRQL and the MDL, and use this difference to qualify sample results.

A.1.19 **Field Duplicates**

Aqueous Field Duplicates

A.1.19.1	Was an aqueous Field Duplicate pair collected and analyzed? (Check Sampling Trip Report)	[✓]	___	___

ACTION:
If yes, prepare a Form (Appendix A.4) for each aqueous Field Duplicate pair. Report the sample and Field Duplicate results on Appendix A.4 from their respective Form I's. Calculate and report RPD on Appendix A.4 when sample and its Field Duplicate values are both > 5xCRQL. Calculate and report the absolute difference on Appendix A.4 when at least one value (sample or duplicate) is <5xCRQL. Evaluate the aqueous Field Duplicate analysis in accordance with the

	YES	NO	N/A
QC criteria stated in Sections A.1.19.2 and A.1.19.3.			

NOTE:
1. Do not transfer "*" from Form I's to Appendix A.4.
2. Do not calculate RPD when both values are non-detects.
3. Substitute MDL for CRQL when MDL > CRQL.
4. If one value is >CRQL and the other value is non-detect, calculate the absolute difference between the value > CRQL and the MDL, and use this the criteria to qualify the results.

A.1.19.2 Circle all values on the Form (Appendix A.4) for Field Duplicates that have:

RPD ≥ 20% or

Difference > ± CRQL

When sample and duplicate values are both ≥5xCRQL (substitute MDL for CRQL when MDL > CRQL),

is any RPD ≥ 20%?	___	[✓]	___
is any RPD ≥ 100%?	___	[✓]	___

ACTION:
If the RPD is >20% but < 100%, flag (J) only the associated sample and its Field Duplicate results ≥ CRQL. If the RPD is ≥ 100%, reject(R) and red-line only the associated sample and its Field Duplicate result ≥ CRQL.

A.1.19.3 When the sample and/or duplicate value(s) <5xCRQL (substitute MDL for CRQL when MDL >CRQL), is the absolute difference between sample and duplicate:

> ± CRQL?	___	[✓]	___
> ± 2 x CRQL?	___	[✓]	___

ACTION:
If the absolute difference is > CRQL, flag detects ≥ MDL but < 5xCRQL as "J" and non-detects as "UJ". If the difference is > 2xCRQL, reject (R) and red-line non-detects

		YES	NO	N/A
	and results ≥ MDL but <5xCRQL of the sample and its Field Duplicate.			
	Soil/Sediment Field Duplicates			
A.1.19.4	Was a soil field duplicate pair collected and analyzed? (Check Sampling Trip Report)	[___]	___	✓

ACTION:
If yes, for each soil Field Duplicate pair proceed as follows:

Prepare Appendix A.4 for each Field Duplicate pair. Report on Appendix A.4 all sample and its Field Duplicate results in MG/KG from their respective Form I's. Calculate and report RPD when sample and its duplicate values are both greater than 5xCRQL. Calculate and report the absolute difference when at least one value (sample or duplicate) is < 5xCRQL. Evaluate the Field Duplicate analysis in accordance with the QC Criteria stated in Sections A.1.19.5 and A.1.19.6.

NOTE:
1. Do not transfer "*" from Form I's to Appendix A.4.
2. Do not calculate RPD when both values are non-detects.
3. Substitute MDL for CRQL when MDL > CRQL.
4. If one value is >CRQL and the other value is non-detect, calculate the absolute difference between the value > CRQL and the MDL, and apply the criteria to qualify the results.

A.1.19.5	Circle on each Appendix A.4 all values that have: RPD ≥ 35%, or Difference > ± 2xCRQL When sample and duplicate values are both ≥ 5xCRQL (substitute MDL for CRQL when MDL > CRQL),			
	is any RPD ≥ 35% but < 120%?	___	[___]	✓
	is any RPD ≥ 120%?	___	[___]	✓

ACTION:
If the RPD is ≥ 35% but < 120%,

		YES	NO	N/A
	flag only the associated sample and its Field Duplicate results ≥ CRQL as "J". If the RPD is ≥ 120%, reject (R) and red-line only the sample and its Field Duplicate results ≥ CRQL.			
A.1.19.6	When the sample and/or duplicate value(s) <5xCRQL (substitute MDL for CRQL when MDL > CRQL), is the absolute difference between sample and Field Duplicate:			
	> ± 2 x CRQL?	___	[___]	✓
	> ± 4 x CRQL?	___	[___]	✓
	ACTION: If the absolute difference is > 2xCRQL, flag Sample and its Field Duplicate resuts ≥ MDL but <5xCRQL as "J" and non-detects as "UJ". If the difference is >4xCRQL, reject(R) and red-line non-detects and detects ≥ MDL but <5xCRQL of the sample and its Field Duplicate.			
A.1.20	**Laboratory Control Sample (LCS)- Form VII**			
A.1.20.1	Was one LCS prepared and analyzed for:			
	Each SDG?	[✓]	___	___
	Each matrix type?	[✓]	___	___
	Each batch samples digested/distilled?	[✓]	___	___
	For each Method(ICP-AES,ICP-MS,Hg,CN) used?	[✓]	___	___
	Was an LCS prepared and analyzed with the samples?	[✓]	___	___
	ACTION: If no for any of the above, prepare Telephone Record Log and contact CLP PO or TOPO for submittal of the LCS results. Flag (J) as estimated all the data for which an LCS was not analyzed.			
	NOTE: If only one LCS was analyzed for			

	YES	NO	N/A
more than 20 samples, then the first 20 samples analyzed are not flagged(J), but all additional samples must be qualified (J).			

A.1.20.2 Aqueous LCS

Circle on each Form VII the LCS percent recoveries outside control limits 80-120%.

NOTE: 1.Use digested ICV as LCS for aqueous mercury
2.Use distilled ICV as LCS for aqueous cyanide

Is any LCS recovery:

	YES	NO	N/A
Less than 50%?	___	[✓]	___
Between 50% and 79%?	___	[✓]	___
Between 121% and 150%?	___	[✓]	___
Greater than 150%?	___	[✓]	___

ACTION:
If the LCS recovery is less than 50%, reject (R) and red-line all associated sample data (detects & non-detects); for a recovery between 50-79%, flag detects as "J" all non-detects as "UJ". if the LCS recovery is between 121-150%, flag only detects as "J". if the recovery is greater than 150%, reject (R) and red-line all detects.

A.1.20.3 Solid LCS

If an analyte's MDL is equal to or greater than the true value of LCS, disregard the "Action" below for that analyte even though the LCS is out of control limits.

	YES	NO	N/A
Is the LCS "Found" value greater than the Upper Control Limit reported on Form VII?	___	[___]	✓

ACTION:

		YES	NO	N/A
	If yes, flag (J) all the associated detects ≥ MDL as estimated (J).			
	Is the LCS "Found" value lower than the Lower Control Limit reported on Form VII?	___	[___]	✓
	ACTION: If yes, flag detects as "J" and non-dectes as "UJ".			
A.1.21	**ICP-AES/ICP-MS Serial Dilution - Form VIII** **NOTE**: Serial dilution analysis is required only when the initial concentration is equal to or greater than 50 x MDL.			
A.1.21.1	Was a Serial Dilution analysis performed:			
	For each SDG?	[✓]	___	___
	On one of the SDG samples?	[✓]	___	___
	For each matrix type?	[✓]	___	___
	For each concentration range (low or med.)?	[✓]	___	___
	Was a Serial Dilution sample analyzed with the SDG samples?	[✓]	___	___
	ACTION: If no for any of the above, flag as estimated (J) detects ≥ MDL of all the SDG samples for which the ICP Serial Dilution Analysis was not performed.			
A.1.21.2	Was a Field Blank or PE sample used for the Serial Dilution Analysis?	___	[✓]	___
	ACTION: If yes, flag as estimated (J) detects ≥ MDL of all the SDG samples			
A.1.21.3	Circle on Form VIII the Percent Differences (%D) between sample results and its dilution results that are outside the control limits ± 10%			

		YES	NO	N/A
	when initial concentrations ≥ 50 x MDLs.			
	Are results outside the control limits flagged with an "E"(Lab Qualifier) on Form VIII and all Form I's?	[___]	___	___
	ACTION: If no, write in the Contract-Problem/ Non-Compliance Section of the Data Review Narrative.			
A.1.21.4	Are any %D values:			
	> 10%?	✓	[___]	___
	≥ 100%?	___	[✓]	___
	ACTION: If the Percent Difference (%D) is greater than 10%, flag (J) as estimated all associated samples whose **raw data** ≥ MDL; if the %D is ≥ 100%, reject (R) and red-line all associated samples with **raw data** ≥ MDL.			
	(**NOTE:**Replace "E" with "J" or "R" as appropriate.)			
A.1.22	Total/Dissolved or Inorganic/Total Analytes			
A.1.22.1	Were any analyses performed for dissolved as well as total analytes on the same sample(s)?	___	[✓]	___
	Were any analyses performed for inorganic as well as total analytes on the same sample(s)?	___	[✓]	___
	ACTION: If yes, prepare a Form (Appendix A.5) to compare the differences between dissolved (or inorganic)and total analyte concentrations. Compute each difference on Appendix A.5 as a percent of the total analyte only when both of the following conditions are fulfilled:			
	(1) The dissolved(or inorganic)concentration is greater than total concentration, and (2) greater than or equal to 5xMDL.			
A.1.22.2	Is any dissolved (or inorganic) concentration greater than its total concentration by more than 20%?	___	[___]	✓

		YES	NO	N/A
A.1.22.3	Is any dissolved(or inorganic) concentration greater than its total concentration by more than 50%?	___	[___]	___
	ACTION: If the percent difference is greater than 20%, flag (J) both dissolved/inorganic and total concentrations as estimated. If the difference is more than 50%, reject (R) and red-line both the values.			
A.1.23	Field Blank - Form I NOTE: Designate "Field Blank" as such on Form I			
A.1.23.1	Was a Field/Rinsate Bank collected and analyzed with the SDG samples?	[___]	✓	___
	If yes, is any Field/Rinsate Blank absolute value of an analyte on Form I greater than its CRQL(or 2xMDL when MDL>CRQL)?	___	[___]	___
	If yes, circle the Field Blank value on Form I that is greater than the CRQL, (or 2 x MDL when MDL > CRQL).			
	Is any Field Blank value greater than CRQL also greater than the Preparation Blank value?	___	[___]	___
	If yes, is the Field Blank value (> CRQL and > the prep. blank value) already rejected due to other QC criteria?	[___]	___	___

ACTION:
If the Field Blank value was not rejected, reject all associated sample data (except the Field Blank results)greater than the CRQL but less than the Field Blank value. Reject on Form I's the soil sample results whose raw values in ug/L in the instrument printout are greater than the CRQL but less than the Field Blank value in ug/L. Flag as "J" detects between the Field Blank value and 10xField Blank value. If the sample result ≥ MDL but ≤ CRQL, replace it with CRQL-U.

If the Field Blank value is less than the

	YES	NO	N/A
Prep.Blank value, do not qualify the sample results due to the Field Blank criteria.			

NOTE:
1. Field Blank result previously rejected due to other criteria cannot be used to qualify field samples.
2. Do not use Rinsate Blank associated with soils to qualify water samples and vice versa.

A.1.24 Verification of Instrumental Parameters - Form IX, XA, XB, XI

A.1.24.1 Is verification report present for:

	YES	NO	N/A
Method Detection Limits (Form IX-Annually)?	[✓]	___	___
ICP-AES Interelement Correction Factors (Form XA & XB -Quarterly)?	[✓]	___	___
ICP-AES & ICP-MS Linear Ranges (Form XI-Quarterly)?	[✓]	___	___

ACTION:
If no, contact CLP PO/TOPO for submittal from the laboratory.

A.1.24.2 Method Detection Limits - Form IX

A.1.24.2.1 Are MDLs present on Form IX for:

	YES	NO	N/A
All the analytes?	[✓]	___	___
All the instruments used?	[✓]	___	___
Digested and undigested samples and Calib.Blanks?	[✓]	___	___
ICP-AES and ICP-MS when both instruments are used for the same analyte?	[✓]	___	___

ACTION:
If no for any of the above, prepare Telephone Record Log and contact CLP PO/TOPO for submittal of the MDLs from the laboratory. Report to CLP PO and write in the Contract Problems/ Non-Compliance Section of the Data Review Narrative if the MDL concentration is not less than ½ CRQL.

		YES	NO	N/A
A.1.24.2.2	Is MDL greater than the CRQL for any analyte?	___	[✓]	___
	If yes, is the analyte concentration on Form I greater than 5 x MDL for the sample analyzed on the instrument whose MDL exceeds CRQL?	[___]	___	___
	ACTION: If no, flag as estimated (J) all values less than five times MDL for the analyte whose MDL exceeds the CRQL.			
A.1.24.3	**Linear Ranges - Form XI**			
A.1.24.3.1	Was any sample result higher than the high linear range for ICP-AES or ICP-MS?	___	[✓]	___
	Was any sample result higher than the highest calibration standard for mercury or cyanide?	___	[✓]	___
	If yes for any of the above, was the sample diluted to obtain the result reported on Form I?	[___]	___	___
	ACTION: If no, flag (J) as estimated the affected detects (≥ MDL) reported on Form I.			
A.1.25	**ICP-MS Tune Analysis - Form XIV**			
A.1.25.1	Was the ICP-MS instrument tuned prior to calibration?	[___]	___	✓
	ACTION: If no, reject (R) and red-line all sample data for which tuning was not performed.			
A.1.25.2	Was the tuning solution analyzed or scanned at least five times consecutively?	[___]	___	✓
	Were all the required isotopes spanning the analytical range present in the tuning solution?	[___]	___	✓
	Was the mass resolution within			

		YES	NO	N/A
	0.1 amu for each isotope in the tuning solution?	[___]	___	✓
	Was %RSD less than 5% for each isotope of each analyte in the tuning solution?	[___]	___	✓
	ACTION: If no for any of the above, qualify all results ≥ MDL associated with that Tune as estimated "J", and all non-detects associated with that Tune as "UJ".			
A.1.26	ICP-MS Internal Standards - Form XV			
A.1.26.1	Were the Internal Standards added to all the samples and all QC samples and calibration standards (except the Tuning Solution)?	[___]	___	✓
	Were all the target analyte masses bracketed by the masses of the five internal standards?	[___]	___	✓
	ACTION: If none of the Internal Standards was added to the samples, reject (R) and red-line all the associated sample data (detects & non-detects). If internal standards were used but did not cover all the analyte masses, reject (R) and red-line only the analyte results not bracketed by the internal standard masses.			
A.1.26.2	Was the intensity of an Internal Standard in each sample within 60-125% of the intensity of the same Internal Standard in the calibration blank?	[___]	___	✓
	If no, was the original sample diluted two fold, Internal Standard added and the sample re-analyzed?	[___]	___	✓
	Was the %RI for the two fold diluted sample within the acceptance limits (60-125%)?	[___]	___	✓
	ACTION: If no for any of the above, flag detects as "J" and non-detects "UJ" of all the analytes with atomic masses between the atomic mass of the internal standard lighter			

than the affected internal standard, and the atomic mass of the internal standard heavier than the affected internal standard.

A.1.27 Percent Solids of Sediments

A.1.27.1 Are percent solids in sediment(s):

< 50%? ___ [___] ✓

ACTION:
If yes, qualify as estimated (J) all detects and non-detects of a sample that has percent solids less than 50%(i.e.,moisture content greater than 50%).

NOTE:
Flag(J) only the sample results that were not previously flagged due to other QC criteria.

Inorganic Data Review Narrative

Case# _____ Site: _____ Matrix: Soil ____

SDG# _____ Lab: _____ Water ____

Sampling Team: _____ Reviewer: _____ Other _____

A.2.1 Data Validation Flags:
The following flags may have been applied in red by the data validator and must be considered by the data user.

J - This flag indicates the result qualified as estimated

R and Red-Line - A red-line drawn through a sample result indicates unusable value. The red-lined data are known to contain significant errors based on documented information and must not be used by the data user.

U - This data validation qualifier is applied to sample results ≥ MDL when associated blank is contaminated

Fully Usable Data - The results that do not carry "J" or "red-line" are fully usable.

A.2.2 Laboratory Qualifiers:
The CLP laboratory applies a contractual qualifier on all

APPENDIX D
SUPPORT DOCUMENTATION

CompuChem
a Division of Liberty Analytical Corp.
501 Madison Avenue
Cary, NC 27513

SDG NARRATIVE
SDG # 1012127
Client: **TETRA TECH**
Project: **CTO-WE08/112G02750 CALVERTON**
PM: Dave Brayack

The indicated Sample Delivery Group (SDG) consisting of eight (8) water samples was received into the laboratory information management system (LIMS) on December 16 and 17, 2010 intact and in good condition with the Chain of Custody (COC) Records in order, unless otherwise noted in any attachments or Quality Assurance Notices. The cooler temperature indicator bottle was found with the samples and the samples temperature was 0.1 to 0.2 degrees Celsius. Temperature was recorded by IR temperature gun.

The samples were prepared and analyzed in accordance with SW846 and DoD methodology for the requested TAL metals and mercury.

EQUATIONS FOR LIQUID SAMPLE CALCULATIONS:

Equation for obtaining metals sample results in µg/L as presented on Analysis Data Sheet data sheets from ICP instrument acquired results in µg/L (ppb).

$$\frac{C \times F}{I}$$

Where

C = concentration (µg/L)

F = final volume in liters after sample preparation

I = initial volume in liters

Example: Barium result in µg/L from sample PZ-15911

$$\frac{21.77831\ \mu g/L\ (C) \times 0.05\ L\ (F)}{0.05\ L\ (I)} = 21.778\ \mu g/L \text{ reported as } 21.8\ J\ \mu g/L$$

INSTRUMENTAL QUALITY CONTROL:

All calibration verification solutions (LLICV, LLCCV, ICV & CCV), blanks (ICB, & CCB), and interference check samples (ICSA & ICSAB) associated with this data were confirmed to be within SW-846 methodology and DoD QSM 4.1 allowable limits.

SAMPLE PREPARATION QUALITY CONTROL:

The sample preparation procedure verifications (LCSW & PBW) were found to be within acceptable ranges and the field samples were prepared and analyzed within the contract specified holding times.

MATRIX RELATED QUALITY CONTROL:

The ICP sample matrix spike, CCN = 0121903-MS1 (PZ-159I1S) was found to be inside control limits except selenium and thallium.

The mercury sample matrix spike, CCN = 0121904-MS1 (PZ-159I1S) was found to be inside control limits.

The ICP sample matrix spike duplicate, CCN = 0121903-MSD1 (PZ-159I1SD) was found to be inside control limits except thallium.

The mercury sample matrix spike duplicate, CCN = 0121904-MSD1 (PZ-159I1SD) was found to be inside control limits.

The ICP sample duplicate spike, CCN = 0121903-DUP1 (PZ-159I1D) was found to be inside control limits.

The mercury sample duplicate spike, CCN = 0121904-DUP1 (PZ-159I1D) was found to be inside control limits.

A five-fold serial dilution of sample, CCN = SDI1012127-01 (PZ-159I1L) was performed in accordance with SW-846 requirements for ICP analysis.

The adjusted sample concentration was inside control limits except potassium and sodium.

The ICP sample post digestion spike, CCN =0121903-PS1 (PZ-159I1A) met all criteria except iron and manganese.

I certify that the tests used in this report meet all requirements of the NELAC standards unless otherwise stated in the SDG narrative or QA notice.

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on CD has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

for Susan Bass

Susan W. Bass
Senior Chemist
December 30, 2010

(**) ALL Sulfide pH (>9), ALL TOC pH (<2), ALL TAL Metals pH (<2)

TETRA TECH NUS, INC. JD 12/22/10 CHAIN OF CUSTODY | NUMBER 27293 | PAGE 1 OF 2

10

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
112G02045	NWIRP Calverton	Dave Brayack	757-461-3824	Cathy Dover CompuChem
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
		Vince Shickora	757-814-9916	501 Madison Av.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FedEx 8741 9938 1493		Cary, NC 27513

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G G P P G P

PRESERVATIVE USED: HCl HCl NA Zn Acetate NaOH H_2SO_4 HNO_3

TYPE OF ANALYSIS: VOC | MEE | Nitrate/Nitrite/Fluoride/Chloride | Sulfide (**) | TOC (**) | TAL Metals (**)

DATE YEAR 2010	TIME	SAMPLE ID (rec'd @ 0.1°C SN0015 0.2°C)	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	VOC	MEE	Nitrate/Nitrite/Fluoride/Chloride	Sulfide (**)	TOC (**)	TAL Metals (**)	COMMENTS
12-13	1200	SA-TB01-20101213	—	—	—	QC	I	3	3						1012127-11 Lab prepared
12-13	1335	SA-PZ158I1-20101213	—	—	—	GW	G	3	3						1012127-12
12-13	*1337	SA-PZ-158I-20101213	—	—	—	GW	G	3	3						*container ID: SA-PZ-158I-20101213 time 1329 (actual 1339 per Reb) -13
12-13	1455	SA-PZ160I1-20101213	—	—	—	GW	G	3	3						-14
12-13	*1502	SA-PZ-160I-20101213	—	—	—	GW	G	5	3	2					*no time on containers ~~-15~~ -10
12-14	0857	SA-PZ-135I-20101214	—	—	—	GW	G	3	3						-16
12-14	0908	SA-PZ136I-20101214	—	—	—	GW	G	3	3						-17
12-14	1045	SA-PZ-161I-20101214	—	—	—	GW	G	3	3						-18
12-14	1200	SA-Dup01-20101214	—	—	—	GW	G	10	3	2	1	1	2	1	1012127-04
12-14	1235	SA-PZ-159I1-20101214	—	—	—	GW	G	10	3	2	1	1	2	1	1012127-01 Run MS/MSD for VOC + TAL Metal Only
12-14	1253	SA-PZ-157I1-20101214	—	—	—	GW	G	10	3	2	1	1	2	1	1012127-03 a = missing containers
12-14	1420	SA-PZ-159I-20101214	—	—	—	GW	G	8	3	2		JD 12/16/10	2	1	~~rec'd~~ JD 12/16/10 1012127-05
12-14	1455	SA-PZ-157I-20101214	—	—	—	GW	G	10	3	2	1	1	2	1	*VOC, MEE, TOC time 1455 1012127-02

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY	12-15-10	1700	1. RECEIVED BY Jennifer Dover	12/16/10	1238
2. RELINQUISHED BY			2. RECEIVED BY		
3. RELINQUISHED BY			3. RECEIVED BY		

MTL Sulfide NO2/NO3 time 1255

COMMENTS: (**) the Dup: "SA-DUP01-20101214" changed to "SA-PZ-157I1-20101214" for NO2/NO3/Fl/Cl & sulfide only →

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TINUS-001

(**) ALL TOC pH (<2), ALL TAL Metals (<2)

TETRA TECH NUS, INC. JD 12/22/10 CHAIN OF CUSTODY | NUMBER 27280 | PAGE 2 OF 2

11

PROJECT NO: 2045 112G02750	FACILITY: NWIRP Calverton	PROJECT MANAGER: Dave Brayack	PHONE NUMBER: 757-461-3824
SAMPLERS (SIGNATURE): [signature]		FIELD OPERATIONS LEADER: Jacob Birkett	PHONE NUMBER: 757-814-9916
		CARRIER/WAYBILL NUMBER: FedEx 8741 9938 1493	

LABORATORY NAME AND CONTACT: Cathy Dover CompuChem
ADDRESS: 501 Madison Av
CITY, STATE: Cary, NC 27513

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

rec'd @ 0.1 °C
0.2 °C
SN0015

DATE YEAR 2010	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	VOC	MEE	TOC (**)	TAL Metals (**)				COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)									G	G	G	P				
PRESERVATIVE USED									HCl	HCl	H_2SO_4	HNO_3				
12-15	0910	SA-PZ-133I-20101215	—	—	—	GW	G	3	3							1012127-15
12-15	1035	SA-PZ-139I-20101215	—	—	—	GW	G	3	3							-19
12-15	1047	SA-PZ-138I1-20101215	—	—	—	GW	G	3	3							-20
12-15	1154	SA-PZ-138I-20101215	—	—	—	GW	G	3	3							-21
12-15	1200	SA-PZ-Dup02-20101215	—	—	—	GW	G	3	3							1012127-22
12-15	1205	SA-PZ-157I1-20101215	—	—	—	GW	G	8	3	2	2	1				1012127-06
12-15	1300	SA-PZ-149I1-20101215	—	—	—	GW	G	3	3							1012127-02
12-15	1335	SA-PZ-155I-20101215	—	—	—	GW	G	8	3	2	2	1				1012127-07

*container ID: SA-PZ-151I1-20101215 (correct ID)

1. RELINQUISHED BY: Jacob Birkett [signature]	DATE: 12-15-10	TIME: 1700	1. RECEIVED BY: Jennifer Dover	DATE: 12/16/10	TIME: 1238
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME
COMMENTS					

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TINUS-001

23150

117

CHAIN OF CUSTODY

Page 1 of

CompuChem
a division of Liberty Analytical Corp.

501 Madison Ave.
Cary, NC 27513
Phone: 919-379-4100 Fax 919-379-4040

Courier FedEx
Airbill No. 8741 9938 1450
Sampling Complete? Y or N

Client/Reporting Information

Company Name: Tetra Tech
Address: 5700 Lake Wright Dr. Suite 307
City: Norfolk State: VA Zip: 23502
Project Contact: Dave Brayack
Phone #: 412 974 4704
Sampler's Name: Jacob Birkett

Project Information

Project Name: NWIRP Calverton ETAB
Sampling Location: SA
Turnaround time: Standard
Batch QC or Project Specific? If Specific, which Sample ID?
Are aqueous samples field filtered for metals? Y or N
Are high concentrations expected? Y or N? If yes, which ID(s)?

Requested Analysis (include method and bottle type)

Matrices: GW - Ground water; WW - Waste water; SW - Surface water; SO - Soil/Sediment; TB - Trip Blank; RI - Rinsate; WP - Wipe; O - Other

CompuChem No (Lab Use)	Field ID	Collection Date	Collection Time	Matrix	# of bottles	HCl	NaOH	HNO3	H2SO4	MEOH	Other ZnAcetate/NaOH	TOC	TAL Metals	Nitrite/Nitrate/Fluoride/Chloride	Sulfide							pH (Sample Info Lab Use) TOC	TAL Metals	Sulfide
1012127-08	SA-PZ-160I-20101216	12-16-10	1541	GW	3			1	2			O	O			rec'd 2-TOC vials & 250mL for TAL Metals						<2	<2	
-09	SA-PZ-159I1-20101216	12-16-10	1535	GW	2						1			1	1		JD 12/17/10							>9

Lab Use Only

Sample Unpacked By: Jennifer Doren
Sample Order Entry By:
Samples Received in Good Condition? Y or N
If no, explain:

Cyanide samples checked for sulfide & chlorine? Y or NA
625 & Phenol samples checked for chlorine? Y or NA
608 samples checked for pH between 5.0-9.0? Y or NA

Comments

Sample Custody

Relinquished by: Jacob Birkett	Date/Time: 12-16-10 1700	Received by: Jennifer Doren	Date/Time: 12/17/10 1020
Relinquished by:	Date/Time:	Received by:	Date/Time:

Subcontact? Y or N If yes, where? Custody Seal(s) intact? Y or N On Ice? Y or N Cooler Temp: 0.1 °C

Samples stored 60 days after date report mailed at no extra charge.

White & Yellow copy to lab • Pink copy for customer SN0010

HOLDTIMES

SDG 1012127

SORT	UNITS	NSAMPLE	LAB_ID	QC_TYPE	SAMP_DATE	EXTR_DATE	ANAL_DATE	SMP_EXTR	EXTR_ANL	SMP_ANL
HG	UG/L	SA-PZ-155I-20101215	1012127-07	NM	12/15/2010	12/20/2010	12/21/2010	5	1	6
HG	UG/L	SA-DUP01-20101214	1012127-04	NM	12/14/2010	12/20/2010	12/21/2010	6	1	7
HG	UG/L	SA-PZ-151I1-20101215	1012127-06	NM	12/15/2010	12/20/2010	12/21/2010	5	1	6
HG	UG/L	SA-PZ-160I-2010216	1012127-08	NM	12/16/2010	12/20/2010	12/21/2010	4	1	5
HG	UG/L	SA-PZ-159I-20101214	1012127-05	NM	12/14/2010	12/29/2010	12/30/2010	15	1	16
HG	UG/L	SA-PZ-157I1-20101214	1012127-03	NM	12/14/2010	12/20/2010	12/21/2010	6	1	7
HG	UG/L	SA-PZ-157I-20101214	1012127-02	NM	12/14/2010	12/20/2010	12/21/2010	6	1	7
HG	UG/L	SA-PZ-159I1-20101214	1012127-01	NM	12/14/2010	12/20/2010	12/21/2010	6	1	7
M	UG/L	SA-PZ-155I-20101215	1012127-07	NM	12/15/2010	12/20/2010	12/28/2010	5	8	13
M	UG/L	SA-PZ-160I-2010216	1012127-08	NM	12/16/2010	12/20/2010	12/28/2010	4	8	12
M	UG/L	SA-PZ-159I-20101214	1012127-05	NM	12/14/2010	12/20/2010	12/28/2010	6	8	14
M	UG/L	SA-PZ-159I1-20101214	1012127-01	NM	12/14/2010	12/20/2010	12/28/2010	6	8	14
M	UG/L	SA-PZ-157I1-20101214	1012127-03	NM	12/14/2010	12/20/2010	12/28/2010	6	8	14
M	UG/L	SA-PZ-151I1-20101215	1012127-06	NM	12/15/2010	12/20/2010	12/28/2010	5	8	13
M	UG/L	SA-DUP01-20101214	1012127-04	NM	12/14/2010	12/20/2010	12/28/2010	6	8	14

SORT	UNITS	NSAMPLE	LAB_ID	QC_TYPE	SAMP_DATE	EXTR_DATE	ANAL_DATE	SMP_EXTR	EXTR_ANL	SMP_ANL
M	UG/L	SA-PZ-157I-20101214	1012127-02	NM	12/14/2010	12/20/2010	12/28/2010	6	8	14
CL	MG/L	SA-PZ-157I1-20101214	1012127-03	NM	12/14/2010	12/16/2010	12/16/2010	2	0	2
CL	MG/L	SA-PZ-157I-20101214	1012127-02	NM	12/14/2010	12/16/2010	12/16/2010	2	0	2
CL	MG/L	SA-PZ-159I1-20101214	1012127-09	NM	12/14/2010	12/17/2010	12/17/2010	3	0	3
FL	MG/L	SA-PZ-157I1-20101214	1012127-03	NM	12/14/2010	12/16/2010	12/16/2010	2	0	2
FL	MG/L	SA-PZ-157I-20101214	1012127-02	NM	12/14/2010	12/16/2010	12/16/2010	2	0	2
FL	MG/L	SA-PZ-159I1-20101214	1012127-09	NM	12/14/2010	12/17/2010	12/17/2010	3	0	3
NTA	MG/L	SA-PZ-157I-20101214	1012127-02	NM	12/14/2010	12/16/2010	12/16/2010	2	0	2
NTA	MG/L	SA-PZ-157I1-20101214	1012127-03	NM	12/14/2010	12/16/2010	12/16/2010	2	0	2
NTA	MG/L	SA-PZ-159I1-20101214	1012127-09	NM	12/14/2010	12/17/2010	12/17/2010	3	0	3
NTI	MG/L	SA-PZ-157I1-20101214	1012127-03	NM	12/14/2010	12/16/2010	12/16/2010	2	0	2
NTI	MG/L	SA-PZ-157I-20101214	1012127-02	NM	12/14/2010	12/16/2010	12/16/2010	2	0	2
NTI	MG/L	SA-PZ-159I1-20101214	1012127-09	NM	12/14/2010	12/17/2010	12/17/2010	3	0	3
SUL	MG/L	SA-PZ-157I1-20101214	1012127-03	NM	12/14/2010	12/21/2010	12/21/2010	7	0	7
SUL	MG/L	SA-PZ-159I1-20101214	1012127-09	NM	12/14/2010	12/21/2010	12/21/2010	7	0	7
SUL	MG/L	SA-PZ-159I1-20101214	1012127-01	NM	12/14/2010	12/21/2010	12/21/2010	7	0	7
SUL	MG/L	SA-PZ-157I-20101214	1012127-02	NM	12/14/2010	12/21/2010	12/21/2010	7	0	7
TOC	MG/L	SA-PZ-159I-20101214	1012127-05	NM	12/14/2010	12/20/2010	12/28/2010	6	8	14

SORT	UNITS	NSAMPLE	LAB_ID	QC_TYPE	SAMP_DATE	EXTR_DATE	ANAL_DATE	SMP_EXTR	EXTR_ANL	SMP_ANL
TOC	MG/L	SA-PZ-159I1-20101214	1012127-01	NM	12/14/2010	12/20/2010	12/28/2010	6	8	14
TOC	MG/L	SA-PZ-157I-20101214	1012127-02	NM	12/14/2010	12/20/2010	12/28/2010	6	8	14
TOC	MG/L	SA-PZ-157I1-20101214	1012127-03	NM	12/14/2010	12/20/2010	12/28/2010	6	8	14
TOC	MG/L	SA-PZ-155I-20101215	1012127-07	NM	12/15/2010	12/20/2010	12/28/2010	5	8	13
TOC	MG/L	SA-PZ-151I1-20101215	1012127-06	NM	12/15/2010	12/20/2010	12/28/2010	5	8	13
TOC	MG/L	SA-DUP01-20101214	1012127-04	NM	12/14/2010	12/20/2010	12/28/2010	6	8	14
TOC	MG/L	SA-PZ-160I-2010216	1012127-08	NM	12/16/2010	12/20/2010	12/28/2010	4	8	12
OV	UG/L	SA-PZ-151I1-20101215	1012127-06	NM	12/15/2010	12/22/2010	12/22/2010	7	0	7
OV	UG/L	SA-TB01-20101213	1012127-11	NM	12/13/2010	12/21/2010	12/21/2010	8	0	8
OV	UG/L	SA-PZ-161I-2010214	1012127-18	NM	12/14/2010	12/22/2010	12/22/2010	8	0	8
OV	UG/L	SA-PZ-160I-2010216	1012127-10	NM	12/16/2010	12/21/2010	12/21/2010	5	0	5
OV	UG/L	SA-PZ-160I1-20101213	1012127-14	NM	12/13/2010	12/22/2010	12/22/2010	9	0	9
OV	UG/L	SA-PZ-159I-20101214	1012127-05	NM	12/14/2010	12/21/2010	12/21/2010	7	0	7
OV	UG/L	SA-PZ-159I1-20101214	1012127-01	NM	12/14/2010	12/22/2010	12/22/2010	8	0	8
OV	UG/L	SA-PZ-158I-20101213	1012127-13	NM	12/13/2010	12/22/2010	12/22/2010	9	0	9
OV	UG/L	SA-PZ-158I1-20101213	1012127-12RE1	NM	12/13/2010	12/22/2010	12/22/2010	9	0	9
OV	UG/L	SA-PZ-158I1-20101213	1012127-12	NM	12/13/2010	12/21/2010	12/21/2010	8	0	8
OV	UG/L	SA-PZ-157I-20101214	1012127-02	NM	12/14/2010	12/22/2010	12/22/2010	8	0	8

NWIRP CALVERTON
WATER DATA
1012127

FRACTION	CHEMICAL	SA-PZ-157I1-20101214	UNITS	SA-PZ-DUP01-20101214	RPD	D
M	ANTIMONY	3.49 J	UG/L	ND	200.00	3.49
M	ARSENIC	5.32 J	UG/L	3.63 J	37.77	1.69
M	BARIUM	21.4 J	UG/L	21.5 J	0.47	0.10
M	CADMIUM	0.892 J	UG/L	0.908 J	1.78	0.02
M	CALCIUM	14800	UG/L	14800	0.00	0.00
M	CHROMIUM	ND	UG/L	1.08 J	200.00	1.08
M	COBALT	1.64 J	UG/L	ND	200.00	1.64
M	IRON	2610	UG/L	2580	1.16	30.00
M	LEAD	2.01 J	UG/L	ND	200.00	2.01
M	MAGNESIUM	1150 J	UG/L	1140 J	0.87	10.00
M	MANGANESE	5540	UG/L	5510	0.54	30.00
M	POTASSIUM	2520 J	UG/L	2530 J	0.40	10.00
M	SELENIUM	2.21 J	UG/L	ND	200.00	2.21
M	SODIUM	7920	UG/L	7740	2.30	180.00
MISC	CHLORIDE	6.65	MG/L	ND	200.00	6.65
MISC	FLUORIDE	0.028 J	MG/L	ND	200.00	0.03
MISC	TOTAL ORGANIC CARBON	107 D	MG/L	ND (1.0 mg/l)	200.00	107.00

Current RPD Quality Control Limit: 30 %.
Shaded cells indicate RPDs that exceed the applicable quality control limit.

ANALYSES DATA PACKAGE COVER PAGE

Client: TETRA TECH

Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Laboratory: COMPUCHEM

SDG: 1012127

Client Sample Id:	Lab Sample Id:
PZ-159I1	1012127-01
PZ-157I	1012127-02
PZ-157I1	1012127-03
DUP01-20101214	1012127-04
PZ-159I	1012127-05
PZ-151I1	1012127-06
PZ-155I	1012127-07
PZ-160I	1012127-08

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the Electronic Data Deliverable has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: _____ Name: Ken Brzybandi

Date: 12-22-10 Title: Lab Manager

Compu Chem
A Division Of
Liberty Analytical Corp.

INITIAL AND CONTINUING CALIBRATION CHECK

EPA 6010C

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Sequence: 0L29002 Instrument ID: P4

Client ID	Lab Sample ID	Analyte	True	Found	%R	Units	Q	Control Limit
ICV	0L29002-ICV1	Aluminum	2521	2590	103	ug/L		+/-10 %
ICV	0L29002-ICV1	Antimony	994.0	1030	103	ug/L		+/-10 %
ICV	0L29002-ICV1	Arsenic	999.0	1010	101	ug/L		+/-10 %
ICV	0L29002-ICV1	Barium	497.0	523	105	ug/L		+/-10 %
ICV	0L29002-ICV1	Beryllium	495.0	511	103	ug/L		+/-10 %
ICV	0L29002-ICV1	Cadmium	496.0	518	104	ug/L		+/-10 %
ICV	0L29002-ICV1	Calcium	10030	10300	103	ug/L		+/-10 %
ICV	0L29002-ICV1	Chromium	490.0	519	106	ug/L		+/-10 %
ICV	0L29002-ICV1	Cobalt	499.0	513	103	ug/L		+/-10 %
ICV	0L29002-ICV1	Copper	492.0	508	103	ug/L		+/-10 %
ICV	0L29002-ICV1	Iron	5082	5220	103	ug/L		+/-10 %
ICV	0L29002-ICV1	Lead	1002	1040	104	ug/L		+/-10 %
ICV	0L29002-ICV1	Magnesium	6074	6210	102	ug/L		+/-10 %
ICV	0L29002-ICV1	Manganese	499.0	514	103	ug/L		+/-10 %
ICV	0L29002-ICV1	Nickel	503.0	524	104	ug/L		+/-10 %
ICV	0L29002-ICV1	Potassium	10020	9840	98	ug/L		+/-10 %
ICV	0L29002-ICV1	Selenium	1029	1040	101	ug/L		+/-10 %
ICV	0L29002-ICV1	Silver	501.0	507	101	ug/L		+/-10 %
ICV	0L29002-ICV1	Sodium	10100	10300	102	ug/L		+/-10 %
ICV	0L29002-ICV1	Thallium	1028	1070	104	ug/L		+/-10 %
ICV	0L29002-ICV1	Vanadium	501.0	513	102	ug/L		+/-10 %
ICV	0L29002-ICV1	Zinc	1025	1070	104	ug/L		+/-10 %
CCV	0L29002-CCV1	Aluminum	50000	49300	99	ug/L		+/-10 %
CCV	0L29002-CCV1	Antimony	1000	1030	103	ug/L		+/-10 %
CCV	0L29002-CCV1	Arsenic	1000	981	98	ug/L		+/-10 %
CCV	0L29002-CCV1	Barium	1000	1010	101	ug/L		+/-10 %
CCV	0L29002-CCV1	Beryllium	1000	996	100	ug/L		+/-10 %
CCV	0L29002-CCV1	Cadmium	1000	989	99	ug/L		+/-10 %
CCV	0L29002-CCV1	Calcium	50000	48900	98	ug/L		+/-10 %
CCV	0L29002-CCV1	Chromium	1000	1000	100	ug/L		+/-10 %
CCV	0L29002-CCV1	Cobalt	1000	961	96	ug/L		+/-10 %
CCV	0L29002-CCV1	Copper	1000	994	99	ug/L		+/-10 %
CCV	0L29002-CCV1	Iron	25000	24400	98	ug/L		+/-10 %
CCV	0L29002-CCV1	Lead	1000	983	98	ug/L		+/-10 %
CCV	0L29002-CCV1	Magnesium	50000	49600	99	ug/L		+/-10 %
CCV	0L29002-CCV1	Manganese	1000	997	100	ug/L		+/-10 %
CCV	0L29002-CCV1	Nickel	1000	999	100	ug/L		+/-10 %
CCV	0L29002-CCV1	Potassium	50000	48700	98	ug/L		+/-10 %
CCV	0L29002-CCV1	Selenium	1000	1000	100	ug/L		+/-10 %
CCV	0L29002-CCV1	Silver	100.0	92.1	92	ug/L		+/-10 %
CCV	0L29002-CCV1	Sodium	50000	50500	101	ug/L		+/-10 %
CCV	0L29002-CCV1	Thallium	1000	993	99	ug/L		+/-10 %
CCV	0L29002-CCV1	Vanadium	1000	986	99	ug/L		+/-10 %
CCV	0L29002-CCV1	Zinc	1100	1110	101	ug/L		+/-10 %
CCV	0L29002-CCV2	Aluminum	50000	49100	98	ug/L		+/-10 %
CCV	0L29002-CCV2	Antimony	1000	1030	103	ug/L		+/-10 %

INITIAL AND CONTINUING CALIBRATION CHECK

EPA 6010C

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Sequence: 0L29002 Instrument ID: P4

Client ID	Lab Sample ID	Analyte	True	Found	%R	Units	Q	Control Limit
CCV	0L29002-CCV2	Arsenic	1000	977	98	ug/L		+/-10 %
CCV	0L29002-CCV2	Barium	1000	1000	100	ug/L		+/-10 %
CCV	0L29002-CCV2	Beryllium	1000	994	99	ug/L		+/-10 %
CCV	0L29002-CCV2	Cadmium	1000	983	98	ug/L		+/-10 %
CCV	0L29002-CCV2	Calcium	50000	48800	98	ug/L		+/-10 %
CCV	0L29002-CCV2	Chromium	1000	1000	100	ug/L		+/-10 %
CCV	0L29002-CCV2	Cobalt	1000	954	95	ug/L		+/-10 %
CCV	0L29002-CCV2	Copper	1000	1020	102	ug/L		+/-10 %
CCV	0L29002-CCV2	Iron	25000	24300	97	ug/L		+/-10 %
CCV	0L29002-CCV2	Lead	1000	979	98	ug/L		+/-10 %
CCV	0L29002-CCV2	Magnesium	50000	49500	99	ug/L		+/-10 %
CCV	0L29002-CCV2	Manganese	1000	995	100	ug/L		+/-10 %
CCV	0L29002-CCV2	Nickel	1000	994	99	ug/L		+/-10 %
CCV	0L29002-CCV2	Potassium	50000	48500	97	ug/L		+/-10 %
CCV	0L29002-CCV2	Selenium	1000	996	100	ug/L		+/-10 %
CCV	0L29002-CCV2	Silver	100.0	95.0	95	ug/L		+/-10 %
CCV	0L29002-CCV2	Sodium	50000	50900	102	ug/L		+/-10 %
CCV	0L29002-CCV2	Thallium	1000	988	99	ug/L		+/-10 %
CCV	0L29002-CCV2	Vanadium	1000	984	98	ug/L		+/-10 %
CCV	0L29002-CCV2	Zinc	1100	1100	100	ug/L		+/-10 %
CCV1	0L29002-CCV3	Aluminum	50000	49900	100	ug/L		+/-10 %
CCV1	0L29002-CCV3	Antimony	1000	1040	104	ug/L		+/-10 %
CCV1	0L29002-CCV3	Arsenic	1000	989	99	ug/L		+/-10 %
CCV1	0L29002-CCV3	Barium	1000	1020	102	ug/L		+/-10 %
CCV1	0L29002-CCV3	Beryllium	1000	1010	101	ug/L		+/-10 %
CCV1	0L29002-CCV3	Cadmium	1000	991	99	ug/L		+/-10 %
CCV1	0L29002-CCV3	Calcium	50000	49400	99	ug/L		+/-10 %
CCV1	0L29002-CCV3	Chromium	1000	1010	101	ug/L		+/-10 %
CCV1	0L29002-CCV3	Cobalt	1000	972	97	ug/L		+/-10 %
CCV1	0L29002-CCV3	Copper	1000	1010	101	ug/L		+/-10 %
CCV1	0L29002-CCV3	Iron	25000	24700	99	ug/L		+/-10 %
CCV1	0L29002-CCV3	Lead	1000	981	98	ug/L		+/-10 %
CCV1	0L29002-CCV3	Magnesium	50000	50200	100	ug/L		+/-10 %
CCV1	0L29002-CCV3	Manganese	1000	1010	101	ug/L		+/-10 %
CCV1	0L29002-CCV3	Nickel	1000	1000	100	ug/L		+/-10 %
CCV1	0L29002-CCV3	Potassium	50000	48600	97	ug/L		+/-10 %
CCV1	0L29002-CCV3	Selenium	1000	1000	100	ug/L		+/-10 %
CCV1	0L29002-CCV3	Silver	100.0	93.6	94	ug/L		+/-10 %
CCV1	0L29002-CCV3	Sodium	50000	51000	102	ug/L		+/-10 %
CCV1	0L29002-CCV3	Thallium	1000	995	100	ug/L		+/-10 %
CCV1	0L29002-CCV3	Vanadium	1000	999	100	ug/L		+/-10 %
CCV1	0L29002-CCV3	Zinc	1100	1110	101	ug/L		+/-10 %

INITIAL AND CONTINUING CALIBRATION CHECK

EPA 7470A

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Sequence: 0L29003 Instrument ID: V4

Client ID	Lab Sample ID	Analyte	True	Found	%R	Units	Q	Control Limit
ICV	0L29003-ICV1	Mercury	4.000	4.15	104	ug/L		+/-20 %
CCV	0L29003-CCV1	Mercury	5.000	5.41	108	ug/L		+/-20 %
CCV	0L29003-CCV2	Mercury	5.000	5.55	111	ug/L		+/-20 %
CCV	0L29003-CCV3	Mercury	5.000	5.46	109	ug/L		+/-20 %

INITIAL AND CONTINUING CALIBRATION CHECK

EPA 7470A

Client: TETRA TECH

SDG: 1012127

Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Sequence: 0L30006

Instrument ID: V4

Client ID	Lab Sample ID	Analyte	True	Found	%R	Units	Q	Control Limit
ICV	0L30006-ICV1	Mercury	4.000	3.97	99	ug/L		+/-20 %
CCV	0L30006-CCV1	Mercury	5.000	5.21	104	ug/L		+/-20 %
CCV	0L30006-CCV2	Mercury	5.000	5.00	100	ug/L		+/-20 %

LOW LEVEL INITIAL AND CONTINUING CALIBRATION CHECK

EPA 6010C

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Sequence: 0L29002 Instrument ID: P4

Client ID	Lab Sample ID	Analyte	True	Found	%R	Units	Q	QC Limts
LLICV	0L29002-CRL1	Aluminum	200.0	235	117	ug/L		70 - 130
LLICV	0L29002-CRL1	Antimony	30.00	37.8	126	ug/L		70 - 130
LLICV	0L29002-CRL1	Arsenic	10.00	12.6	126	ug/L		70 - 130
LLICV	0L29002-CRL1	Barium	200.0	195	98	ug/L	J	70 - 130
LLICV	0L29002-CRL1	Beryllium	5.000	5.06	101	ug/L		70 - 130
LLICV	0L29002-CRL1	Cadmium	5.000	5.66	113	ug/L		70 - 130
LLICV	0L29002-CRL1	Calcium	5000	4880	98	ug/L	J	70 - 130
LLICV	0L29002-CRL1	Chromium	10.00	11.5	115	ug/L		70 - 130
LLICV	0L29002-CRL1	Cobalt	20.00	20.4	102	ug/L		70 - 130
LLICV	0L29002-CRL1	Copper	5.000	4.88	98	ug/L	J	70 - 130
LLICV	0L29002-CRL1	Iron	200.0	208	104	ug/L		70 - 130
LLICV	0L29002-CRL1	Lead	10.00	10.2	102	ug/L		70 - 130
LLICV	0L29002-CRL1	Magnesium	5000	4870	97	ug/L	J	70 - 130
LLICV	0L29002-CRL1	Manganese	10.00	10.2	102	ug/L		70 - 130
LLICV	0L29002-CRL1	Nickel	10.00	11.5	115	ug/L		70 - 130
LLICV	0L29002-CRL1	Potassium	5000	4530	91	ug/L	J	70 - 130
LLICV	0L29002-CRL1	Selenium	10.00	7.99	80	ug/L	J	70 - 130
LLICV	0L29002-CRL1	Silver	5.000	4.54	91	ug/L	J	70 - 130
LLICV	0L29002-CRL1	Sodium	5000	4720	94	ug/L	J	70 - 130
LLICV	0L29002-CRL1	Thallium	30.00	28.7	96	ug/L	J	70 - 130
LLICV	0L29002-CRL1	Vanadium	20.00	19.7	98	ug/L	J	70 - 130
LLICV	0L29002-CRL1	Zinc	30.00	30.7	102	ug/L		70 - 130
LLCCV	0L29002-CRL2	Aluminum	200.0	239	120	ug/L		70 - 130
LLCCV	0L29002-CRL2	Antimony	30.00	31.7	106	ug/L		70 - 130
LLCCV	0L29002-CRL2	Arsenic	10.00	8.28	83	ug/L	J	70 - 130
LLCCV	0L29002-CRL2	Barium	200.0	196	98	ug/L	J	70 - 130
LLCCV	0L29002-CRL2	Beryllium	5.000	4.90	98	ug/L	J	70 - 130
LLCCV	0L29002-CRL2	Cadmium	5.000	3.84	77	ug/L	J	70 - 130
LLCCV	0L29002-CRL2	Calcium	5000	4810	96	ug/L	J	70 - 130
LLCCV	0L29002-CRL2	Chromium	10.00	9.81	98	ug/L	J	70 - 130
LLCCV	0L29002-CRL2	Cobalt	20.00	21.4	107	ug/L		70 - 130
LLCCV	0L29002-CRL2	Copper	5.000	5.72	114	ug/L		70 - 130
LLCCV	0L29002-CRL2	Iron	200.0	180	90	ug/L	J	70 - 130
LLCCV	0L29002-CRL2	Lead	10.00	10.7	107	ug/L		70 - 130
LLCCV	0L29002-CRL2	Magnesium	5000	4760	95	ug/L	J	70 - 130
LLCCV	0L29002-CRL2	Manganese	10.00	9.77	98	ug/L	J	70 - 130
LLCCV	0L29002-CRL2	Nickel	10.00	10.2	102	ug/L		70 - 130
LLCCV	0L29002-CRL2	Potassium	5000	4530	91	ug/L	J	70 - 130
LLCCV	0L29002-CRL2	Selenium	10.00	9.07	91	ug/L	J	70 - 130
LLCCV	0L29002-CRL2	Silver	5.000	4.91	98	ug/L	J	70 - 130

LOW LEVEL INITIAL AND CONTINUING CALIBRATION CHECK

EPA 6010C

Client: TETRA TECH

SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Sequence: 0L29002

Instrument ID: P4

Client ID	Lab Sample ID	Analyte	True	Found	%R	Units	Q	QC Limts
LLCCV	0L29002-CRL2	Sodium	5000	4480	90	ug/L	J	70 - 130
LLCCV	0L29002-CRL2	Thallium	30.00	28.0	93	ug/L	J	70 - 130
LLCCV	0L29002-CRL2	Vanadium	20.00	19.8	99	ug/L	J	70 - 130
LLCCV	0L29002-CRL2	Zinc	30.00	29.5	98	ug/L	J	70 - 130
LLCCV	0L29002-CRL3	Aluminum	200.0	224	112	ug/L		70 - 130
LLCCV	0L29002-CRL3	Antimony	30.00	37.9	126	ug/L		70 - 130
LLCCV	0L29002-CRL3	Arsenic	10.00	10.2	102	ug/L		70 - 130
LLCCV	0L29002-CRL3	Barium	200.0	196	98	ug/L	J	70 - 130
LLCCV	0L29002-CRL3	Beryllium	5.000	4.88	98	ug/L	J	70 - 130
LLCCV	0L29002-CRL3	Cadmium	5.000	4.51	90	ug/L	J	70 - 130
LLCCV	0L29002-CRL3	Calcium	5000	4870	97	ug/L	J	70 - 130
LLCCV	0L29002-CRL3	Chromium	10.00	12.2	122	ug/L		70 - 130
LLCCV	0L29002-CRL3	Cobalt	20.00	16.2	81	ug/L	J	70 - 130
LLCCV	0L29002-CRL3	Copper	5.000	5.37	107	ug/L		70 - 130
LLCCV	0L29002-CRL3	Iron	200.0	221	110	ug/L		70 - 130
LLCCV	0L29002-CRL3	Lead	10.00	9.96	100	ug/L	J	70 - 130
LLCCV	0L29002-CRL3	Magnesium	5000	4860	97	ug/L	J	70 - 130
LLCCV	0L29002-CRL3	Manganese	10.00	10.2	102	ug/L		70 - 130
LLCCV	0L29002-CRL3	Nickel	10.00	12.0	120	ug/L		70 - 130
LLCCV	0L29002-CRL3	Potassium	5000	4530	91	ug/L	J	70 - 130
LLCCV	0L29002-CRL3	Selenium	10.00	7.80	78	ug/L	J	70 - 130
LLCCV	0L29002-CRL3	Silver	5.000	4.04	81	ug/L	J	70 - 130
LLCCV	0L29002-CRL3	Sodium	5000	5020	100	ug/L		70 - 130
LLCCV	0L29002-CRL3	Thallium	30.00	27.9	93	ug/L	J	70 - 130
LLCCV	0L29002-CRL3	Vanadium	20.00	18.8	94	ug/L	J	70 - 130
LLCCV	0L29002-CRL3	Zinc	30.00	30.6	102	ug/L		70 - 130

BLANKS

EPA 6010C

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Sequence: 0L29002 Instrument ID: P4

Client ID	Lab Sample ID	Analyte	Found	DL	LOD	LOQ	Units	Q	Method
ICB	0L29002-ICB1	Aluminum	-1.57	31.0	100	200	ug/L	U	EPA 6010C
ICB	0L29002-ICB1	Antimony	-2.98	1.97	15.0	30.0	ug/L	J	EPA 6010C
ICB	0L29002-ICB1	Arsenic	-0.869	2.44	5.00	10.0	ug/L	U	EPA 6010C
ICB	0L29002-ICB1	Barium	-0.243	15.2	100	200	ug/L	U	EPA 6010C
ICB	0L29002-ICB1	Beryllium	0.0418	0.723	2.50	5.00	ug/L	U	EPA 6010C
ICB	0L29002-ICB1	Cadmium	0.493	0.635	2.50	5.00	ug/L	U	EPA 6010C
ICB	0L29002-ICB1	Calcium	2.27	122	2500	5000	ug/L	U	EPA 6010C
ICB	0L29002-ICB1	Chromium	-0.563	0.750	5.00	10.0	ug/L	U	EPA 6010C
ICB	0L29002-ICB1	Cobalt	0.275	1.45	10.0	20.0	ug/L	U	EPA 6010C
ICB	0L29002-ICB1	Copper	0.0438	1.00	2.50	5.00	ug/L	U	EPA 6010C
ICB	0L29002-ICB1	Iron	-4.91	12.2	100	200	ug/L	U	EPA 6010C
ICB	0L29002-ICB1	Lead	-0.0713	1.60	5.00	10.0	ug/L	U	EPA 6010C
ICB	0L29002-ICB1	Magnesium	-1.63	7.73	2500	5000	ug/L	U	EPA 6010C
ICB	0L29002-ICB1	Manganese	0.0665	0.164	5.00	10.0	ug/L	U	EPA 6010C
ICB	0L29002-ICB1	Nickel	0.141	0.627	5.00	10.0	ug/L	U	EPA 6010C
ICB	0L29002-ICB1	Potassium	-8.46	30.9	2500	5000	ug/L	U	EPA 6010C
ICB	0L29002-ICB1	Selenium	-0.958	2.01	5.00	10.0	ug/L	U	EPA 6010C
ICB	0L29002-ICB1	Silver	-0.0945	0.637	2.50	5.00	ug/L	U	EPA 6010C
ICB	0L29002-ICB1	Sodium	68.0	156	2500	5000	ug/L	U	EPA 6010C
ICB	0L29002-ICB1	Thallium	-1.71	2.92	15.0	30.0	ug/L	U	EPA 6010C
ICB	0L29002-ICB1	Vanadium	0.860	1.50	10.0	20.0	ug/L	U	EPA 6010C
ICB	0L29002-ICB1	Zinc	-0.465	4.17	15.0	30.0	ug/L	U	EPA 6010C
CCB	0L29002-CCB1	Aluminum	8.14	31.0	100	200	ug/L	U	EPA 6010C
CCB	0L29002-CCB1	Antimony	-0.340	1.97	15.0	30.0	ug/L	U	EPA 6010C
CCB	0L29002-CCB1	Arsenic	0.142	2.44	5.00	10.0	ug/L	U	EPA 6010C
CCB	0L29002-CCB1	Barium	-0.174	15.2	100	200	ug/L	U	EPA 6010C
CCB	0L29002-CCB1	Beryllium	0.0573	0.723	2.50	5.00	ug/L	U	EPA 6010C
CCB	0L29002-CCB1	Cadmium	0.622	0.635	2.50	5.00	ug/L	U	EPA 6010C
CCB	0L29002-CCB1	Calcium	0.393	122	2500	5000	ug/L	U	EPA 6010C
CCB	0L29002-CCB1	Chromium	0.111	0.750	5.00	10.0	ug/L	U	EPA 6010C
CCB	0L29002-CCB1	Cobalt	1.00	1.45	10.0	20.0	ug/L	U	EPA 6010C
CCB	0L29002-CCB1	Copper	0.308	1.00	2.50	5.00	ug/L	U	EPA 6010C
CCB	0L29002-CCB1	Iron	1.05	12.2	100	200	ug/L	U	EPA 6010C
CCB	0L29002-CCB1	Lead	1.55	1.60	5.00	10.0	ug/L	U	EPA 6010C
CCB	0L29002-CCB1	Magnesium	-0.692	7.73	2500	5000	ug/L	U	EPA 6010C
CCB	0L29002-CCB1	Manganese	0.0923	0.164	5.00	10.0	ug/L	U	EPA 6010C
CCB	0L29002-CCB1	Nickel	-0.343	0.627	5.00	10.0	ug/L	U	EPA 6010C
CCB	0L29002-CCB1	Potassium	-1.05	30.9	2500	5000	ug/L	U	EPA 6010C
CCB	0L29002-CCB1	Selenium	-0.0660	2.01	5.00	10.0	ug/L	U	EPA 6010C
CCB	0L29002-CCB1	Silver	0.452	0.637	2.50	5.00	ug/L	U	EPA 6010C

BLANKS

EPA 6010C

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Sequence: 0L29002 Instrument ID: P4

Client ID	Lab Sample ID	Analyte	Found	DL	LOD	LOQ	Units	Q	Method
CCB	0L29002-CCB1	Sodium	187	156	2500	5000	ug/L	J	EPA 6010C
CCB	0L29002-CCB1	Thallium	2.15	2.92	15.0	30.0	ug/L	U	EPA 6010C
CCB	0L29002-CCB1	Vanadium	0.837	1.50	10.0	20.0	ug/L	U	EPA 6010C
CCB	0L29002-CCB1	Zinc	-0.124	4.17	15.0	30.0	ug/L	U	EPA 6010C
PBW	0121903-BLK1	Aluminum		31.0	100	200	ug/L	U	EPA 6010C
PBW	0121903-BLK1	Antimony	3.00	1.97	5.00	30.0	ug/L	J	EPA 6010C
PBW	0121903-BLK1	Arsenic		2.44	5.00	10.0	ug/L	U	EPA 6010C
PBW	0121903-BLK1	Barium		15.2	100	200	ug/L	U	EPA 6010C
PBW	0121903-BLK1	Beryllium		0.723	2.50	5.00	ug/L	U	EPA 6010C
PBW	0121903-BLK1	Cadmium		0.635	2.50	5.00	ug/L	U	EPA 6010C
PBW	0121903-BLK1	Calcium		122	2500	5000	ug/L	U	EPA 6010C
PBW	0121903-BLK1	Chromium		0.750	5.00	10.0	ug/L	U	EPA 6010C
PBW	0121903-BLK1	Cobalt	-1.66	1.45	2.50	20.0	ug/L	J	EPA 6010C
PBW	0121903-BLK1	Copper		1.00	2.50	5.00	ug/L	U	EPA 6010C
PBW	0121903-BLK1	Iron	18.8	12.2	50.0	200	ug/L	J	EPA 6010C
PBW	0121903-BLK1	Lead		1.60	5.00	10.0	ug/L	U	EPA 6010C
PBW	0121903-BLK1	Magnesium		7.73	2500	5000	ug/L	U	EPA 6010C
PBW	0121903-BLK1	Manganese	0.293	0.164	5.00	10.0	ug/L	J	EPA 6010C
PBW	0121903-BLK1	Nickel		0.627	2.50	10.0	ug/L	U	EPA 6010C
PBW	0121903-BLK1	Potassium		30.9	2500	5000	ug/L	U	EPA 6010C
PBW	0121903-BLK1	Selenium		2.01	2.50	10.0	ug/L	U	EPA 6010C
PBW	0121903-BLK1	Silver		0.637	2.50	5.00	ug/L	U	EPA 6010C
PBW	0121903-BLK1	Sodium	636	156	2500	5000	ug/L	J	EPA 6010C
PBW	0121903-BLK1	Thallium		2.92	5.00	30.0	ug/L	U	EPA 6010C
PBW	0121903-BLK1	Vanadium		1.50	10.0	20.0	ug/L	U	EPA 6010C
PBW	0121903-BLK1	Zinc	5.11	4.17	10.0	30.0	ug/L	J	EPA 6010C
CCB	0L29002-CCB2	Aluminum	21.8	31.0	100	200	ug/L	U	EPA 6010C
CCB	0L29002-CCB2	Antimony	2.65	1.97	15.0	30.0	ug/L	J	EPA 6010C
CCB	0L29002-CCB2	Arsenic	-0.344	2.44	5.00	10.0	ug/L	U	EPA 6010C
CCB	0L29002-CCB2	Barium	0.621	15.2	100	200	ug/L	U	EPA 6010C
CCB	0L29002-CCB2	Beryllium	0.322	0.723	2.50	5.00	ug/L	U	EPA 6010C
CCB	0L29002-CCB2	Cadmium	1.35	0.635	2.50	5.00	ug/L	J	EPA 6010C
CCB	0L29002-CCB2	Calcium	8.06	122	2500	5000	ug/L	U	EPA 6010C
CCB	0L29002-CCB2	Chromium	0.164	0.750	5.00	10.0	ug/L	U	EPA 6010C
CCB	0L29002-CCB2	Cobalt	2.26	1.45	10.0	20.0	ug/L	J	EPA 6010C
CCB	0L29002-CCB2	Copper	0.111	1.00	2.50	5.00	ug/L	U	EPA 6010C
CCB	0L29002-CCB2	Iron	7.68	12.2	100	200	ug/L	U	EPA 6010C
CCB	0L29002-CCB2	Lead	1.80	1.60	5.00	10.0	ug/L	J	EPA 6010C
CCB	0L29002-CCB2	Magnesium	16.6	7.73	2500	5000	ug/L	J	EPA 6010C
CCB	0L29002-CCB2	Manganese	0.217	0.164	5.00	10.0	ug/L	J	EPA 6010C

BLANKS

EPA 6010C

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Sequence: 0L29002 Instrument ID: P4

Client ID	Lab Sample ID	Analyte	Found	DL	LOD	LOQ	Units	Q	Method
CCB	0L29002-CCB2	Nickel	0.415	0.627	5.00	10.0	ug/L	U	EPA 6010C
CCB	0L29002-CCB2	Potassium	46.3	30.9	2500	5000	ug/L	J	EPA 6010C
CCB	0L29002-CCB2	Selenium	-2.11	2.01	5.00	10.0	ug/L	J	EPA 6010C
CCB	0L29002-CCB2	Silver	-0.126	0.637	2.50	5.00	ug/L	U	EPA 6010C
CCB	0L29002-CCB2	Sodium	1030	156	2500	5000	ug/L	J	EPA 6010C
CCB	0L29002-CCB2	Thallium	-0.525	2.92	15.0	30.0	ug/L	U	EPA 6010C
CCB	0L29002-CCB2	Vanadium	0.246	1.50	10.0	20.0	ug/L	U	EPA 6010C
CCB	0L29002-CCB2	Zinc	-0.139	4.17	15.0	30.0	ug/L	U	EPA 6010C
CCB1	0L29002-CCB3	Aluminum	8.86	31.0	100	200	ug/L	U	EPA 6010C
CCB1	0L29002-CCB3	Antimony	-4.72	1.97	15.0	30.0	ug/L	J	EPA 6010C
CCB1	0L29002-CCB3	Arsenic	-1.81	2.44	5.00	10.0	ug/L	U	EPA 6010C
CCB1	0L29002-CCB3	Barium	0.149	15.2	100	200	ug/L	U	EPA 6010C
CCB1	0L29002-CCB3	Beryllium	0.263	0.723	2.50	5.00	ug/L	U	EPA 6010C
CCB1	0L29002-CCB3	Cadmium	1.96	0.635	2.50	5.00	ug/L	J	EPA 6010C
CCB1	0L29002-CCB3	Calcium	8.94	122	2500	5000	ug/L	U	EPA 6010C
CCB1	0L29002-CCB3	Chromium	-1.05	0.750	5.00	10.0	ug/L	J	EPA 6010C
CCB1	0L29002-CCB3	Cobalt	5.03	1.45	10.0	20.0	ug/L	J	EPA 6010C
CCB1	0L29002-CCB3	Copper	-1.46	1.00	2.50	5.00	ug/L	J	EPA 6010C
CCB1	0L29002-CCB3	Iron	-16.7	12.2	100	200	ug/L	J	EPA 6010C
CCB1	0L29002-CCB3	Lead	0.868	1.60	5.00	10.0	ug/L	U	EPA 6010C
CCB1	0L29002-CCB3	Magnesium	8.16	7.73	2500	5000	ug/L	J	EPA 6010C
CCB1	0L29002-CCB3	Manganese	0.151	0.164	5.00	10.0	ug/L	U	EPA 6010C
CCB1	0L29002-CCB3	Nickel	-0.329	0.627	5.00	10.0	ug/L	U	EPA 6010C
CCB1	0L29002-CCB3	Potassium	17.4	30.9	2500	5000	ug/L	U	EPA 6010C
CCB1	0L29002-CCB3	Selenium	-0.920	2.01	5.00	10.0	ug/L	U	EPA 6010C
CCB1	0L29002-CCB3	Silver	0.998	0.637	2.50	5.00	ug/L	J	EPA 6010C
CCB1	0L29002-CCB3	Sodium	254	156	2500	5000	ug/L	J	EPA 6010C
CCB1	0L29002-CCB3	Thallium	0.790	2.92	15.0	30.0	ug/L	U	EPA 6010C
CCB1	0L29002-CCB3	Vanadium	1.40	1.50	10.0	20.0	ug/L	U	EPA 6010C
CCB1	0L29002-CCB3	Zinc	-0.391	4.17	15.0	30.0	ug/L	U	EPA 6010C

BLANKS

EPA 7470A

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Sequence: 0L29003 Instrument ID: V4

Client ID	Lab Sample ID	Analyte	Found	DL	LOD	LOQ	Units	Q	Method
ICB	0L29003-ICB1	Mercury	-0.159	0.0910	0.180	0.200	ug/L	*J*	EPA 7470A
CCB	0L29003-CCB1	Mercury	-0.167	0.0910	0.180	0.200	ug/L	*J*	EPA 7470A
PBW	0121904-BLK1	Mercury		0.0910	0.180	0.200	ug/L	*U*	EPA 7470A
CCB	0L29003-CCB2	Mercury	-0.0990	0.0910	0.180	0.200	ug/L	*J*	EPA 7470A
CCB	0L29003-CCB3	Mercury	-0.171	0.0910	0.180	0.200	ug/L	*J*	EPA 7470A

BLANKS

EPA 7470A

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Sequence: 0L30006 Instrument ID: V4

Client ID	Lab Sample ID	Analyte	Found	DL	LOD	LOQ	Units	Q	Method
ICB	0L30006-ICB1	Mercury	0.00	0.0910	0.180	0.200	ug/L	*U*	EPA 7470A
CCB	0L30006-CCB1	Mercury	0.00	0.0910	0.180	0.200	ug/L	*U*	EPA 7470A
PBW	0122902-BLK1	Mercury		0.0910	0.180	0.200	ug/L	*U*	EPA 7470A
CCB	0L30006-CCB2	Mercury	0.00	0.0910	0.180	0.200	ug/L	*U*	EPA 7470A

ICP INTERFERENCE CHECK SAMPLE

EPA 6010C

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Sequence: 0L29002 Instrument ID: P4

Client ID	Lab Sample ID	Analyte	True	Found	%R	Units
ICSA	0L29002-IFA1	Aluminum	244100	249084.50	102	ug/L
ICSA	0L29002-IFA1	Antimony		7.02	15.0	ug/L
ICSA	0L29002-IFA1	Arsenic		-0.29	5.00	ug/L
ICSA	0L29002-IFA1	Barium		2.94	100	ug/L
ICSA	0L29002-IFA1	Beryllium		0.87	2.50	ug/L
ICSA	0L29002-IFA1	Cadmium		0.79	2.50	ug/L
ICSA	0L29002-IFA1	Calcium	234900	254586.20	108	ug/L
ICSA	0L29002-IFA1	Chromium	43.00	45.06	105	ug/L
ICSA	0L29002-IFA1	Cobalt	4.000	1.14	29	ug/L
ICSA	0L29002-IFA1	Copper	23.00	24.03	104	ug/L
ICSA	0L29002-IFA1	Iron	95600	98816.54	103	ug/L
ICSA	0L29002-IFA1	Lead	10.00	12.57	126	ug/L
ICSA	0L29002-IFA1	Magnesium	247500	255799.40	103	ug/L
ICSA	0L29002-IFA1	Manganese	19.00	19.32	102	ug/L
ICSA	0L29002-IFA1	Nickel	21.00	21.99	105	ug/L
ICSA	0L29002-IFA1	Potassium		11.69	2500	ug/L
ICSA	0L29002-IFA1	Selenium		2.83	5.00	ug/L
ICSA	0L29002-IFA1	Silver		0.97	2.50	ug/L
ICSA	0L29002-IFA1	Sodium		1034.46	2500	ug/L
ICSA	0L29002-IFA1	Thallium		13.40	15.0	ug/L
ICSA	0L29002-IFA1	Vanadium		3.31	10.0	ug/L
ICSA	0L29002-IFA1	Zinc	28.00	32.91	118	ug/L
ICSAB	0L29002-IFB1	Aluminum	241100	246740.10	102	ug/L
ICSAB	0L29002-IFB1	Antimony	598.0	638.33	107	ug/L
ICSAB	0L29002-IFB1	Arsenic	101.0	101.86	101	ug/L
ICSAB	0L29002-IFB1	Barium	495.0	535.51	108	ug/L
ICSAB	0L29002-IFB1	Beryllium	475.0	518.68	109	ug/L
ICSAB	0L29002-IFB1	Cadmium	940.0	1030.04	110	ug/L
ICSAB	0L29002-IFB1	Calcium	231400	254518.60	110	ug/L
ICSAB	0L29002-IFB1	Chromium	511.0	561.54	110	ug/L
ICSAB	0L29002-IFB1	Cobalt	461.0	504.16	109	ug/L
ICSAB	0L29002-IFB1	Copper	548.0	539.78	99	ug/L
ICSAB	0L29002-IFB1	Iron	94800	98218.49	104	ug/L
ICSAB	0L29002-IFB1	Lead	61.00	66.43	109	ug/L
ICSAB	0L29002-IFB1	Magnesium	251100	253351.20	101	ug/L
ICSAB	0L29002-IFB1	Manganese	502.0	539.65	108	ug/L
ICSAB	0L29002-IFB1	Nickel	984.0	1064.04	108	ug/L
ICSAB	0L29002-IFB1	Potassium		2.69	2500	ug/L
ICSAB	0L29002-IFB1	Selenium	53.00	55.86	105	ug/L
ICSAB	0L29002-IFB1	Silver	206.0	209.30	102	ug/L

ICP INTERFERENCE CHECK SAMPLE

EPA 6010C

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Sequence: 0L29002 Instrument ID: P4

Client ID	Lab Sample ID	Analyte	True	Found	%R	Units
ICSAB	0L29002-IFB1	Sodium		595.36	2500	ug/L
ICSAB	0L29002-IFB1	Thallium	103.0	118.34	115	ug/L
ICSAB	0L29002-IFB1	Vanadium	494.0	517.24	105	ug/L
ICSAB	0L29002-IFB1	Zinc	1028	1068.32	104	ug/L

*The absence of an entry in the "True" column denotes the lack of a true value for that analyte.The entry in the "%R" column represents a Control Limit, established as +/- the analyte's Limit of Detection (LOD).

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY

EPA 6010C

PZ-159I1S

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Lab ID: 0121903-MS1 % Solid: NA Matrix: Water Lab Source ID: 1012127-01 Source Sample: PZ-159I1

ANALYTE	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC.	Q	QC LIMITS REC.
Aluminum	2000	100 U	1990	99.1		80 - 120
Antimony	500.0	5.10 J	504	99.9		80 - 120
Arsenic	40.00	3.43 J	41.3	94.7		80 - 120
Barium	2000	21.8 J	2050	101		80 - 120
Beryllium	50.00	2.50 U	48.4	96.8		80 - 120
Cadmium	50.00	2.50 U	49.9	99.3		80 - 120
Chromium	200.0	1.43 J	205	102		80 - 120
Cobalt	500.0	2.50 U	490	98.0		80 - 120
Copper	250.0	2.50 U	256	103		80 - 120
Iron	1000	2370	3410	104		80 - 120
Lead	20.00	2.60 J	22.0	97.2		80 - 120
Manganese	500.0	6480	7030	111		80 - 120
Nickel	500.0	0.910 J	511	102		80 - 120
Selenium	10.00	2.17 J	14.5	123	J	80 - 120
Silver	50.00	0.672 J	51.4	102		80 - 120
Thallium	50.00	5.00 U	38.0	76.0	J	80 - 120
Vanadium	500.0	10.0 U	504	101		80 - 120
Zinc	500.0	10.0 U	522	104		80 - 120

ANALYTE	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC. #	% RPD	Q	QC LIMITS RPD	QC LIMITS REC.
Aluminum	2000	1980	98.7	0.427		20	80 - 120
Antimony	500.0	503	99.7	0.206		20	80 - 120
Arsenic	40.00	40.4	92.3	2.50		20	80 - 120
Barium	2000	2040	101	0.422		20	80 - 120
Beryllium	50.00	48.1	96.1	0.689		20	80 - 120
Cadmium	50.00	50.6	101	1.34		20	80 - 120
Chromium	200.0	205	102	0.0946		20	80 - 120
Cobalt	500.0	493	98.6	0.597		20	80 - 120
Copper	250.0	248	99.3	3.17		20	80 - 120
Iron	1000	3410	103	0.361		20	80 - 120

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MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY

EPA 6010C

PZ-159I1SD

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Lab ID: 0121903-MSD1 % Solid: NA Matrix: Water Lab Source ID: 1012127-01 Source Sample: PZ-159I1

ANALYTE	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC. #	% RPD	Q	QC LIMITS RPD	QC LIMITS REC.
Lead	20.00	22.6	100	3.11		20	80 - 120
Manganese	500.0	7080	121	8.48		20	80 - 120
Nickel	500.0	505	101	1.23		20	80 - 120
Selenium	10.00	11.6	94.1	26.9	*	20	80 - 120
Silver	50.00	49.4	97.5	4.07		20	80 - 120
Thallium	50.00	39.6	79.3	4.20	J	20	80 - 120
Vanadium	500.0	504	101	0.104		20	80 - 120
Zinc	500.0	528	105	1.13		20	80 - 120

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY

EPA 7470A

PZ-159I1S

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Lab ID: 0121904-MS1 % Solid: NA Matrix: Water Lab Source ID: 1012127-01 Source Sample: PZ-159I1

ANALYTE	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC.	Q	QC LIMITS REC.
Mercury	1.000	0.180 U	1.05	105		80 - 120

ANALYTE	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC. #	% RPD	Q	QC LIMITS RPD	QC LIMITS REC.
Mercury	1.000	1.06	106	0.9		20	80 - 120

DUPLICATES
EPA 6010C

PZ-159I1D

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Lab ID: 0121903-DUP1 % Solid: NA Matrix: Water Lab Source ID:1012127-01 Source Sample: PZ-159I1

ANALYTE	CONTROL LIMIT	SAMPLE CONCENTRATION (ug/L)	DUPLICATE CONCENTRATION (ug/L)	RPD %	Q	METHOD
Aluminum	20	*100 U*	100 U			EPA 6010C
Antimony	20	*5.10 J*	5.00 U			EPA 6010C
Arsenic	20	*3.43 J*	5.00 U			EPA 6010C
Barium	20	*21.8 J*	22.4 J	2.86		EPA 6010C
Beryllium	20	*2.50 U*	2.50 U			EPA 6010C
Cadmium	20	*2.50 U*	2.50 U			EPA 6010C
Calcium	20	*16800*	17100	1.86		EPA 6010C
Chromium	20	*1.43 J*	2.52 J	55.0 OL		EPA 6010C
Cobalt	20	*2.50 U*	2.50 U			EPA 6010C
Copper	20	*2.50 U*	2.50 U			EPA 6010C
Iron	20	*2370*	2440	2.89		EPA 6010C
Lead	20	*2.60 J*	2.21 J	16.3		EPA 6010C
Magnesium	20	*1180 J*	1220 J	3.91		EPA 6010C
Manganese	20	*6480*	6580	1.47		EPA 6010C
Nickel	20	*0.910 J*	2.50 U			EPA 6010C
Potassium	20	*2710 J*	2760 J	1.65		EPA 6010C
Selenium	20	*2.17 J*	4.71 J	74.0 OL		EPA 6010C
Silver	20	*0.672 J*	0.893 J	28.2 OL		EPA 6010C
Sodium	20	*7240*	7390	2.15		EPA 6010C
Thallium	20	*5.00 U*	5.00 U			EPA 6010C
Vanadium	20	*10.0 U*	10.0 U			EPA 6010C
Zinc	20	*10.0 U*	19.0 J			EPA 6010C

DUPLICATES
EPA 7470A

PZ-159I1D

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Lab ID: 0121904-DUP1 % Solid: NA Matrix: Water Lab Source ID:1012127-01 Source Sample: PZ-159I1

ANALYTE	CONTROL LIMIT	SAMPLE CONCENTRATION (ug/L)	DUPLICATE CONCENTRATION (ug/L)	RPD %	Q	METHOD
Mercury	20	*0.180 U*	0.180 U			EPA 7470A

LCS / LCS DUPLICATE RECOVERY

EPA 6010C

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Lab ID: 0121903-BS1 Matrix: Water Client ID: LCSW Batch: 0121903

ANALYTE	SPIKE ADDED (ug/L)	LCS CONCENTRATION (ug/L)	LCS % REC.	Q	QC LIMITS REC.
Aluminum	20000	20100	101		80 - 120
Antimony	6000	6240	104		80 - 120
Arsenic	1000	995	99.5		80 - 120
Barium	20000	21000	105		80 - 120
Beryllium	500.0	498	99.7		80 - 120
Cadmium	500.0	516	103		80 - 120
Calcium	50000	50500	101		80 - 120
Chromium	1000	1040	104		80 - 120
Cobalt	5000	5050	101		80 - 120
Copper	2500	2580	103		80 - 120
Iron	10000	10100	101		80 - 120
Lead	300.0	307	102		80 - 120
Magnesium	50000	51200	102		80 - 120
Manganese	1500	1540	103		80 - 120
Nickel	4000	4100	103		80 - 120
Potassium	50000	48800	97.6		80 - 120
Selenium	500.0	506	101		80 - 120
Silver	1000	1020	102		80 - 120
Sodium	50000	52100	104		80 - 120
Thallium	1000	1010	101		80 - 120
Vanadium	5000	5130	103		80 - 120
Zinc	2000	2090	104		80 - 120

LCS / LCS DUPLICATE RECOVERY

EPA 7470A

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Lab ID: 0121904-BS1 Matrix: Water Client ID: LCSW Batch: 0121904

ANALYTE	SPIKE ADDED (ug/L)	LCS CONCENTRATION (ug/L)	LCS % REC.	Q	QC LIMITS REC.
Mercury	3.000	3.40	113		80 - 120

LCS / LCS DUPLICATE RECOVERY

EPA 7470A

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Lab ID: 0122902-BS1 Matrix: Water Client ID: LCSW Batch: 0122902

ANALYTE	SPIKE ADDED (ug/L)	LCS CONCENTRATION (ug/L)	LCS % REC.	Q	QC LIMITS REC.
Mercury	3.000	2.64	88		80 - 120

SERIAL DILUTION

EPA 6010C

PZ-159I1L

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Lab ID: 0L29002-SRD1 Matrix: Water Lab Source ID: 1012127-01 Source Sample: PZ-159I1

Sequence: 0L29002 Dilution: 5

Analyte	Initial Sample Result (I)	Serial Dilution Result (S)	% Difference	Q	Method	QC Limits % Difference
Aluminum	100 U	500.00 U			EPA 6010C	10
Antimony	5.10 J	75.00 U			EPA 6010C	10
Arsenic	3.43 J	25.00 U			EPA 6010C	10
Barium	21.78 J	500.00 U			EPA 6010C	10
Beryllium	2.50 U	12.50 U			EPA 6010C	10
Cadmium	2.50 U	12.50 U			EPA 6010C	10
Calcium	16799.00	16758.54	0.241		EPA 6010C	10
Chromium	1.43 J	25.00 U			EPA 6010C	10
Cobalt	2.50 U	50.00 U			EPA 6010C	10
Copper	2.50 U	12.50 U			EPA 6010C	10
Iron	2372.00	2344.85	1.15		EPA 6010C	10
Lead	2.60 J	25.00 U			EPA 6010C	10
Magnesium	1176.60 J	1144.30 J	2.74		EPA 6010C	10
Manganese	6479.30	6451.29	0.432		EPA 6010C	10
Nickel	0.91 J	25.00 U			EPA 6010C	10
Potassium	2713.40 J	2433.34 J	10.3	*	EPA 6010C	10
Selenium	2.17 J	25.00 U			EPA 6010C	10
Silver	0.67 J	12.50 U			EPA 6010C	10
Sodium	7237.40	5128.03 J	29.1 OK	*	EPA 6010C	10
Thallium	5.00 U	75.00 U			EPA 6010C	10
Vanadium	10.0 U	50.00 U			EPA 6010C	10
Zinc	10.0 U	75.00 U			EPA 6010C	10

POST DIGEST SPIKE SAMPLE RECOVERY

EPA 6010C

PZ-159I1A

Laboratory: COMPUCHEM

Client: TETRA TECH

Matrix: Water

SDG: 1012127

Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-

Laboratory ID: 0121903-PS1

Lab Source ID: 1012127-01

Analyte	Spike Sample Result (SSR) (ug/L)	Sample Result (SR) (ug/L)	Spike Added (SA) (ug/L)	%R	Control Limit %R
Aluminum	406	U	400.0	99.3	75 - 125
Antimony	25.6	5.10 J	20.00	103	75 - 125
Arsenic	19.4	3.43 J	20.00	80.0	75 - 125
Barium	426	21.8 J	400.0	101	75 - 125
Beryllium	10.0	U	10.00	100	75 - 125
Cadmium	9.07	U	10.00	88.0	75 - 125
Calcium	26200	16800	10000	94.2	75 - 125
Chromium	22.1	1.43 J	20.00	103	75 - 125
Cobalt	34.2	U	40.00	87.7	75 - 125
Copper	9.62	U	10.00	102	75 - 125
Iron	2460	**2370**	**200.0**	**43.4**	**75 - 125**
Lead	20.2	2.60 J	20.00	88.1	75 - 125
Magnesium	11000	1180 J	10000	98.2	75 - 125
Manganese	6330	**6480**	**20.00**	**-734**	**75 - 125**
Nickel	19.6	0.910 J	20.00	93.2	75 - 125
Potassium	12200	2710 J	10000	94.6	75 - 125
Selenium	22.9	2.17 J	20.00	104	75 - 125
Silver	11.9	0.672 J	10.00	113	75 - 125
Sodium	17900	7240	10000	107	75 - 125
Thallium	14.6	U	20.00	90.1	75 - 125
Vanadium	41.5	U	40.00	102	75 - 125
Zinc	63.4	U	60.00	102	75 - 125

METHOD DETECTION AND REPORTING LIMITS

EPA 6010C

Laboratory: COMPUCHEM **SDG:** 1012127

Client: TETRA TECH **Project:** CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water **Instrument:** P4

Analyte	DL	LOQ	Units	Method
Aluminum	31.000	200.00	ug/L	EPA 6010C
Antimony	1.970	30.00	ug/L	EPA 6010C
Arsenic	2.440	10.00	ug/L	EPA 6010C
Barium	15.200	200.00	ug/L	EPA 6010C
Beryllium	0.723	5.00	ug/L	EPA 6010C
Cadmium	0.635	5.00	ug/L	EPA 6010C
Calcium	122.000	5,000.00	ug/L	EPA 6010C
Chromium	0.750	10.00	ug/L	EPA 6010C
Cobalt	1.450	20.00	ug/L	EPA 6010C
Copper	1.000	5.00	ug/L	EPA 6010C
Iron	12.200	200.00	ug/L	EPA 6010C
Lead	1.600	10.00	ug/L	EPA 6010C
Magnesium	7.730	5,000.00	ug/L	EPA 6010C
Manganese	0.164	10.00	ug/L	EPA 6010C
Nickel	0.627	10.00	ug/L	EPA 6010C
Potassium	30.900	5,000.00	ug/L	EPA 6010C
Selenium	2.010	10.00	ug/L	EPA 6010C
Silver	0.637	5.00	ug/L	EPA 6010C
Sodium	156.000	5,000.00	ug/L	EPA 6010C
Thallium	2.920	30.00	ug/L	EPA 6010C
Vanadium	1.500	20.00	ug/L	EPA 6010C
Zinc	4.170	30.00	ug/L	EPA 6010C

METHOD DETECTION AND REPORTING LIMITS

EPA 7470A

Laboratory: COMPUCHEM **SDG:** 1012127

Client: TETRA TECH **Project:** CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Matrix: Water **Instrument:** V4

Analyte	DL	LOQ	Units	Method
Mercury	0.091	0.20	ug/L	EPA 7470A

ICP-AES AND ICP-MS LINEAR RANGES (QUARTERLY)

Client: TETRA TECH

Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

SDG: 1012127 Instrument: P4

Analyte	Concentration ug/L	LR Date
Aluminum	700000	07/15/2010
Antimony	40000	07/15/2010
Arsenic	20000	07/15/2010
Barium	50000	07/15/2010
Beryllium	5000	07/15/2010
Cadmium	10000	07/15/2010
Calcium	600000	07/15/2010
Chromium	60000	07/15/2010
Cobalt	50000	07/15/2010
Copper	40000	07/15/2010
Iron	700000	07/15/2010
Lead	60000	07/15/2010
Magnesium	700000	07/15/2010
Manganese	20000	07/15/2010
Nickel	60000	07/15/2010
Potassium	100000	07/15/2010
Selenium	40000	07/15/2010
Silver	4000	07/15/2010
Sodium	700000	07/15/2010
Thallium	60000	07/15/2010
Vanadium	50000	07/15/2010
Zinc	60000	07/15/2010

ICP-AES INTERELEMENT CORRECTION FACTORS

Client: TETRA TECH

Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

SDG No.: 1012127 Instrument: P4 Date: 7/15/10

Analyte	Wave-length (nm)	Interelement Correction Factors for:				
		Al	Ca	Fe	Mg	Ag
Aluminum	308.21		0.00011			
Antimony	206.84			0.00004		
Arsenic	189.04					
Barium	493.41					
Beryllium	313.04					
Cadmium	226.50	0.00007		0.00011		
Chromium	267.72					
Cobalt	228.62			0.00007		
Copper	324.70					
Iron	271.44				-0.00107	
Lead	220.35					
Manganese	257.61				0.00003	
Nickel	231.60					
Selenium	196.02					
Silver	328.07					
Sodium	330.23					
Thallium	190.86			0.00097		
Vanadium	292.40			-0.00031		
Zinc	206.20					

Comments:

ICP-AES INTERELEMENT CORRECTION FACTORS

Client: TETRA TECH

Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

SDG No.: 1012127 Instrument: P4 Date: 7/15/10

Analyte	Wave-length (nm)	Interelement Correction Factors for: As	B	Ba	Be	Cd
Aluminum	308.21					
Antimony	206.84					
Arsenic	189.04					
Barium	493.41					
Beryllium	313.04					
Cadmium	226.50					
Chromium	267.72					-0.00037
Cobalt	228.62			0.00020		0.00046
Copper	324.70					
Iron	271.44					
Lead	220.35					
Manganese	257.61					
Nickel	231.60					
Selenium	196.02					
Silver	328.07					
Sodium	330.23					
Thallium	190.86					
Vanadium	292.40					
Zinc	206.20					

Comments:

ICP-AES INTERELEMENT CORRECTION FACTORS

Client: TETRA TECH

Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

SDG No.: 1012127 Instrument: P4 Date: 7/15/10

Analyte	Wave-length (nm)	Interelement Correction Factors for: Co	Cr	Cu	K	Mn
Aluminum	308.21					
Antimony	206.84		0.00185			
Arsenic	189.04		-0.00263			
Barium	493.41					
Beryllium	313.04		0.00006			
Cadmium	226.50	0.00006				
Chromium	267.72					
Cobalt	228.62					
Copper	324.70		0.00170			
Iron	271.44	0.06996	0.00575			
Lead	220.35					
Manganese	257.61					
Nickel	231.60	-0.00145				
Selenium	196.02					
Silver	328.07					
Sodium	330.23					
Thallium	190.86	-0.00053	0.00034			
Vanadium	292.40		-0.00128			
Zinc	206.20		-0.00123			

Comments:

ICP-AES INTERELEMENT CORRECTION FACTORS

Client: TETRA TECH

Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

SDG No.: 1012127 Instrument: P4 Date: 7/15/10

Analyte	Wave-length (nm)	Interelement Correction Factors for:				
		Mo	Na	Ni	Pb	Sb
Aluminum	308.21					
Antimony	206.84					
Arsenic	189.04					
Barium	493.41					
Beryllium	313.04			0.00007		0.00021
Cadmium	226.50	0.00026		0.00011		
Chromium	267.72					
Cobalt	228.62			0.00057		
Copper	324.70					
Iron	271.44					
Lead	220.35					
Manganese	257.61					
Nickel	231.60					
Selenium	196.02					
Silver	328.07					
Sodium	330.23					
Thallium	190.86					0.00079
Vanadium	292.40					
Zinc	206.20					

Comments:

ICP-AES INTERELEMENT CORRECTION FACTORS

Client: TETRA TECH

Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

SDG No.: 1012127 Instrument: P4 Date: 7/15/10

Analyte	Wave-length (nm)	Interelement Correction Factors for:				
		Se	Sn	Ti	Tl	V
Aluminum	308.21			0.01189	0.00261	
Antimony	206.84		-0.00299			
Arsenic	189.04					
Barium	493.41					
Beryllium	313.04			0.00029	0.00008	
Cadmium	226.50					
Chromium	267.72					
Cobalt	228.62			0.00249		
Copper	324.70					
Iron	271.44					
Lead	220.35					
Manganese	257.61					
Nickel	231.60					
Selenium	196.02					
Silver	328.07					
Sodium	330.23					
Thallium	190.86					
Vanadium	292.40					
Zinc	206.20					

Comments:

ICP-AES INTERELEMENT CORRECTION FACTORS

Client: TETRA TECH

Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

SDG No.: 1012127 Instrument: P4 Date: 7/15/10

Analyte	Wave-length (nm)	Interelement Correction Factors for: Zn				
Aluminum	308.21	0.00234				
Antimony	206.84					
Arsenic	189.04					
Barium	493.41					
Beryllium	313.04	0.00007				
Cadmium	226.50					
Chromium	267.72					
Cobalt	228.62					
Copper	324.70					
Iron	271.44					
Lead	220.35					
Manganese	257.61					
Nickel	231.60					
Selenium	196.02					
Silver	328.07					
Sodium	330.23	0.03647				
Thallium	190.86					
Vanadium	292.40					
Zinc	206.20					

Comments:

PREPARATION BATCH SUMMARY

EPA 6010C

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Batch: 0121903 Matrix: Water Preparation: EPA 3010A

SAMPLE NAME	LAB SAMPLE ID	DATE PREPARED	INITIAL VOL/WT (mL)	FINAL VOL/WT (mL)
PBW	0121903-BLK1	12/20/10 11:00	50.0	50.0
LCSW	0121903-BS1	12/20/10 11:00	50.0	50.0
PZ-159I1D	0121903-DUP1	12/20/10 11:00	50.0	50.0
PZ-159I1S	0121903-MS1	12/20/10 11:00	50.0	50.0
PZ-159I1SD	0121903-MSD1	12/20/10 11:00	50.0	50.0
PZ-159I1A	0121903-PS1	12/20/10 11:00	50.0	50.0
PZ-159I1	1012127-01	12/20/10 11:00	50.0	50.0
PZ-157I	1012127-02	12/20/10 11:00	50.0	50.0
PZ-157I1	1012127-03	12/20/10 11:00	50.0	50.0
DUP01-20101214	1012127-04	12/20/10 11:00	50.0	50.0
PZ-159I	1012127-05	12/20/10 11:00	50.0	50.0
PZ-151I1	1012127-06	12/20/10 11:00	50.0	50.0
PZ-155I	1012127-07	12/20/10 11:00	50.0	50.0
PZ-160I	1012127-08	12/20/10 11:00	50.0	50.0

PREPARATION BATCH SUMMARY

EPA 7470A

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Batch: 0121904 Matrix: Water Preparation: EPA 7470A Prep

SAMPLE NAME	LAB SAMPLE ID	DATE PREPARED	INITIAL VOL/WT (mL)	FINAL VOL/WT (mL)
PBW	0121904-BLK1	12/20/10 11:00	100	100
LCSW	0121904-BS1	12/20/10 11:00	100	100
PZ-159I1D	0121904-DUP1	12/20/10 11:00	100	100
PZ-159I1S	0121904-MS1	12/20/10 11:00	100	100
PZ-159I1SD	0121904-MSD1	12/20/10 11:00	100	100
PZ-159I1	1012127-01	12/20/10 11:00	100	100
PZ-157I	1012127-02	12/20/10 11:00	100	100
PZ-157I1	1012127-03	12/20/10 11:00	100	100
DUP01-20101214	1012127-04	12/20/10 11:00	100	100
PZ-151I1	1012127-06	12/20/10 11:00	100	100
PZ-155I	1012127-07	12/20/10 11:00	100	100
PZ-160I	1012127-08	12/20/10 11:00	100	100

PREPARATION BATCH SUMMARY

EPA 7470A

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Batch: 0122902 Matrix: Water Preparation: EPA 7470A Prep

SAMPLE NAME	LAB SAMPLE ID	DATE PREPARED	INITIAL VOL/WT (mL)	FINAL VOL/WT (mL)
PBW	0122902-BLK1	12/29/10 14:35	100	100
LCSW	0122902-BS1	12/29/10 14:35	100	100
PZ-159I	1012127-05	12/29/10 14:35	100	100

ANALYSIS SEQUENCE SUMMARY

EPA 6010C

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Sequence: 0L29002 Instrument: P4

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
S0	0L29002-CAL1	P41228Z_P-001	12/28/10 14:57:24
S	0L29002-CAL2	P41228Z_P-002	12/28/10 15:04:37
S	0L29002-CAL4	P41228Z_P-003	12/28/10 15:11:50
S	0L29002-CAL3	P41228Z_P-004	12/28/10 15:17:31
S	0L29002-CAL5	P41228Z_P-005	12/28/10 15:23:58
LLICV	0L29002-CRL1	P41228Z_P-006	12/28/10 15:29:37
ICV	0L29002-ICV1	P41228Z_P-007	12/28/10 15:36:50
ICB	0L29002-ICB1	P41228Z_P-008	12/28/10 15:44:03
ICSA	0L29002-IFA1	P41228Z_P-009	12/28/10 15:51:16
ICSAB	0L29002-IFB1	P41228Z_P-010	12/28/10 15:58:28
LLCCV	0L29002-CRL2	P41228Z_P-011	12/28/10 16:05:41
CCV	0L29002-CCV1	P41228Z_P-012	12/28/10 16:12:54
CCB	0L29002-CCB1	P41228Z_P-013	12/28/10 16:20:08
LRS DOD	0L29002-LCV1	P41228Z_P-014	12/28/10 16:33:28
PBW	0121903-BLK1	P41228Z_P-015	12/28/10 16:40:41
LCSW	0121903-BS1	P41228Z_P-016	12/28/10 16:47:54
PZ-159I1	1012127-01	P41228Z_P-017	12/28/10 16:55:06
PZ-159I1D	0121903-DUP1	P41228Z_P-018	12/28/10 17:02:19
PZ-159I1S	0121903-MS1	P41228Z_P-019	12/28/10 17:09:31
PZ-159I1SD	0121903-MSD1	P41228Z_P-020	12/28/10 17:16:44
PZ-159I1L	0L29002-SRD1	P41228Z_P-021	12/28/10 17:23:56
PZ-159I1A	0121903-PS1	P41228Z_P-022	12/28/10 17:31:08
PZ-157I	1012127-02	P41228Z_P-023	12/28/10 17:38:21
CCV	0L29002-CCV2	P41228Z_P-024	12/28/10 17:45:34
CCB	0L29002-CCB2	P41228Z_P-025	12/28/10 17:52:48
PZ-157I1	1012127-03	P41228Z_P-026	12/28/10 18:00:01
DUP01-20101214	1012127-04	P41228Z_P-027	12/28/10 18:07:14
PZ-159I	1012127-05	P41228Z_P-028	12/28/10 18:14:26
PZ-151I1	1012127-06	P41228Z_P-029	12/28/10 18:21:39
PZ-155I	1012127-07	P41228Z_P-030	12/28/10 18:28:52
PZ-160I	1012127-08	P41228Z_P-031	12/28/10 18:36:05
LLCCV	0L29002-CRL3	P41228Z_P-033	12/28/10 18:50:31

ANALYSIS SEQUENCE SUMMARY

EPA 6010C

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Sequence: 0L29002 Instrument: P4

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
CCV1	0L29002-CCV3	P41228Z_P-034	12/28/10 18:57:44
CCB1	0L29002-CCB3	P41228Z_P-035	12/28/10 19:04:58

ANALYSIS SEQUENCE SUMMARY

EPA 7470A

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Sequence: 0L29003 Instrument: V4

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
S0	0L29003-CAL1	V412210D_P-001	12/21/10 11:36:33
S0.2	0L29003-CAL2	V412210D_P-002	12/21/10 11:38:41
S0.5	0L29003-CAL3	V412210D_P-003	12/21/10 11:40:52
S1.0	0L29003-CAL4	V412210D_P-004	12/21/10 11:42:53
S5.0	0L29003-CAL5	V412210D_P-005	12/21/10 11:44:52
S10.0	0L29003-CAL6	V412210D_P-006	12/21/10 11:46:55
ICV	0L29003-ICV1	V412210D_P-007	12/21/10 11:49:07
ICB	0L29003-ICB1	V412210D_P-008	12/21/10 11:51:07
CCV	0L29003-CCV1	V412210D_P-009	12/21/10 11:53:06
CCB	0L29003-CCB1	V412210D_P-010	12/21/10 11:55:10
PBW	0121904-BLK1	V412210D_P-011	12/21/10 11:57:08
LCSW	0121904-BS1	V412210D_P-012	12/21/10 11:59:18
PZ-159I1	1012127-01	V412210D_P-013	12/21/10 12:01:15
PZ-159I1D	0121904-DUP1	V412210D_P-014	12/21/10 12:03:15
PZ-159I1S	0121904-MS1	V412210D_P-015	12/21/10 12:05:13
PZ-159I1SD	0121904-MSD1	V412210D_P-016	12/21/10 12:07:12
PZ-157I	1012127-02	V412210D_P-018	12/21/10 12:11:30
PZ-157I1	1012127-03	V412210D_P-019	12/21/10 12:13:39
DUP01-20101214	1012127-04	V412210D_P-020	12/21/10 12:15:40
CCV	0L29003-CCV2	V412210D_P-021	12/21/10 12:17:39
CCB	0L29003-CCB2	V412210D_P-022	12/21/10 12:19:48
PZ-151I1	1012127-06	V412210D_P-023	12/21/10 12:21:48
PZ-155I	1012127-07	V412210D_P-024	12/21/10 12:24:21
PZ-160I	1012127-08	V412210D_P-025	12/21/10 12:26:21
CCV	0L29003-CCV3	V412210D_P-026	12/21/10 12:28:30
CCB	0L29003-CCB3	V412210D_P-027	12/21/10 12:30:32

ANALYSIS SEQUENCE SUMMARY

EPA 7470A

Client: TETRA TECH SDG: 1012127 Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057

Sequence: 0L30006 Instrument: V4

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
S0	0L30006-CAL1	V412300B_P-001	12/30/10 10:15:38
S0.2	0L30006-CAL2	V412300B_P-002	12/30/10 10:17:38
S0.5	0L30006-CAL3	V412300B_P-003	12/30/10 10:19:37
S1.0	0L30006-CAL4	V412300B_P-004	12/30/10 10:21:38
S5.0	0L30006-CAL5	V412300B_P-005	12/30/10 10:23:38
S10.0	0L30006-CAL6	V412300B_P-006	12/30/10 10:25:40
ICV	0L30006-ICV1	V412300B_P-007	12/30/10 10:27:44
ICB	0L30006-ICB1	V412300B_P-008	12/30/10 10:29:53
CCV	0L30006-CCV1	V412300B_P-010	12/30/10 10:33:54
CCB	0L30006-CCB1	V412300B_P-011	12/30/10 10:35:52
PBW	0122902-BLK1	V412300B_P-018	12/30/10 10:51:07
LCSW	0122902-BS1	V412300B_P-019	12/30/10 10:53:05
PZ-159I	1012127-05	V412300B_P-020	12/30/10 10:55:07
CCV	0L30006-CCV2	V412300B_P-021	12/30/10 10:57:16
CCB	0L30006-CCB2	V412300B_P-022	12/30/10 10:59:16

ANALYSIS REPORT 12/28/10 05:02:16 PM PAGE 1

METHOD: ALT-P4Q3 SAMPLE NAME: 1012127-01 OPERATOR:
RUN TIME: 12/28/10 16:55:06
COMMENT: SDG:1012127 CLIENTID:PZ-159I1 1:1
MODE: CONC CORR. FACTOR: 1

Sample PZ-159I1

arsenic rep result 3.43ug/L

ELEM	AG3280	AL3082	BA4934	BE3130	CA3179	CD2265	CO2286
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
AVGE	.6720218	8.865058	21.77831	.0070114	16799.03	.2729652	-.849935
SDEV	.4288461	10.37115	.08559	.0408983	23.15	.6578281	1.860561
%RSD	63.81430	116.9891	.3930098	583.3092	.1378123	240.9934	218.9063
#1	1.155037	20.42018	21.78592	.0519400	16774.62	.6466453	.9037724
#2	.3360109	5.811499	21.85984	-.002854	16820.67	.6588469	-.652047
#3	.5250170	.3634960	21.68917	-.028052	16801.80	-.486597	-2.80153
ERRORS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS
HIGH	4000.000	700000.0	50000.00	5000.000	600000.0	10000.00	50000.00
LOW	-4000.00	-700000.	-50000.0	-5000.00	-600000.	-10000.0	-50000.0

ELEM	CR2677	CU3247	FE2714	K_7664	MG2790	MN2576	NA3302
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
AVGE	1.430744	-.602419	2372.041	2713.425	1176.568	6479.289	7237.391
SDEV	.324112	.170707	23.833	11.063	5.854	15.309	245.408
%RSD	22.65342	28.33691	1.004742	.4077259	.4975789	.2362690	3.390833
#1	1.750113	-.491537	2381.617	2703.791	1180.809	6496.898	7134.881
#2	1.440030	-.516723	2389.597	2725.508	1179.008	6469.151	7059.858
#3	1.102088	-.798998	2344.910	2710.975	1169.889	6471.816	7517.434
ERRORS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS
HIGH	60000.00	40000.00	700000.0	100000.0	700000.0	20000.00	700000.0
LOW	-60000.0	-40000.0	-700000.	-100000.	-700000.	-20000.0	-700000.

ELEM	NI2316	TL1908	V_2924	ZN2062	PB2203	SE1960	SB2068
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
AVGE	.9103385	-3.37026	.4868195	2.341995	2.600564	2.166558	5.097124
SDEV	.5150194	2.06553	.2361546	.218291	.723040	3.380427	3.472477
%RSD	56.57449	61.28695	48.50969	9.320742	27.80318	156.0275	68.12620
#1	1.426285	-1.06256	.7134453	2.552259	1.766215	-1.55065	6.763843
#2	.3962515	-4.00226	.2421690	2.357248	2.991624	2.993623	7.422028
#3	.9084789	-5.04595	.5048441	2.116477	3.043854	5.056699	1.105500
ERRORS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS	LC PASS
HIGH	60000.00	60000.00	50000.00	60000.00	60000.00	40000.00	40000.00
LOW	-60000.0	-60000.0	-50000.0	-60000.0	-60000.0	-40000.0	-40000.0

ELEM	AS1890	22031	22032	19601	19602	SN1899	BI2230
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
AVGE	3.434028	-1.51176	4.651618	-5.86967	6.177176	-3.76508	-1.46059
SDEV	3.300267	3.87611	.998614	8.29486	1.678114	2.43230	6.14877
%RSD	96.10486	256.3966	21.46809	141.3173	27.16635	64.60157	420.9781
#1	7.244842	-5.75110	5.517206	-15.4477	5.385982	-6.11296	-8.55358
#2	1.522783	1.850978	3.559053	-1.11009	5.040921	-3.92593	2.358868
#3	1.534458	-.635166	4.878594	-1.05124	8.104627	-1.25635	1.812938
ERRORS	LC PASS	NOCHECK	NOCHECK	NOCHECK	NOCHECK	LC PASS	LC PASS
HIGH	20000.00					40000.00	40000.00
LOW	-20000.0					-40000.0	-40000.0

ELEM	MO2020	TI3349	Y_3710
UNITS	UG/L	UG/L	PPM
AVGE	-2.26078	-.263454	8311.178
SDEV	.74619	.101551	55.988
%RSD	33.00613	38.54606	.6736476
#1	-1.40008	-.173137	8291.267
#2	-2.65643	-.373380	8267.866
#3	-2.72583	-.243847	8374.399
ERRORS	LC PASS	LC PASS	NOCHECK
HIGH	20000.00	40000.00	
LOW	-20000.0	-40000.0	

CompuChem

A Division Of

Liberty Analytical Corp.

SDG NARRATIVE
SDG # 1012127
CTO-WE08/112G02750.PT.PT/N62467-04-D-0057
PM: DAVE BRAYACK

The 9 aqueous samples were received intact and refrigerated with proper documentations in sealed shipping containers, on December 16th & 17th, 2010. The samples were scheduled for the requested analyses of the Wet Chemistry fraction. The samples were analyzed, in accordance with current EPA methods, for the analytes requested as per the COC, with the exceptions and/or additions requested by the client.

SAMPLE IDs:

The cover page contained in this package lists the client ID's and the associated CompuChem numbers which are part of this SDG.

INSTRUMENTAL QUALITY CONTROL:

All calibration verification solutions (ICV & CCV), blanks (ICB, & CCB), associated with this data were confirmed to be within allowable limits.

SAMPLE PREPARATION QUALITY CONTROL:

The sample preparation procedure verifications (LCS & Blank) were found to be within acceptable ranges. All field samples were prepared and analyzed within the contract specified holding times.

MATRIX RELATED QUALITY CONTROL:

PZ-159I1 *(1012127-09)* was used to prepare the matrix spike and matrix spike duplicate for IC 300 Anions. The associated spikes were found to be within control limits.

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Furthermore, I certify that the tests used in this report meet all requirements of the NELAC standards unless otherwise stated in the SDG narrative or QA notice. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on diskette has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Joseph Mohn
Wet Chemistry Supervisor
December 29th, 2010

CompuChem
A Division Of
Liberty Analytical Corp.

TETRA TECH	Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057	
5700 LAKE WRIGHT ROAD	Project Number: CTO-WE08/112G02750.PT.PT/N62467-04-D-00	**Reported:**
NORFOLK VA, 23502	Project Manager: DAVE BRAYACK	12/28/2010 18:04

INORGANIC ANIONS BY IC - Quality Control

COMPUCHEM

Analyte	Result		Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0121718 - NO PREP											
Blank (0121718-BLK1)					Prepared: 12/16/2010 16:00 Analyzed: 12/16/2010 16:00						
Chloride	ND	U	4.00	mg/L							
Fluoride	ND	U	0.400	mg/L							
Nitrate as N	ND	U	0.400	mg/L							
Nitrite as N	ND	U	0.400	mg/L							
LCS (0121718-BS1)					Prepared: 12/16/2010 16:17 Analyzed: 12/16/2010 16:17						
Nitrite as N	2.56		0.400	mg/L	2.500		103	90-110		20	
Chloride	26.1		4.00	mg/L	25.00		104	90-110		20	
Fluoride	2.74		0.400	mg/L	2.500		110	90-110		20	
Nitrate as N	2.63		0.400	mg/L	2.500		105	90-110		20	
LCS Dup (0121718-BSD1)					Prepared: 12/16/2010 16:33 Analyzed: 12/16/2010 16:33						
Fluoride	2.74		0.400	mg/L	2.500		110	90-110	0.1	20	
Nitrate as N	2.62		0.400	mg/L	2.500		105	90-110	0.4	20	
Nitrite as N	2.56		0.400	mg/L	2.500		103	90-110	0	20	
Chloride	25.9		4.00	mg/L	25.00		104	90-110	0.7	20	
Batch 0121719 - NO PREP											
Blank (0121719-BLK1)					Prepared: 12/17/2010 18:09 Analyzed: 12/17/2010 18:09						
Nitrate as N	ND	U	0.400	mg/L							
Fluoride	ND	U	0.400	mg/L							
Chloride	ND	U	4.00	mg/L							
Nitrite as N	ND	U	0.400	mg/L							
LCS (0121719-BS1)					Prepared: 12/17/2010 18:25 Analyzed: 12/17/2010 18:25						
Nitrate as N	2.42		0.400	mg/L	2.500		97	90-110		20	
Fluoride	2.50		0.400	mg/L	2.500		100	90-110		20	
Chloride	24.1		4.00	mg/L	25.00		96	90-110		20	
Nitrite as N	2.44		0.400	mg/L	2.500		98	90-110		20	

COMPUCHEM

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Joe Mohn For Cathy Dover, Project Manager

CompuChem
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Liberty Analytical Corp.

TETRA TECH	Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057	
5700 LAKE WRIGHT ROAD	Project Number: CTO-WE08/112G02750.PT.PT/N62467-04-D-00.	**Reported:**
NORFOLK VA, 23502	Project Manager: DAVE BRAYACK	12/28/2010 18:04

INORGANIC ANIONS BY IC - Quality Control

COMPUCHEM

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0121719 - NO PREP										
Matrix Spike (0121719-MS1)		**Source: 1012127-09**		Prepared: 12/17/2010 18:58 Analyzed: 12/17/2010 18:58						
Chloride	25.2	4.00	mg/L	20.00	3.54	108	90-110		20	
Fluoride	2.38	0.400	mg/L	2.500	0.00	95	90-110		20	
Nitrate as N	2.37	0.400	mg/L	2.500	0.00	95	90-110		20	
Nitrite as N	2.43	0.400	mg/L	2.500	0.00	97	90-110		20	
Matrix Spike Dup (0121719-MSD1)		**Source: 1012127-09**		Prepared: 12/17/2010 19:15 Analyzed: 12/17/2010 19:15						
Fluoride	2.45	0.400	mg/L	2.500	0.00	98	90-110	3	20	
Chloride	25.6	4.00	mg/L	20.00	3.54	110	90-110	1	20	
Nitrite as N	2.49	0.400	mg/L	2.500	0.00	99	90-110	2	20	
Nitrate as N	2.42	0.400	mg/L	2.500	0.00	97	90-110	2	20	

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Joe Mohn For Cathy Dover, Project Manager

CompuChem
A Division Of
Liberty Analytical Corp.

TETRA TECH	Project: CTO-WE08/112G02750.PT.PT/N62467-04-D-0057	
5700 LAKE WRIGHT ROAD	Project Number: CTO-WE08/112G02750.PT.PT/N62467-04-D-00	**Reported:**
NORFOLK VA, 23502	Project Manager: DAVE BRAYACK	12/28/2010 18:04

WET CHEMISTRY PARAMETERS - Quality Control

COMPUCHEM

Analyte	Result		Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0122010 - NO PREP											
Blank (0122010-BLK1)					Prepared: 12/21/2010 11:00 Analyzed: 12/21/2010 11:00						
Sulfide, total	ND	U	1.00	mg/L							
LCS (0122010-BS1)					Prepared: 12/21/2010 11:00 Analyzed: 12/21/2010 11:00						
Sulfide, total	10.0		1.00	mg/L	10.00		100	90-110			
LCS Dup (0122010-BSD1)					Prepared: 12/21/2010 11:00 Analyzed: 12/21/2010 11:00						
Sulfide, total	10.0		1.00	mg/L	10.00		100	90-110	0.00	20	
Batch 0122011 - NO PREP											
Blank (0122011-BLK1)					Prepared: 12/20/2010 10:38 Analyzed: 12/28/2010 14:10						
Total Organic Carbon	ND	U	1.00	mg/L							
LCS (0122011-BS1)					Prepared: 12/20/2010 10:38 Analyzed: 12/28/2010 14:18						
Total Organic Carbon	72.8		1.00	mg/L	75.00		97.0	90-110			
LCS Dup (0122011-BSD1)					Prepared: 12/20/2010 10:38 Analyzed: 12/28/2010 14:24						
Total Organic Carbon	74.9		1.00	mg/L	75.00		99.9	90-110	2.90	20	

COMPUCHEM

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Joe Mohn For Cathy Dover, Project Manager

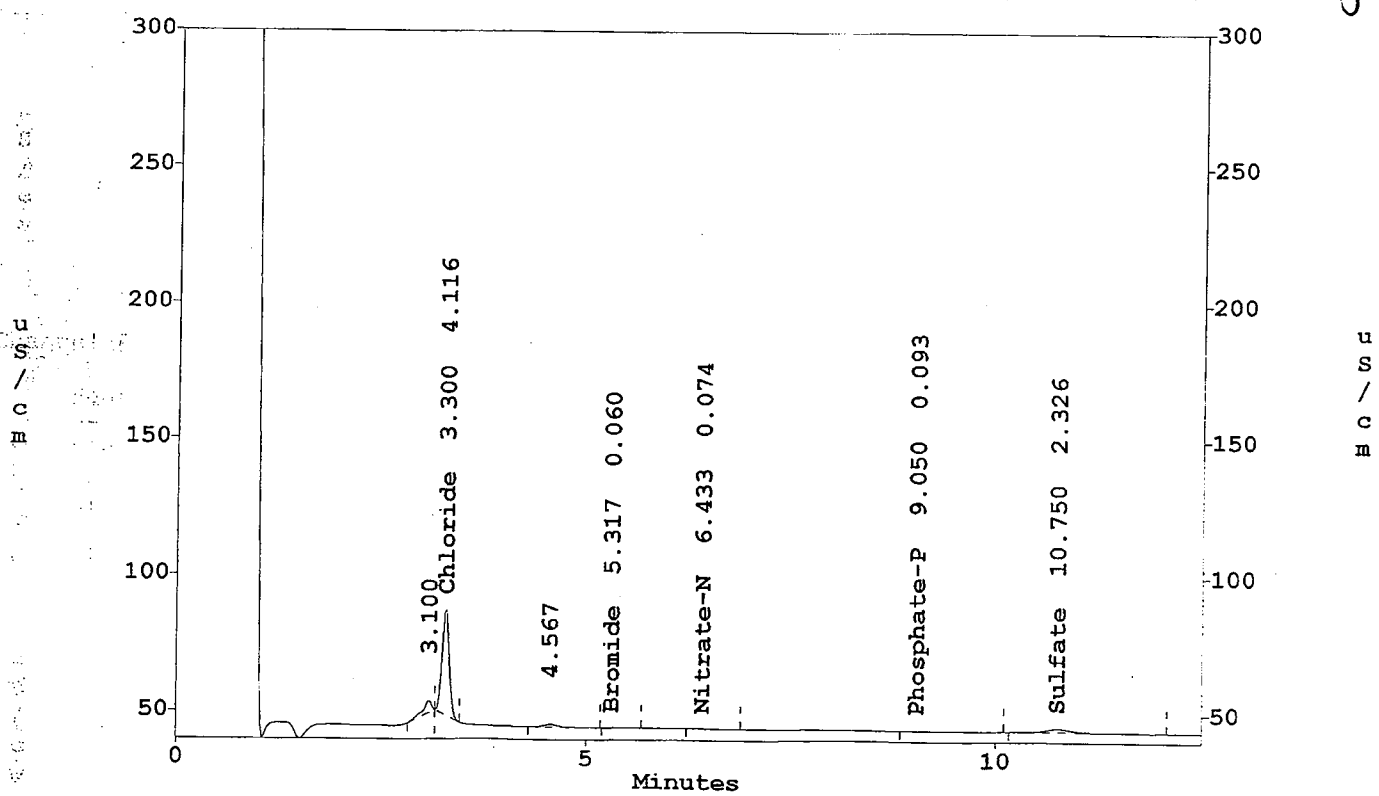
Lachat IC 5000 Report
CompuChem - A Division of Liberty Analytical
File : C:\OMNIONIC\data\121610a.003
Sample ID : 1010127-02
Acquired : Dec 16, 2010 15:27:40
User : 2477

Channel A Results

Peak Name	Results mg/L	Ret. Time	Pk. Area	Pk. Ht.
Fluoride	0.000	2.300	0.0	0.0
Chloride	4.116	3.300	2346949.0	389231.0
Nitrite-N	0.000	4.000	0.0	0.0
Bromide	0.060	5.317	4462.0	341.0
Nitrate-N	0.074	6.433	16422.0	1025.0
Phosphate-P	0.093	9.050	14796.0	440.0
Sulfate	2.326	10.750	271300.0	11954.0

Sample 157I
Nitrate rep result 0.0740 mg/L
Chloride rep result 4.12 mg/L

C:\OMNIONIC\data\121610a.003 -- Channel A



2340 Stock Creek Blvd.
Rockford TN 37853-3044
Phone: (865) 573-8188
Fax: (865) 573-8133
Email: info@microbe.com

Client: David Brayack
Tetra Tech , Inc.
5700 Lake Wright Drive
Twin Oaks I, Suite 309
Norfolk, VA 23502

Phone: 757.461.3824

Fax: 757.461.4148

Identifier: 058HL **Date Rec:** 12/15/2010 **Report Date:** 12/29/2010

Client Project #: 112G02750 **Client Project Name:** NWIRP Calverton EIAB

Purchase Order #: CTO WE08

Analysis Requested: CENSUS

Reviewed By:

Anita Biernacki

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MICROBIAL INSIGHTS, INC.

2340 Stock Creek Blvd. Rockford, TN 37853-3044
Tel. (865) 573-8188 Fax. (865) 573-8133

CENSUS

Client: **Tetra Tech , Inc.**
Project: NWIRP Calverton EIAB

MI Project Number: **058HL**
Date Received: 12/15/2010

Sample Information

Client Sample ID:	**SA-PZ-159I1-20101214**	**SA-PZ-157I-20101214**
Sample Date:	12/14/2010	12/14/2010
Units:	cells/mL	cells/mL
Analyst:	CT	CT

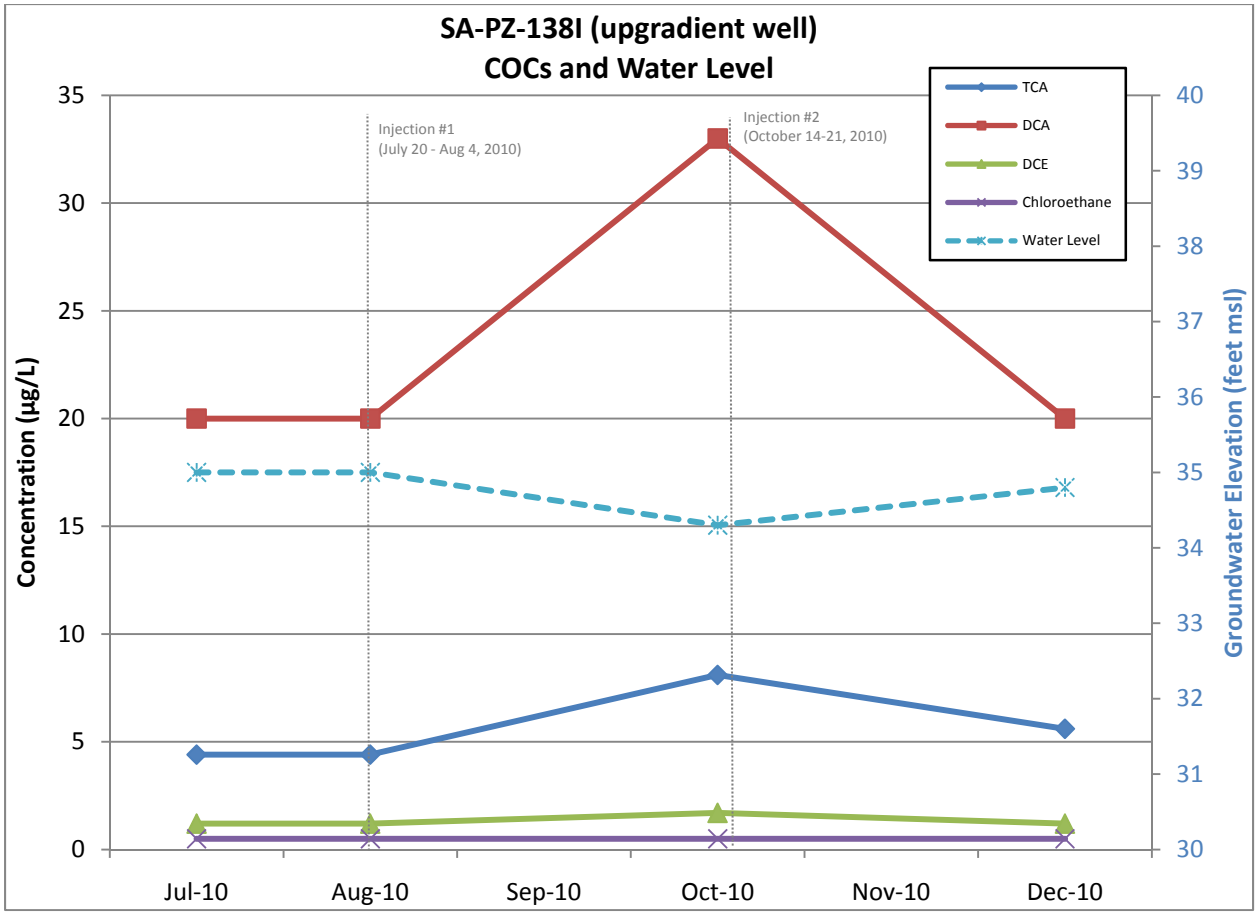
Dechlorinating Bacteria

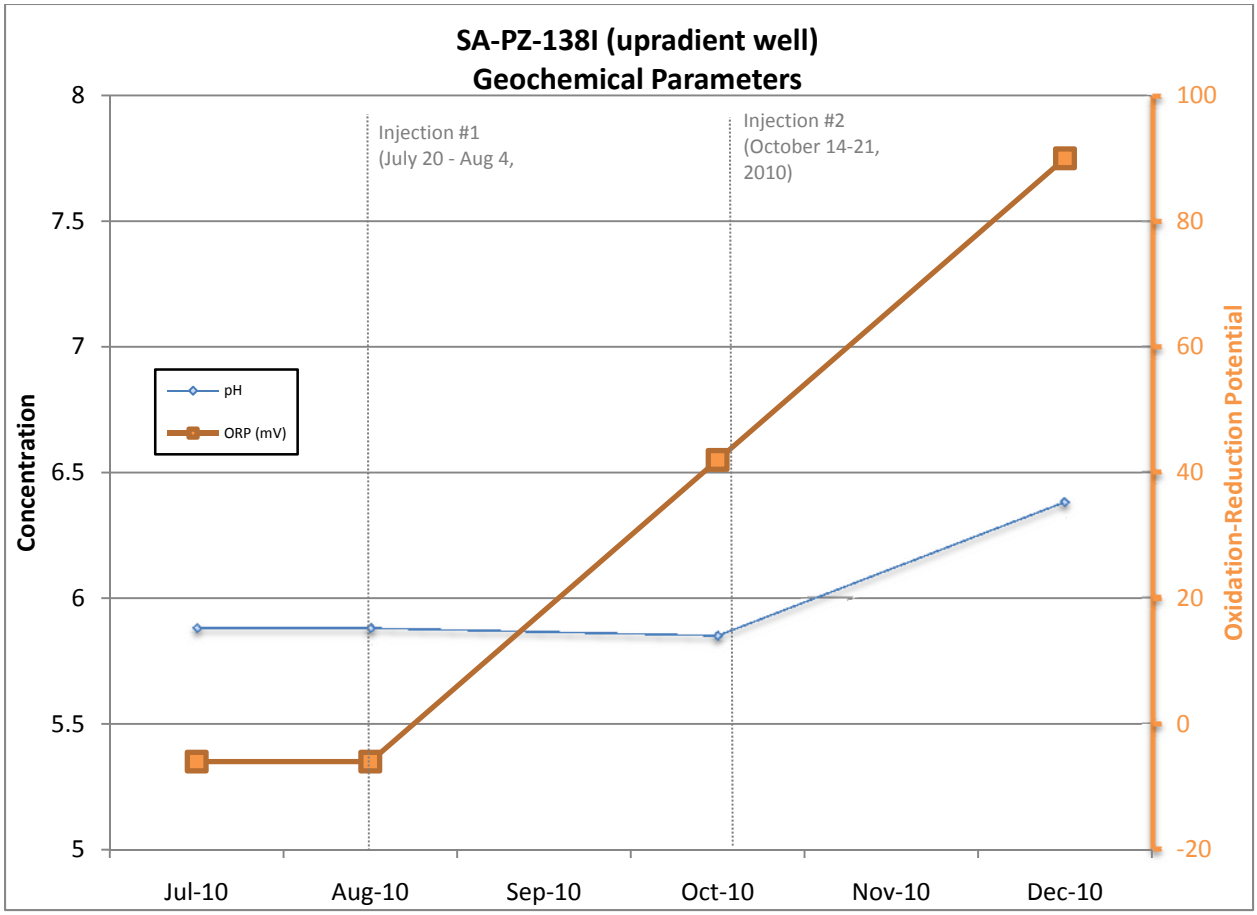
Dehalococcoides spp.	DHC	**1.23E+01**	**1.60E+00**
Dehalobacter spp.	DHB	**1.54E+01**	**4.04E+01**

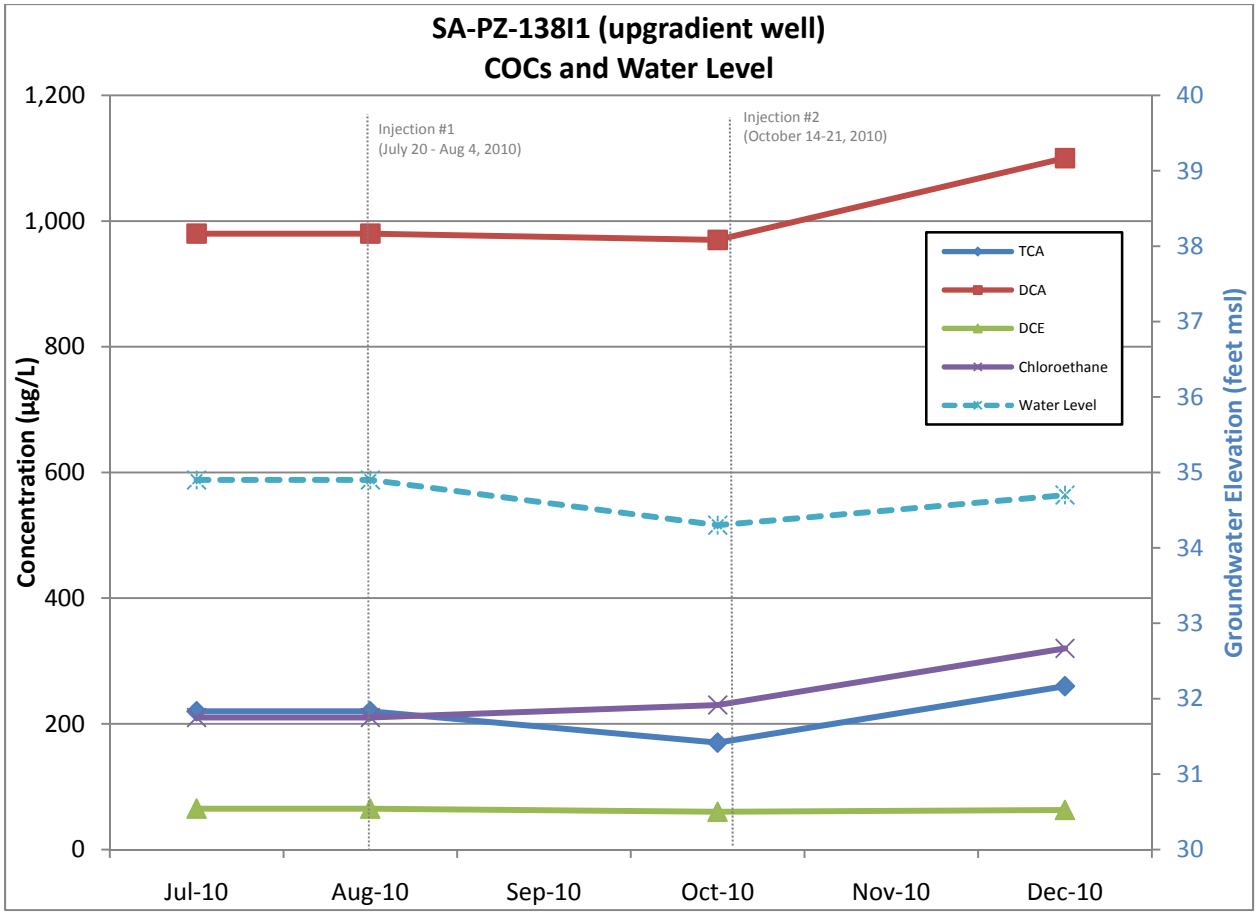
Legend:
NA = Not Analyzed NS = Not Sampled J = Estimated gene copies below PQL but above LQL I = Inhibited
< = Result not detected

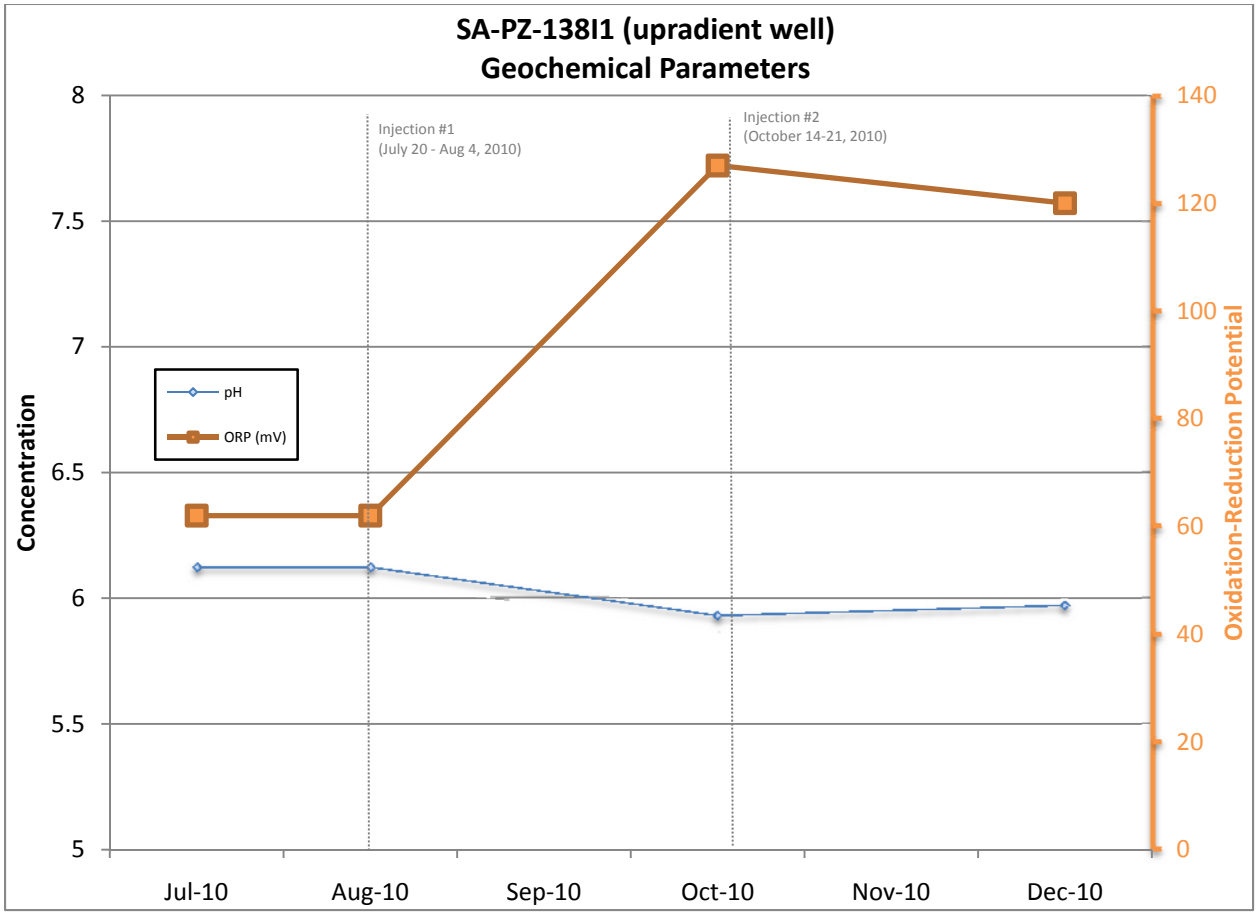
ATTACHMENT C-8

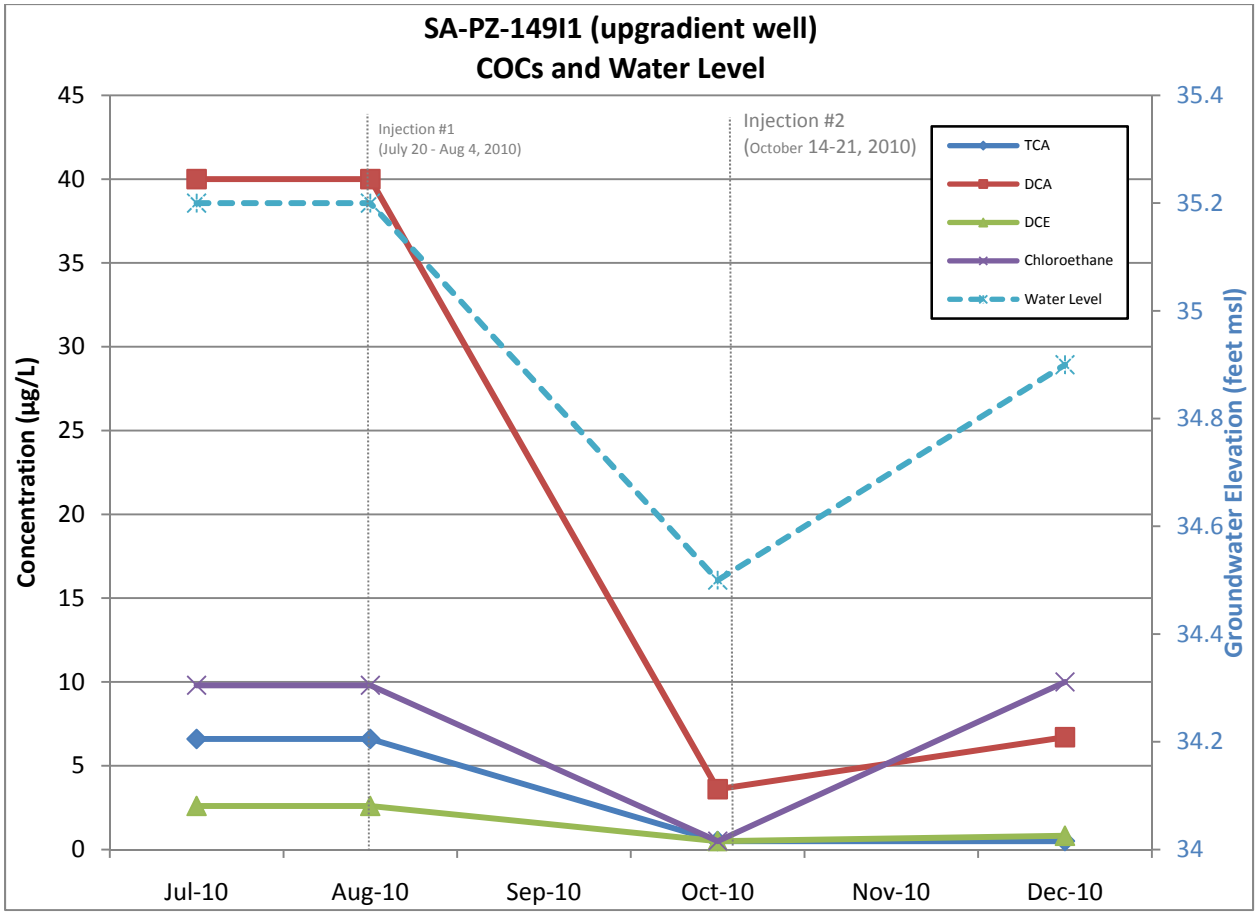
DATA GRAPHS

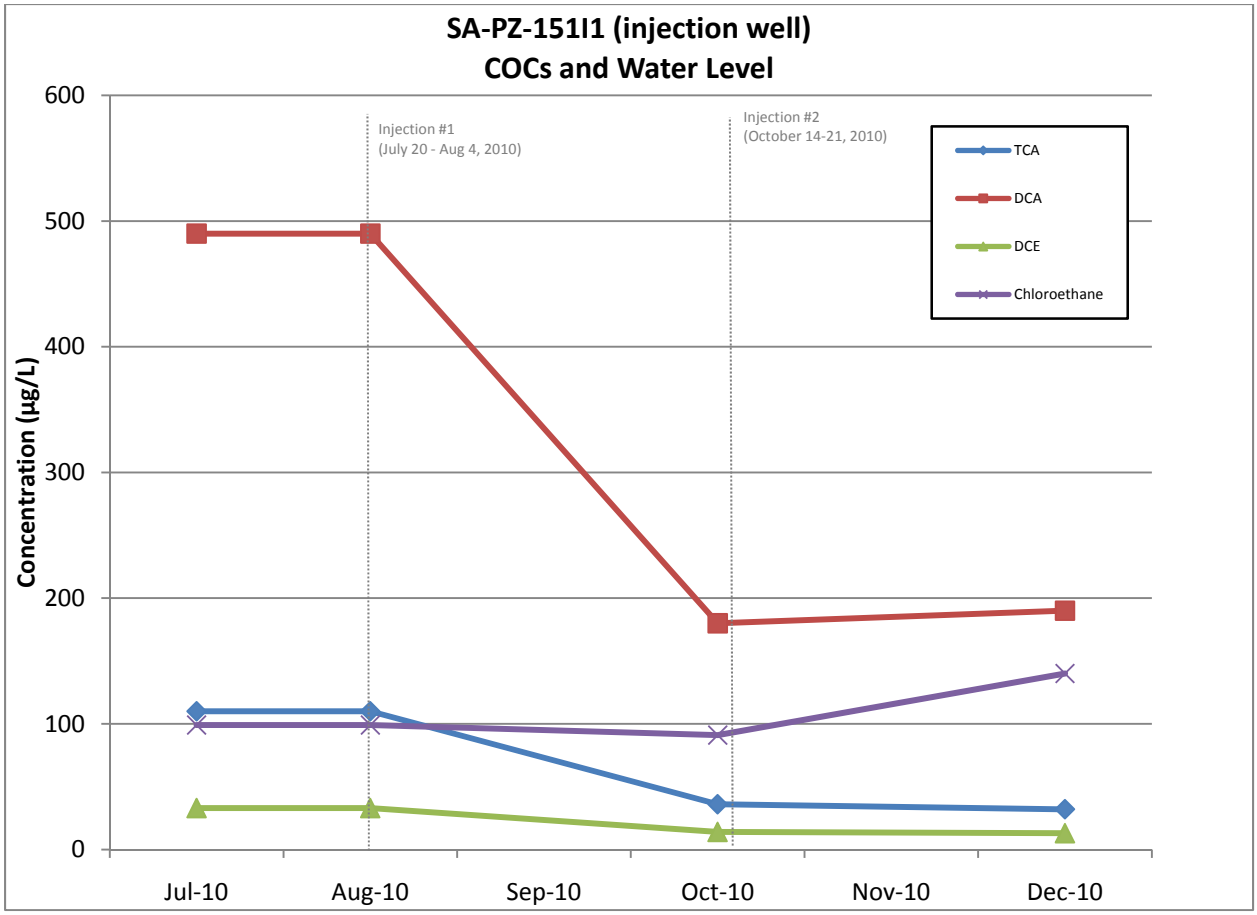

SA-PZ-138I (upgradient well)
COCs and Water Level
Injection #1
(July 20 - Aug 4, 2010)
Injection #2
(October 14-21, 2010)
TCA
DCA
DCE
Chloroethane
Water Level
Concentration (µg/L)
Groundwater Elevation (feet msl)
35
30
25
20
15
10
5
0
40
39
38
37
36
35
34
33
32
31
30
Jul-10
Aug-10
Sep-10
Oct-10
Nov-10
Dec-10

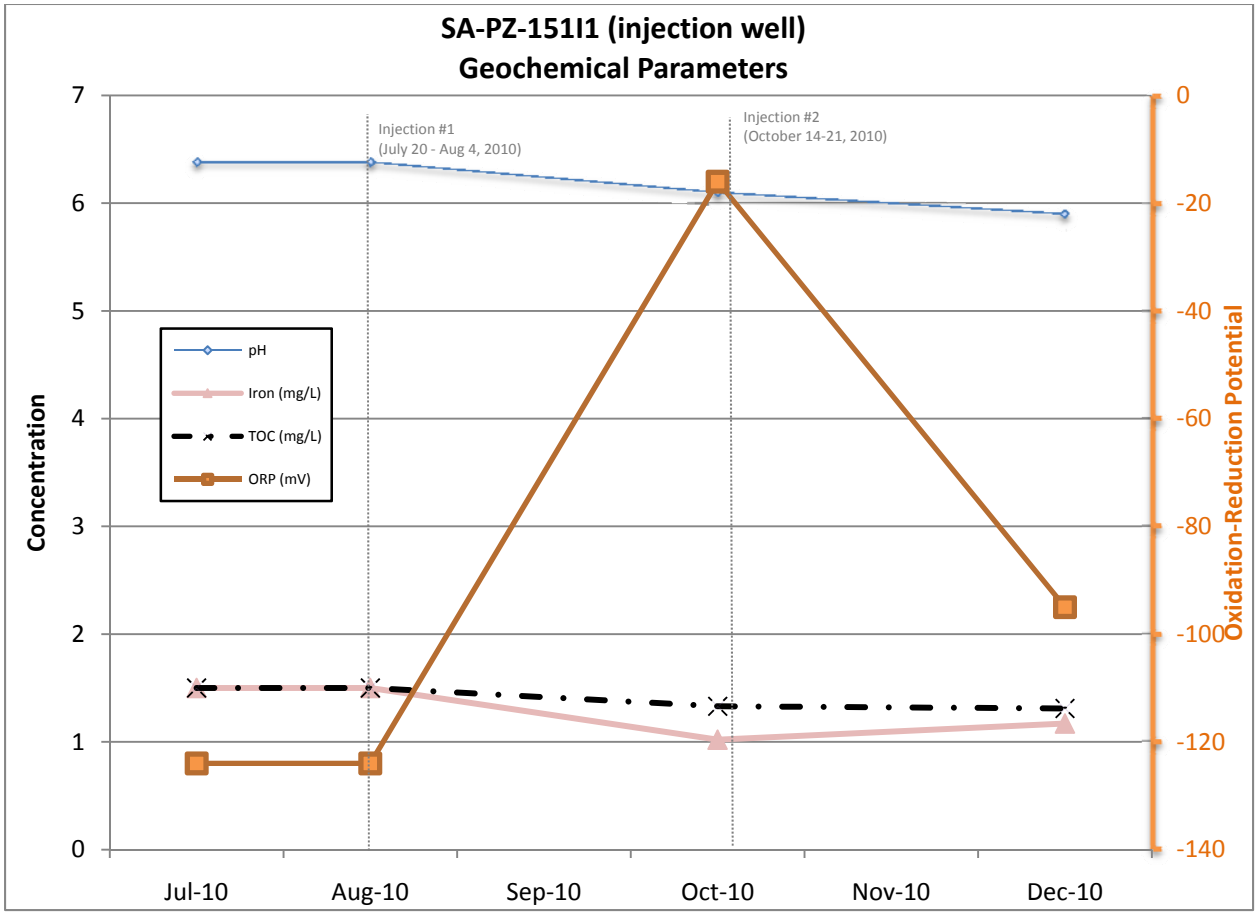

SA-PZ-138I (upradient well)
Geochemical Parameters
Injection #1
(July 20 - Aug 4,
Injection #2
(October 14-21,
2010)
pH
ORP (mV)
Concentration
Oxidation-Reduction Potential
8
7.5
7
6.5
6
5.5
5
100
80
60
40
20
0
-20
Jul-10
Aug-10
Sep-10
Oct-10
Nov-10
Dec-10

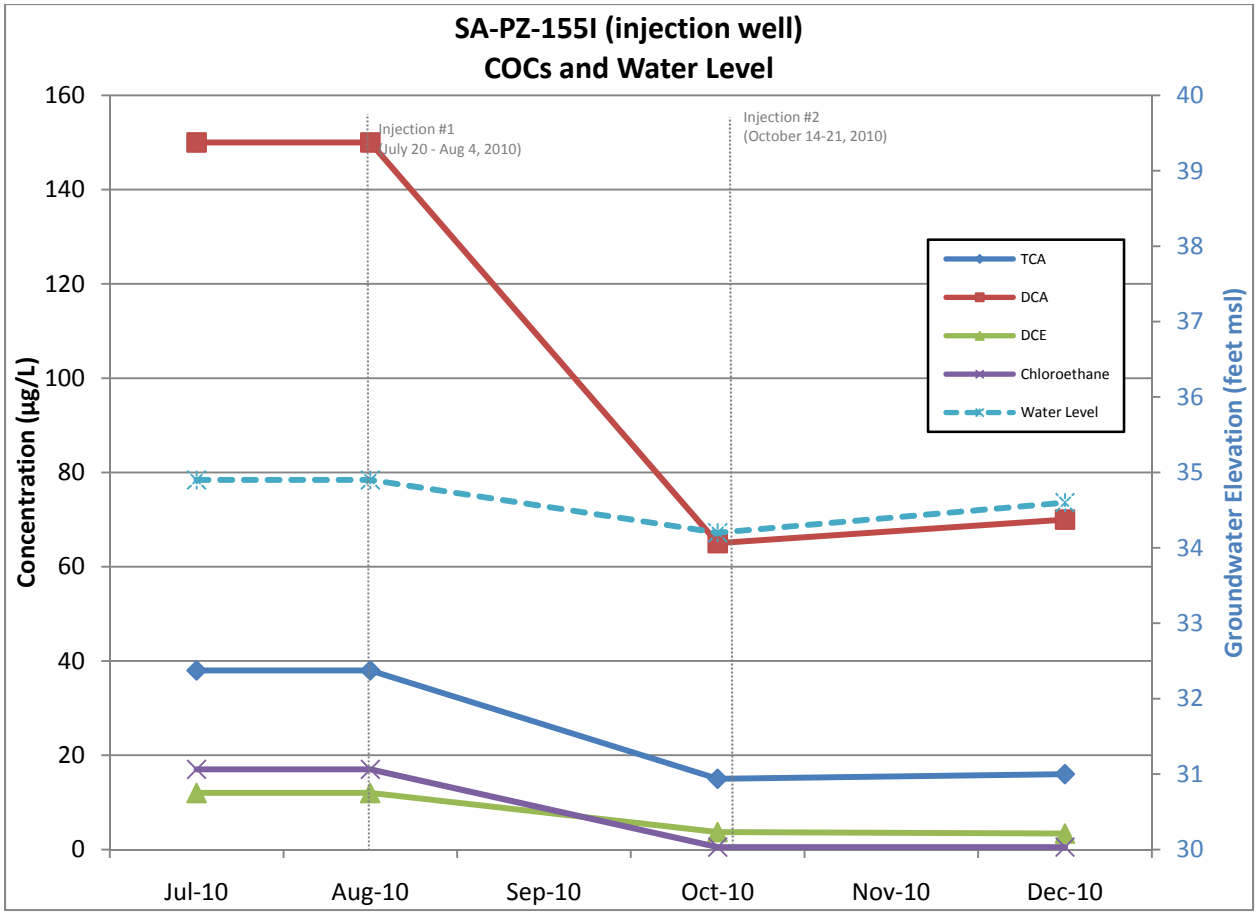

SA-PZ-138I1 (upgradient well)
COCs and Water Level
Injection #1
(July 20 - Aug 4, 2010)
Injection #2
(October 14-21, 2010)
TCA
DCA
DCE
Chloroethane
Water Level
Concentration (µg/L)
Groundwater Elevation (feet msl)
1,200
1,000
800
600
400
200
0
40
39
38
37
36
35
34
33
32
31
30
Jul-10
Aug-10
Sep-10
Oct-10
Nov-10
Dec-10

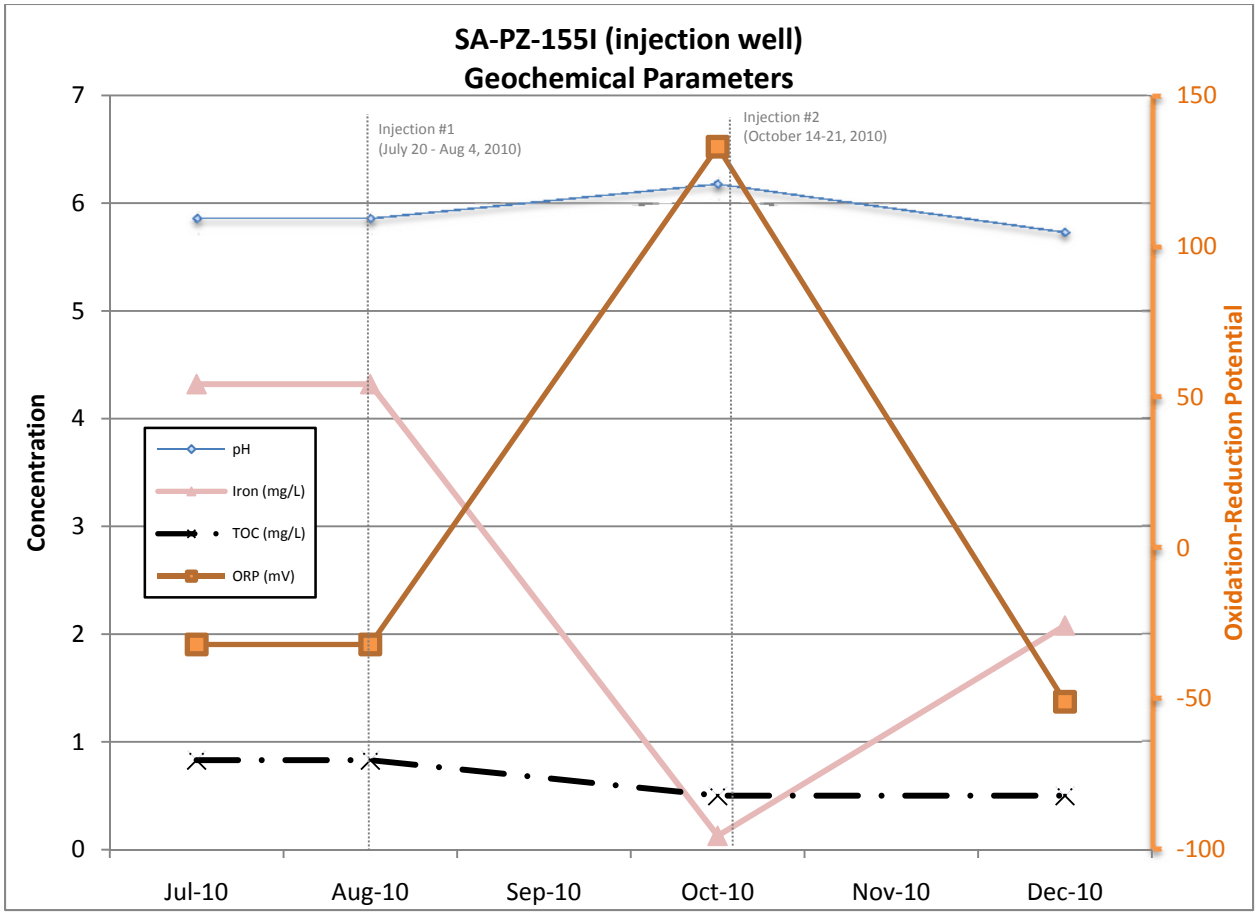

SA-PZ-138I1 (upradient well)
Geochemical Parameters
Injection #1
(July 20 - Aug 4, 2010)
Injection #2
(October 14-21, 2010)
pH
ORP (mV)
Concentration
Oxidation-Reduction Potential
8
7.5
7
6.5
6
5.5
5
140
120
100
80
60
40
20
0
Jul-10
Aug-10
Sep-10
Oct-10
Nov-10
Dec-10

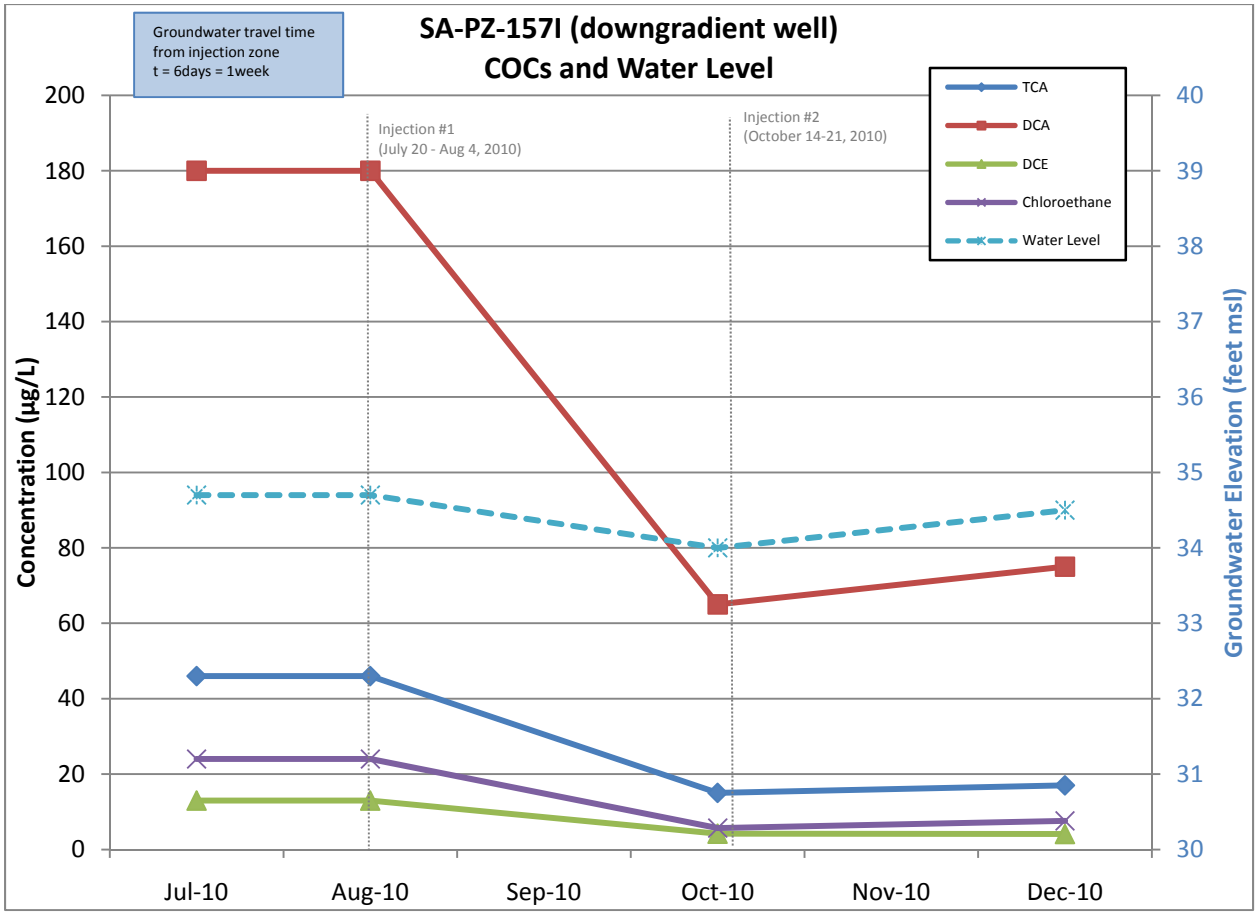

SA-PZ-149I1 (upgradient well)
COCs and Water Level
Concentration (µg/L)
Groundwater Elevation (feet msl)
Injection #1
(July 20 - Aug 4, 2010)
Injection #2
(October 14-21, 2010)
TCA
DCA
DCE
Chloroethane
Water Level
45
40
35
30
25
20
15
10
5
0
35.4
35.2
35
34.8
34.6
34.4
34.2
34
Jul-10
Aug-10
Sep-10
Oct-10
Nov-10
Dec-10

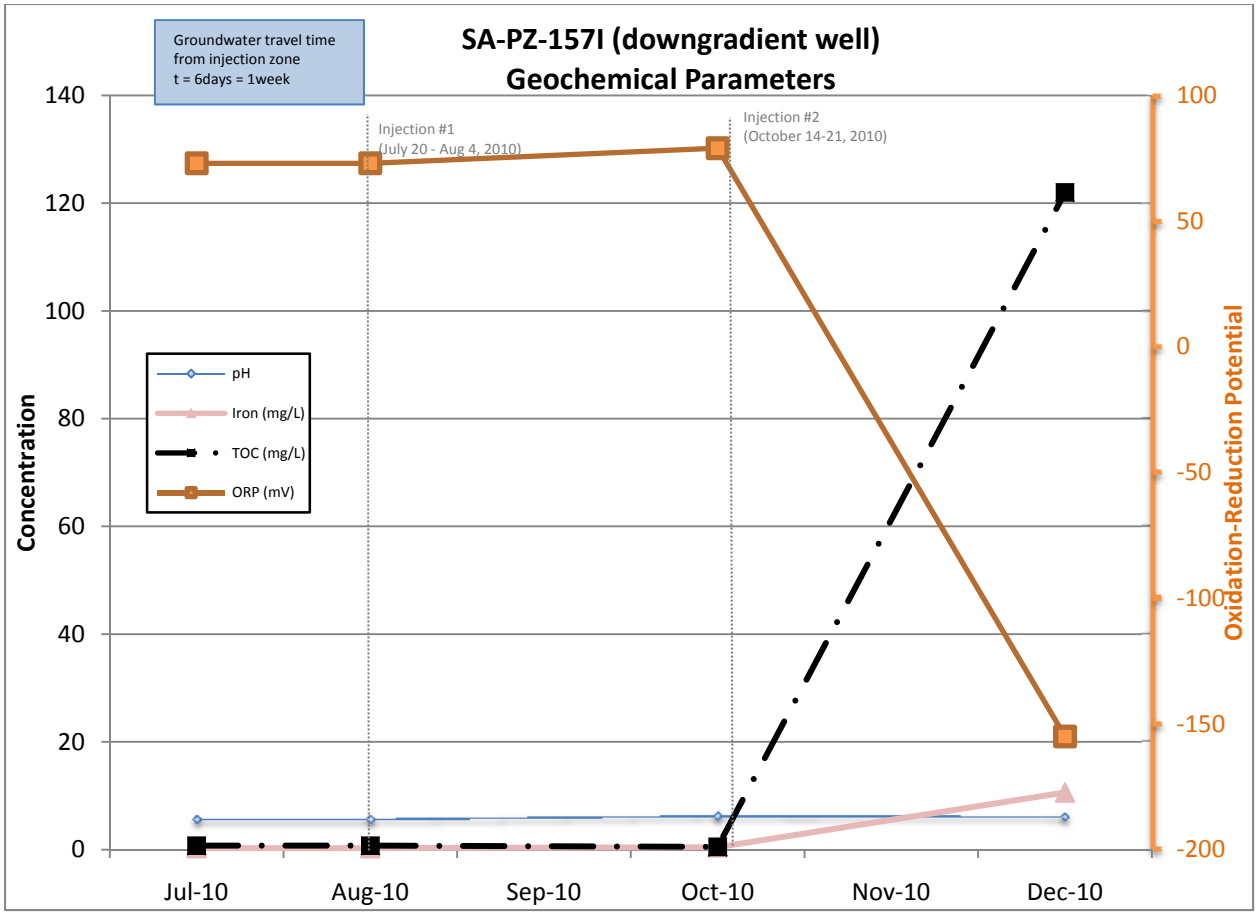

SA-PZ-151I1 (injection well)
COCs and Water Level
Concentration (µg/L)
600
500
400
300
200
100
0
Injection #1
(July 20 - Aug 4, 2010)
Injection #2
(October 14-21, 2010)
TCA
DCA
DCE
Chloroethane
Jul-10
Aug-10
Sep-10
Oct-10
Nov-10
Dec-10

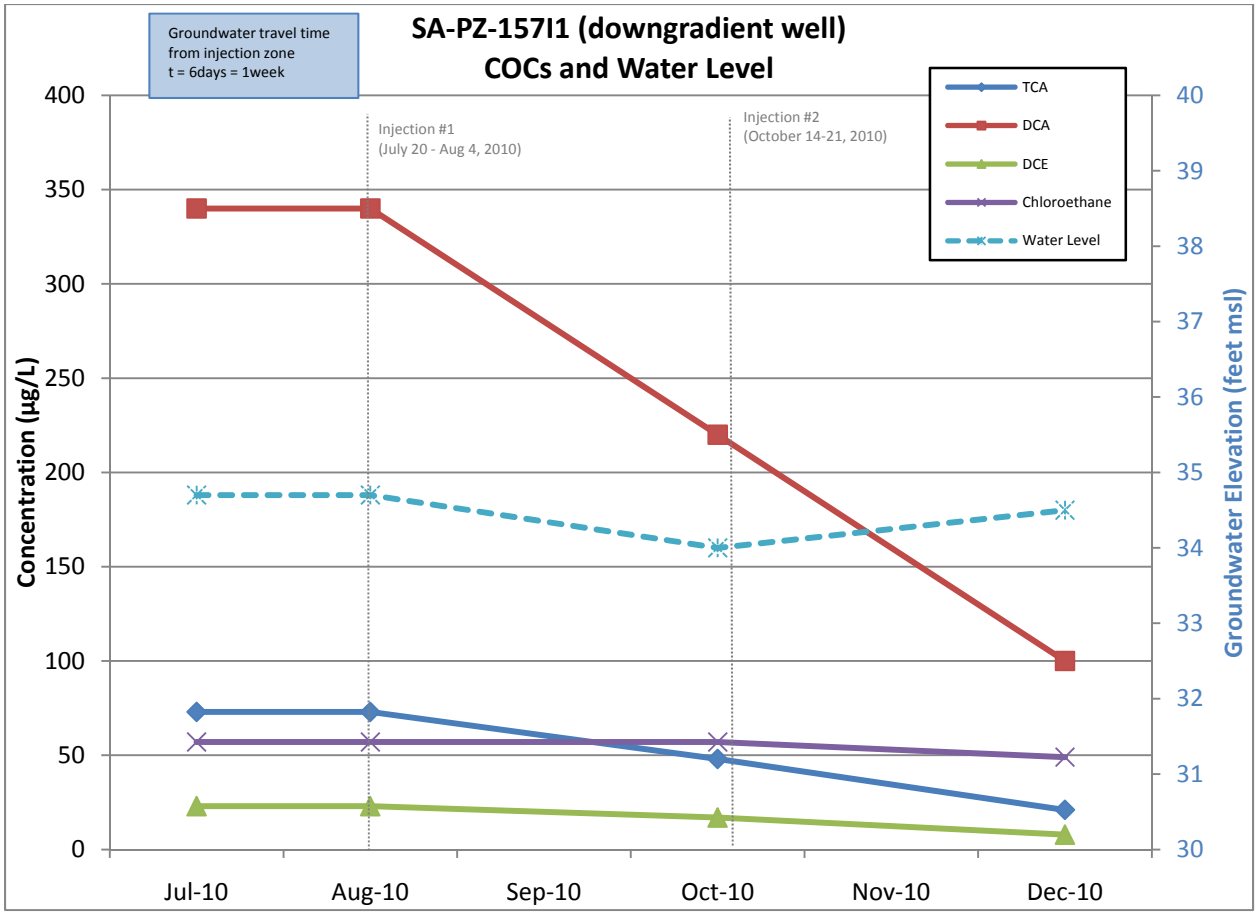

SA-PZ-151I1 (injection well)
Geochemical Parameters
Concentration
7
6
5
4
3
2
1
0
Oxidation-Reduction Potential
0
-20
-40
-60
-80
-100
-120
-140
Injection #1
(July 20 - Aug 4, 2010)
Injection #2
(October 14-21, 2010)
pH
Iron (mg/L)
TOC (mg/L)
ORP (mV)
Jul-10
Aug-10
Sep-10
Oct-10
Nov-10
Dec-10

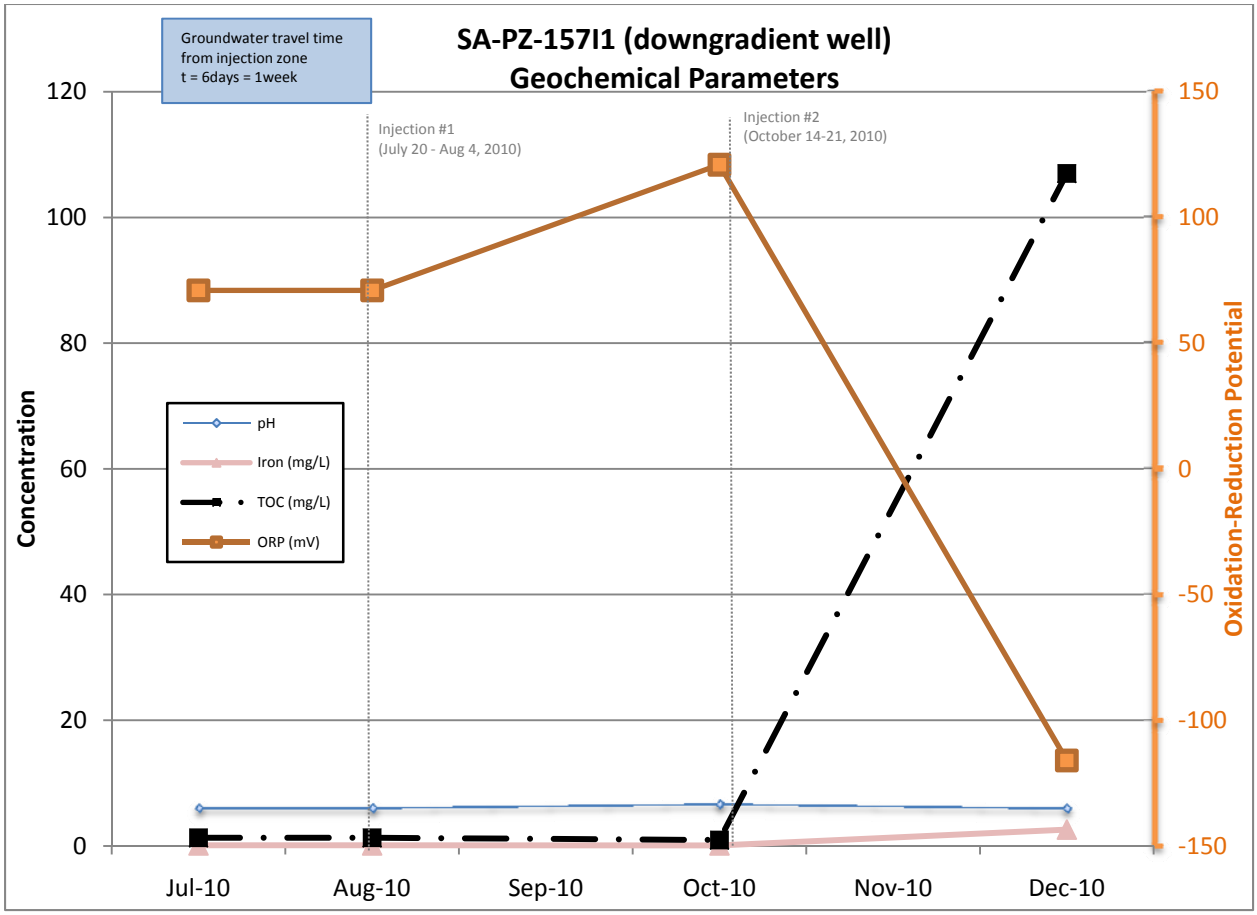

SA-PZ-155I (injection well)
COCs and Water Level
Injection #1
(July 20 - Aug 4, 2010)
Injection #2
(October 14-21, 2010)
TCA
DCA
DCE
Chloroethane
Water Level
Concentration (µg/L)
Groundwater Elevation (feet msl)
160
140
120
100
80
60
40
20
0
40
39
38
37
36
35
34
33
32
31
30
Jul-10
Aug-10
Sep-10
Oct-10
Nov-10
Dec-10

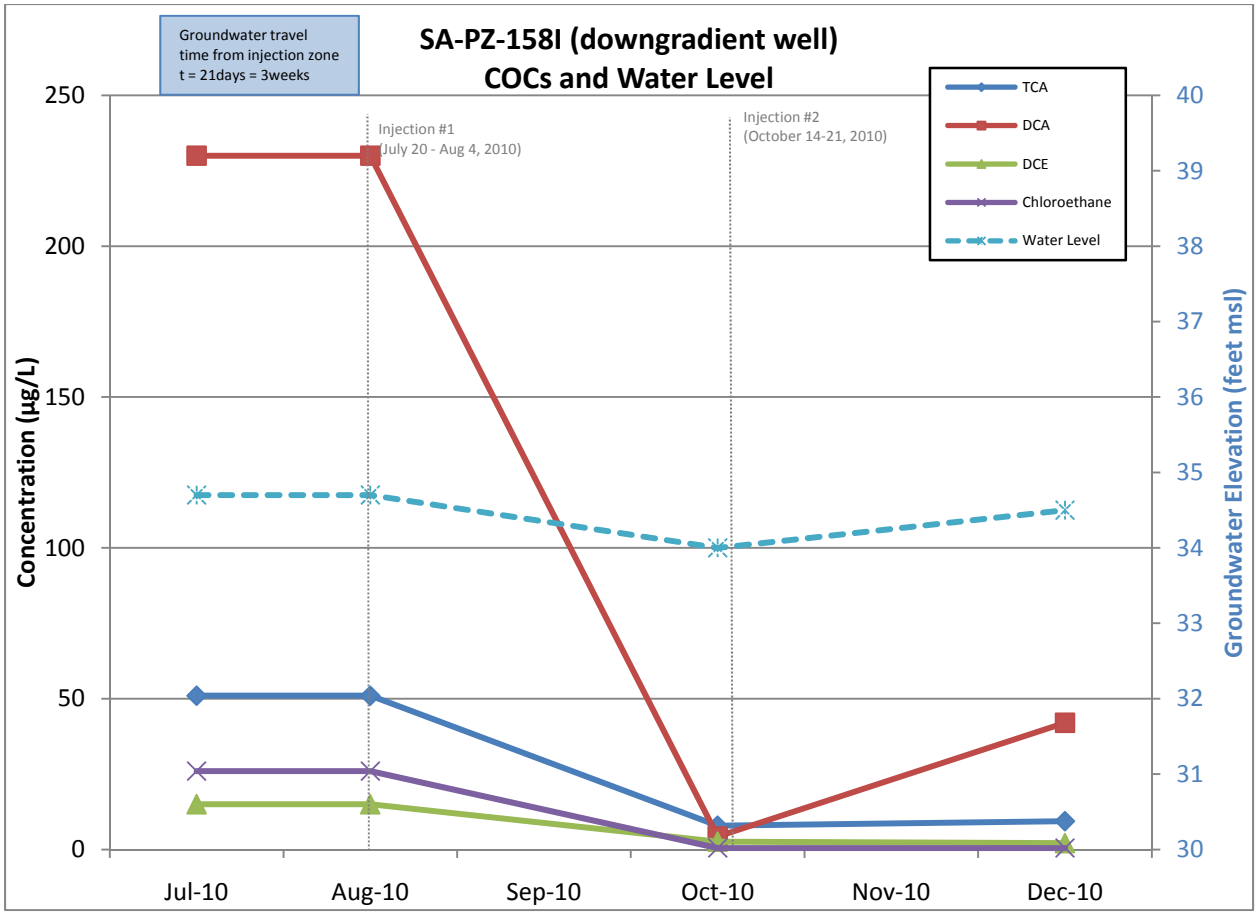

SA-PZ-155I (injection well)
Geochemical Parameters
Injection #1
(July 20 - Aug 4, 2010)
Injection #2
(October 14-21, 2010)
pH
Iron (mg/L)
TOC (mg/L)
ORP (mV)
Concentration
Oxidation-Reduction Potential
7
6
5
4
3
2
1
0
150
100
50
0
-50
-100
Jul-10
Aug-10
Sep-10
Oct-10
Nov-10
Dec-10

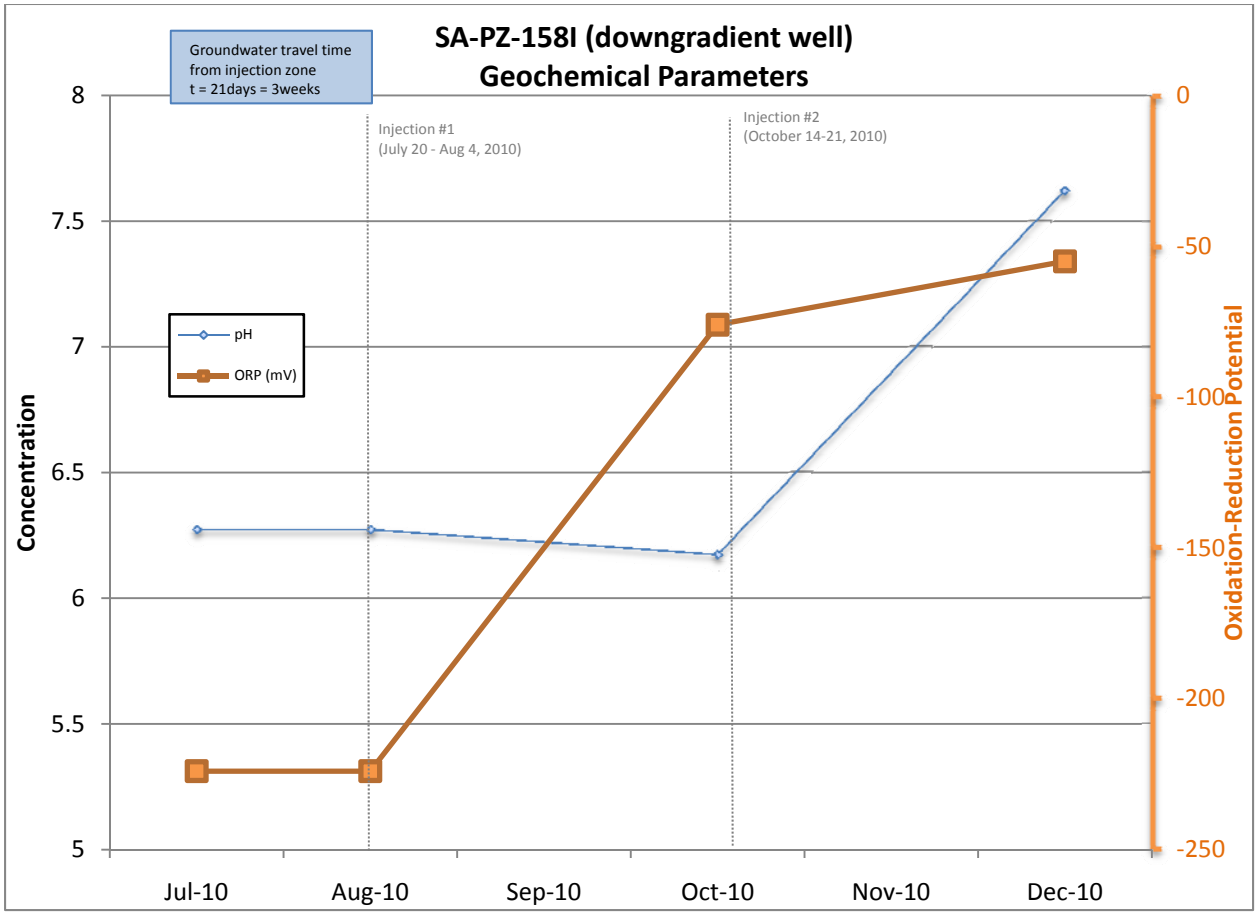

SA-PZ-157I (downgradient well)
COCs and Water Level
Groundwater travel time from injection zone t = 6days = 1week
Injection #1 (July 20 - Aug 4, 2010)
Injection #2 (October 14-21, 2010)
TCA
DCA
DCE
Chloroethane
Water Level
Concentration (µg/L)
Groundwater Elevation (feet msl)
200
180
160
140
120
100
80
60
40
20
0
40
39
38
37
36
35
34
33
32
31
30
Jul-10
Aug-10
Sep-10
Oct-10
Nov-10
Dec-10

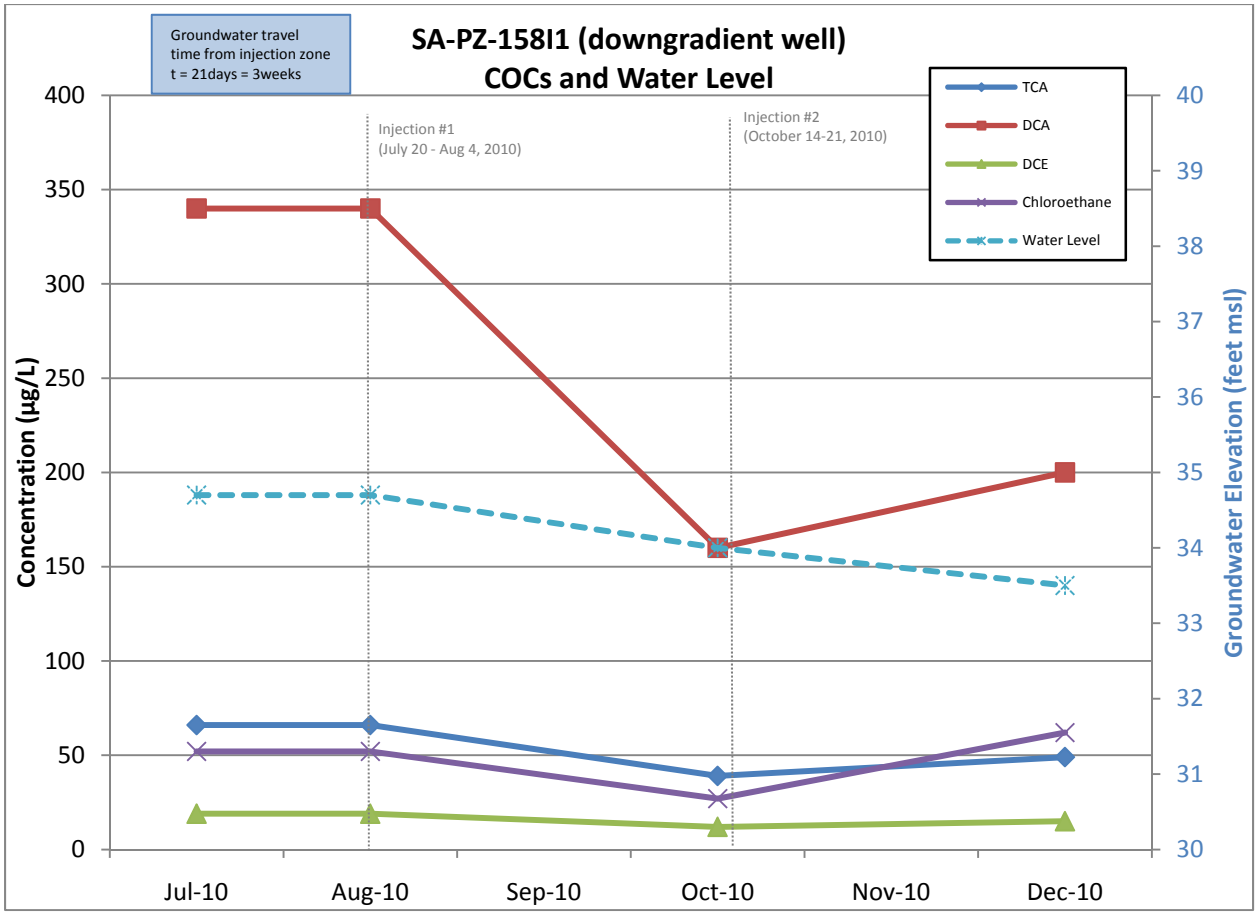

SA-PZ-157I (downgradient well)
Geochemical Parameters
Groundwater travel time from injection zone t = 6days = 1week
Injection #1 (July 20 - Aug 4, 2010)
Injection #2 (October 14-21, 2010)
pH
Iron (mg/L)
TOC (mg/L)
ORP (mV)
Concentration
Oxidation-Reduction Potential
140
120
100
80
60
40
20
0
100
50
0
-50
-100
-150
-200
Jul-10
Aug-10
Sep-10
Oct-10
Nov-10
Dec-10

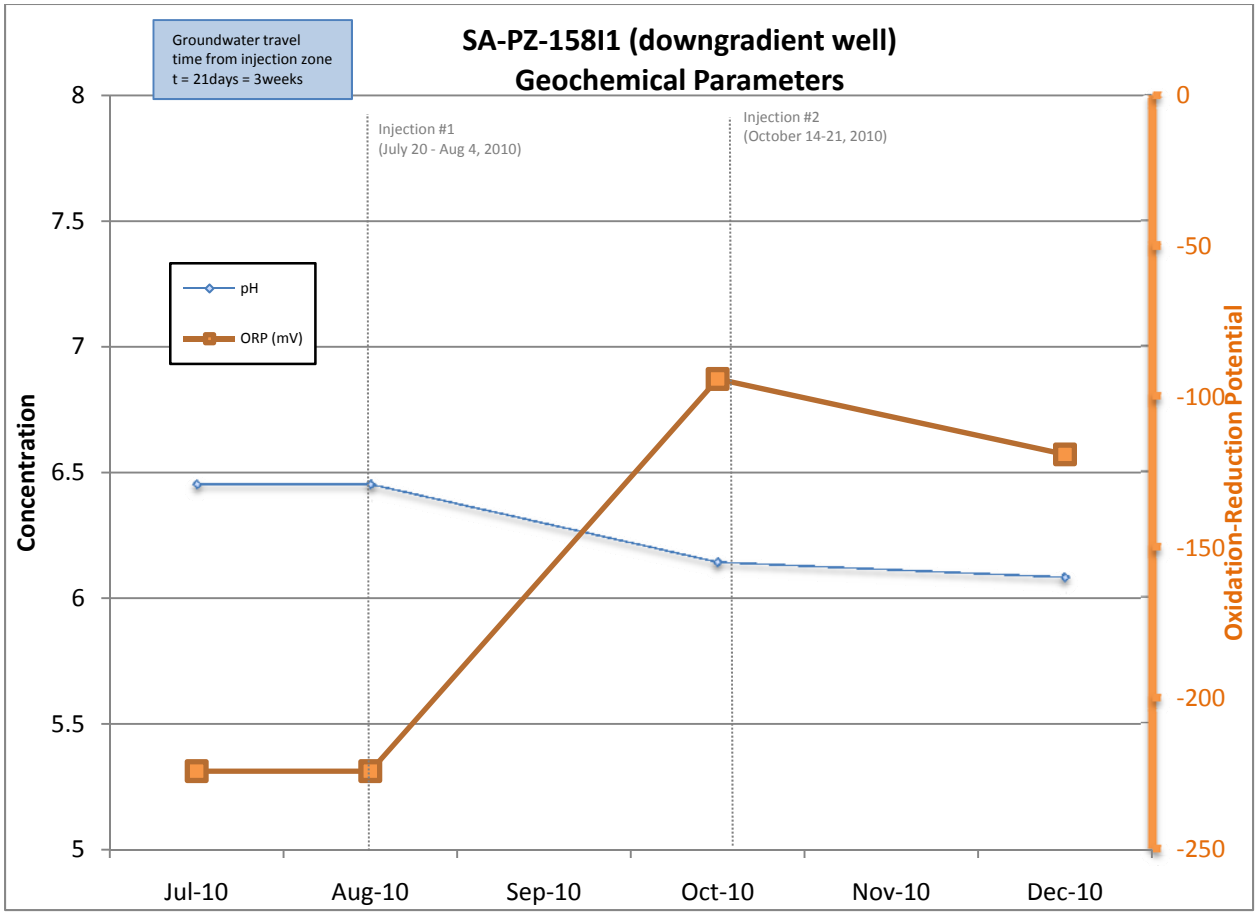

SA-PZ-157I1 (downgradient well)
COCs and Water Level
Groundwater travel time from injection zone t = 6days = 1week
Injection #1 (July 20 - Aug 4, 2010)
Injection #2 (October 14-21, 2010)
TCA
DCA
DCE
Chloroethane
Water Level
Concentration (µg/L)
Groundwater Elevation (feet msl)
400
350
300
250
200
150
100
50
0
40
39
38
37
36
35
34
33
32
31
30
Jul-10
Aug-10
Sep-10
Oct-10
Nov-10
Dec-10

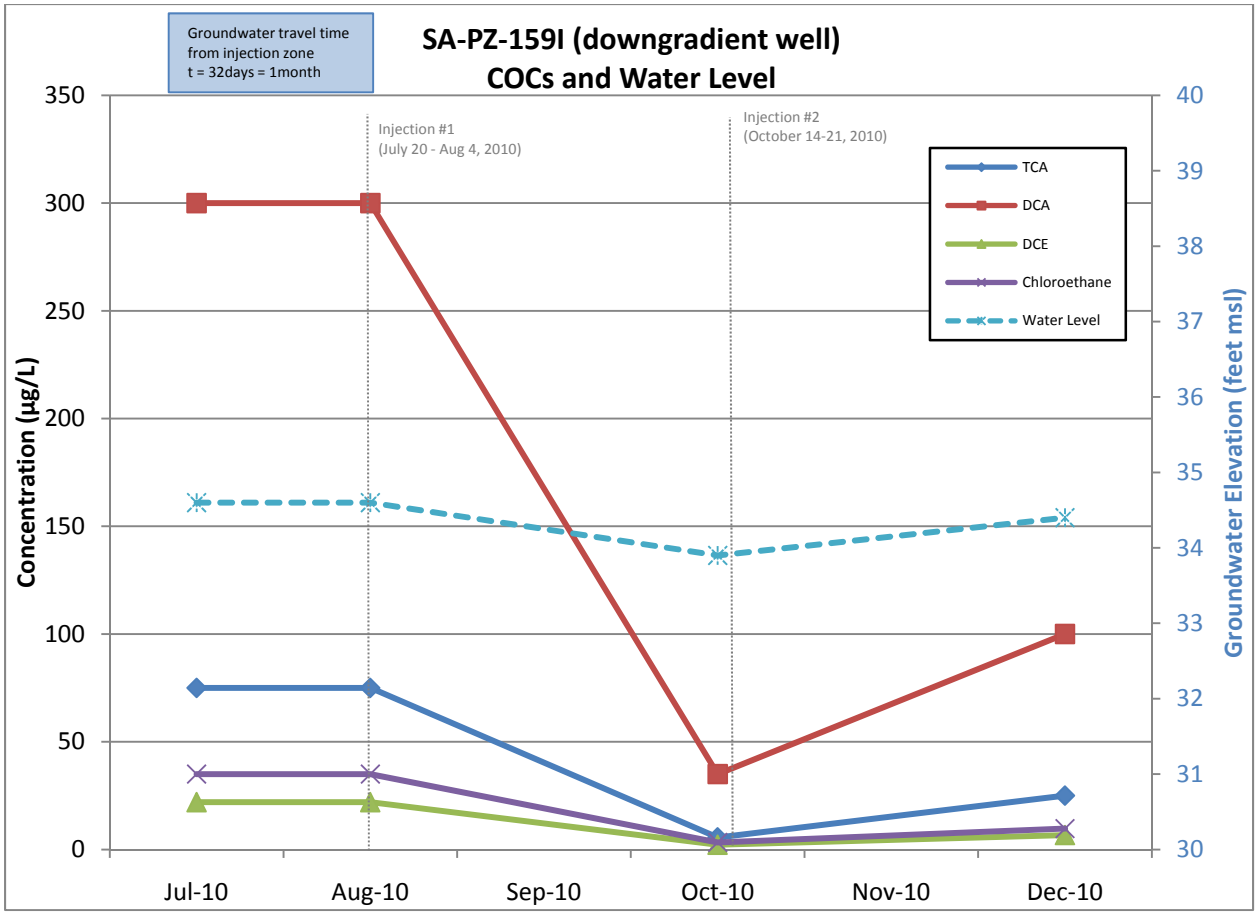

SA-PZ-157I1 (downgradient well)
Geochemical Parameters
Groundwater travel time from injection zone t = 6days = 1week
Injection #1 (July 20 - Aug 4, 2010)
Injection #2 (October 14-21, 2010)
pH
Iron (mg/L)
TOC (mg/L)
ORP (mV)
Concentration
Oxidation-Reduction Potential
120
100
80
60
40
20
0
150
100
50
0
-50
-100
-150
Jul-10
Aug-10
Sep-10
Oct-10
Nov-10
Dec-10

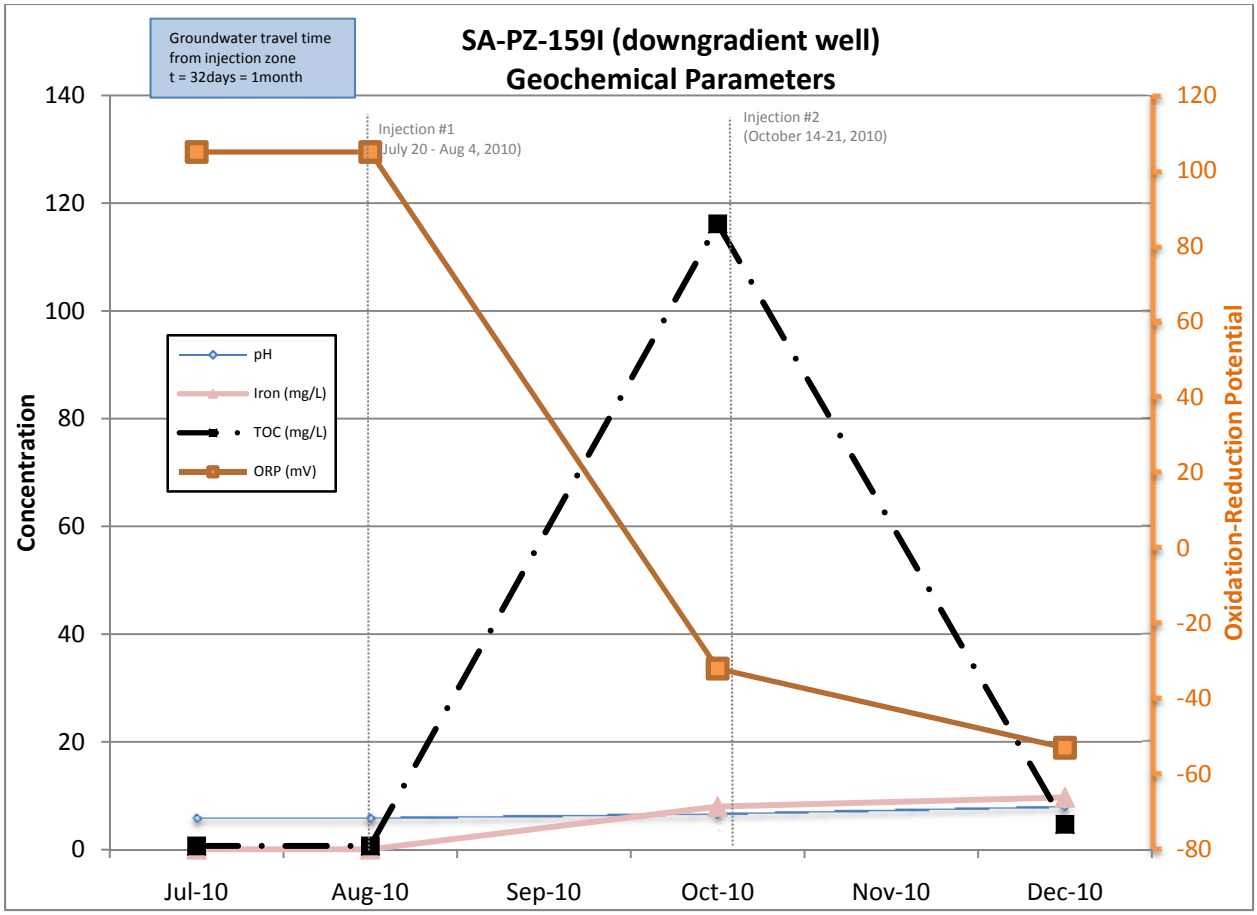

SA-PZ-158I (downgradient well)
COCs and Water Level
Groundwater travel time from injection zone t = 21days = 3weeks
Injection #1 (July 20 - Aug 4, 2010)
Injection #2 (October 14-21, 2010)
TCA
DCA
DCE
Chloroethane
Water Level
Concentration (µg/L)
Groundwater Elevation (feet msl)
250
200
150
100
50
0
40
39
38
37
36
35
34
33
32
31
30
Jul-10
Aug-10
Sep-10
Oct-10
Nov-10
Dec-10

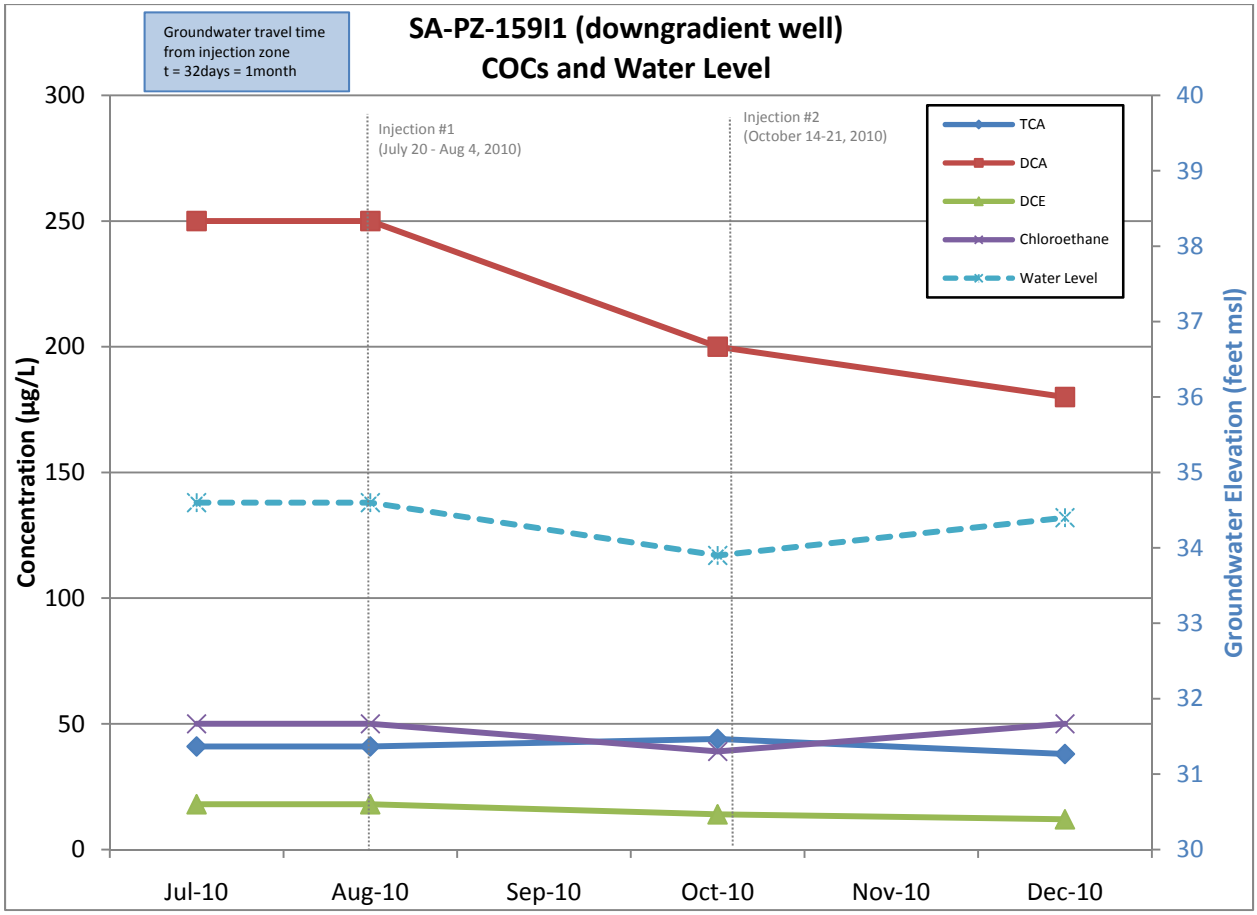

SA-PZ-158I (downgradient well)
Geochemical Parameters
Groundwater travel time from injection zone t = 21days = 3weeks
Injection #1 (July 20 - Aug 4, 2010)
Injection #2 (October 14-21, 2010)
pH
ORP (mV)
Concentration
Oxidation-Reduction Potential
8
7.5
7
6.5
6
5.5
5
0
-50
-100
-150
-200
-250
Jul-10
Aug-10
Sep-10
Oct-10
Nov-10
Dec-10

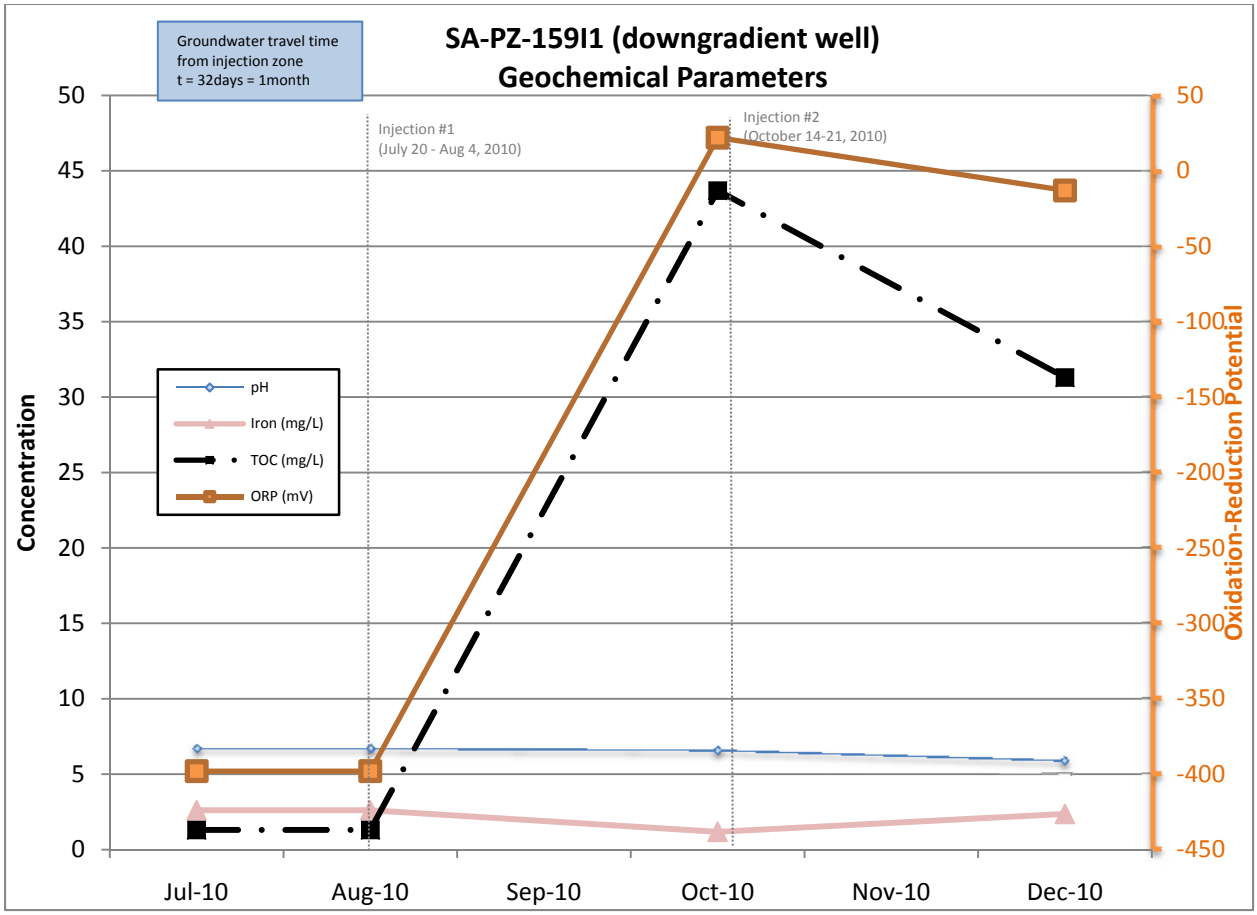

Groundwater travel time from injection zone t = 21days = 3weeks
SA-PZ-158I1 (downgradient well)
COCs and Water Level
Injection #1 (July 20 - Aug 4, 2010)
Injection #2 (October 14-21, 2010)
TCA
DCA
DCE
Chloroethane
Water Level
Concentration (µg/L)
Groundwater Elevation (feet msl)
400
350
300
250
200
150
100
50
0
40
39
38
37
36
35
34
33
32
31
30
Jul-10
Aug-10
Sep-10
Oct-10
Nov-10
Dec-10

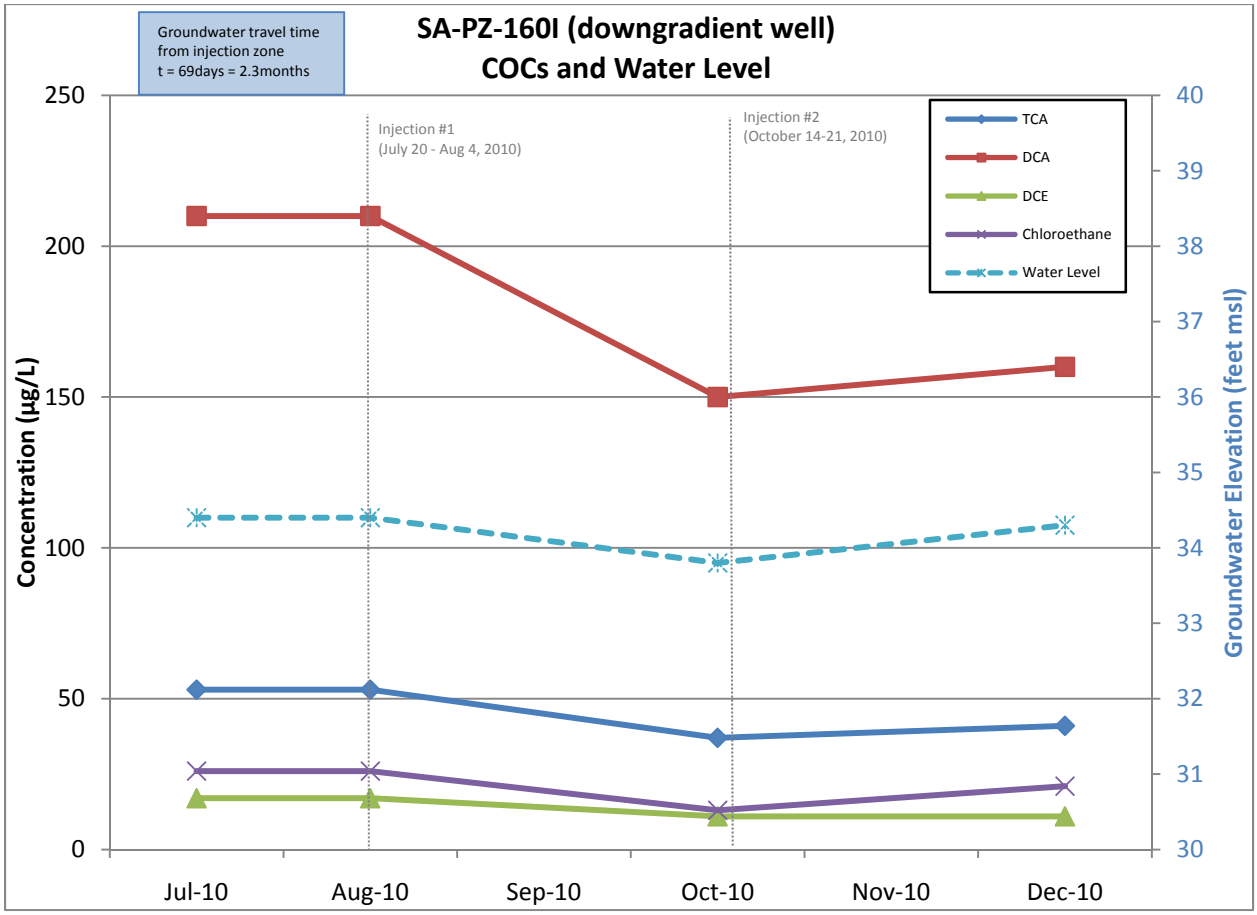

Groundwater travel time from injection zone t = 21days = 3weeks
SA-PZ-158I1 (downgradient well)
Geochemical Parameters
Injection #1 (July 20 - Aug 4, 2010)
Injection #2 (October 14-21, 2010)
pH
ORP (mV)
Concentration
Oxidation-Reduction Potential
8
7.5
7
6.5
6
5.5
5
0
-50
-100
-150
-200
-250
Jul-10
Aug-10
Sep-10
Oct-10
Nov-10
Dec-10

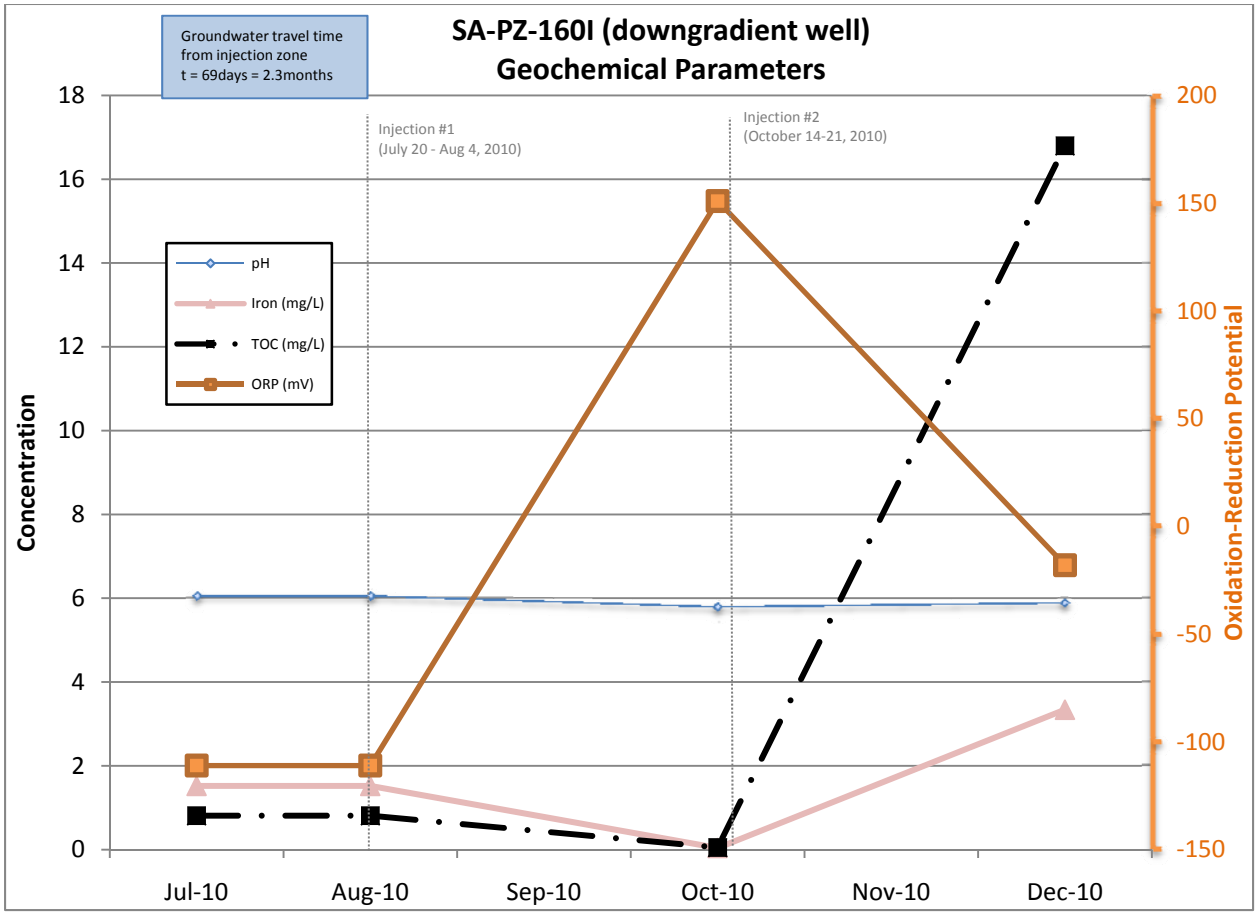

Groundwater travel time
from injection zone
t = 32days = 1month
SA-PZ-159I (downgradient well)
COCs and Water Level
Injection #1
(July 20 - Aug 4, 2010)
Injection #2
(October 14-21, 2010)
TCA
DCA
DCE
Chloroethane
Water Level
Concentration (µg/L)
Groundwater Elevation (feet msl)
350
300
250
200
150
100
50
0
40
39
38
37
36
35
34
33
32
31
30
Jul-10
Aug-10
Sep-10
Oct-10
Nov-10
Dec-10

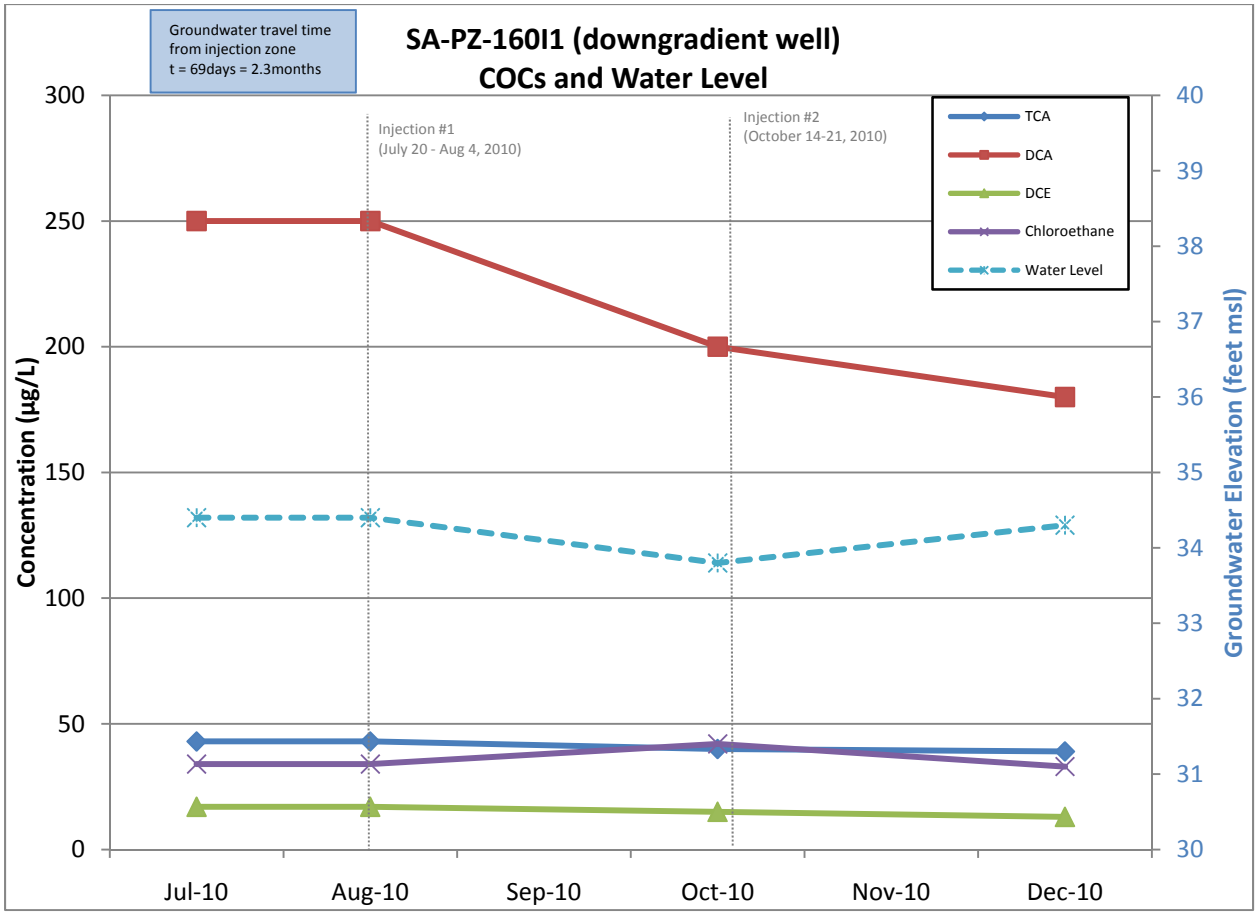

Groundwater travel time
from injection zone
t = 32days = 1month
SA-PZ-159I (downgradient well)
Geochemical Parameters
Injection #1
July 20 - Aug 4, 2010)
Injection #2
(October 14-21, 2010)
pH
Iron (mg/L)
TOC (mg/L)
ORP (mV)
Concentration
Oxidation-Reduction Potential
140
120
100
80
60
40
20
0
120
100
80
60
40
20
0
-20
-40
-60
-80
Jul-10
Aug-10
Sep-10
Oct-10
Nov-10
Dec-10

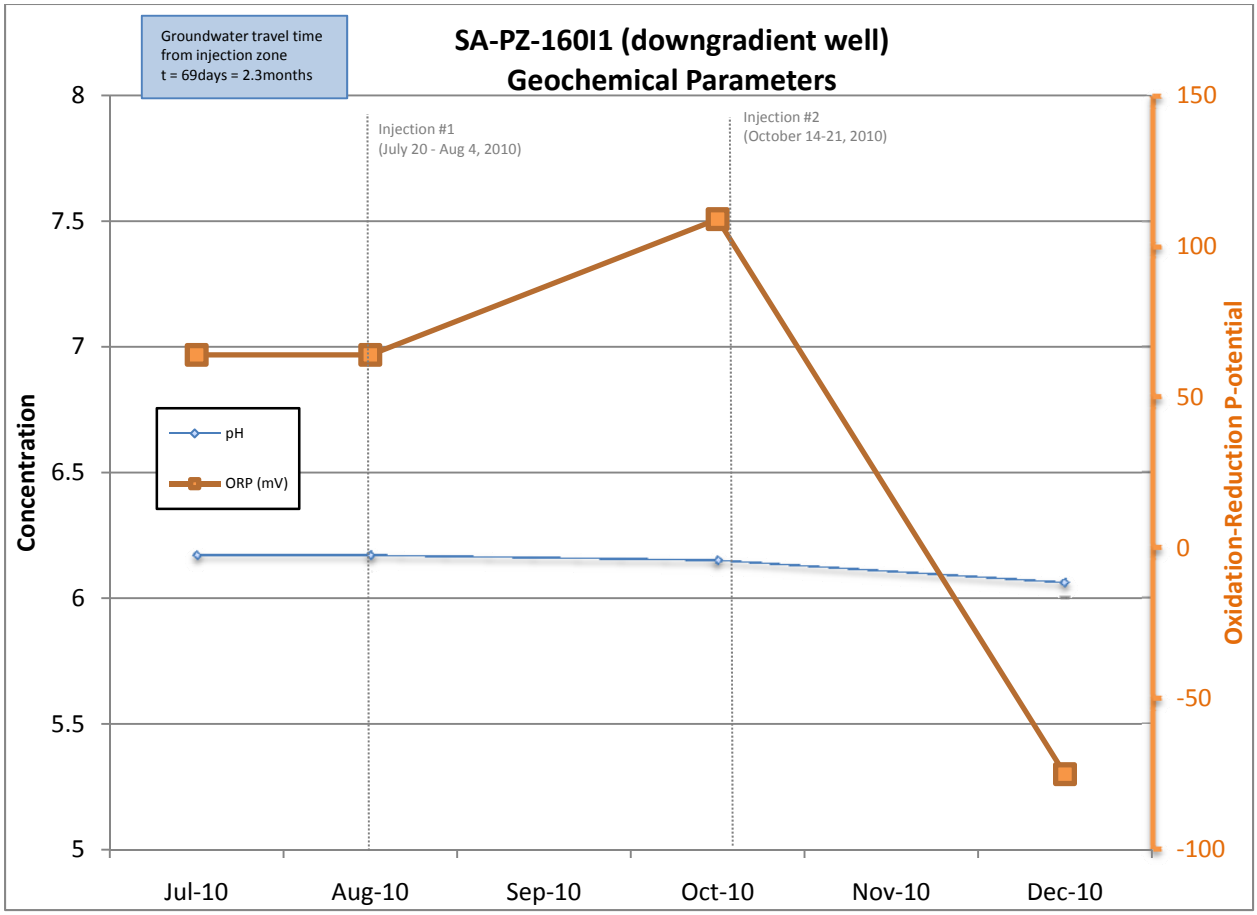

SA-PZ-159I1 (downgradient well)
COCs and Water Level
Groundwater travel time from injection zone t = 32days = 1month
Injection #1 (July 20 - Aug 4, 2010)
Injection #2 (October 14-21, 2010)
TCA
DCA
DCE
Chloroethane
Water Level
Concentration (µg/L)
Groundwater Elevation (feet msl)
300
250
200
150
100
50
0
40
39
38
37
36
35
34
33
32
31
30
Jul-10
Aug-10
Sep-10
Oct-10
Nov-10
Dec-10

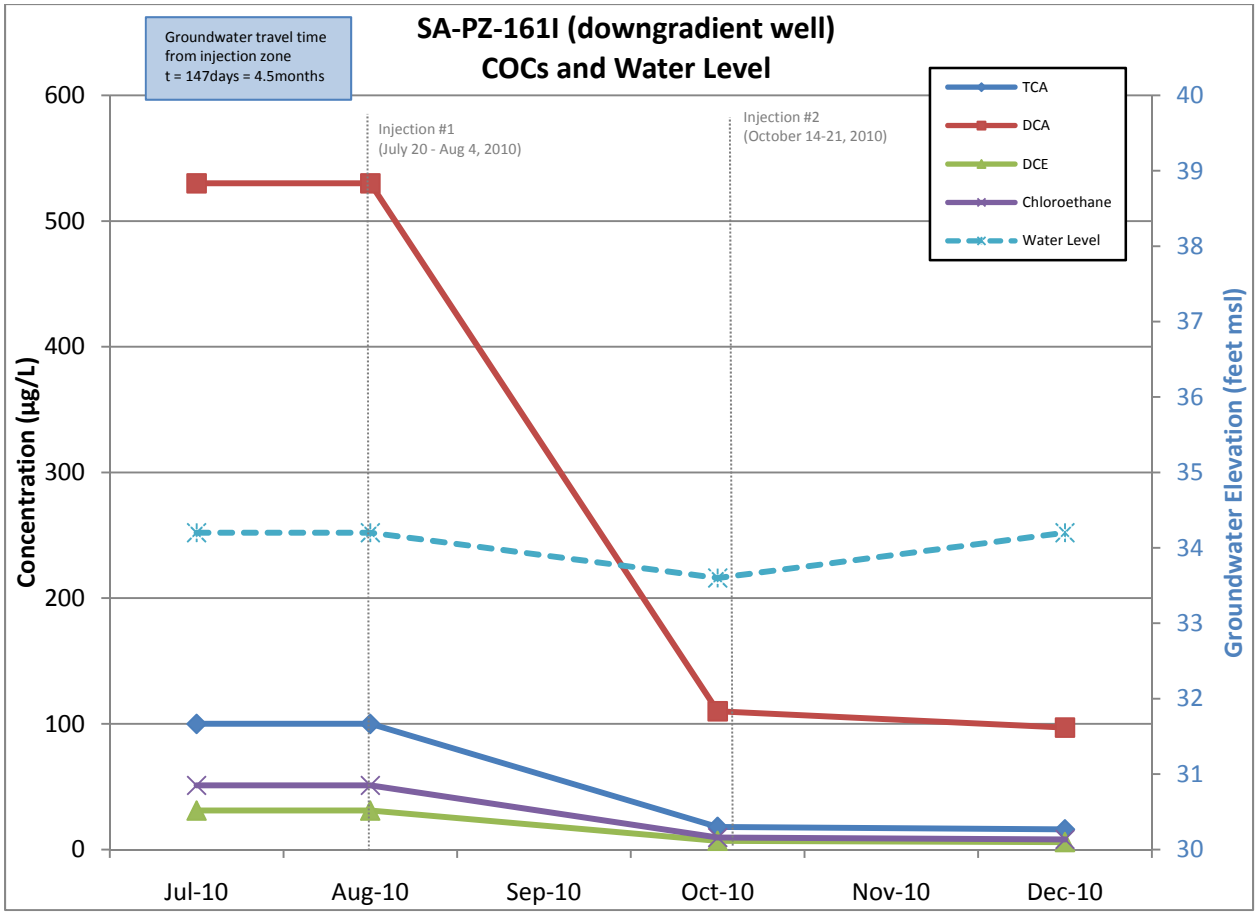

SA-PZ-159I1 (downgradient well)
Geochemical Parameters
Groundwater travel time from injection zone t = 32days = 1month
Injection #1 (July 20 - Aug 4, 2010)
Injection #2 (October 14-21, 2010)
pH
Iron (mg/L)
TOC (mg/L)
ORP (mV)
Concentration
Oxidation-Reduction Potential
50
45
40
35
30
25
20
15
10
5
0
50
0
-50
-100
-150
-200
-250
-300
-350
-400
-450
Jul-10
Aug-10
Sep-10
Oct-10
Nov-10
Dec-10

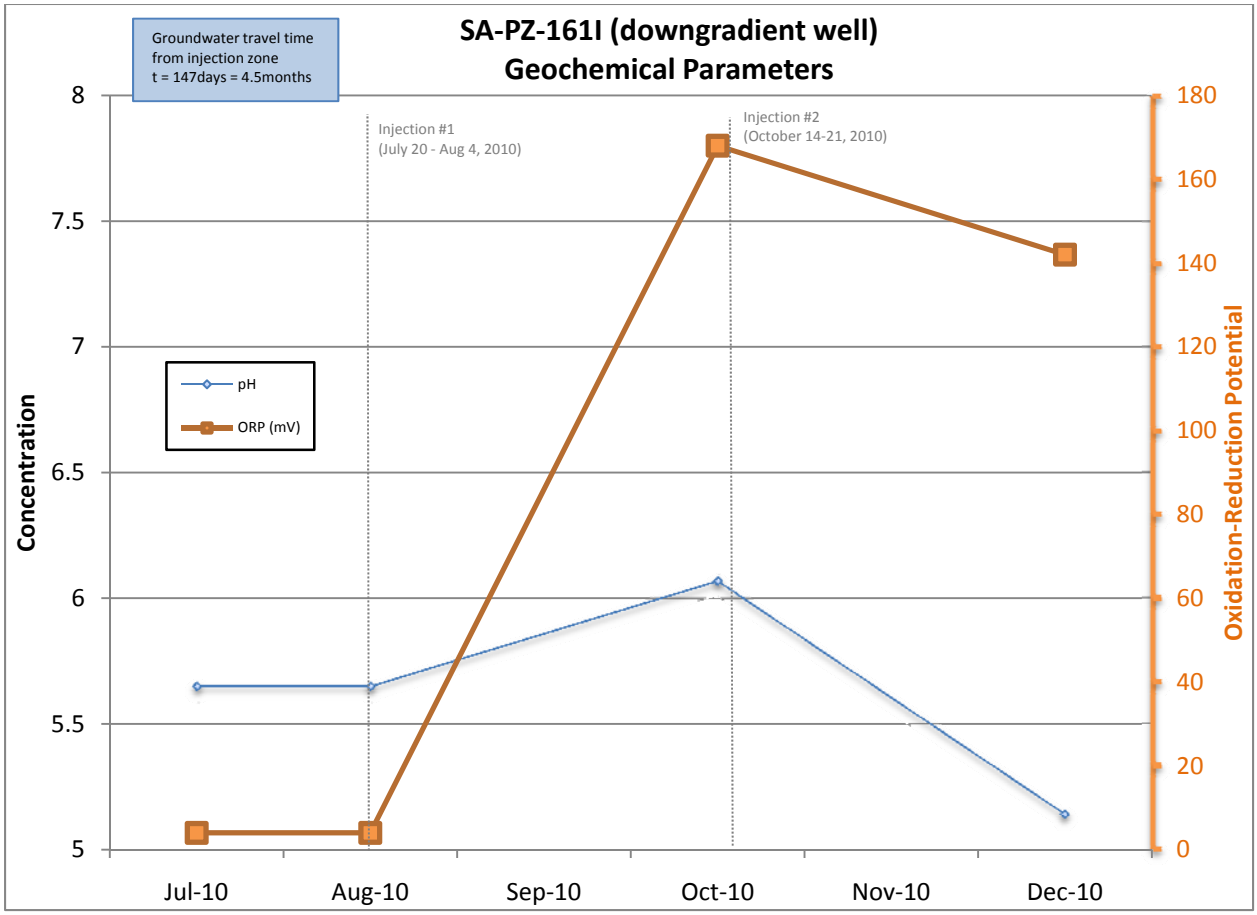

SA-PZ-160I (downgradient well)
COCs and Water Level
Groundwater travel time from injection zone t = 69days = 2.3months
Injection #1 (July 20 - Aug 4, 2010)
Injection #2 (October 14-21, 2010)
TCA
DCA
DCE
Chloroethane
Water Level
Concentration (µg/L)
Groundwater Elevation (feet msl)
250
200
150
100
50
0
40
39
38
37
36
35
34
33
32
31
30
Jul-10
Aug-10
Sep-10
Oct-10
Nov-10
Dec-10


SA-PZ-160I (downgradient well)
Geochemical Parameters
Groundwater travel time from injection zone t = 69days = 2.3months
Injection #1 (July 20 - Aug 4, 2010)
Injection #2 (October 14-21, 2010)
pH
Iron (mg/L)
TOC (mg/L)
ORP (mV)
Concentration
Oxidation-Reduction Potential
18
16
14
12
10
8
6
4
2
0
200
150
100
50
0
-50
-100
-150
Jul-10
Aug-10
Sep-10
Oct-10
Nov-10
Dec-10


Groundwater travel time
from injection zone
t = 69days = 2.3months
SA-PZ-160I1 (downgradient well)
COCs and Water Level
Injection #1
(July 20 - Aug 4, 2010)
Injection #2
(October 14-21, 2010)
TCA
DCA
DCE
Chloroethane
Water Level
Concentration (µg/L)
Groundwater Elevation (feet msl)
300
250
200
150
100
50
0
40
39
38
37
36
35
34
33
32
31
30
Jul-10
Aug-10
Sep-10
Oct-10
Nov-10
Dec-10


Groundwater travel time
from injection zone
t = 69days = 2.3months
SA-PZ-160I1 (downgradient well)
Geochemical Parameters
Injection #1
(July 20 - Aug 4, 2010)
Injection #2
(October 14-21, 2010)
pH
ORP (mV)
Concentration
Oxidation-Reduction P-otential
8
7.5
7
6.5
6
5.5
5
150
100
50
0
-50
-100
Jul-10
Aug-10
Sep-10
Oct-10
Nov-10
Dec-10


SA-PZ-161I (downgradient well)
COCs and Water Level
Groundwater travel time from injection zone t = 147days = 4.5months
Injection #1 (July 20 - Aug 4, 2010)
Injection #2 (October 14-21, 2010)
TCA
DCA
DCE
Chloroethane
Water Level
Concentration (µg/L)
Groundwater Elevation (feet msl)
600
500
400
300
200
100
0
40
39
38
37
36
35
34
33
32
31
30
Jul-10
Aug-10
Sep-10
Oct-10
Nov-10
Dec-10


SA-PZ-161I (downgradient well)
Geochemical Parameters
Groundwater travel time from injection zone t = 147days = 4.5months
Injection #1 (July 20 - Aug 4, 2010)
Injection #2 (October 14-21, 2010)
pH
ORP (mV)
Concentration
Oxidation-Reduction Potential
8
7.5
7
6.5
6
5.5
5
180
160
140
120
100
80
60
40
20
0
Jul-10
Aug-10
Sep-10
Oct-10
Nov-10
Dec-10

APPENDIX D

ARAR EVALUATION

TABLE D-1
CHEMICAL-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)
SOUTHERN AREA CORRECTIVE MEASURES STUDY
NWIRP CALVERTON, NEW YORK

MEDIA	REQUIREMENT	PREREQUISITE	CITATION	ARAR DETERMINATION	COMMENT
FEDERAL CHEMICAL-SPECIFIC ARARs					
Clean Water Act (CWA)					
Surface water	Ambient water quality standards include Federal water quality criteria and State water quality standards.	Direct discharges to surface waters.	Federal Ambient Water Quality Criteria (AWQC) (40 CFR 50)	To Be Considered for Alternatives 2 to 7	AWQC is to be considered for the Peconic River.
EPA Regional Screening Levels (for Human Health)					
Soil, sediment, groundwater, surface water, and air	Generic risk-based screening values and toxicity values for human health established across all EPA Regions. Typically used for human health risk assessment screening, risk calculations, and Preliminary Remediation Goal (PRG) development.	Contaminated environmental media can be screened against these generic values for a preliminary indicator of risk. Also, one can prepare site-specific values using the reference materials.	EPA *Regional Screening Levels (RSLs)* (November 2010) http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/index.htm	To Be Considered for Alternatives 2 to 7	Values were used in the baseline risk assessment and were considered in PRG development. All NYSDOH MCLs fall within or are less than USEPA risk criteria (10^{-4} to 10^{-6}) incremental lifetime cancer risk) or a hazardous index less than 1.
EPA National Recommended Water Quality Criteria					
Surface water	EPA recommended water quality criteria for the protection of aquatic life and human health in surface water to provide guidance for states and tribes to use in adopting water quality standards.	Contaminated environmental media can be screened against these generic values for a preliminary indicator of risk. Also, one can prepare site-specific values using the reference materials.	National Recommended Water Quality Criteria published pursuant to Section 304(a) of the CWA. http://water.epa.gov/scitech/swguidance/waterquality/standards/current/index.cfm	To Be Considered for Alternatives 2 to 7	Site data are compared to these recommended values and are discussed in the CMS for evaluation of VOC migration into Peconic River.
Oak Ridge National Laboratory Sediment Benchmarks (for Aquatic Life)(ORNL)					
Sediment	Generic risk-based screening values for evaluating impacts to benthic invertebrates from pollutants in sediment.	Contaminated environmental media can be screened against these generic values for a preliminary indicator of risk. Also, one can prepare site-specific values using the reference materials.	ORNL sediment quality benchmarks - Table 3 (secondary chronic values), Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota: 1997 Revision (Hull, Jones, and Suter II, 1997). http://www.esd.ornl.gov/programs/ecorisk/documents/tm95r4.pdf.	To Be Considered for Alternatives 2 to 7	VOC-impacted groundwater from the Southern Area discharges to the Peconic River. These screening values are used to evaluate potential impacts to benthic invertebrates. Current data show no adverse impact on the river from site-related contaminants.
Oak Ridge National Laboratory Surface Water Benchmarks (for Aquatic Life)					
Surface water	Generic risk-based screening values for evaluating impacts to aquatic organisms from pollutants in surface water.	Contaminated environmental media can be screened against these generic values for a preliminary indicator of risk. Also, one can prepare site-specific values using the reference materials.	ORNL surface water benchmarks - Table 1 (secondary chronic values), Toxilogical Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota: 1996 Revision (Suter and Tsao, 1996). http://www.esd.ornl.gov/programs/ecorisk/documents/tm96r2.pdf.	To Be Considered for Alternatives 2 to 7	VOC-impacted groundwater from the Southern Area discharges to the Peconic River. These screening values are used to evaluate potential impacts to benthic invertebrates. Current data show no adverse impact on the river from site-related contaminants.

TABLE D-1
CHEMICAL-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)
SOUTHERN AREA CORRECTIVE MEASURES STUDY
NWIRP CALVERTON, NEW YORK

MEDIA	REQUIREMENT	PREREQUISITE	CITATION	ARAR DETERMINATION	COMMENT
NY STATE CHEMICAL-SPECIFIC ARARs					
NYSDOH Soil Vapor Intrusion Guidance					
Indoor Air, Soil Vapor, Ambient Air	TBC guidance from the New York State Department of Health (NYSDOH) provides evaluation framework, mitigation techniques, sampling protocols, and screening values applicable to impacted soil gas and indoor air.	Impacted soil vapor or indoor air.	NYSDOH, 2006. *Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York* . Center for Environmental Health, Bureau of Environmental Exposure Investigation. October. Matrix Tables	To Be Considered for Alternatives 2 to 7	The TBC guidance specifies risk-based benchmark values for subslab vapor and indoor air. The default remedy for mitigating potential future vapor intrusion risk is to remediate the groundwater containing the chemicals presumably causing the vapor intrusion issue(s). The intent of any groundwater remedy to be implemented for the Southern Area plume (evaluated herein) will be to decrease COC concentrations to allow for potable use and comply with ARARs (e.g., NYS MCLs). This action will reduce or eliminate the need for remediating groundwater strictly to address indoor vapor.
NYSDEC Surface Water and Groundwater Effluent Standards					
Groundwater	Water classifications provide for the protection of public water supplies.	Standards are used to protect the public health or welfare and enhance water quality.	6 NYCRR 701.15	To Be Considered for Alternatives 2 to 7	Groundwater in this area is classifed as Class GA. 6 NYCRR 701.15, "The best usage of Class GA waters is as a source of potable water supply."
Surface Water	Water classifications provide for the protection and propagation of fish, shellfish and wildlife, and for recreation in and on the water, and take into account the use and value of propagation of fish, shellfish and wildlife, recreation in and on the water, and agricultural, industrial and other purposes, including navigation.	Standards are used to protect the public health or welfare and enhance water quality.	6 NYCRR 701.8	To Be Considered for Alternatives 2 to 7	Peconic River in this area is classifed as Class C. Per 6 NYCRR 701.8, "the best usage of Class C waters is fishing. These waters shall be suitable for fish, shellfish, and wildlife propagation and survival. The water quality shall be suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes." Therefore the NYS Class C surface water quality standards apply.
NYSDEC Public Water Supply Regulations					
Groundwater and Surface Water Resources	Maximum Contaminant Levels (MCLs) and monitoring requirements for public water supplies, water supply well construction requirements, water quality treatment districts, and bottled and bulk water standards.	Potential site contamination impact on public water supply to be addressed by, or potentially caused by, environmental action.	10 NYCRR 5, Subpart 5-1.51 to 5-1.52	To Be Considered for Alternatives 1 to 7	The aquifer, which is a potential drinking water source, is impacted by site contamination. NYSDOH MCLs are considered in the development of PRGs.
NYSDEC Division of Fish, Wildlife, and Marine Resources					
Surface Water and Sediment	Surface water and sediment screening values and criteria for the protection of human health, aquatic life, wildlife, fish flesh tainting, and aesthetics.	Potential site contamination impact on surface water or sediment to be addressed by, or potentially caused by, environmental action.	NYSDEC, 1999. *Technical Guidance for Screening Contaminated Sediments* . NYSDEC, Division of Fish, Wildlife, and Marine Resources. January 25.	To Be Considered for Alternatives 2 to 7	VOC-impacted groundwater from the Southern Area discharges to the Peconic River. These screening values are used to evaluate potential impacts to aquatic life and human health. Current data show no adverse impact on the river from site-related contaminants.

TABLE D-2
LOCATION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)
SOUTHERN AREA CORRECTIVE MEASURES STUDY
NWIRP CALVERTON, NEW YORK

MEDIA	REQUIREMENT	PREREQUISITE	CITATION	ARAR DETERMINATION	COMMENT
FEDERAL LOCATION-SPECIFIC ARARs					
Clean Water Act (CWA)					
Wetlands	Avoid adverse effects, minimize potential harm, and preserve and enhance wetlands, to the extent possible.	Action involving construction of facilities or management of property in wetlands. Wetland as defined by Executive Order 11990 Section 7 (protection of Wetlands).	Executive Order 11990;	To be considered Applicable Alternatives 3 to 7	Wetlands are present throughout the Southern Area. This affects the implementability of all of the active-technology alternatives. Effects on wetlands must be considered during alternative development and implementation. However, there will not be any "draining, dredging, channelizing, filling, diking, impounding, and related activities and any structures or facilities" in the wetlands (EO 11990 Section 7[b]). Only vertical wells would be installed, and related installation equipment, conveyance piping, and personnel would need to traverse through areas.
Safe Drinking Water Act (SDWA)					
Sole source aquifer	SDWA prevents federal funding from being committed to any project that may contaminate a “sole source aquifer,” meaning any EPA-designated aquifer that is the only principal drinking water supply for a given area which, if contaminated, would present a significant human health hazard.	Generally, CERCLA activities do not in and of themselves increase pre-existing contamination of sole source aquifers.	40 CFR 149	Applicable for Alternatives 2 to 7	The aquifer beneath Suffolk County is a sole source aquifer (43 CFR 26611). All active-technology alternatives treat groundwater and do not have components that would further contaminate the sole source aquifer in the Southern Area.
NY STATE LOCATION-SPECIFIC ARARs					
NYSDEC Air Quality Area Classifications					
Air	Establishes Air Quality Area Classification to determine applicable air standards.	Air standards apply to particular air quality area classification.	6 NYCRR 307.4	Applicable to Alternatives 4, 6, and 7	NWIRP Calverton is in a region of Suffolk County, NY, with an Air Quality Classification of Level I (6 NYCRR 307.4) (Air Quality Classification determines the applicable particulates Air Quality Standard -- all other Standards are independent of Classification). The values are meant to be representative for the geographic region, not the site, and air monitoring is performed by NYSDEC state-wide. The mass of volatiles removed during air stripping (Extraction, Treatment, and Disposal alternative) would be well-below criteria levels.
NYSDEC Water Classifications and Standards of Quality & Purity					
Groundwater	Water classifications for Eastern Suffolk County, NY.	Standards are used to protect the public health or welfare and enhance water quality.	6 NYCRR 701	Applicable to Alternatives 2 to 7	Groundwater in this area is classifed as Class GA. 6 NYCRR 701.15, "The best usage of Class GA waters is as a source of potable water supply."
Surface Water	Water classifications for Eastern Suffolk County, NY.	Standards are used to protect the public health or welfare and enhance water quality.	6 NYCRR 701	Applicable to Alternatives 2 to 7	Peconic River in this area is classifed as Class C per 6 NYCRR 924. Per 6 NYCRR 701.8, "the best usage of Class C waters is fishing. These waters shall be suitable for fish, shellfish, and wildlife propagation and survival. The water quality shall be suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes."

TABLE D-2
LOCATION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)
SOUTHERN AREA CORRECTIVE MEASURES STUDY
NWIRP CALVERTON, NEW YORK

MEDIA	REQUIREMENT	PREREQUISITE	CITATION	ARAR DETERMINATION	COMMENT
NYSDEC Freshwater Wetlands Act					
Wetland	Preserve, protect, and conserve freshwater wetlands (and the benefits derived therefrom) to prevent the despoliation and destruction of freshwater wetlands, and to regulate use and development of such wetlands to secure the natural benefits of freshwater wetlands, consistent with the general welfare and beneficial economic, social, and agricultural development.	Activities within or adjacent to a state-regulated wetlands requires a permit or letter of approval.	NY ECL Article 24; NY ECL 71 Title 23 (enforcement of Article 24). 6 NYCRR 662 - 664.	Applicable for Alternatives 3 to 7	Wetlands are present throughout the Southern Area. This affects the implementability of all of the active-technology alternatives. Effects on wetlands must be considered during alternative development and implementation. The appropriate NYS agencies would be involved in the implementation of any alternative to assure any impacts are minimized.
NYSDEC Endangered and Threatened Species of Fish and Wildlife; Species of Special Concern					
Critical habitat of/or presence of an endangered or threatened species	Identify activities that may affect listed species. Actions must not threaten the continued existence of a listed species. Actions must not destroy critical habitat.	Presence of species or habitat listed as endangered or threatened.	6 NYCRR 182	Applicable for Alternatives 3 to 7	Information provided by NYSDEC and the NY Natural Heritage program indicates several NYS endangered and threatened animal species exist within the Southern. The most notable, tiger salamander (*Ambystoma tigrinum*), may occur onsite in the ponds adjacent to Site 6A and elsewhere with the Southern Area. Other species include the northern cricket frog (*Acris crepitans*) and the least tern (*Sterna antillarum*). Additional endangered and threatened plant species occur within the facility boundary and may be present in the Southern Area. According to the information supplied by NYSDEC, the wetland areas surrounding the Peconic River, including Swan Pond, include significant habitat for many NYS-endangered and threatened animals and plants. Portions of these wetland areas are within the offsite portion of the Southern Area. Any alternative implementation must include measures to minimize impacts.
NYSDEC Wild, Scenic, and Recreational Rivers System Act					
Rivers	Preservation of State rivers in free-flowing condition and protection for the benefit and enjoyment of present and future generations.	Activities within or adjacent to a state-regulated river requires a permit or letter of approval.	6 NYCRR 666	Applicable to Alternatives 3 to 7	NYS designated the upper 10.5-mile reach of the Peconic River as a scenic river and the lower 5.5-mile reach as a recreational river. No alternative will affect the river. However, activities (e.g., remedial construction and O&M) within a certain distance (e.g., 1/2 mile buffer zone [6 NYCRR 666.6]) may require a permit or variance request. No alternatives should impact the "natural, cultural, scenic, and recreational qualities" of the river.
NYSDEC Inactive Hazardous Waste Disposal Site Regulations					
Contaminated Site	NY remediation program for sites listed on the NYS Registry or the NPL, or that are being addressed by the U.S. DOD or DOE.	Navy ERP Site	6 NYCRR 375	Applicable to Alternatives 2 to 7	NWIRP Calverton is not on the NPL, but is listed on the NYS Registry and is a DOD-owned site.

TABLE D-3
ACTION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)
SOUTHERN AREA FEASIBILITY STUDY
NWIRP CALVERTON, NEW YORK

MEDIA	REQUIREMENT	PREREQUISITE	CITATION	ARAR DETERMINATION	COMMENT
FEDERAL ACTION-SPECIFIC ARARs					
Safe Drinking Water Act (SDWA)					
Underground injection	Regulates the subsurface emplacement of liquids through the Underground Injection Control program, which governs the design and operation of five classes of injection wells in order to prevent contamination of underground sources of drinking water. The Underground Injection Control program regulates well construction, well operation, and monitoring.	Underground injection of wastes and treated groundwater.	40 CFR 144.81 and 0.82	Applicable to Alternatives 5, 6, and 7	No alternative includes injection of wastes. Alternative 5 and 6 involves the injection of emulsified vegetable oil, and Alternative 7 involves the injection of treated groundwater via infiltration gallery.
Materials Management					
Fuel and oil	When cumulative onsite bulk storage volume of fuel and/or oil is greater than 1,320 gallons, comprised of containers >55 gallons, the >55-gallon-containers (e.g., drums or tanks) must be secondarily contained, inspected routinely, have a Spill Preventation Control and Countermeasures (SPCC) plan prepared, and meet other specific SPCC requirements.	Fuels and oil stored on site in containers >55 gallons when cumulative onsite bulk storage volume is >1,320 gallons.	40 CFR 112	Applicable to Alternatives 5 and 6	Applicable for Alternatives 5 and 6, which include the temporary onsite staging and injection of emulsified food-grade vegetable oil. Fuel container capacities for the remedial action are not anticipated to be above these volumes. Any fuels and oil would be stored in appropriate containers and controlled areas as appropriate. An SPCC Plan would be prepared under 40 CFR 112 and implemented. Greater than 1,320 gallons of emulsified vegetable oil will be on site.
NY STATE ACTION-SPECIFIC ARARs					
New York Identification and Listing of Hazardous Wastes Regulations					
Hazardous Waste	Characterization and identification of wastes.	Generation of hazardous wastes.	6 NYCRR 371.3, 372.2, and 373-1.1	Applicable to Alternatives 3 to 7	Prior to offsite disposal, waste materials will be characterized for hazardous waste classification.
NYSDOH Soil Vapor Intrusion Guidance					
Indoor Air, Soil Vapor, Ambient Air	TBC guidance from NYSDOH provides evaluation framework, mitigation techniques, sampling protocols, and screening values applicable to impacted soil gas and indoor air.	Investigation and/or environmental action for contaminated soil / soil vapor and/or indoor air.	NYSDOH, 2006. *Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York*. Center for Environmental Health, Bureau of Environmental Exposure Investigation. October.	To Be Considered for Alternatives 1 to 7	The TBC guidance specifies risk-based benchmark values for subslab vapor and indoor air. The default remedy for mitigating potential future vapor intrusion risk is to remediate the groundwater containing the chemicals presumably causing the vapor intrusion issue(s). The intent of any groundwater remedy to be implemented for the Southern Area plume (evaluated herein) will be to decrease COC concentrations to allow for potable use and comply with ARARs (e.g., NYS MCLs). This action will reduce or eliminate the need for remediating groundwater strictly to address indoor vapor.

APPENDIX E

CALCULATIONS

Tetra Tech NUS		STANDARD CALCULATION SHEET	
CLIENT: USN CLEAN	FILE No: WE08	BY: SK	PAGE: 1 of 24
SUBJECT: Area, Volume, Concentration, and Mass Calculations NWIRP Calverton, New York		CHECKED BY:	DATE: 3/21/2011

1. PURPOSE:

Determine characteristics of volatile organic compounds (VOCs) present in contaminated groundwater in the Southern Area Plume. Characteristics include area, volume, concentration, and mass estimates bound in isoconcentration contours 5-50, 50-500 and >500 micrograms per liter (µg/L) 1,1-Dichloroethane (DCA). Characteristics are representative of free VOCs and do not include VOCs adsorbed onto soil particles within the aquifer.

2. APPROACH:

Use isoconcentration contour mapping as the basis to determine the extent of contamination. Divide the plume into areas using DCA Isoconcentration (isoconc.) contours of 5-50, 50-500 and >500 µg/L to calculate area, volume, mean concentration, and mass of contaminants. The plume is divided into three main areas, with three additional sub areas. Area 1 includes three sub areas, A1.1, A1.2, and A1.3. A1.1, A1.2, and A1.3 are all located on-site. Area 2 includes all area of the off-site portion of the Southern Area Plume up to the wetlands bordering the Peconic River. Area 2 is split into 4 larger sub areas that encompass the 5, 50, and 500 isoconcentration contours, which are also subdivided. Area 3 includes the remaining off-site portion of the Southern Area Plume to the Peconic River. See Figure 1 (attached at end) for designation of described areas.

3.0 AREA 1

See Figure 1 (attached at end) for the designation of Area 1.

3.1 CALCULATE AVERAGE CONCENTRATIONS WITHIN THE AQUIFER FOR THE 5-50, 50-500, >500 DCA ISOCONCENTRATION CONTOURS FOR AREA 1.1

Individual DCA isoconc. contour	Length of isoconc. contour (feet (ft))	Width of isoconc. contour (ft)	Area of isoconc. contour (acres)	Volume of isoconc. contour (cubic feet (ft^3))	Depth of plume (ft below ground surface (bgs))	Thickness of plume (ft)	Height above clay unit (ft)
>5	780	200	3.6	4,680,000	18-48	30	12
>50	670	140	2.2	1,313,200	26-40	14	20
>500	600	70	1.0	336,000	29-37	8	23

Isoconc. Contour(1)	Area within isoconc. contour (acres)	Volume of aquifer within isoconc. contour (ft^3)(2)	Minimum DCA concentration in aquifer within contour (µg/L)	Maximum DCA concentration in aquifer within contour (µg/L)	Geometric mean concentration of DCA within contour (µg/L)
5-50	1.4	3,366,800	5	50	16
50-500	1.2	977,200	50	500	158
>500	1.0	336,000	500	1,500	866

1 = Isoconcentration contour 5-50 includes the area within the individual 5 and 50 DCA contours. Isoconcentration contour 50-500 includes the area within the individual 50 and 500 contours, and Isoconcentration contour >500 includes the area within the individual 500 DCA contour.

2 = Volume of aquifer includes the volume of groundwater and soil. A porosity of 25% (0.25) is used to describe the fraction of available groundwater within the aquifer. 75% of the aquifer is made up of soil.

Total volume contaminated aquifer in Area 1.1: 4,680,000 ft^3

3.2 ESTIMATE TOTAL VOCs IN AREA 1.1 BASED ON THE DCA CONCENTRATION IN THE SAMPLE WITH THE MAXIMUM TOTAL VOC CONCENTRATION IN AREA 1.1

Well ID	SA-TW348(1)
Date Sampled	Sep-10
Screen Depth (ft bgs)	20-25
1,1,1-Trichloroethane (µg/L)	550
1,1-Dichloroethane (µg/L)	1,500
1,1-Dichloroethene (µg/L)	68
Chloroethene (µg/L)	340

1 = Well identified as having the maximum total VOC concentration in Area 1.1 of the on-site portion of the plume.

Maximum DCA concentration in the sample with the highest total concentration of VOCs:	1,500 µg/L
Estimated concentration of VOCs in Area 1.1:	2,459 µg/L
Percentage of total VOC concentration that is DCA:	61 %

3.3 MASS OF DCA AND TOTAL VOCs IN AREA 1.1

Isoconc. contour	Geometric mean concentration of DCA within contour (µg/L)	Volume of aquifer within isoconc. contour (ft^3)	Assumed porosity	Volume of contaminated groundwater within isoconc. contour (ft^3)	Volume of contaminated groundwater in isoconc. contour (gallons)	Mass DCA (pounds(lbs))	Mass VOCs (lbs)
5-50	16	3,366,800	0.25	841,700	6,296,353	0.8	1.4
50-500	158	977,200	0.25	244,300	1,827,491	2.4	4.0
>500	866	336,000	0.25	84,000	628,364	4.5	7.4
Total		4,680,000		1,170,000	8,752,208	7.8	13

3.4 CALCULATE AVERAGE CONCENTRATIONS WITHIN THE AQUIFER FOR THE 5-50, 50-500, >500 DCA ISOCONCENTRATION CONTOURS FOR AREA 1.2

Individual DCA isoconc. contour	Length of isoconc. contour (feet (ft))	Width of isoconc. contour (ft)	Area of isoconc. contour (acres)	Volume of isoconc. contour (cubic feet (ft³))	Depth of plume (ft below ground surface (bgs))	Thickness of plume (ft)	Height above clay unit (ft)
>5	870	390	7.8	6,786,000	25-45	20	11
>50	870	230	4.6	2,401,200	30-42	12	14
>500	870	100	2.0	696,000	30-38	8	18

Isoconc. Contour(1)	Area within isoconc. contour (acres)	Volume of aquifer within isoconc. contour (ft³)(2)	Minimum DCA concentration in aquifer within contour (µg/L)	Maximum DCA concentration in aquifer within contour (µg/L)	Geometric mean concentration of DCA within contour (µg/L)
5-50	3.2	4,384,800	5	50	16
50-500	2.6	1,705,200	50	500	158
>500	2.0	696,000	500	2,100	1,025

1 = Isoconcentration contour 5-50 includes the area within the individual 5 and 50 DCA contours. Isoconcentration contour 50-500 includes the area within the individual 50 and 500 contours, and Isoconcentration contour >500 includes the area within the individual 500 DCA contour.

2 = Volume of aquifer includes the volume of groundwater and soil. A porosity of 25% (0.25) is used to describe the fraction of available groundwater within the aquifer. 75% of the aquifer is made up of soil.

Total volume contaminated aquifer in Area 1.2: 6,786,000 ft³

3.5 ESTIMATE TOTAL VOCs IN AREA 1.2 BASED ON THE DCA CONCENTRATION IN THE SAMPLE WITH THE MAXIMUM TOTAL VOC CONCENTRATION IN AREA 1.2

Well ID	SA-TW355(1)
Date Sampled	Jun-10
Screen Depth (ft bgs)	30-35
1,1,1-Trichloroethane (µg/L)	570
1,1-Dichloroethane (µg/L)	2,100
1,1-Dichloroethene (µg/L)	110
Chloroethene (µg/L)	470

1 = Well identified as having the maximum total VOC concentration in Area 1.2 of the on-site portion of the plume.

Maximum DCA concentration in the sample with the highest total concentration of VOCs:	2,100 µg/L
Estimated concentration of total VOCs in Area 1.2:	3,231 µg/L
Percentage of total VOC concentration that is DCA:	65 %

3.6 MASS OF DCA AND TOTAL VOCs IN AREA 1.2

Isoconc. contour	Geometric mean concentration of DCA within contour (µg/L)	Volume of aquifer within isoconc. contour (ft³)	Assumed porosity	Volume of contaminated groundwater within isoconc. contour (ft³)	Volume of contaminated groundwater in isoconc. contour (gallons)	Mass DCA (pounds(lbs))	Mass VOCs (lbs)
5-50	16	4,384,800	0.25	1,096,200	8,200,145	1.1	1.7
50-500	158	1,705,200	0.25	426,300	3,188,945	4.2	6.5
>500	1,025	696,000	0.25	174,000	1,301,610	11	17
Total		6,786,000		1,696,500	12,690,701	16	25

Tetra Tech NUS		STANDARD CALCULATION SHEET	
CLIENT: USN CLEAN	FILE No: WE08	BY: SK	PAGE: 4 of 24
SUBJECT: Area, Volume, Concentration, and Mass Calculations NWIRP Calverton, New York		CHECKED BY:	DATE: 3/21/2011

3.7 CALCULATE AVERAGE CONCENTRATIONS WITHIN THE AQUIFER FOR THE 5-50, 50-500, >500 DCA ISOCONCENTRATION CONTOURS FOR AREA 1.3

>5 Contour

Individual DCA isoconc. contour	Length of isoconc. contour (feet (ft))	Width of isoconc. contour (ft)	Area of isoconc. contour (acres)	Volume of isoconc. contour (cubic feet (ft³))	Depth of plume (ft below ground surface (bgs))	Thickness of plume (ft)	Height above clay unit (ft)
$A_{5,1}$ (1)	960	530	12	11,702,400	27-52	23	0
$A_{5,2}$	960	250	2.8	3,000,000	23-48	25	0
Total			14	14,702,400			

1 = See Figure 1 for the boundaries of additional sub-areas in Areas 1.1, 1.2, 1.3, 2, and 3.

>50 Contour

Individual DCA isoconc. contour	Length of isoconc. contour (ft)	Width of isoconc. contour (ft)	Area of isoconc. contour (acres)	Volume of isoconc. contour (ft³)	Depth of plume (ft bgs)	Thickness of plume (ft)	Height above clay unit (ft)
A_{50}	960	200	4.4	4,416,000	24-47	23	0
Total			4.4	4,416,000			

>500 Contour

Individual DCA isoconc. contour	Length of isoconc. contour (ft)	Width of isoconc. contour (ft)	Area of isoconc. contour (acres)	Volume of isoconc. contour (ft³)	Depth of plume (ft bgs)	Thickness of plume (ft)	Height above clay unit (ft)
A_{500}	960	100	2.2	1,440,000	29-44	15	0
Total			2.2	1,440,000			

Isoconc. Contour(1)	Area within isoconc. contour (acres)	Volume of aquifer within isoconc. contour (ft³)(2)	Minimum DCA concentration in aquifer within contour (µg/L)	Maximum DCA concentration in aquifer within contour (µg/L)	Geometric mean concentration of DCA within contour (µg/L)
5-50	10	10,286,400	5	50	16
50-500	2.2	2,976,000	50	500	158
>500	2.2	1,440,000	500	2,100	1,025

1 = Isoconcentration contour 5-50 includes the area within the individual 5 and 50 DCA contours. Isoconcentration contour 50-500 includes the area within the individual 50 and 500 contours, and Isoconcentration contour >500 includes the area within the individual 500 DCA contour.

2 = Volume of aquifer includes the volume of groundwater and soil. A porosity of 25% (0.25) is used to describe the fraction of available groundwater within the aquifer. 75% of the aquifer is made up of soil.

Total volume contaminated aquifer in Area 1.3: 14,702,400 ft³

Tetra Tech NUS		STANDARD CALCULATION SHEET	
CLIENT: USN CLEAN	FILE No: WE08	BY: SK	PAGE: 5 of 24
SUBJECT: Area, Volume, Concentration, and Mass Calculations NWIRP Calverton, New York		CHECKED BY:	DATE: 3/21/2011

3.8 ESTIMATE TOTAL VOCs IN AREA 1.3 BASED ON THE DCA CONCENTRATION IN THE SAMPLE WITH THE MAXIMUM TOTAL VOC CONCENTRATION IN AREA 1.3

Well ID	SA-TW320(1)
Date Sampled	Mar-10
Screen Depth (ft bgs)	30-34
1,1,1-Trichloroethane (µg/L)	440
1,1-Dichloroethane (µg/L)	1,200
1,1-Dichloroethene (µg/L)	86
Chloroethene (µg/L)	270

1 = Well identified as having the maximum total VOC concentration in Area 1.3 of the on-site portion of the plume.

Maximum DCA concentration in the sample with the highest total concentration of VOCs:	1,200 µg/L
Estimated concentration of total VOCs in Area 1.3:	2,000 µg/L
Percentage of total VOC concentration that is DCA:	60 %

3.9 MASS OF DCA AND TOTAL VOCs IN AREA 1.3

Isoconc. contour	Geometric mean concentration of DCA within contour (µg/L)	Volume of aquifer within isoconc. contour (ft³)	Assumed porosity	Volume of contaminated groundwater within isoconc. contour (ft³)	Volume of contaminated groundwater in isoconc. contour (gallons)	Mass DCA (pounds(lbs))	Mass VOCs (lbs)
5-50	16	10,286,400	0.25	2,571,600	19,236,904	2.5	4.2
50-500	158	2,976,000	0.25	744,000	5,565,506	7.3	12
>500	1,025	1,440,000	0.25	360,000	2,692,987	23	38
Total		14,702,400		3,675,600	27,495,397	33	55

Tetra Tech NUS		STANDARD CALCULATION SHEET	
CLIENT: USN CLEAN	FILE No: WE08	BY: SK	PAGE: 6 of 24
SUBJECT: Area, Volume, Concentration, and Mass Calculations NWIRP Calverton, New York		CHECKED BY:	DATE: 3/21/2011

SUMMARY OF MASS OF DCA AND TOTAL VOCs IN AREA 1.1

Isoconc. contour	Geometric mean concentration of DCA within contour (µg/L)	Volume of contaminated groundwater in isoconc. contour (gallons(gal))	Mass DCA (pounds(lbs))	Mass VOCs (lbs)
5-50	16	6,296,353	0.8	1.4
50-500	158	1,827,491	2.4	4.0
>500	866	628,364	4.5	7.4
Total		8,752,208	7.8	13

SUMMARY OF MASS OF DCA AND TOTAL VOCs IN AREA 1.2

Isoconc. contour	Geometric mean concentration of DCA within contour (µg/L)	Volume of contaminated groundwater in isoconc. contour (gal)	Mass DCA (lbs)	Mass VOCs (lbs)
5-50	16	8,200,145	1.1	1.7
50-500	158	3,188,945	4.2	6.5
>500	1,025	1,301,610	11	17
Total		12,690,701	16	25

SUMMARY OF MASS OF DCA AND TOTAL VOCs IN AREA 1.3

Isoconc. contour	Geometric mean concentration of DCA within contour (µg/L)	Volume of contaminated groundwater in isoconc. contour (gal)	Mass DCA (lbs)	Mass VOCs (lbs)
5-50	16	19,236,904	2.5	4.2
50-500	158	5,565,506	7.3	12
>500	1,025	2,692,987	23	38
Total		27,495,397	33	55

SUMMARY OF MASS OF DCA AND TOTAL VOCs IN AREA 1

Isoconc. Contour	DCA (lbs)	Total VOCs (lbs)
5-50	4.5	7.3
50-500	14	23
>500	39	63
Total	57	93

4.0 AREA 2

See Figure 1 (attached at end) for the designation of Area 2.

4.1 CALCULATE AVERAGE CONCENTRATIONS WITHIN THE AQUIFER FOR THE 5-50, 50-500, >500 DCA ISOCONCENTRATION CONTOURS FOR AREA 2

> 5 Contour

Individual DCA isoconc. contour	Length of isoconc. contour (feet (ft))	Width of isoconc. contour (ft)	Area of isoconc. contour (acres)	Volume of isoconc. contour (cubic feet (ft^3))	Depth of plume (ft below ground surface (bgs))	Thickness of plume (ft)	Height above clay unit (ft)
$A_{5,1,1}$	970	380	4.2	7,187,700	15-54	39	0
$A_{5,1,2}$	970	910	20	34,425,300	15-54	39	0
$A_{5,1,3}$	970	400	4.5	7,566,000	15-54	39	0
$A_{5,2,1}$	580	280	1.9	2,598,400	14-56	32	0
$A_{5,2,2}$	1,680	600	23	32,256,000	14-56	32	0
$A_{5,3,1}$	450	170	0.9	1,109,250	27-56	29	0
$A_{5,3,2}$	1,470	450	7.6	9,591,750	27-56	29	0
$A_{5,3,3}$	450	280	1.4	1,827,000	27-56	29	0
$A_{5,3,4}$	450	120	1.2	1,566,000	27-56	29	0
$A_{5,4,1}$	400	400	1.8	4,080,000	20-71	51	60
$A_{5,4,2}$	600	400	5.5	12,240,000	20-71	51	60
$A_{5,4,3}$	730	600	5.0	11,169,000	20-71	51	60
$A_{5,4,4}$	770	270	4.8	10,602,900	20-71	51	60
Total			82	136,219,300			

> 50 Contour

Individual DCA isoconc. contour	Length of isoconc. contour (ft)	Width of isoconc. contour (ft)	Area of isoconc. contour (acres)	Volume of isoconc. contour (ft^3)	Depth of plume (ft bgs)	Thickness of plume (ft)	Height above clay unit (ft)
$A_{50,1,1}$	970	330	3.7	4,961,550	20-51	31	0
$A_{50,1,2}$	970	430	9.6	12,930,100	20-51	31	0
$A_{50,1,3}$	970	380	4.2	5,713,300	20-51	31	0
$A_{50,2,1}$	1,220	600	17	22,692,000	20-51	31	0
$A_{50,2,2}$	600	520	3.6	4,836,000	20-51	31	0
$A_{50,3,1}$	780	450	4.0	2,632,500	30-45	15	0
$A_{50,3,2}$	680	450	7.0	4,590,000	30-45	15	0
$A_{50,3,3}$	450	280	1.4	945,000	30-45	15	0
$A_{50,4,1}$	750	550	4.7	2,681,250	27-40	13	60
$A_{50,4,2}$	510	110	1.3	729,300	27-40	13	60
Total			56	62,711,000			

> 500 Contour

Individual DCA isoconc. contour	Length of isoconc. contour (ft)	Width of isoconc. contour (ft)	Area of isoconc. contour (acres)	Volume of isoconc. contour (ft^3)	Depth of plume (ft bgs)	Thickness of plume (ft)	Height above clay unit (ft)
$A_{500,1,1}$	190	140	0.3	199,500	32-47	15	0
$A_{500,1,2}$	510	230	1.3	879,750	32-47	15	0
$A_{500,1,3}$	470	120	1.3	846,000	32-47	15	0
$A_{500,2,1}$	540	280	3.5	1,360,800	38-47	9	0
Total			6.4	3,286,050			

Tetra Tech NUS		STANDARD CALCULATION SHEET	
CLIENT: USN CLEAN	FILE No: WE08	BY: SK	PAGE: 8 of 24
SUBJECT: Area, Volume, Concentration, and Mass Calculations NWIRP Calverton, New York		CHECKED BY:	DATE: 3/21/2011

4.1 CALCULATE AVERAGE CONCENTRATIONS WITHIN THE AQUIFER FOR THE 5-50, 50-500, >500 DCA ISOCONCENTRATION CONTOURS FOR AREA 2

Isoconc. Contour(1)	Area within isoconc. contour (acres)	Volume of aquifer within isoconc. contour (ft³)(2)	Minimum DCA concentration in aquifer within contour (µg/L)	Maximum DCA concentration in aquifer within contour (µg/L)	Geometric mean concentration of DCA within contour (µg/L)
5-50	26	73,508,300	5	50	16
50-500	50	59,424,950	50	500	158
>500	6.4	3,286,050	500	1,200	775

1 = Isoconcentration contour 5-50 includes the area within the individual 5 and 50 DCA contours. Isoconcentration contour 50-500 includes the area within the individual 50 and 500 contours, and Isoconcentration contour >500 includes the area within the individual 500 DCA contour.

2 = Volume of aquifer includes the volume of groundwater and soil. A porosity of 25% (0.25) is used to describe the fraction of available groundwater within the aquifer. 75% of the aquifer is made up of soil.

Total volume contaminated aquifer in Area 2: 136,219,300 ft³

4.2 ESTIMATE TOTAL VOCs IN AREA 2 BASED ON THE DCA CONCENTRATION IN THE SAMPLE WITH THE MAXIMUM TOTAL VOC CONCENTRATION IN AREA 2

Well ID	SA-TW312(1)
Date Sampled	Sep-09
Screen Depth (ft bgs)	41-46
1,1,1-Trichloroethane (µg/L)	280
1,1-Dichloroethane (µg/L)	1200 J
1,1-Dichloroethene (µg/L)	55
Chloroethene (µg/L)	91

1 = Well identified as having the maximum total VOC concentration in Area 2 of the off-site plume.

Maximum DCA concentration in the sample with the highest total concentration of VOCs:	1,200 µg/L
Estimated concentration of total VOCs in Area 2:	1,622 µg/L
Percentage of total VOC concentration that is DCA:	74 %

4.3 MASS OF DCA AND TOTAL VOCs IN AREA 2

Isoconc. contour	Geometric mean concentration of DCA within contour (µg/L)	Volume of aquifer within isoconc. contour (ft³)	Assumed porosity	Volume of contaminated groundwater within isoconc. contour (ft³)	Volume of contaminated groundwater in isoconc. contour (gallons)	Mass DCA (pounds(lbs))	Mass VOCs (lbs)
5-50	16	73,508,300	0.25	18,377,075	137,470,068	18	25
50-500	158	59,424,950	0.25	14,856,238	111,132,374	147	198
>500	775	3,286,050	0.25	821,513	6,145,340	40	54
Total		136,219,300		34,054,825	254,747,782	204	276

5.0 AREA 3

See Figure 1 (attached at end) for the designation of Area 3.

5.1 CALCULATE AVERAGE CONCENTRATIONS WITHIN THE AQUIFER FOR THE 5-50, 50-500, >500 DCA ISOCONCENTRATION CONTOURS FOR AREA 3

> 5 Contour

Individual DCA isoconc. contour	Length of isoconc. contour (feet (ft))	Width of isoconc. contour (ft)	Area of isoconc. contour (acres)	Volume of isoconc. contour (cubic feet (ft^3))	Depth of plume (ft below ground surface (bgs))	Thickness of plume (ft)	Height above clay unit (ft)
$A_{5,1}$	600	310	2.1	4,185,000	42-87	45	46
$A_{5,2}$	730	600	10	19,710,000	42-87	45	46
$A_{5,3}$	700	160	1.3	5,040,000	42-87	45	46
Total			13	28,935,000			

> 50 Contour

Individual DCA isoconc. contour	Length of isoconc. contour (ft)	Width of isoconc. contour (ft)	Area of isoconc. contour (acres)	Volume of isoconc. contour (ft^3)	Depth of plume (ft bgs)	Thickness of plume (ft)	Height above clay unit (ft)
$A_{50,1}$	0	0	0	0	0	0	0
Total			0	0			

> 500 Contour

Individual DCA isoconc. contour	Length of isoconc. contour (ft)	Width of isoconc. contour (ft)	Area of isoconc. contour (acres)	Volume of isoconc. contour (ft^3)	Depth of plume (ft bgs)	Thickness of plume (ft)	Height above clay unit (ft)
$A_{500,1}$	0	0	0	0	0	0	0
Total			0	0			

Isoconc. Contour(1)	Area within isoconc. contour (acres)	Volume of aquifer within isoconc. contour (ft^3)(2)	Minimum DCA concentration in aquifer within contour (µg/L)	Maximum DCA concentration in aquifer within contour (µg/L)	Geometric mean concentration of DCA within contour (µg/L)
5-50	13	28,935,000	5	22	10
50-500	0	0	50	0	0
>500	0	0	500	0	0

1 = Isoconcentration contour 5-50 includes the area within the individual 5 and 50 DCA contours. Isoconcentration contour 50-500 includes the area within the individual 50 and 500 contours, and Isoconcentration contour >500 includes the area within the individual 500 DCA contour.

2 = Volume of aquifer includes the volume of groundwater and soil. A porosity of 25% (0.25) is used to describe the fraction of available groundwater within the aquifer. 75% of the aquifer is made up of soil.

Total volume contaminated aquifer in Area 3: 28,935,000 ft^3

Tetra Tech NUS		STANDARD CALCULATION SHEET	
CLIENT: USN CLEAN	FILE No: WE08	BY: SK	PAGE: 10 of 24
SUBJECT: Area, Volume, Concentration, and Mass Calculations NWIRP Calverton, New York		CHECKED BY:	DATE: 3/21/2011

5.2 ESTIMATE TOTAL VOCs IN AREA 3 BASED ON THE DCA CONCENTRATION IN THE SAMPLE WITH THE MAXIMUM TOTAL VOC CONCENTRATION IN AREA 3

Well ID	SA-PZ124[(1)]
Date Sampled	Sep-10
Screen Depth (ft bgs)	3-6
1,1,1-Trichloroethane (µg/L)	0
1,1-Dichloroethane (µg/L)	22
1,1-Dichloroethene (µg/L)	5.2
Chloroethene (µg/L)	0

1 = Well identified as having the maximum total VOC concentration in Area 3 of the off-site plume.

Maximum DCA concentration in the sample with the highest total concentration of VOCs:	22 µg/L
Estimated concentration of total VOCs in Area 3:	27 µg/L
Percentage of total VOC concentration that is DCA:	81 %

5.3 MASS OF DCA AND TOTAL VOCs IN AREA 3

Isoconc. contour	Geometric mean concentration of DCA within contour (µg/L)	Volume of aquifer within isoconc. contour (ft³)	Assumed porosity	Volume of contaminated groundwater within isoconc. contour (ft³)	Volume of contaminated groundwater in isoconc. contour (gallons)	Mass DCA (pounds(lbs))	Mass VOCs (lbs)
5-50	10	28,935,000	0.25	7,233,750	54,112,208	4.7	5.8
50-500	0	0	0.25	0	0	0	0
>500	0	0	0.25	0	0	0	0
Total		28,935,000		7,233,750	54,112,208	4.7	5.8

Tetra Tech NUS		STANDARD CALCULATION SHEET	
CLIENT: USN CLEAN	FILE No: WE08	BY: SK	PAGE: 11 of 24
SUBJECT: Area, Volume, Concentration, and Mass Calculations NWIRP Calverton, New York		CHECKED BY:	DATE: 3/21/2011

SUMMARY OF MASS OF DCA AND TOTAL VOCs IN AREA 1

Isoconc. contour	Geometric mean concentration of DCA within contour (µg/L)	Volume of contaminated groundwater in isoconc. contour (gallons(gal))	Mass DCA (pounds(lbs))	Mass VOCs (lbs)
5-50	16	33,733,403	4.5	7.3
50-500	158	10,581,943	14	23
>500	1,025	4,622,961	39	63
Total		48,938,306	57	93

SUMMARY OF MASS OF DCA AND TOTAL VOCs IN AREA 2

Isoconc. contour	Geometric mean concentration of DCA within contour (µg/L)	Volume of contaminated groundwater in isoconc. contour (gal)	Mass DCA (lbs)	Mass VOCs (lbs)
5-50	16	137,470,068	18	25
50-500	158	111,132,374	147	198
>500	775	6,145,340	40	54
Total		254,747,782	204	276

SUMMARY OF MASS OF DCA AND TOTAL VOCs IN AREA 3

Isoconc. contour	Geometric mean concentration of DCA within contour (µg/L)	Volume of contaminated groundwater in isoconc. contour (gal)	Mass DCA (lbs)	Mass VOCs (lbs)
5-50	10	54,112,208	4.7	5.8
50-500	0	0	0	0
>500	0	0	0	0
Total		54,112,208	4.7	5.8

SUMMARY OF MASS OF DCA AND TOTAL VOCs IN THE SOUTHERN AREA GROUNDWATER PLUME

Isoconc. Contour	DCA (lbs)	Total VOCs (lbs)
5-50	27	38
50-500	161	221
>500	78	117
Total	266	375

6. PURPOSE:

Determine the rate of mass flow of 1,1-Dichloroethane (DCA) and total volatile organic compounds (VOCs) present in contaminated groundwater in the Southern Area Plume. Mass flow estimates were determined using DCA Isoconcentration (Isoconc.) contours of 5-50, 50-500 and >500 µg/L. Estimates are representative of free VOCs within the aquifer.

7. APPROACH:

Use isoconcentration contour mapping as the basis to determine the extent of contamination. The plume is divided into three main areas, with three additional sub areas. Area 1 includes three sub areas, A 1.1, A 1.2, and A1.3. A1.1, A1.2, and A1.3 are all located on-site. Area 2 includes all area of the off-site portion of the Southern Area Plume up to the wetlands bordering the Peconic River. Area 3 includes the remaining off-site portion of the Southern Area Plume up to the Peconic River. See Figure 1 (attached at end) for designation of described areas. The width of the respective isoconcentration contours was multiplied by the thickness of the plume in that location to determine area of flow, mean concentration of DCA flowing through each boundary line, and mass flow rate of DCA and total VOCs in pounds per year. See noted cross sections (attached at end) for plume boundaries at each flow line.

8.0 AREA 1

See Figure 1 for the designation of Area 1 (attached at end).

8.1 PROPERTIES OF PLUME AT CROSS SECTION LINE A 1.1

See Figure A 1.1 (attached at end) for Cross Section A 1.1.

Individual DCA isoconc. contour	Plume width of isoconc. contour (feet (ft))	Depth of plume (ft below ground surface (bgs))	Thickness of plume (ft)	Height above clay unit (ft)
>5	200	18-48	30	12
>50	140	26-40	14	20
>500	70	29-37	8	23

8.2 CALCULATE MASS FLOW RATE OF DCA AND TOTAL VOCs FLOWING THROUGH CROSS SECTION LINE A 1.1

Individual DCA isoconc. contour	Area (ft^2)	Hydraulic conductivity Kh (ft/day)(1)	Gradient(2)	Flow (ft^3/day)	Geometric mean concentration of DCA within contour (µg/L)	Mass flow DCA (pounds (lbs)/year)	Mass flow VOCs (lbs/year)
>5	6,000	216	0.002	2,592	16	0.2	0.4
>50	1,960	216	0.002	847	158	0.8	1.3
>500	560	216	0.002	242	866	1.2	2.0
Total/Average				3,681	104	2.2	3.6
					Percentage of VOCs that is DCA		61%

1 = Value from pumping test 1 conducted on the surficial aquifer indicating an average hydraulic conductivity for the area of groundwater plume above Grumman Boulevard. Contamination extends to depths of approximately 14 to 50 feet below ground surface in this portion of the study area.

2 = Gradient determined using potentiometric values for groundwater elevation (intermediate wells) based on July 2010 values.

8.3 PROPERTIES OF PLUME AT CROSS SECTION LINE A 1.2

See Figure A 1.2 (attached at end) for Cross Section A 1.2.

Individual DCA isoconc. contour	Plume width of isoconc. contour (feet (ft))	Depth of plume (ft below ground surface (bgs))	Thickness of plume (ft)	Height above clay unit (ft)
>5	450	25-45	20	11
>50	150	30-42	12	14
>500	50	30-38	8	18

8.4 CALCULATE MASS FLOW RATE OF DCA AND TOTAL VOCs FLOWING THROUGH CROSS SECTION LINE A 1.2

Individual DCA isoconc. contour	Area (ft^2)	Hydraulic conductivity Kh (ft/day)[1]	Gradient[2]	Flow (ft^3/day)	Geometric mean concentration of DCA within contour (µg/L)	Mass flow DCA (pounds (lbs)/year)	Mass flow VOCs (lbs/year)
>5	9,000	216	0.002	3,888	16	0.4	0.5
>50	1,800	216	0.002	778	158	0.7	1.1
>500	400	216	0.002	173	1,025	1.0	1.6
Total/Average				4,838	75	2.1	3.2
					Percentage of VOCs that is DCA		65%

1 = Value from pumping test 1 conducted on the surficial aquifer indicating an average hydraulic conductivity for the area of groundwater plume above Grumman Boulevard. Contamination extends to depths of approximately 14 to 50 feet below ground surface in this portion of the study area.

2 = Gradient determined using potentiometric values for groundwater elevation (intermediate wells) based on July 2010 values.

8.5 PROPERTIES OF PLUME AT CROSS SECTION LINE A 1.3

See Figure A 1.3 (attached at end) for Cross Section A 1.3.

Individual DCA isoconc. contour	Plume width of isoconc. contour (feet (ft))	Depth of plume (ft below ground surface (bgs))	Thickness of plume (ft)	Height above clay unit (ft)
>5	800	23-48	25	0
>50	420	24-47	23	0
>500	100	29-44	15	0

8.6 CALCULATE MASS FLOW RATE OF DCA AND TOTAL VOCs FLOWING THROUGH CROSS SECTION LINE A 1.3

Individual DCA isoconc. contour	Area (ft^2)	Hydraulic conductivity Kh (ft/day)(1)	Gradient(2)	Flow (ft^3/day)	Geometric mean concentration of DCA within contour (µg/L)	Mass flow DCA (pounds (lbs)/year)	Mass flow VOCs (lbs/year)
>5	20,000	216	0.002	8,640	16	0.8	1.3
>50	9,660	216	0.002	4,173	158	3.8	6.3
>500	1,500	216	0.002	648	866	3.2	5.3
Total/Average				13,461	101	7.7	13
					Percentage of VOCs that is DCA		60%

1 = Value from pumping test 1 conducted on the surficial aquifer indicating an average hydraulic conductivity for the area of groundwater plume above Grumman Boulevard. Contamination extends to depths of approximately 20 to 50 feet below ground surface in this portion of the study area.

2 = Gradient determined using potentiometric values for groundwater elevation (intermediate wells) based on July 2010 values.

9.0 AREA 2

See Figure 1 (attached at end) for the designation of Area 2.

9.1 PROPERTIES OF PLUME AT CROSS SECTION LINE A 2

See Figure A 2 (attached at end) for Cross Section A 2.

Individual DCA isoconc. contour	Plume width of isoconc. contour (feet (ft))	Depth of plume (ft below ground surface (bgs))	Thickness of plume (ft)	Height above clay unit (ft)
>5	1,730	27-54	27	0
>50	1,250	37-50	13	0
>500	300	38-49	11	0

9.2 CALCULATE MASS FLOW RATE OF DCA AND TOTAL VOCs FLOWING THROUGH CROSS SECTION LINE A 2

Individual DCA isoconc. contour	Area (ft^2)	Hydraulic conductivity Kh (ft/day)(1)	Gradient(2)	Flow (ft^3/day)	Geometric mean concentration of DCA within contour (µg/L)	Mass flow DCA (pounds (lbs)/year)	Mass flow VOCs (lbs/year)
>5	46,710	216	0.0016	16,143	16	1.5	2.0
>50	16,250	216	0.0016	5,616	158	5.1	6.8
>500	3,300	216	0.0016	1,140	866	5.6	7.6
Total/Average				22,899	93	12	16
					Percentage of VOCs that is DCA	74%	

1 = Value from pumping test 1 conducted on the surficial aquifer indicating an average hydraulic conductivity for the area of groundwater plume before Connecticut Avenue. Contamination extends to depths of approximately 25 to 55 feet below ground surface in this portion of the study area.

2 = Gradient determined using potentiometric values for groundwater elevation (intermediate wells) based on July 2010 values.

Tetra Tech NUS		STANDARD CALCULATION SHEET	
CLIENT: USN CLEAN	FILE No: WE08	BY: SK	PAGE: 17 of 24
SUBJECT: Mass Flow Calculations for DCA and Total VOCs NWIRP Calverton, New York		CHECKED BY:	DATE: 3/21/2011

10.0 AREA 3

See Figure 1 (attached at end) for the designation of Area 3.

10.1 PROPERTIES OF PLUME AT CROSS SECTION LINE A 3

See Figure A 3 (attached at end) for Cross Section A 3.

Individual DCA isoconc. contour	Plume width of isoconc. contour (feet (ft))	Depth of plume (ft below ground surface (bgs))	Thickness of plume (ft)	Height above clay unit (ft)
>5	1,550	42-87	45	46
>50	0	0	0	0
>500	0	0	0	0

10.2 CALCULATE MASS FLOW RATE OF DCA AND TOTAL VOCs FLOWING THROUGH CROSS SECTION LINE A 3

Individual DCA isoconc. contour	Area (ft^2)	Hydraulic conductivity Kh (ft/day)(1)	Gradient(2)	Flow (ft^3/day)	Geometric mean concentration of DCA within contour (µg/L)	Mass flow DCA (pounds (lbs)/year)	Mass flow VOCs (lbs/year)
>5	69,750	42	0.002	5,859	16	0.53	0.65
>50	0	42	0.002	0	158	0	0
>500	0	42	0.002	0	866	0	0
Total/Average				5,859	16	0.53	0.65
					Percentage of VOCs that is DCA		81%

1 = Value from pumping test 1 conducted on the surficial aquifer indicating an average hydraulic conductivity for the area of groundwater plume from Connecticut Avenue to the Peconic River. Contamination extends to depths of approximately 40 to 90 feet below ground surface in this portion of the study area.

2 = Gradient determined using potentiometric values for groundwater elevation (intermediate wells) based on July 2010 values.

Tetra Tech NUS		STANDARD CALCULATION SHEET	
CLIENT: USN CLEAN	FILE No: WE08	BY: SK	PAGE: 18 of 24
SUBJECT: Total Mass and Mass Flow at the Navy Property Line and Peconic River NWIRP Calverton, New York		CHECKED BY:	DATE: 3/21/2011

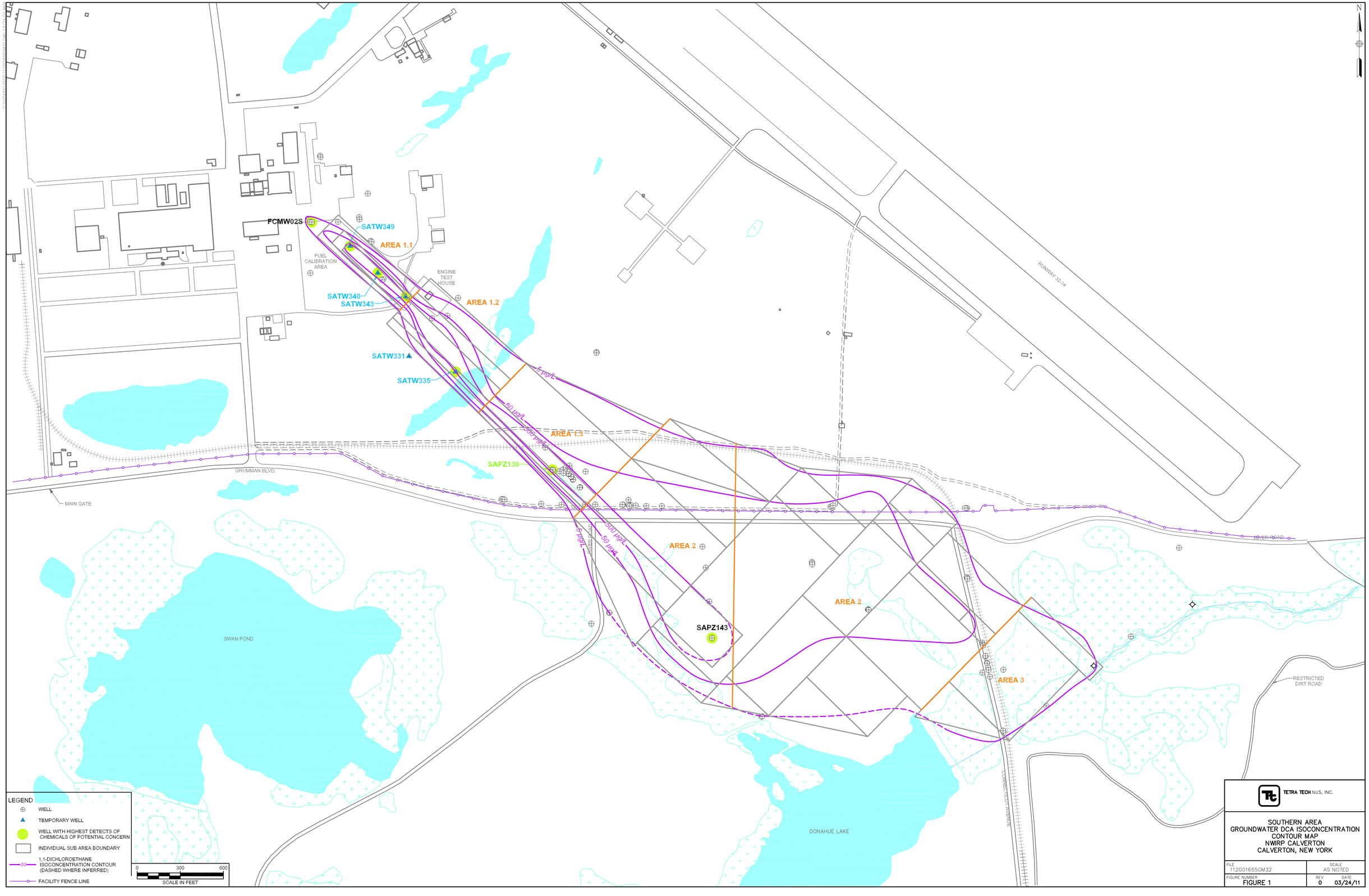
SUMMARY OF MASS AT PROPERTY LINE AND PECONIC RIVER:

Boundary	Pounds DCA	Pounds VOCs
Navy Property Line	57	93
Peconic River	266	375

% VOCs onsite	25
% VOCs offsite	75

SUMMARY OF MASS FLOW AT PROPERTY LINE AND PECONIC RIVER:

Boundary	Pounds DCA/year	Pounds VOCs/year
Navy Property Line	12	20
Peconic River	25	32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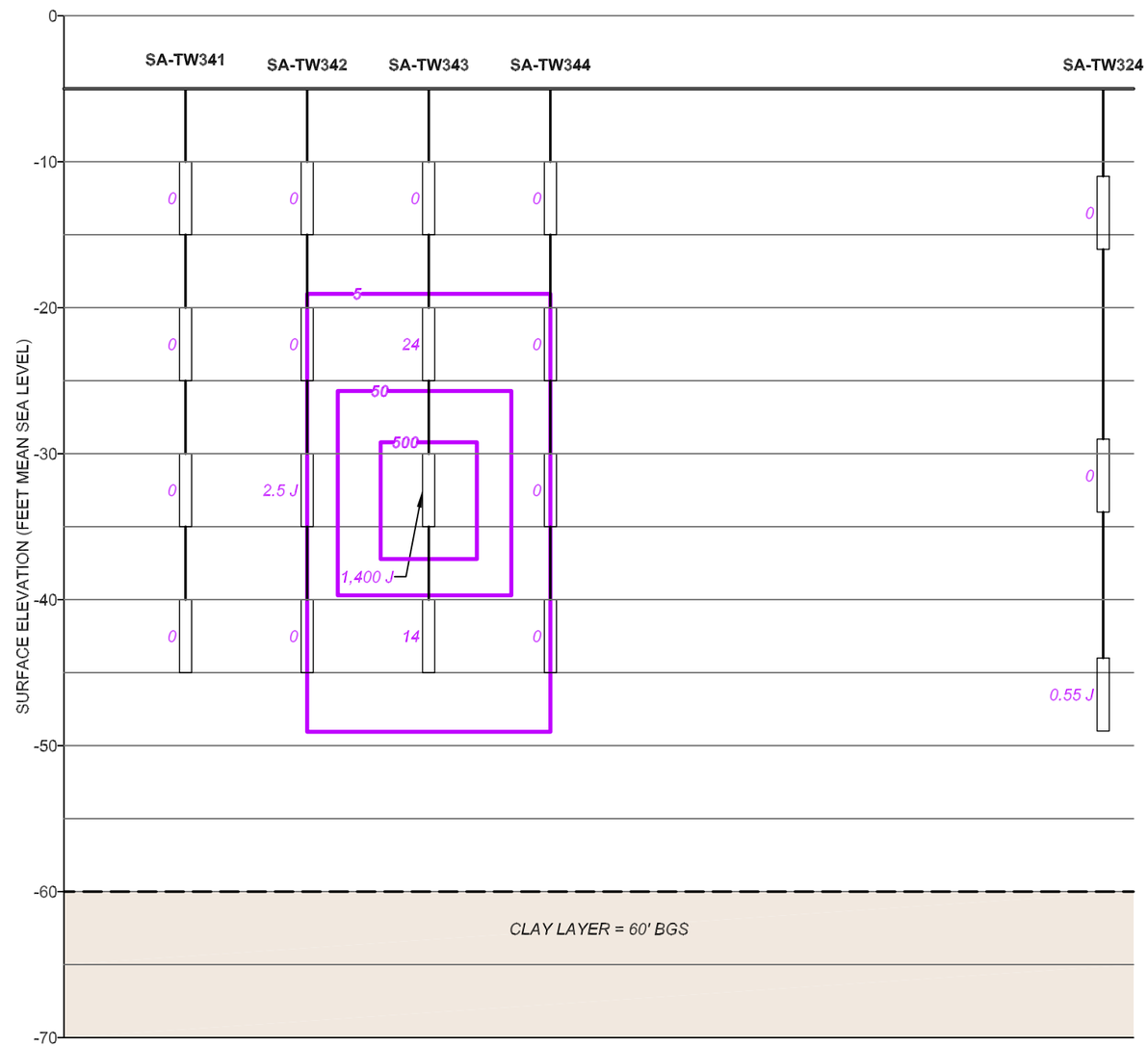
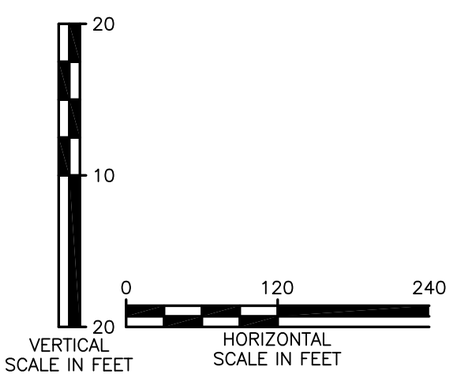
FCMW02S
SATW349
AREA 1.1
FUEL CALIBRATION AREA
ENGINE TEST HOUSE
SATW348
SATW343
AREA 1.2
SATW331
SATW335
5 ug/L
50 ug/L
100 ug/L
500 ug/L
AREA 1.3
SAPZ138
GRUMMAN BLVD.
MAIN GATE
RUNWAY 32-14
RIVER ROAD
AREA 2
AREA 2
SAPZ143
SWAN POND
AREA 3
RESTRICTED DIRT ROAD
CONNECTICUT AVENUE
DONAHUE LAKE
LEGEND
WELL
TEMPORARY WELL
WELL WITH HIGHEST DETECTS OF CHEMICALS OF POTENTIAL CONCERN
INDIVIDUAL SUB AREA BOUNDARY
50
1,1-DICHLOROETHANE ISOCONCENTRATION CONTOUR (DASHED WHERE INFERRED)
FACILITY FENCE LINE
0
300
600
SCALE IN FEET
TETRA TECH NUS, INC.
SOUTHERN AREA
GROUNDWATER DCA ISOCONCENTRATION
CONTOUR MAP
NWIRP CALVERTON
CALVERTON, NEW YORK
FILE
112G01655GM32
SCALE
AS NOTED
FIGURE NUMBER
FIGURE 1
REV
0
DATE
03/24/11

112G02045\0420\112G02045GS05-1.DWG 02/17/11 MKB



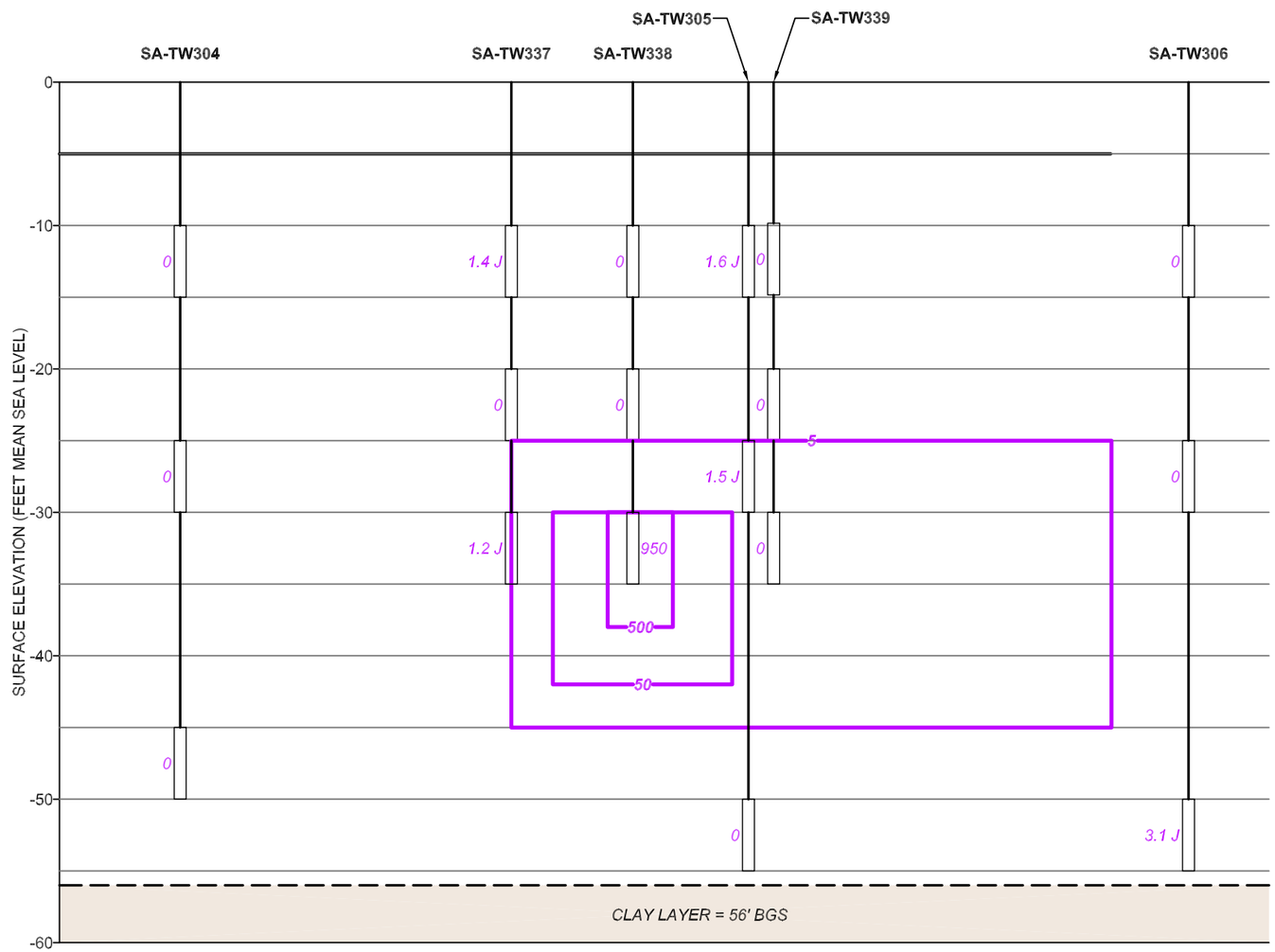


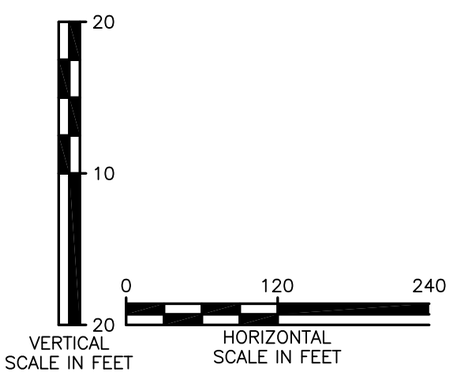
TETRA TECH

CROSS SECTION A1.1
NWIRP CALVERTON
CALVERTON, NEW YORK

FILE	SCALE
112G02045GS05-1	AS NOTED
FIGURE NUMBER	REV / DATE
FIGURE A1.1	0 / 02/17/11

112G02045\0420\112G02045GS05-2.DWG 02/17/11 MKB





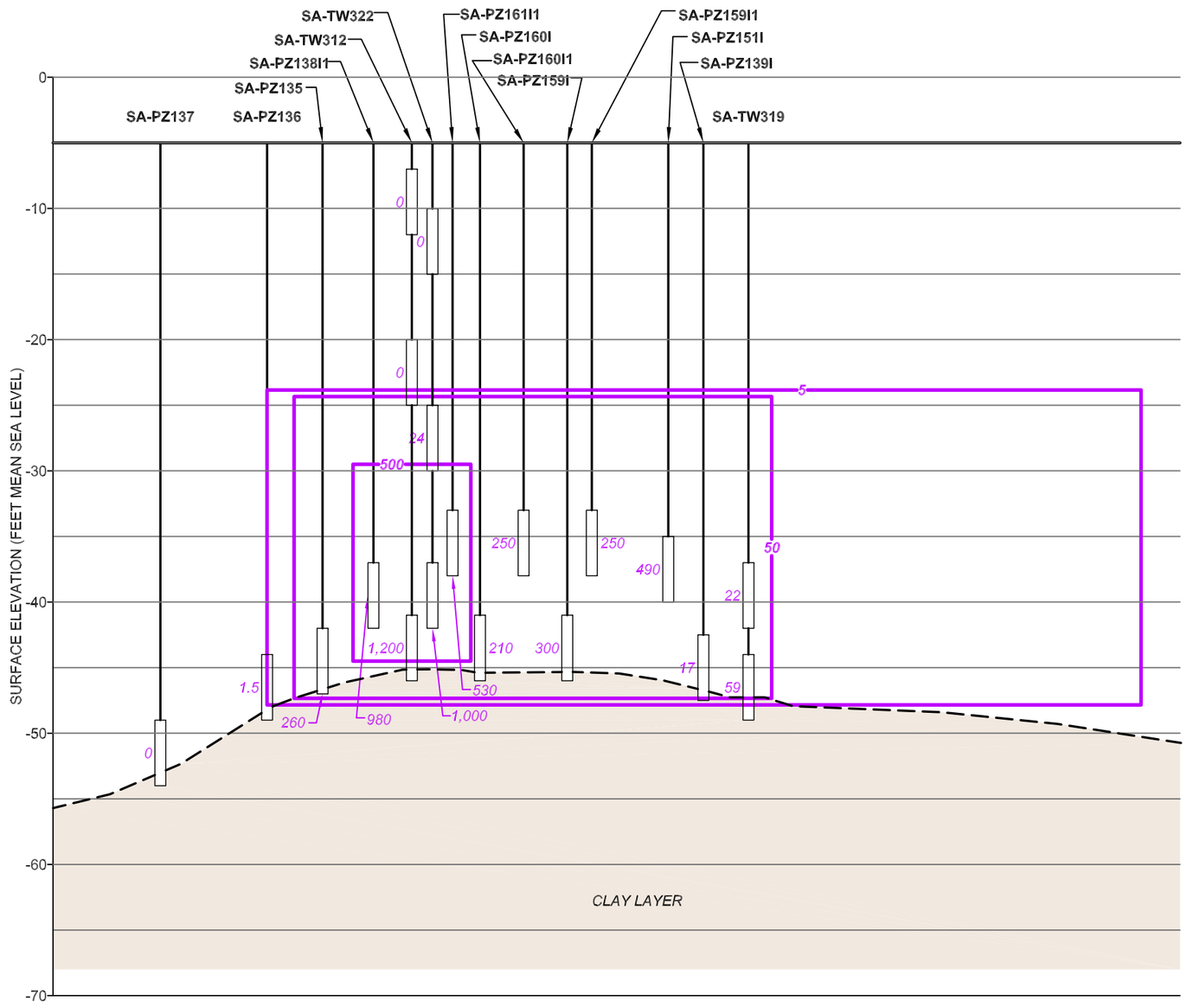
TETRA TECH

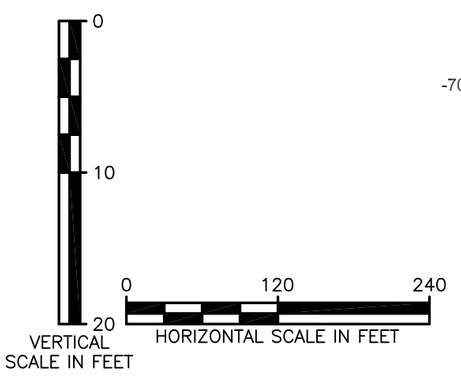
CROSS SECTION A1.2
NWIRP CALVERTON
CALVERTON, NEW YORK

FILE	SCALE
112G02045GS05-2	AS NOTED

FIGURE NUMBER	REV	DATE
FIGURE A1.2	0	02/17/11

112G02045\0420\112G02045GS05-3.DWG 02/17/11 MKB





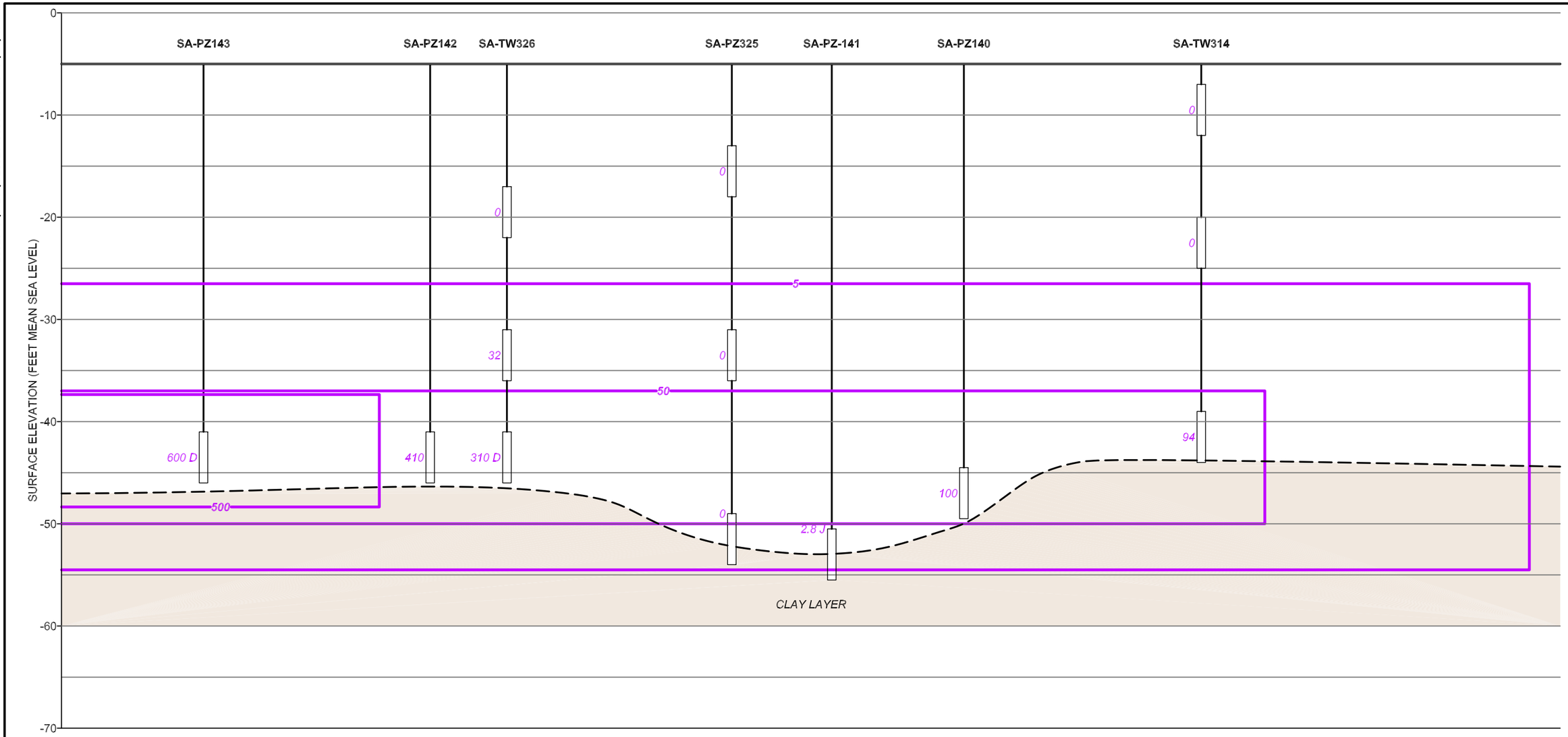
TETRA TECH

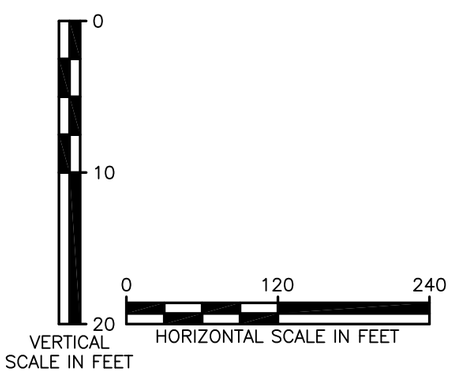
CROSS SECTION A1.3
NWIRP CALVERTON
CALVERTON, NEW YORK

FILE	SCALE
112G02045GS05-3	AS NOTED

FIGURE NUMBER	REV	DATE
FIGURE A1.3	0	02/17/11

112G02045\0420\112G02045GS05-4.DWG 01/10/11 MKB



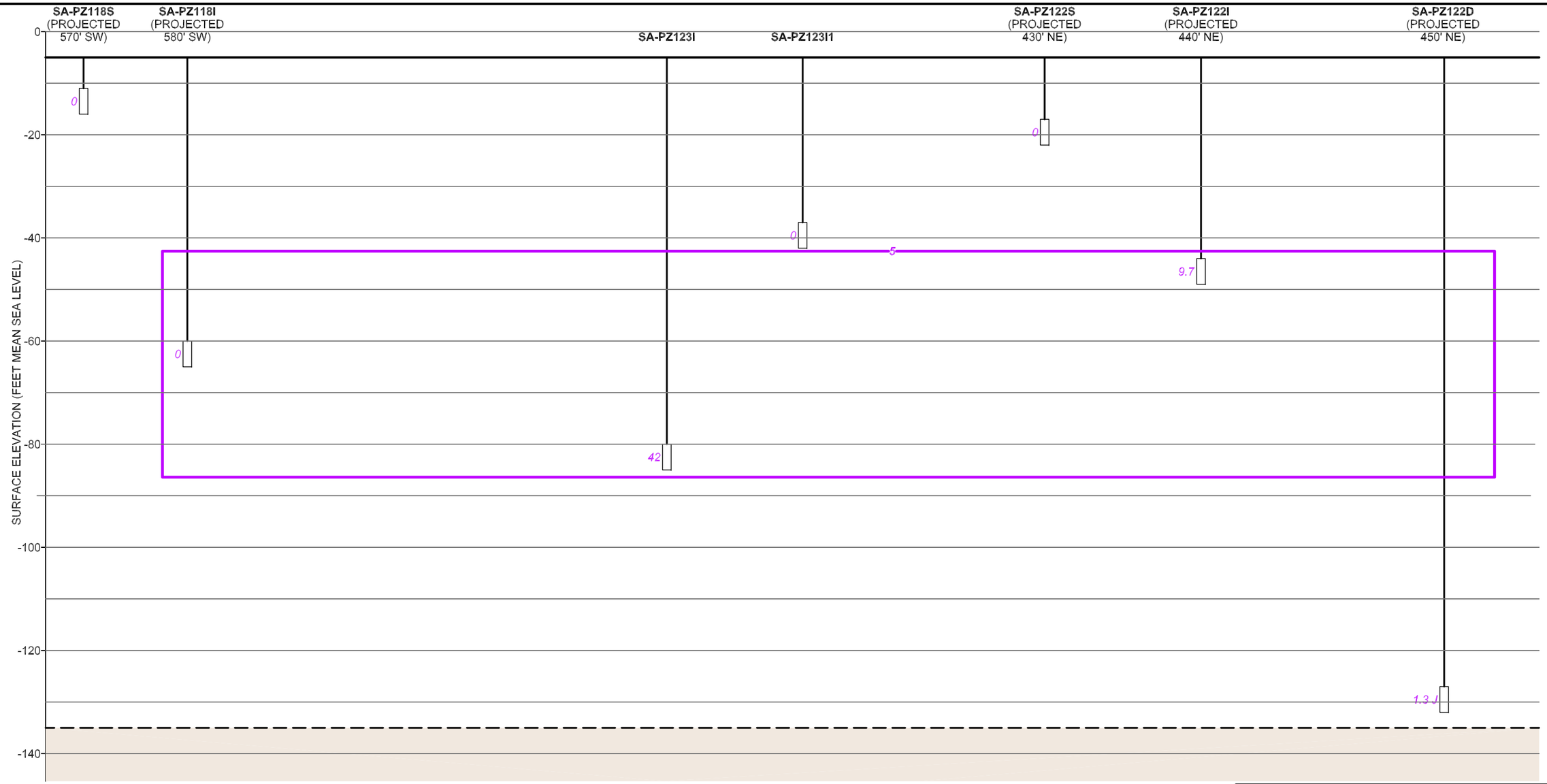


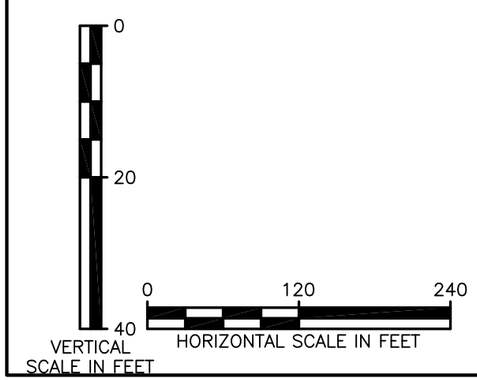
TETRA TECH

CROSS SECTION A.2
NWIRP CALVERTON
CALVERTON, NEW YORK

FILE	SCALE
112G02045GS05-4	AS NOTED
FIGURE NUMBER	REV / DATE
FIGURE A.2	0 / 01/10/11

112G02045\0420\112G02045GS05-5.DWG 02/17/11 MKB





TETRA TECH

CROSS SECTION A.3
NWIRP CALVERTON
CALVERTON, NEW YORK

FILE	SCALE
112G02045GS05-5	AS NOTED
FIGURE NUMBER	REV / DATE
FIGURE A.3	0 / 02/17/11

Tetra Tech NUS			STANDARD CALCULATION SHEET
CLIENT: USN CLEAN	FILE No: WE08	BY: EC	PAGE: 1 of 6
SUBJECT: Mass Flow Through Treatment Areas for Alternative 4 Source Area and River Area Air Sparge Systems NWIRP Calverton, New York		CHECKED BY: EC	DATE: 3/9/2011

Alternative 4 (Figure 5-1A):

Boundary	Pounds DCA Treated(1)	Total Pounds DCA Treated(2)	Pounds VOCs Treated(1)	Total Pounds VOCs Treated(2)
Air Sparge 1 (SA)	1.9	1.9	3.2	3.2
Air Sparge 2 (SA)	1.9	3.8	3.2	6.4
Air Sparge 3 (SA)	1.9	5.7	3.2	9.6
Air Sparge 4 (SA)	7.3	13	11	21
Air Sparge (RA)	253	253	354	354

Boundary	Pounds DCA	Pounds VOCs
Total treatment in Source Area	13	21
Total treatment in River Area	253	354

Notes:

SA = Source Area

RA = River Area

1 = Treatment values include the amount of DCA or VOCs treated at each respective boundary line.

2 = Treatment values include the estimated total amount of DCA and VOCs treated in the plume up to this boundary line.

Tetra Tech NUS			STANDARD CALCULATION SHEET
CLIENT: USN CLEAN	FILE No: WE08	BY: EC	PAGE: 2 of 6
SUBJECT: Air Sparge Design Calculations for Compressor Sizing for Alternative 4 Source Area and River Area Air Sparge Systems NWIRP Calverton, New York		CHECKED BY: EC	DATE: 3/9/2011

1. PURPOSE:

To calculate design parameters for the initial design of air sparge systems for the Southern Area Plume.

2. APPROACH:

Use the number of wells and total dynamic head to calculate pressure, flow, and horsepower required.

3. CALCULATE PARAMETERS FOR PECONIC RIVER AREA VERTICAL AIR SPARGE WELL SYSTEM:

# wells	80		*(1 curtain consiting of 2 rows of 40 wells each)*	
tdh	100	feet		
Q_{well}	3 to 10	cfm(1)		
Q_{total}	320	cfm		
minimum pressure	43	psi		
pressure	50	psi(2)		
power use (HP)	38	(3)	cooler power use (HP)	22
total power use (HP)	60			
HP_{actual}	75	(4)		

1 = Typical air flow ranges from 3 to 25 standard cubic feet per minute (cfm) as referenced by the EPA: (October 1994). Chapter 7: Air Sparging. *http://www.epa.gov. Retrieved March 7, 2011 from http://www.epa.gov/oust/pubs/tum_ch7.pdf.*

2 = Pressure is calculated by dividing the total depth of head (tdh) by 2.3 feet (1 psi required per every 2.3 feet of hydraulic head). To produce the actual pressure requirement an added safety factor of approximately 10 psi is applied.

3 = Horsepower (hp) is calculated by multiplying the theoretical power required to compress one cfm of air by the total cfm to produce the total horsepower required.

4 = Actual horsepower based on value recommended by Eaton Compressor. Chosen model is 75 HP, 3 phase VSD rotary screw combination package. Correspondence dated 2/25/2011.

4. CALCULATE PARAMETERS FOR SOURCE AREA VERTICAL AIR SPARGE WELL SYSTEM:

# wells	48		*(4 curtains consisting of 2 rows each)*	
tdh	50	feet	*Curtain 1 - 2 rows of 7 wells each*	
Q_{well}	3 to 10	cfm(1)	*Curtain 2 - 2 rows of 5 wells each*	
Q_{total}	240	cfm	*Curtain 3 - 2 rows of 5 wells each*	
minimum pressure	22	psi	*Curtain 4 - 2 rows of 7 wells each*	
pressure	30	psi(2)		
power use (HP)	20	(3)	cooler power use (HP)	10
total power use (HP)	30			
HP_{actual}	60	(4)		

1 = Typical air flow ranges from 3 to 25 standard cubic feet per minute (cfm) as referenced by the EPA: (October 1994). Chapter 7: Air Sparging. *http://www.epa.gov. Retrieved March 7, 2011 from http://www.epa.gov/oust/pubs/tum_ch7.pdf.*

2 = Pressure is calculated by dividing the total depth of head (tdh) by 2.3 feet (1 psi required per every 2.3 feet of hydraulic head). To produce the actual pressure requirement an added safety factor of approximately 10 psi is applied.

3 = Horsepower (hp) is calculated by multiplying the theoretical power required to compress one cfm of air by the total cfm to produce the total horsepower required.

4 = Actual horsepower based on value recommended by Eaton Compressor. The chosen model is 60 HP, 3 phase VSD rotary screw combination package. Note that the 60 HP motor in the compressor will not be run at maximum capacity, as it will be run at the calculated capacity of approximately 30 HP. Correspondence dated 2/25/2011.

Tetra Tech NUS		STANDARD CALCULATION SHEET	
CLIENT: USN CLEAN	FILE No: WE08	BY: EC	PAGE: 3 of 6
SUBJECT: Air Sparge Design Calculations to Verify Pressure Drop in Piping for Alternative 4 Source Area Air Sparge Systems NWIRP Calverton, New York		CHECKED BY: EC	DATE: 3/9/2011

1. PURPOSE:
To determine pipe requirements (diameter) of air sparge wells.

2. APPROACH:
Optimize pipe diameter based on given design flows, length of pipe, and resultant pressure drops due to friction (h_f).

Source Area Air Sparge Well Pipe Diameter Design

Assumed Values				
	v	0.000175	ft^2/s	
	ε	0.000005	ft	(Plastic/PVC pipe)
	g	32.2	ft/sec^2	
	ρ_{air}	0.0725	lb/ft^3	90ºF

Straight Lengths of Pipe

Pipe Diameter (in)	Pipe Diameter (ft)	Pipe Length(1) (ft)	Design Flow (CFM)	Design Velocity (ft/min)	Design Velocity (ft/sec)	Temp (ºF)	Re(2) (dim)	Relative Roughness (ε/D)	Friction Factor f(3) (ft)	Head Loss h_f(4) (ft)	Pressure Drop (lb/ft^2)	Pressure Drop (psi)
4	0.33	400	240	21	0.3	90	665	0.000015	0.009	0.020	0.0014	0.0000
2	0.17	600	240	5	0.1	90	83	0.00003	0.010	0.004	0.0003	0.0000
2	0.17	800	240	5	0.1	90	83	0.00003	0.010	0.006	0.0004	0.0000
									TOTAL	0.030	0.0021	0.0000

Calculations
1. Pipe lengths include piping from compressor building to sparge curtain, and to each well in each curtain.
2. Re = Dv/v
v is the kinematic viscosity
3. Solve for the Darcy Friction Factor using the Swamee-Jain Equation

$$f=\frac{0.25}{(\log_{10}\left(\frac{\frac{\varepsilon}{D}}{3.7}\right)+\frac{5.74}{\mathrm{Re}^{0.9}})^2}$$

4. Solve for Head Loss Using the Darcy-Weisbach Equation

$$h_f=\frac{fLv^2}{2Dg}$$

5. Reference: Kaminski, Jensen. *Introduction to Thermals and Fluids Engineering*, 2005.

Pressure Drop in Fittings

Fitting Type	No. of Fittings	Head Loss (Equivalent Lengths of Pipe) (ft)	Pressure Drop (lb/ft^2)	Pressure Drop (psi)
gate valve	1	13	0.9	0.007
check valve	1	135	9.8	0.068
90 elbow	48	30	104.4	0.725
flow meter	1	10	0.7	0.005
Total			115.9	0.805

Total Pressure Drop

Pressure Drop (lb/ft^2)	Pressure Drop (psi)
115.9	0.8

Tetra Tech NUS		STANDARD CALCULATION SHEET	
CLIENT: USN CLEAN	FILE No: WE08	BY: EC	PAGE: 4 of 6
SUBJECT: Air Sparge Design Calculations to Verify Pressure Drop in Piping for Alternative 4 River Area Air Sparge Systems NWIRP Calverton, New York		CHECKED BY: EC	DATE: 3/9/2011

1. PURPOSE:
To determine pipe requirements (diameter) of air sparge wells.

2. APPROACH:
Optimize pipe diameter based on given design flows, length of pipe, and resultant pressure drops due to friction (h_f).

Peconic River Area Air Sparge Well Pipe Diameter Design

Assumed Values	v	0.000175	ft^2/s	
	ε	0.000005	ft	(Plastic/PVC pipe)
	g	32.2	ft/sec^2	
	ρ_{air}	0.0725	lb/ft^3	90ºF

Straight Lengths of Pipe

Pipe Diameter (in)	Pipe Diameter (ft)	Pipe Length(1) (ft)	Design Flow (CFM)	Design Velocity (ft/min)	Design Velocity (ft/sec)	Temp (ºF)	Re(2) (dim)	Relative Roughness (ε/D)	Friction Factor f(3) (ft)	Head Loss h_f(4) (ft)	Pressure Drop (lb/ft^2)	Pressure Drop (psi)
6	0.50	800	600	118	2.0	90	5610	0.00001	0.008	0.8	0.056	0.0004
4	0.33	500	600	52	0.9	90	1662	0.000015	0.009	0.2	0.011	0.0001
2	0.17	1,200	600	13	0.2	90	208	0.00003	0.010	0.1	0.004	0.0000
									TOTAL	1.0	0.071	0.0005

Calculations
1. Pipe lengths include piping from compressor building to sparge curtain, and to each well in each curtain.
2. Re = Dv/v
v is the kinematic viscosity
3. Solve for the Darcy Friction Factor using the Swamee-Jain Equation

$$f=\frac{0.25}{(\log_{10}\left(\frac{\frac{\varepsilon}{D}}{3.7}\right)+\frac{5.74}{\mathrm{Re}^{0.9}})^2}$$

4. Solve for Head Loss Using the Darcy-Weisbach Equation

$$h_f=\frac{fLv^2}{2Dg}$$

5. Reference: Kaminski, Jensen. *Introduction to Thermals and Fluids Engineering*, 2005.

Pressure Drop in Fittings

Fitting Type	No. of Fittings	Head Loss (Equivalent Lengths of Pipe) (ft)	Pressure Drop (lb/ft^2)	Pressure Drop (psi)
gate valve	1	13	0.9	0.007
check valve	1	135	9.8	0.068
90 elbow	80	30	174.0	1.208
flow meter	1	10	0.7	0.005
Total			185.5	1.288

Total Pressure Drop

Pressure Drop (lb/ft^2)	Pressure Drop (psi)
185.5	1.3

Factory Direct 75 HP, 3-Phase Dual Volt Rotary Screw Combination 660-Gallon Tank & Refrigerated Dryer w/Coalescing Filter

Price: **$27,550.00**

Prod. Code: **Rotary Screw Air Compressor**

Package Includes:

- 75 HP 3 Phase Dual Volt (208/230/460/480) Rotary Screw Air Compressor
- Model HT 402 Dryer, 3 Phase, 220V
- 660 Gallon Vertical Tank
- T-350-DG Coalescing Filter, Auto Drain & Hydraulic Hoses

Description	75HP Three Phase Dual Voltage
SCFM @ 100 PSI MAX 145	353.2
Motor Power	75HP
Motor Speed（rpm）	1750
Voltage	208/230/460
Start Type	Y-Delta
Drive Type	Direct Drive
Air End Model	E25G
Noise DB(A)	78
Outlet Connection	NPT 2"
Dimension: L*W*H(Inch)	83x52x72
Weight:LBS	3527

Eaton Compressor and Fabrication, Inc.

Model		PDRYHT0402
Description		402CFM High Temp Dryer
SCFM		402
Pipe Size: Inlet & Outlet (inches)		2"
Voltage		220
Phase (Neutral Wire Required)		3
AMP Draw		15
Drain- CALL OUT/SIDE BAR		Auto
Heat Exchanger	Casting	Aluminum Alloy
	Tube	Copper
Cabinet Type CALL OUT OR FEATURES & BENEFITS		Steel
Refrigerant Pressure Gauge CALL OUT		Yes
Outlet Air Baffle Heater CALL OUT		Yes
Dew Point (degrees F)		37-50
Max Working PSI		175
Max Rated Inlet Temperature (degrees F)		180
Refrigerant Type		404A
Amount of Refrigerant(oz)		113
Max Ambient Temperature (degrees F)		104
Dimension: LxWxH		47" x 28"x 52"
Weight (Lbs)		550
Shipping Weight (Lbs)		610

60 HP, 3-Phase VSD Rotary Screw Combination 240-Gallon Tank & Refrigerated Dryer w/Coalescing Filter

Price: **$21,449.00** **Prod. Code:** VSD Rotary Screw

10 Year Pump Warranty With Annual Purchase of Maintenance Kit

53" x 50" x 65"
261 SCFM @ 100 PSI
Max Pressure - 145 PSI

Model		PDRYHT0402
Description		402CFM High Temp Dryer
SCFM		402
Pipe Size: Inlet & Outlet (inches)		2"
Voltage		220
Phase (Neutral Wire Required)		3
AMP Draw		15
Drain- CALL OUT/SIDE BAR		Auto
Heat Exchanger	Casting	Aluminum Alloy
	Tube	Copper
Cabinet Type CALL OUT OR FEATURES & BENEFITS		Steel
Refrigerant Pressure Gauge CALL OUT		Yes
Outlet Air Baffle Heater CALL OUT		Yes
Dew Point (degrees F)		37-50
Max Working PSI		175
Max Rated Inlet Temperature (degrees F)		180
Refrigerant Type		404A
Amount of Refrigerant(oz)		113
Max Ambient Temperature (degrees F)		104
Dimension: LxWxH		47" x 28"x 52"
Weight (Lbs)		550
Shipping Weight (Lbs)		610

Description	60HP Three Phase Dual Voltage
SCFM @ 100 PSI MAX 145	261
Motor Power	60HP
Motor Speed（rpm）	1750
Voltage	208/230/460
Start Type	Y-Delta
Drive Type	Belt
Air End Model	B170
Noise DB(A)	81
Outlet Connection	NPT 1-1/4"
Dimension: L*W*H(Inch)	53x50x65
Weight:LBS	2860

Eaton Compressor and Fabrication, Inc.

Note: Amperage draw for the compressor is approximately 72 A, 460 V (from correspondence with manufacturer).

Tetra Tech NUS		STANDARD CALCULATION SHEET	
CLIENT: USN CLEAN	FILE No: WE08	BY: EC	PAGE: 1 of 2
SUBJECT: Mass Flow Through Treatment Areas for Alternative 5 Anaerobic EISB Biobarriers NWIRP Calverton, New York		CHECKED BY:	DATE: 3/21/2011

Alternative 5 (Figure 5-2A):

Boundary	Pounds DCA Treated(1)	Pounds DCA(2)	Pounds VOCs Treated(1)	Pounds VOCs(2)
Biobarrier 1 (SA)	4.0	4.0	6.0	6.0
Biobarrier 2 (SA)	6.0	10	10	16
Biobarrier 3 (FL)	14	24	22	38
Biobarrier 4 (FL)	22	46	37	75
Biobarrier 5 (OS)	54	100	75	150
Total Treated:	100		150	

Notes:
SA = Source Area
FL = Navy Fence Line
OS = Offsite Southern Area
1 = Treatment values include the amount of DCA or VOCs treated at each respective boundary line.
2 = Treatment values include the estimated total amount of DCA and VOCs treated in the plume up to this boundary line.

Tetra Tech NUS		STANDARD CALCULATION SHEET	
CLIENT: USN CLEAN	FILE No: WE08	BY: EC	PAGE: 2 of 2
SUBJECT: Alternative 5 EISB Design Calculations NWIRP Calverton, New York		CHECKED BY:	DATE: 3/21/2011

Purpose:
To determine required volume of EOS® Concentrate (in gallons), and the resultant dosage per well as a function of design parameters including the effective radius of injection, depth of the proposed barrier, volume of the respective treatment zones, mobile porosity of the substrate, and the sorption capacity of the aquifer.

EOS Remediation, Inc.

EOS® Dosage Calculation Based on Residual Saturation For Single Injection Well

Southern Area Feasibility Study

Beta Version 1.3 (amended/re-formatted by Tetra Tech)

Site Name: **Southern Area**
Location: **NWIRP Calverton, NY**
Project No.: **112G02045**

Design Inputs

Effective Radius of Injection (ROI)	15	ft	
Depth of proposed barrier (treatment thickness / injection well screen length)	20	ft	*Continuous wrap 0.010-slot 4" screen (20ft length)*
Volume of treatment zone	14,137	ft^3	
Mobile Porosity**	0.15		*not equivalent to effective porosity of 0.25*

*** Mobile porosity is empirically based, and is functionally defined as the volume of injectate required to achieve a specific radius of injection divided by the total volume of the aquifer impacted by the injectate (i.e., the volume percentage of the connected preferential flow paths in the aquifer through which the injectate will actually travel/flow from the well during the injection).*

Soil Characteristics

Nominal soil type	sand	
Density of soil	124	lbs / ft^3
Soil to be treated	1,753,009	lbs
Aquifer "Sorption" Capacity (empirical value)[1]	0.0015	lbs EOS® / lbs soil

-Fine sand with some clay 0.001 to 0.002 lbs EOS® / lbs soil
-Sand with higher silt/clay content 0..002 to 0.004 lbs EOS® / lbs soil
[1] Default values provided based on laboratory studies completed by North Carolina State University

EOS® Concentrate Requirement	2,630	pounds	*EOS concentrate is what is received from the vendor in drums*
Single Injection Well	344.34	gallons	
(0.0015 lb EOS® / lb soil)	6.26	drums	*420 lbs per drum. EOS concentrate is 60% soybean oil.*
Estimated Cost of 7 drums of EOS® Concentrate	$ 5,880		*$840 per drum; not including shipping or tax.*

Note: EOS® is sold by whole drum quantities, only

Dosage Per Injection Well

Number of injection points	1	points				
EOS® *Concentrate* injected per point	2,630	pounds	344.3	gallons	6.26	drums
Estimated **Fractional Cost** of EOS® C*oncentrate* per point	$ 5,259.03					
Injection point diameter	30	feet	*Equal to 2 x ROI*			
Mobile Pore volume per injection point *(using mobile porosity above)*	15,862	gallons	*Mobile porosity (see above) used in calculation of 'pore volume'*			
Displacement flush pore volumes	1	typical values 1 to 1.25				
Displacement flush water (mixture water) volume per point	15,518	gallons	*Subtract out volume of EOS® concentrate*			
Total EOS® *Injection Mixture* volume per injection point	15,862	gallons	*Total EOS® injection mixture (concentrate, dilution water, and flush water)*			

Volume does not include any sodium bicarbonate if pH buffering is necessary (~5 pounds per well if necessary). 2009 microcosm data shows pH at 5-7.

†Exclusive license agreement with Solutions-IES
††U.S. Patent # 6,398,960 and several international patents pending
†††EOS® is a registered trademark of Solutions-IES

Tetra Tech NUS		***STANDARD CALCULATION SHEET***	
CLIENT: USN CLEAN	FILE No: WE08	BY: SK	PAGE: 1 of 1
SUBJECT: Mass Flow Through Treatment Areas for Alternative 6 Anaerobic EISB Biobarriers and River Area Air Sparge System NWIRP Calverton, New York		CHECKED BY:	DATE: 3/21/2011

Alternative 6 (Figure 5-3A)(1):

Boundary	Pounds DCA Treated(2)	Pounds DCA(3)	Pounds VOCs Treated(2)	Pounds VOCs(3)
Biobarrier 1 (SA)	4.0	4.0	6.0	6.0
Biobarrier 2 (SA)	6.0	10	10	16
Biobarrier 3 (FL)	14	24	22	38
Biobarrier 4 (FL)	22	46	37	75
Biobarrier 5 (OS)	54	100	75	150
Air Sparge (RA)	166	266	225	375
	266		375	

Boundary	Pounds DCA	Pounds VOCs
Total treatment in Source Area	100	150
Total treatment in River Area	166	225

Notes:

SA = Source Area

FL = Navy Fence Line

OS = Offsite Southern Area

RA = River Area

1 = Note that Alternative 6 uses the same biobarriers (1 through 5) as designed previously for Alternative 4 in addition to the existing River Area Treatment Zone. No new treatment zones were introduced in this alternative. Refer to previous supplemental calculations for Alternatives 4 and 5 for additional design specifications.

2 = Treatment values include the amount of DCA or VOCs treated at each respective boundary line.

3 = Treatment values include the estimated total amount of DCA and VOCs treated in the plume up to this boundary line.

Tetra Tech NUS		***STANDARD CALCULATION SHEET***	
CLIENT: USN CLEAN	FILE No: WE08	BY: SK	PAGE: 1 of 17
SUBJECT: Mass Flow Through Treatment Areas for Alternative 7 Extraction and Treatment System NWIRP Calverton, New York		CHECKED BY:	DATE: 3/21/2011

Alternative 7 (Figure 5-4A):

Boundary[1]	Pounds DCA	Pounds VOCs
GW Ext. Well (FL)	57	93
GW Ext. Well (RA)	209	282

Notes:

FL = Navy Fence Line

RA = River Area

1 = Treatment values include the estimated total amount of DCA and VOCs treated in the plume up to this boundary line.

Tetra Tech NUS		STANDARD CALCULATION SHEET	
CLIENT: USN CLEAN	FILE No: WE08	BY: SK	PAGE: 2 of 17
SUBJECT: Alternative 7 Groundwater Extraction and Treatment CFM requirements for Equilization Tank NWIRP Calverton, New York		CHECKED BY:	DATE: 3/24/2011

1. Purpose:

To determine characteristics of the extraction, treatment and discharge system for the equilization tank to oxidize and precipitate ferrous iron (Fe^{2+}) present in groundwater. Parameters determined include pounds of oxidized ferrous iron, required flow rates for bubbled air (O_2), pounds sodium hydroxide (NaOH) required for iron removal, and pounds of precipitated solids as iron (III) hydroxide ($Fe(OH)_3$).

2. Approach:

Use flow rate and concentration of ferrous iron in influent groundwater to calculate pounds of ferrous iron requiring removal to also determine air flow requirements and pounds of precipitated solids.

3. Calculate pounds of ferrous iron in influent groundwater:

Water Flow Rate	300	gallons/minute
$[Fe^{2+}]$	10	milligrams/Liter
$[Fe^{2+}]$	0.01	grams/Liter
Pounds of Fe^{2+}	1.3.E+04	pounds Fe^{2+} requiring treatment/year

4. Calculate flow rate of bubbled air (O_2) required:

$$Fe^{2+} + 1/2\ O_2 + H_2O \rightarrow Fe^{3+} + 2OH^-$$

Molecular Weight of Fe^{2+}	56	grams/mole
Molecular Weight of O_2	32	grams/mole
Efficiency of Bubbled Air	0.2	
Transfer Efficiency of O_2	0.05	
Overall Efficiency of O_2	0.01	
Density of Air at 60º F(1)	0.077	pounds/cubic foot
Pounds of O2 required	3.8.E+03	pounds O_2 reacted/year
Pounds of Air required(2)	3.8.E+05	pounds air required/year
Flow Requirement of Air	9.3	cubic feet/minute(3)

(1) Reference: Kaminski, Jensen. *Introduction to Thermals and Fluids Engineering* , 2005.

(2) Note that the efficiency of the bubbled O_2 is only 20%, and only approximately 5% of that 20% is successfully transferred during the reaction. An overall efficiency of 1% was applied to determine pounds of air required to supply adequate oxygen for the reaction to proceed.

(3) Based on the flow requirement of air, a 10 cubic feet per minute (cfm) blower will be used.

Tetra Tech NUS			STANDARD CALCULATION SHEET
CLIENT: USN CLEAN	FILE No: WE08	BY: SK	PAGE: 3 of 17
SUBJECT: Alternative 7 Groundwater Extraction and Treatment CFM requirements for Equilization Tank NWIRP Calverton, New York		CHECKED BY:	DATE: 3/24/2011

5. Calculate pounds sodium hydroxide required, and pounds iron (III) hydroxide precipitated:

$Fe^{3+} + 3NaOH \rightarrow Fe(OH)_3 + 3Na^{+}$ (1)

Molecular Weight of Fe^{3+}	56	grams/mole
Molecular Weight NaOH	40	grams/mole
Molecular Weight $Fe(OH)_3$	107	grams/mole
Pounds NaOH required(2)	1.9.E+04	pounds NaOH/year
Tons NaOH required(2)	9.4	tons NaOH/year
Pounds $Fe(OH)_3$ precipitated	2.5.E+04	pounds $Fe(OH)_3$/year
Tons $Fe(OH)_3$ precipitated	13	tons $Fe(OH)_3$/year
Tons of Solids requiring off-site disposal(3)	65	tons of solids

(1) Note that 2 hydroxide ions (OH-) are already present as a product of the previous oxidation reaction, so a net requirement of 1 (OH-) ion is required. Thus (OH-) ions are present in excess in this reaction.

(2) Sodium hydroxide (NaOH) is injected as a 50% solution.

(3) Exists as 20% solids content

5. Calculate pounds sodium hydroxide required to adjust pH of water to 7.5:

Water Flow Rate	300	gallons/minute
[NaOH]	25	milligrams/Liter
Molecular Weight NaOH	40	grams/mole
Tons NaOH required(1)	16	tons NaOH/year

(1) Sodium hydroxide (NaOH) is injected as a 50% solution.

6. Calculate total tons of sodium hydroxide required for the system:

Tons NaOH required	26	tons NaOH/year

Project:	NWIRP Calverton	Project No.:	112G02045
Site:	River Road Area		
Subject:	Groundwater Extraction System CMS Design		
By:	J. Orient	Date:	2/23/2011
Checked:		Date:	

Project/Design Objective:

Design a groundwater extraction system for containment/cleanup of the Site 6A VOC plume near where it crosses River Road. The VOC plume is in the shallow portion of the unconsolidated groundwater flow system. Project cleanup rates/times assuming that the source will be removed or otherwise isolated from groundwater. The final design should be capable of remediating contaminated groundwater to target cleanup levels within a reasonable time frame (30 years or less), and should offer significant advantages over natural processes in terms of cleanup rate and/or protection of receptors. This design should be considered as conceptual only - additional data, i.e., aquifer characteristics, contaminant distributions are needed for a final design.

Basis of Design Data: (Input cells yellow, blue automatically calculated)

Groundwater Plume Information

Plume Width (W):	400	ft.
Plume Thickness:	15	ft.
Plume Area:	1,000,000	ft^2
Volume of Groundwater in Plume:	3750000	ft^3
Avg Hydraulic Conductivity, Plume Area:	185.5	ft/day

Aquifer Characteristics

Thickness (B):	40	ft.
Avg. Hydraulic Conductivity (K):	185.5	ft/day
Transmissivity (T):	7420	ft^2/day
Porosity (n):	0.25	
Storativity (S):	0.15	
Fractional Organic Carbon Content (foc):	0.0034	
Flow Gradient (i):	0.003	

Contaminant Characteristics

Contaminant A Representative gw conc.:	1,1-DCA	500	ug/L
Contaminant B Representative gw conc.:			
Koc, Contaminant A:		32	l/kg
Koc, Contaminant B:			l/kg
Kd, Contaminant A:		0.1088	l/kg
Kd, Contaminant B:		0	l/kg
Half-life, Contaminant A:			years
Half-life, Contaminant B:			years
Target Cleanup Level, Contaminant A:		5	ug/L
Target Cleanup Level, Contaminant B:			ug/L

Remedial System Information

Extraction Well Radius, (r) :	0.33	ft.
Time to Reach Steady-State Drawdown (t):	30	days
Allowable Drawdown, Single Well, (s):	10	ft.

Technical Approach:

Using aquifer characteristics, plume volume, Kd, half-life, and representative groundwater concentration data, calculate the number of pore volume flushes and times required to reach the target groundwater concentration (performed using the attached spreadsheets). Use standard equations to calculate the minimum required pumping rate for plume containment, per-well achievable pumping rates, and well spacings. Develop a preliminary extraction system design based on the calculations, adjusting the design as appropriate based on data limitation considerations and best scientific judgement.

Required Pumping Rate (Qt) for Total Plume Capture

Qt = TiW x 2 (2x the natural groundwater flow-thru rate for entire aquifer)

Qt = 8904.00 ft^3/day x 2, or 46.25 gpm x 2

Qt = 17808.00 ft^3/day, or 92.50 gpm

Maximum Achievable Pumping Rate in a Single Well (Qa)

Qa = $[4\pi Ts/2.3] / \log [2.25Tt/r^2S]$

Qa = 54150.56 ft^3/day, or 281.29 gpm

Minimum Number of Extraction Wells Required

= Qt/Qa

= 0.33 wells

Plume Cleanup Rate Projections (From Spreadsheet Program or Other Source)

At	100.0	gpm,	15	years
At	125.0	gpm,	12	years
At	150.0	gpm,	10	years
At natural GW flow rate: (plume area only)	17.34	gpm,	32	years

Contaminant that cleanup rate is based on: 1,1-DCA

Based on the limiting conditions calculated above, projections regarding cleanup times at various pumping rates (see accompanying spreadsheets), a suitable safety factor based on the degree of confidence in the design data, and best scientific judgement, the following are the number of extraction wells and pumping rates selected for the design:

Number of Wells:	1		
Per-well Pumping Rate (Qw):	100	gpm, or	19251.00 ft^3/day
Total System Pumping Rate (Qes):	100	gpm, or	19251.00 ft^3/day

Extraction Well Spacings, (WSp), ft Perpendicular to Groundwater Flow Direction

WSp = $Qw/\pi Ti$, for a 2-well extraction system

WSp = 275.28 ft

or

WSp = $1.26(Qw)/\pi Ti$, for a 3-well extraction system

WSp = 346.85 ft

or

WSp = $1.2(Qw)/\pi Ti$, for an extraction system with 4+ wells

WSp = 330.34 ft

Downgradient Stagnation Point (SPd) Approximation

SPd = $Qes/2\pi Ti$, Qes = total extraction system pumping rate, ft^3/day

SPd = 137.64 ft

Alternate Layout of Extraction Well System (I.e., parallel to GW flow direction):

N/A

Final Configuration, Groundwater Extraction System:

One 8-inch diameter extraction well, 40 feet deep with 15 ft screen length, installed within the plume interior between the railroad tracks and River Road. The well will pump at an approximate rate of 100 gpm, with a projected cleanup time of approximately 15 years after the residual source is remediated. Co-contaminants (other volatiles) are expected to clean up within the given time frame (assuming no residual source). Total plume capture is not an objective as system is focused on cutting off any further migration across River Road to downgradient properties.

Heterogeneous Aquifer Flushing Rate Calculations

Project:	NWIRP Calverton	Proj. No.:	112G02045
Chemical :	1,1-DCA	K_{OC} (K_d*) :	32
Concentration units, water & soil (pick 1):	mg/L & mg/Kg:	ug/L & ug/Kg:	X

This spreadsheet calculates flushing rates and cleanup times for a groundwater flow system that consists of up to 3 groundwater "flow units". Flow units are discrete portions of the aquifer that have unique properties, i.e., higher or lower average hydraulic conductivity, porosity, or specific gravity relative to other portions of the aquifer, higher/lower contaminant concentrations, and/or different organic carbon contents. The spreadsheet factors in different flushing rates for discrete portions of the aquifer based on the differences in the physical/chemical characteristics of the flow units. First-order contaminant decay/degradation processes can also be factored into the cleanup rate prediction through the optional use of contaminant half-life data.

NOTE: Input cells are shaded yellow; Cells automatically calculated are shaded blue; the remaining cells are fixed.

All groundwater/soil contaminant concentrations are in consistent units, i.e., mg/L & mg/Kg, or ug/L & ug/Kg.

*** for contaminants that partition between soil and water thru mechanisms other than adsoption onto organic carbon, i.e., metals, the compound's K_d is input directly into the K_{OC} entry cell, with f_{OC} then set to 1. For fractured bedrock, reduce the f_{OC} by 1-2 orders of magnitude to adjust for typical low fractured rock mass total porosity and resulting high model-percieved mass of aquifer solids in contact with water (i.e. artifically high f_{OC}).**

Groundwater Flow Unit Physical/Chemical Data

Flow Unit 1 (U1)		Flow Unit 2 (U2)		Flow Unit 3 (U3)	
Cw_{01}	500.00	Cw_{02}	500.00	Cw_{03}	500.00
n	0.25	n	0.25	n	0.25
S_G	2.65	S_G	2.65	S_G	2.65
f_{OC}*	0.0034	f_{OC}*	0.0034	f_{OC}*	0.0034
K_d	0.109	K_d	0.109	K_d	0.109
M_W	125.000	M_W	125.000	M_W	125.000
C_S	54.400	C_S	54.400	C_S	54.400
M_S	108.120	M_S	108.120	M_S	108.120
M_T	233.120	M_T	233.120	M_T	233.120
M_S/M_T	0.4638	M_S/M_T	0.4638	M_S/M_T	0.4638

Cw_{0N} = Initial contaminant concentration in groundwater flow unit N

Groundwater Flow Unit Hydrogeologic Characteristics

Avg. K, ft/d highest to lowest	Relative average K, K_U	Fraction of aquifer volume, FV_U	Fraction of total flow, FQ_U	Flow unit number, U
370	1.000	0.33	0.568	1
185.5	0.501	0.34	0.291	2
92	0.249	0.33	0.141	3

Pore Volumes and Pore Volume Removal Rates

Groundwater discharge rate		Plume area,	Aquifer/Plume	Total volume occupied
gpm	ft^3/day, Q_T	ft^2	thickness, ft	by plume, ft^3, PV_T
100	19251.34	1,000,000	40	40,000,000

Discharge rate, Unit 1 ft^3/day, Q_1	Discharge rate, Unit 2 ft^3/day, Q_2	Discharge rate, Unit 3 ft^3/day, Q_3	Plume pore Vol., Unit 1 ft^3, PV_1	Plume pore Vol., Unit 2 ft^3, PV_2	Plume pore Vol., Unit 3 ft^3, PV_3	Time for 1 PV flush, Unit 1, days, t_1	Time for 1 PV flush, Unit 2, days, t_2	Time for 1 PV flush, Unit 3, days, t_3
10937.78	5593.90	2719.66	3300000	3400000	3300000	301.71	607.81	1213.39

Contaminant Half-Life Data

Does contaminant have a decay half-life (yes/no):	no	If yes, half-life (days):	2000
1st order decay coefficient (k):	0.000347		

Average Pumped/Discharged and Residual Plume Concentrations Over Time

Target Cleanup Concentration :			5	ug/L
Time period	Time span, days, t	Avg pumped GW conc.	Avg residual GW conc.	Time span, years
0	0	0	**500**	0
0.5	150.85	377.728	**402.824**	0.41
0.75	226.28	330.006	**363.416**	0.62
1	301.71	289.325	**328.929**	0.83
1.5	452.56	224.757	**271.946**	1.24
2	603.41	177.070	**227.379**	1.65
2.5	754.27	141.423	**192.036**	2.07
3.5	1055.97	93.735	**140.502**	2.89
4.5	1357.68	64.966	**105.600**	3.72
6	1810.24	40.016	**71.329**	4.96
7.5	2262.80	26.067	**49.627**	6.20
9	2715.36	17.633	**35.221**	7.43
10.5	3167.92	12.241	**25.350**	8.67
12.5	3771.33	7.740	**16.606**	10.33
15	4525.60	4.502	**9.955**	12.39
17.5	5279.87	2.679	**6.043**	14.46
20	6034.13	1.618	**3.698**	16.52
25	7542.67	0.606	**1.403**	20.65
30	9051.20	0.231	**0.537**	24.78
40	12068.27	0.034	**0.079**	33.04
50	15085.33	0.005	**0.012**	41.30
85	25645.07	0.000	**0.000**	70.21
86	25946.77	0.000	**0.000**	71.04
87	26248.48	0.000	**0.000**	71.86
88	26550.19	0.000	**0.000**	72.69
90	27153.60	0.000	**0.000**	74.34

Adjust the initial time period to auto-adjust the following 19 time periods and obtain the desired range in concentrations.

The last 5 time periods can be modified to more precisely determine the time required to meet a specific residual concentration.

Heterogeneous Aquifer Flushing Rate Calculations

Project:	NWIRP Calverton	Proj. No.:	112G02045
Chemical :	1,1-DCA	K_{OC} (K_d*) :	32
Concentration units, water & soil (pick 1):	mg/L & mg/Kg:	ug/L & ug/Kg:	X

NOTE: Input cells are shaded yellow; Cells automatically calculated are shaded blue; the remaining cells are fixed.

This spreadsheet calculates flushing rates and cleanup times for a groundwater flow system that consists of up to 3 groundwater "flow units". Flow units are discrete portions of the aquifer that have unique properties, i.e., higher or lower average hydraulic conductivity, porosity, or specific gravity relative to other portions of the aquifer, higher/lower contaminant concentrations, and/or different organic carbon contents. The spreadsheet factors in different flushing rates for discrete portions of the aquifer based on the differences in the physical/chemical characteristics of the flow units. First-order contaminant decay/degradation processes can also be factored into the cleanup rate prediction through the optional use of contaminant half-life data.

All groundwater/soil contaminant concentrations are in consistent units, i.e., mg/L & mg/Kg, or ug/L & ug/Kg.

*** for contaminants that partition between soil and water thru mechanisms other than adsoption onto organic carbon, i.e., metals, the compound's K_d is input directly into the K_{OC} entry cell, with f_{OC} then set to 1. For fractured bedrock, reduce the f_{OC} by 1-2 orders of magnitude to adjust for typical low fractured rock mass total porosity and resulting high model-percieved mass of aquifer solids in contact with water (i.e. artifically high f_{OC}).**

Groundwater Flow Unit Physical/Chemical Data

Flow Unit 1 (U1)		Flow Unit 2 (U2)		Flow Unit 3 (U3)	
Cw_{01}	500.00	Cw_{02}	500.00	Cw_{03}	500.00
n	0.25	n	0.25	n	0.25
S_G	2.65	S_G	2.65	S_G	2.65
f_{OC}*	0.0034	f_{OC}*	0.0034	f_{OC}*	0.0034
K_d	0.109	K_d	0.109	K_d	0.109
M_W	125.000	M_W	125.000	M_W	125.000
C_S	54.400	C_S	54.400	C_S	54.400
M_S	108.120	M_S	108.120	M_S	108.120
M_T	233.120	M_T	233.120	M_T	233.120
M_S/M_T	0.4638	M_S/M_T	0.4638	M_S/M_T	0.4638

Cw_{0N} = Initial contaminant concentration in groundwater flow unit N

Groundwater Flow Unit Hydrogeologic Characteristics

Avg. K, ft/d highest to lowest	Relative average K, K_U	Fraction of aquifer volume, FV_U	Fraction of total flow, FQ_U	Flow unit number, U
370	1.000	0.33	0.568	1
185.5	0.501	0.34	0.291	2
92	0.249	0.33	0.141	3

Pore Volumes and Pore Volume Removal Rates

Groundwater discharge rate		Plume area,	Aquifer/Plume	Total volume occupied
gpm	ft^3/day, Q_T	ft^2	thickness, ft	by plume, ft^3, PV_T
125	24064.17	1,000,000	40	40,000,000

Discharge rate, Unit 1 ft^3/day, Q_1	Discharge rate, Unit 2 ft^3/day, Q_2	Discharge rate, Unit 3 ft^3/day, Q_3	Plume pore Vol., Unit 1 ft^3, PV_1	Plume pore Vol., Unit 2 ft^3, PV_2	Plume pore Vol., Unit 3 ft^3, PV_3	Time for 1 PV flush, Unit 1, days, t_1	Time for 1 PV flush, Unit 2, days, t_2	Time for 1 PV flush, Unit 3, days, t_3
13672.22	6992.37	3399.58	3300000	3400000	3300000	241.37	486.24	970.71

Contaminant Half-Life Data

Does contaminant have a decay half-life (yes/no):	no	If yes, half-life (days):	2000
1st order decay coefficient (k):	0.000347		

Average Pumped/Discharged and Residual Plume Concentrations Over Time

Target Cleanup Concentration :			5	ug/L
Time period	Time span, days, t	Avg pumped GW conc.	Avg residual GW conc.	Time span, years
0	0	0	**500**	0
0.5	120.68	377.728	**402.824**	0.33
0.75	181.02	330.006	**363.416**	0.50
1	241.37	289.325	**328.929**	0.66
1.5	362.05	224.757	**271.946**	0.99
2	482.73	177.070	**227.379**	1.32
2.5	603.41	141.423	**192.036**	1.65
3.5	844.78	93.735	**140.502**	2.31
4.5	1086.14	64.966	**105.600**	2.97
6	1448.19	40.016	**71.329**	3.96
7.5	1810.24	26.067	**49.627**	4.96
9	2172.29	17.633	**35.221**	5.95
10.5	2534.34	12.241	**25.350**	6.94
12.5	3017.07	7.740	**16.606**	8.26
15	3620.48	4.502	**9.955**	9.91
17.5	4223.89	2.679	**6.043**	11.56
20	4827.31	1.618	**3.698**	13.22
25	6034.13	0.606	**1.403**	16.52
30	7240.96	0.231	**0.537**	19.82
40	9654.61	0.034	**0.079**	26.43
50	12068.27	0.005	**0.012**	33.04
85	20516.05	0.000	**0.000**	56.17
86	20757.42	0.000	**0.000**	56.83
87	20998.78	0.000	**0.000**	57.49
88	21240.15	0.000	**0.000**	58.15
90	21722.88	0.000	**0.000**	59.47

Adjust the initial time period to auto-adjust the following 19 time periods and obtain the desired range in concentrations.

The last 5 time periods can be modified to more precisely determine the time required to meet a specific residual concentration.

Heterogeneous Aquifer Flushing Rate Calculations

Project:	NWIRP Calverton	Proj. No.:	112G02045
Chemical :	1,1-DCA	K_{OC} (K_d*) :	32
Concentration units, water & soil (pick 1):	mg/L & mg/Kg:	ug/L & ug/Kg:	X

NOTE: Input cells are shaded yellow; Cells automatically calculated are shaded blue; the remaining cells are fixed.

This spreadsheet calculates flushing rates and cleanup times for a groundwater flow system that consists of up to 3 groundwater "flow units". Flow units are discrete portions of the aquifer that have unique properties, i.e., higher or lower average hydraulic conductivity, porosity, or specific gravity relative to other portions of the aquifer, higher/lower contaminant concentrations, and/or different organic carbon contents. The spreadsheet factors in different flushing rates for discrete portions of the aquifer based on the differences in the physical/chemical characteristics of the flow units. First-order contaminant decay/degradation processes can also be factored into the cleanup rate prediction through the optional use of contaminant half-life data.

All groundwater/soil contaminant concentrations are in consistent units, i.e., mg/L & mg/Kg, or ug/L & ug/Kg.

* for contaminants that partition between soil and water thru mechanisms other than adsoption onto organic carbon, i.e., metals, the compound's K_d is input directly into the K_{OC} entry cell, with f_{OC} then set to 1. For fractured bedrock, reduce the f_{OC} by 1-2 orders of magnitude to adjust for typical low fractured rock mass total porosity and resulting high model-percieved mass of aquifer solids in contact with water (i.e. artifically high f_{OC}).

Groundwater Flow Unit Physical/Chemical Data

Flow Unit 1 (U1)		Flow Unit 2 (U2)		Flow Unit 3 (U3)	
Cw_{01}	500.00	Cw_{02}	500.00	Cw_{03}	500.00
n	0.25	n	0.25	n	0.25
S_G	2.65	S_G	2.65	S_G	2.65
f_{OC}*	0.0034	f_{OC}*	0.0034	f_{OC}*	0.0034
K_d	0.109	K_d	0.109	K_d	0.109
M_W	125.000	M_W	125.000	M_W	125.000
C_S	54.400	C_S	54.400	C_S	54.400
M_S	108.120	M_S	108.120	M_S	108.120
M_T	233.120	M_T	233.120	M_T	233.120
M_S/M_T	0.4638	M_S/M_T	0.4638	M_S/M_T	0.4638

Cw_{0N} = Initial contaminant concentration in groundwater flow unit N

Groundwater Flow Unit Hydrogeologic Characteristics

Avg. K, ft/d highest to lowest	Relative average K, K_U	Fraction of aquifer volume, FV_U	Fraction of total flow, FQ_U	Flow unit number, U
370	1.000	0.33	0.568	1
185.5	0.501	0.34	0.291	2
92	0.249	0.33	0.141	3

Pore Volumes and Pore Volume Removal Rates

Groundwater discharge rate		Plume area, ft^2	Aquifer/Plume thickness, ft	Total volume occupied by plume, ft^3, PV_T
gpm	ft^3/day, Q_T			
150	28877.01	1,000,000	40	40,000,000

Discharge rate, Unit 1 ft^3/day, Q_1	Discharge rate, Unit 2 ft^3/day, Q_2	Discharge rate, Unit 3 ft^3/day, Q_3	Plume pore Vol., Unit 1 ft^3, PV_1	Plume pore Vol., Unit 2 ft^3, PV_2	Plume pore Vol., Unit 3 ft^3, PV_3	Time for 1 PV flush, Unit 1, days, t_1	Time for 1 PV flush, Unit 2, days, t_2	Time for 1 PV flush, Unit 3, days, t_3
16406.66	8390.85	4079.49	3300000	3400000	3300000	201.14	405.20	808.92

Contaminant Half-Life Data

Does contaminant have a decay half-life (yes/no):	no	If yes, half-life (days):	2000
1st order decay coefficient (k):	0.000347		

Average Pumped/Discharged and Residual Plume Concentrations Over Time

Target Cleanup Concentration :			5	ug/L
Time period	Time span, days, t	Avg pumped GW conc.	Avg residual GW conc.	Time span, years
0	0	0	**500**	0
0.5	100.57	377.728	**402.824**	0.28
0.75	150.85	330.006	**363.416**	0.41
1	201.14	289.325	**328.929**	0.55
1.5	301.71	224.757	**271.946**	0.83
2	402.28	177.070	**227.379**	1.10
2.5	502.84	141.423	**192.036**	1.38
3.5	703.98	93.735	**140.502**	1.93
4.5	905.12	64.966	**105.600**	2.48
6	1206.83	40.016	**71.329**	3.30
7.5	1508.53	26.067	**49.627**	4.13
9	1810.24	17.633	**35.221**	4.96
10.5	2111.95	12.241	**25.350**	5.78
12.5	2514.22	7.740	**16.606**	6.88
15	3017.07	4.502	**9.955**	8.26
17.5	3519.91	2.679	**6.043**	9.64
20	4022.76	1.618	**3.698**	11.01
25	5028.44	0.606	**1.403**	13.77
30	6034.13	0.231	**0.537**	16.52
40	8045.51	0.034	**0.079**	22.03
50	10056.89	0.005	**0.012**	27.53
85	17096.71	0.000	**0.000**	46.81
86	17297.85	0.000	**0.000**	47.36
87	17498.99	0.000	**0.000**	47.91
88	17700.12	0.000	**0.000**	48.46
90	18102.40	0.000	**0.000**	49.56

Adjust the initial time period to auto-adjust the following 19 time periods and obtain the desired range in concentrations.

The last 5 time periods can be modified to more precisely determine the time required to meet a specific residual concentration.

Heterogeneous Aquifer Flushing Rate Calculations

Project:	NWIRP Calverton	Proj. No.:	112G02045
Chemical :	1,1-DCA	K_{OC} (K_d*) :	32
Concentration units, water & soil (pick 1):	mg/L & mg/Kg:	ug/L & ug/Kg:	X

NOTE: Input cells are shaded yellow; Cells automatically calculated are shaded blue; the remaining cells are fixed.

This spreadsheet calculates flushing rates and cleanup times for a groundwater flow system that consists of up to 3 groundwater "flow units". Flow units are discrete portions of the aquifer that have unique properties, i.e., higher or lower average hydraulic conductivity, porosity, or specific gravity relative to other portions of the aquifer, higher/lower contaminant concentrations, and/or different organic carbon contents. The spreadsheet factors in different flushing rates for discrete portions of the aquifer based on the differences in the physical/chemical characteristics of the flow units. First-order contaminant decay/degradation processes can also be factored into the cleanup rate prediction through the optional use of contaminant half-life data.

All groundwater/soil contaminant concentrations are in consistent units, i.e., mg/L & mg/Kg, or ug/L & ug/Kg.

*** for contaminants that partition between soil and water thru mechanisms other than adsoption onto organic carbon, i.e., metals, the compound's K_d is input directly into the K_{OC} entry cell, with f_{OC} then set to 1. For fractured bedrock, reduce the f_{OC} by 1-2 orders of magnitude to adjust for typical low fractured rock mass total porosity and resulting high model-percieved mass of aquifer solids in contact with water (i.e. artifically high f_{OC}).**

Groundwater Flow Unit Physical/Chemical Data

Flow Unit 1 (U1)		Flow Unit 2 (U2)		Flow Unit 3 (U3)	
Cw_{01}	500.00	Cw_{02}	500.00	Cw_{03}	500.00
n	0.25	n	0.25	n	0.25
S_G	2.65	S_G	2.65	S_G	2.65
f_{OC}*	0.0034	f_{OC}*	0.0034	f_{OC}*	0.0034
K_d	0.109	K_d	0.109	K_d	0.109
M_W	125.000	M_W	125.000	M_W	125.000
C_S	54.400	C_S	54.400	C_S	54.400
M_S	108.120	M_S	108.120	M_S	108.120
M_T	233.120	M_T	233.120	M_T	233.120
M_S/M_T	0.4638	M_S/M_T	0.4638	M_S/M_T	0.4638

Cw_{0N} = Initial contaminant concentration in groundwater flow unit N

Groundwater Flow Unit Hydrogeologic Characteristics

Avg. K, ft/d highest to lowest	Relative average K, K_U	Fraction of aquifer volume, FV_U	Fraction of total flow, FQ_U	Flow unit number, U
370	1.000	0.33	0.568	1
185.5	0.501	0.34	0.291	2
92	0.249	0.33	0.141	3

Pore Volumes and Pore Volume Removal Rates

Groundwater discharge rate		Plume area,	Plume thickness,	Total volume occupied
gpm	ft^3/day, Q_T	ft^2	ft	by plume, ft^3, PV_T
17.4	3349.73	1,000,000	15	15,000,000

Discharge rate, Unit 1 ft^3/day, Q_1	Discharge rate, Unit 2 ft^3/day, Q_2	Discharge rate, Unit 3 ft^3/day, Q_3	Plume pore Vol., Unit 1 ft^3, PV_1	Plume pore Vol., Unit 2 ft^3, PV_2	Plume pore Vol., Unit 3 ft^3, PV_3	Time for 1 PV flush, Unit 1, days, t_1	Time for 1 PV flush, Unit 2, days, t_2	Time for 1 PV flush, Unit 3, days, t_3
1903.17	973.34	473.22	1237500	1275000	1237500	650.23	1309.92	2615.06

Contaminant Half-Life Data

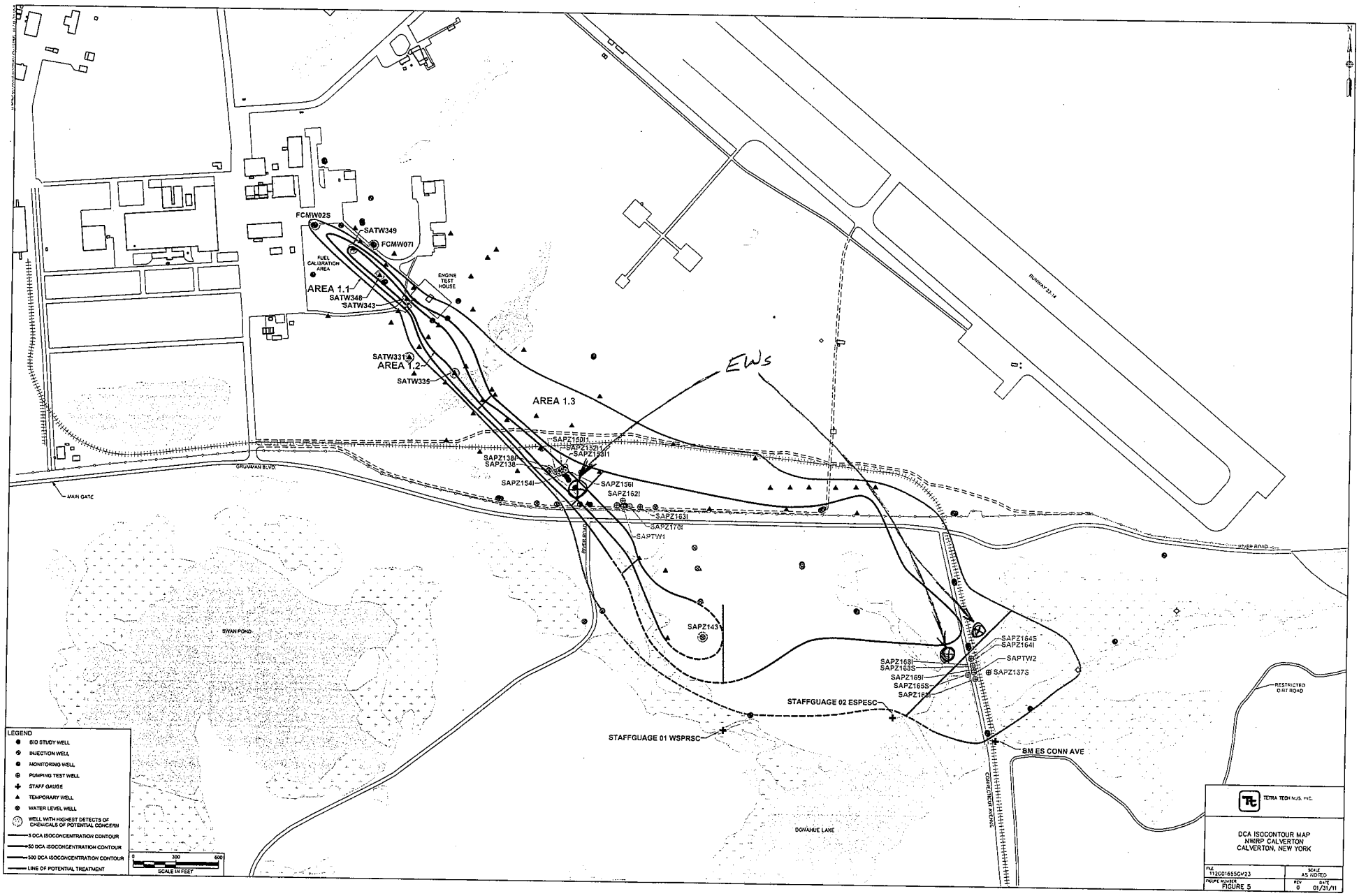
Does contaminant have a decay half-life (yes/no):	no	If yes, half-life (days):	2000
1st order decay coefficient (k):	0.000347		

Average Pumped/Discharged and Residual Plume Concentrations Over Time

Target Cleanup Concentration :		5	ug/L
Time period	Time span, days, t	Avg pumped GW conc.	Avg residual GW conc.	Time span, years
0	0	0	**500**	0
0.5	325.11	377.728	**402.824**	0.89
0.75	487.67	330.006	**363.416**	1.34
1	650.23	289.325	**328.929**	1.78
1.5	975.34	224.757	**271.946**	2.67
2	1300.46	177.070	**227.379**	3.56
2.5	1625.57	141.423	**192.036**	4.45
3.5	2275.80	93.735	**140.502**	6.23
4.5	2926.03	64.966	**105.600**	8.01
6	3901.38	40.016	**71.329**	10.68
7.5	4876.72	26.067	**49.627**	13.35
9	5852.07	17.633	**35.221**	16.02
10.5	6827.41	12.241	**25.350**	18.69
12.5	8127.87	7.740	**16.606**	22.25
15	9753.45	4.502	**9.955**	26.70
17.5	11379.02	2.679	**6.043**	31.15
20	13004.60	1.618	**3.698**	35.60
25	16255.75	0.606	**1.403**	44.51
30	19506.90	0.231	**0.537**	53.41
40	26009.20	0.034	**0.079**	71.21
50	32511.50	0.005	**0.012**	89.01
85	55269.54	0.000	**0.000**	151.32
86	55919.77	0.000	**0.000**	153.10
87	56570.00	0.000	**0.000**	154.88
88	57220.23	0.000	**0.000**	156.66
90	58520.69	0.000	**0.000**	160.22

Adjust the initial time period to auto-adjust the following 19 time periods and obtain the desired range in concentrations.

The last 5 time periods can be modified to more precisely determine the time required to meet a specific residual concentration.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ENGINE TEST HOUSE
AREA 1.1
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SATW343
SATW331
AREA 1.2
SATW335
AREA 1.3
EWs
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STAFFGUAGE 02 ESPESC
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DONAHUE LAKE
RUNWAY 32-14
RESTRICTED DIRT ROAD
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DATE 01/31/11

Project:	NWIRP Calverton	Project No.:	112G02045
Site:	Connecticut Ave. area		
Subject:	Groundwater Extraction System CMS Design		
By:	J. Orient	Date:	2/23/2011
Checked:		Date:	

Project/Design Objective:

Design a groundwater extraction system for containment/cleanup of the Site 6A VOC plume near where it crosses Connecticut Ave.. The VOC plume is in the top 90 ft of the shallow unconsolidated groundwater flow system. Project cleanup rates/times assuming that the source will be removed or otherwise isolated from groundwater. The final design should be capable of remediating contaminated groundwater to target cleanup levels within a reasonable time frame (30 years or less), and should offer significant advantages over natural processes in terms of cleanup rate and/or protection of receptors. This design should be considered as conceptual only - additional data, i.e., aquifer characteristics, contaminant distributions are needed for a final design.

Basis of Design Data: (Input cells yellow, blue automatically calculated)

Groundwater Plume Information

Plume Width (W):	1000	ft.
Plume Thickness:	80	ft.
Plume Area:	3,000,000	ft^2
Volume of Groundwater in Plume:	60000000	ft^3
Avg Hydraulic Conductivity, Plume Area:	55.5	ft/day

Aquifer Characteristics

Thickness (B):	105	ft.
Avg. Hydraulic Conductivity (K):	55.5	ft/day
Transmissivity (T):	5827.5	ft^2/day
Porosity (n):	0.25	
Storativity (S):	0.15	
Fractional Organic Carbon Content (foc):	0.0034	
Flow Gradient (i):	0.003	

Contaminant Characteristics

Contaminant A Representative gw conc.:	1,1-DCA	500	ug/L
Contaminant B Representative gw conc.:			
Koc, Contaminant A:		32	l/kg
Koc, Contaminant B:			l/kg
Kd, Contaminant A:		0.1088	l/kg
Kd, Contaminant B:		0	l/kg
Half-life, Contaminant A:			years
Half-life, Contaminant B:			years
Target Cleanup Level, Contaminant A:		5	ug/L
Target Cleanup Level, Contaminant B:			ug/L

Remedial System Information

Extraction Well Radius, (r) :	0.33	ft.
Time to Reach Steady-State Drawdown (t):	30	days
Allowable Drawdown, Single Well, (s):	10	ft.

Technical Approach:

Using aquifer characteristics, plume volume, Kd, half-life, and representative groundwater concentration data, calculate the number of pore volume flushes and times required to reach the target groundwater concentration (performed using the attached spreadsheets). Use standard equations to calculate the minimum required pumping rate for plume containment, per-well achievable pumping rates, and well spacings. Develop a preliminary extraction system design based on the calculations, adjusting the design as appropriate based on data limitation considerations and best scientific judgement.

Required Pumping Rate (Qt) for Total Plume Capture

Qt = TiW x 2 (2x the natural groundwater flow-thru rate for entire aquifer)

Qt = 17482.50 ft^3/day x 2, or 90.81 gpm x 2

Qt = 34965.00 ft^3/day, or 181.63 gpm

Maximum Achievable Pumping Rate in a Single Well (Qa)

Qa = $[4\pi Ts/2.3] / \log [2.25Tt/r^2S]$

Qa = 43133.12 ft^3/day, or 224.06 gpm

Minimum Number of Extraction Wells Required

= Qt/Qa

= 0.81 wells

Plume Cleanup Rate Projections (From Spreadsheet Program or Other Source)

At	190.0	gpm,	35	years
At	240.0	gpm,	28	years
At	290.0	gpm,	23	years
At natural GW flow rate: (plume area only)	69.19	gpm,	74	years

Contaminant that cleanup rate is based on: 1,1-DCA

Based on the limiting conditions calculated above, projections regarding cleanup times at various pumping rates (see accompanying spreadsheets), a suitable safety factor based on the degree of confidence in the design data, and best scientific judgement, the following are the number of extraction wells and pumping rates selected for the design:

Number of Wells:	2		
Per-well Pumping Rate (Qw):	95	gpm, or	18288.45 ft^3/day
Total System Pumping Rate (Qes):	190	gpm, or	36576.90 ft^3/day

Extraction Well Spacings, (WSp), ft Perpendicular to Groundwater Flow Direction

WSp = $Qw/\pi Ti$, for a 2-well extraction system

WSp = 332.98 ft

or

WSp = $1.26(Qw)/\pi Ti$, for a 3-well extraction system

WSp = 419.56 ft

or

WSp = $1.2(Qw)/\pi Ti$, for an extraction system with 4+ wells

WSp = 399.58 ft

Downgradient Stagnation Point (SPd) Approximation

SPd = $Qes/2\pi Ti$, Qes = total extraction system pumping rate, ft^3/day

SPd = 332.98 ft

Alternate Layout of Extraction Well System (I.e., parallel to GW flow direction):

N/A

Final Configuration, Groundwater Extraction System:

Two 8-inch diameter extraction wells, 90 feet deep with a 60 ft screen length, installed along Connecticut Ave where the core of the plume crosses underneath. The wells will pump at an approximate rate of 95 gpm each, with a projected cleanup time of approximately 35 years after the residual source is remediated or isolated. Co-contaminants (other volatiles) are expected to clean up within the given time frame (assuming no residual source). Optimum plume capture is not an objective as system is focused on cutting off the far downgradient portion of the plume from discharging to the Peconic River. Space the wells approximately 250-300 ft apart along Connecticut Ave.

Heterogeneous Aquifer Flushing Rate Calculations

Project:	NWIRP Calverton	Proj. No.:	112G02045
Chemical :	1,1-DCA	K_{OC} (K_d*) :	32
Concentration units, water & soil (pick 1):	mg/L & mg/Kg:	ug/L & ug/Kg:	X

NOTE: Input cells are shaded yellow; Cells automatically calculated are shaded blue; the remaining cells are fixed.

This spreadsheet calculates flushing rates and cleanup times for a groundwater flow system that consists of up to 3 groundwater "flow units". Flow units are discrete portions of the aquifer that have unique properties, i.e., higher or lower average hydraulic conductivity, porosity, or specific gravity relative to other portions of the aquifer, higher/lower contaminant concentrations, and/or different organic carbon contents. The spreadsheet factors in different flushing rates for discrete portions of the aquifer based on the differences in the physical/chemical characteristics of the flow units. First-order contaminant decay/degradation processes can also be factored into the cleanup rate prediction through the optional use of contaminant half-life data.

All groundwater/soil contaminant concentrations are in consistent units, i.e., mg/L & mg/Kg, or ug/L & ug/Kg.

*** for contaminants that partition between soil and water thru mechanisms other than adsoption onto organic carbon, i.e., metals, the compound's K_d is input directly into the K_{OC} entry cell, with f_{OC} then set to 1. For fractured bedrock, reduce the f_{OC} by 1-2 orders of magnitude to adjust for typical low fractured rock mass total porosity and resulting high model-percieved mass of aquifer solids in contact with water (i.e. artifically high f_{OC}).**

Groundwater Flow Unit Physical/Chemical Data

Flow Unit 1 (U1)		Flow Unit 2 (U2)		Flow Unit 3 (U3)	
Cw_{01}	100.00	Cw_{02}	100.00	Cw_{03}	100.00
n	0.25	n	0.25	n	0.25
S_G	2.65	S_G	2.65	S_G	2.65
f_{OC}*	0.0034	f_{OC}*	0.0034	f_{OC}*	0.0034
K_d	0.109	K_d	0.109	K_d	0.109
M_W	25.000	M_W	25.000	M_W	25.000
C_S	10.880	C_S	10.880	C_S	10.880
M_S	21.624	M_S	21.624	M_S	21.624
M_T	46.624	M_T	46.624	M_T	46.624
M_S/M_T	0.4638	M_S/M_T	0.4638	M_S/M_T	0.4638

Cw_{0N} = Initial contaminant concentration in groundwater flow unit N

Groundwater Flow Unit Hydrogeologic Characteristics

Avg. K, ft/d highest to lowest	Relative average K, K_U	Fraction of aquifer volume, FV_U	Fraction of total flow, FQ_U	Flow unit number, U
110	1.000	0.33	0.567	1
55	0.500	0.34	0.289	2
28	0.255	0.33	0.144	3

Pore Volumes and Pore Volume Removal Rates

Groundwater discharge rate		Plume area,	Aquifer/Plume	Total volume occupied
gpm	ft^3/day, Q_T	ft^2	thickness, ft	by plume, ft^3, PV_T
70	13475.94	3,000,000	80	240,000,000

Discharge rate, Unit 1 ft^3/day, Q_1	Discharge rate, Unit 2 ft^3/day, Q_2	Discharge rate, Unit 3 ft^3/day, Q_3	Plume pore Vol., Unit 1 ft^3, PV_1	Plume pore Vol., Unit 2 ft^3, PV_2	Plume pore Vol., Unit 3 ft^3, PV_3	Time for 1 PV flush, Unit 1, days, t_1	Time for 1 PV flush, Unit 2, days, t_2	Time for 1 PV flush, Unit 3, days, t_3
7636.84	3895.17	1943.92	19800000	20400000	19800000	2592.70	5237.25	10185.59

Contaminant Half-Life Data

Does contaminant have a decay half-life (yes/no):	no	If yes, half-life (days):	2000
1st order decay coefficient (k):	0.000347		

Average Pumped/Discharged and Residual Plume Concentrations Over Time

Target Cleanup Concentration :			5	ug/L
Time period	Time span, days, t	Avg pumped GW conc.	Avg residual GW conc.	Time span, years
0	0	0	**100**	0
0.2	518.54	89.257	**91.543**	1.42
0.3	777.81	84.395	**87.660**	2.13
0.4	1037.08	79.841	**83.987**	2.84
0.6	1555.62	71.575	**77.221**	4.26
0.8	2074.16	64.307	**71.148**	5.68
1	2592.70	57.906	**65.686**	7.10
1.4	3629.77	47.270	**56.314**	9.94
1.8	4666.85	38.935	**48.631**	12.78
2.4	6222.47	29.588	**39.505**	17.04
3	7778.09	22.911	**32.508**	21.30
3.6	9333.71	18.050	**27.043**	25.55
4.2	10889.32	14.444	**22.705**	29.81
5	12963.48	10.957	**18.196**	35.49
6	15556.18	7.976	**14.006**	42.59
7	18148.87	5.948	**10.919**	49.69
8	20741.57	4.518	**8.595**	56.79
10	25926.96	2.711	**5.441**	70.98
12	31112.35	1.687	**3.515**	85.18
16	41483.13	0.697	**1.521**	113.57
20	51853.92	0.303	**0.677**	141.97
9	23334.26	3.480	**6.818**	63.89
10	25926.96	2.711	**5.441**	70.98
10.5	27223.31	2.401	**4.870**	74.53
11	28519.65	2.131	**4.364**	78.08
12	31112.35	1.687	**3.515**	85.18

Adjust the initial time period to auto-adjust the following 19 time periods and obtain the desired range in concentrations.

The last 5 time periods can be modified to more precisely determine the time required to meet a specific residual concentration.

Heterogeneous Aquifer Flushing Rate Calculations

Project:	NWIRP Calverton	Proj. No.:	112G02045
Chemical :	1,1-DCA	K_{OC} (K_d*) :	32
Concentration units, water & soil (pick 1):	mg/L & mg/Kg:	ug/L & ug/Kg:	X

NOTE: Input cells are shaded yellow; Cells automatically calculated are shaded blue; the remaining cells are fixed.

This spreadsheet calculates flushing rates and cleanup times for a groundwater flow system that consists of up to 3 groundwater "flow units". Flow units are discrete portions of the aquifer that have unique properties, i.e., higher or lower average hydraulic conductivity, porosity, or specific gravity relative to other portions of the aquifer, higher/lower contaminant concentrations, and/or different organic carbon contents. The spreadsheet factors in different flushing rates for discrete portions of the aquifer based on the differences in the physical/chemical characteristics of the flow units. First-order contaminant decay/degradation processes can also be factored into the cleanup rate prediction through the optional use of contaminant half-life data.

All groundwater/soil contaminant concentrations are in consistent units, i.e., mg/L & mg/Kg, or ug/L & ug/Kg.

*** for contaminants that partition between soil and water thru mechanisms other than adsoption onto organic carbon, i.e., metals, the compound's K_d is input directly into the K_{OC} entry cell, with f_{OC} then set to 1. For fractured bedrock, reduce the f_{OC} by 1-2 orders of magnitude to adjust for typical low fractured rock mass total porosity and resulting high model-percieved mass of aquifer solids in contact with water (i.e. artifically high f_{OC}).**

Groundwater Flow Unit Physical/Chemical Data

Flow Unit 1 (U1)		Flow Unit 2 (U2)		Flow Unit 3 (U3)	
Cw_{01}	100.00	Cw_{02}	100.00	Cw_{03}	100.00
n	0.25	n	0.25	n	0.25
S_G	2.65	S_G	2.65	S_G	2.65
f_{OC}*	0.0034	f_{OC}*	0.0034	f_{OC}*	0.0034
K_d	0.109	K_d	0.109	K_d	0.109
M_W	25.000	M_W	25.000	M_W	25.000
C_S	10.880	C_S	10.880	C_S	10.880
M_S	21.624	M_S	21.624	M_S	21.624
M_T	46.624	M_T	46.624	M_T	46.624
M_S/M_T	0.4638	M_S/M_T	0.4638	M_S/M_T	0.4638

Cw_{0N} = Initial contaminant concentration in groundwater flow unit N

Groundwater Flow Unit Hydrogeologic Characteristics

Avg. K, ft/d highest to lowest	Relative average K, K_U	Fraction of aquifer volume, FV_U	Fraction of total flow, FQ_U	Flow unit number, U
110	1.000	0.33	0.567	1
55	0.500	0.34	0.289	2
28	0.255	0.33	0.144	3

Pore Volumes and Pore Volume Removal Rates

Groundwater discharge rate		Plume area, ft^2	Aquifer/Plume thickness, ft	Total volume occupied by plume, ft^3, PV_T
gpm	ft^3/day, Q_T			
290	55828.88	3,000,000	105	315,000,000

Discharge rate, Unit 1 ft^3/day, Q_1	Discharge rate, Unit 2 ft^3/day, Q_2	Discharge rate, Unit 3 ft^3/day, Q_3	Plume pore Vol., Unit 1 ft^3, PV_1	Plume pore Vol., Unit 2 ft^3, PV_2	Plume pore Vol., Unit 3 ft^3, PV_3	Time for 1 PV flush, Unit 1, days, t_1	Time for 1 PV flush, Unit 2, days, t_2	Time for 1 PV flush, Unit 3, days, t_3
31638.33	16137.15	8053.39	25987500	26775000	25987500	821.39	1659.21	3226.90

Contaminant Half-Life Data

Does contaminant have a decay half-life (yes/no):	no	If yes, half-life (days):	2000
1st order decay coefficient (k):	0.000347		

Average Pumped/Discharged and Residual Plume Concentrations Over Time

Target Cleanup Concentration :			5	ug/L
Time period	Time span, days, t	Avg pumped GW conc.	Avg residual GW conc.	Time span, years
0	0	0	**100**	0
0.2	164.28	89.257	**91.543**	0.45
0.3	246.42	84.395	**87.660**	0.67
0.4	328.56	79.841	**83.987**	0.90
0.6	492.84	71.575	**77.221**	1.35
0.8	657.11	64.307	**71.148**	1.80
1	821.39	57.906	**65.686**	2.25
1.4	1149.95	47.270	**56.314**	3.15
1.8	1478.51	38.935	**48.631**	4.05
2.4	1971.34	29.588	**39.505**	5.40
3	2464.18	22.911	**32.508**	6.75
3.6	2957.01	18.050	**27.043**	8.10
4.2	3449.85	14.444	**22.705**	9.45
5	4106.96	10.957	**18.196**	11.24
6	4928.36	7.976	**14.006**	13.49
7	5749.75	5.948	**10.919**	15.74
8	6571.14	4.518	**8.595**	17.99
10	8213.93	2.711	**5.441**	22.49
12	9856.71	1.687	**3.515**	26.99
16	13142.29	0.697	**1.521**	35.98
20	16427.86	0.303	**0.677**	44.98
9	7392.54	3.480	**6.818**	20.24
10	8213.93	2.711	**5.441**	22.49
10.5	8624.63	2.401	**4.870**	23.61
11	9035.32	2.131	**4.364**	24.74
12	9856.71	1.687	**3.515**	26.99

Adjust the initial time period to auto-adjust the following 19 time periods and obtain the desired range in concentrations.

The last 5 time periods can be modified to more precisely determine the time required to meet a specific residual concentration.

Heterogeneous Aquifer Flushing Rate Calculations

Project:	NWIRP Calverton	Proj. No.:	112G02045
Chemical :	1,1-DCA	K_{OC} (K_d*) :	32
Concentration units, water & soil (pick 1):	mg/L & mg/Kg:	ug/L & ug/Kg:	X

NOTE: Input cells are shaded yellow; Cells automatically calculated are shaded blue; the remaining cells are fixed.

This spreadsheet calculates flushing rates and cleanup times for a groundwater flow system that consists of up to 3 groundwater "flow units". Flow units are discrete portions of the aquifer that have unique properties, i.e., higher or lower average hydraulic conductivity, porosity, or specific gravity relative to other portions of the aquifer, higher/lower contaminant concentrations, and/or different organic carbon contents. The spreadsheet factors in different flushing rates for discrete portions of the aquifer based on the differences in the physical/chemical characteristics of the flow units. First-order contaminant decay/degradation processes can also be factored into the cleanup rate prediction through the optional use of contaminant half-life data.

All groundwater/soil contaminant concentrations are in consistent units, i.e., mg/L & mg/Kg, or ug/L & ug/Kg.

*** for contaminants that partition between soil and water thru mechanisms other than adsoption onto organic carbon, i.e., metals, the compound's K_d is input directly into the K_{OC} entry cell, with f_{OC} then set to 1. For fractured bedrock, reduce the f_{OC} by 1-2 orders of magnitude to adjust for typical low fractured rock mass total porosity and resulting high model-percieved mass of aquifer solids in contact with water (i.e. artifically high f_{OC}).**

Groundwater Flow Unit Physical/Chemical Data

Flow Unit 1 (U1)		Flow Unit 2 (U2)		Flow Unit 3 (U3)	
Cw_{01}	100.00	Cw_{02}	100.00	Cw_{03}	100.00
n	0.25	n	0.25	n	0.25
S_G	2.65	S_G	2.65	S_G	2.65
f_{OC}*	0.0034	f_{OC}*	0.0034	f_{OC}*	0.0034
K_d	0.109	K_d	0.109	K_d	0.109
M_W	25.000	M_W	25.000	M_W	25.000
C_S	10.880	C_S	10.880	C_S	10.880
M_S	21.624	M_S	21.624	M_S	21.624
M_T	46.624	M_T	46.624	M_T	46.624
M_S/M_T	0.4638	M_S/M_T	0.4638	M_S/M_T	0.4638

Cw_{0N} = Initial contaminant concentration in groundwater flow unit N

Groundwater Flow Unit Hydrogeologic Characteristics

Avg. K, ft/d highest to lowest	Relative average K, K_U	Fraction of aquifer volume, FV_U	Fraction of total flow, FQ_U	Flow unit number, U
110	1.000	0.33	0.567	1
55	0.500	0.34	0.289	2
28	0.255	0.33	0.144	3

Pore Volumes and Pore Volume Removal Rates

Groundwater discharge rate		Plume area,	Aquifer/Plume	Total volume occupied
gpm	ft^3/day, Q_T	ft^2	thickness, ft	by plume, ft^3, PV_T
240	46203.21	3,000,000	105	315,000,000

Discharge rate, Unit 1 ft^3/day, Q_1	Discharge rate, Unit 2 ft^3/day, Q_2	Discharge rate, Unit 3 ft^3/day, Q_3	Plume pore Vol., Unit 1 ft^3, PV_1	Plume pore Vol., Unit 2 ft^3, PV_2	Plume pore Vol., Unit 3 ft^3, PV_3	Time for 1 PV flush, Unit 1, days, t_1	Time for 1 PV flush, Unit 2, days, t_2	Time for 1 PV flush, Unit 3, days, t_3
26183.45	13354.88	6664.88	25987500	26775000	25987500	992.52	2004.88	3899.17

Contaminant Half-Life Data

Does contaminant have a decay half-life (yes/no):	no	If yes, half-life (days):	2000
1st order decay coefficient (k):	0.000347		

Average Pumped/Discharged and Residual Plume Concentrations Over Time

Target Cleanup Concentration :			5	ug/L
Time period	Time span, days, t	Avg pumped GW conc.	Avg residual GW conc.	Time span, years
0	0	0	**100**	0
0.2	198.50	89.257	**91.543**	0.54
0.3	297.75	84.395	**87.660**	0.82
0.4	397.01	79.841	**83.987**	1.09
0.6	595.51	71.575	**77.221**	1.63
0.8	794.01	64.307	**71.148**	2.17
1	992.52	57.906	**65.686**	2.72
1.4	1389.52	47.270	**56.314**	3.80
1.8	1786.53	38.935	**48.631**	4.89
2.4	2382.04	29.588	**39.505**	6.52
3	2977.55	22.911	**32.508**	8.15
3.6	3573.06	18.050	**27.043**	9.78
4.2	4168.57	14.444	**22.705**	11.41
5	4962.58	10.957	**18.196**	13.59
6	5955.10	7.976	**14.006**	16.30
7	6947.61	5.948	**10.919**	19.02
8	7940.13	4.518	**8.595**	21.74
10	9925.16	2.711	**5.441**	27.17
12	11910.20	1.687	**3.515**	32.61
16	15880.26	0.697	**1.521**	43.48
20	19850.33	0.303	**0.677**	54.35
9	8932.65	3.480	**6.818**	24.46
10	9925.16	2.711	**5.441**	27.17
10.5	10421.42	2.401	**4.870**	28.53
11	10917.68	2.131	**4.364**	29.89
12	11910.20	1.687	**3.515**	32.61

Adjust the initial time period to auto-adjust the following 19 time periods and obtain the desired range in concentrations.

The last 5 time periods can be modified to more precisely determine the time required to meet a specific residual concentration.

Heterogeneous Aquifer Flushing Rate Calculations

Project:	NWIRP Calverton	Proj. No.:	112G02045
Chemical :	1,1-DCA	K_{OC} (K_d*) :	32
Concentration units, water & soil (pick 1):	mg/L & mg/Kg:	ug/L & ug/Kg:	X

NOTE: Input cells are shaded yellow; Cells automatically calculated are shaded blue; the remaining cells are fixed.

This spreadsheet calculates flushing rates and cleanup times for a groundwater flow system that consists of up to 3 groundwater "flow units". Flow units are discrete portions of the aquifer that have unique properties, i.e., higher or lower average hydraulic conductivity, porosity, or specific gravity relative to other portions of the aquifer, higher/lower contaminant concentrations, and/or different organic carbon contents. The spreadsheet factors in different flushing rates for discrete portions of the aquifer based on the differences in the physical/chemical characteristics of the flow units. First-order contaminant decay/degradation processes can also be factored into the cleanup rate prediction through the optional use of contaminant half-life data.

All groundwater/soil contaminant concentrations are in consistent units, i.e., mg/L & mg/Kg, or ug/L & ug/Kg.

*** for contaminants that partition between soil and water thru mechanisms other than adsoption onto organic carbon, i.e., metals, the compound's K_d is input directly into the K_{OC} entry cell, with f_{OC} then set to 1. For fractured bedrock, reduce the f_{OC} by 1-2 orders of magnitude to adjust for typical low fractured rock mass total porosity and resulting high model-percieved mass of aquifer solids in contact with water (i.e. artifically high f_{OC}).**

Groundwater Flow Unit Physical/Chemical Data

Flow Unit 1 (U1)		Flow Unit 2 (U2)		Flow Unit 3 (U3)	
Cw_{01}	100.00	Cw_{02}	100.00	Cw_{03}	100.00
n	0.25	n	0.25	n	0.25
S_G	2.65	S_G	2.65	S_G	2.65
f_{OC}*	0.0034	f_{OC}*	0.0034	f_{OC}*	0.0034
K_d	0.109	K_d	0.109	K_d	0.109
M_W	25.000	M_W	25.000	M_W	25.000
C_S	10.880	C_S	10.880	C_S	10.880
M_S	21.624	M_S	21.624	M_S	21.624
M_T	46.624	M_T	46.624	M_T	46.624
M_S/M_T	0.4638	M_S/M_T	0.4638	M_S/M_T	0.4638

Cw_{0N} = Initial contaminant concentration in groundwater flow unit N

Groundwater Flow Unit Hydrogeologic Characteristics

Avg. K, ft/d highest to lowest	Relative average K, K_U	Fraction of aquifer volume, FV_U	Fraction of total flow, FQ_U	Flow unit number, U
110	1.000	0.33	0.567	1
55	0.500	0.34	0.289	2
28	0.255	0.33	0.144	3

Pore Volumes and Pore Volume Removal Rates

Groundwater discharge rate		Plume area, ft^2	Aquifer/Plume thickness, ft	Total volume occupied by plume, ft^3, PV_T
gpm	ft^3/day, Q_T			
190	36577.54	3,000,000	105	315,000,000

Discharge rate, Unit 1 ft^3/day, Q_1	Discharge rate, Unit 2 ft^3/day, Q_2	Discharge rate, Unit 3 ft^3/day, Q_3	Plume pore Vol., Unit 1 ft^3, PV_1	Plume pore Vol., Unit 2 ft^3, PV_2	Plume pore Vol., Unit 3 ft^3, PV_3	Time for 1 PV flush, Unit 1, days, t_1	Time for 1 PV flush, Unit 2, days, t_2	Time for 1 PV flush, Unit 3, days, t_3
20728.56	10572.62	5276.36	25987500	26775000	25987500	1253.70	2532.49	4925.27

Contaminant Half-Life Data

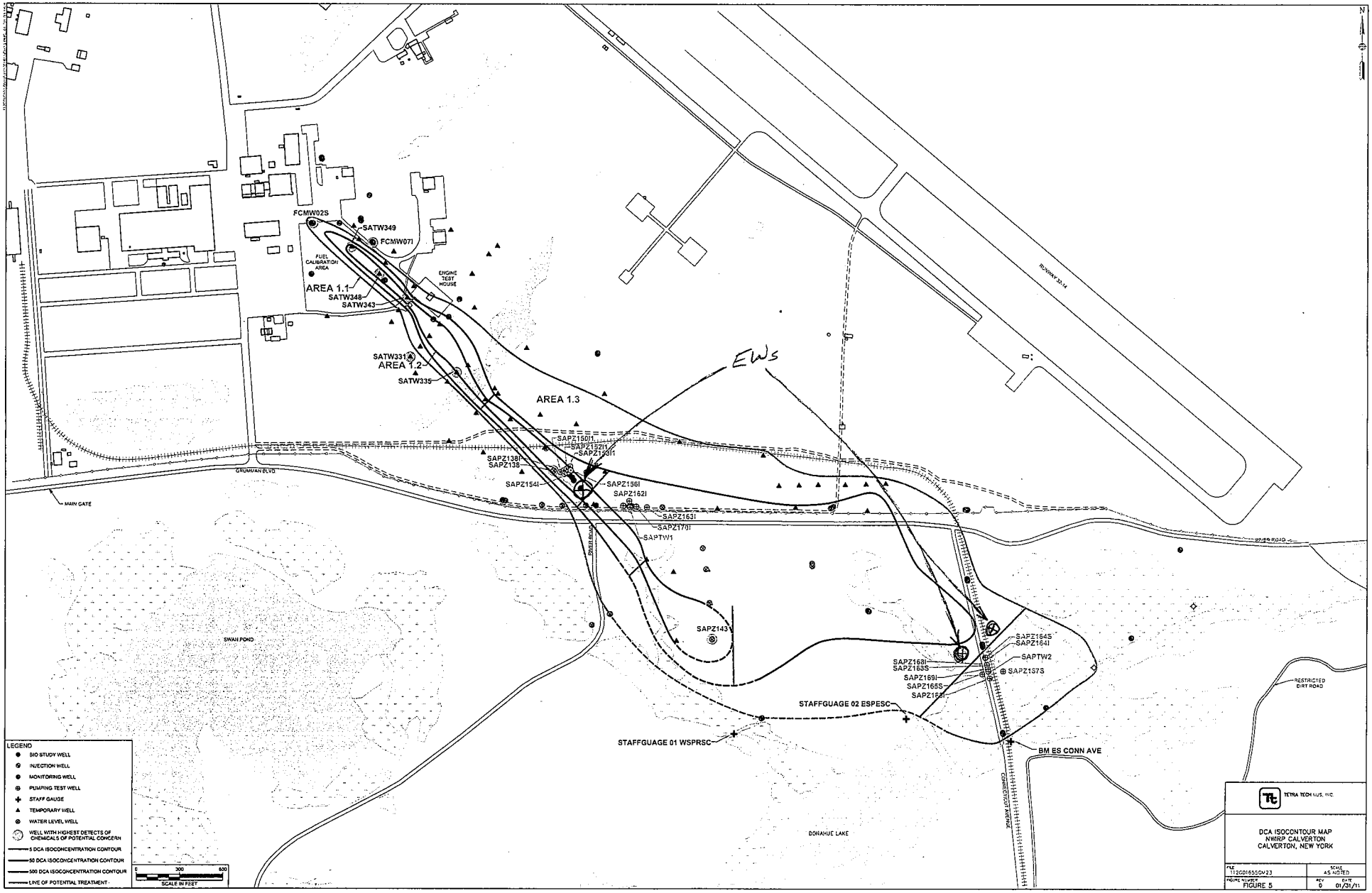
Does contaminant have a decay half-life (yes/no):	no	If yes, half-life (days):	2000
1st order decay coefficient (k):	0.000347		

Average Pumped/Discharged and Residual Plume Concentrations Over Time

Target Cleanup Concentration :			5	ug/L
Time period	Time span, days, t	Avg pumped GW conc.	Avg residual GW conc.	Time span, years
0	0	0	**100**	0
0.2	250.74	89.257	**91.543**	0.69
0.3	376.11	84.395	**87.660**	1.03
0.4	501.48	79.841	**83.987**	1.37
0.6	752.22	71.575	**77.221**	2.06
0.8	1002.96	64.307	**71.148**	2.75
1	1253.70	57.906	**65.686**	3.43
1.4	1755.19	47.270	**56.314**	4.81
1.8	2256.67	38.935	**48.631**	6.18
2.4	3008.89	29.588	**39.505**	8.24
3	3761.11	22.911	**32.508**	10.30
3.6	4513.34	18.050	**27.043**	12.36
4.2	5265.56	14.444	**22.705**	14.42
5	6268.52	10.957	**18.196**	17.16
6	7522.23	7.976	**14.006**	20.59
7	8775.93	5.948	**10.919**	24.03
8	10029.64	4.518	**8.595**	27.46
10	12537.05	2.711	**5.441**	34.32
12	15044.46	1.687	**3.515**	41.19
16	20059.28	0.697	**1.521**	54.92
20	25074.10	0.303	**0.677**	68.65
9	11283.34	3.480	**6.818**	30.89
10	12537.05	2.711	**5.441**	34.32
10.5	13163.90	2.401	**4.870**	36.04
11	13790.75	2.131	**4.364**	37.76
12	15044.46	1.687	**3.515**	41.19

Adjust the initial time period to auto-adjust the following 19 time periods and obtain the desired range in concentrations.

The last 5 time periods can be modified to more precisely determine the time required to meet a specific residual concentration.


FCMW02S
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FUEL CALIBRATION AREA
ENGINE TEST HOUSE
AREA 1.1
SATW348
SATW343
SATW331
AREA 1.2
SATW335
AREA 1.3
EWs
SAPZ150I
SAPZ152I
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SAPZ170I
SAPTW1
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SAPZ164S
SAPZ164I
SAPTW2
SAPZ168I
SAPZ168S
SAPZ169I
SAPZ165S
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SAPZ137S
STAFFGUAGE 02 ESPESC
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GRUMMAN BLVD
MAIN GATE
SWAN POND
DONAHUE LAKE
RUNWAY 33-14
RESTRICTED DIRT ROAD
CONNECTICUT AVENUE
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INJECTION WELL
MONITORING WELL
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APPENDIX F

COST ESTIMATES

APPENDIX F
SUMMARY OF COST ANALYSIS
SOUTHERN AREA FEASIBILITY STUDY
NWIRP CALVERTON, NEW YORK

Alternative	**Alternative 2 Land-Use Controls (LUCs)**			**Alternative 3 Monitored Natural Attenuation (MNA) & LUCs**			**Alternative 4 Air Sparge, MNA, & LUCs**		
Alternative Evaluation Timeframe	**30 years**			**20 years**			**16 years**		
	-30%	**Estimate**	*+50%*	*-30%*	**Estimate**	*+50%*	*-30%*	**Estimate**	*+50%*
Total Implementation Costs	*$6,000*	$8,000	*$12,000*	*$220,000*	$314,000	*$471,000*	*$2,411,000*	$3,444,000	*$5,167,000*
Present Value of Future Costs	*$139,000*	$199,000	*$298,000*	*$1,447,000*	$2,067,000	*$3,100,000*	*$4,302,000*	$6,146,000	*$9,219,000*
Grand Total Present Value	***$145,000***	**$207,000**	***$310,000***	***$1,667,000***	**$2,381,000**	***$3,571,000***	***$6,713,000***	**$9,590,000**	***$14,386,000***

Alternative	**Alternative 5 Enhanced In Situ Bioremediation (EISB), MNA, & LUCs**			**Alternative 6 Air Sparge, EISB, MNA, & LUCs**			**Alternative 7 Extraction, Treatment, Disposal, MNA, & LUCs**		
Alternative Evaluation Timeframe	**10 years**			**10 years**			**16 years**		
	-30%	**Estimate**	*+50%*	*-30%*	**Estimate**	*+50%*	*-30%*	**Estimate**	*+50%*
Total Implementation Costs	*$2,570,000*	$3,671,000	*$5,507,000*	*$3,939,000*	$5,628,000	*$8,442,000*	*$3,312,000*	$4,731,000	*$7,096,000*
Present Value of Future Costs	*$2,135,000*	$3,050,000	*$4,575,000*	*$4,242,000*	$6,060,000	*$9,090,000*	*$10,815,000*	$15,450,000	*$23,175,000*
Grand Total Present Value	***$4,705,000***	**$6,721,000**	***$10,082,000***	***$8,181,000***	**$11,688,000**	***$17,532,000***	***$14,127,000***	**$20,181,000**	***$30,271,000***

Notes:

- Alternative 1 - No Action has no cost ($0).
- The 30-year timeframe evaluated for Alternative 2-LUCs is for reference. The cost of LUCs are built into each of Alternatives 3 through 7 for each alternative's respective timeframe.
- The "Real" Discount Rate used to calculate the Present Value (PV) is timeframe dependent per the Office of Management and Budget (OMB), *Circular A-94, Appendix C, Revised December 2010, "Discount Rates for Cost Effectiveness, Lease Purchase, and Related Analysis" for Calendar Year 2011*, http://www.whitehouse.gov/omb/circulars_a094_a94_appx-c/.

  The Real Discount Rates are a forecast of real interest rates from which the inflation premium has been removed and based on the economic assumptions from the December 2012 Budget Baseline. These real rates are to be used for discounting constant-dollar flows, as is often required in cost-effectiveness analysis.
- EPA, 1988. *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*. OSWER Directive 9355.3-01. EPA/540/G-89/004. October.
- EPA, 2000. *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study*. With the U.S. Army Corps of Engineers. OSWER 9355.0-75. EPA 540-R-00-002. July.
- The information in this cost estimate is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during Baseline Sampling and the Remedial Design phase. This is an order-of-magnitude engineering cost estimate that is expected to be within –30 to +50 percent of the actual project cost (per EPA, 1988 and 2000).

Table F-1
Cost Estimate for Alternative 1 - No Action
Southern Area Feasibility Study
NWIRP Calverton, New York

No Action	
Cost =	**$0**

Table F-2 - Cost Estimate for Alternative 2 - LUCs
Southern Area Feasibility Study
NWIRP Calverton, New York

Assumptions:
LUC RD prepared by contractor. 5YR performed with other reviewed-post-remedy sites at NWIRP Calverton. Annual inspections and reports performed by contractor. Alternative 2 - LUCs cost estimate for a 30-Year timeframe provided for reference. Alternative 2 will not be implemented because LUCs alone would not meet the RAOs. Alternatives 3 through 7 each include LUCs.

Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
IMPLEMENTATION COST					
LUCs					
LUC Remedial Design and implementation into Navy's *LUC Tracker* .	1	each	$8,000	$8,000	Includes Draft and Final LUC Plans. Assume contractor prepares LUC RD.
			Total Implementation Cost	**$8,000**	
FUTURE COSTS (30 years)					
LUCs (Years 1-30)					
Annual Inspections and reporting (1 per year)	30	year	$6,000	$180,000	1 inspection per year at $6,000 per inspection -- for 30 yrs. Assume contractor performs site inspections and reporting.
Subtotal			*$6,000*	*$180,000*	
Project Management	*10%*		*$600*	*$18,000*	
Subtotal			*$6,600*	*$198,000*	
LUCs Future Annual Cost			$6,600		
LUCs Total Future Cost				$198,000	
Present Value (2.3%) of Future Cost of LUCs	30	*year*	*2.3%*	*$141,897*	*Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).*
5-Year Reviews (Years 5, 10, 15, 20, 25, and 30)					
5-Year Review	6	each	$10,000	$82,800	5YR conducted once every 5 years. To be conducted in conjunction with other post-ROD sites at NWIRP Calverton. Years, 5, 10… and 30. Includes pre-draft, draft, draft-final, final, fact sheet, and public notices.
Subtotal			*$10,000*	*$82,800*	
Contingency	*10%*		*$1,000*	*$8,280*	
Project Management	*10%*		*$1,000*	*$8,280*	
G&A	*10%*		*$1,000*	*$8,280*	
Fee	*8%*		*$800*	*$6,624*	
Subtotal			*$13,800*	*$114,264*	
5YR Future Annual Cost at Years 5, 10… and 30			$13,800		
5YR Total Future Cost				$114,264	
Present Value (2.3%) of Future Cost of 5YRs	30	*year*	*2.3%*	*$56,671*	*Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).*
Total Present Value of All Future Costs				**$198,568**	Y2011 PV calculated for 30-yrs-future-cost using Real Discount Rates detailed above per OMB (2010).
TOTAL PV Cost of Alternative 2 - LUCs			*-30%*	*+50%*	
	$206,568		*$144,597*	*$309,852*	

Notes:

- The 30-year timeframe evaluated for Alternative 2-LUCs is for reference. The cost of LUCs are built into each of Alternatives 3 through 7 for each alternative's respective timeframe.
- The "Real" Discount Rates used to calculate the Present Value costs are provided in the Office of Management and Budget (OMB) *Circular A-94, Appendix C, Revised December 2010, "Discount Rates for Cost Effectiveness, Lease Purchase, and Related Analysis" for Calendar Year 2011.* http://www.whitehouse.gov/omb/circulars_a094_a94_appx-c/.

  The Real Discount Rates are a forecast of real interest rates from which the inflation premium has been removed and based on the economic assumptions from the December 2012 Budget Baseline. These real rates are to be used for discounting constant-dollar flows, as is often required in cost-effectiveness analysis.
- This Alternative 2 - LUCs (and the 5-Year Reviews) will be implemented regardless of the selected alternative (except Alternative 1 - No Action).
- EPA. 1988. *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* . OSWER Directive 9355.3-01. EPA/540/G-89/004. October.
- EPA. 2000. *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study* . With the U.S. Army Corps of Engineers. OSWER 9355.0-75. EPA 540-R-00-002. July.
- The information in this cost estimate is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during Baseline Sampling and the Remedial Design phase. This is an order-of-magnitude engineering cost estimate that is expected to be within –30 to +50 percent of the actual project cost (per EPA, 1988 and 2000).

Table F-3a - Cost Estimate for Alternative 3 - MNA and LUCs
Southern Area Feasibility Study
NWIRP Calverton, New York

Assumptions:

LUC RD prepared by contractor. 5YR performed with other NWIRP Calverton sites. Annual inspections performed by contractor. Well maintenance required every 5yrs.
Baseline sampling of 60 wells for COCs and geochemical and biodegradation-related analyses.
Following review of baseline data, install 10 new monitoring wells (varying depths). Sample these for additional baseline data (COCs and geochem/biodeg analyses).
MNA performance monitoring of 50 wells at 9-month intervals through Year 3 to determine seasonal variations. Then annually through Year 20.

Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
IMPLEMENTATION COST					
LUCs					
LUC Remedial Design and implementation into Navy's *LUC Tracker* .	1	each	$8,000	$8,000	Includes Draft and Final LUC Plans. Assume contractor prepares LUC RD.
UFP-SAP					
Work Plan for additional sampling, well installation, and groundwater performance monitoring (in Navy's UFP-SAP format).	1	each	$30,000	$30,000	Pre-Draft, Draft, Draft Final, & Final. Includes Scoping sessions. Recent similar project.
Baseline Sampling (50 existing Wells)					
Labor, ODCs, travel	2.0	week	$9,525	$19,050	Assume sample 50 wells. 2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at $200/day. Rental truck at $65/day.
Equipment & Expendables	2.0	week	$1,000	$2,000	
Lab & Data Validation	1	each	$25,531	$25,531	See lab & DV backup sheets
Report	1	each	$25,000	$25,000	
New Well Installation (10 new wells)					5 wells at 40-50 ft bgs and 5 wells at 60-70 ft bgs.
Mobilization & Site Setup	1	each	$10,000	$10,000	Includes sub mob/demob, utility location, and clearing.
Labor, ODCs, travel	1.7	week	$9,525	$16,510	Install 1.5 wells/day. 10-hr days. 5 days/week. Per diem at $200/day. Rental truck at $65/day. 2 people. 2 hrs per well for well development.
Equipment & Expendables	1.7	week	$200	$347	
Drilling Subcontractor / well installation					
Well installation - HSA drilling & 2-inch PVC install	600	feet	$36	$21,600	Labor & materials. 4.25-inch ID HSA. 10-ft 0.010-slot PVC screens included.
Well Completion with bollards	10	each	$325	$3,250	
Travel	1.7	week	$3,000	$5,200	1 rig, 3-person crew. Per diem at $200/day. 5 day/wk.
Loader/Backhoe for IDW management	1.7	week	1,375	$2,383	
Water usage (hydrant permit fee)	8.7	day	$50	$433	
Survey	1	each	$2,000	$2,000	
Water IDW Transport & Disposal	1,500	gallon	$2	$3,000	Assume 150 gallons per 2-inch well.
Soil IDW Transport & Disposal	0.39	each	$2,000	$776	20 cy rolloff. Note HSA outer diam = 8 inches.
Baseline Sample New Wells (10 wells)					
Labor, ODCs, travel	0.4	week	$9,525	$3,810	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at $200/day. Rental truck at $65/day.
Equipment & Expendables	0.4	week	$1,000	$400	
Lab & Data Validation	1	each	$7,866	$7,866	
Report	1	each	$25,000	$25,000	
Subtotal				*$212,156*	
Contingency	*20%*			*$42,431*	
Project Management	*10%*			*$21,216*	
G&A	*10%*			*$21,216*	
Fee	*8%*			*$16,972*	
			Total Implementation Cost	**$313,991**	
FUTURE COSTS (20 years)					
LUCs (Years 1-20)					
Annual Inspections and reporting (1 per year)	20	year	$6,000	$0	1 inspection per year at $6,000 per inspection -- for 20 yrs. Assume contractor performs site inspections and reporting.
Subtotal			*$6,000*	*$0*	
Project Management	*10%*		*$600*	*$0*	
Subtotal			*$6,600*	*$0*	
LUCs Future Annual Cost			$6,600		
LUCs Total Future Cost				$0	
Present Value (2.1%) of Future Cost of LUCs	*20*	*year*	*2.1%*	*$106,885*	*Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).*
5-Year Reviews (Years 5, 10, 15, and 20)					
5-Year Review	4	each	$10,000	$55,200	5YR conducted once every 5 years. To be conducted in conjunction with other post-ROD sites at MCAS Cherry Point. Years, 5, 10, 15, and 20. Includes pre-draft, draft, draft final, final, fact sheet, and public notices.
Subtotal			*$10,000*	*$55,200*	
Contingency	*10%*		*$1,000*	*$5,520*	
Project Management	*10%*		*$1,000*	*$5,520*	
G&A	*10%*		*$1,000*	*$5,520*	
Fee	*8%*		*$800*	*$4,416*	
Subtotal			*$13,800*	*$76,176*	
5YR Total Annual Cost at Years 5, 10, 15, and 20			$13,800		
5YR Total Future Cost				$76,176	
Present Value (2.1%) of Future Cost of 5YRs	*20*	*year*	*2.1%*	*$42,859*	
Well Maintenance (Years 5, 10, and 15)					
Repair flushmounts & vaults, potential well replacements, etc.	3	event	$15,000	$45,000	Assume well repairs needed approximately every 5 years.
Subtotal			*$15,000*	*$45,000*	
Contingency	*25%*		*$3,750*	*$11,250*	

Table F-3a - Cost Estimate for Alternative 3 - MNA and LUCs
Southern Area Feasibility Study
NWIRP Calverton, New York

Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
Project Management	*10%*		*$1,500*	*$4,500*	
G&A	*10%*		*$1,500*	*$4,500*	
Fee	*8%*		*$1,200*	*$3,600*	
Subtotal			*$22,950*	*$68,850*	
Well Maintenance Future Annual Cost at Years 5, 10, and 15			$22,950		
Well Maintenance Total Future Cost				$68,850	
Present Value (2.1%) of Future Cost of Well Maintenance	*15*	*year*	*2.1%*	*$56,132*	*Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).*
Well Abandonment (Year 20)					
Abandon wells when RAOs are achieved. Driller sub.	80	well	$300	$24,000	Assume well abandonment will occur at Year 20.
Labor, ODCs, and Travel	2.0	week	$9,525	$19,050	Abandon 10 wells/day. 2 people. 10-hr days. 5 days/week. Per diem at $200/day. Rental truck at $65/day.
IDW Disposal	1	each	$2,000	$2,000	
Subtotal				*$45,050*	
Contingency	*25%*			*$11,263*	
Project Management	*10%*			*$4,505*	
G&A	*10%*			*$4,505*	
Fee	*8%*			*$3,604*	
Subtotal				*$68,927*	
Well Abandonment Future Annual Cost at Year 20				$68,927	
Present Value (2.1%) of Future Cost of Well Abandonment	*20*	*year*	*2.1%*	*$45,485*	
Performance Groundwater Monitoring (50 wells)					
Months 9, 18, 27, and 36					Year 1 includes 9-month event; Year 2 includes 18-month event; and Year 3 includes 27- and 36-month event.
Labor, ODCs, travel	8.0	week	$9,525	$76,200	50 wells at 9, 18, 27, and 36 months. 2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at $200/day. Rental truck at $65/day.
Equipment & Expendables	8.0	week	$1,000	$8,000	
Lab & Data Validation	4	each	$25,531	$102,125	See lab & DV backup sheets
Report	4	each	$25,000	$100,000	
Subtotal				*$286,325*	
Contingency	*20%*			*$57,265*	
Project Management	*10%*			*$28,633*	
G&A	*10%*			*$28,633*	
Fee	*8%*			*$22,906*	
Subtotal				*$423,762*	
Future Monitoring Annual Cost during each of Years 1 and 2			$105,940		*(Total / 4). 1 event each of years 1 and 2*
Future Monitoring Annual Cost at Year 3			$211,881		*(Total / 2). 2 events in year 3*
Total Future Monitoring Cost Years 1-3				$423,762	
Present Value (2.1%) of Future Cost of Groundwater Sampling Years 1-3	*3*	*year*	*2.1%*	*$404,463*	*Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).*
Years 4 through 20 (50 wells) (annual sampling)					Annual sampling required by facility RCRA permit. Alternatively, sample at Years 5, 10, 15, and 20.
Labor, ODCs, travel	34.0	week	$9,525	$323,850	Assume 50 wells in performance monitoring program. 17 annual events
Equipment & Expendables	34.0	week	$1,000	$34,000	
Lab & Data Validation	17	each	$25,531	$434,033	See lab & DV backup sheets
Report	17	each	$25,000	$425,000	
Subtotal				*$1,216,883*	
Contingency	*20%*			*$243,377*	
Project Management	*10%*			*$121,688*	
G&A	*10%*			*$121,688*	
Fee	*8%*			*$97,351*	
Subtotal				*$1,800,987*	
Monitoring Future Annual Cost during each of Years 2-20			$105,940		(Total / 17)
Monitoring Total Future Cost				$1,800,987	
Present Value (2.1%) of Future Cost of Groundwater Sampling Years 5, 10, 15, and 20	*20*	*year*	*2.1%*	*$1,410,751*	*Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).*
Total Present Value of All Future Costs				**$2,066,575**	Y2011 PV calculated for 20-yrs-future-cost using Real Discount Rates detailed above per OMB (2010).
TOTAL PV Cost of Alternative 3 - MNA and LUCs			*-30%*	*+50%*	
	$2,380,566		*$1,666,396*	*$3,570,849*	

Notes:

● The "Real" Discount Rates used to calculate the Present Value costs are provided in the Office of Management and Budget (OMB) *Circular A-94, Appendix C, Revised December 2010, "Discount Rates for Cost Effectiveness, Lease Purchase, and Related Analysis" for Calendar Year 2011.* http://www.whitehouse.gov/omb/circulars_a094_a94_appx-c/.

The Real Discount Rates are a forecast of real interest rates from which the inflation premium has been removed and based on the economic assumptions from the December 2012 Budget Baseline. These real rates are to be used for discounting constant-dollar flows, as is often required in cost-effectiveness analysis.

● EPA. 1988. *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* . OSWER Directive 9355.3-01. EPA/540/G-89/004. October.

● EPA. 2000. *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study* . With the U.S. Army Corps of Engineers. OSWER 9355.0-75. EPA 540-R-00-002. July.

● The information in this cost estimate is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during Baseline Sampling and the Remedial Design phase. This is an order-of-magnitude engineering cost estimate that is expected to be within –30 to +50 percent of the actual project cost (per EPA, 1988 and 2000).

Table F-3b - Lab Backup for Alternative 3 - MNA and LUCs
Southern Area Feasibility Study
NWIRP Calverton, New Yorkt

Analysis/Test	Sample Matrix	Field Samples	Field Duplicates	Equipment Rinsate Blanks	Field Blanks	Trip Blanks	Matrix Spike	Matrix Spike Duplicate	Total Number of Solid Samples	Total Billable Solid Samples	Solid Unit Price	Solid Subtotal Cost	Total Number of Liquid Samples	Total Billable Liquid Samples	Liquid Unit Price	Liquid Subtotal Cost	Total Analytical Cost
Implementation																	
Baseline Sampling - Assume 50 existing monitoring wells for COCs and other technology-performance monitoring analyses																	
Groundwater wells																	
TCL VOCs by CLP OLM04.3	GW	50	5	10	2	10	4	4					85	85	$111.71	$9,495.35	$9,495.35
Methane, Ethane, & Ethene by RSK-175	GW	25	0	0	0	0	2	2					29	29	$105.18	$3,050.22	$3,050.22
Nitrate, Nitrite, & Sulfate by USEPA 300.0	GW	25	0	0	0	0	2	2					29	29	$50.87	$1,475.23	$1,475.23
Sulfide by USEPA 376.1	GW	25	0	0	0	0	2	2					29	29	$35.12	$1,018.48	$1,018.48
Alkalinity by USEPA 310.1	GW	25	0	0	0	0	2	2					29	29	$13.73	$398.17	$398.17
Volatile Fatty Acids (VFAs) (Acetic, Butyric, Pyruvic, Propionic, & Lactic Acid) by AM23G	GW	25	0	0	0	0	2	2					29	29	$134.90	$3,912.10	$3,912.10
TOC by SW-846 9060 Quadruplicate analysis	GW	25	0	0	0	0	2	2					29	29	$33.21	$963.09	$963.09
Dissolved Arsenic, Iron, & Manganese by SW-846 6010B	GW	25	3	0	0	0	2	2					32	32	$35.73	$1,143.36	$1,143.36
IDW - Purged groundwater and decon water																	
TCLP VOCs (1311/ 8260B)	Aqueous	1											1	1	$116.00	$116.00	$116.00
																Baseline Subtotal	**$21,572.00**
Additional Baseline -- Assume 10 new wells																	
Groundwater wells																	
TCL VOCs	GW	10	1	2	1	2	1	1					18	18	$95.00	$1,710.00	$1,710.00
Methane, Ethane, Ethene	GW	10	0	0	0	0	1	1					12	12	$101.09	$1,213.08	$1,213.08
Nitrate, Nitrite, Sulfate	GW	10	0	0	0	0	1	1					12	12	$48.82	$585.84	$585.84
Sulfide	GW	10	0	0	0	0	1	1					12	12	$21.91	$262.92	$262.92
Alkalinity	GW	10	0	0	0	0	1	1					12	12	$13.18	$158.16	$158.16
VFAs	GW	10	0	0	0	0	1	1					12	12	$128.57	$1,542.84	$1,542.84
TOC	GW	10	0	0	0	0	1	1					12	12	$33.21	$398.52	$398.52
Dissolved Arsenic, Iron, and Manganese	GW	10	1	0	0	0	1	1					13	13	$28.08	$365.04	$365.04
IDW - (1) Soil cuttings from new well installations;																	
(2) Drilling decon water and well development water; and																	
(3) Purged groundwater and decon water. Soil IDW sample rate is 1 sample per 200 cubic yards if soil.																	
TCLP VOCs	Aqueous & Solid	2							1	1	$132.00	$132.00	2	2	$116.00	$232.00	$364.00
																Additional Baseline Subtotal	**$6,600.40**
																TOTAL IMPLEMENTATION LAB COST	**$28,172.40**
Performance Monitoring - Assume sampling network consists of 50 monitoring wells																	
Months 9, 18, 27, and 36 -- Assume 50 wells																	
Groundwater wells																	
TCL VOCs	GW	50	5	10	2	10	4	4					85	85	$111.71	$9,495.35	$9,495.35
Methane, Ethane, Ethene	GW	25	0	0	0	0	2	2					29	29	$105.18	$3,050.22	$3,050.22
Nitrate, Nitrite, Sulfate	GW	25	0	0	0	0	2	2					29	29	$50.87	$1,475.23	$1,475.23
Sulfide	GW	25	0	0	0	0	2	2					29	29	$35.12	$1,018.48	$1,018.48
Alkalinity	GW	25	0	0	0	0	2	2					29	29	$13.73	$398.17	$398.17
VFAs	GW	25	0	0	0	0	2	2					29	29	$134.90	$3,912.10	$3,912.10
TOC	GW	25	0	0	0	0	2	2					29	29	$33.21	$963.09	$963.09
Dissolved Arsenic, Iron, and Manganese	GW	25	3	0	0	0	2	2					32	32	$35.73	$1,143.36	$1,143.36
IDW - Purged groundwater and decon water																	
TCLP VOCs	Aqueous	1											1	1	$116.00	$116.00	$116.00
																Subtotal	**$21,572.00**
																Total for 9,18,27&36 months	**$86,288.00**
Years 4 through 20 -- Assume 50 wells																	
Groundwater wells																	
TCL VOCs	GW	50	5	10	2	10	4	4					85	85	$111.71	$9,495.35	$9,495.35
Methane, Ethane, Ethene	GW	25	0	0	0	0	2	2					29	29	$105.18	$3,050.22	$3,050.22
Nitrate, Nitrite, Sulfate	GW	25	0	0	0	0	2	2					29	29	$50.87	$1,475.23	$1,475.23
Sulfide	GW	25	0	0	0	0	2	2					29	29	$35.12	$1,018.48	$1,018.48
Alkalinity	GW	25	0	0	0	0	2	2					29	29	$13.73	$398.17	$398.17
VFAs	GW	25	0	0	0	0	2	2					29	29	$134.90	$3,912.10	$3,912.10
TOC	GW	25	0	0	0	0	2	2					29	29	$33.21	$963.09	$963.09
Dissolved Arsenic, Iron, and Manganese	GW	25	3	0	0	0	2	2					32	32	$35.73	$1,143.36	$1,143.36
IDW - Purged groundwater and decon water																	
TCLP VOCs	Aqueous	1											1	1	$116.00	$116.00	$116.00
																Subtotal	**$21,572.00**
																Total for 4-20	**$366,724.00**
																TOTAL FUTURE LAB COST	**$453,012.00**

Full QA/QC for OU14 COCs only. Also, duplicates for metals. MS/MSDs are billable Standard turnaround time

Table F-3c - Data Validation Bacup for Alternative 3 - MNA and LUCs
Southern Area Feasibility Study
NWIRP Calverton, New York

Analysis/Test	Sample Matrix	Field Samples	Field Duplicates	Equipment Rinsate Blanks	Field Blanks	Trip Blanks	Matrix Spike	Matrix Spike Duplicate	Total Number of Solid Samples	Total Billable Solid Samples	Solid Unit Price	Solid Subtotal Cost	Total Number of Liquid Samples	Total Billable Liquid Samples	Liquid Unit Price	Liquid Subtotal Cost	Total Analytical Cost
Implementation																	
Baseline Sampling - Assume 50 existing monitoring wells for COCs and other technology-performance monitoring analyses																	
Groundwater wells																	
TCL VOCs by CLP OLM04.3	GW	50	5	10	2	10	4	4					85	85	$21.63	$1,838.55	$1,838.55
Methane, Ethane, & Ethene by RSK-175	GW	25	0	0	0	0	2	2					29	29	$15.14	$439.06	$439.06
Nitrate, Nitrite, & Sulfate by USEPA 300.0	GW	25	0	0	0	0	2	2					29	29	$16.22	$470.38	$470.38
Sulfide by USEPA 376.1	GW	25	0	0	0	0	2	2					29	29	$5.41	$156.89	$156.89
Alkalinity by USEPA 310.1	GW	25	0	0	0	0	2	2					29	29	$5.41	$156.89	$156.89
Volatile Fatty Acids (VFAs) (Acetic, Butyric, Pyruvic, Propionic, & Lactic Acid) by AM23G	GW	25	0	0	0	0	2	2					29	29	$15.14	$439.06	$439.06
TOC by SW-846 9060 Quadruplicate analysis	GW	25	0	0	0	0	2	2					29	29	$8.65	$250.85	$250.85
Dissolved Arsenic, Iron, & Manganese by SW-846 6010B	GW	25	3	0	0	0	2	2					32	32	$6.49	$207.68	$207.68
																Baseline Subtotal	**$3,959.36**
Additional Baseline -- Assume 25 new wells																	
Groundwater wells																	
TCL VOCs	GW	10	1	2	1	2	1	1					18	18	$21.63	$389.34	$389.34
Methane, Ethane, Ethene	GW	10	0	0	0	0	1	1					12	12	$15.14	$181.68	$181.68
Nitrate, Nitrite, Sulfate	GW	10	0	0	0	0	1	1					12	12	$16.22	$194.64	$194.64
Sulfide	GW	10	0	0	0	0	1	1					12	12	$5.41	$64.92	$64.92
Alkalinity	GW	10	0	0	0	0	1	1					12	12	$5.41	$64.92	$64.92
VFAs	GW	10	0	0	0	0	1	1					12	12	$15.14	$181.68	$181.68
TOC	GW	10	0	0	0	0	1	1					12	12	$8.65	$103.80	$103.80
Dissolved Arsenic, Iron, and Manganese	GW	10	1	0	0	0	1	1					13	13	$6.49	$84.37	$84.37
																Additional Baseline Subtotal	**$1,265.35**
																TOTAL IMPLEMENTATION DV COST	**$5,224.71**
Performance Monitoring - Assume sampling network consists of 50 monitoring wells																	
Months 9, 18, 27, and 36 -- Assume 50 wells																	
Groundwater wells																	
TCL VOCs	GW	50	5	10	2	10	4	4					85	85	$21.63	$1,838.55	$1,838.55
Methane, Ethane, Ethene	GW	25	0	0	0	0	2	2					29	29	$15.14	$439.06	$439.06
Nitrate, Nitrite, Sulfate	GW	25	0	0	0	0	2	2					29	29	$16.22	$470.38	$470.38
Sulfide	GW	25	0	0	0	0	2	2					29	29	$5.41	$156.89	$156.89
Alkalinity	GW	25	0	0	0	0	2	2					29	29	$5.41	$156.89	$156.89
VFAs	GW	25	0	0	0	0	2	2					29	29	$15.14	$439.06	$439.06
TOC	GW	25	0	0	0	0	2	2					29	29	$8.65	$250.85	$250.85
Dissolved Arsenic, Iron, and Manganese	GW	25	3	0	0	0	2	2					32	32	$6.49	$207.68	$207.68
																Subtotal	**$3,959.36**
																Total for 9,18,27&36 months	**$15,837.44**
Years 4 through 20 -- Assume 50 wells																	
Groundwater wells																	
TCL VOCs	GW	50	5	10	2	10	4	4					85	85	$21.63	$1,838.55	$1,838.55
Methane, Ethane, Ethene	GW	25	0	0	0	0	2	2					29	29	$15.14	$439.06	$439.06
Nitrate, Nitrite, Sulfate	GW	25	0	0	0	0	2	2					29	29	$16.22	$470.38	$470.38
Sulfide	GW	25	0	0	0	0	2	2					29	29	$5.41	$156.89	$156.89
Alkalinity	GW	25	0	0	0	0	2	2					29	29	$5.41	$156.89	$156.89
VFAs	GW	25	0	0	0	0	2	2					29	29	$15.14	$439.06	$439.06
TOC	GW	25	0	0	0	0	2	2					29	29	$8.65	$250.85	$250.85
Dissolved Arsenic, Iron, and Manganese	GW	25	3	0	0	0	2	2					32	32	$6.49	$207.68	$207.68
																Subtotal	**$3,959.36**
																Years 4-20	**$67,309.12**
																TOTAL FUTURE DV COST	**$83,146.56**

Table F-4a - Cost Estimate for Alternative 4 - Air Sparge, MNA, and LUCs
Southern Area Feasibility Study
NWIRP Calverton, New York

Assumptions:

LUC RD prepared by contractor. 5YR performed with other NWIRP Calverton sites. Annual inspections performed by contractor. Well maintenance required every 5yrs.

Baseline sampling of 50 wells for COCs and geochemical and biodegradation-related analyses.

Following review of baseline data, install 25 new monitoring wells. Sample these for additional baseline data (COCs and geochem/biodeg analyses).

Performance monitoring: 50 wells. Quarterly during Year 1, and then annually through Year 16.

Vertical Air Sparge wells in (1) Source Area and (2) Peconic River Area.

(1) Source Area contains 48 vertical air sparge wells at 4 locations (2 curtains of 7 wells, 2 curtains of 10 wells, 2 curtains of 10 wells, and 2 curtains of 7 wells); all screened 45-50 ft bgs (0.010-slot); spaced 25 ft; 15 ft radius of influence; 5 cfs per well; 2-inch PVC).

(2) Peconic River Area contains 80 vertical air sparge wells at 1 location (2 curtains of 40 wells); all screened 95-100 ft bgs; spaced 25 ft; 15 ft radius of influence; 5 cfs per well; 2-inch PVC).

Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
IMPLEMENTATION COST					
LUCs					
LUC Remedial Design and implementation into Navy's *LUC Tracker* .	1	each	$8,000	$8,000	Includes Draft and Final LUC Plans. Assume contractor prepares LUC RD.
UFP-SAP & Remedial Action Work Plan					
Work Plan for additional sampling, well installation, sparge operation, and groundwater performance monitoring (in Navy's UFP-SAP format).	1	each	$50,000	$50,000	Pre-Draft, Draft, Draft Final, & Final. Includes Scoping sessions. Recent similar project.
Baseline Sampling (50 existing Wells)					
Labor, ODCs, travel	2.0	week	$9,525	$19,050	Assume sample 50 wells. 2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at $200/day. Rental truck at $65/day.
Equipment & Expendables	2.0	week	$1,000	$2,000	
Lab & Data Validation	1	each	$25,531	$25,531	See lab & DV backup sheets
Report	1	each	$25,000	$25,000	
New Well Installation (25 new wells)					5 wells screened at 20-30 ft bgs, 10 wells at 40-50 ft bgs, and 10 wells at 60-70 ft bgs.
Mobilization & Site Setup	1	each	$10,000	$10,000	Includes sub mob/demob, utility location, and clearing.
Labor, ODCs, travel	4.3	week	$9,525	$41,275	Install 1.5 wells/day. 10-hr days. 5 days/week. Per diem at $200/day. Rental truck at $65/day. 2 people. 2 hrs per well for well development.
Equipment & Expendables	4.3	week	$200	$867	
Drilling Subcontractor / well installation					
Well installation - HSA drilling & 2-inch PVC install	1,350	feet	$36	$48,600	Labor & materials. 4.25-inch ID HSA. 10-ft 0.010-slot PVC screens included.
Well Completion with bollards	30	each	$325	$9,750	
Travel	4.3	week	$3,000	$13,000	1 rig, 3-person crew. Per diem at $200/day. 5 day/wk.
Loader/Backhoe for IDW management	4.3	week	1,375	$5,958	
Water usage (hydrant permit fee)	21.7	day	$50	$1,083	
Water IDW Transport & Disposal	3,750	gallon	$2	$7,500	Assume 150 gallons per 2-inch well.
Soil IDW Transport & Disposal	0.87	each	$2,000	$1,745	20 cy rolloff. Note HSA outer diam = 8 inches.
Baseline Sample New Wells (25 wells)					
Labor, ODCs, travel	1.0	week	$9,525	$9,525	Assume sample 25 wells. 2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at $200/day. Rental truck at $65/day.
Equipment & Expendables	1.0	week	$1,000	$1,000	
Lab & Data Validation	1	each	$18,455	$18,455	
Report	1	each	$25,000	$25,000	
SOURCE AREA - Vertical Air Sparge System Installation & Startup					48 vertical wells screened 45-50 ft bgs
Office Trailer, Storage Trailer, & Site Utilities	6	month	$610	$3,657	
Drilling/Well Installation Equipment and Subcontractor					
Mobilization and Site Setup	1	each	$10,000	$10,000	Includes sub mob/demob, utility location, and clearing.
Labor, ODCs, travel	8.3	week	$9,525	$79,248	Install 1.5 wells/day. 10-hr days. 5 days/week. Per diem at $200/day. Rental truck at $65/day. 2 people. 2 hrs per well for development.
Equipment & Expendables	8.3	week	$200	$1,664	
Drilling Subcontractor / well installation					
Well installation - HSA drilling & 2-inch PVC install	2,400	feet	$32	$76,800	Labor & materials. 4.25-inch ID HSA. 5-ft 0.010-slot PVC screens included.
Well Completion with pads	48	each	$120	$5,760	includes miscellaneous vaults and accesses.
Travel	8.3	week	$3,000	$24,960	1 rig, 3-person crew. Per diem at $200/day. 5 day/wk.
Loader/Backhoe for IDW management	8.3	week	1,375	$11,440	
Water usage (hydrant permit fee)	41.6	day	$50	$2,080	
Water IDW Transport & Disposal	7,200	gallon	$2	$14,400	Assume 150 gallons per 2-inch well.
Water characterization - TCLP VOCs	1	each	$116	$116	
Soil IDW Transport & Disposal	1.55	each	$2,000	$3,103	20 cy rolloff. Note HSA outer diam = 8 inches.
Soil characterization - TCLP VOCs	2	each	$132	$264	1 per 20 cy.
Air Sparge System Equipment & Setup					
System Storage/Operations Building	400	sq ft	$200	$80,000	20 ft x 20 ft building.
Electricity Conveyance & Hookup	1	each	$50,000	$50,000	LIPA shares some of the cost of primary connections due to longevity of system use. LIPA provides primary swithch. Navy provides all else.
Conveyance Piping Materials					
4-inch HDPE (to system area)	400	feet	$3.50	$1,400	
2-inch HDPE (to curtains)	600	feet	$3.20	$1,920	
2-inch HDPE (along curtains)	800	feet	$3.20	$2,560	
Trenching & Installation	3.6	week	$10,025	$36,090	1,800 ft. 100 ft/day. 2 persons. Includes equipment.
Ball valve (per 5 Air Sparge wells)	10	each	$30	$300	
Misc Piping, Fittings, Materials	1	each	$15,000	$15,000	
60 HP, 3-Phase VSD Rotary Screw Combination 240-Gallon Tank & Refrigerated Dryer with Coalescing Filter	1	ea	$36,449	$36,449	Eaton Compressor & Fabrication, Inc. 10-year warranty. Includes installation.
Equipment Delivery	1	each	$1,500	$1,500	
Switchgear	1	each	$2,600	$2,600	
Instrumentation	1	each	$15,000	$15,000	
Telemetry System	1	each	$3,000	$3,000	
Post-Construction Site Survey	1	LS	$4,500	$4,500	
Air Sparge System Startup & Testing					
Labor, ODCs, travel	4	week	$9,525	$38,100	2 people.
Startup Equipment Rental	4	week	$300	$1,200	
Construction Report	1	each	$15,000	$15,000	Draft and Final Construction Completion Report

Table F-4a - Cost Estimate for Alternative 4 - Air Sparge, MNA, and LUCs
Southern Area Feasibility Study
NWIRP Calverton, New York

Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
PECONIC RIVER AREA - Vertical Air Sparge System Installation & Startup					80 vertical wells screened 95-100 ft bgs
Pilot Scale Testing	1	each	$30,000	$30,000	
Office Trailer, Storage Trailer, & Site Utilities	9	month	$610	$5,486	
Drilling/Well Installation Equipment and Subcontractor					
Mobilization and Site Setup	1	each	$15,000	$15,000	Includes sub mob/demob, utility location, and clearing.
Labor, ODCs, travel	19.2	week	$9,525	$182,880	Install 1 well/day. 10-hr days. 5 days/week. Per diem at $200/day. Rental truck at $65/day. 2 people. 2 hrs per well for development.
Equipment & Expendables	19.2	week	$200	$3,840	
Drilling Subcontractor / well installation					
Well installation - HSA drilling & 2-inch PVC install	8,000	feet	$32	$256,000	Labor & materials. 4.25-inch ID HSA. 5-ft 0.010-slot PVC screens included.
Well Completion with pads	80	each	$120	$9,600	includes miscellaneous vaults and accesses.
Travel	19.2	week	$3,000	$57,600	1 rig, 3-person crew. Per diem at $200/day. 5 day/wk.
Loader/Backhoe for IDW management	19.2	week	1,375	$26,400	
Water usage (hydrant permit fee)	96.0	day	$50	$4,800	
Water IDW Transport & Disposal	12,000	gallon	$2	$24,000	Assume 150 gallons per 2-inch well.
Water characterization - TCLP VOCs	1	each	$116	$116	
Soil IDW Transport & Disposal	5.17	each	$2,000	$10,343	20 cy rolloff. Note HSA outer diam = 8 inches.
Soil characterization - TCLP VOCs	6	each	$132	$792	1 per 20 cy.
Air Sparge System Equipment & Setup					
System Storage/Operations Building	600	sq ft	$400	$240,000	20 ft x 30 ft building.
Electricity Conveyance & Hookup	1	each	$75,000	$75,000	LIPA shares some of the cost of primary connections due to longevity of system use. LIPA provides primary swithch. Navy provides all else.
Conveyance Piping Materials					
6-inch HDPE (to system area)	800	feet	$3.80	$3,040	
4-inch HDPE (to curtains)	500	feet	$3.50	$1,750	
2-inch HDPE (along curtains)	800	feet	$3.20	$2,560	
Trenching & Installation	4.2	week	$10,025	$42,105	2,100 ft. 100 ft/day. 2 persons. Includes equipment.
Jack & Bore under railroad	1	each	$50,000	$50,000	
Ball valve (per 5 Air Sparge wells)	16	each	$30	$480	
Misc Piping, Fittings, Materials	1	each	$15,000	$15,000	
60 HP, 3-Phase VSD Rotary Screw Combination 240-Gallon Tank & Refrigerated Dryer with Coalescing Filter	1	ea	$36,449	$36,449	Eaton Compressor & Fabrication, Inc. 10-year warranty. Includes installation.
Equipment Delivery	1	each	$2,500	$2,500	
Switchgear	1	each	$2,600	$2,600	
Instrumentation	1	each	$15,000	$15,000	
Telemetry System	1	each	$3,000	$3,000	
Post-Construction Site Survey	1	LS	$6,000	$6,000	
Air Sparge System Startup & Testing					
Labor, ODCs, travel	4	week	$9,525	$38,100	2 people.
Startup Equipment Rental	4	week	$300	$1,200	
Construction Report	1	each	$15,000	$15,000	Draft and Final Construction Completion Report
Subtotal				*$2,038,091*	
Contingency	*25%*			*$509,523*	
Project Management	*10%*			*$203,809*	
Remedial Design	*6%*			*$122,285*	
Construction Oversight	*10%*			*$203,809*	
G&A	*10%*			*$203,809*	
Fee	*8%*			*$163,047*	
			Total Implementation Cost	**$3,444,374**	
FUTURE COSTS (16 years)					
LUCs (Years 1-16)					
Annual Inspections and reporting (1 per year)	16	year	$6,000	$152,400	1 inspection per year at $6,000 per inspection -- for 16 yrs. Assume
Subtotal			*$6,000*	*$152,400*	
Project Management	*10%*		*$600*	*$15,240*	
Subtotal			*$6,600*	*$167,640*	
LUCs Future Annual Cost			$6,600		
LUCs Total Future Cost				$167,640	
Present Value (1.78%) of Future Cost of LUCs	*16*	*year*	*1.78%*	*$91,194*	*Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).*
5-Year Reviews (Years 5, 10, and 15)					
5-Year Review	3	each	$10,000	$41,400	5YR conducted once every 5 years. To be conducted in conjunction with other post-ROD sites at MCAS Cherry Point. Years, 5, 10… and 40. Includes pre-draft, draft, draft final, final, fact sheet, and public notices.
Subtotal			*$10,000*	*$41,400*	
Contingency	*10%*		*$1,000*	*$4,140*	
Project Management	*10%*		*$1,000*	*$4,140*	
G&A	*10%*		*$1,000*	*$4,140*	
Fee	*8%*		*$800*	*$3,312*	
Subtotal			*$13,800*	*$57,132*	
5YR Total Annual Cost at Years 5, 10, and 15			$13,800		
5YR Total Future Cost				$57,132	
Present Value (1.78%) of Future Cost of 5YRs	*15*	*year*	*1.78%*	*$34,794*	
Well Maintenance (Years 5, 10, and 15)					
Repair flushmounts & vaults, potential well replacements, etc.	3	event	$25,000	$75,000	Assume well repairs needed approximately every 5 years.
Subtotal			*$25,000*	*$75,000*	
Contingency	*20%*		*$5,000*	*$15,000*	
Project Management	*10%*		*$2,500*	*$7,500*	
G&A	*10%*		*$2,500*	*$7,500*	
Fee	*8%*		*$2,000*	*$6,000*	
Subtotal			*$37,000*	*$111,000*	

Table F-4a - Cost Estimate for Alternative 4 - Air Sparge, MNA, and LUCs
Southern Area Feasibility Study
NWIRP Calverton, New York

Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
Well Maintenance Future Annual Cost at Years 5, 10, and 15			$37,000		
Well Maintenance Total Future Cost				$111,000	
Present Value (1.78%) of Future Cost of Well Maintenance	*15*	*year*	*1.78%*	*$93,288*	
Well Abandonment (Year 16)					
Abandon wells when RAOs are achieved. Driller sub.	208	well	$300	$62,400	Assume well abandonment will occur at Year 16. Abandon all monitoring wells and air sparge wells.
Labor, ODCs, and Travel	5.0	week	$9,525	$47,625	Abandon 10 wells/day. 2 people. 10-hr days. 5 days/week. Per diem at $200/day. Rental truck at $65/day.
IDW disposal	1	each	$4,000	$4,000	minimal IDW generated.
Subtotal				*$114,025*	
Contingency	*20%*			*$22,805*	
Project Management	*10%*			*$11,403*	
G&A	*10%*			*$11,403*	
Fee	*8%*			*$9,122*	
Subtotal				*$168,757*	
Present Value (1.78%) of Future Cost of Well Abandonment	*16*	*year*	*1.78%*	*$127,251*	
SOURCE AREA Air Sparge System O&M (Years 1-4)					System shut down after 4 years of operation.
Weekly System Checks	208	events	$850	$176,800	labor and travel
Monthly O&M	48	events	$950	$45,600	labor and travel
Quarterly "Heavy" Maintenance	16	events	$1,600	$25,600	labor and travel
Telemetry System	4	year	$1,200	$4,800	
O&M Supplies	4	year	$2,000	$8,000	
Electrical usage (4 years)	1,276,157	kW-hr	$0.21	$267,993	Power for 4 years continual operation. Power cost assumes $0.21/kW-hr. 60 HP compressor at 460 V & 72 A. 60 HP dryer at 220 V & 15 A.
Subtotal				*$528,793*	
Contingency	*25%*			*$132,198*	
Project Management	*10%*			*$52,879*	
G&A	*10%*			*$52,879*	
Fee	*8%*			*$42,303*	
Source Area Air Sparge O&M Years 1-4 Subtotal				*$809,053*	
Source Area Air Sparge O&M Subtotal per year			*$202,263*		(Years 1-4 Subtotal / 4)
Present Value (1.78%) of Future Cost of Source Area Air Sparge O&M Years 1-4	*4*	*year*	*1.78%*	*$774,293*	
PECONIC RIVER AREA Vertical Air Sparge System O&M (Years 1-16)					System shut down after 16 years of operation.
Weekly System Checks	832	events	$850	$707,200	labor and travel
Monthly O&M Labor + Travel	192	events	$950	$182,400	labor and travel
Quarterly "Heavy" Maintenance	64	events	$1,600	$102,400	labor and travel
Telemetry System	16	year	$1,200	$19,200	
O&M Supplies	16	year	$2,000	$32,000	
Electrical usage (16 years)	6,559,488	kw/yr	$0.21	$1,377,492	Power for 16 years continual operation. Power cost assumes $0.21/kW-hr. 60 HP compressor at 460 V & 96 A. 60 HP dryer at 220 V & 12 A.
Subtotal				*$2,420,692*	
Contingency	*25%*			*$605,173*	
Project Management	*10%*			*$242,069*	
G&A	*10%*			*$242,069*	
Fee	*8%*			*$193,655*	
Peconic River Area Air Sparge O&M Years 1-16 Subtotal				*$3,703,659*	
Peconic River Area Air Sparge O&M Subtotal per year			*$231,479*		(Years 1-16 Subtotal / 16)
Present Value (1.78%) of Future Cost of Source Area Air Sparge O&M Years 1-16	*16*	*year*	*1.78%*	*$3,198,422*	
Demo/Abandonment of Both Air Sparge Systems (Year 16)					Wait to remove Source Area Air Sparge system until Peconic River Area Air Sparge system is ready for shut down (assumed at Year 16). Air sparge well abandonment accounted for above with monitoring well abandonment.
Abandon Air Sparge systems when RAOs are achieved. Demo sub.	1	each	$15,000	$15,000	Demo and abandon Source Area and Peconic River Air Sparge buildings. Demo and abandon trenched conveyance piping.
Labor, ODCs, and Travel	2.0	week	$9,525	$19,050	
IDW disposal	1	each	$10,000	$10,000	
Subtotal				*$44,050*	
Contingency	*25%*			*$11,013*	
Project Management	*10%*			*$4,405*	
G&A	*10%*			*$4,405*	
Fee	*8%*			*$3,524*	
Subtotal				*$67,397*	
Present Value (1.78%) of Future Cost of Well Abandonment	*16*	*year*	*1.78%*	*$50,820*	
Performance Groundwater Monitoring (50 wells)					
Year 1 (Quarterly events)					
Labor, ODCs, travel	8.0	week	$9,525	$76,200	Assume sample 50 wells. 2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at $200/day. Rental truck at $65/day. (2.0 weeks per event).
Equipment & Expendables	8.0	week	$1,000	$8,000	
Lab & Data Validation	4	each	$25,531	$102,125	See lab & DV backup sheets
Report	4	each	$25,000	$100,000	
Subtotal				*$286,325*	
Contingency	*20%*			*$57,265*	
Project Management	*10%*			*$28,633*	
G&A	*10%*			*$28,633*	
Fee	*8%*			*$22,906*	

Table F-4a - Cost Estimate for Alternative 4 - Air Sparge, MNA, and LUCs
Southern Area Feasibility Study
NWIRP Calverton, New York

Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
Total Future Groundwater Sampling Cost Year 1				*$423,762*	
Total per quarterly event			*$105,940*		(Year 1 Subtotal / 4)
Present Value (1.78%) of Future Cost of Groundwater Sampling Year 1	*1*	*year*	*1.78%*	*$416,351*	
Years 2-16 (annual) (50 wells)					Annual sampling required by facility RCRA permit.
Labor, ODCs, travel	30.0	week	$9,525	$285,750	Assume sample 50 wells. 2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at $200/day. Rental truck at $65/day. (2.0 weeks per event).
Equipment & Expendables	30.0	week	$1,000	$30,000	
Lab & Data Validation	15	each	$25,531	$382,970	See lab & DV backup sheets
Report	15	each	$25,000	$375,000	
Subtotal				*$1,073,720*	
Contingency	*20%*			*$214,744*	
Project Management	*10%*			*$107,372*	
G&A	*10%*			*$107,372*	
Fee	*8%*			*$85,898*	
Total Future Groundwater Sampling Cost Years 2-16				*$1,589,106*	
Total per year			*$105,940*		(Total / 15)
Present Value (1.78%) of Future Cost of Groundwater Sampling Years 2-16			*1.78%*	*$1,359,728*	
Total Present Value of All Future Costs				**$6,146,141**	Y2011 PV calculated for 16-yrs-future-cost using Real Discount Rates detailed above per OMB (2010).
TOTAL PV Cost of Alternative 4 - Air Sparge, MNA, and LUCs			*-30%*	*+50%*	
	$9,590,515		*$6,713,360*	*$14,385,772*	

Notes:

● The "Real" Discount Rates used to calculate the Present Value costs are provided in the Office of Management and Budget (OMB) *Circular A-94, Appendix C, Revised December 2010, "Discount Rates for Cost Effectiveness, Lease Purchase, and Related Analysis" for Calendar Year 2011.* http://www.whitehouse.gov/omb/circulars_a094_a94_appx-c/.

The Real Discount Rates are a forecast of real interest rates from which the inflation premium has been removed and based on the economic assumptions from the December 2012 Budget Baseline. These real rates are to be used for discounting constant-dollar flows, as is often required in cost-effectiveness analysis.

● EPA. 1988. *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* . OSWER Directive 9355.3-01. EPA/540/G-89/004. October.

● EPA. 2000. *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study* . With the U.S. Army Corps of Engineers. OSWER 9355.0-75. EPA 540-R-00-002. July.

● The information in this cost estimate is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during Baseline Sampling and the Remedial Design phase. This is an order-of-magnitude engineering cost estimate that is expected to be within –30 to +50 percent of the actual project cost (per EPA, 1988 and 2000).

Table F-4b - Lab Backup for Alternative 4 - Air Sparge, MNA, and LUCs
Southern Area Feasibility Study
NWIRP Calverton, New York

Analysis/Test	Sample Matrix	Field Samples	Field Duplicates	Equipment Rinsate Blanks	Field Blanks	Trip Blanks	Matrix Spike	Matrix Spike Duplicate	Total Number of Solid Samples	Total Billable Solid Samples	Solid Unit Price	Solid Subtotal Cost	Total Number of Liquid Samples	Total Billable Liquid Samples	Liquid Unit Price	Liquid Subtotal Cost	Total Analytical Cost
Implementation																	
Baseline Sampling - Assume 50 existing monitoring wells for COCs and other technology-performance monitoring analyses																	
Groundwater wells																	
TCL VOCs by CLP OLM04.3	GW	50	5	10	2	10	4	4					85	85	$111.71	$9,495.35	$9,495.35
Methane, Ethane, & Ethene by RSK-175	GW	25	0	0	0	0	2	2					29	29	$105.18	$3,050.22	$3,050.22
Nitrate, Nitrite, & Sulfate by USEPA 300.0	GW	25	0	0	0	0	2	2					29	29	$50.87	$1,475.23	$1,475.23
Sulfide by USEPA 376.1	GW	25	0	0	0	0	2	2					29	29	$35.12	$1,018.48	$1,018.48
Alkalinity by USEPA 310.1	GW	25	0	0	0	0	2	2					29	29	$13.73	$398.17	$398.17
Volatile Fatty Acids (VFAs) (Acetic, Butyric, Pyruvic, Propionic, & Lactic Acid) by AM23G	GW	25	0	0	0	0	2	2					29	29	$134.90	$3,912.10	$3,912.10
TOC by SW-846 9060 Quadruplicate analysis	GW	25	0	0	0	0	2	2					29	29	$33.21	$963.09	$963.09
Dissolved Arsenic, Iron, & Manganese by SW-846 6010B	GW	25	3	0	0	0	2	2					32	32	$35.73	$1,143.36	$1,143.36
IDW - Purged groundwater and decon water														0			
TCLP VOCs (1311/ 8260B)	Aqueous	1											1	1	$116.00	$116.00	$116.00
																Baseline Subtotal	**$21,572.00**
Additional Baseline -- Assume 25 new wells																	
Groundwater wells																	
TCL VOCs	GW	25	3	5	1	5	2	2					43	43	$95.00	$4,085.00	$4,085.00
Methane, Ethane, & Ethene	GW	25	0	0	0	0	2	2					29	29	$101.09	$2,931.61	$2,931.61
Nitrate, Nitrite, & Sulfate	GW	25	0	0	0	0	2	2					29	29	$48.82	$1,415.78	$1,415.78
Sulfide	GW	25	0	0	0	0	2	2					29	29	$21.91	$635.39	$635.39
Alkalinity	GW	25	0	0	0	0	2	2					29	29	$13.18	$382.22	$382.22
VFAs	GW	25	0	0	0	0	2	2					29	29	$128.57	$3,728.53	$3,728.53
TOC	GW	25	0	0	0	0	2	2					29	29	$33.21	$963.09	$963.09
Dissolved Arsenic, Iron, & Manganese	GW	25	3	0	0	0	2	2					32	32	$28.08	$898.56	$898.56
IDW - (1) Soil cuttings from new well installations; (2) Drilling decon water and well development water; and (3) Purged groundwater and decon water. Soil IDW sample rate is 1 sample per 200 cubic yards if soil.																	
TCLP VOCs	Aqueous & Solid	2							1	1	$132.00	$132.00	2	2	$116.00	$232.00	$364.00
																Additional Baseline Subtotal	**$15,404.18**
																TOTAL IMPLEMENTATION LAB COST	**$36,976.18**
Performance Monitoring - Assume sampling network consists of up to 50 monitoring wells (depending on event)																	
Years 1 - Quarterly Sampling Event																	
Groundwater wells																	
TCL VOCs	GW	50	5	10	2	10	4	4					85	85	$111.71	$9,495.35	$9,495.35
Methane, Ethane, & Ethene	GW	25	0	0	0	0	2	2					29	29	$105.18	$3,050.22	$3,050.22
Nitrate, Nitrite, & Sulfate	GW	25	0	0	0	0	2	2					29	29	$50.87	$1,475.23	$1,475.23
Sulfide	GW	25	0	0	0	0	2	2					29	29	$35.12	$1,018.48	$1,018.48
Alkalinity	GW	25	0	0	0	0	2	2					29	29	$13.73	$398.17	$398.17
VFAs	GW	25	0	0	0	0	2	2					29	29	$134.90	$3,912.10	$3,912.10
TOC	GW	25	0	0	0	0	2	2					29	29	$33.21	$963.09	$963.09
Dissolved Arsenic, Iron, & Manganese	GW	25	3	0	0	0	2	2					32	32	$35.73	$1,143.36	$1,143.36
IDW - Purged groundwater and decon water																	
TCLP VOCs	Aqueous	1											1	1	$116.00	$116.00	$116.00
																Subtotal per event	**$21,572.00**
																Total for Year 1	**$86,288.00**
Years 2-16 (annual)																	
Groundwater wells																	
TCL VOCs	GW	50	5	10	2	10	4	4					85	85	$111.71	$9,495.35	$9,495.35
Methane, Ethane, Ethene	GW	25	0	0	0	0	2	2					29	29	$105.18	$3,050.22	$3,050.22
Nitrate, Nitrite, Sulfate	GW	25	0	0	0	0	2	2					29	29	$50.87	$1,475.23	$1,475.23
Sulfide	GW	25	0	0	0	0	2	2					29	29	$35.12	$1,018.48	$1,018.48
Alkalinity	GW	25	0	0	0	0	2	2					29	29	$13.73	$398.17	$398.17
VFAs	GW	25	0	0	0	0	2	2					29	29	$134.90	$3,912.10	$3,912.10
TOC	GW	25	0	0	0	0	2	2					29	29	$33.21	$963.09	$963.09
Dissolved Iron and Manganese	GW	25	3	0	0	0	2	2					32	32	$35.73	$1,143.36	$1,143.36
IDW - Purged groundwater and decon water																	
TCLP VOCs	Aqueous	1											1	1	$116.00	$116.00	$116.00
																Subtotal per event	**$21,572.00**
																Total for Years 2-16	**$323,580.00**
																TOTAL FUTURE LAB COST	**$409,868.00**

Full QA/QC for OU14 COCs only. Also, duplicates for metals. MS/MSDs are billable Standard turnaround time

Table F-4c - Data Validation Backup for Alternative 4 - Air Sparge, MNA, and LUCs
Southern Area Feasibility Study
NWIRP Calverton, New York

Analysis/Test	Sample Matrix	Field Samples	Field Duplicates	Equipment Rinsate Blanks	Field Blanks	Trip Blanks	Matrix Spike	Matrix Spike Duplicate	Total Number of Solid Samples	Total Billable Solid Samples	Solid Unit Price	Solid Subtotal Cost	Total Number of Liquid Samples	Total Billable Liquid Samples	Liquid Unit Price	Liquid Subtotal Cost	Total Analytical Cost
Implementation																	
Baseline Sampling - Assume 50 existing monitoring wells for COCs and other technology-performance monitoring analyses																	
Groundwater wells																	
TCL VOCs by CLP OLM04.3	GW	50	5	10	2	10	4	4					85	85	$21.63	$1,838.55	$1,838.55
Methane, Ethane, & Ethene by RSK-175	GW	25	0	0	0	0	2	2					29	29	$15.14	$439.06	$439.06
Nitrate, Nitrite, & Sulfate by USEPA 300.0	GW	25	0	0	0	0	2	2					29	29	$16.22	$470.38	$470.38
Sulfide by USEPA 376.1	GW	25	0	0	0	0	2	2					29	29	$5.41	$156.89	$156.89
Alkalinity by USEPA 310.1	GW	25	0	0	0	0	2	2					29	29	$5.41	$156.89	$156.89
Volatile Fatty Acids (VFAs) (Acetic, Butyric, Pyruvic, Propionic, & Lactic Acid) by AM23G	GW	25	0	0	0	0	2	2					29	29	$15.14	$439.06	$439.06
TOC by SW-846 9060 Quadruplicate analysis	GW	25	0	0	0	0	2	2					29	29	$8.65	$250.85	$250.85
Dissolved Arsenic, Iron, & Manganese by SW-846 6010B	GW	25	3	0	0	0	2	2					32	32	$6.49	$207.68	$207.68
																Baseline Subtotal	**$3,959.36**
Additional Baseline -- Assume 25 new wells																	
Groundwater wells																	
TCL VOCs	GW	25	3	5	1	5	2	2					43	43	$21.63	$930.09	$930.09
Methane, Ethane, Ethene	GW	25	0	0	0	0	2	2					29	29	$15.14	$439.06	$439.06
Nitrate, Nitrite, Sulfate	GW	25	0	0	0	0	2	2					29	29	$16.22	$470.38	$470.38
Sulfide	GW	25	0	0	0	0	2	2					29	29	$5.41	$156.89	$156.89
Alkalinity	GW	25	0	0	0	0	2	2					29	29	$5.41	$156.89	$156.89
VFAs	GW	25	0	0	0	0	2	2					29	29	$15.14	$439.06	$439.06
TOC	GW	25	0	0	0	0	2	2					29	29	$8.65	$250.85	$250.85
Dissolved Iron and Manganese	GW	25	3	0	0	0	2	2					32	32	$6.49	$207.68	$207.68
																Additional Baseline Subtotal	**$3,050.90**
																TOTAL IMPLEMENTATION DV COST	**$7,010.26**
Performance Monitoring - Assume sampling network consists of up to 50 monitoring wells (depending on event)																	
Years 1 - Quarterly Sampling Event																	
Groundwater wells																	
TCL VOCs	GW	50	5	10	2	10	4	4					85	85	$21.63	$1,838.55	$1,838.55
Methane, Ethane, & Ethene	GW	25	0	0	0	0	2	2					29	29	$15.14	$439.06	$439.06
Nitrate, Nitrite, & Sulfate	GW	25	0	0	0	0	2	2					29	29	$16.22	$470.38	$470.38
Sulfide	GW	25	0	0	0	0	2	2					29	29	$5.41	$156.89	$156.89
Alkalinity	GW	25	0	0	0	0	2	2					29	29	$5.41	$156.89	$156.89
VFAs	GW	25	0	0	0	0	2	2					29	29	$15.14	$439.06	$439.06
TOC	GW	25	0	0	0	0	2	2					29	29	$8.65	$250.85	$250.85
Dissolved Arsenic, Iron, & Manganese	GW	25	3	0	0	0	2	2					32	32	$6.49	$207.68	$207.68
																Subtotal per event	**$3,959.36**
																Total for Years 1+2	**$31,674.88**
Years 2-16 (annual)																	
Groundwater wells																	
TCL VOCs	GW	50	5	10	2	10	4	4					85	85	$21.63	$1,838.55	$1,838.55
Methane, Ethane, Ethene	GW	25	0	0	0	0	2	2					29	29	$15.14	$439.06	$439.06
Nitrate, Nitrite, Sulfate	GW	25	0	0	0	0	2	2					29	29	$16.22	$470.38	$470.38
Sulfide	GW	25	0	0	0	0	2	2					29	29	$5.41	$156.89	$156.89
Alkalinity	GW	25	0	0	0	0	2	2					29	29	$5.41	$156.89	$156.89
VFAs	GW	25	0	0	0	0	2	2					29	29	$15.14	$439.06	$439.06
TOC	GW	25	0	0	0	0	2	2					29	29	$8.65	$250.85	$250.85
Dissolved Iron and Manganese	GW	25	3	0	0	0	2	2					32	32	$6.49	$207.68	$207.68
																Subtotal per event	**$3,959.36**
																Total for Years 3-16	**$55,431.04**
																TOTAL FUTURE DV COST	**$87,105.92**

Table F-5a - Cost Estimate for Alternative 5 - EISB, MNA, and LUCs
Southern Area Feasbility Study
NWIRP Calverton, New York

Assumptions:

LUC RD prepared by contractor. 5YR performed with other NWIRP Calverton sites. Annual inspections performed by contractor. Well maintenance required every 5yrs.

Baseline sampling of 50 wells for COCs and geochemical and biodegradation-related analyses.

Following review of baseline data, install 30 new monitoring wells (varying depths). Sample these for additional baseline data (COCs and geochem/biodeg analyses).

Performance monitoring: 60 wells. Quarterly during injection year followed by annual events.

Permanent injection wells. Assume 113 injection wells (varying depths) spaced 25-ft on center. 15-ft radius of injection. 4-inch diameter. 20-ft 0.010-slot continuous wrap screens.

2,630 pounds of 60% emulsified vegetable oil injected per well. EOS® 598B42 product assumed. Saturation dosage based on 0.0015 lbs EOS® per lb soil in treatment area. Mobile porosity at 15%. Total oil concentrate and mixture/chase water injected per well = 15,862 gallons. See Dosage calculation sheet.

Estimated Time to Complete Year 1 injection event (113 wells) = 71 days (4-well injection manifold; 15 gpm; 7 hrs injection/day); Year 5 Re-injection event (74 wells) =47 days

2 Injection events: Implementation/Year 0 and at Year 5. No bioaugmentation necessary. No pH buffering required.

Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
IMPLEMENTATION COST					
LUCs					
LUC Remedial Design and implementation into Navy's *LUC Tracker* .	1	each	$8,000	$8,000	Includes Draft and Final LUC Plans. Assume contractor prepares LUC RD.
UFP-SAP & Remedial Action Work Plan					
Work Plan for additional sampling, well installation, injection, and groundwater performance monitoring (in Navy's UFP-SAP format).	1	each	$50,000	$50,000	Pre-Draft, Draft, Draft Final, & Final. Includes Scoping sessions. Includes Spill Prevention, Control, and Countermeasure Plan for vegetable oil. Recent similar project.
Baseline Sampling (50 existing Wells)					
Labor, ODCs, travel	2.0	week	$9,525	$19,050	2 people. Sample 5 wells/day. 5 days/week. Per diem at $200/day. Rental truck at $65/day.
Equipment & Expendables	2.0	week	$1,000	$2,000	
Lab & Data Validation	1	each	$25,531	$25,531	See lab & DV backup sheets
Report	1	each	$25,000	$25,000	
New Well Installation (30 new wells)					10 wells screened at 20-30 ft bgs, 10 wells at 40-50 ft bgs, and 10 wells at 60-70 ft bgs. 2-inch PVC.
Mobilization & Site Setup	1	each	$10,000	$10,000	Includes sub mob/demob, utility location, and clearing.
Labor, ODCs, travel	5.2	week	$9,525	$49,530	Assume install 30 wells. Install 1.5 wells/day. 10-hr days. 5 days/week. Per diem at $200/day. Rental truck at $65/day. 2 people. 2 hrs per well for development.
Equipment	5.2	week	$200	$1,040	
Drilling Subcontractor / well installation					
Well installation - HSA drilling & 2-inch PVC install	1,500	feet	$36	$54,000	Labor & materials. 4.25-inch ID HSA. 10-ft 0.010-slot PVC screens included.
Well Completion with bollards	30	each	$325	$9,750	
Travel	5.2	week	$3,000	$15,600	1 rig, 3-person crew. Per diem at $200/day. 5 day/wk.
Loader/Backhoe for IDW management	5	week	1,375	$7,150	
Water usage (hydrant permit fee)	26	day	$50	$1,300	
Survey	1	each	$2,000	$2,000	
Water IDW Transport & Disposal	4,500	gallon	$2	$9,000	Assume 150 gallons per 2-inch well.
Soil IDW Transport & Disposal	0.97	each	$2,000	$1,939	20 cy rolloff. Note HSA outer diam = 8 inches.
Baseline Sample New Wells (30 wells)					
Labor, ODCs, travel	1.2	week	$9,525	$11,430	Assume sample 30 wells. 2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at $200/day. Rental truck at $65/day.
Equipment	1.2	week	$1,000	$1,200	
Lab & Data Validation	1	each	$21,858	$21,858	
Report	1	each	$8,000	$8,000	
EISB Well Installation and Injection					
Office Trailer, Storage Trailer, & Site Utilities	10	month	$610	$6,371	
Well Installation (113 wells)					Barrier 1 - 6 wells screened at 15-35 ft bgs & 5 wells at 25-45 ft bgs. Barrier 2 - 6 wells at 15-35 ft bgs & 5 wells at 25-45 ft bgs. Barrier 3 - 9 wells at 20-40 ft bgs & 8 wells at 30-50 ft bgs. Barrier 4 - 13 wells at 25-45 ft bgs & 12 wells at 35-55 ft bgs. Barrier 5 - 25 wells at 25-45 ft bgs & 24 wells at 35-55 ft bgs.
Mobilization	1	each	$15,000	$15,000	Includes sub mob/demob, utility location, construction of staging area, and clearing.
Labor	19.6	week	$9,525	$186,563	Install 113 wells listed above. Install 1.5 wells/day. 10-hr days. 5 days/week. Per diem at $200/day. Rental truck at $65/day. 2 people. 2 hrs per well for development.
Equipment & Expendables	19.6	week	$200	$3,917	
Drilling Subcontractor / well installation					Includes mob, materials, labor, travel
Well installation - HSA drilling & 4-inch PVC install	5,320	feet	$38	$202,160	Labor and materials. 6.25-inch ID HSA.
4-inch, 20-ft PVC 0.010-slot continuous-wrap screens	113	each	$990	$111,870	
Well Completion with bollards	113	each	$325	$36,725	
Travel	19.6	week	$2,000	$39,173	1 rig, 3-person crew. Per diem at $200/day. 5 day/wk.
Loader/Backhoe for IDW management	19.6	week	1,375	$26,932	
Water usage (hydrant permit fee)	97.9	day	$50	$4,897	
Survey	1	each	$3,000	$3,000	
Water IDW Transport & Disposal	56,500	gallon	$2	$113,000	Assume 500 gallons per 4-inch well.
Water characterization - TCLP VOCs	1	each	$116	$116	
Soil IDW Transport & Disposal	6.50	each	$2,000	$13,004	20 cy rolloff. Note HSA outer diam = 11 inches.
Soil characterization - TCLP VOCs	7	each	$132	$924	1 per 20 cy.
Injection (113 wells)					
Labor, ODCs, Travel	14.2	week	$14,450	$205,558	3 people. 7 hrs injection time per day. 5 days/wk. Per diem at $200/day. 2 rental trucks at $65/day each.
Equipment	14.2	week	$700	$9,958	Trailer, generator, expendables
Injection parts and equipment	1	each	$10,000	$10,000	
Emulsified Oil material and delivery	712	drum	$1,106	$787,757	*EOS® 598B42* brand. See dosage calculation sheet for dosage per well calc. Includes material, delivery, and NY taxes.
Water usage (hydrant permit fee)	71.1	day	$50	$3,556	
Drum disposal	712	drum	$40	$28,480	
Construction Report	1	each	$30,000	$30,000	Draft and Final Construction Completion Report
Subtotal				*$2,172,339*	
Contingency	*25%*			*$543,085*	
Project Management	*10%*			*$217,234*	

Table F-5a - Cost Estimate for Alternative 5 - EISB, MNA, and LUCs
Southern Area Feasbility Study
NWIRP Calverton, New York

Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
Remedial Design	*6%*			*$130,340*	
Construction Oversight	*10%*			*$217,234*	
G&A	*10%*			*$217,234*	
Fee	*8%*			*$173,787*	
			Total Implementation Cost	**$3,671,253**	
FUTURE COSTS (10 years)					
LUCs (Years 1-10)					
Annual Inspections and reporting (1 per year)	10	year	$6,000	$95,250	1 inspection per year at $6,000 per inspection -- for 10 yrs. Assume contractor performs site inspections and reporting.
Subtotal			*$6,000*	*$95,250*	
Project Management	*10%*		*$600*	*$9,525*	
Subtotal			*$6,600*	*$104,775*	
LUCs Future Annual Cost			$6,600		
LUCs Total Future Cost				$104,775	
Present Value (1.3%) of Future Cost of LUCs	*10*	*year*	*1.3%*	*$61,516*	*Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).*
5-Year Reviews (Years 5 and 10)					
5-Year Review	2	each	$10,000	$20,000	5YR conducted once every 5 years. To be conducted in conjunction with other post-ROD sites at NWIRP Calverton. Years 5 and 10. Includes pre-draft, draft, draft final, final, fact sheet, and public notices.
Subtotal			*$10,000*	*$20,000*	
Contingency	*10%*		*$1,000*	*$2,000*	
Project Management	*10%*		*$1,000*	*$2,000*	
G&A	*10%*		*$1,000*	*$2,000*	
Fee	*8%*		*$800*	*$1,600*	
Subtotal			*$13,800*	*$27,600*	
5YR Total Annual Cost at Years 5 and 10			$13,800		
5YR Total Future Cost				$27,600	
Present Value (1.3%) of Future Cost of 5YRs	*10*	*year*	*1.3%*	*$25,065*	*Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).*
Well Maintenance (Year 5)					
Repair flushmounts & vaults, potential well replacements, etc.	1	event	$22,000	$22,000	Assume well repairs needed approximately every 5 years.
Subtotal			*$22,000*	*$22,000*	
Contingency	*20%*		*$4,400*	*$4,400*	
Project Management	*10%*		*$2,200*	*$2,200*	
G&A	*10%*		*$2,200*	*$2,200*	
Fee	*8%*		*$1,760*	*$1,760*	
Subtotal			*$32,560*	*$32,560*	
Well Maintenance Future Annual Cost at Year 5				$32,560	
Present Value (1.3%) of Future Cost of Well Maintenance	*5*	*year*	*1.3%*	*$30,524*	*Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).*
Well Abandonment (Year 10)					
Abandon wells when RAOs are achieved. Driller sub.	193	well	$300	$57,900	Assume well abandonment will occur at Year 10. Abandon monitoring wells and injection wells.
Labor, ODCs, and Travel	4	week	$9,525	$38,100	Abandon 10 wells/day. 2 people. 10-hr days. 5 days/week. Per diem at $200/day. Rental truck at $65/day.
IDW Disposal	1	each	$4,000	$4,000	
Subtotal				*$100,000*	
Contingency	*20%*			*$20,000*	
Project Management	*10%*			*$10,000*	
G&A	*10%*			*$10,000*	
Fee	*8%*			*$8,000*	
Subtotal				*$148,000*	
Well Abandonment Future Annual Cost at Year 10				$148,000	
Present Value (1.3%) of Future Cost of Well Abandonment	*10*	*year*	*1.3%*	*$130,067*	*Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).*
Re-Injection at Year 5					Re-inject into Barriers 4 & 5 (74 wells) at Year 5
Labor, ODCs, Travel	9.3	week	$14,450	$134,613	3 people. 7 hrs injection time per day. 5 days/wk. Per diem at $200/day. 2 rental trucks at $65/day each.
Equipment & Expendables	9.3	week	$700	$6,521	Trailer, generator, expendables
Injection parts and equipment	1	each	$10,000	$10,000	
Emulsified Oil material and delivery	467	drum	$1,106	$516,689	*EOS® 598B42* brand. See dosage calculation sheet for dosage per well calc. Includes material, delivery, and NY taxes.
Water usage (hydrant permit fee)	46.6	day	$50	$2,329	
Drum disposal	467	drum	$40	$18,680	
Trip Report	1	each	$10,000	$10,000	summary tech memo of injection event.
Subtotal				*$698,832*	
Contingency	*25%*			*$174,708*	
Project Management	*10%*			*$69,883*	
G&A	*10%*			*$69,883*	
Fee	*8%*			*$55,907*	
Subtotal				*$1,069,213*	
Re-Injection Future Annual Cost at Year 5				$1,069,213	
Present Value (1.3%) of Future Cost of Re-injection at Year 5			*1.3%*	*$1,002,344*	*Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).*

Table F-5a - Cost Estimate for Alternative 5 - EISB, MNA, and LUCs
Southern Area Feasbility Study
NWIRP Calverton, New York

Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
Performance Groundwater Monitoring (60 wells)					
Years 1 and 5 (Quarterly events)					
Labor, ODCs, travel	19.2	week	$9,525	$182,880	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at $200/day. Rental truck at $65/day. (2.4 weeks per event).
Equipment & Expendables	19.2	week	$1,000	$19,200	
Lab & Data Validation	8	each	$30,337	$242,700	See lab & DV backup sheets
Report	8	each	$25,000	$200,000	
Subtotal				*$644,780*	
Contingency	*20%*			*$128,956*	
Project Management	*10%*			*$64,478*	
G&A	*10%*			*$64,478*	
Fee	*8%*			*$51,582*	
Subtotal				*$954,274*	
Total Future Monitoring Cost Each Quarter			$119,284		(Total / 8)
Total Future Annual Monitoring Cost during each of Years 1 and 5			$477,137		(Quarterly x 4)
Monitoring Total Future Cost				$954,274	
Present Value (1.3%) of Future Cost of Groundwater Sampling Years 1 and 5			*1.3%*	*$918,311*	*Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).*
Performance Groundwater Monitoring (60 wells)					Annual sampling required by facility RCRA permit.
Years 2, 3, 4 and 6, 7, 8, 9, 10 (Annual)					
Labor, ODCs, travel	19.2	week	$9,525	$182,880	Assume sample 60 wells. 2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at $200/day. Rental truck at $65/day. (2.4 weeks per event).
Equipment & Expendables	19.2	week	$1,000	$19,200	
Lab & Data Validation	8	each	$30,337	$242,700	See lab & DV backup sheets
Report	8	each	$25,000	$200,000	
Subtotal				*$644,780*	
Contingency	*20%*			*$128,956*	
Project Management	*10%*			*$64,478*	
G&A	*10%*			*$64,478*	
Fee	*8%*			*$51,582*	
Subtotal				*$954,274*	
Total Future Monitoring Annual Cost during each of Years 2-4 and 6-10			$119,284		(Total / 8)
Total Future Monitoring Cost				$954,274	
Present Value (1.3%) of Future Cost of Groundwater Sampling Years 2-4 and 6-10			*1.3%*	*$882,231*	*Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).*
Total Present Value of All Future Costs				**$3,050,058**	Y2011 PV calculated for 10-yrs-future-cost using Real Discount Rates detailed above per OMB (2010).
TOTAL PV Cost of Alternative 5 - EISB, MNA, and LUCs			*-30%*	*+50%*	
	$6,721,311		*$4,704,917*	*$10,081,966*	

Notes:

● The "Real" Discount Rates used to calculate the Present Value costs are provided in the Office of Management and Budget (OMB) *Circular A-94, Appendix C, Revised December 2010, "Discount Rates for Cost Effectiveness, Lease Purchase, and Related Analysis" for Calendar Year 2011.* http://www.whitehouse.gov/omb/circulars_a094_a94_appx-c/.

The Real Discount Rates are a forecast of real interest rates from which the inflation premium has been removed and based on the economic assumptions from the December 2012 Budget Baseline. These real rates are to be used for discounting constant-dollar flows, as is often required in cost-effectiveness analysis.

● EPA. 1988. *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* . OSWER Directive 9355.3-01. EPA/540/G-89/004. October.

● EPA. 2000. *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study* . With the U.S. Army Corps of Engineers. OSWER 9355.0-75. EPA 540-R-00-002. July.

● The information in this cost estimate is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during Baseline Sampling and the Remedial Design phase. This is an order-of-magnitude engineering cost estimate that is expected to be within –30 to +50 percent of the actual project cost (per EPA, 1988 and 2000).

Table F-5b - Lab Backup for Alternative 5 - EISB, MNA, and LUCs
Southern Area Feasbility Study
NWIRP Calverton, New York

Analysis/Test	Sample Matrix	Field Samples	Field Duplicates	Equipment Rinsate Blanks	Field Blanks	Trip Blanks	Matrix Spike	Matrix Spike Duplicate	Total Number of Solid Samples	Total Billable Solid Samples	Solid Unit Price	Solid Subtotal Cost	Total Number of Liquid Samples	Total Billable Liquid Samples	Liquid Unit Price	Liquid Subtotal Cost	Total Analytical Cost
Implementation																	
Baseline Sampling - Assume 50 existing monitoring wells for COCs and other technology-performance monitoring analyses																	
Groundwater wells																	
TCL VOCs by CLP OLM04.3	GW	50	5	10	2	10	4	4					85	85	$111.71	$9,495.35	$9,495.35
Methane, Ethane, & Ethene by RSK-175	GW	25	0	0	0	0	2	2					29	29	$105.18	$3,050.22	$3,050.22
Nitrate, Nitrite, & Sulfate by USEPA 300.0	GW	25	0	0	0	0	2	2					29	29	$50.87	$1,475.23	$1,475.23
Sulfide by USEPA 376.1	GW	25	0	0	0	0	2	2					29	29	$35.12	$1,018.48	$1,018.48
Alkalinity by USEPA 310.1	GW	25	0	0	0	0	2	2					29	29	$13.73	$398.17	$398.17
Volatile Fatty Acids (VFAs) (Acetic, Butyric, Pyruvic, Propionic, & Lactic Acid) by AM23G	GW	25	0	0	0	0	2	2					29	29	$134.90	$3,912.10	$3,912.10
TOC by SW-846 9060 Quadruplicate analysis	GW	25	0	0	0	0	2	2					29	29	$33.21	$963.09	$963.09
Dissolved Arsenic, Iron, & Manganese by SW-846 6010B	GW	25	3	0	0	0	2	2					32	32	$35.73	$1,143.36	$1,143.36
IDW - Purged groundwater and decon water																	
TCLP VOCs (1311/ 8260B)	Aqueous	1											1	1	$116.00	$116.00	$116.00
																Baseline Subtotal	**$21,572.00**
Additional Baseline -- Assume 30 new wells																	
Groundwater wells																	
TCL VOCs	GW	30	3	6	2	6	3	3					53	53	$95.00	$5,035.00	$5,035.00
Methane, Ethane, & Ethene	GW	30	0	0	0	0	2	2					34	34	$101.09	$3,437.06	$3,437.06
Nitrate, Nitrite, & Sulfate	GW	30	0	0	0	0	2	2					34	34	$48.82	$1,659.88	$1,659.88
Sulfide	GW	30	0	0	0	0	2	2					34	34	$21.91	$744.94	$744.94
Alkalinity	GW	30	0	0	0	0	2	2					34	34	$13.18	$448.12	$448.12
VFAs	GW	30	0	0	0	0	2	2					34	34	$128.57	$4,371.38	$4,371.38
TOC	GW	30	0	0	0	0	2	2					34	34	$33.21	$1,129.14	$1,129.14
Dissolved Arsenic, Iron, & Manganese	GW	30	3	0	0	0	2	2					37	37	$28.08	$1,038.96	$1,038.96
IDW - (1) Soil cuttings from new well installations;																	
TCLP VOCs	Aqueous & Solid	2							1	1	$132.00	$132.00	2	2	$116.00	$232.00	$364.00
																Additional Baseline Subtotal	**$18,228.48**
																TOTAL IMPLEMENTATION LAB COST	**$39,800.48**
Performance Monitoring - Assume sampling network consists of up to 60 monitoring wells (depending on event)																	
Years 1 & 5 - Quarterly Sampling Event (60 wells)																	
Groundwater wells																	
TCL VOCs	GW	60	6	12	3	12	5	5					103	103	$111.71	$11,506.13	$11,506.13
Methane, Ethane, & Ethene	GW	30	0	0	0	0	2	2					34	34	$105.18	$3,576.12	$3,576.12
Nitrate, Nitrite, & Sulfate	GW	30	0	0	0	0	2	2					34	34	$50.87	$1,729.58	$1,729.58
Sulfide	GW	30	0	0	0	0	2	2					34	34	$35.12	$1,194.08	$1,194.08
Alkalinity	GW	30	0	0	0	0	2	2					34	34	$13.73	$466.82	$466.82
VFAs	GW	30	0	0	0	0	2	2					34	34	$134.90	$4,586.60	$4,586.60
TOC	GW	30	0	0	0	0	2	2					34	34	$33.21	$1,129.14	$1,129.14
Dissolved Arsenic, Iron, & Manganese	GW	30	3	0	0	0	2	2					37	37	$35.73	$1,322.01	$1,322.01
IDW - Purged groundwater and decon water																	
TCLP VOCs	Aqueous	1											1	1	$116.00	$116.00	$116.00
																Subtotal per event	**$25,626.48**
																Total for Years 1+5	**$205,011.84**
Years 2-4 and 6-10 (annual) (60 wells)																	
Groundwater wells																	
TCL VOCs	GW	60	6	12	3	12	5	5					103	103	$111.71	$11,506.13	$11,506.13
Methane, Ethane, & Ethene	GW	30	0	0	0	0	2	2					34	34	$105.18	$3,576.12	$3,576.12
Nitrate, Nitrite, & Sulfate	GW	30	0	0	0	0	2	2					34	34	$50.87	$1,729.58	$1,729.58
Sulfide	GW	30	0	0	0	0	2	2					34	34	$35.12	$1,194.08	$1,194.08
Alkalinity	GW	30	0	0	0	0	2	2					34	34	$13.73	$466.82	$466.82
VFAs	GW	30	0	0	0	0	2	2					34	34	$134.90	$4,586.60	$4,586.60
TOC	GW	30	0	0	0	0	2	2					34	34	$33.21	$1,129.14	$1,129.14
Dissolved Arsenic, Iron, & Manganese	GW	30	3	0	0	0	2	2					37	37	$35.73	$1,322.01	$1,322.01
IDW - Purged groundwater and decon water																	
TCLP VOCs	Aqueous	1											1	1	$116.00	$116.00	$116.00
																Subtotal per event	**$25,626.48**
																Total for Years 2-4 + 6-10	**$205,011.84**
																TOTAL FUTURE LAB COST	**$410,023.68**

Full QA/QC for OU14 COCs only. Also+duplicates for metals. MS/MSDs are billable Standard turnaround time

Table F-5c - Data Validation Backup for Alternative 5 - EISB, MNA, and LUCs
Southern Area Feasbility Study
NWIRP Calverton, New York

Analysis/Test	Sample Matrix	Field Samples	Field Duplicates	Equipment Rinsate Blanks	Field Blanks	Trip Blanks	Matrix Spike	Matrix Spike Duplicate	Total Number of Solid Samples	Total Billable Solid Samples	Solid Unit Price	Solid Subtotal Cost	Total Number of Liquid Samples	Total Billable Liquid Samples	Liquid Unit Price	Liquid Subtotal Cost	Total Analytical Cost
Implementation																	
Baseline Sampling - Assume 50 existing monitoring wells for COCs and other technology-performance monitoring analyses																	
Groundwater wells																	
TCL VOCs by CLP OLM04.3	GW	50	5	10	2	10	4	4					85	85	$21.63	$1,838.55	$1,838.55
Methane, Ethane, & Ethene by RSK-175	GW	25	0	0	0	0	2	2					29	29	$15.14	$439.06	$439.06
Nitrate, Nitrite, & Sulfate by USEPA 300.0	GW	25	0	0	0	0	2	2					29	29	$16.22	$470.38	$470.38
Sulfide by USEPA 376.1	GW	25	0	0	0	0	2	2					29	29	$5.41	$156.89	$156.89
Alkalinity by USEPA 310.1	GW	25	0	0	0	0	2	2					29	29	$5.41	$156.89	$156.89
Volatile Fatty Acids (VFAs) (Acetic, Butyric, Pyruvic, Propionic, & Lactic Acid) by AM23G	GW	25	0	0	0	0	2	2					29	29	$15.14	$439.06	$439.06
TOC by SW-846 9060 Quadruplicate analysis	GW	25	0	0	0	0	2	2					29	29	$8.65	$250.85	$250.85
Dissolved Arsenic, Iron, & Manganese by SW-846 6010B	GW	25	3	0	0	0	2	2					32	32	$6.49	$207.68	$207.68
																Baseline Subtotal	**$3,959.36**
Additional Baseline -- Assume 30 new wells																	
Groundwater wells																	
TCL VOCs	GW	30	3	6	2	6	3	3					53	53	$21.63	$1,146.39	$1,146.39
Methane, Ethane, & Ethene	GW	30	0	0	0	0	2	2					34	34	$15.14	$514.76	$514.76
Nitrate, Nitrite, & Sulfate	GW	30	0	0	0	0	2	2					34	34	$16.22	$551.48	$551.48
Sulfide	GW	30	0	0	0	0	2	2					34	34	$5.41	$183.94	$183.94
Alkalinity	GW	30	0	0	0	0	2	2					34	34	$5.41	$183.94	$183.94
VFAs	GW	30	0	0	0	0	2	2					34	34	$15.14	$514.76	$514.76
TOC	GW	30	0	0	0	0	2	2					34	34	$8.65	$294.10	$294.10
Dissolved Arsenic, Iron, & Manganese	GW	30	3	0	0	0	2	2					37	37	$6.49	$240.13	$240.13
																Additional Baseline Subtotal	**$3,629.50**
																TOTAL IMPLEMENTATION DV COST	**$7,588.86**
Performance Monitoring - Assume sampling network consists of up to 60 monitoring wells (depending on event)																	
Years 1 & 5 - Quarterly Sampling Event (60 wells)																	
Groundwater wells																	
TCL VOCs	GW	60	6	12	3	12	5	5					103	103	$21.63	$2,227.89	$2,227.89
Methane, Ethane, & Ethene	GW	30	0	0	0	0	2	2					34	34	$15.14	$514.76	$514.76
Nitrate, Nitrite, & Sulfate	GW	30	0	0	0	0	2	2					34	34	$16.22	$551.48	$551.48
Sulfide	GW	30	0	0	0	0	2	2					34	34	$5.41	$183.94	$183.94
Alkalinity	GW	30	0	0	0	0	2	2					34	34	$5.41	$183.94	$183.94
VFAs	GW	30	0	0	0	0	2	2					34	34	$15.14	$514.76	$514.76
TOC	GW	30	0	0	0	0	2	2					34	34	$8.65	$294.10	$294.10
Dissolved Arsenic, Iron, & Manganese	GW	30	3	0	0	0	2	2					37	37	$6.49	$240.13	$240.13
																Subtotal per event	**$4,711.00**
																Total for Years 1+5	**$37,688.00**
Years 2-4 and 6-10 (annual) (60 wells)																	
Groundwater wells																	
TCL VOCs	GW	60	6	12	3	12	5	5					103	103	$21.63	$2,227.89	$2,227.89
Methane, Ethane, & Ethene	GW	30	0	0	0	0	2	2					34	34	$15.14	$514.76	$514.76
Nitrate, Nitrite, & Sulfate	GW	30	0	0	0	0	2	2					34	34	$16.22	$551.48	$551.48
Sulfide	GW	30	0	0	0	0	2	2					34	34	$5.41	$183.94	$183.94
Alkalinity	GW	30	0	0	0	0	2	2					34	34	$5.41	$183.94	$183.94
VFAs	GW	30	0	0	0	0	2	2					34	34	$15.14	$514.76	$514.76
TOC	GW	30	0	0	0	0	2	2					34	34	$8.65	$294.10	$294.10
Dissolved Arsenic, Iron, & Manganese	GW	30	3	0	0	0	2	2					37	37	$6.49	$240.13	$240.13
																Subtotal per event	**$4,711.00**
																Total for Years 2-4 + 6-10	**$42,399.00**
																TOTAL FUTURE DV COST	**$80,087.00**

Table F-6a - Cost Estimate for Alternative 6 - Air Sparge, EISB, MNA, and LUCs
Southern Area Feasbility Study
NWIRP Calverton, New York

Assumptions:

LUC RD prepared by contractor. 5YR performed with other NWIRP Calverton sites. Annual inspections performed by contractor. Well maintenance required every 5yrs.

Baseline sampling of 50 wells for COCs and geochemical and biodegradation-related analyses.

Following review of baseline data, install 30 new monitoring wells (varying depths). Sample these for additional baseline data (COCs and geochem/biodeg analyses).

Performance monitoring: 60 wells. Quarterly during injection year followed by annual events.

Permanent injection wells. Assume 74 injection wells (varying depths) spaced 25-ft on center. 15-ft radius of injection. 4-inch diameter. 20-ft 0.010-slot continuous wrap screens.

2,630 pounds of 60% emulsified vegetable oil injected per well. EOS® 598B42 product assumed. Saturation dosage based on 0.0015 lbs EOS® per lb soil in treatment area. Mobile porosity at 15%. Total oil concentrate and mixture/chase water injected per well = 15,862 gallons. See Dosage calculation sheet.

Estimated Time to Complete 1 injection event = 47 days (4-well injection manifold; 15 gpm; 7 hrs injection/day)

2 Injection events: Implementation/Year 0 and at Year 5. No bioaugmentation necessary. No pH buffering required.

Vertical Air Sparge wells in (1) Source Area and (2) Peconic River Area.

(1) Source Area contains 48 vertical air sparge wells at 4 locations (2 curtains of 7 wells, 2 curtains of 10 wells, 2 curtains of 10 wells, and 2 curtains of 7 wells); all screened 45-50 ft bgs (0.010-slot); spaced 25 ft; 15 ft radius of influence; 5 cfs per well; 2-inch PVC).

(2) Peconic River Area contains 80 vertical air sparge wells at 1 location (2 curtains of 40 wells); all screened 95-100 ft bgs; spaced 25 ft; 15 ft radius of influence; 5 cfs per well; 2-inch PVC).

Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
IMPLEMENTATION COST					
LUCs					
LUC Remedial Design and implementation into Navy's *LUC Tracker* .	1	each	$8,000	$8,000	Includes Draft and Final LUC Plans. Assume contractor prepares LUC RD.
UFP-SAP & Remedial Action Work Plan					
Work Plan for additional sampling, well installation, injection, and groundwater performance monitoring (in Navy's UFP-SAP format).	1	each	$50,000	$50,000	Pre-Draft, Draft, Draft Final, & Final. Includes Scoping sessions. Includes Spill Prevention, Control, and Countermeasure Plan for vegetable oil. Recent similar project.
Baseline Sampling (50 existing Wells)					
Labor, ODCs, travel	2.0	week	$9,525	$19,050	2 people. Sample 5 wells/day. 5 days/week. Per diem at $200/day. Rental truck at $65/day.
Equipment & Expendables	2.0	week	$1,000	$2,000	
Lab & Data Validation	1	each	$25,531	$25,531	See lab & DV backup sheets
Report	1	each	$25,000	$25,000	
New Well Installation (30 new wells)					10 wells screened at 20-30 ft bgs, 10 wells at 40-50 ft bgs, and 10 wells at 60-70 ft bgs. 2-inch PVC.
Mobilization & Site Setup	1	each	$10,000	$10,000	Includes sub mob/demob, utility location, and clearing.
Labor, ODCs, travel	5.2	week	$9,525	$49,530	Install 1.5 wells/day. 10-hr days. 5 days/week. Per diem at $200/day. Rental truck at $65/day. 2 people. 2 hrs per well for development.
Equipment	5.2	week	$200	$1,040	
Drilling Subcontractor / well installation					
Well installation - HSA drilling & 2-inch PVC install	1,500	feet	$36	$54,000	Labor & materials. 4.25-inch ID HSA. 10-ft 0.010-slot PVC screens included.
Well Completion with bollards	30	each	$325	$9,750	
Travel	5.2	week	$3,000	$15,600	1 rig, 3-person crew. Per diem at $200/day. 5 day/wk.
Loader/Backhoe for IDW management	5	week	1,375	$7,150	
Water usage (hydrant permit fee)	26	day	$50	$1,300	
Survey	1	each	$2,000	$2,000	
Water IDW Transport & Disposal	3,000	gallon	$2	$6,000	Assume 150 gallons per 2-inch well.
Soil IDW Transport & Disposal	0.97	each	$2,000	$1,939	20 cy rolloff. Note HSA outer diam = 8 inches.
Baseline Sample New Wells (30 wells)					
Labor, ODCs, travel	1.2	week	$9,525	$11,430	Assume sample 30 wells. 2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at $200/day. Rental truck at $65/day.
Equipment	1.2	week	$1,000	$1,200	
Lab & Data Validation	1	each	$21,858	$21,858	
Report	1	each	$25,000	$25,000	
EISB Well Installation and Injection					
Office Trailer, Storage Trailer, & Site Utilities	8	month	$610	$4,593	
Well Installation (74 wells)					Barrier 1 - 13 wells at 25-45 ft bgs & 12 wells at 35-55 ft bgs. Barrier 2 - 25 wells at 25-45 ft bgs & 24 wells at 35-55 ft bgs.
Mobilization	1	each	$10,000	$10,000	Includes sub mob/demob, utility location, construction of staging area, and clearing.
Labor	12.8	week	$9,525	$122,174	Install 1.5 wells/day. 10-hr days. 5 days/week. Per diem at $200/day. Rental truck at $65/day. 2 people. 2 hrs per well for development.
Equipment & Expendables	12.8	week	$200	$2,565	
Drilling Subcontractor / well installation					Includes mob, materials, labor, travel
Well installation - HSA drilling & 4-inch PVC install	3,690	feet	$38	$140,220	Labor and materials. 6.25-inch ID HSA.
4-inch, 20-ft PVC 0.010-slot continuous-wrap screens	74	each	$990	$73,260	
Well Completion with bollards	74	each	$325	$24,050	
Travel	12.8	week	$2,000	$25,653	1 rig, 3-person crew. Per diem at $200/day. 5 day/wk.
Loader/Backhoe for IDW management	12.8	week	1,375	$17,637	
Water usage (hydrant permit fee)	64.1	day	$50	$3,207	
Survey	1	each	$3,000	$3,000	
Water IDW Transport & Disposal	56,500	gallon	$2	$113,000	Assume 500 gallons per 4-inch well.
Water characterization - TCLP VOCs	1	each	$116	$116	
Soil IDW Transport & Disposal	4.51	each	$2,000	$9,019	20 cy rolloff. Note HSA outer diam = 11 inches.
Soil characterization - TCLP VOCs	5	each	$132	$660	1 per 20 cy.
Injection (74 wells)					
Labor, ODCs, Travel	9.3	week	$14,450	$134,613	3 people. 7 hrs injection time per day. 5 days/wk. Per diem at $200/day. 2 rental trucks at $65/day each.
Equipment	9.3	week	$700	$6,521	Trailer, generator, expendables
Injection parts and equipment	1	each	$10,000	$10,000	
Emulsified Oil material and delivery	467	drum	$1,106	$516,689	*EOS® 598B42* brand. See dosage calculation sheet for dosage per well calc. Includes material, delivery, and NY taxes.
Water usage (hydrant permit fee)	46.6	day	$50	$2,329	
Drum disposal	467	drum	$40	$18,680	
Construction Report	1	each	$30,000	$30,000	Draft and Final Construction Completion Report
SOURCE AREA - Vertical Air Sparge System Installation & Startup					48 vertical wells screened 45-50 ft bgs
Office Trailer, Storage Trailer, & Site Utilities	6	month	$610	$3,657	
Drilling/Well Installation Equipment and Subcontractor					

Table F-6a - Cost Estimate for Alternative 6 - Air Sparge, EISB, MNA, and LUCs
Southern Area Feasbility Study
NWIRP Calverton, New York

Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
Mobilization and Site Setup	1	each	$10,000	$10,000	Includes sub mob/demob, utility location, and clearing.
Labor, ODCs, travel	8.3	week	$9,525	$79,248	Install 1.5 wells/day. 10-hr days. 5 days/week. Per diem at $200/day. Rental truck at $65/day. 2 people. 2 hrs per well for development.
Equipment & Expendables	8.3	week	$200	$1,664	
Drilling Subcontractor / well installation					
Well installation - HSA drilling & 2-inch PVC install	2,400	feet	$32	$76,800	Labor & materials. 4.25-inch ID HSA. 5-ft 0.010-slot PVC screens included.
Well Completion with pads	48	each	$120	$5,760	includes miscellaneous vaults and accesses.
Travel	8.3	week	$3,000	$24,960	1 rig, 3-person crew. Per diem at $200/day. 5 day/wk.
Loader/Backhoe for IDW management	8.3	week	1,375	$11,440	
Water usage (hydrant permit fee)	41.6	day	$50	$2,080	
Water IDW Transport & Disposal	7,200	gallon	$2	$14,400	Assume 150 gallons per 2-inch well.
Water characterization - TCLP VOCs	1	each	$116	$116	
Soil IDW Transport & Disposal	1.55	each	$2,000	$3,103	20 cy rolloff. Note HSA outer diam = 8 inches.
Soil characterization - TCLP VOCs	2	each	$132	$264	1 per 20 cy.
Air Sparge System Equipment & Setup					
System Storage/Operations Building	400	sq ft	$200	$80,000	20 ft x 20 ft building.
Electricity Conveyance & Hookup	1	each	$50,000	$50,000	LIPA shares some of the cost of primary connections due to longevity of system use. LIPA provides primary swithch. Navy provides all else.
Conveyance Piping Materials					
4-inch HDPE (to system area)	400	feet	$3.50	$1,400	
2-inch HDPE (to curtains)	600	feet	$3.20	$1,920	
2-inch HDPE (along curtains)	800	feet	$3.20	$2,560	
Trenching & Installation	3.6	week	$10,025	$36,090	1,800 ft. 100 ft/day. 2 persons. Includes equipment.
Ball valve (per 5 Air Sparge wells)	10	each	$30	$300	
Misc Piping, Fittings, Materials	1	each	$15,000	$15,000	
60 HP, 3-Phase VSD Rotary Screw Combination 240-Gallon Tank & Refrigerated Dryer with Coalescing Filter	1	ea	$36,449	$36,449	Eaton Compressor & Fabrication, Inc. 10-year warranty. Includes installation.
Equipment Delivery	1	each	$1,500	$1,500	
Switchgear	1	each	$2,600	$2,600	
Instrumentation	1	each	$15,000	$15,000	
Telemetry System	1	each	$3,000	$3,000	
Post-Construction Site Survey	1	LS	$4,500	$4,500	
Air Sparge System Startup & Testing					
Labor, ODCs, travel	4	week	$9,525	$38,100	2 people.
Startup Equipment Rental	4	week	$300	$1,200	
Construction Report	1	each	$15,000	$15,000	Draft and Final Construction Completion Report
PECONIC RIVER AREA - Vertical Air Sparge System Installation & Startup					80 vertical wells screened 95-100 ft bgs
Pilot Scale Testing	1	each	$30,000	$30,000	
Office Trailer, Storage Trailer, & Site Utilities	9	month	$610	$5,394	
Drilling/Well Installation Equipment and Subcontractor					
Mobilization and Site Setup	1	each	$15,000	$15,000	Includes sub mob/demob, utility location, and clearing.
Labor, ODCs, travel	19.2	week	$9,525	$182,880	Install 1 well/day. 10-hr days. 5 days/week. Per diem at $200/day. Rental truck at $65/day. 2 people. 2 hrs per well for development.
Equipment & Expendables	19.2	week	$200	$3,840	
Drilling Subcontractor / well installation					
Well installation - HSA drilling & 2-inch PVC install	8,000	feet	$32	$256,000	Labor & materials. 4.25-inch ID HSA. 5-ft 0.010-slot PVC screens included.
Well Completion with pads	80	each	$120	$9,600	includes miscellaneous vaults and accesses.
Travel	19.2	week	$3,000	$57,600	1 rig, 3-person crew. Per diem at $200/day. 5 day/wk.
Loader/Backhoe for IDW management	19.2	week	1,375	$26,400	
Water usage (hydrant permit fee)	96.0	day	$50	$4,800	
Water IDW Transport & Disposal	12,000	gallon	$2	$24,000	Assume 150 gallons per 2-inch well.
Water characterization - TCLP VOCs	1	each	$116	$116	
Soil IDW Transport & Disposal	5.17	each	$2,000	$10,343	20 cy rolloff. Note HSA outer diam = 8 inches.
Soil characterization - TCLP VOCs	6	each	$132	$792	1 per 20 cy.
Air Sparge System Equipment & Setup					
System Storage/Operations Building	600	sq ft	$400	$240,000	20 ft x 30 ft building.
Electricity Conveyance & Hookup	1	each	$75,000	$75,000	LIPA shares some of the cost of primary connections due to longevity of system use. LIPA provides primary swithch. Navy provides all else.
Conveyance Piping Materials					
6-inch HDPE (to system area)	800	feet	$3.80	$3,040	
4-inch HDPE (to curtains)	500	feet	$3.50	$1,750	
2-inch HDPE (along curtains)	800	feet	$3.20	$2,560	
Trenching & Installation	4.2	week	$10,025	$42,105	2,100 ft. 100 ft/day. 2 persons. Includes equipment.
Jack & Bore under railroad	1	each	$50,000	$50,000	
Ball valve (per 5 Air Sparge wells)	16	each	$30	$480	
Misc Piping, Fittings, Materials	1	each	$15,000	$15,000	
60 HP, 3-Phase VSD Rotary Screw Combination 240-Gallon Tank & Refrigerated Dryer with Coalescing Filter	1	ea	$36,449	$36,449	Eaton Compressor & Fabrication, Inc. 10-year warranty. Includes installation.
Equipment Delivery	1	each	$2,500	$2,500	
Switchgear	1	each	$2,600	$2,600	
Instrumentation	1	each	$15,000	$15,000	
Telemetry System	1	each	$3,000	$3,000	
Post-Construction Site Survey	1	LS	$6,000	$6,000	
Air Sparge System Startup & Testing					
Labor, ODCs, travel	4	week	$9,525	$38,100	2 people.
Startup Equipment Rental	4	week	$300	$1,200	
Construction Report	1	each	$15,000	$15,000	Draft and Final Construction Completion Report
Subtotal				*$3,330,024*	
Contingency	*25%*			*$832,506*	
Project Management	*10%*			*$333,002*	
Remedial Design	*6%*			*$199,801*	
Construction Oversight	*10%*			*$333,002*	
G&A	*10%*			*$333,002*	
Overhead & Profit	*8%*			*$266,402*	
Total Implementation Cost				**$5,627,741**	

Table F-6a - Cost Estimate for Alternative 6 - Air Sparge, EISB, MNA, and LUCs
Southern Area Feasbility Study
NWIRP Calverton, New York

Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
FUTURE COSTS (10 years)					
LUCs (Years 1-10)					
Annual Inspections and reporting (1 per year)	10	year	$6,000	$95,250	1 inspection per year at $6,000 per inspection -- for 10 yrs. Assume contractor performs site inspections and reporting.
Subtotal			*$6,000*	*$95,250*	
Project Management	*10%*		*$600*	*$9,525*	
Subtotal			*$6,600*	*$104,775*	
LUCs Future Annual Cost			$6,600		
LUCs Total Future Cost				$104,775	
Present Value (1.3%) of Future Cost of LUCs	*10*	*year*	*1.3%*	*$61,516*	*Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).*
5-Year Reviews (Years 5 and 10)					
5-Year Review	2	each	$10,000	$20,000	5YR conducted once every 5 years. To be conducted in conjunction with other post-ROD sites at NWIRP Calverton. Years 5 and 10. Includes pre-draft, draft, draft final, final, fact sheet, and public notices.
Subtotal			*$10,000*	*$20,000*	
Contingency	*10%*		*$1,000*	*$2,000*	
Project Management	*10%*		*$1,000*	*$2,000*	
G&A	*10%*		*$1,000*	*$2,000*	
Fee	*8%*		*$800*	*$1,600*	
Subtotal			*$13,800*	*$27,600*	
5YR Total Annual Cost at Years 5 and 10			$13,800		
5YR Total Future Cost				$27,600	
Present Value (1.3%) of Future Cost of 5YRs	*10*	*year*	*1.3%*	*$25,065*	*Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).*
Well Maintenance (Year 5)					
Repair flushmounts & vaults, potential well replacements, etc.	1	event	$30,000	$30,000	Assume well repairs needed approximately every 5 years.
Subtotal			*$30,000*	*$30,000*	
Contingency	*20%*		*$6,000*	*$6,000*	
Project Management	*10%*		*$3,000*	*$3,000*	
G&A	*10%*		*$3,000*	*$3,000*	
Fee	*8%*		*$2,400*	*$2,400*	
Subtotal			*$44,400*	*$44,400*	
Well Maintenance Future Annual Cost at Year 5				$44,400	
Present Value (1.3%) of Future Cost of Well Maintenance	*5*	*year*	*1.3%*	*$41,623*	*Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).*
Well Abandonment (Year 10)					
Abandon wells when RAOs are achieved. Driller sub.	282	well	$300	$84,600	Assume well abandonment will occur at Year 10. Abandon all monitoring wells, injection wells, & air sparge wells.
Labor, ODCs, and Travel	6	week	$9,525	$57,150	Abandon 10 wells/day. 2 people. 10-hr days. 5 days/week. Per diem at $200/day. Rental truck at $65/day.
IDW Disposal	1	each	$6,000	$6,000	
Subtotal				*$147,750*	
Contingency	*20%*			*$29,550*	
Project Management	*10%*			*$14,775*	
G&A	*10%*			*$14,775*	
Fee	*8%*			*$11,820*	
Subtotal				*$218,670*	
Well Abandonment Future Annual Cost at Year 10				$218,670	
Present Value (1.3%) of Future Cost of Well Abandonment	*10*	*year*	*1.3%*	*$192,174*	*Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).*
SOURCE AREA Air Sparge System O&M (Years 1-4)					System shut down after 4 years of operation.
Weekly System Checks	208	events	$850	$176,800	labor and travel
Monthly O&M	48	events	$950	$45,600	labor and travel
Quarterly "Heavy" Maintenance	16	events	$1,600	$25,600	labor and travel
Telemetry System	4	year	$1,200	$4,800	
O&M Supplies	4	year	$2,000	$8,000	
Electrical usage (4 years)	1,276,157	kW-hr	$0.21	$267,993	Power for 4 years continual operation. Power cost assumes $0.21/kW-hr. 60 HP compressor at 460 V & 72 A. 60 HP dryer at 220 V & 15 A.
Subtotal				*$528,793*	
Contingency	*25%*			*$132,198*	
Project Management	*10%*			*$52,879*	
G&A	*10%*			*$52,879*	
Fee	*8%*			*$42,303*	
Source Area Air Sparge O&M Years 1-4 Subtotal				*$809,053*	
Source Area Air Sparge O&M Subtotal per year			*$202,263*		(Years 1-4 Subtotal / 4)
Present Value (1.78%) of Future Cost of Source Area Air Sparge O&M Years 1-4	*4*	*year*	*1.78%*	*$774,293*	
PECONIC RIVER AREA Vertical Air Sparge System O&M (Years 1-10)					System shut down after 16 years of operation.
Weekly System Checks	520	events	$850	$442,000	labor and travel
Monthly O&M Labor + Travel	120	events	$950	$114,000	labor and travel
Quarterly "Heavy" Maintenance	40	events	$1,600	$64,000	labor and travel
Telemetry System	10	year	$1,200	$12,000	
O&M Supplies	10	year	$2,000	$20,000	
Electrical usage (10 years)	4,099,680	kw/yr	$0.21	$860,933	Power for 16 years continual operation. Power cost assumes $0.21/kW-hr. 60 HP compressor at 460 V & 96 A. 60 HP dryer at 220 V & 12 A.

Table F-6a - Cost Estimate for Alternative 6 - Air Sparge, EISB, MNA, and LUCs
Southern Area Feasbility Study
NWIRP Calverton, New York

Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
Subtotal				*$1,512,933*	
Contingency	*25%*			*$378,233*	
Project Management	*10%*			*$151,293*	
G&A	*10%*			*$151,293*	
Fee	*8%*			*$121,035*	
Peconic River Area Air Sparge O&M Years 1-10 Subtotal				*$2,314,787*	
Peconic River Area Air Sparge O&M Subtotal per year			*$231,479*		(Years 1-10 Subtotal / 10)
Present Value (1.78%) of Future Cost of Source Area Air Sparge O&M Years 1-10	*10*	*year*	*1.78%*	*$2,103,416*	
Demo/Abandonment of Both Air Sparge Systems (Year 10)					Wait to remove Source Area Air Sparge system until Peconic River Area Air Sparge system is ready for shut down (assumed at Year 10). Air sparge well abandonment accounted for above with monitoring well abandonment.
Abandon Air Sparge systems when RAOs are achieved. Demo sub.	1	each	$15,000	$15,000	Demo and abandon Source Area and Peconic River Air Sparge buildings. Demo and abandon trenched conveyance piping.
Labor, ODCs, and Travel	2.0	week	$9,525	$19,050	
IDW disposal	1	each	$10,000	$10,000	
Subtotal				*$44,050*	
Contingency	*25%*			*$11,013*	
Project Management	*10%*			*$4,405*	
G&A	*10%*			*$4,405*	
Fee	*8%*			*$3,524*	
Subtotal				*$67,397*	
Present Value (1.3%) of Future Cost of Well Abandonment	*10*	*year*	*1.3%*	*$59,230*	
Re-Injection at Year 5					
Labor, ODCs, Travel	9.3	week	$14,450	$134,613	3 people. 7 hrs injection time per day. 5 days/wk. Per diem at $200/day. 2 rental trucks at $65/day each.
Equipment & Expendables	9.3	week	$700	$6,521	Trailer, generator, expendables
Injection parts and equipment	1	each	$10,000	$10,000	
Emulsified Oil material and delivery	467	drum	$1,106	$516,689	*EOS® 598B42* brand. See dosage calculation sheet for dosage per well calc. Includes material, delivery, and NY taxes.
Water usage (hydrant permit fee)	46.6	day	$50	$2,329	
Drum disposal	467	drum	$40	$18,680	
Trip Report	1	each	$10,000	$10,000	summary tech memo of injection event.
Subtotal				*$698,832*	
Contingency	*25%*			*$174,708*	
Project Management	*10%*			*$69,883*	
G&A	*10%*			*$69,883*	
Fee	*8%*			*$55,907*	
Subtotal				*$1,069,213*	
Re-Injection Future Annual Cost at Year 5				$1,069,213	
Present Value (1.3%) of Future Cost of Re-injection at Year 5			*1.3%*	*$1,002,344*	*Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).*
Performance Groundwater Monitoring (60 wells)					
Years 1 and 5 (Quarterly events)					
Labor, ODCs, travel	19.2	week	$9,525	$182,880	Assume sample 60 wells. 2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at $200/day. Rental truck at $65/day. (2.4 weeks per event).
Equipment & Expendables	19.2	week	$1,000	$19,200	
Lab & Data Validation	8	each	$30,337	$242,700	See lab & DV backup sheets
Report	8	each	$25,000	$200,000	
Subtotal				*$644,780*	
Contingency	*20%*			*$128,956*	
Project Management	*10%*			*$64,478*	
G&A	*10%*			*$64,478*	
Fee	*8%*			*$51,582*	
Subtotal				*$954,274*	
Total Future Monitoring Quarterly Cost			$119,284		(Total / 8)
Total Future Annual Monitoring Cost during each of Years 1 and 5			$477,137		(Quarterly x 4)
Monitoring Total Future Cost				$954,274	
Present Value (1.3%) of Future Cost of Groundwater Sampling Years 1 and 5			*1.3%*	*$918,311*	*Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).*
Performance Groundwater Monitoring (60 wells)					Annual sampling required by facility RCRA permit.
Years 2, 3, 4 and 6, 7, 8, 9, 10 (Annual)					
Labor, ODCs, travel	19.2	week	$9,525	$182,880	Assume sample 60 wells. 2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at $200/day. Rental truck at $65/day. (2.4 weeks per event).
Equipment & Expendables	19.2	week	$1,000	$19,200	
Lab & Data Validation	8	each	$30,337	$242,700	See lab & DV backup sheets
Report	8	each	$25,000	$200,000	
Subtotal				*$644,780*	
Contingency	*20%*			*$128,956*	
Project Management	*10%*			*$64,478*	
G&A	*10%*			*$64,478*	
Fee	*8%*			*$51,582*	
Subtotal				*$954,274*	
Total Future Monitoring Annual Cost during each of Years 2-4 and 6-10			$119,284		(Total / 8)
Total Future Monitoring Cost				$954,274	

Table F-6a - Cost Estimate for Alternative 6 - Air Sparge, EISB, MNA, and LUCs
Southern Area Feasbility Study
NWIRP Calverton, New York

Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
Present Value (1.3%) of Future Cost of Groundwater Sampling Years 2-4 and 6-10			*1.3%*	*$882,231*	*Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).*
Total Present Value of All Future Costs				**$6,060,204**	Y2011 PV calculated for 10-yrs-future-cost using Real Discount Rates detailed above per OMB (2010).
TOTAL PV Cost of Alternative 6 - Air Sparge, EISB, MNA, and LUCs			*-30%*	*+50%*	
	$11,687,945		*$8,181,561*	*$17,531,917*	

Notes:

● The "Real" Discount Rates used to calculate the Present Value costs are provided in the Office of Management and Budget (OMB) *Circular A-94, Appendix C, Revised December 2010, "Discount Rates for Cost Effectiveness, Lease Purchase, and Related Analysis" for Calendar Year 2011.* http://www.whitehouse.gov/omb/circulars_a094_a94_appx-c/.

The Real Discount Rates are a forecast of real interest rates from which the inflation premium has been removed and based on the economic assumptions from the December 2012 Budget Baseline. These real rates are to be used for discounting constant-dollar flows, as is often required in cost-effectiveness analysis.

● EPA. 1988. *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* . OSWER Directive 9355.3-01. EPA/540/G-89/004. October.

● EPA. 2000. *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study* . With the U.S. Army Corps of Engineers. OSWER 9355.0-75. EPA 540-R-00-002. July.

● The information in this cost estimate is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during Baseline Sampling and the Remedial Design phase. This is an order-of-magnitude engineering cost estimate that is expected to be within –30 to +50 percent of the actual project cost (per EPA, 1988 and 2000).

Table F-6b - Lab Backup for Alternative 6 - Air Sparge, EISB, MNA, and LUCs
Southern Area Feasbility Study
NWIRP Calverton, New York

Analysis/Test	Sample Matrix	Field Samples	Field Duplicates	Equipment Rinsate Blanks	Field Blanks	Trip Blanks	Matrix Spike	Matrix Spike Duplicate	Total Number of Solid Samples	Total Billable Solid Samples	Solid Unit Price	Solid Subtotal Cost	Total Number of Liquid Samples	Total Billable Liquid Samples	Liquid Unit Price	Liquid Subtotal Cost	Total Analytical Cost
Implementation																	
Baseline Sampling - Assume 50 existing monitoring wells for COCs and other technology-performance monitoring analyses																	
Groundwater wells																	
TCL VOCs by CLP OLM04.3	GW	50	5	10	2	10	4	4					85	85	$111.71	$9,495.35	$9,495.35
Methane, Ethane, & Ethene by RSK-175	GW	25	0	0	0	0	2	2					29	29	$105.18	$3,050.22	$3,050.22
Nitrate, Nitrite, & Sulfate by USEPA 300.0	GW	25	0	0	0	0	2	2					29	29	$50.87	$1,475.23	$1,475.23
Sulfide by USEPA 376.1	GW	25	0	0	0	0	2	2					29	29	$35.12	$1,018.48	$1,018.48
Alkalinity by USEPA 310.1	GW	25	0	0	0	0	2	2					29	29	$13.73	$398.17	$398.17
Volatile Fatty Acids (VFAs) (Acetic, Butyric, Pyruvic, Propionic, & Lactic Acid) by AM23G	GW	25	0	0	0	0	2	2					29	29	$134.90	$3,912.10	$3,912.10
TOC by SW-846 9060 Quadruplicate analysis	GW	25	0	0	0	0	2	2					29	29	$33.21	$963.09	$963.09
Dissolved Arsenic, Iron, & Manganese by SW-846 6010B	GW	25	3	0	0	0	2	2					32	32	$35.73	$1,143.36	$1,143.36
IDW - Purged groundwater and decon water																	
TCLP VOCs (1311/ 8260B)	Aqueous	1											1	1	$116.00	$116.00	$116.00
																Baseline Subtotal	**$21,572.00**
Additional Baseline -- Assume 30 new wells																	
Groundwater wells																	
TCL VOCs	GW	30	3	6	2	6	3	3					53	53	$95.00	$5,035.00	$5,035.00
Methane, Ethane, & Ethene	GW	30	0	0	0	0	2	2					34	34	$101.09	$3,437.06	$3,437.06
Nitrate, Nitrite, & Sulfate	GW	30	0	0	0	0	2	2					34	34	$48.82	$1,659.88	$1,659.88
Sulfide	GW	30	0	0	0	0	2	2					34	34	$21.91	$744.94	$744.94
Alkalinity	GW	30	0	0	0	0	2	2					34	34	$13.18	$448.12	$448.12
VFAs	GW	30	0	0	0	0	2	2					34	34	$128.57	$4,371.38	$4,371.38
TOC	GW	30	0	0	0	0	2	2					34	34	$33.21	$1,129.14	$1,129.14
Dissolved Arsenic, Iron, & Manganese	GW	30	3	0	0	0	2	2					37	37	$28.08	$1,038.96	$1,038.96
IDW - (1) Soil cuttings from new well installations;																	
TCLP VOCs	Aqueous & Solid	2							1	1	$132.00	$132.00	2	2	$116.00	$232.00	$364.00
																Additional Baseline Subtotal	**$18,228.48**
																TOTAL IMPLEMENTATION LAB COST	**$39,800.48**
Performance Monitoring - Assume sampling network consists of up to 60 monitoring wells (depending on event)																	
Years 1 & 5 - Quarterly Sampling Event (60 wells)																	
Groundwater wells																	
TCL VOCs	GW	60	6	12	3	12	5	5					103	103	$111.71	$11,506.13	$11,506.13
Methane, Ethane, & Ethene	GW	30	0	0	0	0	2	2					34	34	$105.18	$3,576.12	$3,576.12
Nitrate, Nitrite, & Sulfate	GW	30	0	0	0	0	2	2					34	34	$50.87	$1,729.58	$1,729.58
Sulfide	GW	30	0	0	0	0	2	2					34	34	$35.12	$1,194.08	$1,194.08
Alkalinity	GW	30	0	0	0	0	2	2					34	34	$13.73	$466.82	$466.82
VFAs	GW	30	0	0	0	0	2	2					34	34	$134.90	$4,586.60	$4,586.60
TOC	GW	30	0	0	0	0	2	2					34	34	$33.21	$1,129.14	$1,129.14
Dissolved Arsenic, Iron, & Manganese	GW	30	3	0	0	0	2	2					37	37	$35.73	$1,322.01	$1,322.01
IDW - Purged groundwater and decon water																	
TCLP VOCs	Aqueous	1											1	1	$116.00	$116.00	$116.00
																Subtotal per event	**$25,626.48**
																Total for Years 1+5	**$205,011.84**
Years 2-4 and 6-10 (annual) (60 wells)																	
Groundwater wells																	
TCL VOCs	GW	60	6	12	3	12	5	5					103	103	$111.71	$11,506.13	$11,506.13
Methane, Ethane, & Ethene	GW	30	0	0	0	0	2	2					34	34	$105.18	$3,576.12	$3,576.12
Nitrate, Nitrite, & Sulfate	GW	30	0	0	0	0	2	2					34	34	$50.87	$1,729.58	$1,729.58
Sulfide	GW	30	0	0	0	0	2	2					34	34	$35.12	$1,194.08	$1,194.08
Alkalinity	GW	30	0	0	0	0	2	2					34	34	$13.73	$466.82	$466.82
VFAs	GW	30	0	0	0	0	2	2					34	34	$134.90	$4,586.60	$4,586.60
TOC	GW	30	0	0	0	0	2	2					34	34	$33.21	$1,129.14	$1,129.14
Dissolved Arsenic, Iron, & Manganese	GW	30	3	0	0	0	2	2					37	37	$35.73	$1,322.01	$1,322.01
IDW - Purged groundwater and decon water																	
TCLP VOCs	Aqueous	1											1	1	$116.00	$116.00	$116.00
																Subtotal per event	**$25,626.48**
																Total for Years 2-4 + 6-10	**$205,011.84**
																TOTAL FUTURE LAB COST	**$410,023.68**

Full QA/QC for OU14 COCs only. Also+duplicates for metals. MS/MSDs are billable Standard turnaround time

Table F-6c - Data Validation Backup for Alternative 6 - Air Sparge, EISB, MNA, and LUCs
Southern Area Feasbility Study
NWIRP Calverton, New York

Analysis/Test	Sample Matrix	Field Samples	Field Duplicates	Equipment Rinsate Blanks	Field Blanks	Trip Blanks	Matrix Spike	Matrix Spike Duplicate	Total Number of Solid Samples	Total Billable Solid Samples	Solid Unit Price	Solid Subtotal Cost	Total Number of Liquid Samples	Total Billable Liquid Samples	Liquid Unit Price	Liquid Subtotal Cost	Total Analytical Cost
Implementation																	
Baseline Sampling - Assume 50 existing monitoring wells for COCs and other technology-performance monitoring analyses																	
Groundwater wells																	
TCL VOCs by CLP OLM04.3	GW	50	5	10	2	10	4	4					85	85	$21.63	$1,838.55	$1,838.55
Methane, Ethane, & Ethene by RSK-175	GW	25	0	0	0	0	2	2					29	29	$15.14	$439.06	$439.06
Nitrate, Nitrite, & Sulfate by USEPA 300.0	GW	25	0	0	0	0	2	2					29	29	$16.22	$470.38	$470.38
Sulfide by USEPA 376.1	GW	25	0	0	0	0	2	2					29	29	$5.41	$156.89	$156.89
Alkalinity by USEPA 310.1	GW	25	0	0	0	0	2	2					29	29	$5.41	$156.89	$156.89
Volatile Fatty Acids (VFAs) (Acetic, Butyric, Pyruvic, Propionic, & Lactic Acid) by AM23G	GW	25	0	0	0	0	2	2					29	29	$15.14	$439.06	$439.06
TOC by SW-846 9060 Quadruplicate analysis	GW	25	0	0	0	0	2	2					29	29	$8.65	$250.85	$250.85
Dissolved Arsenic, Iron, & Manganese by SW-846 6010B	GW	25	3	0	0	0	2	2					32	32	$6.49	$207.68	$207.68
																Baseline Subtotal	**$3,959.36**
Additional Baseline -- Assume 30 new wells																	
Groundwater wells																	
TCL VOCs	GW	30	3	6	2	6	3	3					53	53	$21.63	$1,146.39	$1,146.39
Methane, Ethane, & Ethene	GW	30	0	0	0	0	2	2					34	34	$15.14	$514.76	$514.76
Nitrate, Nitrite, & Sulfate	GW	30	0	0	0	0	2	2					34	34	$16.22	$551.48	$551.48
Sulfide	GW	30	0	0	0	0	2	2					34	34	$5.41	$183.94	$183.94
Alkalinity	GW	30	0	0	0	0	2	2					34	34	$5.41	$183.94	$183.94
VFAs	GW	30	0	0	0	0	2	2					34	34	$15.14	$514.76	$514.76
TOC	GW	30	0	0	0	0	2	2					34	34	$8.65	$294.10	$294.10
Dissolved Arsenic, Iron, & Manganese	GW	30	3	0	0	0	2	2					37	37	$6.49	$240.13	$240.13
																Additional Baseline Subtotal	**$3,629.50**
																TOTAL IMPLEMENTATION DV COST	**$7,588.86**
Performance Monitoring - Assume sampling network consists of up to 60 monitoring wells (depending on event)																	
Years 1 & 5 - Quarterly Sampling Event (60 wells)																	
Groundwater wells																	
TCL VOCs	GW	60	6	12	3	12	5	5					103	103	$21.63	$2,227.89	$2,227.89
Methane, Ethane, & Ethene	GW	30	0	0	0	0	2	2					34	34	$15.14	$514.76	$514.76
Nitrate, Nitrite, & Sulfate	GW	30	0	0	0	0	2	2					34	34	$16.22	$551.48	$551.48
Sulfide	GW	30	0	0	0	0	2	2					34	34	$5.41	$183.94	$183.94
Alkalinity	GW	30	0	0	0	0	2	2					34	34	$5.41	$183.94	$183.94
VFAs	GW	30	0	0	0	0	2	2					34	34	$15.14	$514.76	$514.76
TOC	GW	30	0	0	0	0	2	2					34	34	$8.65	$294.10	$294.10
Dissolved Arsenic, Iron, & Manganese	GW	30	3	0	0	0	2	2					37	37	$6.49	$240.13	$240.13
																Subtotal per event	**$4,711.00**
																Total for Years 1+5	**$37,688.00**
Years 2-4 and 6-10 (annual) (60 wells)																	
Groundwater wells																	
TCL VOCs	GW	60	6	12	3	12	5	5					103	103	$21.63	$2,227.89	$2,227.89
Methane, Ethane, & Ethene	GW	30	0	0	0	0	2	2					34	34	$15.14	$514.76	$514.76
Nitrate, Nitrite, & Sulfate	GW	30	0	0	0	0	2	2					34	34	$16.22	$551.48	$551.48
Sulfide	GW	30	0	0	0	0	2	2					34	34	$5.41	$183.94	$183.94
Alkalinity	GW	30	0	0	0	0	2	2					34	34	$5.41	$183.94	$183.94
VFAs	GW	30	0	0	0	0	2	2					34	34	$15.14	$514.76	$514.76
TOC	GW	30	0	0	0	0	2	2					34	34	$8.65	$294.10	$294.10
Dissolved Arsenic, Iron, & Manganese	GW	30	3	0	0	0	2	2					37	37	$6.49	$240.13	$240.13
																Subtotal per event	**$4,711.00**
																Total for Years 2-4 + 6-10	**$42,399.00**
																TOTAL FUTURE DV COST	**$80,087.00**

Table F-7a - Cost Estimate for Alternative 7 - Extraction, Treatment, Disposal, MNA, and LUCs
Southern Area Feasibility Study
NWIRP Calverton, New York

Assumptions:

LUC RD prepared by contractor. 5YR performed with other NWIRP Calverton sites. Annual inspections performed by contractor. Well maintenance required every 5yrs.
Baseline sampling of 50 wells for COCs and geochemical and biodegradation-related analyses.
Following review of baseline data, install 10 new monitoring wells. Sample these for additional baseline data (COCs and geochem/biodeg analyses).
Performance monitoring: 50 wells. Quarterly during Year 1, and then annually through Year 16.
Extraction wells at (1) Fenceline Area and (2) Peconic River Area
(1) Fenceline Area - 1 4-inch steel extraction well screened 25-45 ft bgs. Extraction at 95 gpm.
(2) Peconic River Area - 2 4-inch steel extraction wells screened 30-90 ft bgs. Extraction at 100 gpm each.

Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
IMPLEMENTATION COST					
LUCs					
LUC Remedial Design and implementation into Navy's *LUC Tracker* .	1	each	$8,000	$8,000	Includes Draft and Final LUC Plans. Assume contractor prepares LUC RD.
UFP-SAP & Remedial Action Work Plan					
Work Plan for additional sampling, well installation, sparge operation, and groundwater performance monitoring (in Navy's UFP-SAP format).	1	each	$50,000	$50,000	Pre-Draft, Draft, Draft Final, & Final. Includes Scoping sessions. Recent similar project.
Baseline Sampling (50 existing Wells)					
Labor, ODCs, travel	2.0	week	$9,525	$19,050	Assume sample 50 wells. 2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at $200/day. Rental truck at $65/day.
Equipment & Expendables	2.0	week	$1,000	$2,000	
Lab & Data Validation	1	each	$25,531	$25,531	See lab & DV backup sheets
Report	1	each	$25,000	$25,000	
New Well Installation (10 new wells)					5 wells at 40-50 ft bgs and 5 wells at 60-70 ft bgs.
Mobilization & Site Setup	1	each	$10,000	$10,000	Includes sub mob/demob, utility location, and clearing.
Labor, ODCs, travel	1.7	week	$9,525	$16,510	Install 1.5 wells/day. 10-hr days. 5 days/week. Per diem at $200/day. Rental truck at $65/day. 2 people. 2 hrs per well for well development.
Equipment & Expendables	1.7	week	$200	$347	
Drilling Subcontractor / well installation					
Well installation - HSA drilling & 2-inch PVC install	600	feet	$36	$21,600	Labor & materials. 4.25-inch ID HSA. 10-ft 0.010-slot PVC screens included.
Well Completion with bollards	10	each	$325	$3,250	
Travel	1.7	week	$3,000	$5,200	1 rig, 3-person crew. Per diem at $200/day. 5 day/wk.
Loader/Backhoe for IDW management	1.7	week	1,375	$2,383	
Water usage (hydrant permit fee)	8.7	day	$50	$433	
Survey	1	each	$2,000	$2,000	
Water IDW Transport & Disposal	1,500	gallon	$2	$3,000	Assume 150 gallons per 2-inch well.
Soil IDW Transport & Disposal	0.39	each	$2,000	$776	20 cy rolloff. Note HSA outer diam = 8 inches.
Baseline Sample New Wells (10 wells)					
Labor, ODCs, travel	0.4	week	$9,525	$3,810	Assume sample 25 wells. 2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at $200/day. Rental truck at $65/day.
Equipment & Expendables	0.4	week	$1,000	$400	
Lab & Data Validation	1	each	$7,866	$7,866	
Report	1	each	$25,000	$25,000	
Extraction & Treatment System Installation & Startup					3 vertical extraction wells - 1 screened 25-45 ft bgs and 2 screened 30-90 ft bgs.
Drilling/Well Installation Equipment and Subcontractor					
Mobilization and Site Setup	1	each	$5,000	$5,000	Includes sub mob/demob, utility location, and clearing.
Labor, ODCs, travel	1.8	week	$7,500	$13,500	Assume install 3 wells. 3 days per well. 10-hr days. 5 days/week. Per diem at $200/day. Rental truck at $65/day. 2 people.
Equipment & Expendables	1.8	week	$200	$360	
Drilling Subcontractor / well installation					
12-inch Mud Rotary drilling	225	feet	$48	$10,800	Labor & materials. 12-inch mud rotary drilling.
8-inch carbon steel riser installed	85	feet	$48	$4,080	
8-inch stainless steel 10-ft screen	14	each	$1,650	$23,100	
Well Completion pads with bollards	3	each	$575	$1,725	
Travel	1.8	week	$3,000	$5,400	1 rig, 3-person crew. Per diem at $200/day. 5 day/wk.
Loader/Backhoe for IDW management	1.8	week	1,375	$2,475	
Water usage (hydrant permit fee)	9.0	day	$50	$450	
Water IDW Transport & Disposal	3,000	gallon	$2	$6,000	Assume 1000 gallons per well.
Water characterization - TCLP VOCs	1	each	$116	$116	
Soil IDW Transport & Disposal	0.27	each	$2,000	$550	20 cy rolloff. Note HSA outer diam = 11 inches.
Soil characterization - TCLP VOCs	1	each	$132	$132	1 per 20 cy.
Submersible Centrifugal Pump & Installation	3	ea	$5,000	$15,000	100 gpm, 100 ft head, 54 HP
Equipment Delivery	1	each	$500	$500	
Extraction System Equipment & Setup					
Mobilization and Site Setup	1	each	$30,000	$30,000	Includes sub mob/demob, utility location, and clearing.
System Storage/Operations Building	3,000	sq ft	$400	$1,200,000	50 ft x 60 ft building.
Electricity Conveyance & Hookup	1	each	$75,000	$75,000	LIPA shares some of the cost of primary connections due to longevity of system use. LIPA provides primary swithch. Navy provides all else.
Conveyance Piping					
Fencline Extraction Well - 4-inch HDPE	1,300	feet	$3.50	$4,550	
River Area Extraction Wells (2) - 4-inch HDPE	4,000	feet	$3.50	$14,000	
Trenching & Installation	5.3	week	$10,025	$53,133	5,300 ft. 200 ft/day. 2 persons. Includes equipment.
Misc Piping, Fittings, Materials	1	each	$15,000	$15,000	
Discharge Beds & Piping					
6-inch Holed PVC	5,000	feet	$13.00	$65,000	
Trenching & Installation	5.0	week	$10,025	$50,125	5,000 ft. 200 ft/day. 2 persons. Includes equipment.
Geotextile for Infiltration Beds	1,200	sy	$2.00	$2,400	includes labor
Gravel layer, 2 beds, each 500 ft long, 6 inches x 1 ft	150	cy	$34.19	$5,129	includes equipment and labor.
Re-vegetation	1	each	$6,000.00	$6,000	
Treatment Plant					
Equalization Tank - 15-ft diam, 20 ft high (20,0000 gal)	1	each	$41,585.40	$41,585	materials, installation, and equipment
Top mounted low-speed turbine-type mixer (2 hp)	1	each	$55,250.00	$55,250	materials, installation, and equipment
Horizontal-Centrifugal Pump, 300 gpm, 10 hp, 100 ft head	2	each	$7,205.50	$14,411	materials, installation, and equipment

Table F-7a - Cost Estimate for Alternative 7 - Extraction, Treatment, Disposal, MNA, and LUCs
Southern Area Feasibility Study
NWIRP Calverton, New York

Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
Clairfier Tank, 30-ft diam (80,000 gal)	1	each	$332,193.94	$332,194	materials, installation, and equipment
Bag filter, multi-bag (242 sq ft total)	4	each	$12,410.00	$49,640	materials, installation, and equipment
Air Stripper, 2,400 cfm blower & control panel (300 gpm)	1	each	$84,000.00	$84,000	materials, installation, and equipment
Caustic Feed System	1	each	$21,640.00	$21,640	materials, installation, and equipment
Air Feed Feed System	1	each	$15,000.00	$15,000	materials, installation, and equipment
Sludge Holding Tank (20,000 gal)	1	each	$60,000.00	$60,000	materials, installation, and equipment
Filter Press (20 cubic ft)	1	each	$120,000.00	$120,000	materials, installation, and equipment
Switchgear	1	each	$2,600.00	$2,600	materials, installation, and equipment
Heat Tracing	200	feet	$17.00	$3,400	materials, installation, and equipment
Plumb/electrical systems	1	each	$19,056.00	$19,056	materials, installation, and equipment
Post-Construction Site Survey	1	LS	$6,000	$6,000	
System Startup & Testing					
Labor, ODCs, travel	4	week	$9,525	$38,100	2 people.
Construction Report	1	each	$30,000	$30,000	Draft and Final Construction Completion Report
Subtotal				*$2,734,556*	
Contingency	*25%*			*$683,639*	
Project Management	*10%*			*$273,456*	
Construction Oversight	*10%*			*$273,456*	
Remedial Design	*10%*			*$273,456*	
G&A	*10%*			*$273,456*	
Fee	*8%*			*$218,765*	
			Total Implementation Cost	**$4,730,783**	
FUTURE COSTS (16 years)					
LUCs (Years 1-16)					
Annual Inspections and reporting (1 per year)	16	year	$6,000	$152,400	1 inspection per year at $6,000 per inspection -- for 16 yrs. Assume contractor performs site inspections and reporting.
Subtotal			*$6,000*	*$152,400*	
Project Management	*10%*		*$600*	*$15,240*	
Subtotal			*$6,600*	*$167,640*	
LUCs Future Annual Cost			$6,600		
LUCs Total Future Cost				$167,640	
Present Value (1.78%) of Future Cost of LUCs	*16*	*year*	*1.78%*	*$91,194*	*Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).*
5-Year Reviews (Years 5, 10, and 15)					
5-Year Review	3	each	$10,000	$41,400	5YR conducted once every 5 years. To be conducted in conjunction with other post-ROD sites at MCAS Cherry Point. Years, 5, 10… and 40. Includes pre-draft, draft, draft final, final, fact sheet, and public notices.
Subtotal			*$10,000*	*$41,400*	
Contingency	*10%*		*$1,000*	*$4,140*	
Project Management	*10%*		*$1,000*	*$4,140*	
G&A	*10%*		*$1,000*	*$4,140*	
Fee	*8%*		*$800*	*$3,312*	
Subtotal			*$13,800*	*$57,132*	
5YR Total Annual Cost at Years 5, 10, and 15			$13,800		
5YR Total Future Cost				$57,132	
Present Value (1.78%) of Future Cost of 5YRs	*15*	*year*	*1.78%*	*$34,794*	
Well Maintenance (Years 5, 10, and 15)					
Repair flushmounts & vaults, potential well replacements, etc.	3	event	$15,000	$45,000	Assume well repairs needed approximately every 5 years.
Subtotal			*$15,000*	*$45,000*	
Contingency	*20%*		*$3,000*	*$9,000*	
Project Management	*10%*		*$1,500*	*$4,500*	
G&A	*10%*		*$1,500*	*$4,500*	
Fee	*8%*		*$1,200*	*$3,600*	
Subtotal			*$22,200*	*$66,600*	
Well Maintenance Future Annual Cost at Years 5, 10, and 15			$22,200		
Well Maintenance Total Future Cost				$66,600	
Present Value (1.78%) of Future Cost of Well Maintenance	*15*	*year*	*1.78%*	*$55,973*	
Well Abandonment (Year 16)					
Abandon wells when RAOs are achieved. Driller sub.	83	well	$300	$24,900	Assume well abandonment will occur at Year 16. Abandon all monitoring wells, injection wells, & air sparge wells.
Labor, ODCs, and Travel	2	week	$9,525	$19,050	Abandon 10 wells/day. 2 people. 10-hr days. 5 days/week. Per diem at $200/day. Rental truck at $65/day.
IDW Disposal	1	each	$6,000	$6,000	
Subtotal				*$49,950*	
Contingency	*20%*			*$9,990*	
Project Management	*10%*			*$4,995*	
G&A	*10%*			*$4,995*	
Fee	*8%*			*$3,996*	
Subtotal				*$73,926*	
Present Value (1.78%) of Future Cost of Well Abandonment	*16*	*year*	*1.78%*	*$55,744*	
Extraction System O&M (Years 1-16)					

Table F-7a - Cost Estimate for Alternative 7 - Extraction, Treatment, Disposal, MNA, and LUCs
Southern Area Feasibility Study
NWIRP Calverton, New York

Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
Electrical usage	7,100,506	kW-hr	$0.21	$1,491,106	Power for 16 years continual operation. Power cost assumes $0.21/kW-hr. 3 5-hp extraction pumps; 2 hp turbine mixer; 10 hp horizontal-centrifugal pump; 30 hp blower; 10 hp clarifier; 1 hp for air feed system.
Maintenance	16	each	$125,120	$2,001,920	5% of installation cost
Caustic Soda	1,152	drum	$2,000	$2,304,000	26 tons per yr @ 700 lbs per drum = 74 drums/yr
Influent & Exfluent Sampling					Once per month. VOCs only. 30% QA/QC
Labor, ODCs, & Travel	192	day	$800	$153,600	
Equipment & Expendables	192	day	$100	$19,200	
VOC Samples (3 extraction wells and 1 effluent)	1,248	sample	$112	$139,776	
Sludge Handling					
Disposal	1,216	ton	$200	$243,200	Assume 76 ton/yr
Labor, ODCs, & Travel	832	week	$4,225	$3,515,200	40 hrs per wk
O&M Report	192	each	$3,000	$576,000	
Subtotal				*$10,444,002*	
Contingency	*25%*			*$2,611,001*	
Project Management	*10%*			*$1,044,400*	
G&A	*10%*			*$1,044,400*	
Fee	*8%*			*$835,520*	
Extraction System O&M Year 1-16 Subtotal				*$15,979,324*	
O&M per year			*$998,708*		*(Years 1-16 Subotal / 16)*
Present Value (1.78%) of Future Cost of Extraction&Treatment O&M Years 1-16	*16*	*year*	*1.78%*	*$13,799,491*	
Demo/Abandonment of Extraction System (Year 16)					
Abandon Extraction system when RAOs are achieved. Demo sub.	1	each	$25,000	$25,000	Demo and abandon extraction & treatment system building. Demo and abandon trenched conveyance and discharge piping.
Labor, ODCs, and Travel	2.0	week	$9,525	$19,050	
IDW disposal	1	each	$10,000	$10,000	
Subtotal				*$54,050*	
Contingency	*20%*			*$9,990*	
Project Management	*10%*			*$4,995*	
G&A	*10%*			*$4,995*	
Fee	*8%*			*$3,996*	
Subtotal				*$78,026*	
Present Value (1.78%) of Future Cost of Well Abandonment	*16*	*year*	*1.78%*	*$58,836*	
Performance Groundwater Monitoring (50 wells)					
Year 1 (Quarterly events)					
Labor, ODCs, travel	8.0	week	$9,525	$76,200	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at $200/day. Rental truck at $65/day.
Equipment & Expendables	8.0	week	$1,000	$8,000	
Lab & Data Validation	4	each	$25,531	$102,125	See lab & DV backup sheets
Report	4	each	$8,000	$32,000	
Subtotal				*$218,325*	
Contingency	*20%*			*$43,665*	
Project Management	*10%*			*$21,833*	
G&A	*10%*			*$21,833*	
Fee	*8%*			*$17,466*	
Total Future Groundwater Sampling Cost Year 1				*$323,122*	
Total per quarterly event			*$80,780*		(Year 1 Subtotal / 4)
Present Value (1.78%) of Future Cost of Groundwater Sampling Year 1	*1*	*year*	*1.78%*	*$317,471*	
Years 2-16 (annual) (50 wells)					
Labor, ODCs, travel	30.0	week	$9,525	$285,750	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at $200/day. Rental truck at $65/day.
Equipment & Expendables	30.0	week	$1,000	$30,000	
Lab & Data Validation	15	each	$25,531	$382,970	See lab & DV backup sheets
Report	15	each	$8,000	$120,000	
Subtotal				*$818,720*	
Contingency	*20%*			*$163,744*	
Project Management	*10%*			*$81,872*	
G&A	*10%*			*$81,872*	
Fee	*8%*			*$65,498*	
Total Future Groundwater Sampling Cost Years 2-16				*$1,211,706*	
Total per year			*$80,780*		(Total / 15)
Present Value (1.78%) of Future Cost of Groundwater Sampling Years 2-16			*1.78%*	*$1,036,803*	
Total Present Value of All Future Costs				**$15,450,305**	Y2011 PV calculated for 16-yrs-future-cost using Real Discount Rates detailed above per OMB (2010).
TOTAL PV Cost of Alternative 4 - Air Sparge, MNA, and LUCs			*-30%*	*+50%*	
	$20,181,088		*$14,126,761*	*$30,271,632*	

Notes:

● The "Real" Discount Rates used to calculate the Present Value costs are provided in the Office of Management and Budget (OMB) *Circular A-94, Appendix C, Revised December 2010, "Discount Rates for Cost Effectiveness, Lease Purchase, and Related Analysis" for Calendar Year 2011.* http://www.whitehouse.gov/omb/circulars_a094_a94_appx-c/.

The Real Discount Rates are a forecast of real interest rates from which the inflation premium has been removed and based on the economic assumptions from the December 2012 Budget Baseline. These real rates are to be used for discounting constant-dollar flows, as is often required in cost-effectiveness analysis.

● EPA. 1988. *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* . OSWER Directive 9355.3-01. EPA/540/G-89/004. October.

Table F-7a - Cost Estimate for Alternative 7 - Extraction, Treatment, Disposal, MNA, and LUCs
Southern Area Feasibility Study
NWIRP Calverton, New York

Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments

● EPA. 2000. *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study* . With the U.S. Army Corps of Engineers. OSWER 9355.0-75. EPA 540-R-00-002. July.

● The information in this cost estimate is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during Baseline Sampling and the Remedial Design phase. This is an order-of-magnitude engineering cost estimate that is expected to be within –30 to +50 percent of the actual project cost (per EPA, 1988 and 2000).

Table F-7b - Lab Backup for Alternative 7 - Extraction, Treatment, Disposal, MNA, and LUCs
Southern Area Feasibility Study
NWIRP Calverton, New York

Analysis/Test	Sample Matrix	Field Samples	Field Duplicates	Equipment Rinsate Blanks	Field Blanks	Trip Blanks	Matrix Spike	Matrix Spike Duplicate	Total Number of Solid Samples	Total Billable Solid Samples	Solid Unit Price	Solid Subtotal Cost	Total Number of Liquid Samples	Total Billable Liquid Samples	Liquid Unit Price	Liquid Subtotal Cost	Total Analytical Cost
Implementation																	
Baseline Sampling - Assume 50 existing monitoring wells for COCs and other technology-performance monitoring analyses																	
Groundwater wells																	
TCL VOCs by CLP OLM04.3	GW	50	5	10	2	10	4	4					85	85	$111.71	$9,495.35	$9,495.35
Methane, Ethane, & Ethene by RSK-175	GW	25	0	0	0	0	2	2					29	29	$105.18	$3,050.22	$3,050.22
Nitrate, Nitrite, & Sulfate by USEPA 300.0	GW	25	0	0	0	0	2	2					29	29	$50.87	$1,475.23	$1,475.23
Sulfide by USEPA 376.1	GW	25	0	0	0	0	2	2					29	29	$35.12	$1,018.48	$1,018.48
Alkalinity by USEPA 310.1	GW	25	0	0	0	0	2	2					29	29	$13.73	$398.17	$398.17
Volatile Fatty Acids (VFAs) (Acetic, Butyric, Pyruvic, Propionic, & Lactic Acid) by AM23G	GW	25	0	0	0	0	2	2					29	29	$134.90	$3,912.10	$3,912.10
TOC by SW-846 9060 Quadruplicate analysis	GW	25	0	0	0	0	2	2					29	29	$33.21	$963.09	$963.09
Dissolved Arsenic, Iron, & Manganese by SW-846 6010B	GW	25	3	0	0	0	2	2					32	32	$35.73	$1,143.36	$1,143.36
IDW - Purged groundwater and decon water														0			
TCLP VOCs (1311/ 8260B)	Aqueous	1											1	1	$116.00	$116.00	$116.00
																Baseline Subtotal	**$21,572.00**
Additional Baseline -- Assume 10 new wells																	
Groundwater wells																	
TCL VOCs	GW	10	1	2	1	2	1	1					18	18	$95.00	$1,710.00	$1,710.00
Methane, Ethane, & Ethene	GW	10	0	0	0	0	1	1					12	12	$101.09	$1,213.08	$1,213.08
Nitrate, Nitrite, & Sulfate	GW	10	0	0	0	0	1	1					12	12	$48.82	$585.84	$585.84
Sulfide	GW	10	0	0	0	0	1	1					12	12	$21.91	$262.92	$262.92
Alkalinity	GW	10	0	0	0	0	1	1					12	12	$13.18	$158.16	$158.16
VFAs	GW	10	0	0	0	0	1	1					12	12	$128.57	$1,542.84	$1,542.84
TOC	GW	10	0	0	0	0	1	1					12	12	$33.21	$398.52	$398.52
Dissolved Arsenic, Iron, & Manganese	GW	10	1	0	0	0	1	1					13	13	$28.08	$365.04	$365.04
IDW - (1) Soil cuttings from new well installations; (2) Drilling decon water and well development water; and (3) Purged groundwater and decon water. Soil IDW sample rate is 1 sample per 200 cubic yards if soil.																	
TCLP VOCs	Aqueous & Solid	2							1	1	$132.00	$132.00	2	2	$116.00	$232.00	$364.00
																Additional Baseline Subtotal	**$6,600.40**
																TOTAL IMPLEMENTATION LAB COST	**$28,172.40**
Performance Monitoring - Assume sampling network consists of up to 50 monitoring wells (depending on event)																	
Year 1 - Quarterly Sampling Event																	
Groundwater wells																	
TCL VOCs	GW	50	5	10	2	10	4	4					85	85	$111.71	$9,495.35	$9,495.35
Methane, Ethane, & Ethene	GW	25	0	0	0	0	2	2					29	29	$105.18	$3,050.22	$3,050.22
Nitrate, Nitrite, & Sulfate	GW	25	0	0	0	0	2	2					29	29	$50.87	$1,475.23	$1,475.23
Sulfide	GW	25	0	0	0	0	2	2					29	29	$35.12	$1,018.48	$1,018.48
Alkalinity	GW	25	0	0	0	0	2	2					29	29	$13.73	$398.17	$398.17
VFAs	GW	25	0	0	0	0	2	2					29	29	$134.90	$3,912.10	$3,912.10
TOC	GW	25	0	0	0	0	2	2					29	29	$33.21	$963.09	$963.09
Dissolved Arsenic, Iron, & Manganese	GW	25	3	0	0	0	2	2					32	32	$35.73	$1,143.36	$1,143.36
IDW - Purged groundwater and decon water																	
TCLP VOCs	Aqueous	1											1	1	$116.00	$116.00	$116.00
																Subtotal per event	**$21,572.00**
																Total for Year 1	**$86,288.00**
Years 2-16 (annual)																	
Groundwater wells																	
TCL VOCs	GW	50	5	10	2	10	4	4					85	85	$111.71	$9,495.35	$9,495.35
Methane, Ethane, Ethene	GW	25	0	0	0	0	2	2					29	29	$105.18	$3,050.22	$3,050.22
Nitrate, Nitrite, Sulfate	GW	25	0	0	0	0	2	2					29	29	$50.87	$1,475.23	$1,475.23
Sulfide	GW	25	0	0	0	0	2	2					29	29	$35.12	$1,018.48	$1,018.48
Alkalinity	GW	25	0	0	0	0	2	2					29	29	$13.73	$398.17	$398.17
VFAs	GW	25	0	0	0	0	2	2					29	29	$134.90	$3,912.10	$3,912.10
TOC	GW	25	0	0	0	0	2	2					29	29	$33.21	$963.09	$963.09
Dissolved Iron and Manganese	GW	25	3	0	0	0	2	2					32	32	$35.73	$1,143.36	$1,143.36
IDW - Purged groundwater and decon water																	
TCLP VOCs	Aqueous	1											1	1	$116.00	$116.00	$116.00
																Subtotal per event	**$21,572.00**
																Total for Years 2-16	**$323,580.00**
																TOTAL FUTURE LAB COST	**$409,868.00**

Full QA/QC for OU14 COCs only. Also, duplicates for metals. MS/MSDs are billable Standard turnaround time

Table F-7c - Data Validation Backup for Alternative 7 - Extraction, Treatment, Disposal, MNA, and LUCs
Southern Area Feasibility Study
NWIRP Calverton, New York

Analysis/Test	Sample Matrix	Field Samples	Field Duplicates	Equipment Rinsate Blanks	Field Blanks	Trip Blanks	Matrix Spike	Matrix Spike Duplicate	Total Number of Solid Samples	Total Billable Solid Samples	Solid Unit Price	Solid Subtotal Cost	Total Number of Liquid Samples	Total Billable Liquid Samples	Liquid Unit Price	Liquid Subtotal Cost	Total Analytical Cost
Implementation																	
Baseline Sampling - Assume 50 existing monitoring wells for COCs and other technology-performance monitoring analyses																	
Groundwater wells																	
TCL VOCs by CLP OLM04.3	GW	50	5	10	2	10	4	4					85	85	$21.63	$1,838.55	$1,838.55
Methane, Ethane, & Ethene by RSK-175	GW	25	0	0	0	0	2	2					29	29	$15.14	$439.06	$439.06
Nitrate, Nitrite, & Sulfate by USEPA 300.0	GW	25	0	0	0	0	2	2					29	29	$16.22	$470.38	$470.38
Sulfide by USEPA 376.1	GW	25	0	0	0	0	2	2					29	29	$5.41	$156.89	$156.89
Alkalinity by USEPA 310.1	GW	25	0	0	0	0	2	2					29	29	$5.41	$156.89	$156.89
Volatile Fatty Acids (VFAs) (Acetic, Butyric, Pyruvic, Propionic, & Lactic Acid) by AM23G	GW	25	0	0	0	0	2	2					29	29	$15.14	$439.06	$439.06
TOC by SW-846 9060 Quadruplicate analysis	GW	25	0	0	0	0	2	2					29	29	$8.65	$250.85	$250.85
Dissolved Arsenic, Iron, & Manganese by SW-846 6010B	GW	25	3	0	0	0	2	2					32	32	$6.49	$207.68	$207.68
																Baseline Subtotal	**$3,959.36**
Additional Baseline -- Assume 10 new wells																	
Groundwater wells																	
TCL VOCs	GW	10	1	2	1	2	1	1					18	18	$21.63	$389.34	$389.34
Methane, Ethane, Ethene	GW	10	0	0	0	0	1	1					12	12	$15.14	$181.68	$181.68
Nitrate, Nitrite, Sulfate	GW	10	0	0	0	0	1	1					12	12	$16.22	$194.64	$194.64
Sulfide	GW	10	0	0	0	0	1	1					12	12	$5.41	$64.92	$64.92
Alkalinity	GW	10	0	0	0	0	1	1					12	12	$5.41	$64.92	$64.92
VFAs	GW	10	0	0	0	0	1	1					12	12	$15.14	$181.68	$181.68
TOC	GW	10	0	0	0	0	1	1					12	12	$8.65	$103.80	$103.80
Dissolved Iron and Manganese	GW	10	1	0	0	0	1	1					13	13	$6.49	$84.37	$84.37
																Additional Baseline Subtotal	**$1,265.35**
																TOTAL IMPLEMENTATION DV COST	**$5,224.71**
Performance Monitoring - Assume sampling network consists of up to 50 monitoring wells (depending on event)																	
Year 1 - Quarterly Sampling Event																	
Groundwater wells																	
TCL VOCs	GW	50	5	10	2	10	4	4					85	85	$21.63	$1,838.55	$1,838.55
Methane, Ethane, & Ethene	GW	25	0	0	0	0	2	2					29	29	$15.14	$439.06	$439.06
Nitrate, Nitrite, & Sulfate	GW	25	0	0	0	0	2	2					29	29	$16.22	$470.38	$470.38
Sulfide	GW	25	0	0	0	0	2	2					29	29	$5.41	$156.89	$156.89
Alkalinity	GW	25	0	0	0	0	2	2					29	29	$5.41	$156.89	$156.89
VFAs	GW	25	0	0	0	0	2	2					29	29	$15.14	$439.06	$439.06
TOC	GW	25	0	0	0	0	2	2					29	29	$8.65	$250.85	$250.85
Dissolved Arsenic, Iron, & Manganese	GW	25	3	0	0	0	2	2					32	32	$6.49	$207.68	$207.68
																Subtotal per event	**$3,959.36**
																Total for Year 1	**$15,837.44**
Years 2-16 (annual)																	
Groundwater wells																	
TCL VOCs	GW	50	5	10	2	10	4	4					85	85	$21.63	$1,838.55	$1,838.55
Methane, Ethane, Ethene	GW	25	0	0	0	0	2	2					29	29	$15.14	$439.06	$439.06
Nitrate, Nitrite, Sulfate	GW	25	0	0	0	0	2	2					29	29	$16.22	$470.38	$470.38
Sulfide	GW	25	0	0	0	0	2	2					29	29	$5.41	$156.89	$156.89
Alkalinity	GW	25	0	0	0	0	2	2					29	29	$5.41	$156.89	$156.89
VFAs	GW	25	0	0	0	0	2	2					29	29	$15.14	$439.06	$439.06
TOC	GW	25	0	0	0	0	2	2					29	29	$8.65	$250.85	$250.85
Dissolved Iron and Manganese	GW	25	3	0	0	0	2	2					32	32	$6.49	$207.68	$207.68
																Subtotal per event	**$3,959.36**
																Total for Years 2-16	**$59,390.40**
																TOTAL FUTURE DV COST	**$75,227.84**

APPENDIX G

LIFECYCLE ANALYSIS

INPUT SUMMARY

Alternative 2: LUCs

Remedial Investigation Phase				
Transportation-Personnel				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
Land Use Controls	Light truck	300	miles	LUC institution, 3 days 2 people 50 miles

Remedial Action Operations Phase				
Transportation				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
Land Use Controls	Light truck	9000	miles	Annual Inspection, 1 per year 30 years, assume 3 days, 2 people, 50 miles/day/person

Alternative 3: MNA and LUCs

Remedial Action Construction Phase				
Materials				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
Monitoring Well Installation				
Monitoring System	2" Sched 40 PVC	409	lb	5 wells x 50', 5 wells x 70' = 600' @ .682 lb/ft
Monitoring System	Steel	7040	lb	10 Wells, 4 bollards/well, 8' each, 22lb/ft
Monitoring System	Grout	10281	lb	Monitoring wells (36.5'x5 wells and 56.5'x5 wells of grout placed in 0.33 sq ft annular space) - 8" borehole, 2" piping, 67 lb/cf
Monitoring System	Sand	2475	lb	Monitoring wells (10 x with 10' of sand placed in 0.33 sq ft annular space) - 8" borehole, 2" piping, 75 lb/cf
Monitoring System	Bentonite	614	lb	Monitoring wells (10x with 2' of bentonite placed in 0.33 sq ft annular space) - 8" borehole, 2" piping, 93 lb/cf
Monitoring Well Abandonment				
Monitoring System	Grout	9821	lb	Monitoring well abandonment, filled with grout, assume 80 wells 60' avg each, 2" dia, .022 sf, 2500 lb/cy, 93 lb/cf, 80 wells
Transportation-Personnel				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
LUC Institution				
Land Use Controls	Light truck	300	miles	LUC institution, 3 days 2 people 50 miles
Baseline Sampling -Existing Wells				
Monitoring System	Light truck	1000	miles	Baseline sampling 50 wells, 10 days, 2 people, 50 miles/person/day
Monitoring Well Installation				
Monitoring System	Light truck	900	miles	Well installation, 2 people 9 days, 50 miles/trip
Monitoring System	Heavy Duty	1350	miles	3 ppl rig crew 9 days, 50 miles/trip
Sampling New Wells				
Monitoring System	Light truck	200	miles	Sampling new wells 2 people 2 days, 50 miles/trip
Monitoring Well Abandonment				
Monitoring System	Light truck	1000	miles	Well decomissioning 2 people 10 days, 50 miles/day
Transportation-Equipment				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
Monitoring Well Construction				
Monitoring System	Drill Rig	10	tons	100 miles
Monitoring System	Loader/Backhoe	9	tons	100 miles
Monitoring System	Material Delivery	15	tons	100 miles

Alternative 3: MNA and LUCs

Remedial Action Construction Phase (continued)				
Equipment Use				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
Monitoring Well Construction				
Monitoring System	HSA Drill Rig	72	hours	9 days 8 hrs/day
Monitoring System	Loader/Backhoe	36	hours	9 days 4 hrs/day
Residual Handling				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
Monitoring Well Construction				
Monitoring System	Soil Disposal	12	tons	20 cy rolloff, 40% full, 50 miles =8 cy @ 1.5 tons/cy
Monitoring System	Water Disposal	6.105	tons	1500 gallons 50 miles away, 8.14 lb/gal
Remedial Action Operations Phase				
Materials				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
Monitoring System	Water	1500	gal	Water usage
Transportation				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
Land Use Controls	Light truck	9000	miles	Annual Inspection, 1 per year 30 years, assume 3 days assume local
Long Term Monitoring Phase				
Transportation				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
Monitoring System	Light truck	8000	miles	Performance Monitoring - 2 people 40 days, 4 events, 50 miles/trip
Monitoring System	Light truck	8500	miles	Years 4-20 Sampling, 2 people 17 events 1 week/event, 50 miles/trip

Alternative 4: Air Sparge, MNA and LUCs

Remedial Action Construction Phase

Materials

Process/System	Item	Quantity	Units	Comments
Well Installation				
Monitoring System	2" Sched 40 PVC	921	lb	5 wells x 30', 10 wells x 50', 10 wells x 70' = 1350' @ .682 lb/ft
Monitoring System	Steel	17600	lb	25 Wells, 4 bollards/well, 8' each, 22lb/ft
Monitoring System	Grout	22386	lb	Monitoring wells (16.5' x 5 wells, 36.5'x10 wells and 56.5'x10 wells of grout placed in 0.33 sq ft annular space) - 8" borehole, 2" piping, 67 lb/cf
Monitoring System	Sand	6188	lb	Monitoring wells (25 x with 10' of sand placed in 0.33 sq ft annular space) - 8" borehole, 2" piping, 75 lb/cf
Monitoring System	Bentonite	1535	lb	Monitoring wells (25x with 2' of bentonite placed in 0.33 sq ft annular space) - 8" borehole, 2" piping, 93 lb/cf
Monitoring System	Water	3750	gal	Water usage - Monitoring Wells
SOURCE AREA Well Installation				
Air Sparge System	2" Sched 40 PVC	1637	lb	48 wells 50 ft =2400 feet @ .682 lb/ft
Air Sparge System	Steel	33792	lb	48 Wells, 4 bollards/well, 8' each, 22lb/ft
Air Sparge System	Grout	44043	lb	AS wells (41.5' x 48 wells of grout placed in 0.33 sq ft annular space) - 8" borehole, 2" piping, 67 lb/cf
Air Sparge System	Sand	5940	lb	AS wells (48 x with 5' of sand placed in 0.33 sq ft annular space) - 8" borehole, 2" piping, 75 lb/cf
Air Sparge System	Bentonite	2946	lb	AS wells (48x with 2' of bentonite placed in 0.33 sq ft annular space) - 8" borehole, 2" piping, 93 lb/cf
Air Sparge System	Concrete	194400	lb	48 concrete pads, 1 cy each, concrete = 4050 lb/cy
SOURCE AREA: Air Sparge Equip Setup				
Air Sparge System	Steel	16000	lb	20'x20' steel building, 40 lbs/sf
Air Sparge System	4" HDPE	916	lb	160 psi, 2.29 lb/ft,400 ft
Air Sparge System	2" HDPE	384	lb	160 psi, 0.64 lb/ft, 600 ft
Air Sparge System	2" HDPE	512	lb	160 psi, 0.64 lb/ft, 800 ft
Air Sparge System	Steel	500	lb	Misc Piping, Fittings, Assume 500 lb
RIVER AREA Well Installation				
Air Sparge System	2" Sched 40 PVC	5456	lb	80 wells 100 ft =8000 feet @ .682 lb/ft
Air Sparge System	Steel	56320	lb	80 Wells, 4 bollards/well, 8' each, 22lb/ft

Alternative 4: Air Sparge, MNA and LUCs

Remedial Action Construction Phase (continued)

Materials

Air Sparge System	Grout	161845	lb	Monitoring wells (91.5' x 80 wells of grout placed in 0.33 sq ft annular space) - 8" borehole, 2" piping, 67 lb/cf
Air Sparge System	Sand	9900	lb	Monitoring wells (80 wells with 5' of sand placed in 0.33 sq ft annular space) - 8" borehole, 2" piping, 75 lb/cf
Air Sparge System	Bentonite	4910	lb	Monitoring wells (80 x with 2' of bentonite placed in 0.33 sq ft annular space) - 8" borehole, 2" piping, 93 lb/cf
Air Sparge System	Concrete	194400	lb	48 concrete pads, 1 cy each, concrete = 4050lb/cy
RIVER AREA Air Sparge Equip Setup				
Air Sparge System	Steel	24000	lb	20'x30' steel building, 40 lbs/sf
Air Sparge System	6" HDPE	3976	lb	160 psi, 4.97 lb/ft,800 ft
Air Sparge System	4" HDPE	1145	lb	161 psi, 2.29 lb/ft, 500 ft
Air Sparge System	2" HDPE	512	lb	162 psi, 0.64 lb/ft, 800 ft
Air Sparge System	Steel	500	lb	Misc Piping, Fittings
Monitoring Well Abandonment				
Monitoring System	Grout	28644	lb	Monitoring well abandonment, filled with grout, assume 80 wells total 8000', 25 new wells 1350', 2" pipe, 48 at 2" total 2400' and assume 50 existing wells avg 45' and are 2", 2" dia =.022 sf, 93 lb/cf

Transportation-Personnel

Process/System	**Item**	**Quantity**	**Units**	**Comments**
LUC Intitution				
Land Use Controls	Light truck	300	miles	LUC institution, 3 days 2 people 50 miles
Baseline Sampling -Existing Wells				
Monitoring System	Light truck	1000	miles	Baseline sampling 50 existing, 10 days, 2 ppl, 50 miles/trip
Well Instatllation				
Monitoring System	Light truck	2200	miles	Well installation, 2 people 22 days, 50 miles
Monitoring System	Heavy Duty	3300	miles	3 ppl rig crew 22 days, 50 miles/trip
Baseline Sampling -New Wells				
Monitoring System	Light truck	500	miles	Sampling new wells 2 people 5 days, 50 miles/trip
SOURCE AREA Well Installation				
Air Sparge System	Light truck	4200	miles	Well installation, 2 people 42 days, 50 miles/trip
Air Sparge System	Heavy Duty	6300	miles	3 ppl rig crew 42 days, 50 miles/trip

Alternative 4: Air Sparge, MNA and LUCs

Remedial Action Construction Phase (continued)				
Transportation-Personnel				
SOURCE AREA: Air Sparge Equip Setup				
Air Sparge System	Light truck	1800	miles	Trenching 2 ppl 18 days 50 miles/trip
Air Sparge System	Light truck	2000	miles	System Startup/Testing, 2 people 20 days 50 miles/trip
RIVER AREA Well Installation				
Air Sparge System	Light truck	9600	miles	Well installation, 2 people 96 days, 50 miles/trip
Air Sparge System	Heavy Duty	14400	miles	3 ppl rig crew 96 days, 50 miles/trip
RIVER AREA: Air Sparge Equip Setup				
Air Sparge System	Light truck	2100	miles	Trenching 2 ppl 21 days, 50miles/trip
Air Sparge System	Light truck	2000	miles	System Startup/Testing, 2 people 20 days, 50 miles/trip
Monitoring Well Abandonment				
Monitoring System	Light truck	2500	miles	2 people, 25 days, 50 miles/trip
Demo/Abandonment of Air Sparge Systems				
Air Sparge System	Light truck	1500	miles	3 people, 10 days, 50 miles/trip
Transportation-Equipment				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
Well Installation				
Monitoring System	Drill Rig	10	tons	100 miles
Monitoring System	Loader/Backhoe	9	tons	100 miles
Monitoring System	Materials Delivery	150	tons	100 miles/trip, 20 tons trip, 8 trips = 800 miles
Vertical Air Sparge System				100 miles
Air Sparge System	Trailers (1 mob)	20	tons	100 miles
Air Sparge System	Steel Building Delivery Source Area	8	tons	100 miles
Air Sparge System	Steel Building Delivery River Area	12	tons	100 miles
Air Sparge System	Materials Delivery	333	tons	100 miles/trip , 20 tons/trip, 17 trips = 1700 miles
Air Sparge System	Trenching Equip	10	tons	100 miles
Demo/Abandonment of Air Sparge Systems				
Air Sparge System	Dozer 335hp	32	tons	100 miles
Equipment Use				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
Well Installation				
Monitoring System	Loader/Backhoe	88	hours	22 days 4 hrs/day
Monitoring System	HSA Drill Rig	176	hours	22 days 8 hrs/day
SOURCE AREA: Vertical Air Sparge System				
Air Sparge System	Loader/Backhoe	294	hours	42 days 7 hrs/day
Air Sparge System	HSA Drill Rig	336	hours	42 days 8 hrs/day
RIVER AREA Air Sparge System				
Air Sparge System	Loader/Backhoe	672	hours	96 days 7 hrs/day
Air Sparge System	HSA Drill Rig	768	hours	96 days 8 hrs/day
Demo/Abandonment of Air Sparge Systems				
Air Sparge System	Dozer 335hp	80	hours	Demo/Abandoment Equipment 10 days 8 hrs/day

Alternative 4: Air Sparge, MNA and LUCs

Remedial Action Construction Phase (continued)				
Residual Handling				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
Well Installation				
Monitoring System	Soil Disposal	26.1	tons	20 cy rolloff, .87 full, 50 miles
Monitoring System	Water Disposal	15	tons	3750 gallons 50 miles away
SOURCE AREA Vertical Air Sparge System				
Air Sparge System	Soil Disposal	46.5	tons	20 cy rolloff,1.55 full, 50 miles
Air Sparge System	Water Disposal	29	tons	7200 gallons 50 miles away
RIVER AREA Air Sparge System				
Air Sparge System	Soil Disposal	155	tons	20 cy rolloff,5.17 full, 50 miles
Air Sparge System	Water Disposal	49	tons	12000 gallons 50 miles away
Remedial Action Operations Phase				
Materials				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
Air Sparge System	Water	7200	gal	Water usage - Source Area
Air Sparge System	Water	12000	gal	Water usage - River Area
Transportation				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
Land Use Controls	Light truck	4800	miles	Annual Inspection, 1 per year 16 years, assume 3 days assume local 2 ppl
SOURCE AREA Air Sparge System				
Air Sparge System	Light truck	10400	miles	Weekly System Checks, 1 person, 1 day/week 50 mile. 208 trips
Air Sparge System	Light truck	9600	miles	Monthly O&M, 2 ppl 2 days 48 trips
Air Sparge System	Light truck	6400	miles	Quarterly Heavy Maintenance, assume 4 days, 2 people, 16 trips
RIVER AREA Air Sparge System				
Air Sparge System	Light truck	41600	miles	Weekly System Checks, 1 person, 1 day/week 50 mile, 832 trips
Air Sparge System	Light truck	38400	miles	Monthly O&M, 2 ppl 2 days 192 trips
Air Sparge System	Light truck	25600	miles	Quarterly Heavy Maintenance, assume 4 days, 2 people, 64 trips
Equipment Use				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
SOURCE AREA Air Sparge System				
Air Sparge System	Electricity	1276157	kWh	Air Sparge System
RIVER AREA Air Sparge System				
Air Sparge System	Electricity	6559488	kWh	Air Sparge System

Alternative 4: Air Sparge, MNA and LUCs

Long Term Monitoring Phase (continued)				
Transportation-Personnel				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
Long Term Monitoring and Maintenance				
Monitoring System	Light truck	1500	miles	Well Maintenance, 5 events, 2 people, 3 days
Monitoring System	Light truck	4000	miles	Groundwater Monitoring Quarterly, 2 ppl, 40 trips, 50 miles/trip
Monitoring System	Light truck	15000	miles	Groundwater Monitoring Annual, 2ppl, 150 trips, 50 miles/trip

Alternative 5: EISB, MNA, and LUCs

Remedial Action Construction Phase				
Materials				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
Well Installation				
Monitoring System	2" Sched 40 PVC	1023	lb	10 wells x 30', 10 wells x 50', 10 wells x 70' = 1350' @ .682 lb/ft
Monitoring System	Steel	21120	lb	30 Wells, 4 bollards/well, 8' each, 22lb/ft
Monitoring System	Grout	24210	lb	Monitoring wells (16.5' x 10 wells, 36.5'x10 wells and 56.5'x10 wells of grout placed in 0.33 sq ft annular space) - 8" borehole,
Monitoring System	Sand	7425	lb	Monitoring wells (30 x with 10' of sand placed in 0.33 sq ft annular space) - 8" borehole, 2" piping, 75 lb/cf
Monitoring System	Bentonite	1841	lb	Monitoring wells (30x with 2' of bentonite placed in 0.33 sq ft annular space) - 8" borehole, 2" piping, 93 lb/cf
Monitoring System	Water	4500	gal	Water usage
EISB Well Installation				
Injection System	4" Sched 40 PVC	3628	lb	113 wells, total of 5320 feet @ .682 lb/ft
Injection System	Steel	79552	lb	113 Wells, 4 bollards/well, 8' each, 22lb/ft
Injection System	Grout	144912	lb	Monitoring wells (4190'-113*13.5' wells of grout placed in 0.57 sq ft annular space) - 11" borehole, 4" piping, 67 lb/cf
Injection System	Sand	48308	lb	Monitoring wells (113 x with 10' of sand placed in 0.57 sq ft annular space) - 11" borehole, 4" piping, 75 lb/cf
Injection System	Bentonite	59901	lb	Monitoring wells (113 x with 2' of bentonite placed in 0.57 sq ft annular space) - 11" borehole, 4" piping, 93 lb/cf
Monitoring Well Abandonment				
Monitoring System	Grout	41574	lb	Monitoring well abandonment, filled with grout, assume 113 wells at 4" and 30 at 2" and assume 50 existing wells avg 45' and are 2", 2" dia =.022 sf, 4" dia =.087 sf, 93 lb/cf
Transportation-Personnel				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
LUCS institution				
Land Use Controls	Light truck	300	miles	LUC institution, 3 days 2 people 50 miles

Alternative 5: EISB, MNA, and LUCs

Remedial Action Construction Phase (continued)				
Transporation - Personnel				
Baseline Sampling -Existing Wells				
Monitoring System	Light truck	500	miles	5 days, 2 people, Baseline sampling 50 existing wells, 50 miles/day
Well Instatllation				
Monitoring System	Light truck	2600	miles	Well installation, 2 people 26 days, 50 miles/trip
Monitoring System	Heavy Duty	3900	miles	3 ppl rig crew 26 days, 50 miles/trip
Baseline Sampling -New Wells				
Monitoring System	Light truck	600	miles	Sampling new wells 2 people 6 days, 50 miles/trip
EISB Well Installation				
Injection System	Light truck	9800	miles	Well installation, 2 people 98 days, 50 miles/trip
Injection System	Heavy Duty	14700	miles	3 ppl rig crew 98 days, 50 miles/trip
Monitoring Well Abandonment				
Monitoring System	Light truck	2000	miles	2 people 20 days 50 miles/day
Transportation-Equipment				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
Well Installation				
Monitoring System	Drill Rig	10	tons	100 miles
Monitoring System	Loader/Backhoe	9	tons	100 miles
Monitoring System	Materials Delivery	18	tons	100 miles/trip, 18 tons/trip
EISB Well Installation				
Injection System	Trailers	20	tons	100 miles
Injection System	Materials Delivery	425	tons	100 miles/trip, 20 tons/trip 425 tons = 21 trips of 100 miles
Equipment Use				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
Well Installation				
Monitoring System	Loader/Backhoe	100	hours	25 days 4 hrs/day
Monitoring System	HSA Drill Rig	200	hours	25 days 8 hrs/day
EISB Well Installation				
Injection System	Loader/Backhoe	392	hours	98 days 4 hrs/day
Injection System	HSA Drill Rig	784	hours	98 days 8 hrs/day
Residual Handling				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
Well Installation				
Monitoring System	Soil Disposal	29	tons	20 cy rolloff, .97 full, 50 miles

Alternative 5: EISB, MNA, and LUCs

Remedial Action Construction Phase (continued)				
Residual Handling				
Monitoring System	Water Disposal	18	tons	4500 gallons 50 miles away
EISB Well Installation				
Injection System	Soil Disposal	195	tons	20 cy rolloff, 6.5 full, 50 miles
Injection System	Water Disposal	230	trip	56500 gallons 50 miles away
Remedial Action Operations Phase				
Materials				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
Injection System	Water	56500	gal	Water usage
1st Injection				
Injection System	Oil	296726	lb	712 drums, 416.75 lb/drum
2nd Injection				
Injection System	Oil	194622	lb	467 drums, 416.75 lb/drum
Transportation-Personnel				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
Land Use Controls	Light truck	3000	miles	days/trip 2 ppl
1st injection				
Injection System	Light truck	10650	miles	3 ppl, 71 days, 50 miles/day
2nd Injection				
Injection System	Light truck	7050	miles	3 ppl, 47 days, 50 miles/day
Transportation-Equipment				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
1st Injection				
Injection System	Oil/ Materials Delivery	150	tons	100 miles/trip, 20 tons/trip 150 tons = 8 trips of 100 miles
2nd Injection				
Injection System	Oil/ MaterialsDelivery	97	tons	100 miles/trip, 20 tons/trip 97 tons = 5 trips of 100 miles
Equipment Use				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
1st Injection				
Injection System	Generator	497	hours	71 days 7 hrs/day assume 100 hp
2nd Injection				
Injection System	Generator	329	hours	47 days 7 hrs/day assume 100 hp

Alternative 5: EISB, MNA, and LUCs

Remedial Action Operations Phase (continued)				
Residual Handling				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
1st Injection				
Injection System	Oil drum disposal	11	tons	712 drums, 30 lbs/drum
2nd Injection				
Injection System	Oil drum disposal	7	tons	467 drums, 30 lbs/drum

Long Term Monitoring Phase				
Transportation				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
Long Term Monitoring and Maintenance				
Monitoring System	Light truck	9600	miles	miles/trip
Monitoring System	Light truck	9600	miles	GW monitoring Annual 2 people, 96 days, 50 miles/trip
Monitoring System	Light truck	300	miles	Well Maintenance, 1 events, 2 people, 3 days

Alternative 6: Air Sparge, EISB, MNA and LUCs

Remedial Action Construction Phase

Materials

Process/System	Item	Quantity	Units	Comments
Well Installation				
Monitoring System	2" Sched 40 PVC	921	lb	10 wells x 30', 10 wells x 50', 10 wells x 70' = 1350' @ .682 lb/ft
Monitoring System	Steel	21120	lb	30 Wells, 4 bollards/well, 8' each, 22lb/ft
Monitoring System	Grout	24210	lb	Monitoring wells (16.5' x 10 wells, 36.5'x10 wells and 56.5'x10 wells of grout placed in 0.33 sq ft annular space) - 8" borehole, 2" piping, 67 lb/cf
Monitoring System	Sand	7425	lb	Monitoring wells (30 x with 10' of sand placed in 0.33 sq ft annular space) - 8" borehole, 2" piping, 75 lb/cf
Monitoring System	Bentonite	1841	lb	Monitoring wells (30x with 2' of bentonite placed in 0.33 sq ft annular space) - 8" borehole, 2" piping, 93 lb/cf
Monitoring System	Water	3000	gal	Water usage
EISB Well Installation				
Injection System	4" Sched 40 PVC	2517	lb	74 wells, avg depth gives total of 3690 feet @ .682 lb/ft
Injection System	Steel	52096	lb	74 Wells, 4 bollards/well, 8' each, 22lb/ft
Injection System	Grout	102769	lb	Monitoring wells (2950'-74*13.5' wells of grout placed in 0.57 sq ft annular space) - 11" borehole, 4" piping, 67 lb/cf
Injection System	Sand	31635	lb	Monitoring wells (74 x with 10' of sand placed in 0.57 sq ft annular space) - 11" borehole, 4" piping, 75 lb/cf
Injection System	Bentonite	39227	lb	Monitoring wells (74 x with 2' of bentonite placed in 0.57 sq ft annular space) - 11" borehole, 4" piping, 75 lb/cf
SOURCE AREA Well Installation				
Air Sparge System	2" Sched 40 PVC	1637	lb	48 wells 50 ft =2400 feet @ .682 lb/ft
Air Sparge System	Steel	33792	lb	48 Wells, 4 bollards/well, 8' each, 22lb/ft
Air Sparge System	Grout	40859	lb	Monitoring wells (38.5' x 48 wells of grout placed in 0.33 sq ft annular space) - 8" borehole, 2" piping, 67 lb/cf
Air Sparge System	Sand	5940	lb	Monitoring wells (48 x with 5' of sand placed in 0.33 sq ft annular space) - 8" borehole, 2" piping, 75 lb/cf

Alternative 6: Air Sparge, EISB, MNA and LUCs

Remedial Action Construction Phase (continued)

Materials

Air Sparge System	Bentonite	2946	lb	Monitoring wells (48x with 2' of bentonite placed in 0.33 sq ft annular space) - 8" borehole, 2" piping, 93 lb/cf
Air Sparge System	Concrete	194400	lb	48 concrete pads, 1 cy each, concrete =4050 lb/cy
Air Sparge System	Water	7200	gal	Water usage - Source area
SOURCE AREA: Air Sparge Equip Setup				
Air Sparge System	Steel	16000	lb	20'x20' steel building 40 lbs/sf
Air Sparge System	4" HDPE	916	lb	160 psi, 2.29 lb/ft,400 ft
Air Sparge System	2" HDPE	384	lb	161 psi, 0.64 lb/ft, 600 ft
Air Sparge System	2" HDPE	512	lb	162 psi, 0.64 lb/ft, 800 ft
Air Sparge System	Steel	500	lb	Misc piping, fittings assume 500 lbs
RIVER AREA Well Installation				
Air Sparge System	2" Sched 40 PVC	5456	lb	80 wells 100 ft =8000 feet @ .682 lb/ft
Air Sparge System	Steel	56320	lb	80 Wells, 4 bollards/well, 8' each, 22lb/ft
Air Sparge System	Grout	161845	lb	Monitoring wells (91.5' x 80 wells of grout placed in 0.33 sq ft annular space) - 8" borehole, 2" piping, 67 lb/cf
Air Sparge System	Sand	9900	lb	Monitoring wells (80 wells with 5' of sand placed in 0.33 sq ft annular space) - 8" borehole, 2" piping, 75 lb/cf
Air Sparge System	Bentonite	4910	lb	Monitoring wells (80 x with 2' of bentonite placed in 0.33 sq ft annular space) - 8" borehole, 2" piping, 93 lb/cf
Air Sparge System	Concrete	194400	lb	48 concrete pads, 1 cy each, concrete =4050 lb/cy
Air Sparge System	Water	12000	gal	Water usage - River Area
RIVER AREA Air Sparge Equip Setup				
Air Sparge System	Steel	24000	lb	20'x30' steel building, 40 lbs/sf
Air Sparge System	6" HDPE	3976	lb	160 psi, 4.97 lb/ft,800 ft
Air Sparge System	4" HDPE	1145	lb	161 psi, 2.29 lb/ft, 500 ft
Air Sparge System	2" HDPE	512	lb	162 psi, 0.64 lb/ft, 800 ft
Air Sparge System	Steel	500	lb	Misc Piping, Fittings
Monitoring Well Abandonment				
Monitoring System	Grout	58807	lb	Monitoring well abandonment, filled with grout, assume 1500'new monitoring wells, 3690' 4" dia EISB wells, 80 wells total 8000', 2" pipe, 48 at 2" total 2400' and assume 50 existing wells avg 45' and are 2", 2" dia =.022 sf, 4" dia = .087 93 lb/cf

Alternative 6: Air Sparge, EISB, MNA and LUCs

Remedial Action Construction Phase (continued)

Transportation-Personnel

Process/System	Item	Quantity	Units	Comments
LUCS institution				
Land Use Controls	Light truck	300	miles	LUC institution, 3 days 2 people 50 miles
Baseline Sampling -Existing Wells				
Monitoring System	Light truck	500	miles	10 days, 2 people, Baseline sampling 50 existing wells, 50 miles/trip
Well Instatllation				
Monitoring System	Light truck	2600	miles	Well installation, 2 people 26 days, 50 miles/trip
Monitoring System	Light truck	3900	miles	3 ppl rig crew 26 days, 50 miles/trip
Monitoring System	Water	3000	gal	Water usage - Monitoring wells
Baseline Sampling -New Wells				
Monitoring System	Light truck	600	miles	Sampling new wells 2 people 6 days, 50 miles/trip
EISB Well Installation				
Injection System	Light truck	6400	miles	Well installation, 2 people 64 days, 50 miles/trip
Injection System	Heavy Duty	9600	miles	3 ppl rig crew 64 days 50 miles/trip
SOURCE AREA Well Installation				
Air Sparge System	Light truck	4200	miles	Well installation, 2 people 42 days, 50 miles/trip
Air Sparge System	Heavy Duty	6300	miles	3 ppl rig crew 42 days 50 miles/trip
SOURCE AREA: Air Sparge Equip Setup				
Air Sparge System	Light truck	1800	miles	Trenching 2 ppl 18 days 50 miles/trip
Air Sparge System	Light truck	2000	miles	System Startup/Testing, 2 people 20 days 50 miles/trip
RIVER AREA Well Installation				
Air Sparge System	Light truck	9600	miles	Well installation, 2 people 96 days 50 miles/trip
Air Sparge System	Heavy Duty	14400	miles	3 ppl rig crew 96 days 50 miles/trip
RIVER AREA: Air Sparge Equip Setup				
Air Sparge System	Light truck	2100	miles	Trenching 2 ppl 21 days 50 miles/trip
Air Sparge System	Light truck	2000	miles	System Startup/Testing, 2 people 20 days 50 miles/trip
Monitoring Well Abandonment				
Monitoring System	Light truck	2500	miles	2 people, 25 days, 50 miles/trip
Demo/Abandonment of Air Sparge Systems				
Air Sparge System	Light truck	1500	miles	3 people, 10 days 50 miles/trip

Transportation-Equipment

Process/System	Item	Quantity	Units	Comments
Well Installation				
Monitoring System	Drill Rig	10	tons	100 miles
Monitoring System	Loader/Backhoe	9	tons	100 miles
Monitoring System	Materials Delivery	18	tons	100 miles
EISB Well Installation				
Injection System	Trailers	20	tons	100 miles
Injection System	Materials Delivery	90	tons	90 tons, 20 tons/trip, 100 miles/trip, 5 trips

Alternative 6: Air Sparge, EISB, MNA and LUCs

Remedial Action Construction Phase (continued)				
Transportation-Equipment				
1st Injection				
Injection System	Oil/ Materials Delivery 467 drums	97	tons	97 tons, 20 tons/trip, 100 miles/trip, 5 trips
2nd Injection				
Injection System	Oil/ MaterialsDelivery	97	tons	97 tons, 20 tons/trip, 100 miles/trip, 5 trips
Vertical Air Sparge System				
Air Sparge System	Trailers (1 mob)	20	tons	100 miles
Air Sparge System	Steel Building Delivery Source Area	8	tons	8 tons, 100 miles
Air Sparge System	Steel Building Delivery River Area	12	tons	12 tons, 100 miles
Air Sparge System	Materials Delivery	333	tons	20 tons/trip, 17 trips, 100 miles/trip = 1700 miles
Air Sparge System	Trenching Equip	10	tons	100 miles
Demo/Abandonment of Air Sparge Systems				
Air Sparge System	Dozer 335 hp	32	tons	100 miles
Equipment Use				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
Well Installation				
Monitoring System	Loader/Backhoe	100	hours	25 days 4 hrs/day
Monitoring System	HSA Drill Rig	200	hours	25 days 8 hrs/day
EISB Well Installation				
Injection System	Loader/Backhoe	256	hours	64 days 4 hrs/day'
Injection System	HSA Drill Rig	512	hours	64 days 8 hrs/day
1st Injection				
Injection System	Generator	329	hours	47 days 7 hrs/day
2nd Injection				
Injection System	Generator	329	hours	47 days 7 hrs/day
SOURCE AREA: Vertical Air Sparge System				
Air Sparge System	Loader/Backhoe	294	hours	42 days 7 hrs/day
Air Sparge System	HSA Drill Rig	336	hours	42 days 8 hrs/day
RIVER AREA Air Sparge System				
Air Sparge System	Loader/Backhoe	672	hours	96 days 7 hrs/day
Air Sparge System	HSA Drill Rig	768	hours	96 days 8 hrs/day
Demo/Abandonment of Air Sparge Systems				
Air Sparge System	Dozer 335 hp	80	hours	Demo/Abandoment Equipment 10 days 8 hrs/day
Residual Handling				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
Well Installation				
Monitoring System	Soil Disposal	29	tons	20 cy rolloff, .97 full, 50 miles
Monitoring System	Water Disposal	12	tons	3000 gallons 50 miles away
EISB Well Installation				
Injection System	Soil Disposal	135	tons	20 cy rolloff, 4.51 full, 50 miles
Injection System	Water Disposal	150	tons	37000 gallons 50 miles away

Alternative 6: Air Sparge, EISB, MNA and LUCs

Remedial Action Construction Phase (continued)				
Residual Handling				
SOURCE AREA Vertical Air Sparge System				
Air Sparge System	Soil Disposal	47	tons	20 cy rolloff,1.55 full, 50 miles
Air Sparge System	Water Disposal	29	tons	7200 gallons 50 miles away
RIVER AREA Air Sparge System				
Air Sparge System	Soil Disposal	155	tons	20 cy rolloff,5.17 full, 50 miles
Air Sparge System	Water Disposal	49	tons	12000 gallons 50 miles away
Remedial Action Operations Phase				
Materials				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
EISB Injection				
Injection System	Water	56500	gal	Water usage -EISB well
First Injection				
Injection System	Oil	194622	lb	467 drums, 416.75 lb/drum
Second Injection				
Injection System	Oil	194622	lb	467 drums, 416.75 lb/drum
N/A				
Transportation				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
Annual LUC Inspections				
Land Use Controls	Light truck	4800	miles	Annual Inspection, 1 per year 16 years, assume 3 days assume local, 50 miles/trip
1st injection				
Injection System	Light truck	7050	miles	3 ppl, 47 days, 50 miles/day
2nd Injection				
Injection System	Light truck	7050	miles	3 ppl, 47 days, 50 miles/day
SOURCE AREA Air Sparge System				
Air Sparge System	Light truck	10400	miles	Weekly System Checks, 1 person, 1 day/week 50 miles, 208 trips
Air Sparge System	Light truck	9600	miles	Monthly O&M, 2 ppl 2 days 48 trips, 50 miles/trip
Air Sparge System	Light truck	6400	miles	Quarterly Heavy Maintenance, assume 4 days, 2 people, 16 trips. 50 miles/trip
RIVER AREA Air Sparge System				
Air Sparge System	Light truck	26000	miles	Weekly System Checks, 1 person, 1 day/week 50 mile, 520 trips
Air Sparge System	Light truck	24000	miles	Monthly O&M, 2 ppl 2 days 120 trips, 50 miles/trip
Air Sparge System	Light truck	16000	miles	Quarterly Heavy Maintenance, assume 4 days, 2 people, 40 trips, 50 miles/trip

Alternative 6: Air Sparge, EISB, MNA and LUCs

Remedial Action Operations Phase (continued)				
Equipment Use				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
SOURCE AREA Air Sparge System				
Air Sparge System	Electricity	1276157	kWh	Blower system electricity use
RIVER AREA Air Sparge System				
Air Sparge System	Electricity	4099680	kWh	Blower system electricity use
Residual Handling				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
1st Injection				
Injection System	Oil drum disposal	7	tons	467 drums, 30 lbs/drum
2nd Injection				
Injection System	Oil drum disposal	7	tons	467 drums, 30 lbs/drum
Long Term Monitoring Phase				
Materials				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
N/A				
Transportation-Personnel				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
Monitoring System	Light truck	300	miles	Well Maintenance, 1 events, 2 people, 3 days, 50 miles/person/day
Monitoring System	Light truck	9600	miles	GW monitoring years 1, 5 quarterly 2 people, 96 days, 50 miles/trip
Monitoring System	Light truck	9600	miles	GW monitoring Annual 2 people, 96 days, 50 miles/trip

Alternative 7: Extraction, Treatment, Disposal, and LUCs

Remedial Action Construction Phase (continued)

Materials

Process/System	Item	Quantity	Units	Comments
Monitoring Well Installation				
Monitoring System	2" Sched 40 PVC	409	lb	5 wells x 50', 5 wells x 70' = 600' @ .682 lb/ft
Monitoring System	Steel	7040	lb	10 wells, 4 bollards/well 8 ft each, 22 lb/ft
Monitoring System	Grout	10281	lb	Monitoring wells (36.5'x5 wells and 56.5'x5 wells of grout placed in 0.33 sq ft annular space) - 8" borehole, 2" piping, 67 lb/cf
Monitoring System	Sand	2475	lb	Monitoring wells (10 x with 10' of sand placed in 0.33 sq ft annular space) - 8" borehole, 2" piping, 75 lb/cf
Monitoring System	Bentonite	614	lb	Monitoring wells (10x with 2' of bentonite placed in 0.33 sq ft annular space) - 8" borehole, 2" piping, 93 lb/cf
Monitoring System	Water	1500	gal	Water usage
Monitoring Well Abandonment				
Monitoring System	Grout	9821	lb	Monitoring well abandonment, filled with grout, assume 80 wells 60' avg each, 2" dia, .022 sf, 2500 lb/cy, 93 lb/cf, 80 wells
Extraction System Installation				
Extraction System	Water	3000	gal	Water usage
Extraction System	Well Bollards	90	lb	3 @ 30 lbs each
Extraction System	Steel	3969000	lb	40'x60' steel building, 15' high, 1.5'thick walls, 490 lbs/cf
Extraction System	4" HDPE	12137	lb	1300 ft + 4000 ft, 160 psi, 2.29 lb/ft,
Extraction System	Misc Piping and Fittings	500	lb	
Extraction System	6" PVC	17650	lb	3.53 lb/ft, 5000 ft
Extraction System	Geotextile	600	lb	Assume 8 oz/sy, 1200 sy
Extraction System	Gravel 150 cy	425250	lb	105 lb/cf = 2835 lb/cy
Extraction System	20000 gal Equalization Tank	25488	lb	HDPE, 59 lb/cf, 15' dia x 20'high x 4" thick
Extraction System	80000 gal clarifier tank 30 ft dia	64880	lb	HDPE, 59 lb/cf, 30' dia x 20'high x 4" thick
Extraction System	Sludge Holding Tank (20000 gal)	25488	lb	HDPE, 59 lb/cf, 15' dia x 20'high x 4" thick

Transportation-Personnel

Process/System	Item	Quantity	Units	Comments
LUC Institution				
Monitoring System	Light truck	300	miles	LUC institution, 3 days 2 people 50 miles
Baseline Sampling -Existing Wells				
Monitoring System	Light truck	500	miles	10 days, 2 people, Baseline sampling 50 wells

Alternative 7: Extraction, Treatment, Disposal, and LUCs

Remedial Action Construction Phase (continued)				
Transportation-Personnel				
Monitoring Well Installation				
Monitoring System	Light truck	900	miles	Well installation, 2 people 9 days, 50 miles/trip
Monitoring System	Light truck	1350	miles	3 ppl rig crew 9 days, 50 miles/trip
Sampling New Wells				
Monitoring System	Light truck	200	miles	Sampling new wells 2 people 2 days, 50 miles/trip
Monitoring Well Abandonment				
Monitoring System	Light truck	1000	miles	Well decomissioning 2 people 10 days, 50 miles/trip
Extraction Installation				
Extraction System	Light truck	900	miles	Well Installation 2 people 9 days, 50 miles/trip
Extraction System	Light truck	1350	miles	Rig, 3 people, 9 days, 50 miles/trip
Extraction System	Light truck	2650	miles	Trenching/Installation Conveyance Piping 5.3 weeks 2 ppl, 50 miles/trip
Extraction System	Light truck	2500	miles	Trenching/Installation Discharge Piping 5 weeks 2 ppl, 50 miles/trip
Extraction System	Light truck	1000	miles	Startup System Testing, 2 ppl 10 days, 50 miles/trip
Demo/Abandment of Extraction System				
Extraction System	Light truck	1500	miles	3 people 10 days, 50 miles/trip
Transportation-Equipment				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
Monitoring Well Construction				
Monitoring System	Drill Rig	10	tons	100 miles
Monitoring System	Loader/Backhoe	9	tons	100 miles
Monitoring System	Material Delivery incl tanks	2282	tons	100 miles, 2282 tons, 20 tons/trip, 114 trips
Extraction Installation				
Extraction System	12" Mud Rotary	10	tons	100 miles
Extraction System	Pumps etc delivery	10	tons	100 miles
Extraction System	Misc. Equipment Delivery	3	tons	100 miles
Demo/Abandment of Extraction System				
Extraction System	Demo Equipment -Dozer	32	tons	100 miles
Equipment Use				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
Monitoring Well Construction				
Monitoring System	HSA Drill Rig	72	hours	9 days 8 hrs/day
Monitoring System	Loader/Backhoe	36	hours	9 days 4 hrs/day
Extraction Installation				
Extraction System	12" Mud Rotary	72	hours	9 days 8 hrs/day
Extraction System	Loader/Backhoe	36	hours	9 days 4 hrs/day
Demo/Abandment of Extraction System				
Extraction System	Dozer 335 hp	80	hours	Demo/Abandoment Equipment 10 days 8 hrs/day

Alternative 7: Extraction, Treatment, Disposal, and LUCs

Remedial Action Construction Phase (continued)				
Residual Handling				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
Monitoring Well Construction				
Monitoring System	Soil Disposal	12	tons	20 cy rolloff, 40% full, 50 miles
Monitoring System	Water Disposal	6.1	tons	1500 gallons 50 miles away
Extraction Installation				
Extraction System	Water Disposal	12	tons	3000 gallons
Extraction System	Soil Disposal	8	tons	0.27 full 20 cy rolloff
Remedial Action Operations Phase				
Materials				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
Extraction System Operations				
Extraction System	Caustic Soda (Sodium Hydroxide, 27 tons/year	806400	lb	700 lb/drum 1152 drums
Transportation				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
LUC Inspections and Monitoring				
Monitoring System	Light truck	4800	miles	Annual Inspection, 1 per year 16years, assume 3 days, 50 miles/trip
Extraction System	Light truck	41600	miles	Weekly system checks 832 events, 50 miles/trip
Extraction System	Light truck	19200	miles	Monthly Sampling, 2 people 192 events, 50 miles/trip
Extraction System	Light truck	416000	miles	Sludge handling, 5 days/week 832 weeks, assume 2 people, 50 miles/trip
Equipment Use				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
Extraction System Operations				
Extraction System	Electricity	7100506	kWh	Extraction System use
Residual Handling				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
Extraction System Operations				
Extraction System	Sludge Handling	1216	tons	50 miles/trip, 20 tons/trip, 61 trips
Long Term Monitoring Phase				
Transportation-Personnel				
Process/System	**Item**	**Quantity**	**Units**	**Comments**
Long Term Monitoring and Maintenance				
Monitoring System	Light truck	4000	miles	Groundwater Monitoring Year 1 - 2 people 40 days, 50 miles/trip
Monitoring System	Light truck	15000	miles	Groundwater Monitoring years 2-16 30 weeks, 50 miles/trip
Monitoring System	Light truck	900	miles	Well Maintenance 3 events, 2 people, 3 days, 50 miles/trip

IMPACT ANALYSIS

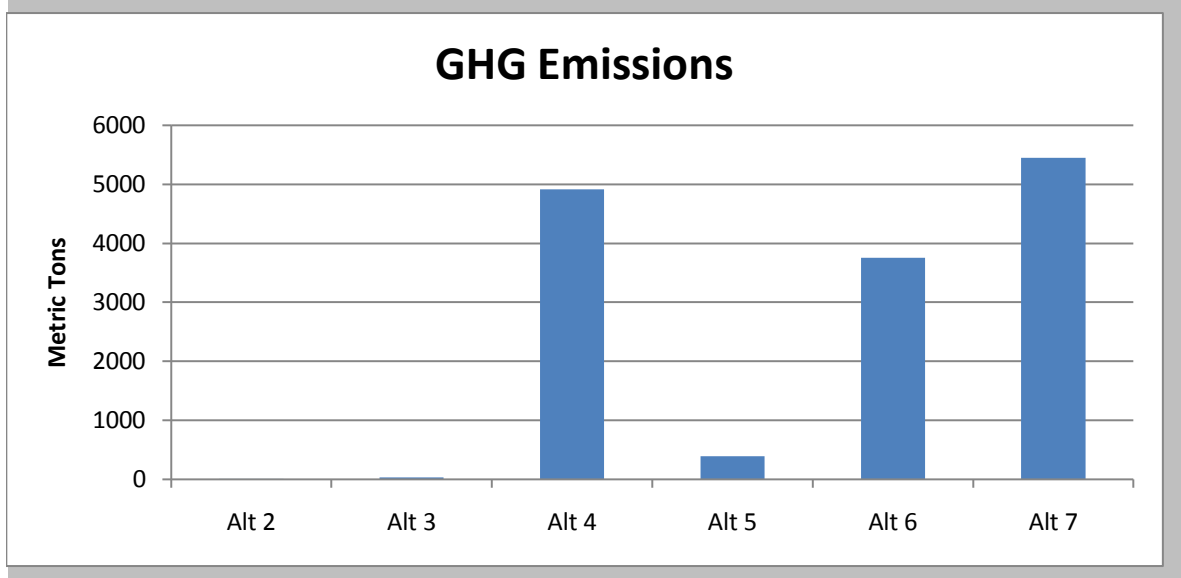
TABLE 1
SUSTAINABILITY EVALUATION
IMPACT ANALYSIS
NWIRP CALVERTON
FEASIBILITY STUDY
CALVERTON, NEW YORK

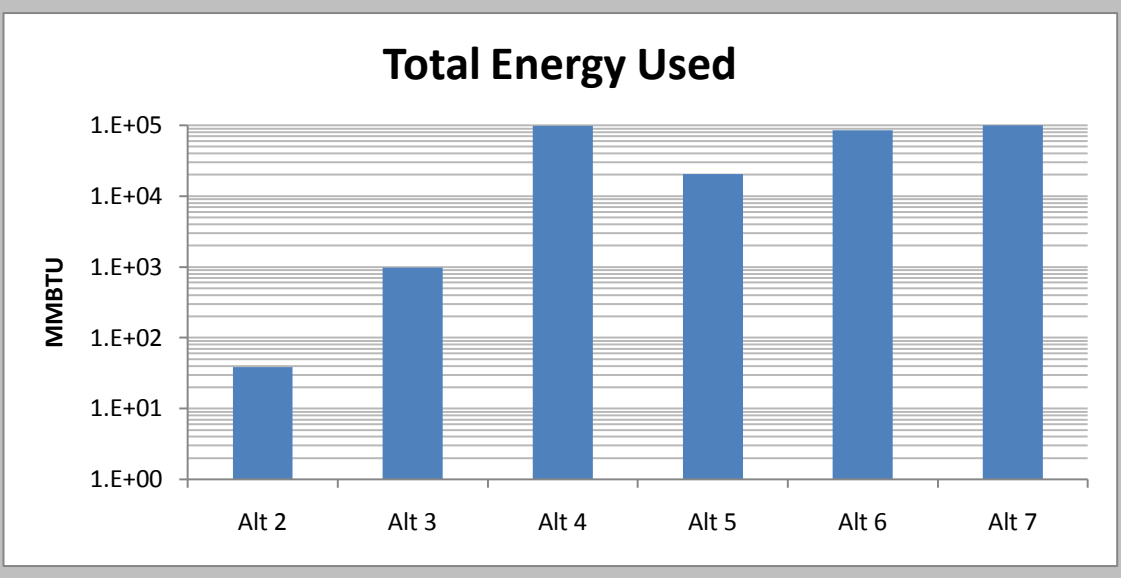
Remedial Alternative	Impact Assessment	Greenhouse Gas Emissions	Criteria Pollutant Emissions	Energy Usage	Water Consumption
2: LUCs	Relative Impact	Low	Low	Low	Low
	Primary Impact Drivers	Transportation (Personnel)	Transportation (Personnel)	Transportation (Personnel)	-
3: LUCs, MNA	Relative Impact	Low	Low	Low	Low to Moderate
	Primary Impact Drivers	Materials (Steel)	Equipment Use	Materials (Steel)	Materials (Steel)
4: Air Sparge, MNA, LUCs	Relative Impact	High	Moderate to High	Moderate to High	High
	Primary Impact Drivers	Electricity Consumption (Air Sparge)	Electricity Consumption (Air Sparge)	Electricity Consumption (Air Sparge)	Electricity Consumption (Air Sparge)
5: EISB, MNA, LUCs	Relative Impact	Low to Moderate	Moderate	Moderate	Moderate to High
	Primary Impact Drivers	Materials, Equipment Use	Materials, Equipment Use	Materials (Emulsified Oil), Generators for EISB	Electricity Consumption (EISB)
6: Air Sparge, EISB, MNA, LUCs	Relative Impact	Moderate to High	Moderate to High	Moderate to High	High
	Primary Impact Drivers	Electricity Consumption (Air Sparge)	Electricity Consumption (Air Sparge)	Electricity Consumption (Air Sparge)	Electricity Consumption (Air Sparge, EISB)
7: GW Extraction, Infiltration, MNA, LUCs	Relative Impact	High	Moderate to High	High	High
	Primary Impact Drivers	Electricity Consumption (Extraction System)	Electricity Consumption (Extraction System)	Electricity Consumption (Extraction System)	Electricity Consumption (Extraction System)

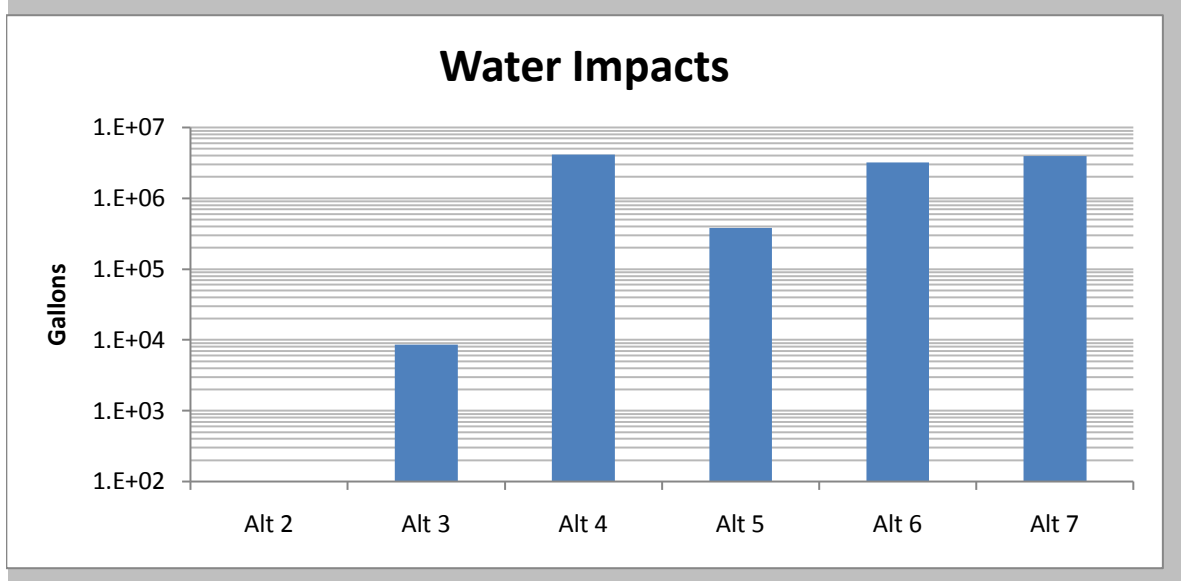
SITEWISE/GSRX SUMMARY OF RESULTS

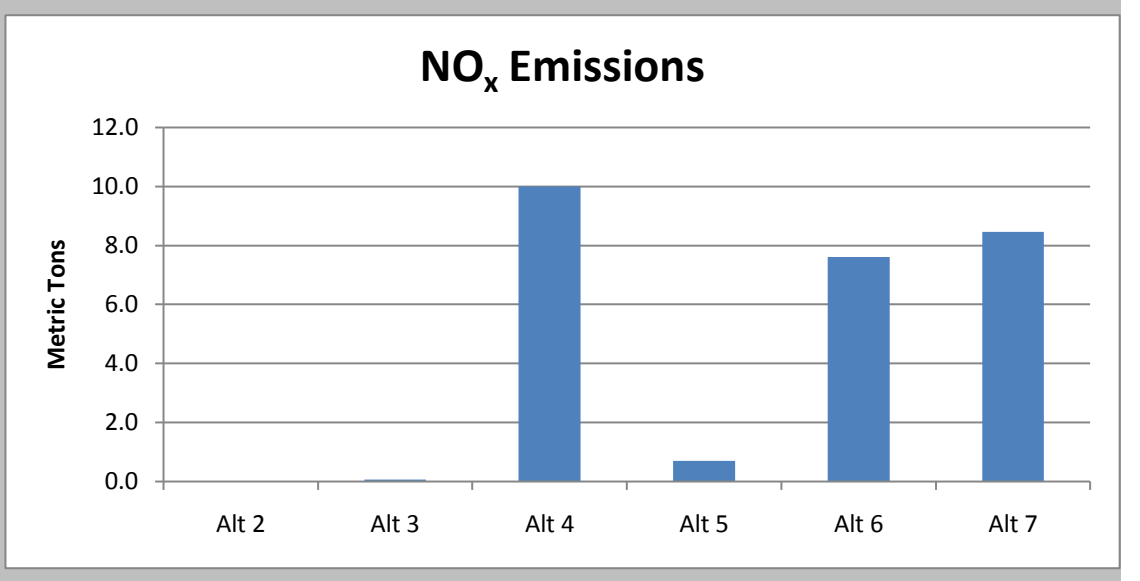
TABLE 2
SUMMARY OF RESULTS
NWIRP CALVERTON

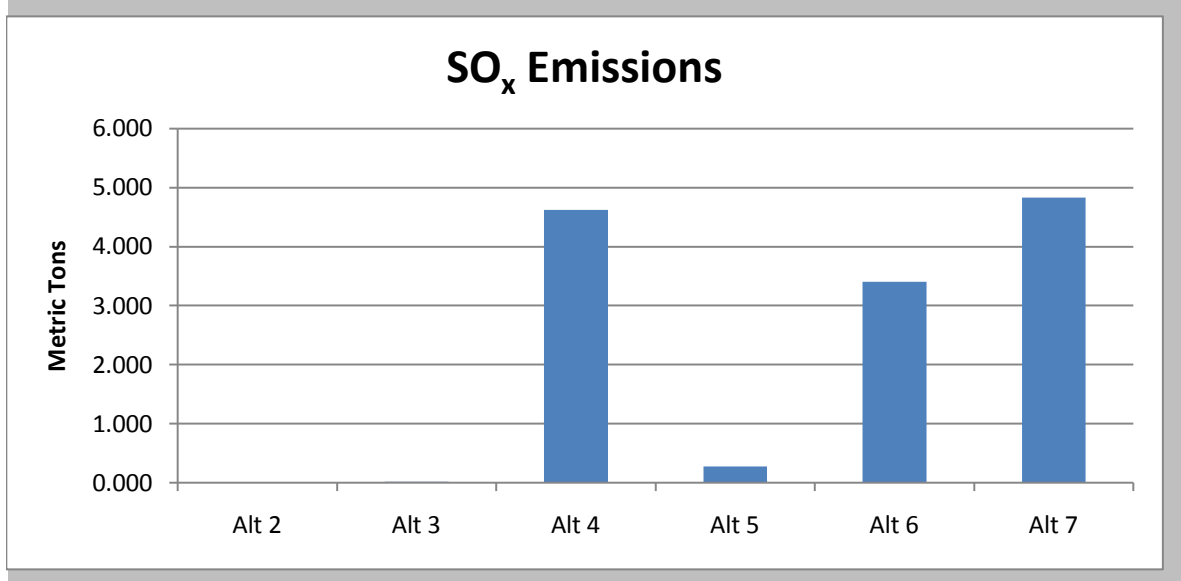
Remedial Alternatives	GHG Emissions	Total energy Used	Water Consumption	NO_x emissions	SO_x Emissions	PM_{10} Emissions	Accident Risk Fatality	Accident Risk Injury
	metric ton	MMBTU	gallons	metric ton	metric ton	metric ton		
Alt 2	3.51	38.44	0.00E+00	3.78E-03	9.07E-04	5.67E-04	7.91E-05	5.67E-03
Alt 3	35.85	982.97	8.53E+03	6.57E-02	1.46E-02	6.26E-03	2.96E-04	2.14E-02
Alt 4	4915.91	97643.91	4.15E+06	9.99E+00	4.62E+00	1.15E-01	1.84E-03	1.33E-01
Alt 5	395.60	20318.92	3.81E+05	6.97E-01	2.78E-01	7.22E-02	6.51E-04	4.85E-02
Alt 6	3754.94	8.53E+04	3.18E+06	7.60E+00	3.41E+00	1.44E-01	1.93E-03	1.41E-01
Alt 7	5447.78	1.23E+05	3.97E+06	8.47E+00	4.83E+00	1.60E-01	4.52E-03	3.28E-01

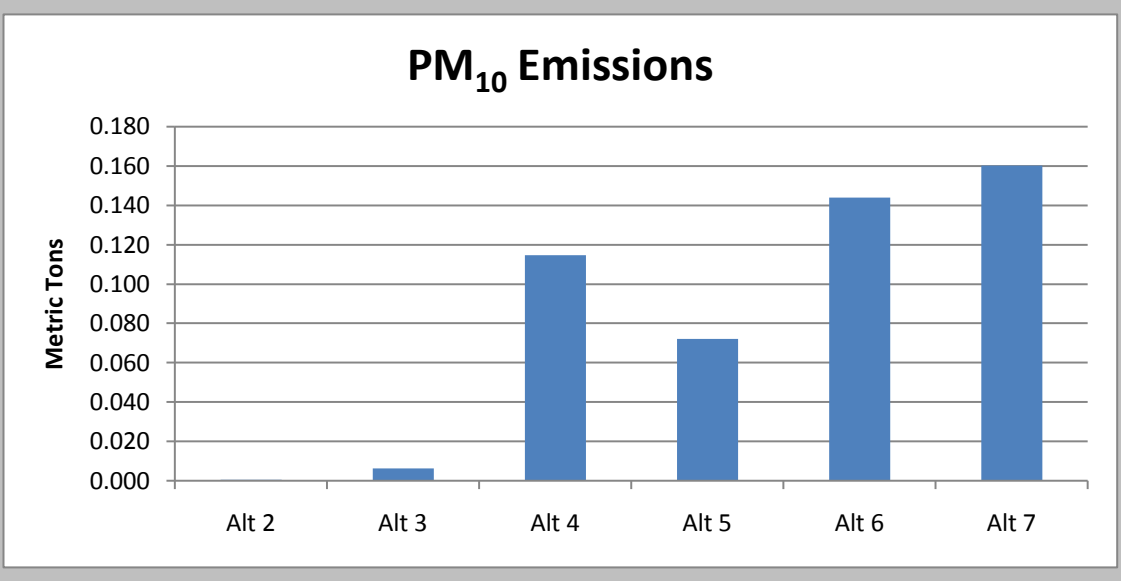


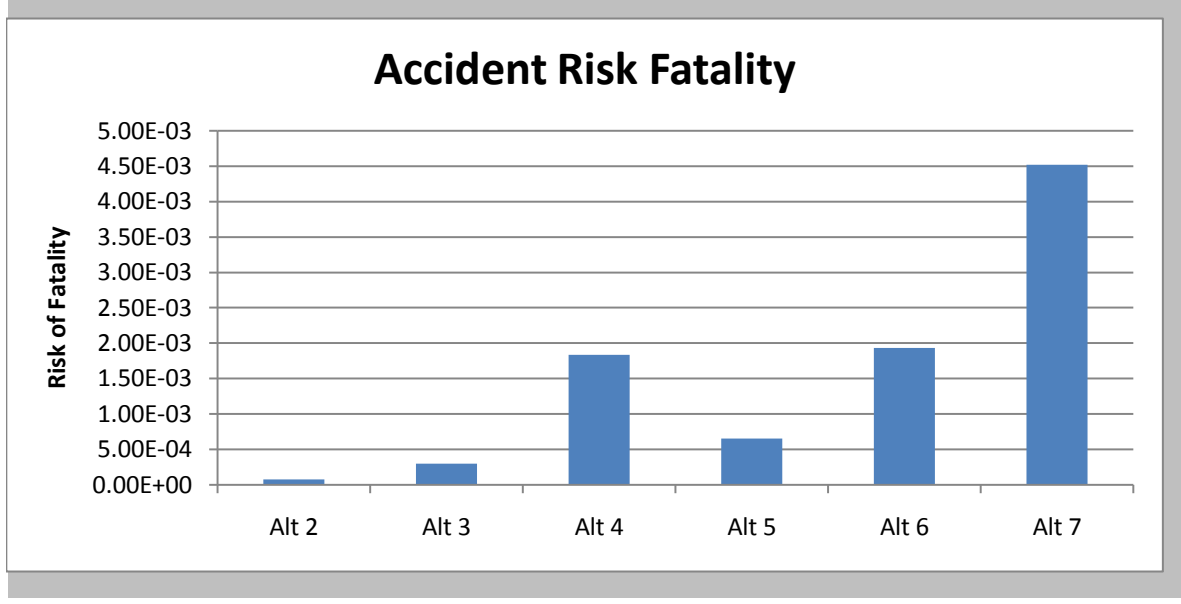


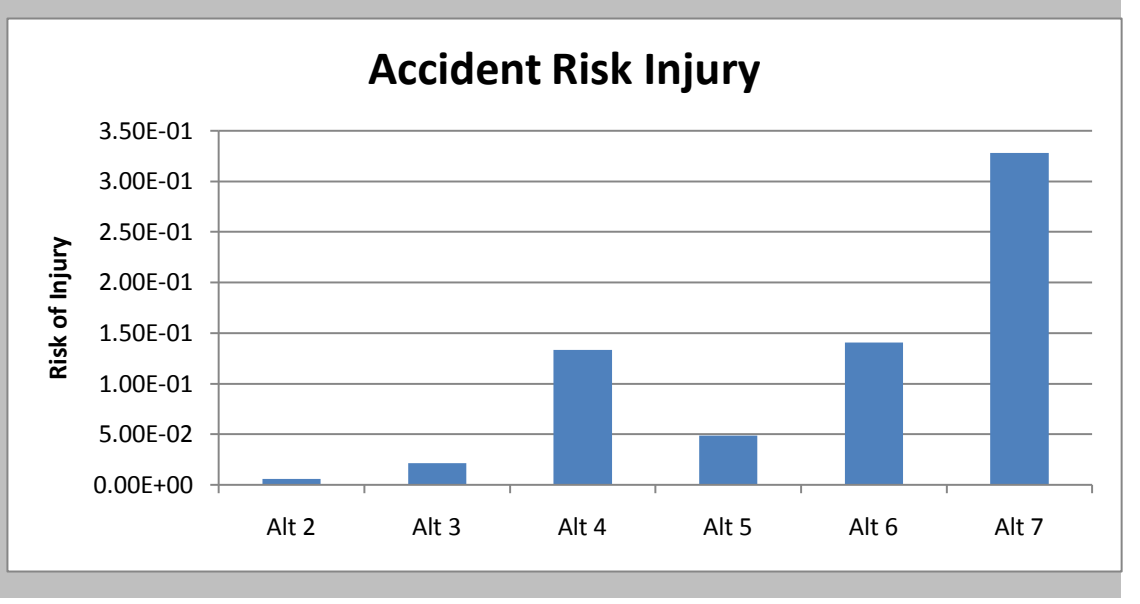






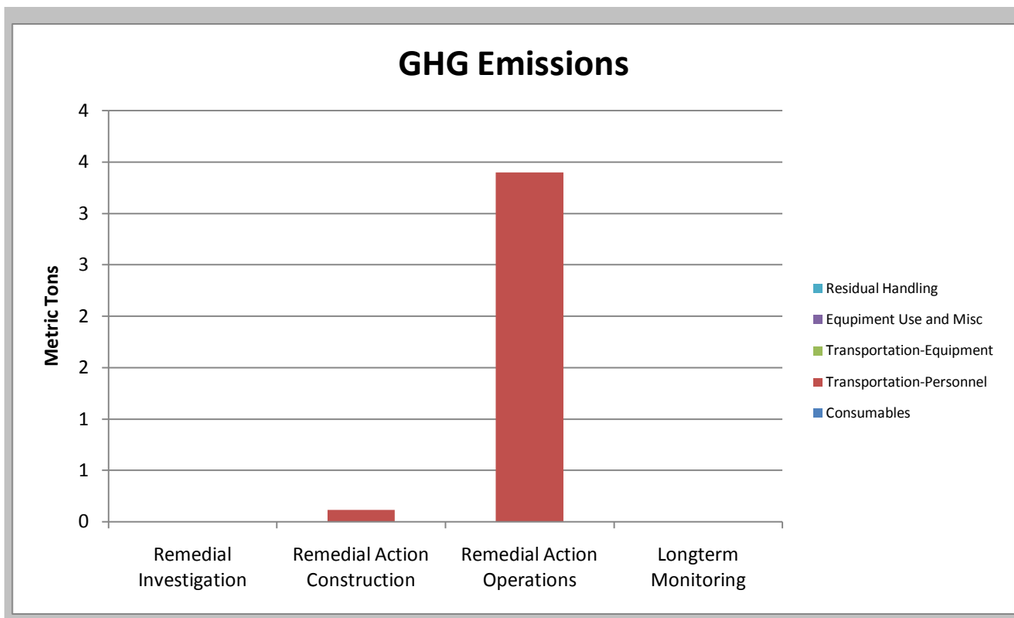


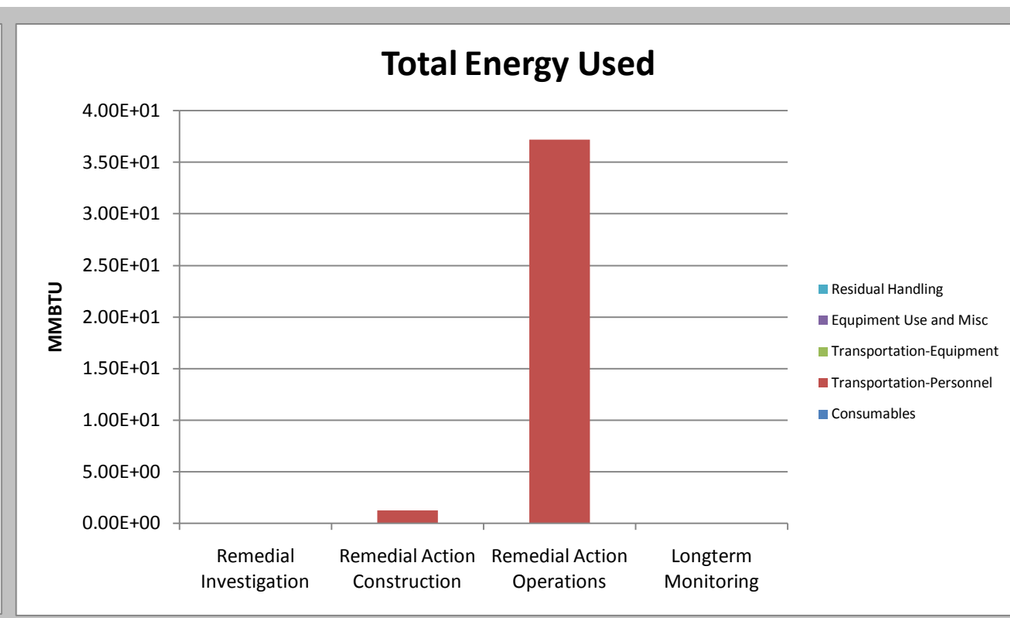


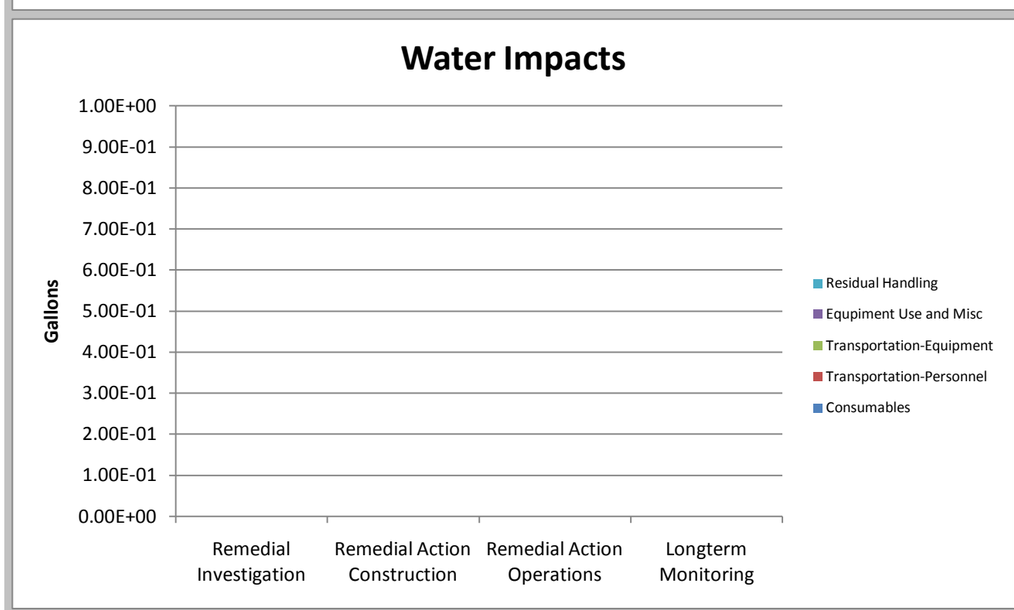


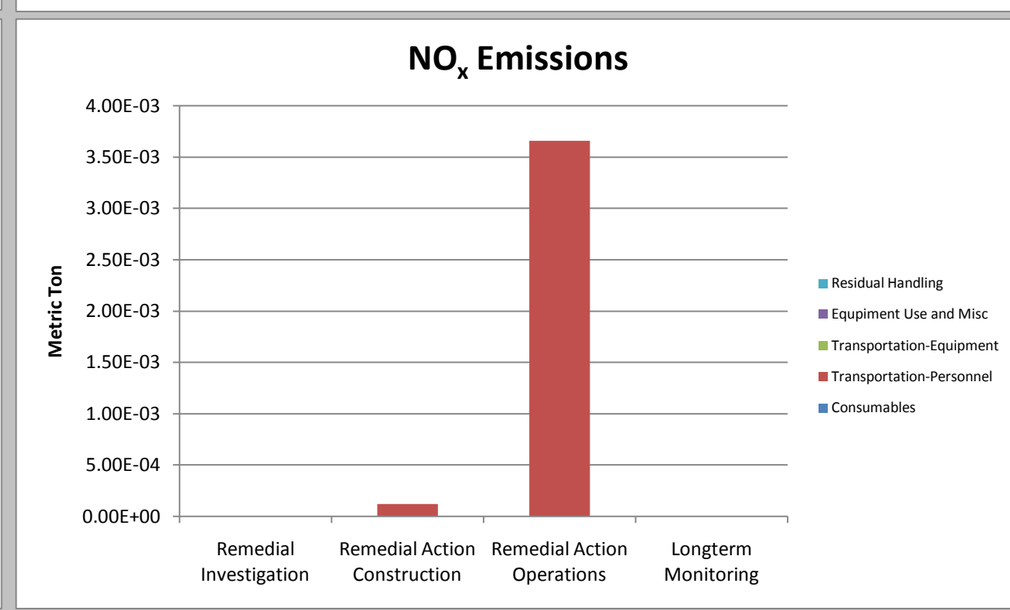
Sustainable Remediation - Environmental Footprint Summary
Alt 2

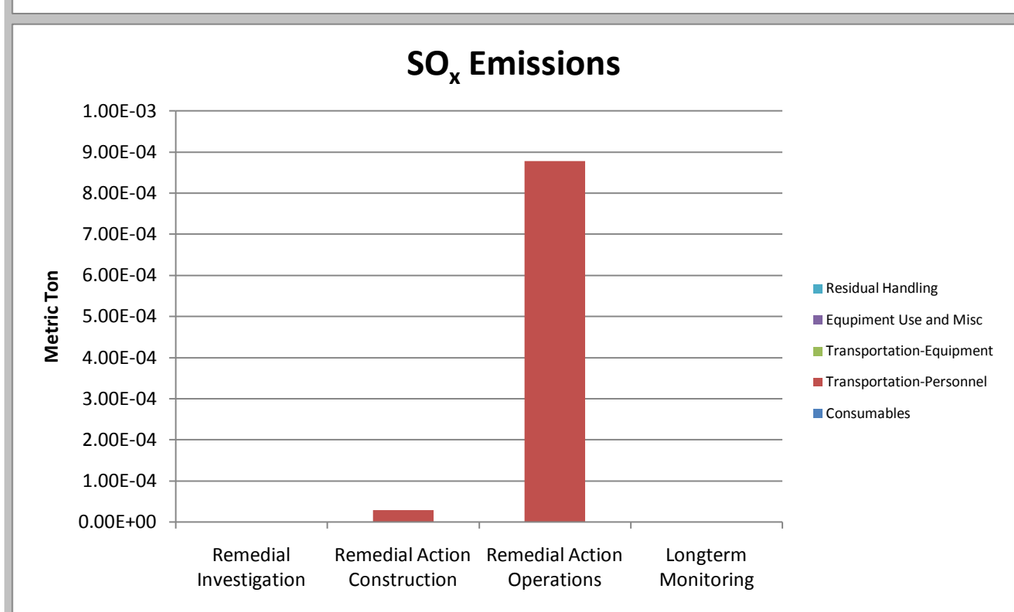
Phase	Activities	GHG Emissions metric ton	Total Energy Used MMBTU	Water Impacts gallons	NO_x Emissions metric ton	SO_x Emissions metric ton	PM_{10} Emissions metric ton	Accident Risk Fatality	Accident Risk Injury
Remedial Investigation	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Transportation-Equipment	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Residual Handling	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Remedial Action Construction	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	0.11	1.2E+00	NA	1.2E-04	2.9E-05	1.8E-05	2.6E-06	1.8E-04
	Transportation-Equipment	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Residual Handling	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	0.11	1.24E+00	0.00E+00	1.22E-04	2.93E-05	1.83E-05	2.55E-06	1.83E-04
Remedial Action Operations	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	3.40	3.7E+01	NA	3.7E-03	8.8E-04	5.5E-04	7.7E-05	5.5E-03
	Transportation-Equipment	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Residual Handling	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	3.40	37.20	0.00E+00	3.66E-03	8.78E-04	5.49E-04	7.65E-05	5.49E-03
Longterm Monitoring	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Transportation-Equipment	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Residual Handling	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total		**3.51**	**3.84E+01**	**0.00E+00**	**0.00**	**0.00**	**5.67E-04**	**7.91E-05**	**0.01**

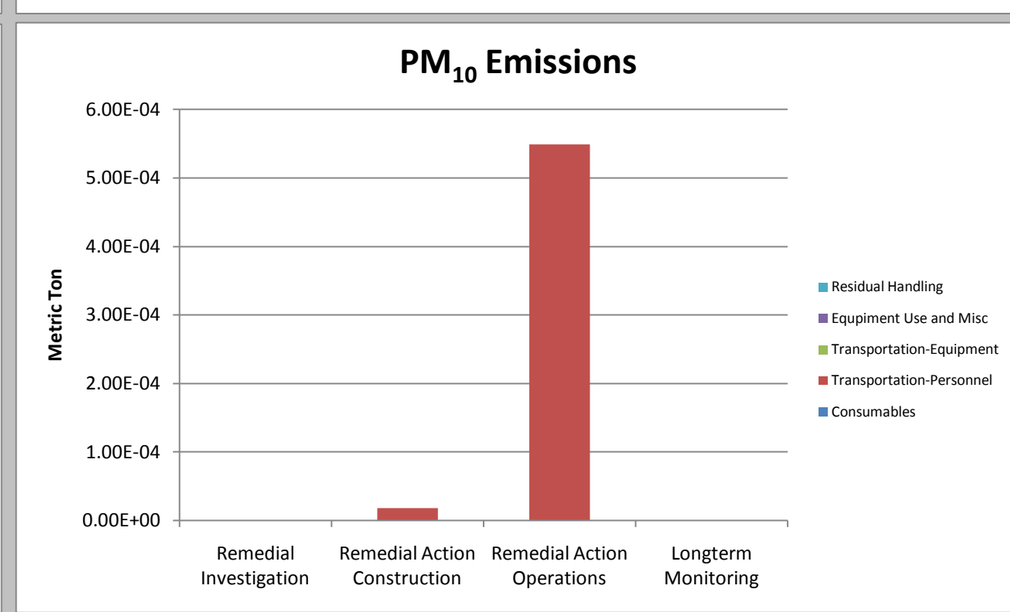

GHG Emissions
Metric Tons
4
4
3
3
2
2
1
1
0
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

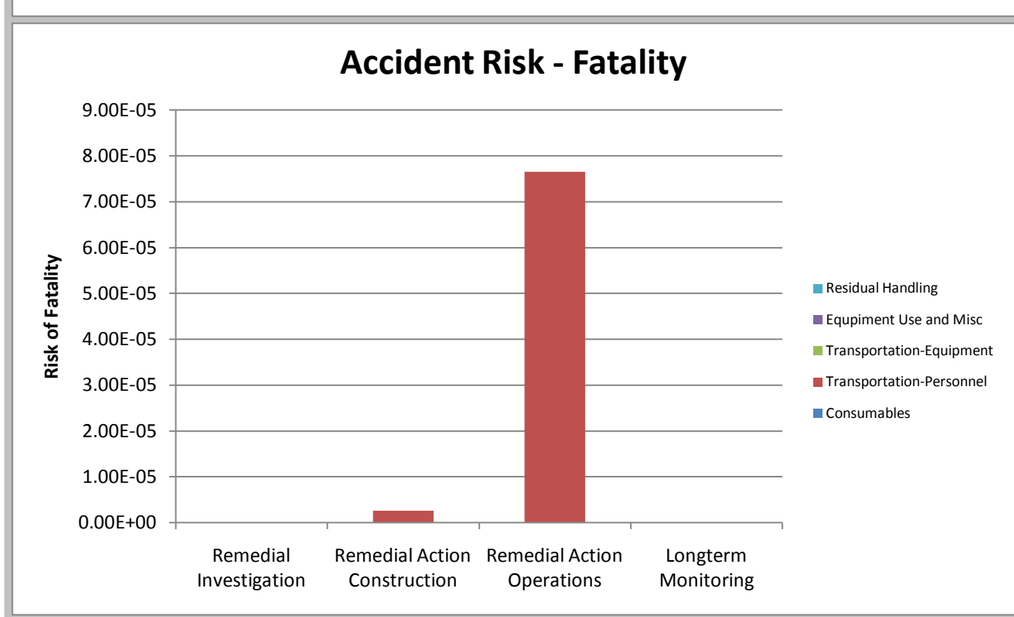

Total Energy Used
MMBTU
4.00E+01
3.50E+01
3.00E+01
2.50E+01
2.00E+01
1.50E+01
1.00E+01
5.00E+00
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

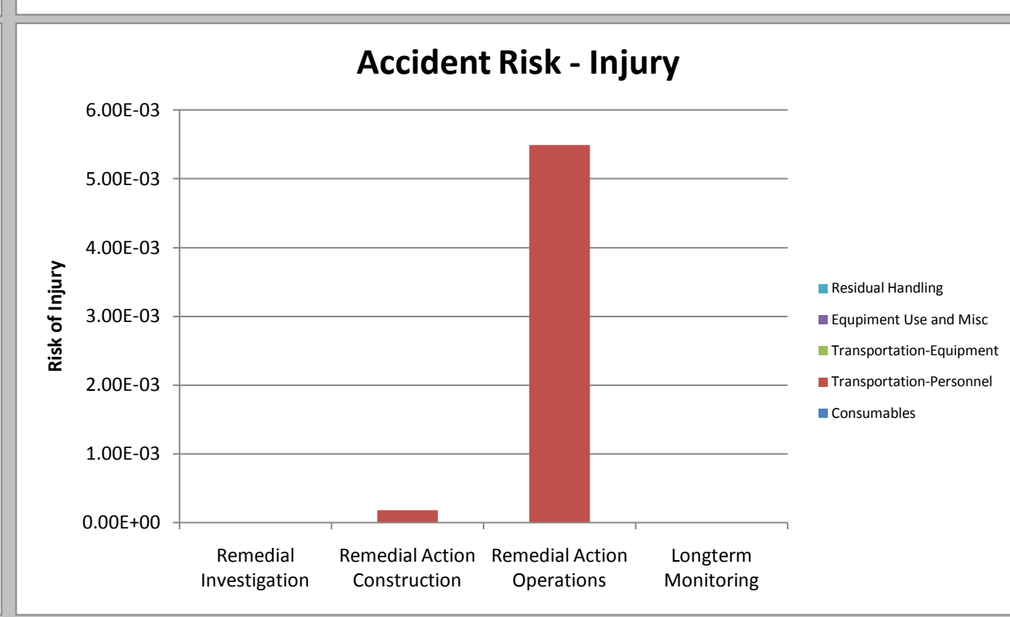

Water Impacts
Gallons
1.00E+00
9.00E-01
8.00E-01
7.00E-01
6.00E-01
5.00E-01
4.00E-01
3.00E-01
2.00E-01
1.00E-01
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


NOx Emissions
Metric Ton
4.00E-03
3.50E-03
3.00E-03
2.50E-03
2.00E-03
1.50E-03
1.00E-03
5.00E-04
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


SOx Emissions
Metric Ton
1.00E-03
9.00E-04
8.00E-04
7.00E-04
6.00E-04
5.00E-04
4.00E-04
3.00E-04
2.00E-04
1.00E-04
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

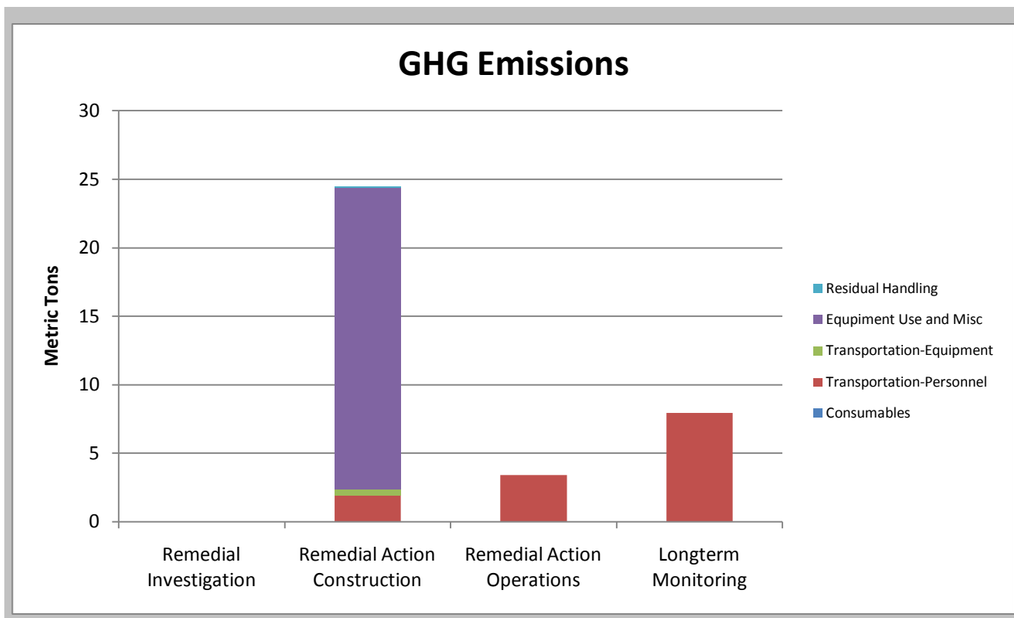

PM10 Emissions
Metric Ton
6.00E-04
5.00E-04
4.00E-04
3.00E-04
2.00E-04
1.00E-04
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

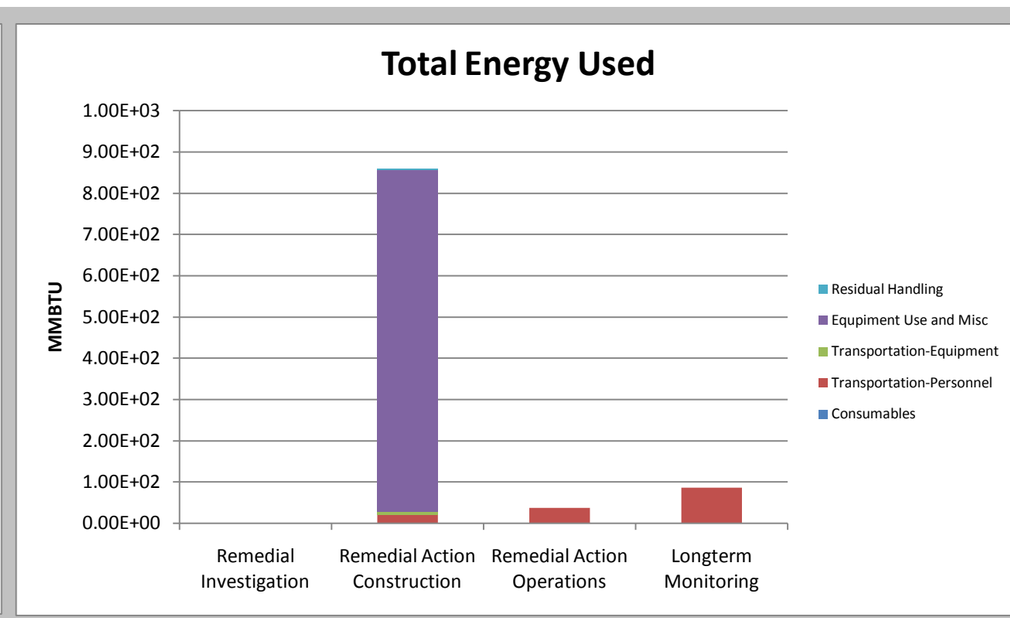

Accident Risk - Fatality
Risk of Fatality
9.00E-05
8.00E-05
7.00E-05
6.00E-05
5.00E-05
4.00E-05
3.00E-05
2.00E-05
1.00E-05
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

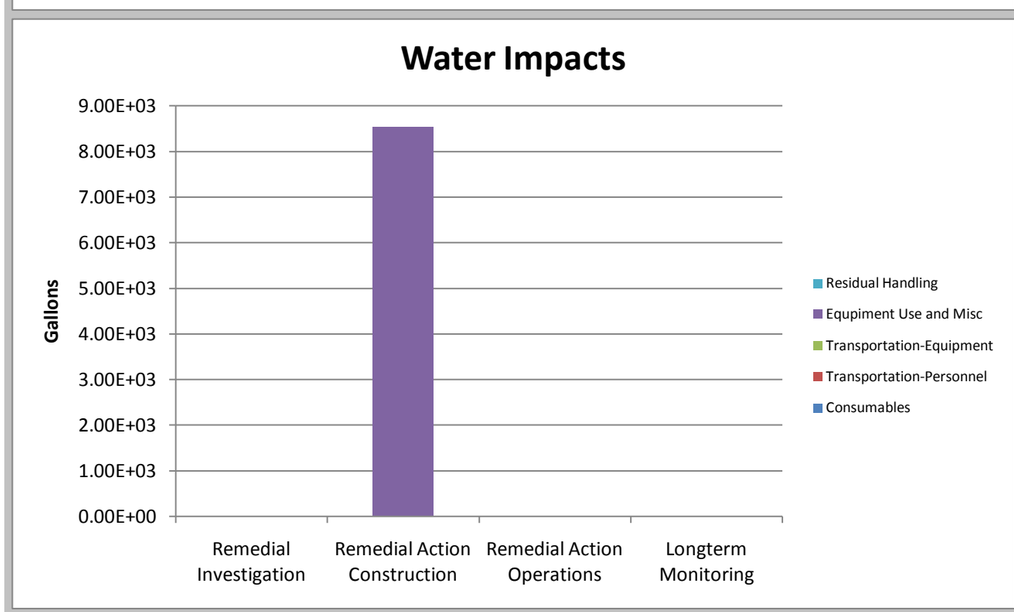

Accident Risk - Injury
Risk of Injury
6.00E-03
5.00E-03
4.00E-03
3.00E-03
2.00E-03
1.00E-03
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

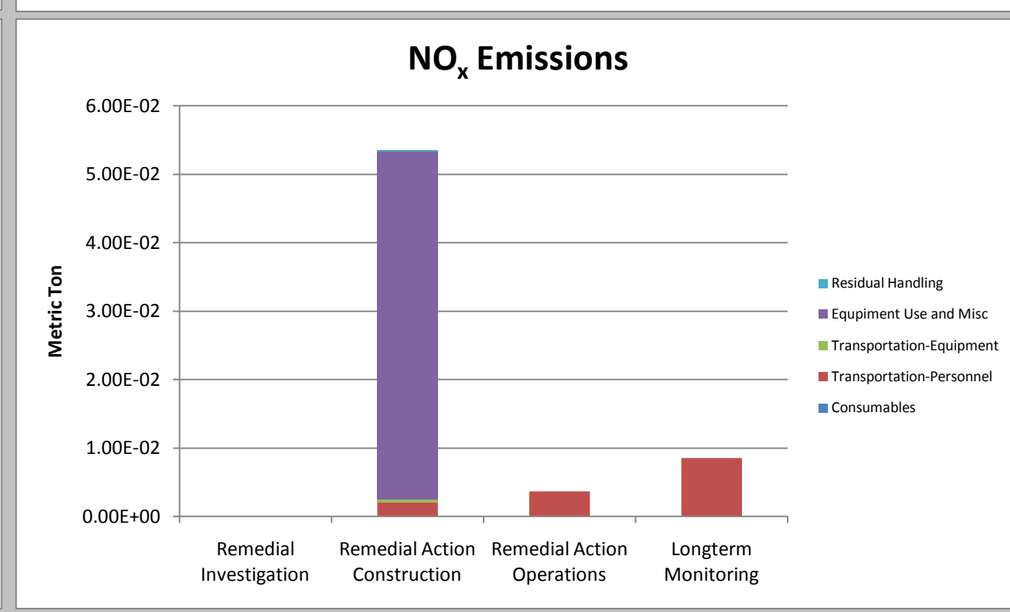
Sustainable Remediation - Environmental Footprint Summary
Alt 3

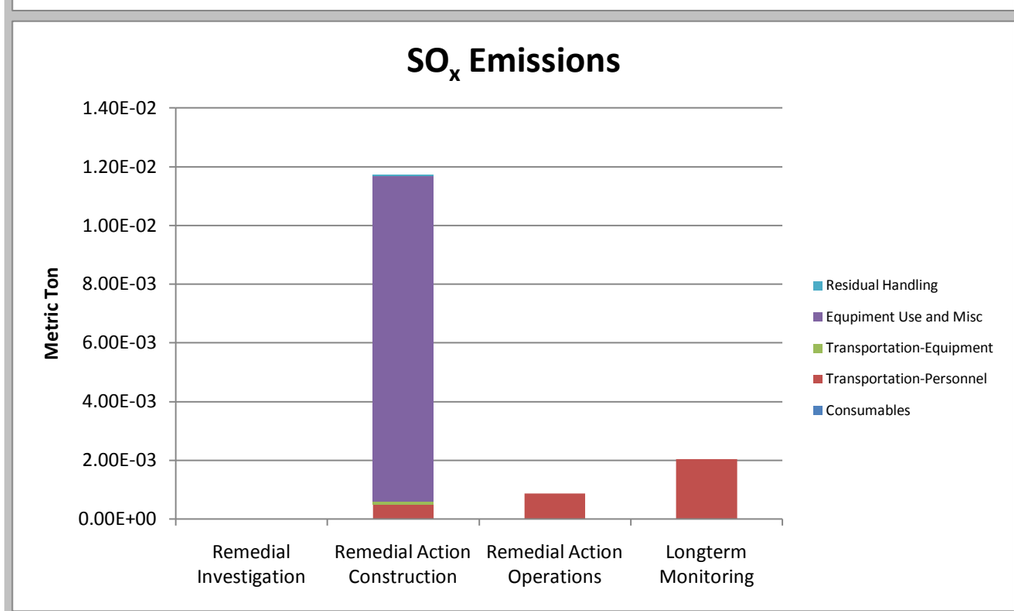
Phase	Activities	GHG Emissions metric ton	Total Energy Used MMBTU	Water Impacts gallons	NO_x Emissions metric ton	SO_x Emissions metric ton	PM_{10} Emissions metric ton	Accident Risk Fatality	Accident Risk Injury
Remedial Investigation	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Transportation-Equipment	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Residual Handling	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Remedial Action Construction	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	1.92	2.1E+01	NA	2.1E-03	5.0E-04	3.1E-04	4.0E-05	2.9E-03
	Transportation-Equipment	0.42	6.2E+00	NA	4.8E-04	9.2E-05	6.4E-05	7.2E-07	1.5E-04
	Equipment Use and Misc	22.05	8.3E+02	8.5E+03	5.1E-02	1.1E-02	4.0E-03	0.0E+00	0.0E+00
	Residual Handling	0.12	2.0E+00	NA	1.4E-04	2.6E-05	1.8E-05	3.8E-07	7.9E-05
	Sub-Total	24.52	8.59E+02	8.53E+03	5.35E-02	1.17E-02	4.43E-03	4.15E-05	3.13E-03
Remedial Action Operations	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	3.40	3.7E+01	NA	3.7E-03	8.8E-04	5.5E-04	7.7E-05	5.5E-03
	Transportation-Equipment	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Residual Handling	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	3.40	3.72E+01	0.00E+00	3.66E-03	8.78E-04	5.49E-04	7.65E-05	5.49E-03
Longterm Monitoring	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	7.94	8.7E+01	NA	8.5E-03	2.0E-03	1.3E-03	1.8E-04	1.3E-02
	Transportation-Equipment	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Residual Handling	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	7.94	8.68E+01	0.00E+00	8.54E-03	2.05E-03	1.28E-03	1.79E-04	1.28E-02
Total		**35.85**	**9.83E+02**	**8.53E+03**	**0.07**	**0.01**	**6.26E-03**	**2.96E-04**	**0.02**

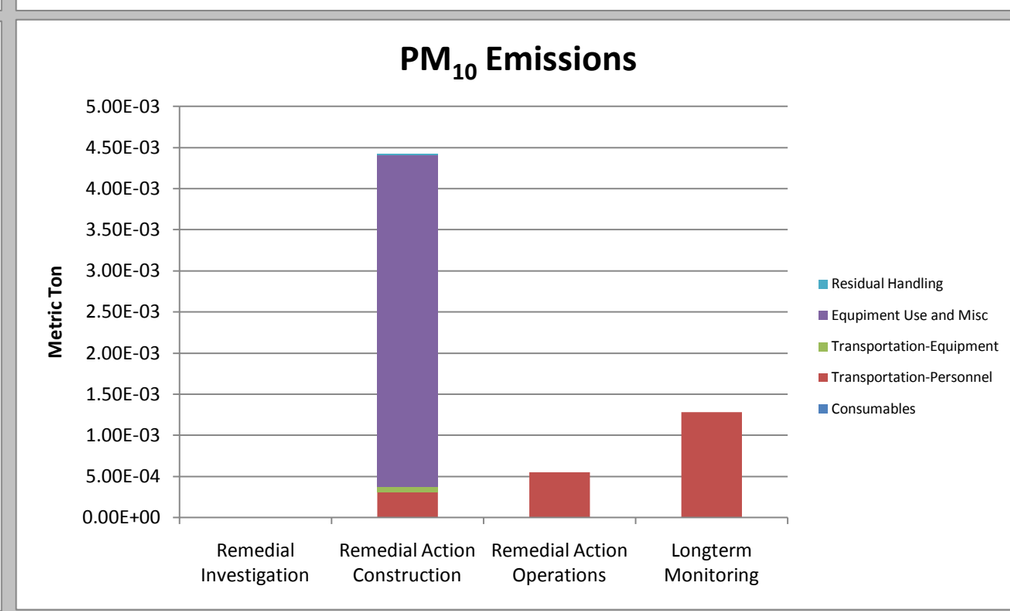

GHG Emissions
Metric Tons
30
25
20
15
10
5
0
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

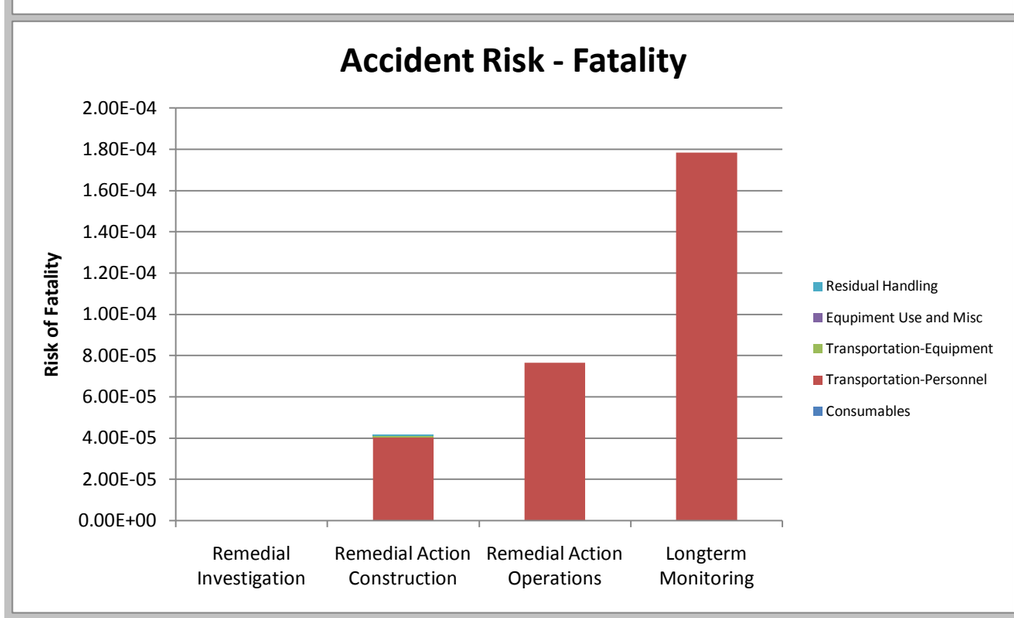

Total Energy Used
MMBTU
1.00E+03
9.00E+02
8.00E+02
7.00E+02
6.00E+02
5.00E+02
4.00E+02
3.00E+02
2.00E+02
1.00E+02
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

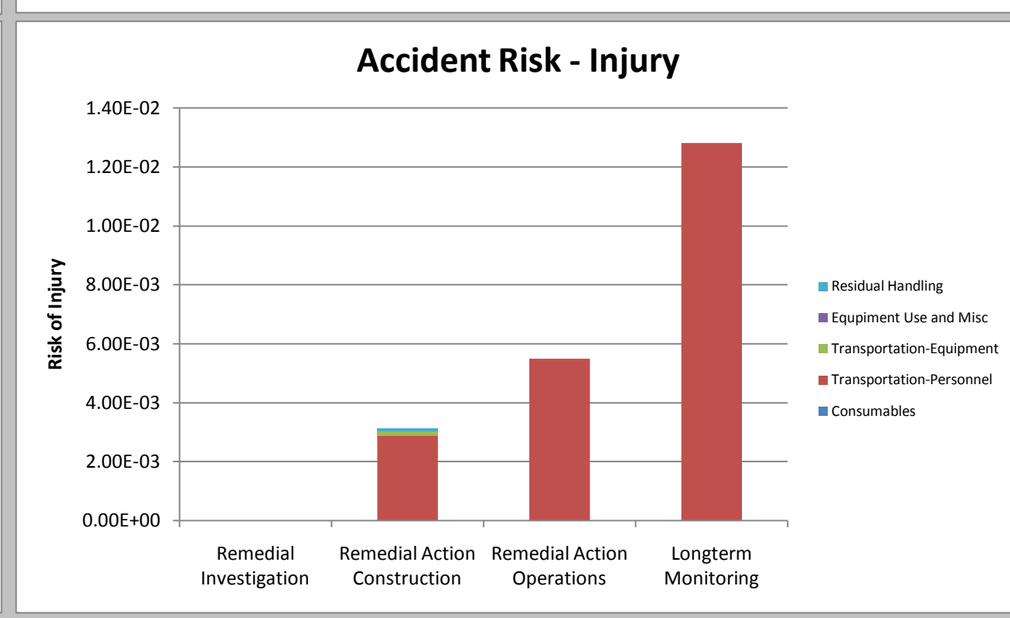

Water Impacts
Gallons
9.00E+03
8.00E+03
7.00E+03
6.00E+03
5.00E+03
4.00E+03
3.00E+03
2.00E+03
1.00E+03
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


NOx Emissions
Metric Ton
6.00E-02
5.00E-02
4.00E-02
3.00E-02
2.00E-02
1.00E-02
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


SOx Emissions
Metric Ton
1.40E-02
1.20E-02
1.00E-02
8.00E-03
6.00E-03
4.00E-03
2.00E-03
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

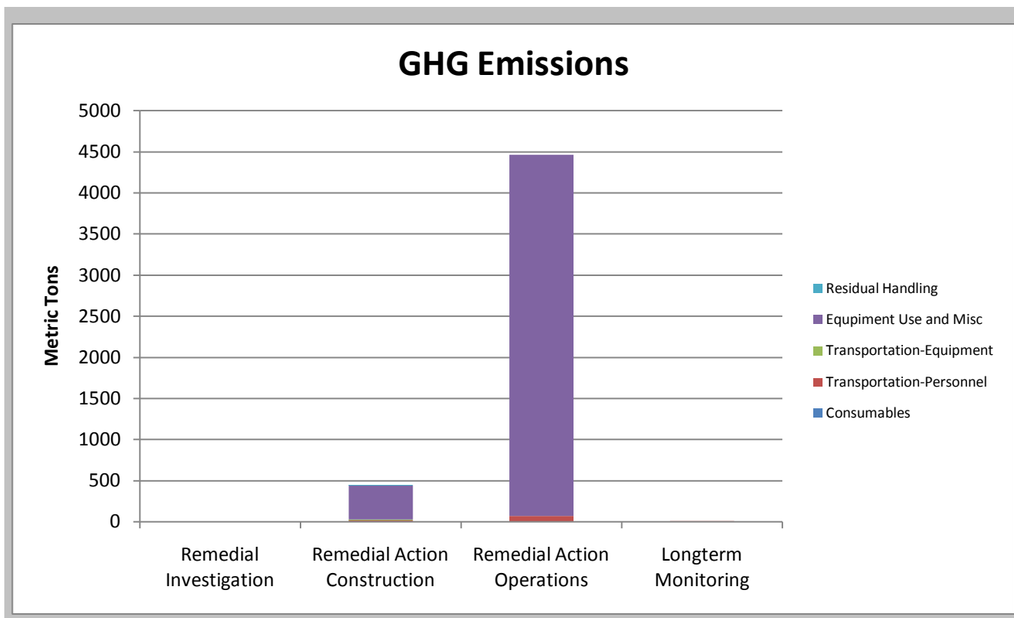

PM10 Emissions
Metric Ton
5.00E-03
4.50E-03
4.00E-03
3.50E-03
3.00E-03
2.50E-03
2.00E-03
1.50E-03
1.00E-03
5.00E-04
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

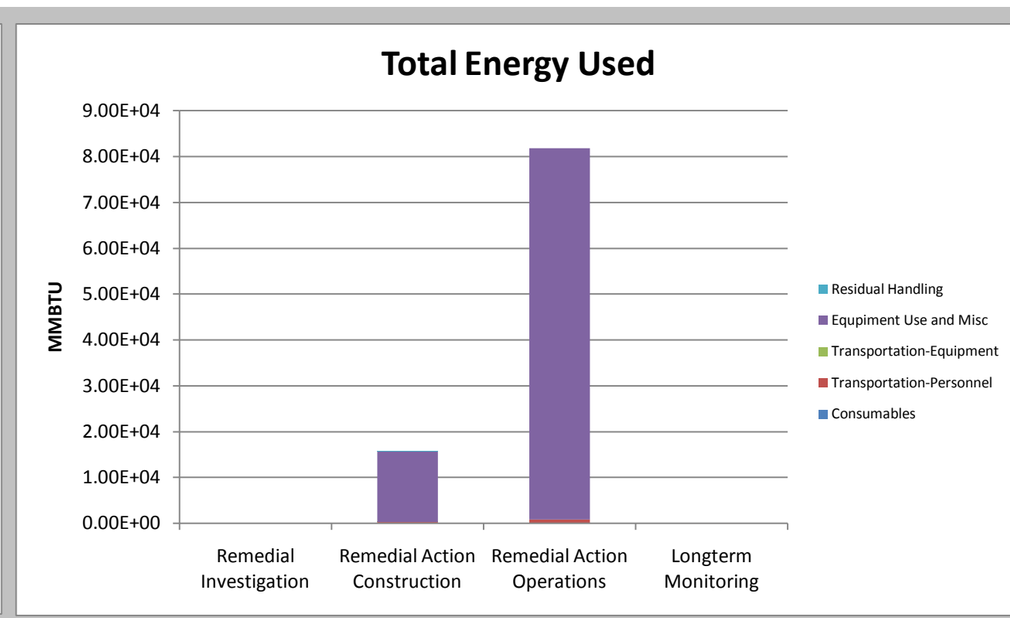

Accident Risk - Fatality
Risk of Fatality
2.00E-04
1.80E-04
1.60E-04
1.40E-04
1.20E-04
1.00E-04
8.00E-05
6.00E-05
4.00E-05
2.00E-05
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

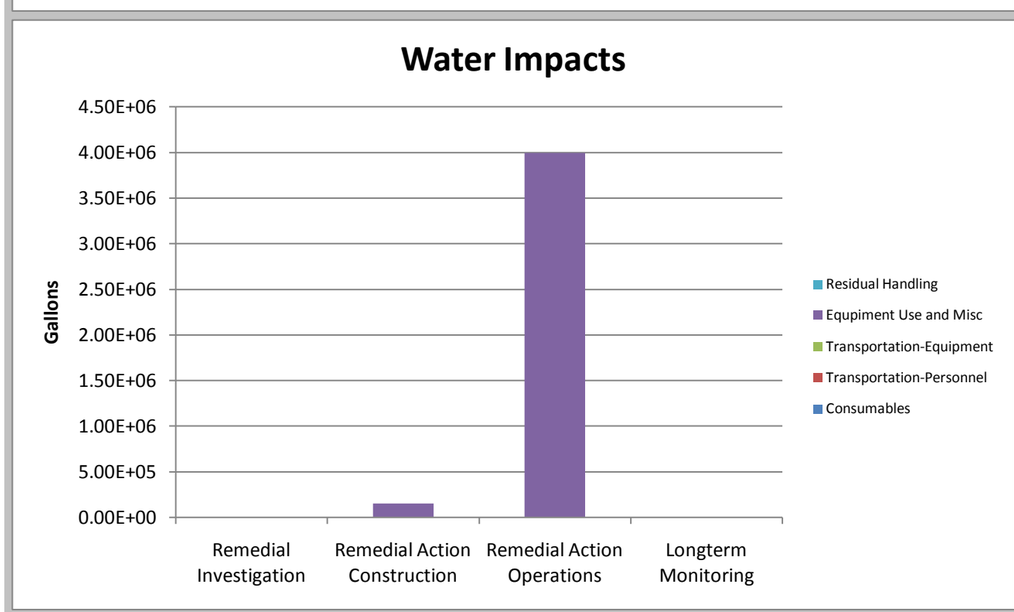

Accident Risk - Injury
Risk of Injury
1.40E-02
1.20E-02
1.00E-02
8.00E-03
6.00E-03
4.00E-03
2.00E-03
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

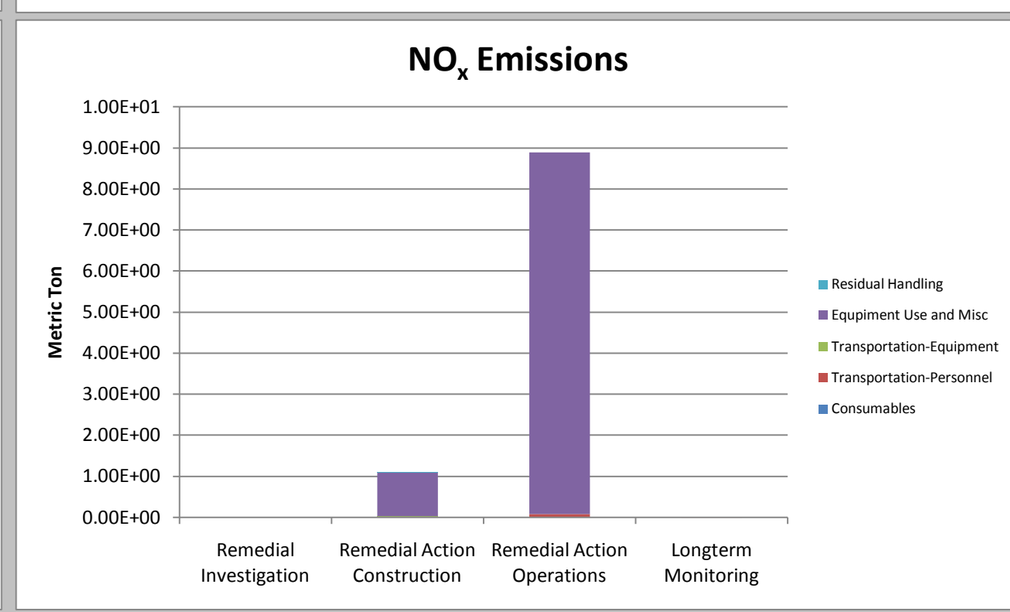
Sustainable Remediation - Environmental Footprint Summary
Alt 4

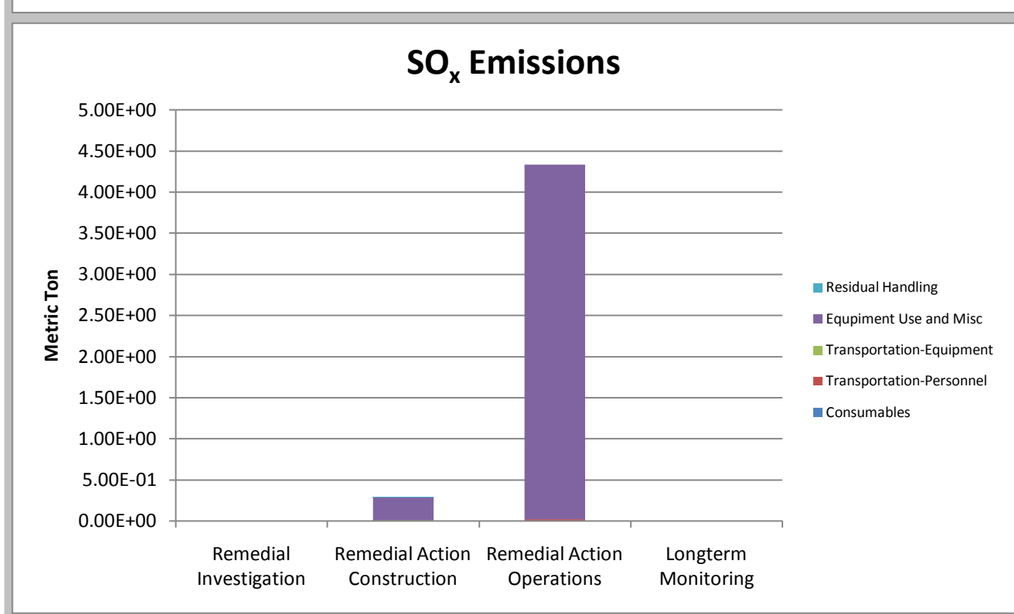
Phase	Activities	GHG Emissions metric ton	Total Energy Used MMBTU	Water Impacts gallons	NO_x Emissions metric ton	SO_x Emissions metric ton	PM_{10} Emissions metric ton	Accident Risk Fatality	Accident Risk Injury
Remedial Investigation	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Transportation-Equipment	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Residual Handling	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Remedial Action Construction	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	22.37	2.4E+02	NA	2.4E-02	5.8E-03	3.6E-03	4.6E-04	3.3E-02
	Transportation-Equipment	4.75	6.9E+01	NA	5.4E-03	1.0E-03	7.2E-04	7.0E-06	1.5E-03
	Equipment Use and Misc	418.03	1.5E+04	1.5E+05	1.1E+00	2.8E-01	9.7E-02	0.0E+00	0.0E+00
	Residual Handling	0.95	2.0E+01	NA	1.1E-03	2.1E-04	1.4E-04	3.0E-06	6.3E-04
	Sub-Total	446.10	1.57E+04	1.53E+05	1.09E+00	2.86E-01	1.02E-01	4.66E-04	3.48E-02
Remedial Action Operations	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	72.93	8.0E+02	NA	7.8E-02	1.9E-02	1.2E-02	1.2E-03	8.6E-02
	Transportation-Equipment	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	4,389.12	8.1E+04	4.0E+06	8.8E+00	4.3E+00	0.0E+00	0.0E+00	0.0E+00
	Residual Handling	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	4,462.06	8.18E+04	4.00E+06	8.89E+00	4.33E+00	1.18E-02	1.20E-03	8.60E-02
Longterm Monitoring	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	7.75	8.5E+01	NA	8.3E-03	2.0E-03	1.3E-03	1.7E-04	1.3E-02
	Transportation-Equipment	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Residual Handling	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	7.75	8.47E+01	0.00E+00	8.33E-03	2.00E-03	1.25E-03	1.74E-04	1.25E-02
Total		**4915.91**	**9.76E+04**	**4.15E+06**	**9.99**	**4.62**	**1.15E-01**	**1.84E-03**	**0.13**

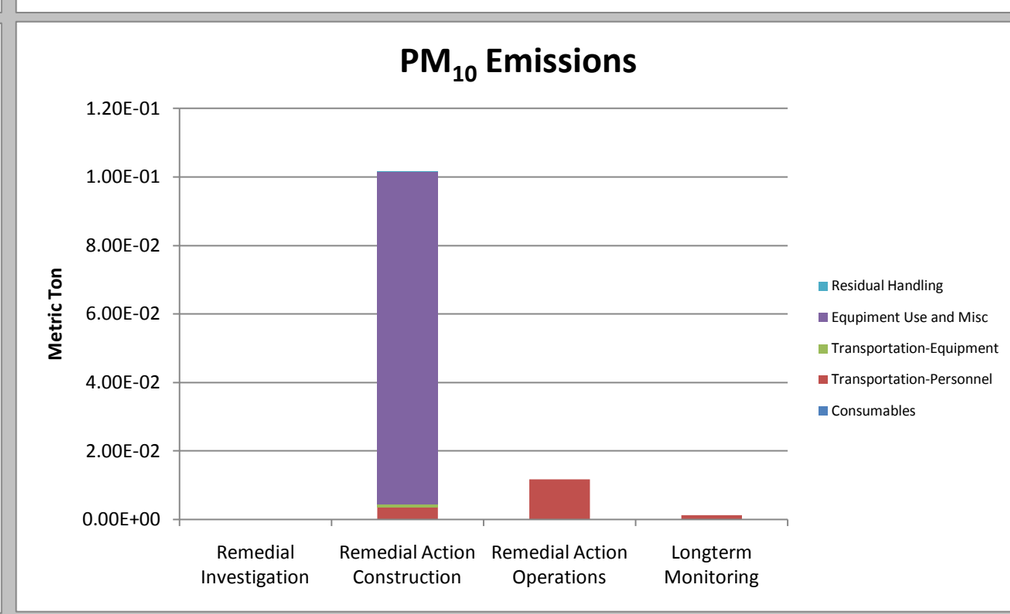

GHG Emissions
Metric Tons
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

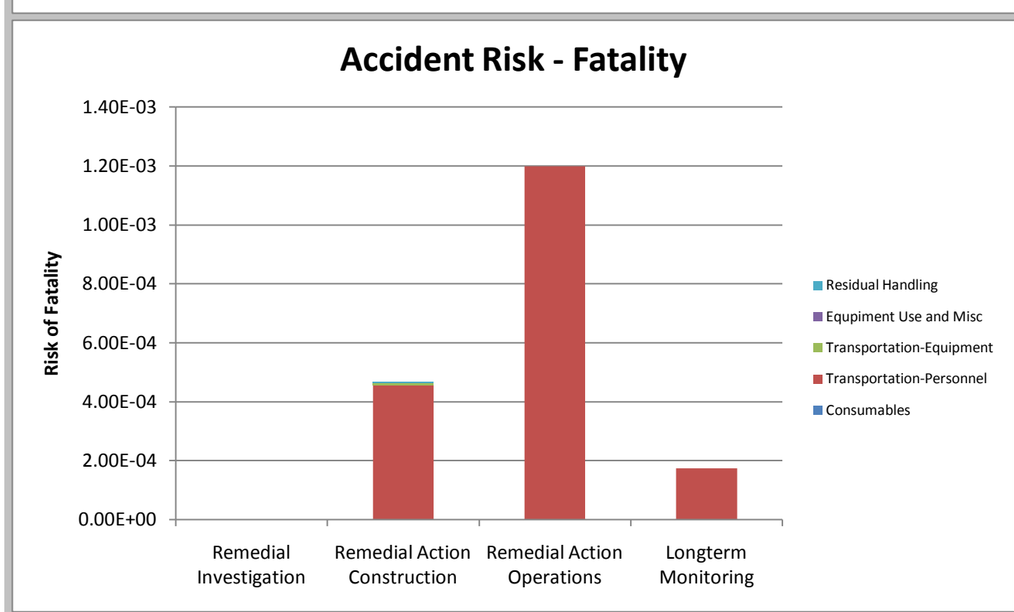

Total Energy Used
MMBTU
9.00E+04
8.00E+04
7.00E+04
6.00E+04
5.00E+04
4.00E+04
3.00E+04
2.00E+04
1.00E+04
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

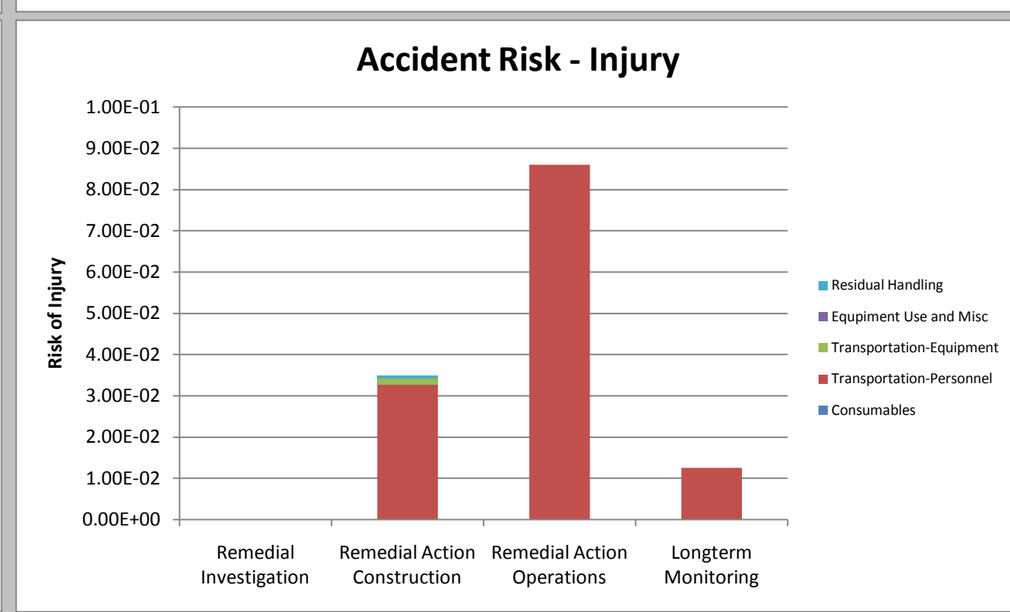

Water Impacts
Gallons
4.50E+06
4.00E+06
3.50E+06
3.00E+06
2.50E+06
2.00E+06
1.50E+06
1.00E+06
5.00E+05
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


NOx Emissions
Metric Ton
1.00E+01
9.00E+00
8.00E+00
7.00E+00
6.00E+00
5.00E+00
4.00E+00
3.00E+00
2.00E+00
1.00E+00
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


SOx Emissions
Metric Ton
5.00E+00
4.50E+00
4.00E+00
3.50E+00
3.00E+00
2.50E+00
2.00E+00
1.50E+00
1.00E+00
5.00E-01
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

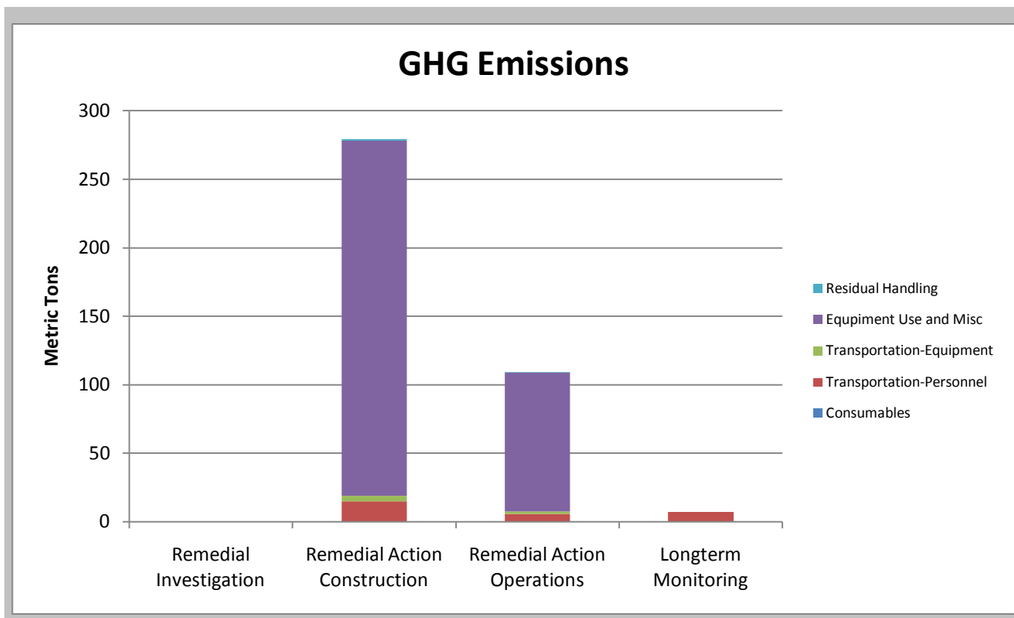

PM10 Emissions
Metric Ton
1.20E-01
1.00E-01
8.00E-02
6.00E-02
4.00E-02
2.00E-02
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

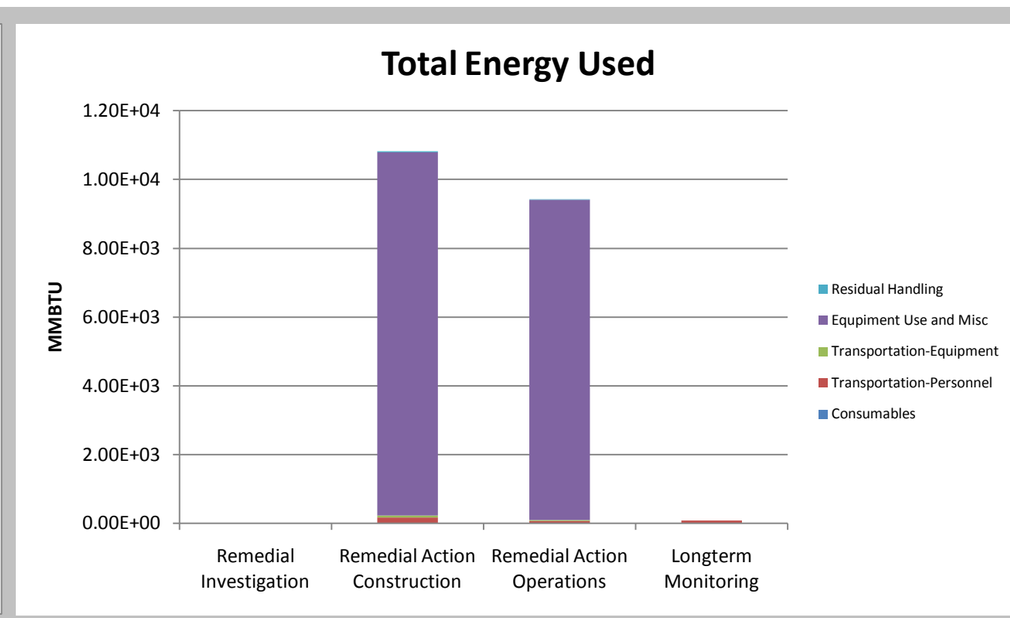

Accident Risk - Fatality
Risk of Fatality
1.40E-03
1.20E-03
1.00E-03
8.00E-04
6.00E-04
4.00E-04
2.00E-04
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

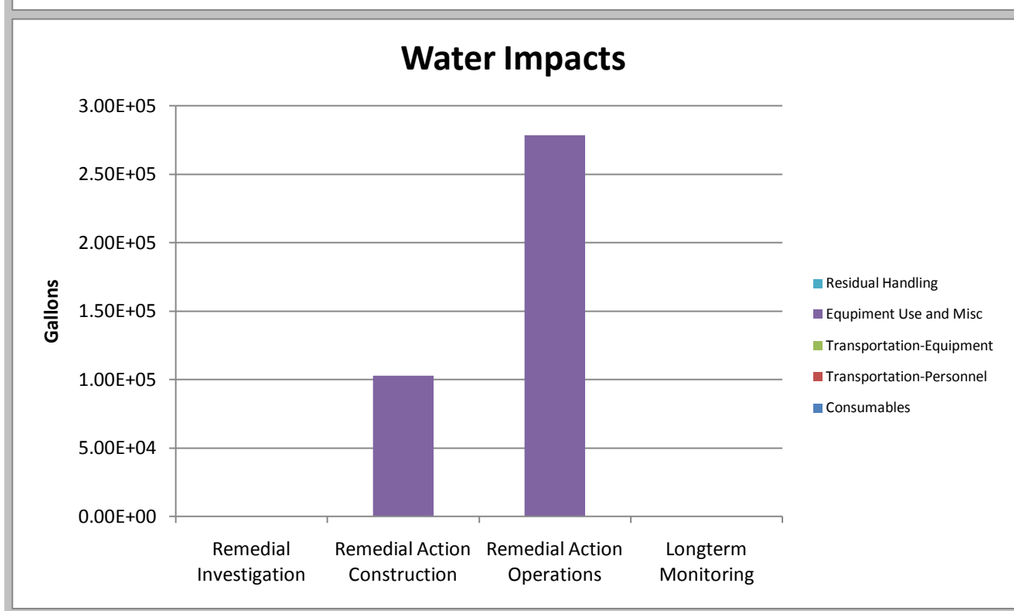

Accident Risk - Injury
Risk of Injury
1.00E-01
9.00E-02
8.00E-02
7.00E-02
6.00E-02
5.00E-02
4.00E-02
3.00E-02
2.00E-02
1.00E-02
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

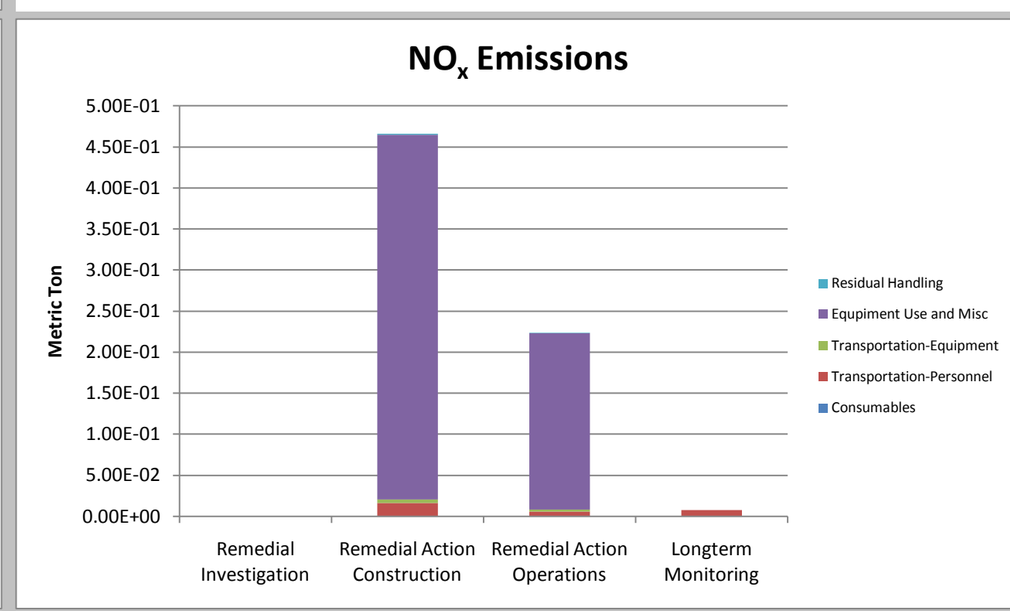
Sustainable Remediation - Environmental Footprint Summary
Alt 5

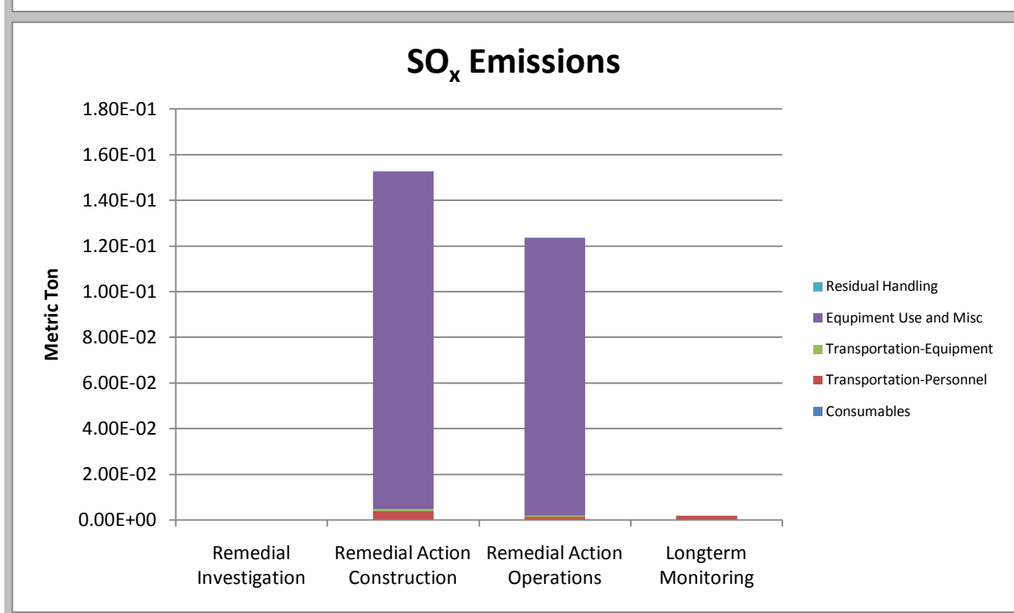
Phase	Activities	GHG Emissions metric ton	Total Energy Used MMBTU	Water Impacts gallons	NO_x Emissions metric ton	SO_x Emissions metric ton	PM_{10} Emissions metric ton	Accident Risk Fatality	Accident Risk Injury
Remedial Investigation	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Transportation-Equipment	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Residual Handling	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Remedial Action Construction	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	14.95	1.6E+02	NA	1.6E-02	3.9E-03	2.4E-03	3.0E-04	2.1E-02
	Transportation-Equipment	4.04	5.9E+01	NA	4.6E-03	8.8E-04	6.1E-04	6.0E-06	1.3E-03
	Equipment Use and Misc	259.17	1.1E+04	1.0E+05	4.4E-01	1.5E-01	3.9E-02	0.0E+00	0.0E+00
	Residual Handling	1.19	2.7E+01	NA	1.4E-03	2.6E-04	1.8E-04	3.8E-06	7.9E-04
	Sub-Total	279.34	1.08E+04	1.03E+05	4.66E-01	1.53E-01	4.23E-02	3.06E-04	2.33E-02
Remedial Action Operations	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	5.59	6.1E+01	NA	6.0E-03	1.4E-03	9.0E-04	1.8E-04	1.3E-02
	Transportation-Equipment	2.13	3.1E+01	NA	2.4E-03	4.6E-04	3.2E-04	3.1E-06	6.5E-04
	Equipment Use and Misc	101.11	9.3E+03	2.8E+05	2.1E-01	1.2E-01	2.7E-02	0.0E+00	0.0E+00
	Residual Handling	0.06	1.2E+00	NA	6.8E-05	1.3E-05	9.0E-06	1.9E-07	3.9E-05
	Sub-Total	108.89	9.41E+03	2.78E+05	2.23E-01	1.24E-01	2.87E-02	1.79E-04	1.33E-02
Longterm Monitoring	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	7.37	8.1E+01	NA	7.9E-03	1.9E-03	1.2E-03	1.7E-04	1.2E-02
	Transportation-Equipment	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Residual Handling	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	7.37	8.06E+01	0.00E+00	7.93E-03	1.90E-03	1.19E-03	1.66E-04	1.19E-02
Total		**395.60**	**2.03E+04**	**3.81E+05**	**0.70**	**2.78E-01**	**7.22E-02**	**6.51E-04**	**4.85E-02**

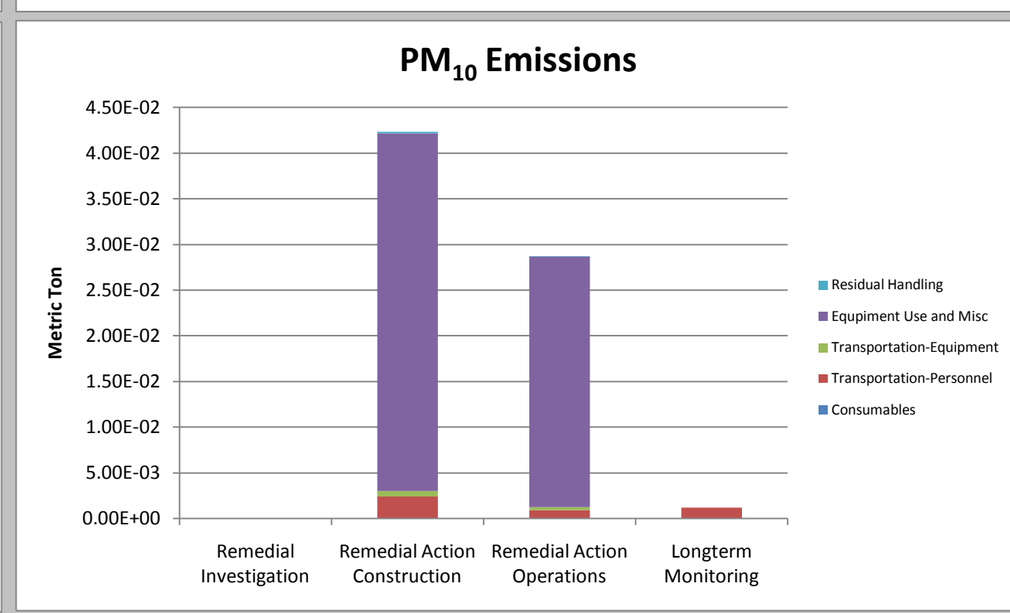

GHG Emissions
Metric Tons
300
250
200
150
100
50
0
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

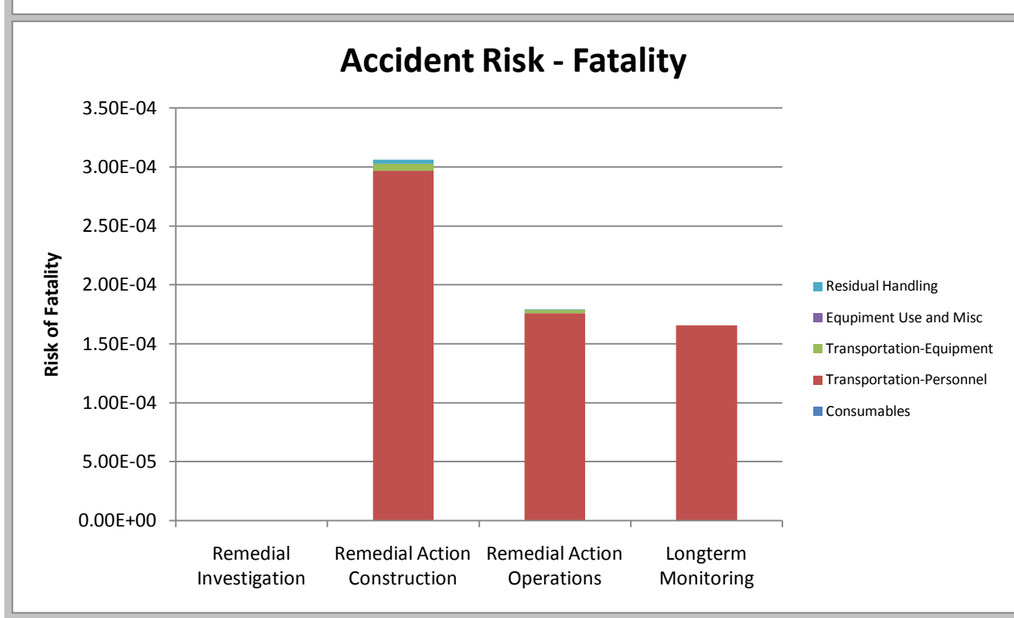

Total Energy Used
MMBTU
1.20E+04
1.00E+04
8.00E+03
6.00E+03
4.00E+03
2.00E+03
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

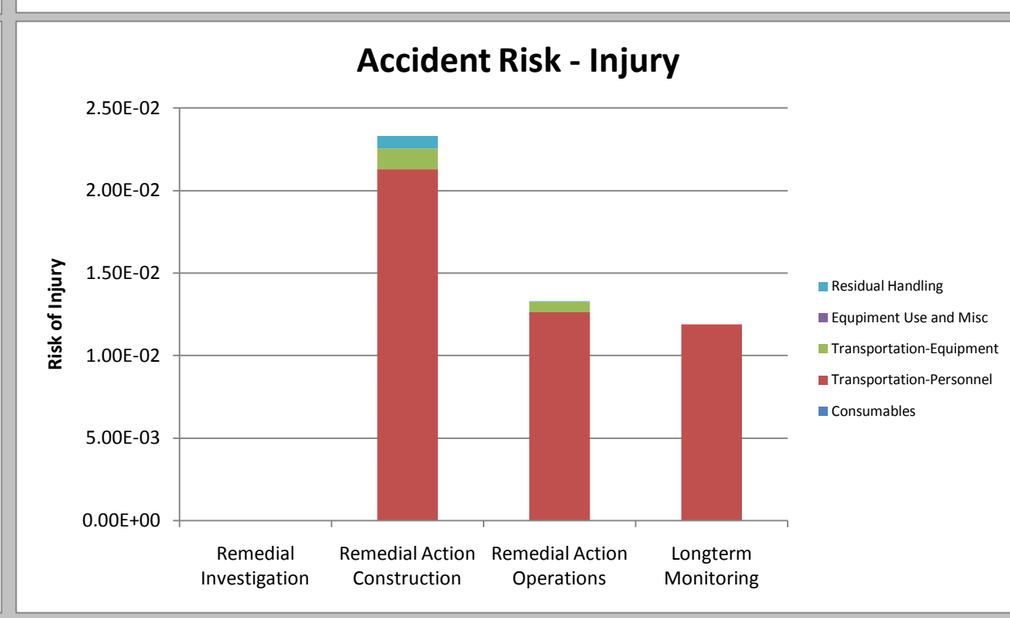

Water Impacts
Gallons
3.00E+05
2.50E+05
2.00E+05
1.50E+05
1.00E+05
5.00E+04
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


NOx Emissions
Metric Ton
5.00E-01
4.50E-01
4.00E-01
3.50E-01
3.00E-01
2.50E-01
2.00E-01
1.50E-01
1.00E-01
5.00E-02
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


SOx Emissions
Metric Ton
1.80E-01
1.60E-01
1.40E-01
1.20E-01
1.00E-01
8.00E-02
6.00E-02
4.00E-02
2.00E-02
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

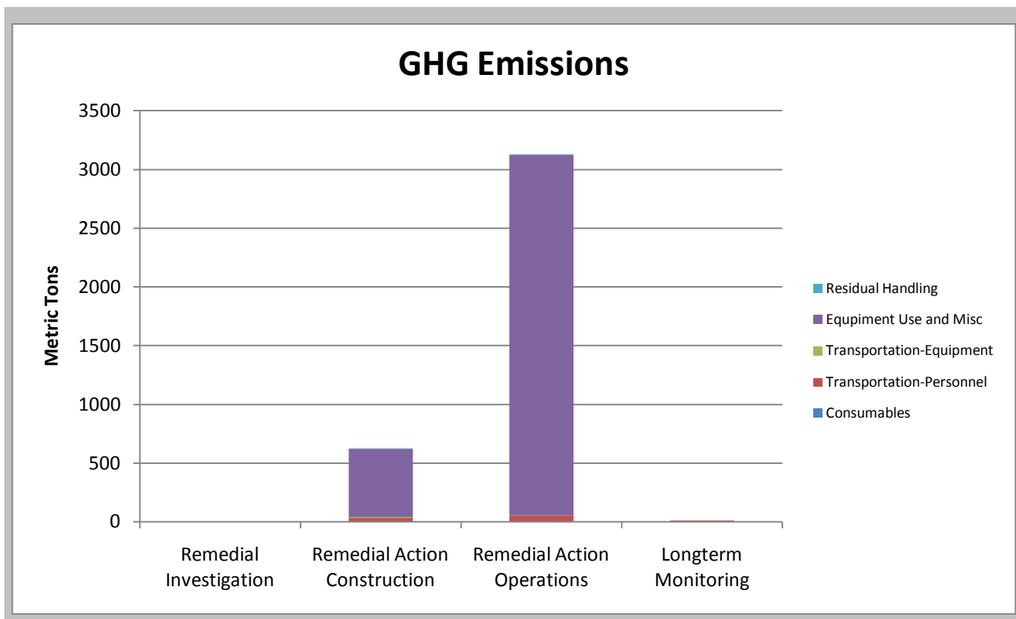

PM10 Emissions
Metric Ton
4.50E-02
4.00E-02
3.50E-02
3.00E-02
2.50E-02
2.00E-02
1.50E-02
1.00E-02
5.00E-03
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

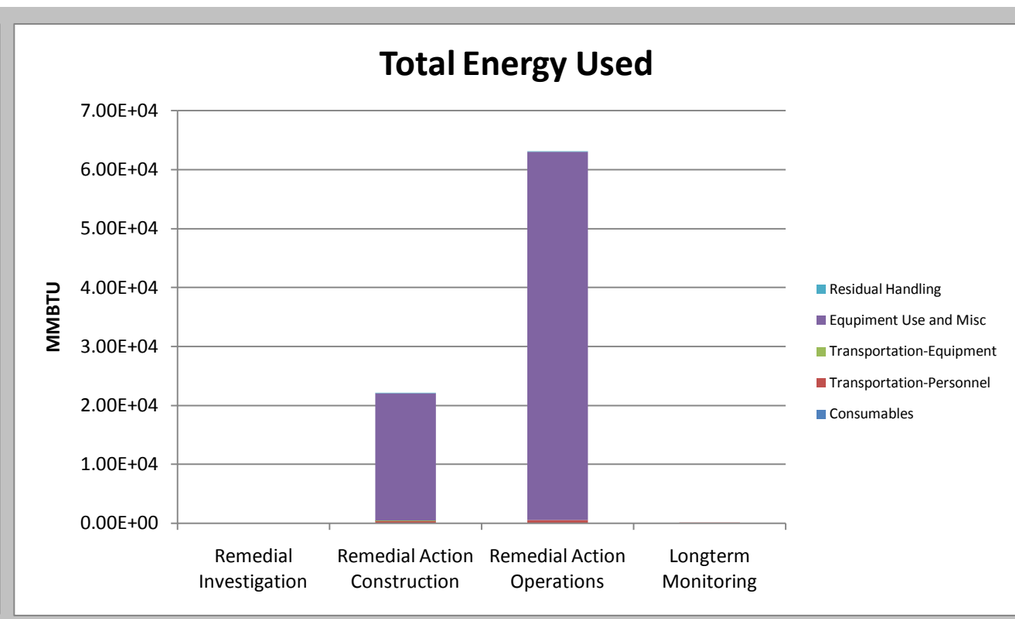

Accident Risk - Fatality
Risk of Fatality
3.50E-04
3.00E-04
2.50E-04
2.00E-04
1.50E-04
1.00E-04
5.00E-05
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

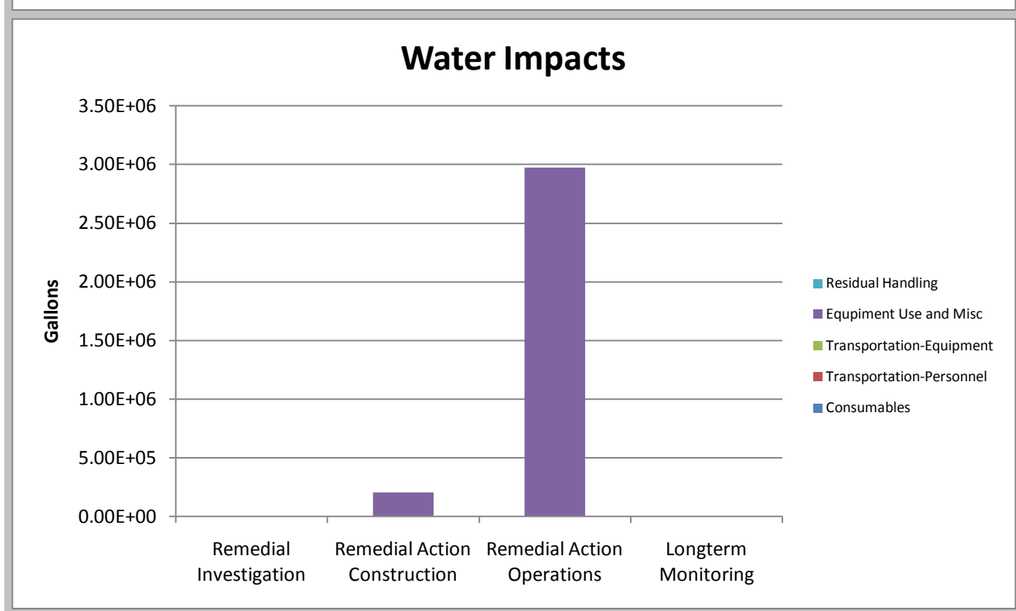

Accident Risk - Injury
Risk of Injury
2.50E-02
2.00E-02
1.50E-02
1.00E-02
5.00E-03
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

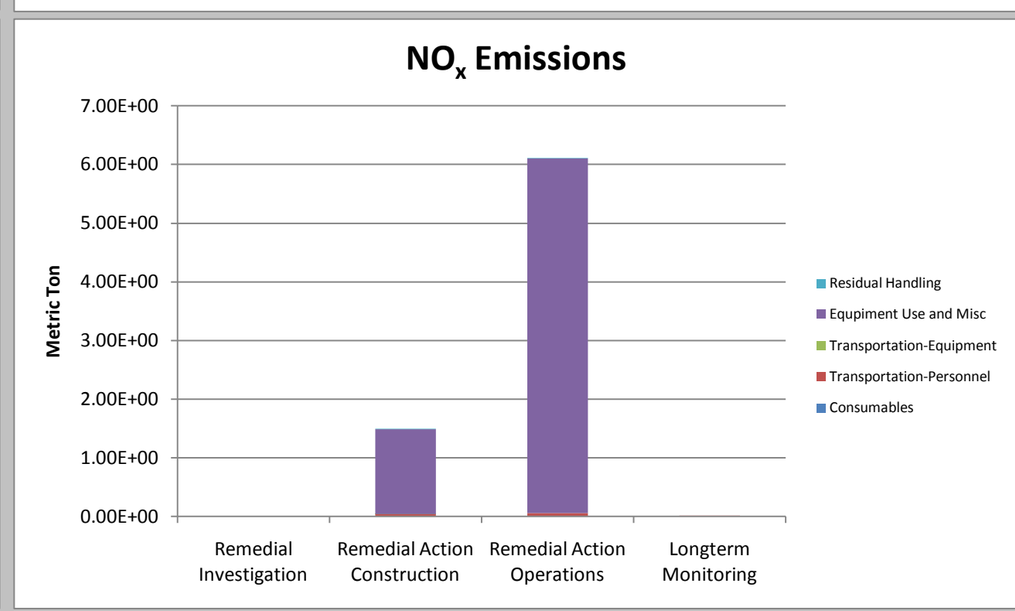
Sustainable Remediation - Environmental Footprint Summary
Alt 6

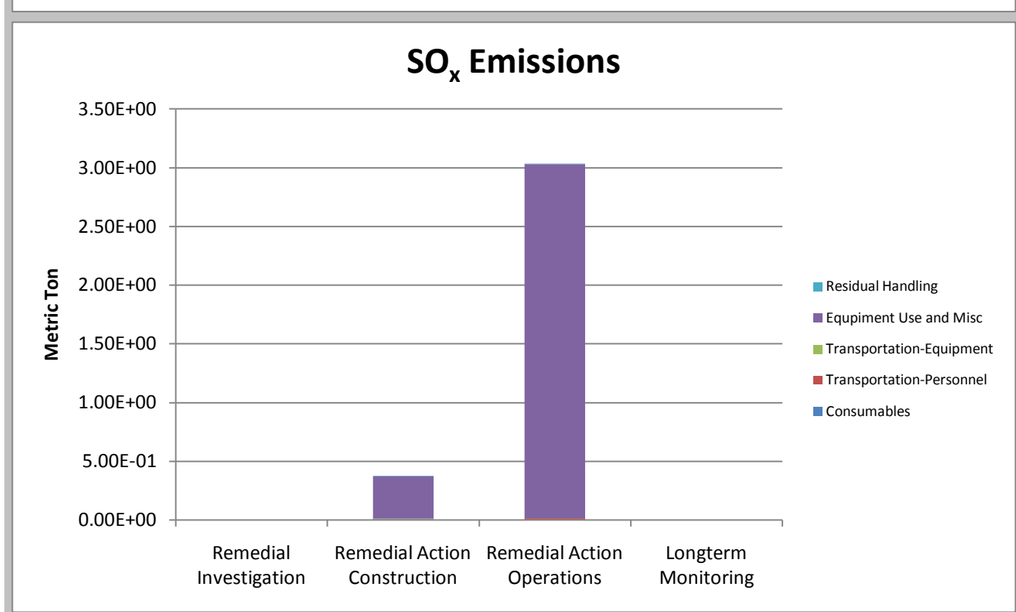
Phase	Activities	GHG Emissions metric ton	Total Energy Used MMBTU	Water Impacts gallons	NO_x Emissions metric ton	SO_x Emissions metric ton	PM_{10} Emissions metric ton	Accident Risk Fatality	Accident Risk Injury
Remedial Investigation	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Transportation-Equipment	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Residual Handling	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Remedial Action Construction	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	33.17	3.6E+02	NA	3.6E-02	8.6E-03	5.4E-03	7.4E-04	5.3E-02
	Transportation-Equipment	6.69	9.8E+01	NA	7.6E-03	1.5E-03	1.0E-03	9.8E-06	2.1E-03
	Equipment Use and Misc	579.76	2.2E+04	2.1E+05	1.4E+00	3.6E-01	1.3E-01	0.0E+00	0.0E+00
	Residual Handling	1.60	3.7E+01	NA	1.8E-03	3.5E-04	2.4E-04	5.1E-06	1.1E-03
	Sub-Total	621.23	2.21E+04	2.07E+05	1.49E+00	3.73E-01	1.34E-01	7.60E-04	5.65E-02
Remedial Action Operations	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	53.36	5.8E+02	NA	5.7E-02	1.4E-02	8.6E-03	9.3E-04	6.7E-02
	Transportation-Equipment	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	3,069.52	6.3E+04	3.0E+06	6.0E+00	3.0E+00	2.3E-05	0.0E+00	0.0E+00
	Residual Handling	0.06	1.1E+00	NA	6.8E-05	1.3E-05	9.0E-06	1.9E-07	3.9E-05
	Sub-Total	3,122.94	6.31E+04	2.97E+06	6.10E+00	3.03E+00	8.65E-03	9.31E-04	6.68E-02
Longterm Monitoring	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	10.77	1.2E+02	NA	1.2E-02	2.8E-03	1.7E-03	2.4E-04	1.7E-02
	Transportation-Equipment	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Residual Handling	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	10.77	1.18E+02	0.00E+00	1.16E-02	2.78E-03	1.74E-03	2.42E-04	1.74E-02
Total		**3.8E+03**	**8.5E+04**	**3.2E+06**	**7.6E+00**	**3.4E+00**	**1.4E-01**	**1.9E-03**	**1.4E-01**

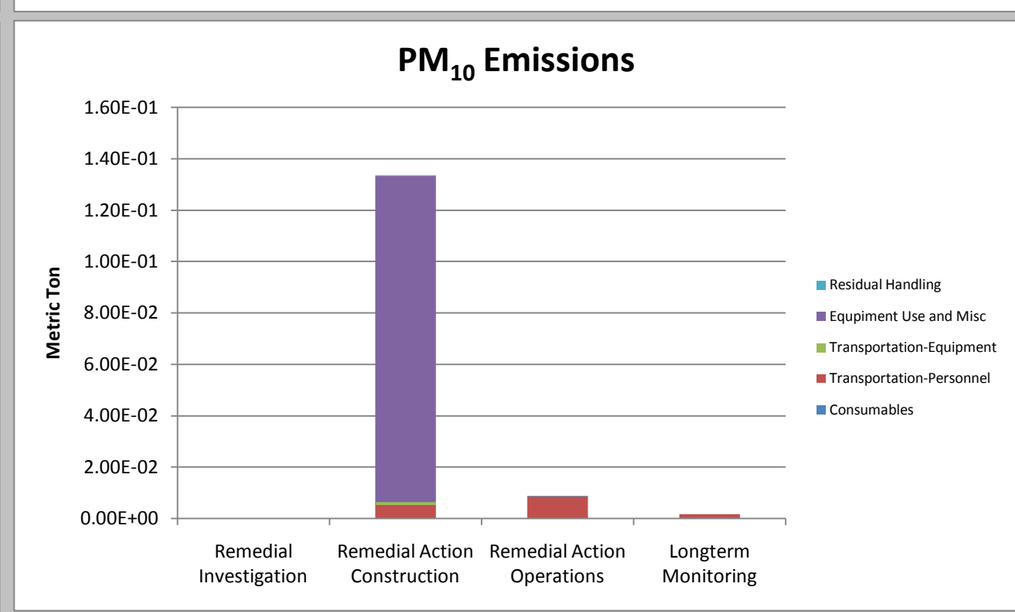

GHG Emissions
Metric Tons
3500
3000
2500
2000
1500
1000
500
0
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

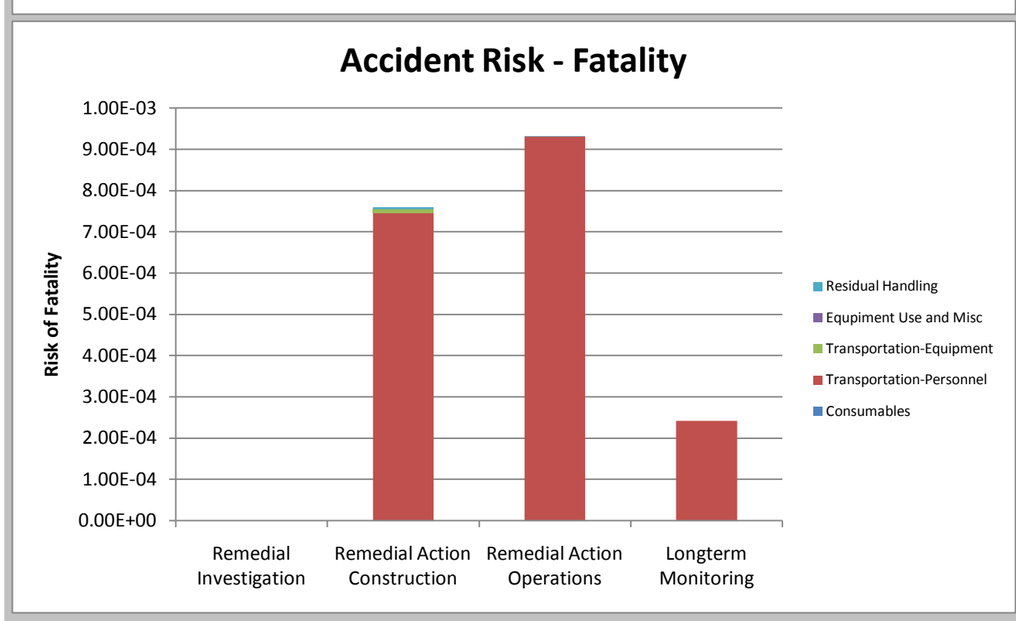

Total Energy Used
MMBTU
7.00E+04
6.00E+04
5.00E+04
4.00E+04
3.00E+04
2.00E+04
1.00E+04
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

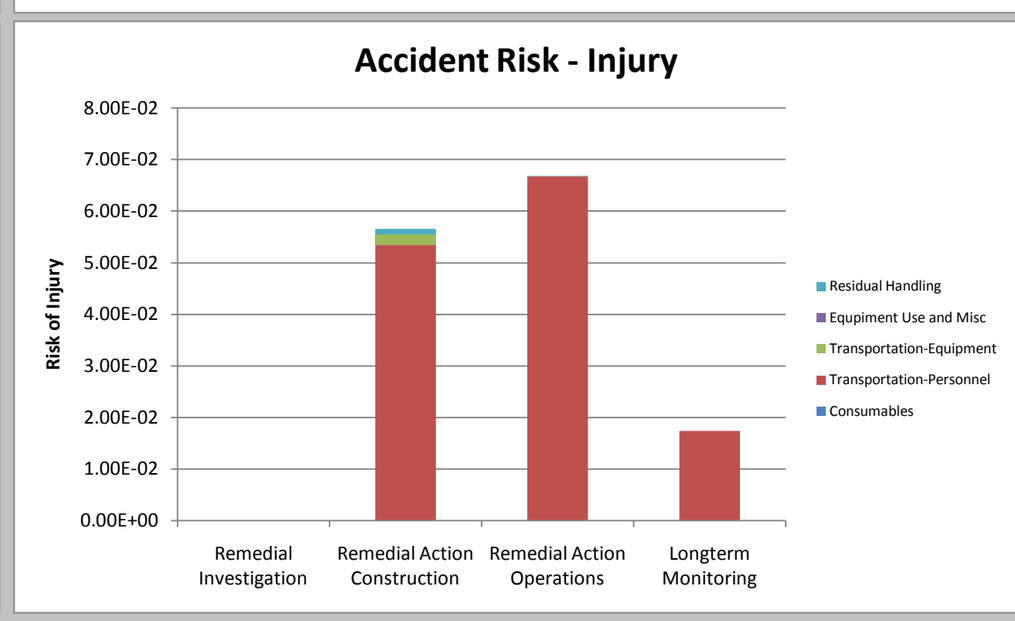

Water Impacts
Gallons
3.50E+06
3.00E+06
2.50E+06
2.00E+06
1.50E+06
1.00E+06
5.00E+05
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


NOx Emissions
Metric Ton
7.00E+00
6.00E+00
5.00E+00
4.00E+00
3.00E+00
2.00E+00
1.00E+00
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


SOx Emissions
Metric Ton
3.50E+00
3.00E+00
2.50E+00
2.00E+00
1.50E+00
1.00E+00
5.00E-01
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

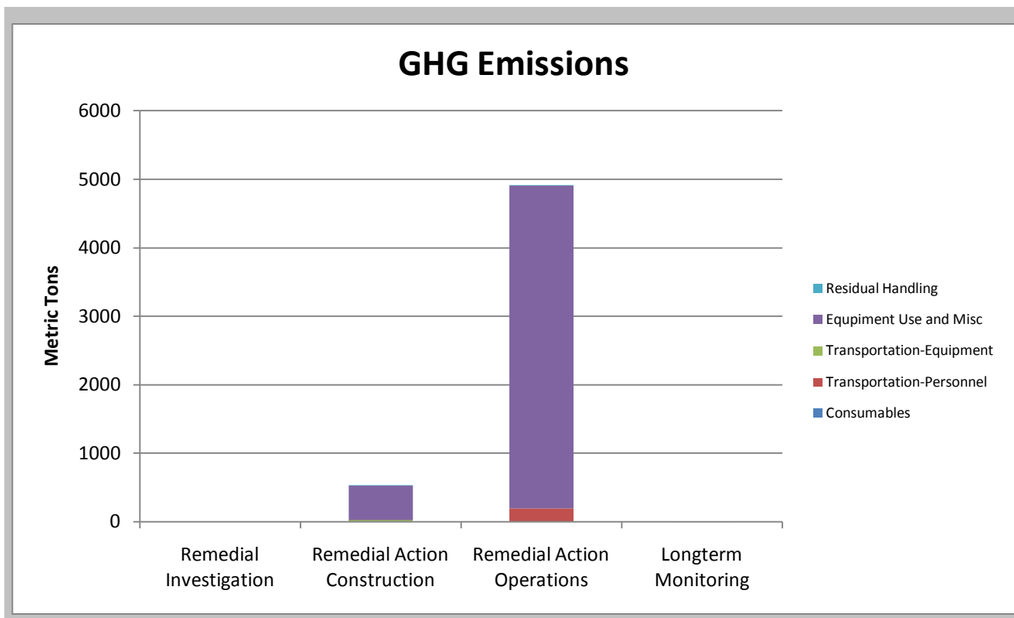

PM10 Emissions
Metric Ton
1.60E-01
1.40E-01
1.20E-01
1.00E-01
8.00E-02
6.00E-02
4.00E-02
2.00E-02
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

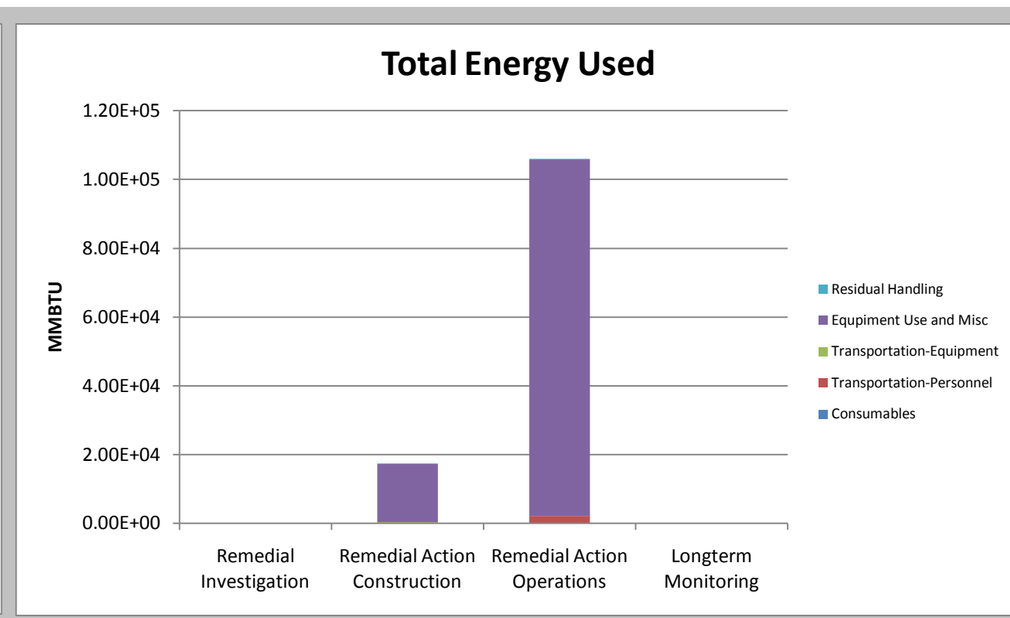

Accident Risk - Fatality
Risk of Fatality
1.00E-03
9.00E-04
8.00E-04
7.00E-04
6.00E-04
5.00E-04
4.00E-04
3.00E-04
2.00E-04
1.00E-04
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

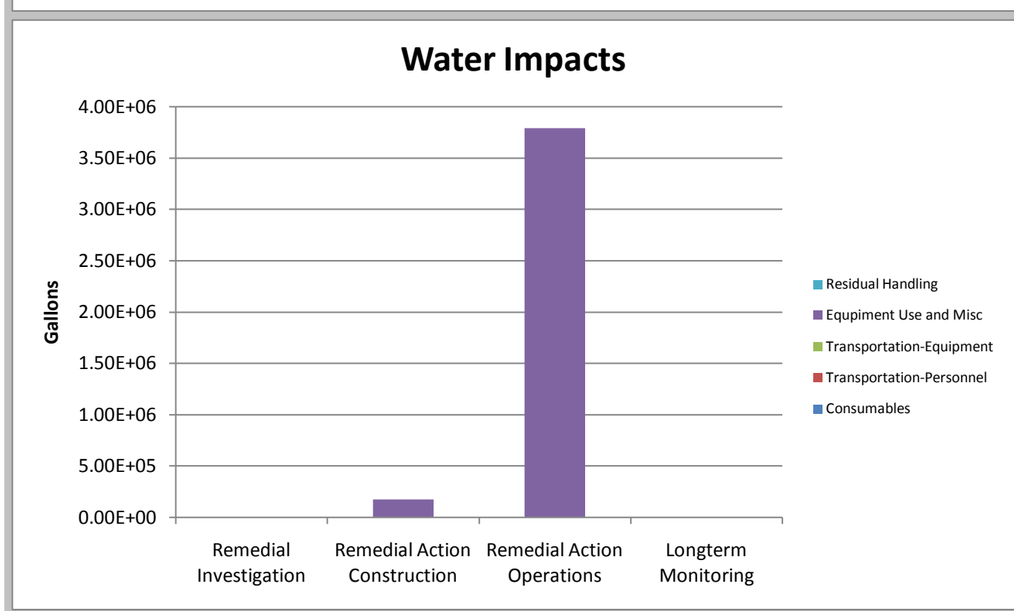

Accident Risk - Injury
Risk of Injury
8.00E-02
7.00E-02
6.00E-02
5.00E-02
4.00E-02
3.00E-02
2.00E-02
1.00E-02
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

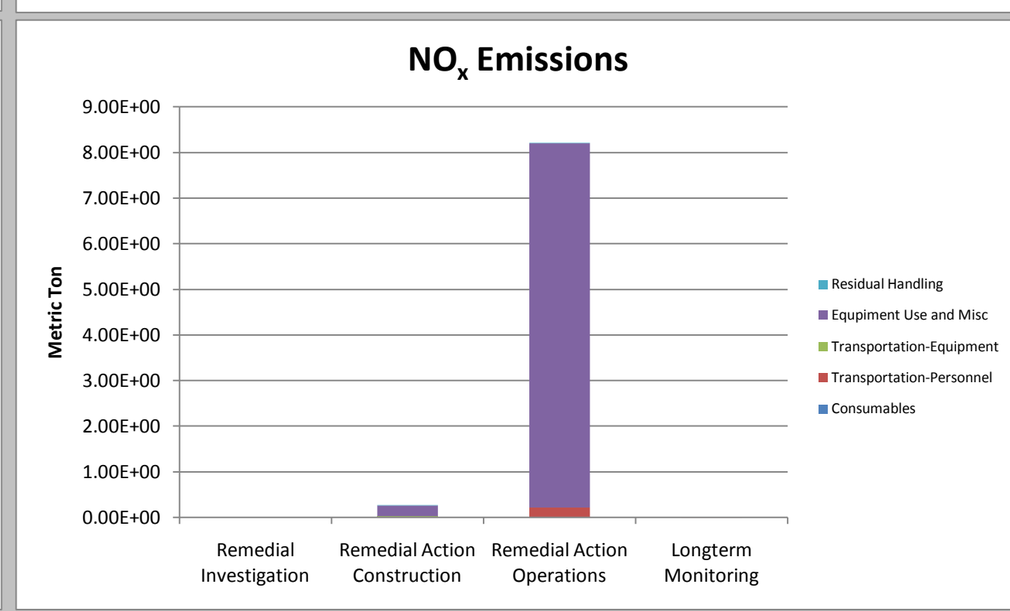
Sustainable Remediation - Environmental Footprint Summary
Alt 7

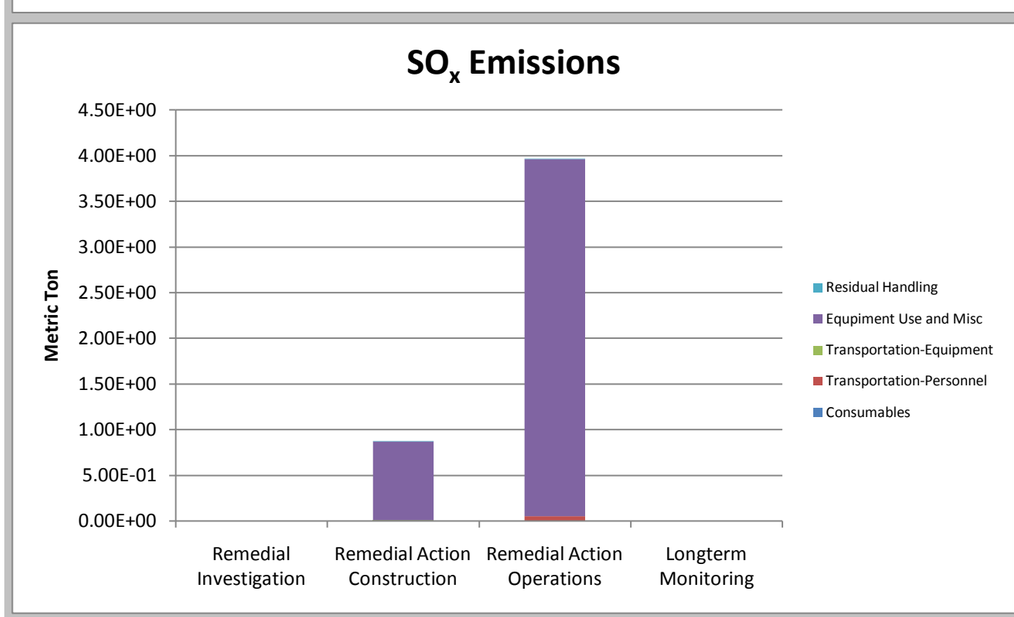
Phase	Activities	GHG Emissions metric ton	Total Energy Used MMBTU	Water Impacts gallons	NO_x Emissions metric ton	SO_x Emissions metric ton	PM_{10} Emissions metric ton	Accident Risk Fatality	Accident Risk Injury
Remedial Investigation	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Transportation-Equipment	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Residual Handling	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Remedial Action Construction	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	11.36	1.2E+02	NA	1.2E-02	2.9E-03	1.8E-03	2.3E-04	1.6E-02
	Transportation-Equipment	16.04	2.3E+02	NA	1.8E-02	3.5E-03	2.4E-03	1.5E-05	3.2E-03
	Equipment Use and Misc	498.98	1.7E+04	1.8E+05	2.3E-01	8.6E-01	1.2E-01	0.0E+00	0.0E+00
	Residual Handling	0.12	2.4E+00	NA	1.4E-04	2.6E-05	1.8E-05	3.8E-07	7.9E-05
	Sub-Total	526.50	1.72E+04	1.77E+05	2.56E-01	8.69E-01	1.27E-01	2.44E-04	1.96E-02
Remedial Action Operations	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	197.72	2.2E+03	NA	2.1E-01	5.1E-02	3.2E-02	4.1E-03	2.9E-01
	Transportation-Equipment	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	4,712.42	1.0E+05	3.8E+06	8.0E+00	3.9E+00	0.0E+00	0.0E+00	0.0E+00
	Residual Handling	3.62	7.3E+01	NA	4.1E-03	7.9E-04	5.5E-04	1.2E-05	2.4E-03
	Sub-Total	4,913.76	1.06E+05	3.79E+06	8.20E+00	3.96E+00	3.25E-02	4.11E-03	2.96E-01
Longterm Monitoring	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	7.52	8.2E+01	NA	8.1E-03	1.9E-03	1.2E-03	1.7E-04	1.2E-02
	Transportation-Equipment	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Residual Handling	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	7.52	8.23E+01	0.00E+00	8.09E-03	1.94E-03	1.21E-03	1.69E-04	1.21E-02
Total		**5.4E+03**	**1.2E+05**	**4.0E+06**	**8.5E+00**	**4.8E+00**	**1.6E-01**	**4.5E-03**	**3.3E-01**

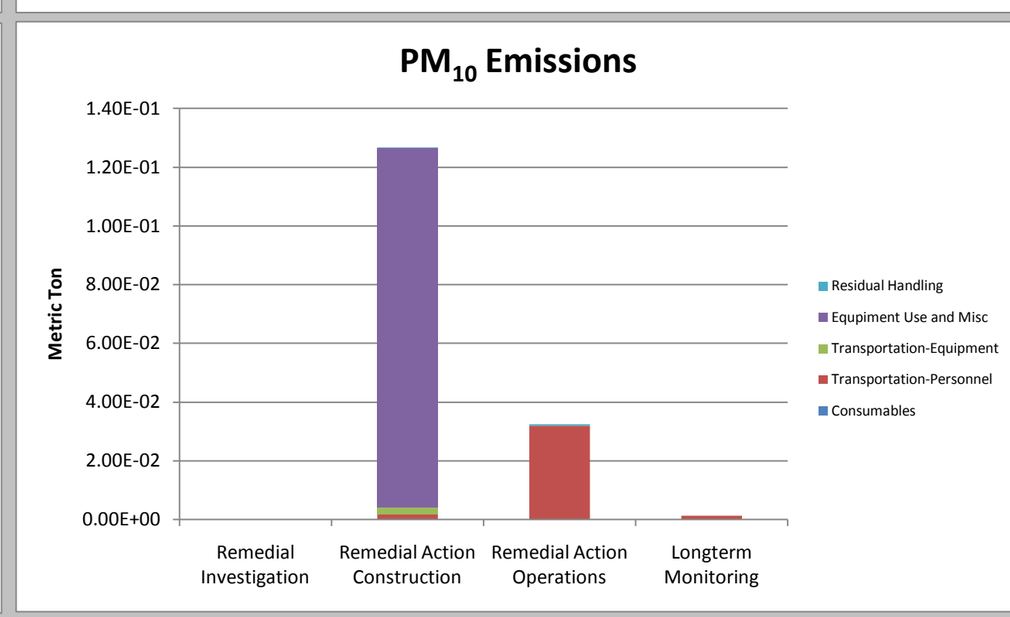

GHG Emissions
Metric Tons
6000
5000
4000
3000
2000
1000
0
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

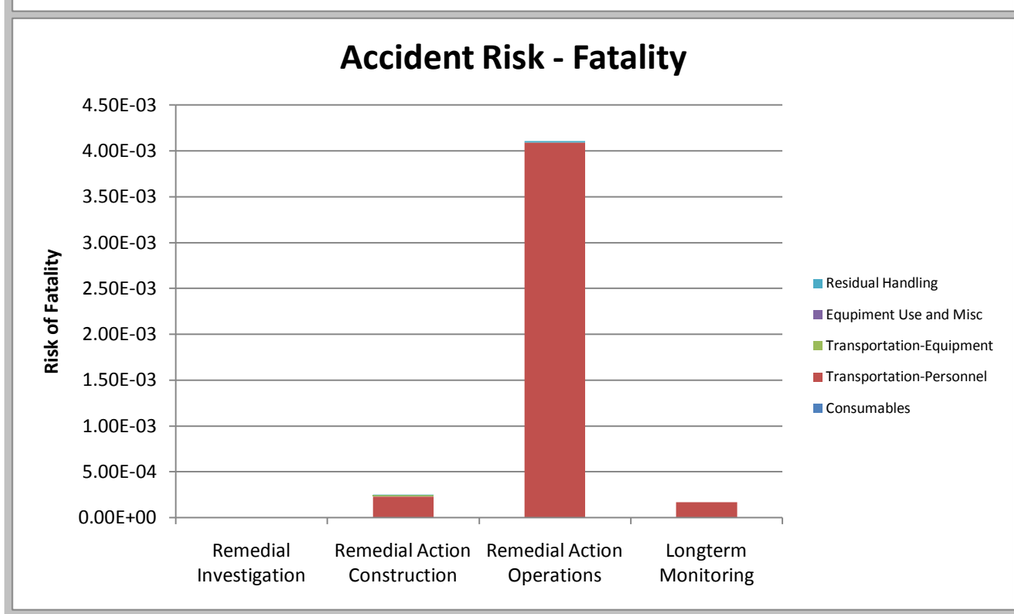

Total Energy Used
MMBTU
1.20E+05
1.00E+05
8.00E+04
6.00E+04
4.00E+04
2.00E+04
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

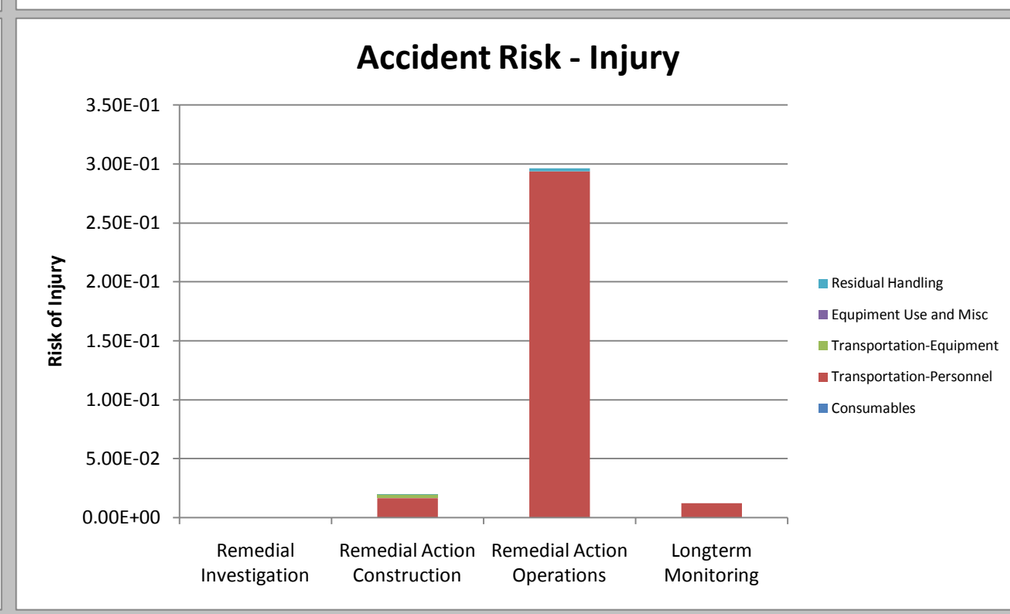

Water Impacts
Gallons
4.00E+06
3.50E+06
3.00E+06
2.50E+06
2.00E+06
1.50E+06
1.00E+06
5.00E+05
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


NOx Emissions
Metric Ton
9.00E+00
8.00E+00
7.00E+00
6.00E+00
5.00E+00
4.00E+00
3.00E+00
2.00E+00
1.00E+00
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


SOx Emissions
Metric Ton
4.50E+00
4.00E+00
3.50E+00
3.00E+00
2.50E+00
2.00E+00
1.50E+00
1.00E+00
5.00E-01
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


PM10 Emissions
Metric Ton
1.40E-01
1.20E-01
1.00E-01
8.00E-02
6.00E-02
4.00E-02
2.00E-02
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


Accident Risk - Fatality
Risk of Fatality
4.50E-03
4.00E-03
3.50E-03
3.00E-03
2.50E-03
2.00E-03
1.50E-03
1.00E-03
5.00E-04
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


Accident Risk - Injury
Risk of Injury
3.50E-01
3.00E-01
2.50E-01
2.00E-01
1.50E-01
1.00E-01
5.00E-02
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

SITEWISE/GSRX INPUT SHEETS

SITE INFORMATION	
Name	Elena Goldstein
Date	3/24/2011
Site	Calverton
Remedial Alternative Name	Alt 2

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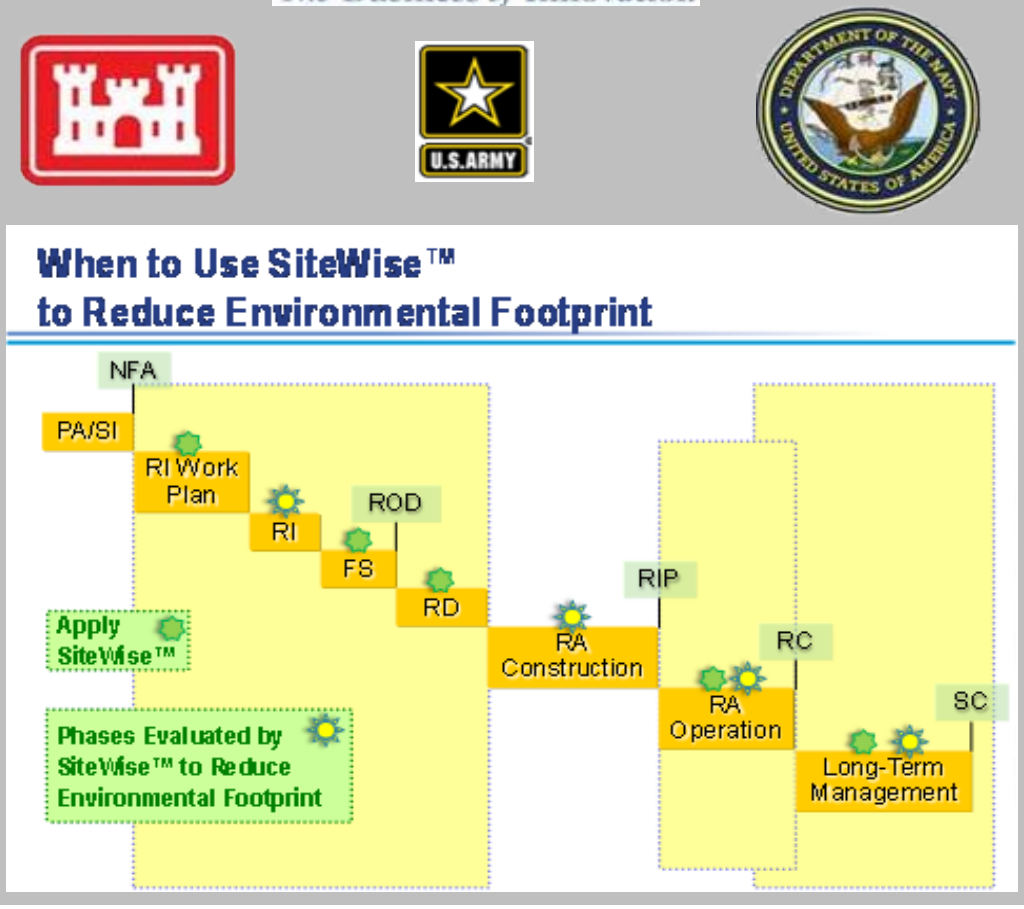
Battelle
The Business of Innovation



Remedial Action Construction

This worksheet allows the user to define material production, transportation, equipment use, and residual handling variables for the remedial alternative

Yellow cells	require the user to choose an input from a drop down menu
White cells	require the user to type in a value

MATERIAL PRODUCTION

WELL MATERIALS	Well Type 1	Well Type 2	Well Type 3	Well Type 4	Well Type 5	Well Type 6
Input number of wells						
Input depth of wells (ft)						
Choose well diameter (in) from drop down menu	1/2	1/2	1/2	1/2	1/2	1/2
Choose material type from drop down menu	PVC	PVC	PVC	PVC	PVC	PVC
Choose specific material schedule from drop down menu	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC

TREATMENT CHEMICALS & MATERIALS	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6
Input number of injection points						
Choose material type from drop down menu	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide
Input amount of material injected at each point (pounds dry mass)						
Input number of injections per injection point						

GAC	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6
Input weight of GAC used (lbs)						
Choose material type from drop down menu	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC

CONSTRUCTION MATERIALS	Material 1	Material 2	Material 3	Material 4	Material 5	Material 6
Choose material type from drop down menu	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner
Input area of material (ft^2)						
Input depth of material (ft)						

WELL DECOMMISSIONING	Well Type 1	Well Type 2	Well Type 3	Well Type 4	Well Type 5	Well Type 6
Input number of wells						
Input depth of wells (ft)						
Input well diameter (in)	1	1	1	1	1	1
Choose material from drop down menu	Soil	Soil	Soil	Soil	Soil	Soil

TRANSPORTATION

LUC Institution

PERSONNEL TRANSPORTATION - ROAD	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Choose vehicle type from drop down menu*	Light truck	Cars	Cars	Cars	Cars	Cars
Choose fuel used from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input distance traveled per trip (miles)	50					
Input number of trips taken	3					
Input number of travelers	2					
Input estimated vehicular fuel economy (mi/gal) (Input only if known for the vehicle selected, otherwise a default will be used by the tool)						

*For vehicle type 'Other' please enter values in Table 2b in the Look Up Table tab.

PERSONNEL TRANSPORTATION - AIR	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input number of travelers						
Input number of flights taken						

PERSONNEL TRANSPORTATION - RAIL	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Choose vehicle type from drop down menu	Intercity rail	Intercity rail	Intercity rail	Intercity rail	Intercity rail	Intercity rail
Input distance traveled (miles)						
Input number of trips taken						
Input number of travelers						

EQUIPMENT TRANSPORTATION - ROAD	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Choose fuel used from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input distance traveled (miles)						
Input weight of equipment transported (tons)						

EQUIPMENT TRANSPORTATION - AIR	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input weight of equipment transported (tons)						

EQUIPMENT TRANSPORTATION - RAIL	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input weight of load (tons)						

EQUIPMENT TRANSPORTATION - WATER	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (mile)						
Input weight of load (tons)						

EQUIPMENT USE

EARTHWORK	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose earthwork equipment type from drop down menu	Dozer	Dozer	Dozer	Dozer	Dozer	Dozer
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input volume of material to be removed (yd^3)						
Will DIESEL-run equipment be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
DRILLING	**Event 1**	**Event 2**	**Event 3**	**Event 4**	**Event 5**	**Event 6**
Input number of drilling locations						
Choose drilling method from drop down menu	Direct Push	Direct Push	Direct Push	Direct Push	Direct Push	Direct Push
Input time spent drilling at each location (hr)						
Input depth of wells (ft)						
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel

For each pump, select only one of the three methods to calculate energy and GHG emissions
Enter "0" for all user input values for unused pump columns or unused methods

PUMP OPERATION	Pump 1	Pump 2	Pump 3	Pump 4	Pump 5	Pump 6
Choose method from drop down	Method 2	Method 1	Method 1	Method 1	Method 1	Method 1
Method 1 - ELECTRICAL USAGE IS KNOWN						
Input pump electrical usage (KWh)	0	0	0	0	0	0
Method 2 - PUMP HEAD IS KNOWN						
Input flow rate (gpm)	0	0	0	0	0	0
Input total head (ft)	0	0	0	0	0	0
Input number of pumps operating	0	0	0	0	0	0
Input operating time for each pump (hrs)	0	0	0	0	0	0
Pump efficiency times motor efficiency (default already present, user override possible)	0.51	0.51	0.51	0.51	0.51	0.51
Input specific gravity (default already present, user override possible)	1	1	1	1	1	1
Method 3 - NAME PLATE SPECIFICATIONS ARE KNOWN						
Input pump horsepower (hp)	0	0	0	0	0	0
Input number of pumps operating	0	0	0	0	0	0
Input operating time for each pump (hrs)	0	0	0	0	0	0
Input pump load (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Input pump motor efficiency (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Region						
Choose region from drop down menu (scroll right to see figure)	AKGD	AKGD	AKGD	AKGD	AKGD	AKGD

DIESEL AND GASOLINE PUMPS	Pump 1	Pump 2	Pump 3	Pump 4	Pump 5	Pump 6
Choose fuel type from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Choose horsepower range from drop down menu	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1
Equipment operating hours (hrs)						
Input estimated fuel consumption rate (gal/hr) (Input only if known for the pump selected, otherwise a default will be used by the tool)						

For each type of equipment, select only one of the methods to calculate energy and GHG emissions
Enter "0" for all user input values for unused equipment columns or unused methods

BLOWER, COMPRESSOR, MIXER, AND OTHER EQUIPMENT	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose type of equipment from drop down	Blower	Blower	Blower	Blower	Blower	Blower
Choose method from drop down	Method 1	Method 1	Method 1	Method 1	Method 1	Method 1
Method 1 - NAME PLATE SPECIFICATIONS ARE KNOWN						
Input equipment horsepower (hp)	0	0	0	0	0	0
Input number of equipments operating	0	0	0	0	0	0
Input operating time for each equipment (hrs)	0	0	0	0	0	0
Input equipment load (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Input motor efficiency (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Method 2 - ELECTRICAL USAGE IS KNOWN						
Input equipment electrical usage, if known (KWh)	0	0	0	0	0	0
Region						
Choose region from drop down menu (scroll right to see figure)	AKGD	AKGD	AKGD	AKGD	AKGD	AKGD

GENERATORS	Generator 1	Generator 2	Generator 3	Generator 4	Generator 5	Generator 6
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Choose horsepower range from drop down menu	3 to 6	3 to 6	3 to 6	3 to 6	3 to 6	3 to 6
Input operating hours (hr)						

AGRICULTURAL EQUIPMENT	Tillage Tractor 1	Tillage Tractor 2	Tillage Tractor 3	Tillage Tractor 4	Tillage Tractor 5	Tillage Tractor 6
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input area to till (acre)						
Choose soil condition from drop down menu	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil
Choose soil type from drop down menu	Clay Soil	Clay Soil	Clay Soil	Clay Soil	Clay Soil	Clay Soil
Input time available (work days)						
Input depth of tillage (in)						

CAPPING EQUIPMENT	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose stabilization equipment type from drop down menu	Roller	Roller	Roller	Roller	Roller	Roller
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input area (ft^2)						
Input time available (work days)						

MIXING EQUIPMENT	Mixer 1	Mixer 2	Mixer 3	Mixer 4	Mixer 5	Mixer 6
Choose fuel type from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Choose horsepower range from drop down menu	1 to 3	1 to 3	1 to 3	1 to 3	1 to 3	1 to 3
Input volume (yd^3)						
Input production rate (yd^3/hr)						
Input estimated fuel consumption rate (gal/hr) (Input only if known for the mixer selected, otherwise a default will be used by the tool)						

RESIDUAL HANDLING

RESIDUE DISPOSAL/RECYCLING	Soil Residue	Residual Water	Material Residue	Other Residuals	Other Residuals	Other Residuals
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Input weight of the waste transported to landfill or recycling per trip (tons)						
Choose vehicle type from drop down menu	On-road truck	On-road truck	On-road truck	On-road truck	On-road truck	On-road truck
Choose fuel used from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input total number of trips						
Input number of miles per trip						

LANDFILL OPERATIONS	Operation 1	Operation 2	Operation 3	Operation 4	Operation 5	Operation 6
Input tons of soil or waste to be incinerated (user must input emission factors in the Look Up Table, Table 7a)						

THERMAL/CATALYTIC OXIDIZERS*	Oxidizer 1	Oxidizer 2	Oxidizer 3	Oxidizer 4	Oxidizer 5	Oxidizer 6
Choose oxidizer type from drop down menu	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer
Choose fuel type from drop down menu	natural gas	Propane	natural gas	natural gas	natural gas	natural gas
Input waste gas flow rate (scfm)						
Input time running (hours)						
Input waste gas inlet temperature (F)						
Input contaminant concentration (ppmV)						

*(Electric blowers are included in the analysis)

WATER CONSUMPTION	Treatment System 1	Treatment System 2	Treatment System 3	Treatment System 4	Treatment System 5	Treatment System 6
Input water disposed/collected during treatment (gal)						
Input water disposed/collected during site preparation (gal)						
Input water disposed/collected during sampling (gal)						
Input water disposed/collected during site demobilization (gal)						

LANDFILL METHANE EMISSIONS	Landfill 1	Landfill 2	Landfill 3	Landfill 4	Landfill 5	Landfill 6
Input landfill methane emissions (metric tons)						

OTHER KNOWN ONSITE ACTIVITIES	Entire Site
Input energy usage (MMBTU)	
Water consumption (gallon)	
Input CO_2 emission (metric ton)	
Input N_2O emission (metric ton CO_2 e)	
Input CH_4 emissions (metric ton CO_2 e)	
Input NOx emission (metric ton)	
Input SOx emission (metric ton)	
Input PM_{10} emission (metric ton)	
Input fatality risk	
Input injury risk	

Remedial Action Operations

This worksheet allows the user to define material production, transportation, equipment use, and residual handling variables for the remedial alternative

Yellow cells	require the user to choose an input from a drop down menu
White cells	require the user to type in a value

MATERIAL PRODUCTION

WELL MATERIALS	Well Type 1	Well Type 2	Well Type 3	Well Type 4	Well Type 5	Well Type 6
Input number of wells						
Input depth of wells (ft)						
Choose well diameter (in) from drop down menu	1/2	1/2	1/2	1/2	1/2	1/2
Choose material type from drop down menu	PVC	PVC	PVC	PVC	PVC	PVC
Choose specific material schedule from drop down menu	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC

TREATMENT CHEMICALS & MATERIALS	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6
Input number of injection points						
Choose material type from drop down menu	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide
Input amount of material injected at each point (pounds dry mass)						
Input number of injections per injection point						

GAC	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6
Input weight of GAC used (lbs)						
Choose material type from drop down menu	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC

CONSTRUCTION MATERIALS	Material 1	Material 2	Material 3	Material 4	Material 5	Material 6
Choose material type from drop down menu	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner
Input area of material (ft^2)						
Input depth of material (ft)						

WELL DECOMMISSIONING	Well Type 1	Well Type 2	Well Type 3	Well Type 4	Well Type 5	Well Type 6
Input number of wells						
Input depth of wells (ft)						
Input well diameter (in)	1	1	1	1	1	1
Choose material from drop down menu	Soil	Soil	Soil	Soil	Soil	Soil

TRANSPORTATION

Annual LUC Inspections

PERSONNEL TRANSPORTATION - ROAD	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Choose vehicle type from drop down menu*	Light truck	Cars	Cars	Cars	Cars	Cars
Choose fuel used from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input distance traveled per trip (miles)	50					
Input number of trips taken	90					
Input number of travelers	2					
Input estimated vehicular fuel economy (mi/gal) (Input only if known for the vehicle selected, otherwise a default will be used by the tool)						

*For vehicle type 'Other' please enter values in Table 2b in the Look Up Table tab.

PERSONNEL TRANSPORTATION - AIR	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input number of travelers						
Input number of flights taken						

PERSONNEL TRANSPORTATION - RAIL	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Choose vehicle type from drop down menu	Intercity rail	Intercity rail	Intercity rail	Intercity rail	Intercity rail	Intercity rail
Input distance traveled (miles)						
Input number of trips taken						
Input number of travelers						

EQUIPMENT TRANSPORTATION - ROAD	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Choose fuel used from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input distance traveled (miles)						
Input weight of equipment transported (tons)						

EQUIPMENT TRANSPORTATION - AIR	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input weight of equipment transported (tons)						

EQUIPMENT TRANSPORTATION - RAIL	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input weight of load (tons)						

EQUIPMENT TRANSPORTATION - WATER	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (mile)						
Input weight of load (tons)						

EQUIPMENT USE

EARTHWORK	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose earthwork equipment type from drop down menu	Dozer	Dozer	Dozer	Dozer	Dozer	Dozer
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input volume of material to be removed (yd^3)						
Will DIESEL-run equipment be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
DRILLING	**Event 1**	**Event 2**	**Event 3**	**Event 4**	**Event 5**	**Event 6**
Input number of drilling locations						
Choose drilling method from drop down menu	Direct Push	Direct Push	Direct Push	Direct Push	Direct Push	Direct Push
Input time spent drilling at each location (hr)						
Input depth of wells (ft)						
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel

For each pump, select only one of the three methods to calculate energy and GHG emissions
Enter "0" for all user input values for unused pump columns or unused methods

PUMP OPERATION	Pump 1	Pump 2	Pump 3	Pump 4	Pump 5	Pump 6
Choose method from drop down	Method 1	Method 1	Method 1	Method 1	Method 1	Method 1
Method 1 - ELECTRICAL USAGE IS KNOWN						
Input pump electrical usage (KWh)	0	0	0	0	0	0
Method 2 - PUMP HEAD IS KNOWN						
Input flow rate (gpm)	0	0	0	0	0	0
Input total head (ft)	0	0	0	0	0	0
Input number of pumps operating	0	0	0	0	0	0
Input operating time for each pump (hrs)	0	0	0	0	0	0
Pump efficiency times motor efficiency (default already present, user override possible)	0.51	0.51	0.51	0.51	0.51	0.51
Input specific gravity (default already present, user override possible)	1	1	1	1	1	1
Method 3 - NAME PLATE SPECIFICATIONS ARE KNOWN						
Input pump horsepower (hp)	0	0	0	0	0	0
Input number of pumps operating	0	0	0	0	0	0
Input operating time for each pump (hrs)	0	0	0	0	0	0
Input pump load (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Input pump motor efficiency (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Region						
Choose region from drop down menu (scroll right to see figure)	AKGD	AKGD	AKGD	AKGD	AKGD	AKGD

DIESEL AND GASOLINE PUMPS	Pump 1	Pump 2	Pump 3	Pump 4	Pump 5	Pump 6
Choose fuel type from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Choose horsepower range from drop down menu	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1
Equipment operating hours (hrs)						
Input estimated fuel consumption rate (gal/hr) (Input only if known for the pump selected, otherwise a default will be used by the tool)						

For each type of equipment, select only one of the methods to calculate energy and GHG emissions
Enter "0" for all user input values for unused equipment columns or unused methods

BLOWER, COMPRESSOR, MIXER, AND OTHER EQUIPMENT	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose type of equipment from drop down	Blower	Blower	Blower	Blower	Blower	Blower
Choose method from drop down	Method 2	Method 2	Method 2	Method 1	Method 1	Method 1
Method 1 - NAME PLATE SPECIFICATIONS ARE KNOWN						
Input equipment horsepower (hp)	0	0	0	0	0	0
Input number of equipments operating	0	0	0	0	0	0
Input operating time for each equipment (hrs)	0	0	0	0	0	0
Input equipment load (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Input motor efficiency (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Method 2 - ELECTRICAL USAGE IS KNOWN						
Input equipment electrical usage, if known (KWh)	0.00	0.00	0.00	0	0	0
Region						
Choose region from drop down menu (scroll right to see figure)	AKGD	AKGD	AKGD	AKGD	AKGD	AKGD

GENERATORS	Generator 1	Generator 2	Generator 3	Generator 4	Generator 5	Generator 6
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Choose horsepower range from drop down menu	3 to 6	3 to 6	3 to 6	3 to 6	3 to 6	3 to 6
Input operating hours (hr)						

AGRICULTURAL EQUIPMENT	Tillage Tractor 1	Tillage Tractor 2	Tillage Tractor 3	Tillage Tractor 4	Tillage Tractor 5	Tillage Tractor 6
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input area to till (acre)						
Choose soil condition from drop down menu	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil
Choose soil type from drop down menu	Clay Soil	Clay Soil	Clay Soil	Clay Soil	Clay Soil	Clay Soil
Input time available (work days)						
Input depth of tillage (in)						

CAPPING EQUIPMENT	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose stabilization equipment type from drop down menu	Roller	Roller	Roller	Roller	Roller	Roller
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input area (ft^2)						
Input time available (work days)						

MIXING EQUIPMENT	Mixer 1	Mixer 2	Mixer 3	Mixer 4	Mixer 5	Mixer 6
Choose fuel type from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Choose horsepower range from drop down menu	1 to 3	1 to 3	1 to 3	1 to 3	1 to 3	1 to 3
Input volume (yd^3)						
Input production rate (yd^3/hr)						
Input estimated fuel consumption rate (gal/hr) (Input only if known for the mixer selected, otherwise a default will be used by the tool)						

RESIDUAL HANDLING

RESIDUE DISPOSAL/RECYCLING	Soil Residue	Residual Water	Material Residue	Other Residuals	Other Residuals	Other Residuals
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Input weight of the waste transported to landfill or recycling per trip (tons)						
Choose vehicle type from drop down menu	On-road truck	On-road truck	On-road truck	On-road truck	On-road truck	On-road truck
Choose fuel used from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input total number of trips						
Input number of miles per trip						

LANDFILL OPERATIONS	Operation 1	Operation 2	Operation 3	Operation 4	Operation 5	Operation 6
Input tons of soil or waste to be incinerated (user must input emission factors in the Look Up Table, Table 7a)						

THERMAL/CATALYTIC OXIDIZERS*	Oxidizer 1	Oxidizer 2	Oxidizer 3	Oxidizer 4	Oxidizer 5	Oxidizer 6
Choose oxidizer type from drop down menu	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer
Choose fuel type from drop down menu	natural gas	Propane	natural gas	natural gas	natural gas	natural gas
Input waste gas flow rate (scfm)						
Input time running (hours)						
Input waste gas inlet temperature (F)						
Input contaminant concentration (ppmV)						
*(Electric blowers are included in the analysis)	P&T					

WATER CONSUMPTION	Treatment System 1	Treatment System 2	Treatment System 3	Treatment System 4	Treatment System 5	Treatment System 6
Input water disposed/collected during treatment (gal)						
Input water disposed/collected during site preparation (gal)						
Input water disposed/collected during sampling (gal)						
Input water disposed/collected during site demobilization (gal)						

LANDFILL METHANE EMISSIONS	Landfill 1	Landfill 2	Landfill 3	Landfill 4	Landfill 5	Landfill 6
Input landfill methane emissions (metric tons)						

OTHER KNOWN ONSITE ACTIVITIES	Entire Site
Input energy usage (MMBTU)	
Water consumption (gallon)	
Input CO_2 emission (metric ton)	
Input N_2O emission (metric ton CO_2 e)	
Input CH_4 emissions (metric ton CO_2 e)	
Input NOx emission (metric ton)	
Input SOx emission (metric ton)	
Input PM_{10} emission (metric ton)	
Input fatality risk	
Input injury risk	

SITE INFORMATION	
Name	Elena Goldstein
Date	3/24/2011
Site	Calverton
Remedial Alternative Name	Alt 3

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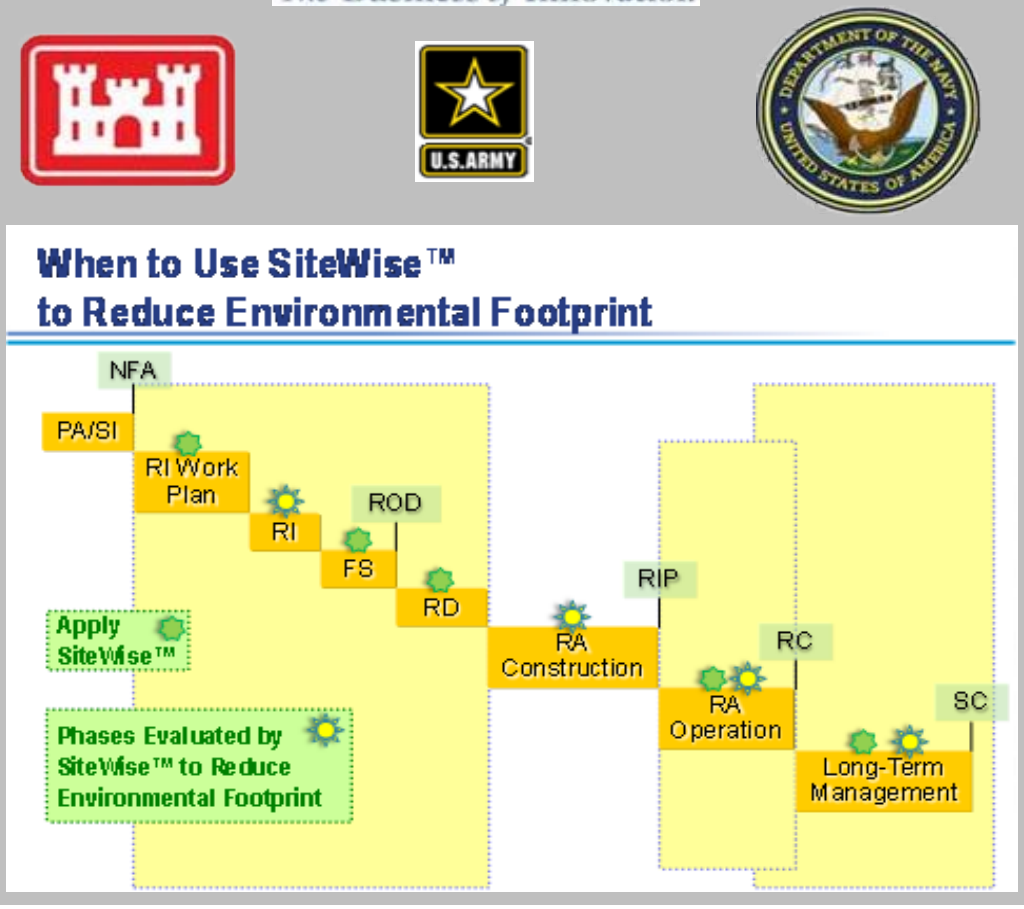

Remedial Action Construction

This worksheet allows the user to define material production, transportation, equipment use, and residual handling variables for the remedial alternative

Yellow cells	require the user to choose an input from a drop down menu
White cells	require the user to type in a value

MATERIAL PRODUCTION

WELL MATERIALS	Well Type 1	Well Type 2	Well Type 3	Well Type 4	Well Type 5	Well Type 6
Input number of wells						
Input depth of wells (ft)						
Choose well diameter (in) from drop down menu	1/2	1/2	1/2	1/2	1/2	1/2
Choose material type from drop down menu	PVC	PVC	PVC	PVC	PVC	PVC
Choose specific material schedule from drop down menu	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC

TREATMENT CHEMICALS & MATERIALS	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6
Input number of injection points						
Choose material type from drop down menu	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide
Input amount of material injected at each point (pounds dry mass)						
Input number of injections per injection point						

GAC	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6
Input weight of GAC used (lbs)						
Choose material type from drop down menu	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC

CONSTRUCTION MATERIALS	Material 1	Material 2	Material 3	Material 4	Material 5	Material 6
Choose material type from drop down menu	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner
Input area of material (ft^2)						
Input depth of material (ft)						

WELL DECOMMISSIONING	Well Type 1	Well Type 2	Well Type 3	Well Type 4	Well Type 5	Well Type 6
Input number of wells						
Input depth of wells (ft)						
Input well diameter (in)	1	1	1	1	1	1
Choose material from drop down menu	Soil	Soil	Soil	Soil	Soil	Soil

TRANSPORTATION

	LUC Institution	Sampling Existing Wells	Well Installation	Well Installation RIG	Sampling New Wells	Well Decomissioning
PERSONNEL TRANSPORTATION - ROAD	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Choose vehicle type from drop down menu*	Light truck	Light truck	Light truck	Heavy Duty	Light truck	Light truck
Choose fuel used from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input distance traveled per trip (miles)	50	50	50	50	50	50
Input number of trips taken	3	10	9	9	2	10
Input number of travelers	2	2	2	3	2	2
Input estimated vehicular fuel economy (mi/gal) (Input only if known for the vehicle selected, otherwise a default will be used by the tool)						

*For vehicle type 'Other' please enter values in Table 2b in the Look Up Table tab.

PERSONNEL TRANSPORTATION - AIR	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input number of travelers						
Input number of flights taken						

PERSONNEL TRANSPORTATION - RAIL	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Choose vehicle type from drop down menu	Intercity rail	Intercity rail	Intercity rail	Intercity rail	Intercity rail	Intercity rail
Input distance traveled (miles)						
Input number of trips taken						
Input number of travelers						

	HSA Drill Rig	Loader	Materials Delivery			
EQUIPMENT TRANSPORTATION - ROAD	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Choose fuel used from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Gasoline
Input distance traveled (miles)	100	100	100			
Input weight of equipment transported (tons)	10	9	15			

EQUIPMENT TRANSPORTATION - AIR	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input weight of equipment transported (tons)						

EQUIPMENT TRANSPORTATION - RAIL	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input weight of load (tons)						

EQUIPMENT TRANSPORTATION - WATER	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (mile)						
Input weight of load (tons)						

EQUIPMENT USE

EARTHWORK	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose earthwork equipment type from drop down menu	Dozer	Dozer	Dozer	Dozer	Dozer	Dozer
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input volume of material to be removed (yd^3)						
Will DIESEL-run equipment be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
DRILLING	**Event 1**	**Event 2**	**Event 3**	**Event 4**	**Event 5**	**Event 6**
Input number of drilling locations						
Choose drilling method from drop down menu	Direct Push	Direct Push	Direct Push	Direct Push	Direct Push	Direct Push
Input time spent drilling at each location (hr)						
Input depth of wells (ft)						
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel

For each pump, select only one of the three methods to calculate energy and GHG emissions
Enter "0" for all user input values for unused pump columns or unused methods

PUMP OPERATION	Pump 1	Pump 2	Pump 3	Pump 4	Pump 5	Pump 6
Choose method from drop down	Method 2	Method 1	Method 1	Method 1	Method 1	Method 1
Method 1 - ELECTRICAL USAGE IS KNOWN						
Input pump electrical usage (KWh)	0	0	0	0	0	0
Method 2 - PUMP HEAD IS KNOWN						
Input flow rate (gpm)	0	0	0	0	0	0
Input total head (ft)	0	0	0	0	0	0
Input number of pumps operating	0	0	0	0	0	0
Input operating time for each pump (hrs)	0	0	0	0	0	0
Pump efficiency times motor efficiency (default already present, user override possible)	0.51	0.51	0.51	0.51	0.51	0.51
Input specific gravity (default already present, user override possible)	1	1	1	1	1	1
Method 3 - NAME PLATE SPECIFICATIONS ARE KNOWN						
Input pump horsepower (hp)	0	0	0	0	0	0
Input number of pumps operating	0	0	0	0	0	0
Input operating time for each pump (hrs)	0	0	0	0	0	0
Input pump load (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Input pump motor efficiency (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Region						
Choose region from drop down menu (scroll right to see figure)	AKGD	AKGD	AKGD	AKGD	AKGD	AKGD

DIESEL AND GASOLINE PUMPS	Pump 1	Pump 2	Pump 3	Pump 4	Pump 5	Pump 6
Choose fuel type from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Choose horsepower range from drop down menu	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1
Equipment operating hours (hrs)						
Input estimated fuel consumption rate (gal/hr) (Input only if known for the pump selected, otherwise a default will be used by the tool)						

For each type of equipment, select only one of the methods to calculate energy and GHG emissions
Enter "0" for all user input values for unused equipment columns or unused methods

BLOWER, COMPRESSOR, MIXER, AND OTHER EQUIPMENT	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose type of equipment from drop down	Blower	Blower	Blower	Blower	Blower	Blower
Choose method from drop down	Method 1	Method 1	Method 1	Method 1	Method 1	Method 1
Method 1 - NAME PLATE SPECIFICATIONS ARE KNOWN						
Input equipment horsepower (hp)	0	0	0	0	0	0
Input number of equipments operating	0	0	0	0	0	0
Input operating time for each equipment (hrs)	0	0	0	0	0	0
Input equipment load (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Input motor efficiency (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Method 2 - ELECTRICAL USAGE IS KNOWN						
Input equipment electrical usage, if known (KWh)	0	0	0	0	0	0
Region						
Choose region from drop down menu (scroll right to see figure)	AKGD	AKGD	AKGD	AKGD	AKGD	AKGD

GENERATORS	Generator 1	Generator 2	Generator 3	Generator 4	Generator 5	Generator 6
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Choose horsepower range from drop down menu	3 to 6	3 to 6	3 to 6	3 to 6	3 to 6	3 to 6
Input operating hours (hr)						

AGRICULTURAL EQUIPMENT	Tillage Tractor 1	Tillage Tractor 2	Tillage Tractor 3	Tillage Tractor 4	Tillage Tractor 5	Tillage Tractor 6
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input area to till (acre)						
Choose soil condition from drop down menu	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil
Choose soil type from drop down menu	Clay Soil	Clay Soil	Clay Soil	Clay Soil	Clay Soil	Clay Soil
Input time available (work days)						
Input depth of tillage (in)						

CAPPING EQUIPMENT	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose stabilization equipment type from drop down menu	Roller	Roller	Roller	Roller	Roller	Roller
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input area (ft^2)						
Input time available (work days)						

MIXING EQUIPMENT	Mixer 1	Mixer 2	Mixer 3	Mixer 4	Mixer 5	Mixer 6
Choose fuel type from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Choose horsepower range from drop down menu	1 to 3	1 to 3	1 to 3	1 to 3	1 to 3	1 to 3
Input volume (yd^3)						
Input production rate (yd^3/hr)						
Input estimated fuel consumption rate (gal/hr) (Input only if known for the mixer selected, otherwise a default will be used by the tool)						

RESIDUAL HANDLING

RESIDUE DISPOSAL/RECYCLING	Soil Residue	Residual Water	Material Residue	Other Residuals	Other Residuals	Other Residuals
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Input weight of the waste transported to landfill or recycling per trip (tons)	12	6				
Choose vehicle type from drop down menu	Heavy Duty	Heavy Duty	On-road truck	On-road truck	On-road truck	On-road truck
Choose fuel used from drop down menu	Diesel	Diesel	Gasoline	Gasoline	Gasoline	Gasoline
Input total number of trips	1	1				
Input number of miles per trip	50	50				

LANDFILL OPERATIONS	Operation 1	Operation 2	Operation 3	Operation 4	Operation 5	Operation 6
Input tons of soil or waste to be incinerated (user must input emission factors in the Look Up Table, Table 7a)						

THERMAL/CATALYTIC OXIDIZERS*	Oxidizer 1	Oxidizer 2	Oxidizer 3	Oxidizer 4	Oxidizer 5	Oxidizer 6
Choose oxidizer type from drop down menu	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer
Choose fuel type from drop down menu	natural gas	Propane	natural gas	natural gas	natural gas	natural gas
Input waste gas flow rate (scfm)						
Input time running (hours)						
Input waste gas inlet temperature (F)						
Input contaminant concentration (ppmV)						

*(Electric blowers are included in the analysis)

WATER CONSUMPTION	Treatment System 1	Treatment System 2	Treatment System 3	Treatment System 4	Treatment System 5	Treatment System 6
Input water disposed/collected during treatment (gal)						
Input water disposed/collected during site preparation (gal)	1500					
Input water disposed/collected during sampling (gal)						
Input water disposed/collected during site demobilization (gal)						

LANDFILL METHANE EMISSIONS	Landfill 1	Landfill 2	Landfill 3	Landfill 4	Landfill 5	Landfill 6
Input landfill methane emissions (metric tons)						

OTHER KNOWN ONSITE ACTIVITIES	Entire Site
Input energy usage (MMBTU)	8.3E+02
Water consumption (gallon)	7.0E+03
Input CO_2 emission (metric ton)	2.1E+01
Input N_2O emission (metric ton CO_2 e)	6.4E-01
Input CH_4 emissions (metric ton CO_2 e)	2.4E-01
Input NOx emission (metric ton)	5.1E-02
Input SOx emission (metric ton)	1.1E-02
Input PM_{10} emission (metric ton)	4.0E-03
Input fatality risk	0.0E+00
Input injury risk	0.0E+00

Remedial Action Operations

This worksheet allows the user to define material production, transportation, equipment use, and residual handling variables for the remedial alternative

Yellow cells	require the user to choose an input from a drop down menu
White cells	require the user to type in a value

MATERIAL PRODUCTION

WELL MATERIALS	Well Type 1	Well Type 2	Well Type 3	Well Type 4	Well Type 5	Well Type 6
Input number of wells						
Input depth of wells (ft)						
Choose well diameter (in) from drop down menu	1/2	1/2	1/2	1/2	1/2	1/2
Choose material type from drop down menu	PVC	PVC	PVC	PVC	PVC	PVC
Choose specific material schedule from drop down menu	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC

TREATMENT CHEMICALS & MATERIALS	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6
Input number of injection points						
Choose material type from drop down menu	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide
Input amount of material injected at each point (pounds dry mass)						
Input number of injections per injection point						

GAC	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6
Input weight of GAC used (lbs)						
Choose material type from drop down menu	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC

CONSTRUCTION MATERIALS	Material 1	Material 2	Material 3	Material 4	Material 5	Material 6
Choose material type from drop down menu	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner
Input area of material (ft^2)						
Input depth of material (ft)						

WELL DECOMMISSIONING	Well Type 1	Well Type 2	Well Type 3	Well Type 4	Well Type 5	Well Type 6
Input number of wells						
Input depth of wells (ft)						
Input well diameter (in)	1	1	1	1	1	1
Choose material from drop down menu	Soil	Soil	Soil	Soil	Soil	Soil

TRANSPORTATION

Annual LUCs

PERSONNEL TRANSPORTATION - ROAD	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Choose vehicle type from drop down menu*	Light truck	Cars	Cars	Cars	Cars	Cars
Choose fuel used from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input distance traveled per trip (miles)	50					
Input number of trips taken	90					
Input number of travelers	2					
Input estimated vehicular fuel economy (mi/gal) (Input only if known for the vehicle selected, otherwise a default will be used by the tool)						

*For vehicle type 'Other' please enter values in Table 2b in the Look Up Table tab.

PERSONNEL TRANSPORTATION - AIR	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input number of travelers						
Input number of flights taken						

PERSONNEL TRANSPORTATION - RAIL	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Choose vehicle type from drop down menu	Intercity rail	Intercity rail	Intercity rail	Intercity rail	Intercity rail	Intercity rail
Input distance traveled (miles)						
Input number of trips taken						
Input number of travelers						

EQUIPMENT TRANSPORTATION - ROAD	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Choose fuel used from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input distance traveled (miles)						
Input weight of equipment transported (tons)						

EQUIPMENT TRANSPORTATION - AIR	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input weight of equipment transported (tons)						

EQUIPMENT TRANSPORTATION - RAIL	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input weight of load (tons)						

EQUIPMENT TRANSPORTATION - WATER	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (mile)						
Input weight of load (tons)						

EQUIPMENT USE

EARTHWORK	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose earthwork equipment type from drop down menu	Dozer	Dozer	Dozer	Dozer	Dozer	Dozer
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input volume of material to be removed (yd^3)						
Will DIESEL-run equipment be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
DRILLING	**Event 1**	**Event 2**	**Event 3**	**Event 4**	**Event 5**	**Event 6**
Input number of drilling locations						
Choose drilling method from drop down menu	Direct Push	Direct Push	Direct Push	Direct Push	Direct Push	Direct Push
Input time spent drilling at each location (hr)						
Input depth of wells (ft)						
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel

For each pump, select only one of the three methods to calculate energy and GHG emissions
Enter "0" for all user input values for unused pump columns or unused methods

PUMP OPERATION	Pump 1	Pump 2	Pump 3	Pump 4	Pump 5	Pump 6
Choose method from drop down	Method 1	Method 1	Method 1	Method 1	Method 1	Method 1
Method 1 - ELECTRICAL USAGE IS KNOWN						
Input pump electrical usage (KWh)	0	0	0	0	0	0
Method 2 - PUMP HEAD IS KNOWN						
Input flow rate (gpm)	0	0	0	0	0	0
Input total head (ft)	0	0	0	0	0	0
Input number of pumps operating	0	0	0	0	0	0
Input operating time for each pump (hrs)	0	0	0	0	0	0
Pump efficiency times motor efficiency (default already present, user override possible)	0.51	0.51	0.51	0.51	0.51	0.51
Input specific gravity (default already present, user override possible)	1	1	1	1	1	1
Method 3 - NAME PLATE SPECIFICATIONS ARE KNOWN						
Input pump horsepower (hp)	0	0	0	0	0	0
Input number of pumps operating	0	0	0	0	0	0
Input operating time for each pump (hrs)	0	0	0	0	0	0
Input pump load (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Input pump motor efficiency (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Region						
Choose region from drop down menu (scroll right to see figure)	AKGD	AKGD	AKGD	AKGD	AKGD	AKGD

DIESEL AND GASOLINE PUMPS	Pump 1	Pump 2	Pump 3	Pump 4	Pump 5	Pump 6
Choose fuel type from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Choose horsepower range from drop down menu	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1
Equipment operating hours (hrs)						
Input estimated fuel consumption rate (gal/hr) (Input only if known for the pump selected, otherwise a default will be used by the tool)						

For each type of equipment, select only one of the methods to calculate energy and GHG emissions
Enter "0" for all user input values for unused equipment columns or unused methods

BLOWER, COMPRESSOR, MIXER, AND OTHER EQUIPMENT	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose type of equipment from drop down	Blower	Blower	Blower	Blower	Blower	Blower
Choose method from drop down	Method 2	Method 2	Method 2	Method 1	Method 1	Method 1
Method 1 - NAME PLATE SPECIFICATIONS ARE KNOWN						
Input equipment horsepower (hp)	0	0	0	0	0	0
Input number of equipments operating	0	0	0	0	0	0
Input operating time for each equipment (hrs)	0	0	0	0	0	0
Input equipment load (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Input motor efficiency (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Method 2 - ELECTRICAL USAGE IS KNOWN						
Input equipment electrical usage, if known (KWh)	0.00	0.00	0.00	0	0	0
Region						
Choose region from drop down menu (scroll right to see figure)	AKGD	AKGD	AKGD	AKGD	AKGD	AKGD

GENERATORS	Generator 1	Generator 2	Generator 3	Generator 4	Generator 5	Generator 6
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Choose horsepower range from drop down menu	3 to 6	3 to 6	3 to 6	3 to 6	3 to 6	3 to 6
Input operating hours (hr)						

AGRICULTURAL EQUIPMENT	Tillage Tractor 1	Tillage Tractor 2	Tillage Tractor 3	Tillage Tractor 4	Tillage Tractor 5	Tillage Tractor 6
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input area to till (acre)						
Choose soil condition from drop down menu	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil
Choose soil type from drop down menu	Clay Soil	Clay Soil	Clay Soil	Clay Soil	Clay Soil	Clay Soil
Input time available (work days)						
Input depth of tillage (in)						

CAPPING EQUIPMENT	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose stabilization equipment type from drop down menu	Roller	Roller	Roller	Roller	Roller	Roller
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input area (ft^2)						
Input time available (work days)						

MIXING EQUIPMENT	Mixer 1	Mixer 2	Mixer 3	Mixer 4	Mixer 5	Mixer 6
Choose fuel type from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Choose horsepower range from drop down menu	1 to 3	1 to 3	1 to 3	1 to 3	1 to 3	1 to 3
Input volume (yd^3)						
Input production rate (yd^3/hr)						
Input estimated fuel consumption rate (gal/hr) (Input only if known for the mixer selected, otherwise a default will be used by the tool)						

RESIDUAL HANDLING

RESIDUE DISPOSAL/RECYCLING	Soil Residue	Residual Water	Material Residue	Other Residuals	Other Residuals	Other Residuals
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Input weight of the waste transported to landfill or recycling per trip (tons)						
Choose vehicle type from drop down menu	On-road truck	On-road truck	On-road truck	On-road truck	On-road truck	On-road truck
Choose fuel used from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input total number of trips						
Input number of miles per trip						

LANDFILL OPERATIONS	Operation 1	Operation 2	Operation 3	Operation 4	Operation 5	Operation 6
Input tons of soil or waste to be incinerated (user must input emission factors in the Look Up Table, Table 7a)						

THERMAL/CATALYTIC OXIDIZERS*	Oxidizer 1	Oxidizer 2	Oxidizer 3	Oxidizer 4	Oxidizer 5	Oxidizer 6
Choose oxidizer type from drop down menu	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer
Choose fuel type from drop down menu	natural gas	Propane	natural gas	natural gas	natural gas	natural gas
Input waste gas flow rate (scfm)						
Input time running (hours)						
Input waste gas inlet temperature (F)						
Input contaminant concentration (ppmV)						
*(Electric blowers are included in the analysis)	P&T					

WATER CONSUMPTION	Treatment System 1	Treatment System 2	Treatment System 3	Treatment System 4	Treatment System 5	Treatment System 6
Input water disposed/collected during treatment (gal)						
Input water disposed/collected during site preparation (gal)						
Input water disposed/collected during sampling (gal)						
Input water disposed/collected during site demobilization (gal)						

LANDFILL METHANE EMISSIONS	Landfill 1	Landfill 2	Landfill 3	Landfill 4	Landfill 5	Landfill 6
Input landfill methane emissions (metric tons)						

OTHER KNOWN ONSITE ACTIVITIES	Entire Site
Input energy usage (MMBTU)	
Water consumption (gallon)	
Input CO_2 emission (metric ton)	
Input N_2O emission (metric ton CO_2 e)	
Input CH_4 emissions (metric ton CO_2 e)	
Input NOx emission (metric ton)	
Input SOx emission (metric ton)	
Input PM_{10} emission (metric ton)	
Input fatality risk	
Input injury risk	

Long Term Monitoring

This worksheet allows the user to define material production, transportation, equipment use, and residual handling variables for the remedial alternative

Yellow cells	require the user to choose an input from a drop down menu
White cells	require the user to type in a value

MATERIAL PRODUCTION

WELL MATERIALS	Well Type 1	Well Type 2	Well Type 3	Well Type 4	Well Type 5	Well Type 6
Input number of wells						
Input depth of wells (ft)						
Choose well diameter (in) from drop down menu	1/2	1/2	1/2	1/2	1/2	1/2
Choose material type from drop down menu	PVC	PVC	PVC	PVC	PVC	PVC
Choose specific material schedule from drop down menu	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC

TREATMENT CHEMICALS & MATERIALS	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6
Input number of injection points						
Choose material type from drop down menu	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide
Input amount of material injected at each point (pounds dry mass)						
Input number of injections per injection point						

GAC	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6
Input weight of GAC used (lbs)						
Choose material type from drop down menu	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC

CONSTRUCTION MATERIALS	Material 1	Material 2	Material 3	Material 4	Material 5	Material 6
Choose material type from drop down menu	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner
Input area of material (ft^2)						
Input depth of material (ft)						

WELL DECOMMISSIONING	Well Type 1	Well Type 2	Well Type 3	Well Type 4	Well Type 5	Well Type 6
Input number of wells						
Input depth of wells (ft)						
Input well diameter (in)	1	1	1	1	1	1
Choose material from drop down menu	Soil	Soil	Soil	Soil	Soil	Soil

TRANSPORTATION

	Groundwater	Groundwater				
PERSONNEL TRANSPORTATION - ROAD	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Choose vehicle type from drop down menu*	Light truck	Light truck	Light truck	Light truck	Light truck	Cars
Choose fuel used from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input distance traveled per trip (miles)	50	50				
Input number of trips taken	40	170				
Input number of travelers	2	2				
Input estimated vehicular fuel economy (mi/gal) (Input only if known for the vehicle selected, otherwise a default will be used by the tool)						

*For vehicle type 'Other' please enter values in Table 2b in the Look Up Table tab.

PERSONNEL TRANSPORTATION - AIR	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input number of travelers						
Input number of flights taken						

PERSONNEL TRANSPORTATION - RAIL	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Choose vehicle type from drop down menu	Intercity rail	Intercity rail	Intercity rail	Intercity rail	Intercity rail	Intercity rail
Input distance traveled (miles)						
Input number of trips taken						
Input number of travelers						

EQUIPMENT TRANSPORTATION - ROAD	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Choose fuel used from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input distance traveled (miles)						
Input weight of equipment transported (tons)						

EQUIPMENT TRANSPORTATION - AIR	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input weight of equipment transported (tons)						

EQUIPMENT TRANSPORTATION - RAIL	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input weight of load (tons)						

EQUIPMENT TRANSPORTATION - WATER	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (mile)						

Input weight of load (tons)						

EQUIPMENT USE

EARTHWORK	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose earthwork equipment type from drop down menu	Dozer	Dozer	Dozer	Dozer	Dozer	Dozer
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input volume of material to be removed (yd^3)						
Will DIESEL-run equipment be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
DRILLING	**Event 1**	**Event 2**	**Event 3**	**Event 4**	**Event 5**	**Event 6**
Input number of drilling locations						
Choose drilling method from drop down menu	Direct Push	Direct Push	Direct Push	Direct Push	Direct Push	Direct Push
Input time spent drilling at each location (hr)						
Input depth of wells (ft)						
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel

For each pump, select only one of the three methods to calculate energy and GHG emissions
Enter "0" for all user input values for unused pump columns or unused methods

PUMP OPERATION	Pump 1	Pump 2	Pump 3	Pump 4	Pump 5	Pump 6
Choose method from drop down	Method 1	Method 1	Method 1	Method 1	Method 1	Method 1
Method 1 - ELECTRICAL USAGE IS KNOWN						
Input pump electrical usage (KWh)	0	0	0	0	0	0
Method 2 - PUMP HEAD IS KNOWN						
Input flow rate (gpm)	0	0	0	0	0	0
Input total head (ft)	0	0	0	0	0	0
Input number of pumps operating	0	0	0	0	0	0
Input operating time for each pump (hrs)	0	0	0	0	0	0
Pump efficiency times motor efficiency (default already present, user override possible)	0.51	0.51	0.51	0.51	0.51	0.51
Input specific gravity (default already present, user override possible)	1	1	1	1	1	1
Method 3 - NAME PLATE SPECIFICATIONS ARE KNOWN						
Input pump horsepower (hp)	0	0	0	0	0	0
Input number of pumps operating	0	0	0	0	0	0
Input operating time for each pump (hrs)	0	0	0	0	0	0
Input pump load (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Input pump motor efficiency (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Region						
Choose region from drop down menu (scroll right to see figure)	AKGD	AKGD	AKGD	AKGD	AKGD	AKGD

DIESEL AND GASOLINE PUMPS	Pump 1	Pump 2	Pump 3	Pump 4	Pump 5	Pump 6
Choose fuel type from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Choose horsepower range from drop down menu	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1
Equipment operating hours (hrs)						
Input estimated fuel consumption rate (gal/hr) (Input only if known for the pump selected, otherwise a default will be used by the tool)						

For each type of equipment, select only one of the methods to calculate energy and GHG emissions
Enter "0" for all user input values for unused equipment columns or unused methods

BLOWER, COMPRESSOR, MIXER, AND OTHER EQUIPMENT	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose type of equipment from drop down	Blower	Blower	Blower	Blower	Blower	Blower
Choose method from drop down	Method 1	Method 1	Method 1	Method 1	Method 1	Method 1
Method 1 - NAME PLATE SPECIFICATIONS ARE KNOWN						
Input equipment horsepower (hp)	0	0	0	0	0	0
Input number of equipments operating	0	0	0	0	0	0
Input operating time for each equipment (hrs)	0	0	0	0	0	0
Input equipment load (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Input motor efficiency (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Method 2 - ELECTRICAL USAGE IS KNOWN						
Input equipment electrical usage, if known (KWh)	0	0	0	0	0	0
Region						
Choose region from drop down menu (scroll right to see figure)	AKGD	AKGD	AKGD	AKGD	AKGD	AKGD

GENERATORS	Generator 1	Generator 2	Generator 3	Generator 4	Generator 5	Generator 6
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Choose horsepower range from drop down menu	3 to 6	3 to 6	3 to 6	3 to 6	3 to 6	3 to 6
Input operating hours (hr)						

AGRICULTURAL EQUIPMENT	Tillage Tractor 1	Tillage Tractor 2	Tillage Tractor 3	Tillage Tractor 4	Tillage Tractor 5	Tillage Tractor 6
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input area to till (acre)						
Choose soil condition from drop down menu	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil
Choose soil type from drop down menu	Clay Soil	Clay Soil	Clay Soil	Clay Soil	Clay Soil	Clay Soil
Input time available (work days)						
Input depth of tillage (in)						

CAPPING EQUIPMENT	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose stabilization equipment type from drop down menu	Roller	Roller	Roller	Roller	Roller	Roller
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input area (ft^2)						
Input time available (work days)						

MIXING EQUIPMENT	Mixer 1	Mixer 2	Mixer 3	Mixer 4	Mixer 5	Mixer 6
Choose fuel type from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Choose horsepower range from drop down menu	1 to 3	1 to 3	1 to 3	1 to 3	1 to 3	1 to 3
Input volume (yd^3)						
Input production rate (yd^3/hr)						
Input estimated fuel consumption rate (gal/hr) (Input only if known for the mixer selected, otherwise a default will be used by the tool)						

RESIDUAL HANDLING

RESIDUE DISPOSAL/RECYCLING	Soil Residue	Residual Water	Material Residue	Other Residuals	Other Residuals	Other Residuals
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Input weight of the waste transported to landfill or recycling per trip (tons)						
Choose vehicle type from drop down menu	On-road truck	On-road truck	On-road truck	On-road truck	On-road truck	On-road truck
Choose fuel used from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input total number of trips						
Input number of miles per trip						

LANDFILL OPERATIONS	Operation 1	Operation 2	Operation 3	Operation 4	Operation 5	Operation 6
Input tons of soil or waste to be incinerated (user must input emission factors in the Look Up Table, Table 7a)						

THERMAL/CATALYTIC OXIDIZERS*	Oxidizer 1	Oxidizer 2	Oxidizer 3	Oxidizer 4	Oxidizer 5	Oxidizer 6
Choose oxidizer type from drop down menu	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer
Choose fuel type from drop down menu	natural gas	Propane	natural gas	natural gas	natural gas	natural gas
Input waste gas flow rate (scfm)						
Input time running (hours)						
Input waste gas inlet temperature (F)						
Input contaminant concentration (ppmV)						

*(Electric blowers are included in the analysis)

WATER CONSUMPTION	Treatment System 1	Treatment System 2	Treatment System 3	Treatment System 4	Treatment System 5	Treatment System 6
Input water disposed/collected during treatment (gal)						
Input water disposed/collected during site preparation (gal)						
Input water disposed/collected during sampling (gal)						
Input water disposed/collected during site demobilization (gal)						

LANDFILL METHANE EMISSIONS	Landfill 1	Landfill 2	Landfill 3	Landfill 4	Landfill 5	Landfill 6
Input landfill methane emissions (metric tons)						

OTHER KNOWN ONSITE ACTIVITIES	Entire Site
Input energy usage (MMBTU)	
Water consumption (gallon)	
Input CO_2 emission (metric ton)	
Input N_2O emission (metric ton CO_2 e)	
Input CH_4 emissions (metric ton CO_2 e)	
Input NOx emission (metric ton)	
Input SOx emission (metric ton)	
Input PM_{10} emission (metric ton)	
Input fatality risk	
Input injury risk	

GSRx - ALTERNATIVE 3
HYBRID SITEWISE EVALUATION
NWIRP CALVERTON
CALVERTON, NEW YORK

Technology Module / Phase	Module Components	Comments / Assumptions	Quantity	(Units)	Greenhouse Gas Emissions				Criteria Pollutant Emission			Energy Consumption	Water Consumption
					$CO_{2\ equiv}$	CO_2	N_20	CH_4	NO_x	SO_x	PM_{10}		
Materials						**Tonnes**						**MWhr**	**gal x 1000**
Well Construction	PVC	2" Sched 40 PVC, 600'	409	lbs	0.46	0.46	0.00	0.01	0.00	0.00	0.00	16.91	0.70
Well Construction	Steel	10 wells, 4 bollards/well, 8 ft each, 22 lb/ft	7040	lbs	8.62	8.62	0.00	0.00	0.00	0.01	0.00	148.52	6.33
Well Construction	Typical Cement	10 Monitoring wells grouted	10,281	lbs	3.87	3.87	0.00	0.00	0.00	0.00	0.00	28.97	0.00
Well Construction	Sand	10 Monitoring wells 10' of sand	2,475	lbs	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.15	0.00
Well Construction	Bentonite	10 Monitoring wells, 2' of bentonite	614	lbs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Well Abandonment	Typical Cement	Monitoring Well Abandonment	9821	lbs	3.70	3.70	0.00	0.00	0.00	0.00	0.00	27.67	0.00
Subtotal					**16.66**	**16.66**	**0.00**	**0.01**	**0.00**	**0.01**	**0.00**	**222.22**	**7.03**
Transportation						**Tonnes**						**MWhr**	**gal x 1000**
Input Into Sitewise				miles									
Subtotal					**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0**

GSRx - ALTERNATIVE 3
HYBRID SITEWISE EVALUATION
NWIRP CALVERTON
CALVERTON, NEW YORK

Technology Module / Phase	Module Components	Comments / Assumptions	Quantity	(Units)	Greenhouse Gas Emissions				Criteria Pollutant Emission			Energy Consumption	Water Consumption
					$CO_{2\ equiv}$	CO_2	N_20	CH_4	NO_x	SO_x	PM_{10}		
Materials						**Tonnes**						**MWhr**	**gal x 1000**
Construction Equipment						**Tonnes**						**MWhr**	**gal x 1000**
Well Construction	Drill Rig, HSA (diesel)	9 days, 8 hrs/day	72	hrs	3.92	3.92	0.00	0.00	0.05	0.00	0.00	18.33	
Well Construction	Loader, 100 HP, 2 CY (diesel)	9 days, 4 hrs/day	36	hrs	0.59	0.59	0.00	0.00	0.00	0.00	0.00	2.64	
Subtotal					**4.52**	**4.52**	**0.00**	**0.00**	**0.05**	**0.00**	**0.00**	**20.97**	**0**
Operating Consumption						**Tonnes**						**MWhr**	**gal x 1000**
Input Into Sitewise													0
					0	**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0**	**0**
			Total		**21**	**21**	**0.00**	**0.01**	**0.05**	**0.01**	**0.00**	**243**	**7**

Alternative 3
Values Input into SiteWise as "Other"

Module	Greenhouse Gas Emissions				Criteria Pollutant Emission			Energy Consumption	Water Consumption
	$CO_{2\ equiv}$	CO_2	N_20 (CO2e)	CH_4 (CO2e)	NO_x	SO_x	PM_{10}		
		Tonnes						**MMBTU**	**gal**
RI									
RAC	2.12E+01	2.12E+01	6.42E-01	2.40E-01	5.08E-02	1.11E-02	4.04E-03	8.30E+02	7.03E+03
RAO									
LTM									

Note: 1 MWhr = 3412141.4799 BTU, 1MMTBU = 10^6 BTU

SITE INFORMATION	
Name	Elena Goldstein
Date	3/24/2011
Site	Calverton
Remedial Alternative Name	Alt 4

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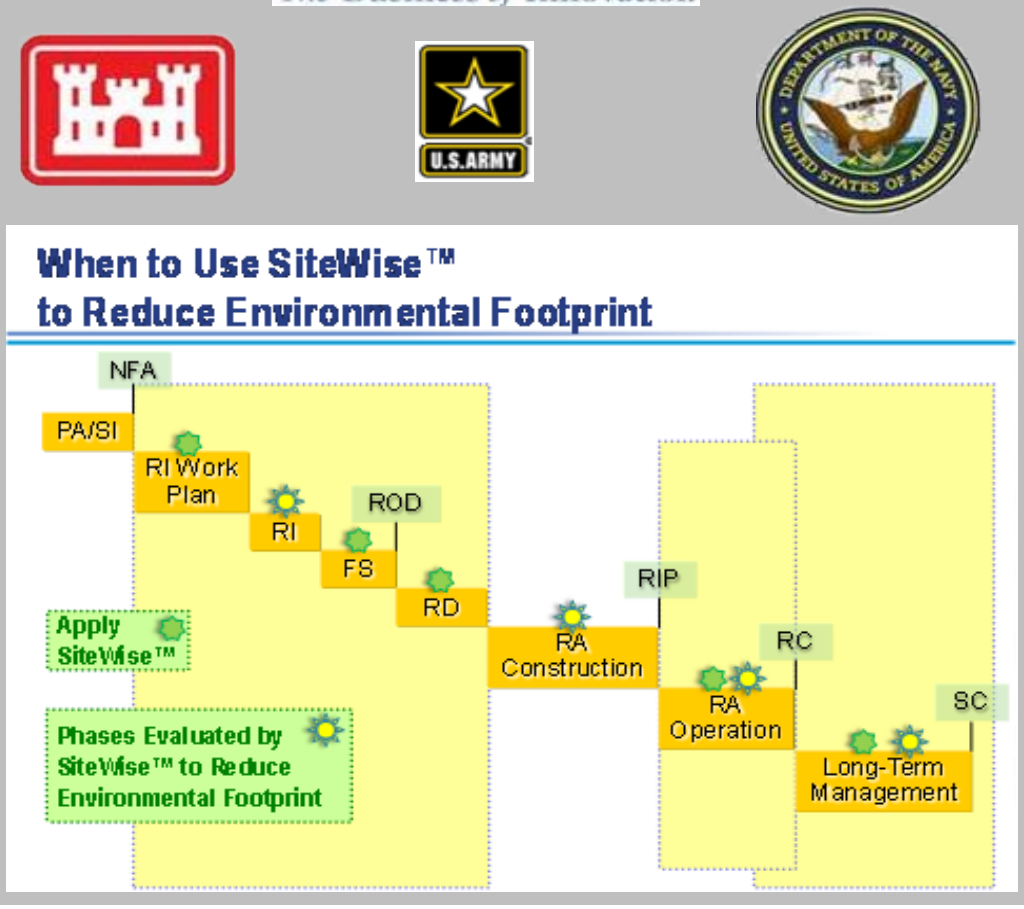


Remedial Action Construction

This worksheet allows the user to define material production, transportation, equipment use, and residual handling variables for the remedial alternative

Yellow cells	require the user to choose an input from a drop down menu
White cells	require the user to type in a value

MATERIAL PRODUCTION

WELL MATERIALS	Well Type 1	Well Type 2	Well Type 3	Well Type 4	Well Type 5	Well Type 6
Input number of wells						
Input depth of wells (ft)						
Choose well diameter (in) from drop down menu	1/2	1/2	1/2	1/2	1/2	1/2
Choose material type from drop down menu	PVC	PVC	PVC	PVC	PVC	PVC
Choose specific material schedule from drop down menu	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC

TREATMENT CHEMICALS & MATERIALS	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6
Input number of injection points						
Choose material type from drop down menu	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide
Input amount of material injected at each point (pounds dry mass)						
Input number of injections per injection point						

GAC	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6
Input weight of GAC used (lbs)						
Choose material type from drop down menu	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC

CONSTRUCTION MATERIALS	Material 1	Material 2	Material 3	Material 4	Material 5	Material 6
Choose material type from drop down menu	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner
Input area of material (ft^2)						
Input depth of material (ft)						

WELL DECOMMISSIONING	Well Type 1	Well Type 2	Well Type 3	Well Type 4	Well Type 5	Well Type 6
Input number of wells						
Input depth of wells (ft)						
Input well diameter (in)	1	1	1	1	1	1
Choose material from drop down menu	Soil	Soil	Soil	Soil	Soil	Soil

TRANSPORTATION

	LUC,sSampling, well ins	Rig crew	Air Sparge Well Installat	Air Sparge Rig Crew	Well Abandonment	Demo
PERSONNEL TRANSPORTATION - ROAD	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Choose vehicle type from drop down menu*	Light truck	Heavy Duty	Light truck	Heavy Duty	Light truck	Light truck
Choose fuel used from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input distance traveled per trip (miles)	50	50	50	50	50	50
Input number of trips taken	40	22	217	138	25	10
Input number of travelers	2	3	2	3	2	3
Input estimated vehicular fuel economy (mi/gal) (Input only if known for the vehicle selected, otherwise a default will be used by the tool)						

*For vehicle type 'Other' please enter values in Table 2b in the Look Up Table tab.

PERSONNEL TRANSPORTATION - AIR	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input number of travelers						
Input number of flights taken						

PERSONNEL TRANSPORTATION - RAIL	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Choose vehicle type from drop down menu	Intercity rail	Intercity rail	Intercity rail	Intercity rail	Intercity rail	Intercity rail
Input distance traveled (miles)						
Input number of trips taken						
Input number of travelers						

	Drill Rig	Loader	Materials, Trenching	Trailers	Steel Building	Demo Equip
EQUIPMENT TRANSPORTATION - ROAD	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Choose fuel used from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input distance traveled (miles)	100	100	2,400	100	100	100
Input weight of equipment transported (tons)	10	9	20	20	20	32.0

EQUIPMENT TRANSPORTATION - AIR	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input weight of equipment transported (tons)						

EQUIPMENT TRANSPORTATION - RAIL	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input weight of load (tons)						

EQUIPMENT TRANSPORTATION - WATER	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (mile)						
Input weight of load (tons)						

EQUIPMENT USE

EARTHWORK	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose earthwork equipment type from drop down menu	Dozer	Dozer	Dozer	Dozer	Dozer	Dozer
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input volume of material to be removed (yd^3)						
Will DIESEL-run equipment be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
DRILLING	**Event 1**	**Event 2**	**Event 3**	**Event 4**	**Event 5**	**Event 6**
Input number of drilling locations						
Choose drilling method from drop down menu	Direct Push	Direct Push	Direct Push	Direct Push	Direct Push	Direct Push
Input time spent drilling at each location (hr)						
Input depth of wells (ft)						
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel

For each pump, select only one of the three methods to calculate energy and GHG emissions
Enter "0" for all user input values for unused pump columns or unused methods

PUMP OPERATION	Pump 1	Pump 2	Pump 3	Pump 4	Pump 5	Pump 6
Choose method from drop down	Method 2	Method 1	Method 1	Method 1	Method 1	Method 1
Method 1 - ELECTRICAL USAGE IS KNOWN						
Input pump electrical usage (KWh)	0	0	0	0	0	0
Method 2 - PUMP HEAD IS KNOWN						
Input flow rate (gpm)	0	0	0	0	0	0
Input total head (ft)	0	0	0	0	0	0
Input number of pumps operating	0	0	0	0	0	0
Input operating time for each pump (hrs)	0	0	0	0	0	0
Pump efficiency times motor efficiency (default already present, user override possible)	0.51	0.51	0.51	0.51	0.51	0.51
Input specific gravity (default already present, user override possible)	1	1	1	1	1	1
Method 3 - NAME PLATE SPECIFICATIONS ARE KNOWN						
Input pump horsepower (hp)	0	0	0	0	0	0
Input number of pumps operating	0	0	0	0	0	0
Input operating time for each pump (hrs)	0	0	0	0	0	0
Input pump load (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Input pump motor efficiency (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Region						
Choose region from drop down menu (scroll right to see figure)	AKGD	AKGD	AKGD	AKGD	AKGD	AKGD

DIESEL AND GASOLINE PUMPS	Pump 1	Pump 2	Pump 3	Pump 4	Pump 5	Pump 6
Choose fuel type from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Choose horsepower range from drop down menu	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1
Equipment operating hours (hrs)						
Input estimated fuel consumption rate (gal/hr) (Input only if known for the pump selected, otherwise a default will be used by the tool)						

For each type of equipment, select only one of the methods to calculate energy and GHG emissions
Enter "0" for all user input values for unused equipment columns or unused methods

BLOWER, COMPRESSOR, MIXER, AND OTHER EQUIPMENT	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose type of equipment from drop down	Blower	Blower	Blower	Blower	Blower	Blower
Choose method from drop down	Method 1	Method 1	Method 1	Method 1	Method 1	Method 1
Method 1 - NAME PLATE SPECIFICATIONS ARE KNOWN						
Input equipment horsepower (hp)	0	0	0	0	0	0
Input number of equipments operating	0	0	0	0	0	0
Input operating time for each equipment (hrs)	0	0	0	0	0	0
Input equipment load (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Input motor efficiency (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Method 2 - ELECTRICAL USAGE IS KNOWN						
Input equipment electrical usage, if known (KWh)	0	0	0	0	0	0
Region						
Choose region from drop down menu (scroll right to see figure)	AKGD	AKGD	AKGD	AKGD	AKGD	AKGD

GENERATORS	Generator 1	Generator 2	Generator 3	Generator 4	Generator 5	Generator 6
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Choose horsepower range from drop down menu	3 to 6	3 to 6	3 to 6	3 to 6	3 to 6	3 to 6
Input operating hours (hr)						

AGRICULTURAL EQUIPMENT	Tillage Tractor 1	Tillage Tractor 2	Tillage Tractor 3	Tillage Tractor 4	Tillage Tractor 5	Tillage Tractor 6
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input area to till (acre)						
Choose soil condition from drop down menu	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil
Choose soil type from drop down menu	Clay Soil	Clay Soil	Clay Soil	Clay Soil	Clay Soil	Clay Soil
Input time available (work days)						
Input depth of tillage (in)						

CAPPING EQUIPMENT	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose stabilization equipment type from drop down menu	Roller	Roller	Roller	Roller	Roller	Roller
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input area (ft^2)						
Input time available (work days)						

MIXING EQUIPMENT	Mixer 1	Mixer 2	Mixer 3	Mixer 4	Mixer 5	Mixer 6
Choose fuel type from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Choose horsepower range from drop down menu	1 to 3	1 to 3	1 to 3	1 to 3	1 to 3	1 to 3
Input volume (yd^3)						
Input production rate (yd^3/hr)						
Input estimated fuel consumption rate (gal/hr) (Input only if known for the mixer selected, otherwise a default will be used by the tool)						

RESIDUAL HANDLING

RESIDUE DISPOSAL/RECYCLING	Soil Residue	Residual Water	Material Residue	Other Residuals	Other Residuals	Other Residuals
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Input weight of the waste transported to landfill or recycling per trip (tons)	22	22				
Choose vehicle type from drop down menu	Heavy Duty	Heavy Duty	On-road truck	On-road truck	On-road truck	On-road truck
Choose fuel used from drop down menu	Diesel	Diesel	Gasoline	Gasoline	Gasoline	Gasoline
Input total number of trips	11	5				
Input number of miles per trip	50	50				

LANDFILL OPERATIONS	Operation 1	Operation 2	Operation 3	Operation 4	Operation 5	Operation 6
Input tons of soil or waste to be incinerated (user must input emission factors in the Look Up Table, Table 7a)						

THERMAL/CATALYTIC OXIDIZERS*	Oxidizer 1	Oxidizer 2	Oxidizer 3	Oxidizer 4	Oxidizer 5	Oxidizer 6
Choose oxidizer type from drop down menu	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer
Choose fuel type from drop down menu	natural gas	Propane	natural gas	natural gas	natural gas	natural gas
Input waste gas flow rate (scfm)						
Input time running (hours)						
Input waste gas inlet temperature (F)						
Input contaminant concentration (ppmV)						

*(Electric blowers are included in the analysis)

WATER CONSUMPTION	Treatment System 1	Treatment System 2	Treatment System 3	Treatment System 4	Treatment System 5	Treatment System 6
Input water disposed/collected during treatment (gal)	19200					
Input water disposed/collected during site preparation (gal)	3750					
Input water disposed/collected during sampling (gal)						
Input water disposed/collected during site demobilization (gal)						

LANDFILL METHANE EMISSIONS	Landfill 1	Landfill 2	Landfill 3	Landfill 4	Landfill 5	Landfill 6
Input landfill methane emissions (metric tons)						

OTHER KNOWN ONSITE ACTIVITIES	Entire Site
Input energy usage (MMBTU)	1.5E+04
Water consumption (gallon)	1.3E+05
Input CO_2 emission (metric ton)	3.9E+02
Input N_2O emission (metric ton CO_2 e)	1.9E+01
Input CH_4 emissions (metric ton CO_2 e)	5.8E+00
Input NOx emission (metric ton)	1.1E+00
Input SOx emission (metric ton)	2.8E-01
Input PM_{10} emission (metric ton)	9.7E-02
Input fatality risk	0.0E+00
Input injury risk	0.0E+00

Remedial Action Operations

This worksheet allows the user to define material production, transportation, equipment use, and residual handling variables for the remedial alternative

Yellow cells	require the user to choose an input from a drop down menu
White cells	require the user to type in a value

MATERIAL PRODUCTION

WELL MATERIALS	Well Type 1	Well Type 2	Well Type 3	Well Type 4	Well Type 5	Well Type 6
Input number of wells						
Input depth of wells (ft)						
Choose well diameter (in) from drop down menu	1/2	1/2	1/2	1/2	1/2	1/2
Choose material type from drop down menu	PVC	PVC	PVC	PVC	PVC	PVC
Choose specific material schedule from drop down menu	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC

TREATMENT CHEMICALS & MATERIALS	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6
Input number of injection points						
Choose material type from drop down menu	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide
Input amount of material injected at each point (pounds dry mass)						
Input number of injections per injection point						

GAC	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6
Input weight of GAC used (lbs)						
Choose material type from drop down menu	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC

CONSTRUCTION MATERIALS	Material 1	Material 2	Material 3	Material 4	Material 5	Material 6
Choose material type from drop down menu	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner
Input area of material (ft^2)						
Input depth of material (ft)						

WELL DECOMMISSIONING	Well Type 1	Well Type 2	Well Type 3	Well Type 4	Well Type 5	Well Type 6
Input number of wells						
Input depth of wells (ft)						
Input well diameter (in)	1	1	1	1	1	1
Choose material from drop down menu	Soil	Soil	Soil	Soil	Soil	Soil

TRANSPORTATION

	Weekly Checks Source	Monthly O&M Source	Quarterly Source	Weekly Checks River	Monthly/Quarterly River	Annual LUCs
PERSONNEL TRANSPORTATION - ROAD	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 1
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Choose vehicle type from drop down menu*	Light truck	Light truck	Light truck	Light truck	Light truck	Light truck
Choose fuel used from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input distance traveled per trip (miles)	50	50	50	50	50	50
Input number of trips taken	208	96	64	832	640	90
Input number of travelers	1	2	2	1	2	2
Input estimated vehicular fuel economy (mi/gal) (Input only if known for the vehicle selected, otherwise a default will be used by the tool)						

*For vehicle type 'Other' please enter values in Table 2b in the Look Up Table tab.

PERSONNEL TRANSPORTATION - AIR	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input number of travelers						
Input number of flights taken						

PERSONNEL TRANSPORTATION - RAIL	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Choose vehicle type from drop down menu	Intercity rail	Intercity rail	Intercity rail	Intercity rail	Intercity rail	Intercity rail
Input distance traveled (miles)						
Input number of trips taken						
Input number of travelers						

EQUIPMENT TRANSPORTATION - ROAD	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Choose fuel used from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input distance traveled (miles)						
Input weight of equipment transported (tons)						

EQUIPMENT TRANSPORTATION - AIR	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input weight of equipment transported (tons)						

EQUIPMENT TRANSPORTATION - RAIL	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input weight of load (tons)						

EQUIPMENT TRANSPORTATION - WATER	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (mile)						
Input weight of load (tons)						

EQUIPMENT USE

EARTHWORK	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose earthwork equipment type from drop down menu	Dozer	Dozer	Dozer	Dozer	Dozer	Dozer
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input volume of material to be removed (yd^3)						
Will DIESEL-run equipment be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
DRILLING	**Event 1**	**Event 2**	**Event 3**	**Event 4**	**Event 5**	**Event 6**
Input number of drilling locations						
Choose drilling method from drop down menu	Direct Push	Direct Push	Direct Push	Direct Push	Direct Push	Direct Push
Input time spent drilling at each location (hr)						
Input depth of wells (ft)						
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel

For each pump, select only one of the three methods to calculate energy and GHG emissions
Enter "0" for all user input values for unused pump columns or unused methods

PUMP OPERATION	Pump 1	Pump 2	Pump 3	Pump 4	Pump 5	Pump 6
Choose method from drop down	Method 1	Method 1	Method 1	Method 1	Method 1	Method 1
Method 1 - ELECTRICAL USAGE IS KNOWN						
Input pump electrical usage (KWh)			0	0	0	0
Method 2 - PUMP HEAD IS KNOWN						
Input flow rate (gpm)	0	0	0	0	0	0
Input total head (ft)	0	0	0	0	0	0
Input number of pumps operating	0	0	0	0	0	0
Input operating time for each pump (hrs)	0	0	0	0	0	0
Pump efficiency times motor efficiency (default already present, user override possible)	0.51	0.51	0.51	0.51	0.51	0.51
Input specific gravity (default already present, user override possible)	1	1	1	1	1	1
Method 3 - NAME PLATE SPECIFICATIONS ARE KNOWN						
Input pump horsepower (hp)	0	0	0	0	0	0
Input number of pumps operating	0	0	0	0	0	0
Input operating time for each pump (hrs)	0	0	0	0	0	0
Input pump load (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Input pump motor efficiency (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Region						
Choose region from drop down menu (scroll right to see figure)	AKGD	AKGD	AKGD	AKGD	AKGD	AKGD

DIESEL AND GASOLINE PUMPS	Pump 1	Pump 2	Pump 3	Pump 4	Pump 5	Pump 6
Choose fuel type from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Choose horsepower range from drop down menu	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1
Equipment operating hours (hrs)						
Input estimated fuel consumption rate (gal/hr) (Input only if known for the pump selected, otherwise a default will be used by the tool)						

For each type of equipment, select only one of the methods to calculate energy and GHG emissions
Enter "0" for all user input values for unused equipment columns or unused methods

BLOWER, COMPRESSOR, MIXER, AND OTHER EQUIPMENT	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose type of equipment from drop down	Compressor	Compressor	Blower	Blower	Blower	Blower
Choose method from drop down	Method 2	Method 2	Method 2	Method 1	Method 1	Method 1
Method 1 - NAME PLATE SPECIFICATIONS ARE KNOWN						
Input equipment horsepower (hp)	0	0	0	0	0	0
Input number of equipments operating	0	0	0	0	0	0
Input operating time for each equipment (hrs)	0	0	0	0	0	0
Input equipment load (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Input motor efficiency (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Method 2 - ELECTRICAL USAGE IS KNOWN						
Input equipment electrical usage, if known (KWh)	1276157	6559488	0.00	0	0	0
Region						
Choose region from drop down menu (scroll right to see figure)	AKGD	AKGD	AKGD	AKGD	AKGD	AKGD

GENERATORS	Generator 1	Generator 2	Generator 3	Generator 4	Generator 5	Generator 6
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Choose horsepower range from drop down menu	3 to 6	3 to 6	3 to 6	3 to 6	3 to 6	3 to 6
Input operating hours (hr)						

AGRICULTURAL EQUIPMENT	Tillage Tractor 1	Tillage Tractor 2	Tillage Tractor 3	Tillage Tractor 4	Tillage Tractor 5	Tillage Tractor 6
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input area to till (acre)						
Choose soil condition from drop down menu	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil
Choose soil type from drop down menu	Clay Soil	Clay Soil	Clay Soil	Clay Soil	Clay Soil	Clay Soil
Input time available (work days)						
Input depth of tillage (in)						

CAPPING EQUIPMENT	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose stabilization equipment type from drop down menu	Roller	Roller	Roller	Roller	Roller	Roller
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input area (ft^2)						
Input time available (work days)						

MIXING EQUIPMENT	Mixer 1	Mixer 2	Mixer 3	Mixer 4	Mixer 5	Mixer 6
Choose fuel type from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Choose horsepower range from drop down menu	1 to 3	1 to 3	1 to 3	1 to 3	1 to 3	1 to 3
Input volume (yd^3)						
Input production rate (yd^3/hr)						
Input estimated fuel consumption rate (gal/hr) (Input only if known for the mixer selected, otherwise a default will be used by the tool)						

RESIDUAL HANDLING

RESIDUE DISPOSAL/RECYCLING	Soil Residue	Residual Water	Material Residue	Other Residuals	Other Residuals	Other Residuals
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Input weight of the waste transported to landfill or recycling per trip (tons)						
Choose vehicle type from drop down menu	On-road truck	On-road truck	On-road truck	On-road truck	On-road truck	On-road truck
Choose fuel used from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input total number of trips						
Input number of miles per trip						

LANDFILL OPERATIONS	Operation 1	Operation 2	Operation 3	Operation 4	Operation 5	Operation 6
Input tons of soil or waste to be incinerated (user must input emission factors in the Look Up Table, Table 7a)						

THERMAL/CATALYTIC OXIDIZERS*	Oxidizer 1	Oxidizer 2	Oxidizer 3	Oxidizer 4	Oxidizer 5	Oxidizer 6
Choose oxidizer type from drop down menu	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer
Choose fuel type from drop down menu	natural gas	Propane	natural gas	natural gas	natural gas	natural gas
Input waste gas flow rate (scfm)						
Input time running (hours)						
Input waste gas inlet temperature (F)						
Input contaminant concentration (ppmV)						
*(Electric blowers are included in the analysis)	P&T					

WATER CONSUMPTION	Treatment System 1	Treatment System 2	Treatment System 3	Treatment System 4	Treatment System 5	Treatment System 6
Input water disposed/collected during treatment (gal)						
Input water disposed/collected during site preparation (gal)						
Input water disposed/collected during sampling (gal)						
Input water disposed/collected during site demobilization (gal)						

LANDFILL METHANE EMISSIONS	Landfill 1	Landfill 2	Landfill 3	Landfill 4	Landfill 5	Landfill 6
Input landfill methane emissions (metric tons)						

OTHER KNOWN ONSITE ACTIVITIES	Entire Site
Input energy usage (MMBTU)	
Water consumption (gallon)	
Input CO_2 emission (metric ton)	
Input N_2O emission (metric ton CO_2 e)	
Input CH_4 emissions (metric ton CO_2 e)	
Input NOx emission (metric ton)	
Input SOx emission (metric ton)	
Input PM_{10} emission (metric ton)	
Input fatality risk	
Input injury risk	

Long Term Monitoring

This worksheet allows the user to define material production, transportation, equipment use, and residual handling variables for the remedial alternative

Yellow cells	require the user to choose an input from a drop down menu
White cells	require the user to type in a value

MATERIAL PRODUCTION

WELL MATERIALS	Well Type 1	Well Type 2	Well Type 3	Well Type 4	Well Type 5	Well Type 6
Input number of wells						
Input depth of wells (ft)						
Choose well diameter (in) from drop down menu	1/2	1/2	1/2	1/2	1/2	1/2
Choose material type from drop down menu	PVC	PVC	PVC	PVC	PVC	PVC
Choose specific material schedule from drop down menu	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC

TREATMENT CHEMICALS & MATERIALS	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6
Input number of injection points						
Choose material type from drop down menu	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide
Input amount of material injected at each point (pounds dry mass)						
Input number of injections per injection point						

GAC	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6
Input weight of GAC used (lbs)						
Choose material type from drop down menu	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC

CONSTRUCTION MATERIALS	Material 1	Material 2	Material 3	Material 4	Material 5	Material 6
Choose material type from drop down menu	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner
Input area of material (ft^2)						
Input depth of material (ft)						

WELL DECOMMISSIONING	Well Type 1	Well Type 2	Well Type 3	Well Type 4	Well Type 5	Well Type 6
Input number of wells						
Input depth of wells (ft)						
Input well diameter (in)	1	1	1	1	1	1
Choose material from drop down menu	Soil	Soil	Soil	Soil	Soil	Soil

TRANSPORTATION

	Well Maintenance	Groundwater Quarterly	Groundwater Annual			
PERSONNEL TRANSPORTATION - ROAD	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Choose vehicle type from drop down menu*	Light truck	Light truck	Light truck	Light truck	Light truck	Light truck
Choose fuel used from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input distance traveled per trip (miles)	50	50	50			
Input number of trips taken	15	40	150			
Input number of travelers	2	2	2			
Input estimated vehicular fuel economy (mi/gal) (Input only if known for the vehicle selected, otherwise a default will be used by the tool)						

*For vehicle type 'Other' please enter values in Table 2b in the Look Up Table tab.

PERSONNEL TRANSPORTATION - AIR	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input number of travelers						
Input number of flights taken						

PERSONNEL TRANSPORTATION - RAIL	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Choose vehicle type from drop down menu	Intercity rail	Intercity rail	Intercity rail	Intercity rail	Intercity rail	Intercity rail
Input distance traveled (miles)						
Input number of trips taken						
Input number of travelers						

EQUIPMENT TRANSPORTATION - ROAD	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Choose fuel used from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input distance traveled (miles)						
Input weight of equipment transported (tons)						

EQUIPMENT TRANSPORTATION - AIR	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input weight of equipment transported (tons)						

EQUIPMENT TRANSPORTATION - RAIL	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input weight of load (tons)						

EQUIPMENT TRANSPORTATION - WATER	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (mile)						

Input weight of load (tons)						

EQUIPMENT USE

EARTHWORK	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose earthwork equipment type from drop down menu	Dozer	Dozer	Dozer	Dozer	Dozer	Dozer
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input volume of material to be removed (yd^3)						
Will DIESEL-run equipment be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
DRILLING	**Event 1**	**Event 2**	**Event 3**	**Event 4**	**Event 5**	**Event 6**
Input number of drilling locations						
Choose drilling method from drop down menu	Direct Push	Direct Push	Direct Push	Direct Push	Direct Push	Direct Push
Input time spent drilling at each location (hr)						
Input depth of wells (ft)						
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel

For each pump, select only one of the three methods to calculate energy and GHG emissions
Enter "0" for all user input values for unused pump columns or unused methods

PUMP OPERATION	Pump 1	Pump 2	Pump 3	Pump 4	Pump 5	Pump 6
Choose method from drop down	Method 1	Method 1	Method 1	Method 1	Method 1	Method 1
Method 1 - ELECTRICAL USAGE IS KNOWN						
Input pump electrical usage (KWh)	0	0	0	0	0	0
Method 2 - PUMP HEAD IS KNOWN						
Input flow rate (gpm)	0	0	0	0	0	0
Input total head (ft)	0	0	0	0	0	0
Input number of pumps operating	0	0	0	0	0	0
Input operating time for each pump (hrs)	0	0	0	0	0	0
Pump efficiency times motor efficiency (default already present, user override possible)	0.51	0.51	0.51	0.51	0.51	0.51
Input specific gravity (default already present, user override possible)	1	1	1	1	1	1
Method 3 - NAME PLATE SPECIFICATIONS ARE KNOWN						
Input pump horsepower (hp)	0	0	0	0	0	0
Input number of pumps operating	0	0	0	0	0	0
Input operating time for each pump (hrs)	0	0	0	0	0	0
Input pump load (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Input pump motor efficiency (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Region						
Choose region from drop down menu (scroll right to see figure)	AKGD	AKGD	AKGD	AKGD	AKGD	AKGD

DIESEL AND GASOLINE PUMPS	Pump 1	Pump 2	Pump 3	Pump 4	Pump 5	Pump 6
Choose fuel type from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Choose horsepower range from drop down menu	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1
Equipment operating hours (hrs)						
Input estimated fuel consumption rate (gal/hr) (Input only if known for the pump selected, otherwise a default will be used by the tool)						

For each type of equipment, select only one of the methods to calculate energy and GHG emissions
Enter "0" for all user input values for unused equipment columns or unused methods

BLOWER, COMPRESSOR, MIXER, AND OTHER EQUIPMENT	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose type of equipment from drop down	Blower	Blower	Blower	Blower	Blower	Blower
Choose method from drop down	Method 1	Method 1	Method 1	Method 1	Method 1	Method 1
Method 1 - NAME PLATE SPECIFICATIONS ARE KNOWN						
Input equipment horsepower (hp)	0	0	0	0	0	0
Input number of equipments operating	0	0	0	0	0	0
Input operating time for each equipment (hrs)	0	0	0	0	0	0
Input equipment load (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Input motor efficiency (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Method 2 - ELECTRICAL USAGE IS KNOWN						
Input equipment electrical usage, if known (KWh)	0	0	0	0	0	0
Region						
Choose region from drop down menu (scroll right to see figure)	AKGD	AKGD	AKGD	AKGD	AKGD	AKGD

GENERATORS	Generator 1	Generator 2	Generator 3	Generator 4	Generator 5	Generator 6
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Choose horsepower range from drop down menu	3 to 6	3 to 6	3 to 6	3 to 6	3 to 6	3 to 6
Input operating hours (hr)						

AGRICULTURAL EQUIPMENT	Tillage Tractor 1	Tillage Tractor 2	Tillage Tractor 3	Tillage Tractor 4	Tillage Tractor 5	Tillage Tractor 6
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input area to till (acre)						
Choose soil condition from drop down menu	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil
Choose soil type from drop down menu	Clay Soil	Clay Soil	Clay Soil	Clay Soil	Clay Soil	Clay Soil
Input time available (work days)						
Input depth of tillage (in)						

CAPPING EQUIPMENT	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose stabilization equipment type from drop down menu	Roller	Roller	Roller	Roller	Roller	Roller
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input area (ft^2)						
Input time available (work days)						

MIXING EQUIPMENT	Mixer 1	Mixer 2	Mixer 3	Mixer 4	Mixer 5	Mixer 6
Choose fuel type from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Choose horsepower range from drop down menu	1 to 3	1 to 3	1 to 3	1 to 3	1 to 3	1 to 3
Input volume (yd^3)						
Input production rate (yd^3/hr)						
Input estimated fuel consumption rate (gal/hr) (Input only if known for the mixer selected, otherwise a default will be used by the tool)						

RESIDUAL HANDLING

RESIDUE DISPOSAL/RECYCLING	Soil Residue	Residual Water	Material Residue	Other Residuals	Other Residuals	Other Residuals
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Input weight of the waste transported to landfill or recycling per trip (tons)						
Choose vehicle type from drop down menu	On-road truck	On-road truck	On-road truck	On-road truck	On-road truck	On-road truck
Choose fuel used from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input total number of trips						
Input number of miles per trip						

LANDFILL OPERATIONS	Operation 1	Operation 2	Operation 3	Operation 4	Operation 5	Operation 6
Input tons of soil or waste to be incinerated (user must input emission factors in the Look Up Table, Table 7a)						

THERMAL/CATALYTIC OXIDIZERS*	Oxidizer 1	Oxidizer 2	Oxidizer 3	Oxidizer 4	Oxidizer 5	Oxidizer 6
Choose oxidizer type from drop down menu	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer
Choose fuel type from drop down menu	natural gas	Propane	natural gas	natural gas	natural gas	natural gas
Input waste gas flow rate (scfm)						
Input time running (hours)						
Input waste gas inlet temperature (F)						
Input contaminant concentration (ppmV)						

*(Electric blowers are included in the analysis)

WATER CONSUMPTION	Treatment System 1	Treatment System 2	Treatment System 3	Treatment System 4	Treatment System 5	Treatment System 6
Input water disposed/collected during treatment (gal)						
Input water disposed/collected during site preparation (gal)						
Input water disposed/collected during sampling (gal)						
Input water disposed/collected during site demobilization (gal)						

LANDFILL METHANE EMISSIONS	Landfill 1	Landfill 2	Landfill 3	Landfill 4	Landfill 5	Landfill 6
Input landfill methane emissions (metric tons)						

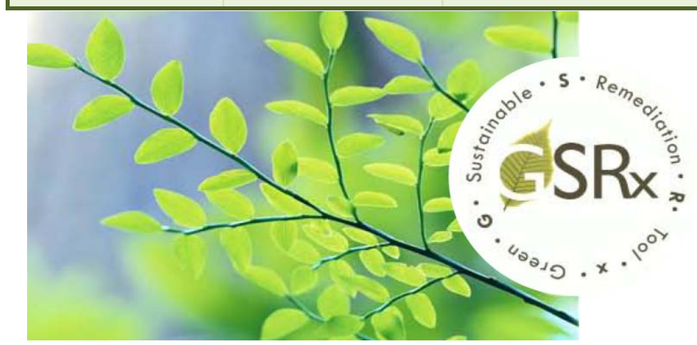
OTHER KNOWN ONSITE ACTIVITIES	Entire Site
Input energy usage (MMBTU)	
Water consumption (gallon)	
Input CO_2 emission (metric ton)	
Input N_2O emission (metric ton CO_2 e)	
Input CH_4 emissions (metric ton CO_2 e)	
Input NOx emission (metric ton)	
Input SOx emission (metric ton)	
Input PM_{10} emission (metric ton)	
Input fatality risk	
Input injury risk	

GSRx - ALTERNATIVE 4
HYBRID SITEWISE EVALUATION
NWIRP CALVERTON
CALVERTON, NEW YORK

Technology Module / Phase	Module Components	Comments / Assumptions	Quantity	(Units)	Greenhouse Gas Emissions				Criteria Pollutant Emission			Energy Consumption	Water Consumption
					$CO_{2\ equiv}$	CO_2	N_20	CH_4	NO_x	SO_x	PM_{10}		
Materials						**Tonnes**						**MWhr**	**gal x 1000**
Monitoring Well Installation	PVC	1350' of wells @ .682 lb/ft	921	lbs	1.04	1.04	0.00	0.01	0.00	0.00	0.00	38.07	1.58
Monitoring Well Installation	Steel	25 wells, 4 Bollards/well, 8 feet each, 22 lb/ft	17600	lbs	21.55	21.55	0.00	0.01	0.00	0.02	0.00	371.29	15.82
Monitoring Well Installation	Typical Cement	67 lb/cf	22386	lbs	8.43	8.43	0.00	0.00	0.00	0.00	0.00	63.08	0.00
Monitoring Well Installation	Sand	75 lb/cf	6188	lbs	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.38	0.00
Monitoring Well Installation	Bentonite	93 lb/cf	1535	lbs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Air Sparge Installation	PVC	2400 ft + 8000 ft, 2" PVC	7093	lbs	8.04	8.04	0.02	0.09	0.00	0.03	0.00	293.27	12.20
Air Sparge Installation	Steel	48 wells per site, total=96, 4 bollards/well, 8' 22 lb/ft + Misc steel piping and fittings (500 lb/site)	68584	lbs	83.98	83.98	0.01	0.02	0.00	0.07	0.00	1446.86	61.63
Air Sparge Installation	Typical Cement	67 lb/cf	205888	lbs	77.50	77.50	0.00	0.00	0.00	0.00	0.00	580.14	0.00
Air Sparge Installation	Sand	75 lb/cf	15840	lbs	0.04	0.04	0.00	0.00	0.00	0.00	0.00	0.97	0.00
Air Sparge Installation	Bentonite	93 lb/cf	7856	lbs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Air Sparge Installation	General concrete	96 concrete pads 1 cy each, 4050 lb/cy	388800	lbs	22.92	22.92	0.00	0.00	0.00	0.00	0.00	226.25	0.00
Air Sparge Installation	Steel	Steel Building Source Area 20'x20' 40 lb/sf	16000	lbs	19.59	19.59	0.00	0.01	0.00	0.02	0.00	337.54	14.38
Air Sparge Installation	HDPE	HDPE piping, 400' 4" and 1400' of 2", Source Area	1812	lbs	2.14	2.14	0.01	0.02	0.00	0.01	0.00	23.71	0.65
Air Sparge Installation	HDPE	HDPE piping, 800' of 6", 500' 4" and 800' of 2", River Area	5633	lbs	6.64	6.64	0.02	0.05	0.00	0.03	0.00	73.72	2.02
Air Sparge Installation	Steel	Steel Building River Area 20'x30 40 lb/sf	24000	lbs	29.39	29.39	0.00	0.01	0.00	0.03	0.00	506.31	21.57
Well Decomissioning	Typical Cement	Abandon all wells	28644	lbs	10.78	10.78	0.00	0.00	0.00	0.00	0.00	80.71	0.00
Subtotal					**292.06**	**292.06**	**0.06**	**0.22**	**0.00**	**0.20**	**0.01**	**4042.30**	**129.85**
Transportation						**Tonnes**						**MWhr**	**gal x 1000**
Input Into Sitewise				miles									
Subtotal					**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0**

GSRx - ALTERNATIVE 4
HYBRID SITEWISE EVALUATION
NWIRP CALVERTON
CALVERTON, NEW YORK

Technology Module / Phase	Module Components	Comments / Assumptions	Quantity	(Units)	Greenhouse Gas Emissions				Criteria Pollutant Emission			Energy Consumption	Water Consumption
					$CO_{2\ equiv}$	CO_2	N_20	CH_4	NO_x	SO_x	PM_{10}		
Materials						**Tonnes**						**MWhr**	**gal x 1000**
Construction Equipment						**Tonnes**						**MWhr**	**gal x 1000**
Monitoring Well Installation	Loader, 100 HP, 2 CY (diesel)	22 days 4 hrs/day	88	hrs	1.45	1.45	0.00	0.00	0.01	0.00	0.00	6.45	
Monitoring Well Installation	Drill Rig, HSA (diesel)	22 days 8 hrs/day	176	hrs	9.59	9.59	0.00	0.01	0.11	0.00	0.01	44.81	
Air Sparge Installation	Loader, 100 HP, 2 CY (diesel)	42 days 7 hrs/day	294	hrs	4.85	4.85	0.00	0.00	0.04	0.01	0.01	21.56	
Air Sparge Installation	Drill Rig, HSA (diesel)	42 days 8 hrs/day	336	hrs	18.30	18.30	0.00	0.02	0.21	0.00	0.01	85.55	
Air Sparge Installation	Loader, 100 HP, 2 CY (diesel)	96 days 7 hrs/day	672	hrs	11.09	11.09	0.00	0.00	0.09	0.02	0.02	49.28	
Air Sparge Installation	Drill Rig, HSA (diesel)	96 days 8 hrs/day	768	hrs	41.83	41.83	0.00	0.04	0.49	0.01	0.03	195.54	
Demolition	Dozer, 335 HP (D8) w/U Blade (diesel)	8 hrs/day 10 days, Demolition	80	hrs	14.47	14.47	0.00	0.00	0.11	0.03	0.01	70.39	
Subtotal					**101.58**	**101.58**	**0.00**	**0.06**	**1.06**	**0.07**	**0.09**	**473.57**	**0**
Operating Consumption						**Tonnes**						**MWhr**	**gal x 1000**
Input Into Sitewise													0
					0	**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0**	**0**
			Total		**394**	**394**	**0.06**	**0.28**	**1.06**	**0.28**	**0.10**	**4,516**	**130**



Alternative 4
Values Input into SiteWise as "Other"

Module	Greenhouse Gas Emissions				Criteria Pollutant Emission			Energy Consumption	Water Consumption
	$CO_{2\ equiv}$	CO_2	N_20 (CO2e)	CH_4 (CO2e)	NO_x	SO_x	PM_{10}		
		Tonnes						**MMBTU**	**gal**
RI									
RAC	3.94E+02	3.94E+02	1.86E+01	5.82E+00	1.06E+00	2.78E-01	9.72E-02	1.54E+04	1.30E+05
RAO	4.02E+01	4.02E+01	1.01E+00	1.83E-01	6.53E-05	2.50E-02	0.00E+00	2.00E+03	2.16E+04
LTM									

Note: 1 MWhr = 3412141.4799 BTU, 1MMTBU = 10^6 BTU

SITE INFORMATION	
Name	Elena Goldstein
Date	3/24/2011
Site	Calverton
Remedial Alternative Name	Alt 5

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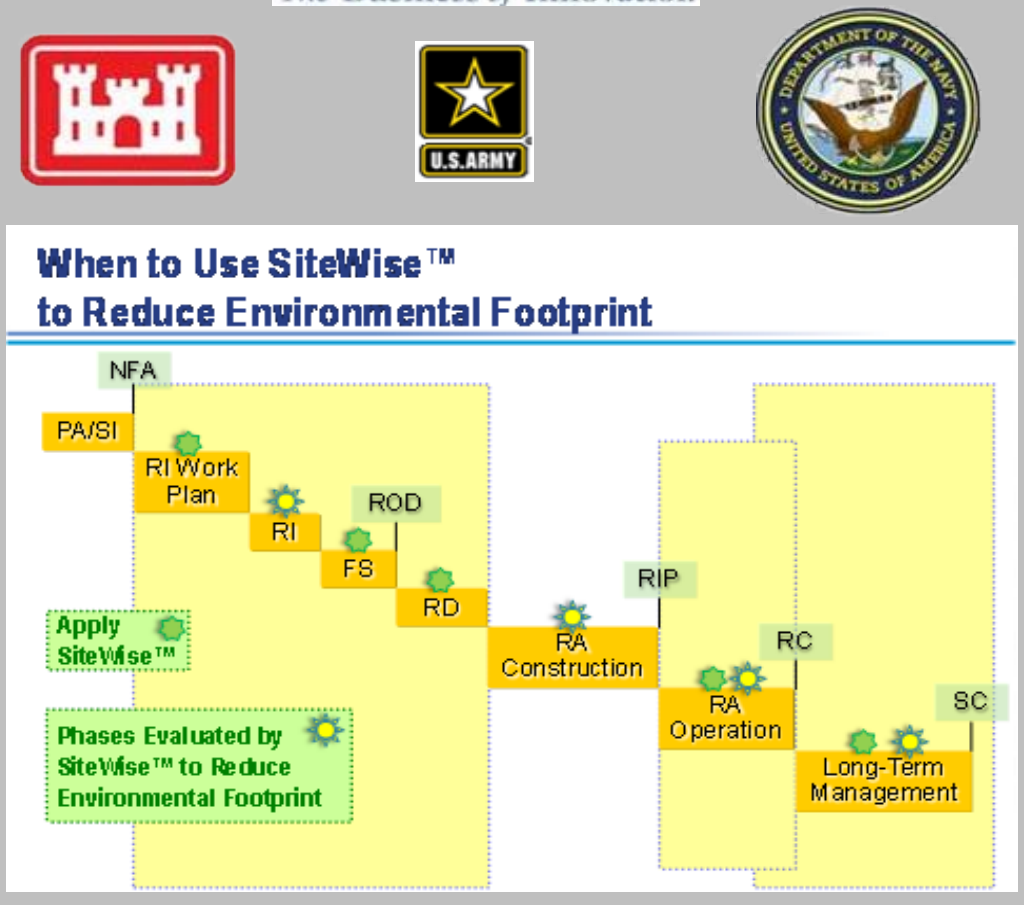

Remedial Action Construction

This worksheet allows the user to define material production, transportation, equipment use, and residual handling variables for the remedial alternative

Yellow cells	require the user to choose an input from a drop down menu
White cells	require the user to type in a value

MATERIAL PRODUCTION

WELL MATERIALS	Well Type 1	Well Type 2	Well Type 3	Well Type 4	Well Type 5	Well Type 6
Input number of wells						
Input depth of wells (ft)						
Choose well diameter (in) from drop down menu	1/2	1/2	1/2	1/2	1/2	1/2
Choose material type from drop down menu	PVC	PVC	PVC	PVC	PVC	PVC
Choose specific material schedule from drop down menu	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC

TREATMENT CHEMICALS & MATERIALS	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6
Input number of injection points						
Choose material type from drop down menu	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide
Input amount of material injected at each point (pounds dry mass)						
Input number of injections per injection point						

GAC	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6
Input weight of GAC used (lbs)						
Choose material type from drop down menu	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC

CONSTRUCTION MATERIALS	Material 1	Material 2	Material 3	Material 4	Material 5	Material 6
Choose material type from drop down menu	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner
Input area of material (ft^2)						
Input depth of material (ft)						

WELL DECOMMISSIONING	Well Type 1	Well Type 2	Well Type 3	Well Type 4	Well Type 5	Well Type 6
Input number of wells						
Input depth of wells (ft)						
Input well diameter (in)	1	1	1	1	1	1
Choose material from drop down menu	Soil	Soil	Soil	Soil	Soil	Soil

TRANSPORTATION

	Well Install/Sampling	Drill Rig Crew	EISB Well Installation	Rig Crew	Well Abandonment	
PERSONNEL TRANSPORTATION - ROAD	Trip 1	Trip 2	Trip 3	Trip 4	Trip 6	Trip 6
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Choose vehicle type from drop down menu*	Light truck	Heavy Duty	Light truck	Heavy Duty	Light truck	Light truck
Choose fuel used from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input distance traveled per trip (miles)	50	50	50	50	50	
Input number of trips taken	45	26	98	98	20	
Input number of travelers	2	3	2	3	2	
Input estimated vehicular fuel economy (mi/gal) (Input only if known for the vehicle selected, otherwise a default will be used by the tool)						

*For vehicle type 'Other' please enter values in Table 2b in the Look Up Table tab.

PERSONNEL TRANSPORTATION - AIR	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input number of travelers						
Input number of flights taken						

PERSONNEL TRANSPORTATION - RAIL	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Choose vehicle type from drop down menu	Intercity rail	Intercity rail	Intercity rail	Intercity rail	Intercity rail	Intercity rail
Input distance traveled (miles)						
Input number of trips taken						
Input number of travelers						

	Drill Rig	Loader	Mon. Well Mat'l	Trailers	EISB Mat'l Delivery	
EQUIPMENT TRANSPORTATION - ROAD	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Choose fuel used from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input distance traveled (miles)	100	100	100	100	2,100	
Input weight of equipment transported (tons)	10	9	18	20	20	

EQUIPMENT TRANSPORTATION - AIR	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input weight of equipment transported (tons)						

EQUIPMENT TRANSPORTATION - RAIL	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input weight of load (tons)						

EQUIPMENT TRANSPORTATION - WATER	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (mile)						
Input weight of load (tons)						

EQUIPMENT USE

EARTHWORK	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose earthwork equipment type from drop down menu	Dozer	Dozer	Dozer	Dozer	Dozer	Dozer
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input volume of material to be removed (yd^3)						
Will DIESEL-run equipment be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
DRILLING	**Event 1**	**Event 2**	**Event 3**	**Event 4**	**Event 5**	**Event 6**
Input number of drilling locations						
Choose drilling method from drop down menu	Direct Push	Direct Push	Direct Push	Direct Push	Direct Push	Direct Push
Input time spent drilling at each location (hr)						
Input depth of wells (ft)						
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel

For each pump, select only one of the three methods to calculate energy and GHG emissions
Enter "0" for all user input values for unused pump columns or unused methods

PUMP OPERATION	Pump 1	Pump 2	Pump 3	Pump 4	Pump 5	Pump 6
Choose method from drop down	Method 2	Method 1	Method 1	Method 1	Method 1	Method 1
Method 1 - ELECTRICAL USAGE IS KNOWN						
Input pump electrical usage (KWh)	0	0	0	0	0	0
Method 2 - PUMP HEAD IS KNOWN						
Input flow rate (gpm)	0	0	0	0	0	0
Input total head (ft)	0	0	0	0	0	0
Input number of pumps operating	0	0	0	0	0	0
Input operating time for each pump (hrs)	0	0	0	0	0	0
Pump efficiency times motor efficiency (default already present, user override possible)	0.51	0.51	0.51	0.51	0.51	0.51
Input specific gravity (default already present, user override possible)	1	1	1	1	1	1
Method 3 - NAME PLATE SPECIFICATIONS ARE KNOWN						
Input pump horsepower (hp)	0	0	0	0	0	0
Input number of pumps operating	0	0	0	0	0	0
Input operating time for each pump (hrs)	0	0	0	0	0	0
Input pump load (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Input pump motor efficiency (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Region						
Choose region from drop down menu (scroll right to see figure)	AKGD	AKGD	AKGD	AKGD	AKGD	AKGD

DIESEL AND GASOLINE PUMPS	Pump 1	Pump 2	Pump 3	Pump 4	Pump 5	Pump 6
Choose fuel type from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Choose horsepower range from drop down menu	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1
Equipment operating hours (hrs)						
Input estimated fuel consumption rate (gal/hr) (Input only if known for the pump selected, otherwise a default will be used by the tool)						

For each type of equipment, select only one of the methods to calculate energy and GHG emissions
Enter "0" for all user input values for unused equipment columns or unused methods

BLOWER, COMPRESSOR, MIXER, AND OTHER EQUIPMENT	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose type of equipment from drop down	Blower	Blower	Blower	Blower	Blower	Blower
Choose method from drop down	Method 1	Method 1	Method 1	Method 1	Method 1	Method 1
Method 1 - NAME PLATE SPECIFICATIONS ARE KNOWN						
Input equipment horsepower (hp)	0	0	0	0	0	0
Input number of equipments operating	0	0	0	0	0	0
Input operating time for each equipment (hrs)	0	0	0	0	0	0
Input equipment load (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Input motor efficiency (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Method 2 - ELECTRICAL USAGE IS KNOWN						
Input equipment electrical usage, if known (KWh)	0	0	0	0	0	0
Region						
Choose region from drop down menu (scroll right to see figure)	AKGD	AKGD	AKGD	AKGD	AKGD	AKGD

GENERATORS	Generator 1	Generator 2	Generator 3	Generator 4	Generator 5	Generator 6
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Choose horsepower range from drop down menu	3 to 6	3 to 6	3 to 6	3 to 6	3 to 6	3 to 6
Input operating hours (hr)						

AGRICULTURAL EQUIPMENT	Tillage Tractor 1	Tillage Tractor 2	Tillage Tractor 3	Tillage Tractor 4	Tillage Tractor 5	Tillage Tractor 6
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input area to till (acre)						
Choose soil condition from drop down menu	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil
Choose soil type from drop down menu	Clay Soil	Clay Soil	Clay Soil	Clay Soil	Clay Soil	Clay Soil
Input time available (work days)						
Input depth of tillage (in)						

CAPPING EQUIPMENT	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose stabilization equipment type from drop down menu	Roller	Roller	Roller	Roller	Roller	Roller
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input area (ft^2)						
Input time available (work days)						

MIXING EQUIPMENT	Mixer 1	Mixer 2	Mixer 3	Mixer 4	Mixer 5	Mixer 6
Choose fuel type from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Choose horsepower range from drop down menu	1 to 3	1 to 3	1 to 3	1 to 3	1 to 3	1 to 3
Input volume (yd^3)						
Input production rate (yd^3/hr)						
Input estimated fuel consumption rate (gal/hr) (Input only if known for the mixer selected, otherwise a default will be used by the tool)						

RESIDUAL HANDLING

RESIDUE DISPOSAL/RECYCLING	Roll offs Soil Residue	Residual Water	Material Residue	Other Residuals	Other Residuals	Other Residuals
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Input weight of the waste transported to landfill or recycling per trip (tons)	30	22				
Choose vehicle type from drop down menu	Heavy Duty	Heavy Duty	Heavy Duty	On-road truck	On-road truck	On-road truck
Choose fuel used from drop down menu	Diesel	Diesel	Diesel	Gasoline	Gasoline	Gasoline
Input total number of trips	8	12				
Input number of miles per trip	50	50				

LANDFILL OPERATIONS	Operation 1	Operation 2	Operation 3	Operation 4	Operation 5	Operation 6
Input tons of soil or waste to be incinerated (user must input emission factors in the Look Up Table, Table 7a)						

THERMAL/CATALYTIC OXIDIZERS*	Oxidizer 1	Oxidizer 2	Oxidizer 3	Oxidizer 4	Oxidizer 5	Oxidizer 6
Choose oxidizer type from drop down menu	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer
Choose fuel type from drop down menu	natural gas	Propane	natural gas	natural gas	natural gas	natural gas
Input waste gas flow rate (scfm)						
Input time running (hours)						
Input waste gas inlet temperature (F)						
Input contaminant concentration (ppmV)						

*(Electric blowers are included in the analysis)

WATER CONSUMPTION	Treatment System 1	Treatment System 2	Treatment System 3	Treatment System 4	Treatment System 5	Treatment System 6
Input water disposed/collected during treatment (gal)						
Input water disposed/collected during site preparation (gal)	4500					
Input water disposed/collected during sampling (gal)						
Input water disposed/collected during site demobilization (gal)						

LANDFILL METHANE EMISSIONS	Landfill 1	Landfill 2	Landfill 3	Landfill 4	Landfill 5	Landfill 6
Input landfill methane emissions (metric tons)						

OTHER KNOWN ONSITE ACTIVITIES	Entire Site
Input energy usage (MMBTU)	1.1E+04
Water consumption (gallon)	9.8E+04
Input CO_2 emission (metric ton)	2.5E+02
Input N_2O emission (metric ton CO_2 e)	8.2E+00
Input CH_4 emissions (metric ton CO_2 e)	2.7E+00
Input NOx emission (metric ton)	4.4E-01
Input SOx emission (metric ton)	1.5E-01
Input PM_{10} emission (metric ton)	3.9E-02
Input fatality risk	0.0E+00
Input injury risk	0.0E+00

Remedial Action Operations

This worksheet allows the user to define material production, transportation, equipment use, and residual handling variables for the remedial alternative

Yellow cells	require the user to choose an input from a drop down menu
White cells	require the user to type in a value

MATERIAL PRODUCTION

WELL MATERIALS	Well Type 1	Well Type 2	Well Type 3	Well Type 4	Well Type 5	Well Type 6
Input number of wells						
Input depth of wells (ft)						
Choose well diameter (in) from drop down menu	1/2	1/2	1/2	1/2	1/2	1/2
Choose material type from drop down menu	PVC	PVC	PVC	PVC	PVC	PVC
Choose specific material schedule from drop down menu	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC

TREATMENT CHEMICALS & MATERIALS	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6
Input number of injection points						
Choose material type from drop down menu	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide
Input amount of material injected at each point (pounds dry mass)						
Input number of injections per injection point						

GAC	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6
Input weight of GAC used (lbs)						
Choose material type from drop down menu	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC

CONSTRUCTION MATERIALS	Material 1	Material 2	Material 3	Material 4	Material 5	Material 6
Choose material type from drop down menu	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner
Input area of material (ft^2)						
Input depth of material (ft)						

WELL DECOMMISSIONING	Well Type 1	Well Type 2	Well Type 3	Well Type 4	Well Type 5	Well Type 6
Input number of wells						
Input depth of wells (ft)						
Input well diameter (in)	1	1	1	1	1	1
Choose material from drop down menu	Soil	Soil	Soil	Soil	Soil	Soil

TRANSPORTATION

	LUC inspection	Injection				
PERSONNEL TRANSPORTATION - ROAD	Trip 1	Trip 5	Trip 3	Trip 4	Trip 5	Trip 6
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Choose vehicle type from drop down menu*	Light truck	Light truck	Cars	Cars	Cars	Cars
Choose fuel used from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input distance traveled per trip (miles)	50	50				
Input number of trips taken	30	118				
Input number of travelers	2	3				
Input estimated vehicular fuel economy (mi/gal) (Input only if known for the vehicle selected, otherwise a default will be used by the tool)						

*For vehicle type 'Other' please enter values in Table 2b in the Look Up Table tab.

PERSONNEL TRANSPORTATION - AIR	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input number of travelers						
Input number of flights taken						

PERSONNEL TRANSPORTATION - RAIL	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Choose vehicle type from drop down menu	Intercity rail	Intercity rail	Intercity rail	Intercity rail	Intercity rail	Intercity rail
Input distance traveled (miles)						
Input number of trips taken						
Input number of travelers						

	Veg Oil Delivery					
EQUIPMENT TRANSPORTATION - ROAD	Trip 6	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Choose fuel used from drop down menu	Diesel	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input distance traveled (miles)	1,300					
Input weight of equipment transported (tons)	20.0					

EQUIPMENT TRANSPORTATION - AIR	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input weight of equipment transported (tons)						

EQUIPMENT TRANSPORTATION - RAIL	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input weight of load (tons)						

EQUIPMENT TRANSPORTATION - WATER	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (mile)						
Input weight of load (tons)						

EQUIPMENT USE

EARTHWORK	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose earthwork equipment type from drop down menu	Dozer	Dozer	Dozer	Dozer	Dozer	Dozer
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input volume of material to be removed (yd^3)						
Will DIESEL-run equipment be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
DRILLING	**Event 1**	**Event 2**	**Event 3**	**Event 4**	**Event 5**	**Event 6**
Input number of drilling locations						
Choose drilling method from drop down menu	Direct Push	Direct Push	Direct Push	Direct Push	Direct Push	Direct Push
Input time spent drilling at each location (hr)						
Input depth of wells (ft)						
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel

For each pump, select only one of the three methods to calculate energy and GHG emissions
Enter "0" for all user input values for unused pump columns or unused methods

PUMP OPERATION	Pump 1	Pump 2	Pump 3	Pump 4	Pump 5	Pump 6
Choose method from drop down	Method 1	Method 1	Method 1	Method 1	Method 1	Method 1
Method 1 - ELECTRICAL USAGE IS KNOWN						
Input pump electrical usage (KWh)	0	0	0	0	0	0
Method 2 - PUMP HEAD IS KNOWN						
Input flow rate (gpm)	0	0	0	0	0	0
Input total head (ft)	0	0	0	0	0	0
Input number of pumps operating	0	0	0	0	0	0
Input operating time for each pump (hrs)	0	0	0	0	0	0
Pump efficiency times motor efficiency (default already present, user override possible)	0.51	0.51	0.51	0.51	0.51	0.51
Input specific gravity (default already present, user override possible)	1	1	1	1	1	1
Method 3 - NAME PLATE SPECIFICATIONS ARE KNOWN						
Input pump horsepower (hp)	0	0	0	0	0	0
Input number of pumps operating	0	0	0	0	0	0
Input operating time for each pump (hrs)	0	0	0	0	0	0
Input pump load (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Input pump motor efficiency (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Region						
Choose region from drop down menu (scroll right to see figure)	AKGD	AKGD	AKGD	AKGD	AKGD	AKGD

DIESEL AND GASOLINE PUMPS	Pump 1	Pump 2	Pump 3	Pump 4	Pump 5	Pump 6
Choose fuel type from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Choose horsepower range from drop down menu	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1
Equipment operating hours (hrs)						
Input estimated fuel consumption rate (gal/hr) (Input only if known for the pump selected, otherwise a default will be used by the tool)						

For each type of equipment, select only one of the methods to calculate energy and GHG emissions
Enter "0" for all user input values for unused equipment columns or unused methods

BLOWER, COMPRESSOR, MIXER, AND OTHER EQUIPMENT	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose type of equipment from drop down	Blower	Blower	Blower	Blower	Blower	Blower
Choose method from drop down	Method 2	Method 2	Method 2	Method 1	Method 1	Method 1
Method 1 - NAME PLATE SPECIFICATIONS ARE KNOWN						
Input equipment horsepower (hp)	0	0	0	0	0	0
Input number of equipments operating	0	0	0	0	0	0
Input operating time for each equipment (hrs)	0	0	0	0	0	0
Input equipment load (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Input motor efficiency (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Method 2 - ELECTRICAL USAGE IS KNOWN						
Input equipment electrical usage, if known (KWh)	0.00	0.00	0.00	0	0	0
Region						
Choose region from drop down menu (scroll right to see figure)	AKGD	AKGD	AKGD	AKGD	AKGD	AKGD

	First Injection	Second Injection				
GENERATORS	Generator 1	Generator 2	Generator 3	Generator 4	Generator 5	Generator 6
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Choose horsepower range from drop down menu	75 to 100	75 to 100	3 to 6	3 to 6	3 to 6	3 to 6
Input operating hours (hr)	497	329				

AGRICULTURAL EQUIPMENT	Tillage Tractor 1	Tillage Tractor 2	Tillage Tractor 3	Tillage Tractor 4	Tillage Tractor 5	Tillage Tractor 6
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input area to till (acre)						
Choose soil condition from drop down menu	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil
Choose soil type from drop down menu	Clay Soil	Clay Soil	Clay Soil	Clay Soil	Clay Soil	Clay Soil
Input time available (work days)						
Input depth of tillage (in)						

CAPPING EQUIPMENT	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose stabilization equipment type from drop down menu	Roller	Roller	Roller	Roller	Roller	Roller
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input area (ft^2)						
Input time available (work days)						

MIXING EQUIPMENT	Mixer 1	Mixer 2	Mixer 3	Mixer 4	Mixer 5	Mixer 6
Choose fuel type from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Choose horsepower range from drop down menu	1 to 3	1 to 3	1 to 3	1 to 3	1 to 3	1 to 3
Input volume (yd^3)						
Input production rate (yd^3/hr)						
Input estimated fuel consumption rate (gal/hr) (Input only if known for the mixer selected, otherwise a default will be used by the tool)						

RESIDUAL HANDLING

			Oil Drum disposal			
RESIDUE DISPOSAL/RECYCLING	Soil Residue	Residual Water	Material Residue	Other Residuals	Other Residuals	Other Residuals
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Input weight of the waste transported to landfill or recycling per trip (tons)			18			
Choose vehicle type from drop down menu	On-road truck	On-road truck	Heavy Duty	On-road truck	On-road truck	On-road truck
Choose fuel used from drop down menu	Gasoline	Gasoline	Diesel	Gasoline	Gasoline	Gasoline
Input total number of trips			1			
Input number of miles per trip			50			

LANDFILL OPERATIONS	Operation 1	Operation 2	Operation 3	Operation 4	Operation 5	Operation 6
Input tons of soil or waste to be incinerated (user must input emission factors in the Look Up Table, Table 7a)						

THERMAL/CATALYTIC OXIDIZERS*	Oxidizer 1	Oxidizer 2	Oxidizer 3	Oxidizer 4	Oxidizer 5	Oxidizer 6
Choose oxidizer type from drop down menu	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer
Choose fuel type from drop down menu	natural gas	Propane	natural gas	natural gas	natural gas	natural gas
Input waste gas flow rate (scfm)						
Input time running (hours)						
Input waste gas inlet temperature (F)						
Input contaminant concentration (ppmV)						

*(Electric blowers are included in the analysis)

	P&T					
WATER CONSUMPTION	Treatment System 1	Treatment System 2	Treatment System 3	Treatment System 4	Treatment System 5	Treatment System 6
Input water disposed/collected during treatment (gal)	56,500					
Input water disposed/collected during site preparation (gal)						
Input water disposed/collected during sampling (gal)						
Input water disposed/collected during site demobilization (gal)						

LANDFILL METHANE EMISSIONS	Landfill 1	Landfill 2	Landfill 3	Landfill 4	Landfill 5	Landfill 6
Input landfill methane emissions (metric tons)						

OTHER KNOWN ONSITE ACTIVITIES	Entire Site
Input energy usage (MMBTU)	8.7E+03
Water consumption (gallon)	2.2E+05
Input CO_2 emission (metric ton)	7.4E+01
Input N_2O emission (metric ton CO_2 e)	1.6E-03
Input CH_4 emissions (metric ton CO_2 e)	0.0E+00
Input NOx emission (metric ton)	0.0E+00
Input SOx emission (metric ton)	7.3E-02
Input PM_{10} emission (metric ton)	2.9E-05
Input fatality risk	0.0E+00
Input injury risk	0.0E+00

Long Term Monitoring

This worksheet allows the user to define material production, transportation, equipment use, and residual handling variables for the remedial alternative

Yellow cells	require the user to choose an input from a drop down menu
White cells	require the user to type in a value

MATERIAL PRODUCTION

WELL MATERIALS	Well Type 1	Well Type 2	Well Type 3	Well Type 4	Well Type 5	Well Type 6
Input number of wells						
Input depth of wells (ft)						
Choose well diameter (in) from drop down menu	1/2	1/2	1/2	1/2	1/2	1/2
Choose material type from drop down menu	PVC	PVC	PVC	PVC	PVC	PVC
Choose specific material schedule from drop down menu	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC

TREATMENT CHEMICALS & MATERIALS	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6
Input number of injection points						
Choose material type from drop down menu	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide
Input amount of material injected at each point (pounds dry mass)						
Input number of injections per injection point						

GAC	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6
Input weight of GAC used (lbs)						
Choose material type from drop down menu	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC

CONSTRUCTION MATERIALS	Material 1	Material 2	Material 3	Material 4	Material 5	Material 6
Choose material type from drop down menu	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner
Input area of material (ft^2)						
Input depth of material (ft)						

WELL DECOMMISSIONING	Well Type 1	Well Type 2	Well Type 3	Well Type 4	Well Type 5	Well Type 6
Input number of wells						
Input depth of wells (ft)						
Input well diameter (in)	1	1	1	1	1	1
Choose material from drop down menu	Soil	Soil	Soil	Soil	Soil	Soil

TRANSPORTATION

	GW Monitoring	GW Monitoring	Well Maintenance			
PERSONNEL TRANSPORTATION - ROAD	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Choose vehicle type from drop down menu*	Light truck	Light truck	Light truck	Light truck	Cars	Cars
Choose fuel used from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input distance traveled per trip (miles)	50	50	50			
Input number of trips taken	96	96	3			
Input number of travelers	2	2	2			
Input estimated vehicular fuel economy (mi/gal) (Input only if known for the vehicle selected, otherwise a default will be used by the tool)						

*For vehicle type 'Other' please enter values in Table 2b in the Look Up Table tab.

PERSONNEL TRANSPORTATION - AIR	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input number of travelers						
Input number of flights taken						

PERSONNEL TRANSPORTATION - RAIL	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Choose vehicle type from drop down menu	Intercity rail	Intercity rail	Intercity rail	Intercity rail	Intercity rail	Intercity rail
Input distance traveled (miles)						
Input number of trips taken						
Input number of travelers						

EQUIPMENT TRANSPORTATION - ROAD	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Choose fuel used from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input distance traveled (miles)						
Input weight of equipment transported (tons)						

EQUIPMENT TRANSPORTATION - AIR	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input weight of equipment transported (tons)						

EQUIPMENT TRANSPORTATION - RAIL	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input weight of load (tons)						

EQUIPMENT TRANSPORTATION - WATER	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (mile)						

Input weight of load (tons)						

EQUIPMENT USE

EARTHWORK	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose earthwork equipment type from drop down menu	Dozer	Dozer	Dozer	Dozer	Dozer	Dozer
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input volume of material to be removed (yd^3)						
Will DIESEL-run equipment be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
DRILLING	**Event 1**	**Event 2**	**Event 3**	**Event 4**	**Event 5**	**Event 6**
Input number of drilling locations						
Choose drilling method from drop down menu	Direct Push	Direct Push	Direct Push	Direct Push	Direct Push	Direct Push
Input time spent drilling at each location (hr)						
Input depth of wells (ft)						
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel

For each pump, select only one of the three methods to calculate energy and GHG emissions
Enter "0" for all user input values for unused pump columns or unused methods

PUMP OPERATION	Pump 1	Pump 2	Pump 3	Pump 4	Pump 5	Pump 6
Choose method from drop down	Method 1	Method 1	Method 1	Method 1	Method 1	Method 1
Method 1 - ELECTRICAL USAGE IS KNOWN						
Input pump electrical usage (KWh)	0	0	0	0	0	0
Method 2 - PUMP HEAD IS KNOWN						
Input flow rate (gpm)	0	0	0	0	0	0
Input total head (ft)	0	0	0	0	0	0
Input number of pumps operating	0	0	0	0	0	0
Input operating time for each pump (hrs)	0	0	0	0	0	0
Pump efficiency times motor efficiency (default already present, user override possible)	0.51	0.51	0.51	0.51	0.51	0.51
Input specific gravity (default already present, user override possible)	1	1	1	1	1	1
Method 3 - NAME PLATE SPECIFICATIONS ARE KNOWN						
Input pump horsepower (hp)	0	0	0	0	0	0
Input number of pumps operating	0	0	0	0	0	0
Input operating time for each pump (hrs)	0	0	0	0	0	0
Input pump load (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Input pump motor efficiency (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Region						
Choose region from drop down menu (scroll right to see figure)	AKGD	AKGD	AKGD	AKGD	AKGD	AKGD

DIESEL AND GASOLINE PUMPS	Pump 1	Pump 2	Pump 3	Pump 4	Pump 5	Pump 6
Choose fuel type from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Choose horsepower range from drop down menu	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1
Equipment operating hours (hrs)						
Input estimated fuel consumption rate (gal/hr) (Input only if known for the pump selected, otherwise a default will be used by the tool)						

For each type of equipment, select only one of the methods to calculate energy and GHG emissions
Enter "0" for all user input values for unused equipment columns or unused methods

BLOWER, COMPRESSOR, MIXER, AND OTHER EQUIPMENT	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose type of equipment from drop down	Blower	Blower	Blower	Blower	Blower	Blower
Choose method from drop down	Method 1	Method 1	Method 1	Method 1	Method 1	Method 1
Method 1 - NAME PLATE SPECIFICATIONS ARE KNOWN						
Input equipment horsepower (hp)	0	0	0	0	0	0
Input number of equipments operating	0	0	0	0	0	0
Input operating time for each equipment (hrs)	0	0	0	0	0	0
Input equipment load (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Input motor efficiency (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Method 2 - ELECTRICAL USAGE IS KNOWN						
Input equipment electrical usage, if known (KWh)	0	0	0	0	0	0
Region						
Choose region from drop down menu (scroll right to see figure)	AKGD	AKGD	AKGD	AKGD	AKGD	AKGD

GENERATORS	Generator 1	Generator 2	Generator 3	Generator 4	Generator 5	Generator 6
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Choose horsepower range from drop down menu	3 to 6	3 to 6	3 to 6	3 to 6	3 to 6	3 to 6
Input operating hours (hr)						

AGRICULTURAL EQUIPMENT	Tillage Tractor 1	Tillage Tractor 2	Tillage Tractor 3	Tillage Tractor 4	Tillage Tractor 5	Tillage Tractor 6
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input area to till (acre)						
Choose soil condition from drop down menu	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil
Choose soil type from drop down menu	Clay Soil	Clay Soil	Clay Soil	Clay Soil	Clay Soil	Clay Soil
Input time available (work days)						
Input depth of tillage (in)						

CAPPING EQUIPMENT	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose stabilization equipment type from drop down menu	Roller	Roller	Roller	Roller	Roller	Roller
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input area (ft^2)						
Input time available (work days)						

MIXING EQUIPMENT	Mixer 1	Mixer 2	Mixer 3	Mixer 4	Mixer 5	Mixer 6
Choose fuel type from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Choose horsepower range from drop down menu	1 to 3	1 to 3	1 to 3	1 to 3	1 to 3	1 to 3
Input volume (yd^3)						
Input production rate (yd^3/hr)						
Input estimated fuel consumption rate (gal/hr) (Input only if known for the mixer selected, otherwise a default will be used by the tool)						

RESIDUAL HANDLING

RESIDUE DISPOSAL/RECYCLING	Soil Residue	Residual Water	Material Residue	Other Residuals	Other Residuals	Other Residuals
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Input weight of the waste transported to landfill or recycling per trip (tons)						
Choose vehicle type from drop down menu	On-road truck	On-road truck	On-road truck	On-road truck	On-road truck	On-road truck
Choose fuel used from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input total number of trips						
Input number of miles per trip						

LANDFILL OPERATIONS	Operation 1	Operation 2	Operation 3	Operation 4	Operation 5	Operation 6
Input tons of soil or waste to be incinerated (user must input emission factors in the Look Up Table, Table 7a)						

THERMAL/CATALYTIC OXIDIZERS*	Oxidizer 1	Oxidizer 2	Oxidizer 3	Oxidizer 4	Oxidizer 5	Oxidizer 6
Choose oxidizer type from drop down menu	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer
Choose fuel type from drop down menu	natural gas	Propane	natural gas	natural gas	natural gas	natural gas
Input waste gas flow rate (scfm)						
Input time running (hours)						
Input waste gas inlet temperature (F)						
Input contaminant concentration (ppmV)						

*(Electric blowers are included in the analysis)

WATER CONSUMPTION	Treatment System 1	Treatment System 2	Treatment System 3	Treatment System 4	Treatment System 5	Treatment System 6
Input water disposed/collected during treatment (gal)						
Input water disposed/collected during site preparation (gal)						
Input water disposed/collected during sampling (gal)						
Input water disposed/collected during site demobilization (gal)						

LANDFILL METHANE EMISSIONS	Landfill 1	Landfill 2	Landfill 3	Landfill 4	Landfill 5	Landfill 6
Input landfill methane emissions (metric tons)						

OTHER KNOWN ONSITE ACTIVITIES	Entire Site
Input energy usage (MMBTU)	
Water consumption (gallon)	
Input CO_2 emission (metric ton)	
Input N_2O emission (metric ton CO_2 e)	
Input CH_4 emissions (metric ton CO_2 e)	
Input NOx emission (metric ton)	
Input SOx emission (metric ton)	
Input PM_{10} emission (metric ton)	
Input fatality risk	
Input injury risk	

GSRx - ALTERNATIVE 5
HYBRID SITEWISE EVALUATION
NWIRP CALVERTON
CALVERTON, NEW YORK

Technology Module / Phase	Module Components	Comments / Assumptions	Quantity	(Units)	Greenhouse Gas Emissions				Criteria Pollutant Emission			Energy Consumption	Water Consumption
					$CO_{2\ equiv}$	CO_2	N_20	CH_4	NO_x	SO_x	PM_{10}		
Materials						**Tonnes**						**MWhr**	**gal x 1000**
Monitoring System	PVC	10 wells x 30', 10 wells x 50', 10 wells x 70' = 1500' @ .682 lb/ft	1023	lbs	1.16	1.16	0.00	0.01	0.00	0.00	0.00	42.30	1.76
Monitoring System	Steel	4 bollards/well, 30 wells, 8 ft each, 22 lb/ft	21120	lbs	25.86	25.86	0.00	0.01	0.00	0.02	0.00	445.55	18.98
Monitoring System	Typical Cement	67 lb/cf	24210	lbs	9.11	9.11	0.00	0.00	0.00	0.00	0.00	68.22	0.00
Monitoring System	Sand	75 lb/cf	7425	lbs	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.45	0.00
Monitoring System	Bentonite	93 lb/cf	1841	lbs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Injection System Construct	PVC	113 wells, total of 5320 feet @ .682 lb/ft	3628	lbs	4.11	4.11	0.01	0.05	0.00	0.02	0.00	150.02	6.24
Injection System Construct	Steel	4 bollards/well, 113 wells, 8 ft each, 22 lb/ft	79552	lbs	97.41	97.41	0.01	0.03	0.00	0.08	0.00	1678.24	71.49
Injection System Construct	Typical Cement	67 lb/cf	144912	lbs	54.55	54.55	0.00	0.00	0.00	0.00	0.00	408.32	0.00
Injection System Construct	Sand	75 lb/cf	48308	lbs	0.11	0.11	0.00	0.00	0.00	0.00	0.00	2.96	0.00
Injection System Construct	Bentonite	93 lb/cf	59901	lbs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Monitoring Well Abandonm	Typical Cement	113 wells filled with grout	41574	lbs	15.65	15.65	0.00	0.00	0.00	0.00	0.00	117.14	0.00
Injection System	Vegetable Oil	712 drums, 416.75 lb/drum	296726	lbs	44.41	44.41	0.00	0.00	0.00	0.04	0.00	1544.95	134.04
Injection System	Vegetable Oil	467 drums, 416.75 lb/drum	194622	lbs	29.13	29.13	0.00	0.00	0.00	0.03	0.00	1013.33	87.91
Subtotal					**281.52**	**281.52**	**0.03**	**0.10**	**0.00**	**0.20**	**0.00**	**5471.49**	**320.42**
Transportation						**Tonnes**						**MWhr**	**gal x 1000**
Input Into Sitewise				miles									
Subtotal					**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0**

GSRx - ALTERNATIVE 5
HYBRID SITEWISE EVALUATION
NWIRP CALVERTON
CALVERTON, NEW YORK

Technology Module / Phase	Module Components	Comments / Assumptions	Quantity	(Units)	Greenhouse Gas Emissions				Criteria Pollutant Emission			Energy Consumption	Water Consumption
					$CO_{2\ equiv}$	CO_2	N_20	CH_4	NO_x	SO_x	PM_{10}		
Materials						**Tonnes**						**MWhr**	**gal x 1000**
Construction Equipment						**Tonnes**						**MWhr**	**gal x 1000**
Monitoring Well Installation	Loader, 100 HP, 2 CY (diesel)	25 days 4 hrs/day	100	hrs	1.65	1.65	0.00	0.00	0.01	0.00	0.00	7.33	
Monitoring Well Installation	Drill Rig, HSA (diesel)	25 days 8 hrs/day	200	hrs	10.89	10.89	0.00	0.01	0.13	0.00	0.01	50.92	
Injection System	Loader, 100 HP, 2 CY (diesel)	98 days 4 hrs/day'	392	hrs	6.47	6.47	0.00	0.00	0.05	0.01	0.01	28.74	
Injection System	Drill Rig, HSA (diesel)	98 days 8 hrs/day	784	hrs	21.35	21.35	0.00	0.02	0.25	0.00	0.02	99.81	
Subtotal					**40.37**	**40.37**	**0.00**	**0.03**	**0.44**	**0.02**	**0.04**	**186.80**	**0**
Operating Consumption						**Tonnes**						**MWhr**	**gal x 1000**
Input Into Sitewise													0
					0	**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0**	**0**
			Total		**322**	**322**	**0.03**	**0.13**	**0.44**	**0.22**	**0.04**	**5,658**	**320**

Alternative 5
Values Input into SiteWise as "Other"

Module	Greenhouse Gas Emissions				Criteria Pollutant Emission			Energy Consumption	Water Consumption
	$CO_{2\ equiv}$	CO_2	N_20 (CO2e)	CH_4 (CO2e)	NO_x	SO_x	PM_{10}		
		Tonnes						**MMBTU**	**gal**
RI									
RAC	2.48E+02	2.48E+02	8.17E+00	2.65E+00	4.44E-01	1.48E-01	3.91E-02	1.06E+04	9.85E+04
RAO	7.35E+01	7.35E+01	1.60E-03	0.00E+00	0.00E+00	7.31E-02	2.90E-05	8.73E+03	2.22E+05
LTM									

Note: 1 MWhr = 3412141.4799 BTU, 1MMTBU = 10^6 BTU

SITE INFORMATION	
Name	Elena Goldstein
Date	3/24/2011
Site	Calverton
Remedial Alternative Name	Alt 6

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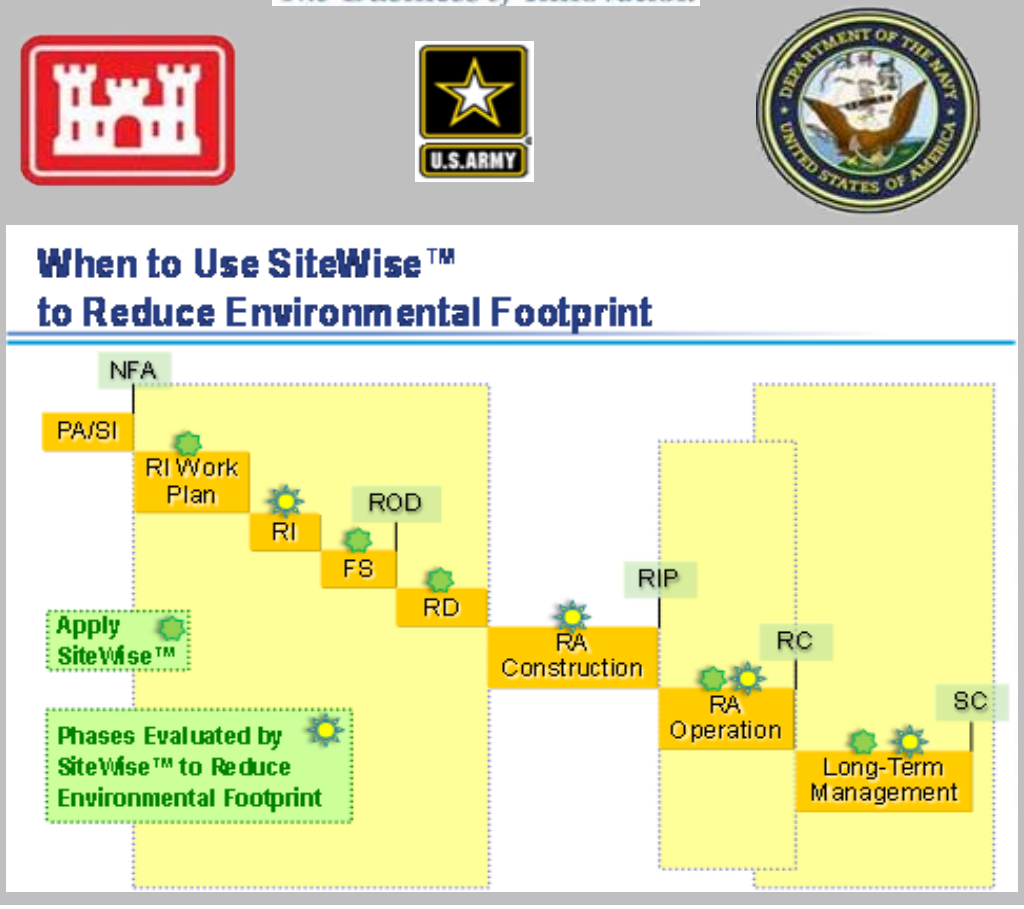


Remedial Action Construction

This worksheet allows the user to define material production, transportation, equipment use, and residual handling variables for the remedial alternative

Yellow cells require the user to choose an input from a drop down menu

White cells require the user to type in a value

MATERIAL PRODUCTION

WELL MATERIALS	Well Type 1	Well Type 2	Well Type 3	Well Type 4	Well Type 5	Well Type 6
Input number of wells						
Input depth of wells (ft)						
Choose well diameter (in) from drop down menu	1/2	1/2	1/2	1/2	1/2	1/2
Choose material type from drop down menu	PVC	PVC	PVC	PVC	PVC	PVC
Choose specific material schedule from drop down menu	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC

TREATMENT CHEMICALS & MATERIALS	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6
Input number of injection points						
Choose material type from drop down menu	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide
Input amount of material injected at each point (pounds dry mass)						
Input number of injections per injection point						

GAC	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6
Input weight of GAC used (lbs)						
Choose material type from drop down menu	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC

CONSTRUCTION MATERIALS	Material 1	Material 2	Material 3	Material 4	Material 5	Material 6
Choose material type from drop down menu	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner
Input area of material (ft^2)						
Input depth of material (ft)						

WELL DECOMMISSIONING	Well Type 1	Well Type 2	Well Type 3	Well Type 4	Well Type 5	Well Type 6
Input number of wells						
Input depth of wells (ft)						
Input well diameter (in)	1	1	1	1	1	1
Choose material from drop down menu	Soil	Soil	Soil	Soil	Soil	Soil

TRANSPORTATION

	Monitoring Wells	Rig Crews	EISB Well installation	Air Sparge +Demo	Air Sparge + Well Deconmiss	
PERSONNEL TRANSPORTATION - ROAD	Trip 1	Trip 2	Trip 3	Trip 5	Trip 6	Trip 6
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Choose vehicle type from drop down menu*	Light truck	Heavy Duty	Light truck	Light truck	Light truck	Light truck
Choose fuel used from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input distance traveled per trip (miles)	50	50	50	50	50	
Input number of trips taken	45	202	64	242	148	
Input number of travelers	2	3	2	2	3	
Input estimated vehicular fuel economy (mi/gal) (Input only if known for the vehicle selected, otherwise a default will be used by the tool)						

*For vehicle type 'Other' please enter values in Table 2b in the Look Up Table tab.

PERSONNEL TRANSPORTATION - AIR	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input number of travelers						
Input number of flights taken						

PERSONNEL TRANSPORTATION - RAIL	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Choose vehicle type from drop down menu	Intercity rail	Intercity rail	Intercity rail	Intercity rail	Intercity rail	Intercity rail
Input distance traveled (miles)						
Input number of trips taken						
Input number of travelers						

	Drill/Loader/Trenching	Materials Delivery	Trailer	Oil Delivery	Steel Building Delivery	Dozer
EQUIPMENT TRANSPORTATION - ROAD	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Choose fuel used from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input distance traveled (miles)	300	2,400	200	1,000	100	100
Input weight of equipment transported (tons)	10	20	20	20	20	32.0

EQUIPMENT TRANSPORTATION - AIR	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input weight of equipment transported (tons)						

EQUIPMENT TRANSPORTATION - RAIL	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input weight of load (tons)						

EQUIPMENT TRANSPORTATION - WATER	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (mile)						
Input weight of load (tons)						

EQUIPMENT USE

EARTHWORK	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose earthwork equipment type from drop down menu	Dozer	Dozer	Dozer	Dozer	Dozer	Dozer
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input volume of material to be removed (yd^3)						
Will DIESEL-run equipment be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
DRILLING	**Event 1**	**Event 2**	**Event 3**	**Event 4**	**Event 5**	**Event 6**
Input number of drilling locations						
Choose drilling method from drop down menu	Direct Push	Direct Push	Direct Push	Direct Push	Direct Push	Direct Push
Input time spent drilling at each location (hr)						
Input depth of wells (ft)						
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel

For each pump, select only one of the three methods to calculate energy and GHG emissions
Enter "0" for all user input values for unused pump columns or unused methods

PUMP OPERATION	Pump 1	Pump 2	Pump 3	Pump 4	Pump 5	Pump 6
Choose method from drop down	Method 2	Method 1	Method 1	Method 1	Method 1	Method 1
Method 1 - ELECTRICAL USAGE IS KNOWN						
Input pump electrical usage (KWh)	0	0	0	0	0	0
Method 2 - PUMP HEAD IS KNOWN						
Input flow rate (gpm)	0	0	0	0	0	0
Input total head (ft)	0	0	0	0	0	0
Input number of pumps operating	0	0	0	0	0	0
Input operating time for each pump (hrs)	0	0	0	0	0	0
Pump efficiency times motor efficiency (default already present, user override possible)	0.51	0.51	0.51	0.51	0.51	0.51
Input specific gravity (default already present, user override possible)	1	1	1	1	1	1
Method 3 - NAME PLATE SPECIFICATIONS ARE KNOWN						
Input pump horsepower (hp)	0	0	0	0	0	0
Input number of pumps operating	0	0	0	0	0	0
Input operating time for each pump (hrs)	0	0	0	0	0	0
Input pump load (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Input pump motor efficiency (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Region						
Choose region from drop down menu (scroll right to see figure)	AKGD	AKGD	AKGD	AKGD	AKGD	AKGD

DIESEL AND GASOLINE PUMPS	Pump 1	Pump 2	Pump 3	Pump 4	Pump 5	Pump 6
Choose fuel type from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Choose horsepower range from drop down menu	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1
Equipment operating hours (hrs)						
Input estimated fuel consumption rate (gal/hr) (Input only if known for the pump selected, otherwise a default will be used by the tool)						

For each type of equipment, select only one of the methods to calculate energy and GHG emissions
Enter "0" for all user input values for unused equipment columns or unused methods

BLOWER, COMPRESSOR, MIXER, AND OTHER EQUIPMENT	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose type of equipment from drop down	Blower	Blower	Blower	Blower	Blower	Blower
Choose method from drop down	Method 1	Method 1	Method 1	Method 1	Method 1	Method 1
Method 1 - NAME PLATE SPECIFICATIONS ARE KNOWN						
Input equipment horsepower (hp)	0	0	0	0	0	0
Input number of equipments operating	0	0	0	0	0	0
Input operating time for each equipment (hrs)	0	0	0	0	0	0
Input equipment load (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Input motor efficiency (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Method 2 - ELECTRICAL USAGE IS KNOWN						
Input equipment electrical usage, if known (KWh)	0	0	0	0	0	0
Region						
Choose region from drop down menu (scroll right to see figure)	AKGD	AKGD	AKGD	AKGD	AKGD	AKGD

GENERATORS	Generator 1	Generator 2	Generator 3	Generator 4	Generator 5	Generator 6
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Choose horsepower range from drop down menu	3 to 6	3 to 6	3 to 6	3 to 6	3 to 6	3 to 6
Input operating hours (hr)						

AGRICULTURAL EQUIPMENT	Tillage Tractor 1	Tillage Tractor 2	Tillage Tractor 3	Tillage Tractor 4	Tillage Tractor 5	Tillage Tractor 6
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input area to till (acre)						
Choose soil condition from drop down menu	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil
Choose soil type from drop down menu	Clay Soil	Clay Soil	Clay Soil	Clay Soil	Clay Soil	Clay Soil
Input time available (work days)						
Input depth of tillage (in)						

CAPPING EQUIPMENT	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose stabilization equipment type from drop down menu	Roller	Roller	Roller	Roller	Roller	Roller
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input area (ft^2)						
Input time available (work days)						

MIXING EQUIPMENT	Mixer 1	Mixer 2	Mixer 3	Mixer 4	Mixer 5	Mixer 6
Choose fuel type from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Choose horsepower range from drop down menu	1 to 3	1 to 3	1 to 3	1 to 3	1 to 3	1 to 3
Input volume (yd^3)						
Input production rate (yd^3/hr)						
Input estimated fuel consumption rate (gal/hr) (Input only if known for the mixer selected, otherwise a default will be used by the tool)						

RESIDUAL HANDLING

RESIDUE DISPOSAL/RECYCLING	Soil Residue	Residual Water (Water disposal)	Material Residue	Other Residuals	Other Residuals	Other Residuals
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Input weight of the waste transported to landfill or recycling per trip (tons)	30	22				
Choose vehicle type from drop down menu	Heavy Duty	Heavy Duty	Heavy Duty	On-road truck	On-road truck	On-road truck
Choose fuel used from drop down menu	Diesel	Diesel	Diesel	Gasoline	Gasoline	Gasoline
Input total number of trips	12	15				
Input number of miles per trip	50	50				

LANDFILL OPERATIONS	Operation 1	Operation 2	Operation 3	Operation 4	Operation 5	Operation 6
Input tons of soil or waste to be incinerated (user must input emission factors in the Look Up Table, Table 7a)						

THERMAL/CATALYTIC OXIDIZERS*	Oxidizer 1	Oxidizer 2	Oxidizer 3	Oxidizer 4	Oxidizer 5	Oxidizer 6
Choose oxidizer type from drop down menu	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer
Choose fuel type from drop down menu	natural gas	Propane	natural gas	natural gas	natural gas	natural gas
Input waste gas flow rate (scfm)						
Input time running (hours)						
Input waste gas inlet temperature (F)						
Input contaminant concentration (ppmV)						

*(Electric blowers are included in the analysis)

WATER CONSUMPTION	Treatment System 1	Treatment System 2	Treatment System 3	Treatment System 4	Treatment System 5	Treatment System 6
Input water disposed/collected during treatment (gal)	19200					
Input water disposed/collected during site preparation (gal)	3000					
Input water disposed/collected during sampling (gal)						
Input water disposed/collected during site demobilization (gal)						

LANDFILL METHANE EMISSIONS	Landfill 1	Landfill 2	Landfill 3	Landfill 4	Landfill 5	Landfill 6
Input landfill methane emissions (metric tons)						

OTHER KNOWN ONSITE ACTIVITIES	Entire Site
Input energy usage (MMBTU)	2.2E+04
Water consumption (gallon)	1.8E+05
Input CO_2 emission (metric ton)	5.5E+02
Input N_2O emission (metric ton CO_2 e)	2.3E+01
Input CH_4 emissions (metric ton CO_2 e)	7.5E+00
Input NOx emission (metric ton)	1.4E+00
Input SOx emission (metric ton)	3.6E-01
Input PM_{10} emission (metric ton)	1.3E-01
Input fatality risk	0.0E+00
Input injury risk	0.0E+00

Remedial Action Operations

This worksheet allows the user to define material production, transportation, equipment use, and residual handling variables for the remedial alternative

Yellow cells	require the user to choose an input from a drop down menu
White cells	require the user to type in a value

MATERIAL PRODUCTION

WELL MATERIALS	Well Type 1	Well Type 2	Well Type 3	Well Type 4	Well Type 5	Well Type 6
Input number of wells						
Input depth of wells (ft)						
Choose well diameter (in) from drop down menu	1/2	1/2	1/2	1/2	1/2	1/2
Choose material type from drop down menu	PVC	PVC	PVC	PVC	PVC	PVC
Choose specific material schedule from drop down menu	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC

TREATMENT CHEMICALS & MATERIALS	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6
Input number of injection points						
Choose material type from drop down menu	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide
Input amount of material injected at each point (pounds dry mass)						
Input number of injections per injection point						

GAC	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6
Input weight of GAC used (lbs)						
Choose material type from drop down menu	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC

CONSTRUCTION MATERIALS	Material 1	Material 2	Material 3	Material 4	Material 5	Material 6
Choose material type from drop down menu	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner
Input area of material (ft^2)						
Input depth of material (ft)						

WELL DECOMMISSIONING	Well Type 1	Well Type 2	Well Type 3	Well Type 4	Well Type 5	Well Type 6
Input number of wells						
Input depth of wells (ft)						
Input well diameter (in)	1	1	1	1	1	1
Choose material from drop down menu	Soil	Soil	Soil	Soil	Soil	Soil

TRANSPORTATION

	Weekly Checks	Monthly/Quarterly	Injection	LUC inspections		
PERSONNEL TRANSPORTATION - ROAD	Trip 1	Trip 2	Trip 4	Trip 1	Trip 5	Trip 6
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Choose vehicle type from drop down menu*	Light truck	Light truck	Light truck	Light truck	Light truck	Light truck
Choose fuel used from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input distance traveled per trip (miles)	50	50	50	50		
Input number of trips taken	728	560	94	30		
Input number of travelers	1	2	3	2		
Input estimated vehicular fuel economy (mi/gal) (Input only if known for the vehicle selected, otherwise a default will be used by the tool)						

*For vehicle type 'Other' please enter values in Table 2b in the Look Up Table tab.

PERSONNEL TRANSPORTATION - AIR	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input number of travelers						
Input number of flights taken						

PERSONNEL TRANSPORTATION - RAIL	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Choose vehicle type from drop down menu	Intercity rail	Intercity rail	Intercity rail	Intercity rail	Intercity rail	Intercity rail
Input distance traveled (miles)						
Input number of trips taken						
Input number of travelers						

EQUIPMENT TRANSPORTATION - ROAD	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Choose fuel used from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input distance traveled (miles)						
Input weight of equipment transported (tons)						

EQUIPMENT TRANSPORTATION - AIR	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input weight of equipment transported (tons)						

EQUIPMENT TRANSPORTATION - RAIL	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input weight of load (tons)						

EQUIPMENT TRANSPORTATION - WATER	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (mile)						
Input weight of load (tons)						

EQUIPMENT USE

EARTHWORK	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose earthwork equipment type from drop down menu	Dozer	Dozer	Dozer	Dozer	Dozer	Dozer
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input volume of material to be removed (yd^3)						
Will DIESEL-run equipment be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
DRILLING	**Event 1**	**Event 2**	**Event 3**	**Event 4**	**Event 5**	**Event 6**
Input number of drilling locations						
Choose drilling method from drop down menu	Direct Push	Direct Push	Direct Push	Direct Push	Direct Push	Direct Push
Input time spent drilling at each location (hr)						
Input depth of wells (ft)						
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel

For each pump, select only one of the three methods to calculate energy and GHG emissions
Enter "0" for all user input values for unused pump columns or unused methods

PUMP OPERATION	Pump 1	Pump 2	Pump 3	Pump 4	Pump 5	Pump 6
Choose method from drop down	Method 1	Method 1	Method 1	Method 1	Method 1	Method 1
Method 1 - ELECTRICAL USAGE IS KNOWN						
Input pump electrical usage (KWh)			0	0	0	0
Method 2 - PUMP HEAD IS KNOWN						
Input flow rate (gpm)	0	0	0	0	0	0
Input total head (ft)	0	0	0	0	0	0
Input number of pumps operating	0	0	0	0	0	0
Input operating time for each pump (hrs)	0	0	0	0	0	0
Pump efficiency times motor efficiency (default already present, user override possible)	0.51	0.51	0.51	0.51	0.51	0.51
Input specific gravity (default already present, user override possible)	1	1	1	1	1	1
Method 3 - NAME PLATE SPECIFICATIONS ARE KNOWN						
Input pump horsepower (hp)	0	0	0	0	0	0
Input number of pumps operating	0	0	0	0	0	0
Input operating time for each pump (hrs)	0	0	0	0	0	0
Input pump load (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Input pump motor efficiency (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Region						
Choose region from drop down menu (scroll right to see figure)	AKGD	AKGD	AKGD	AKGD	AKGD	AKGD

DIESEL AND GASOLINE PUMPS	Pump 1	Pump 2	Pump 3	Pump 4	Pump 5	Pump 6
Choose fuel type from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Choose horsepower range from drop down menu	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1
Equipment operating hours (hrs)						
Input estimated fuel consumption rate (gal/hr) (Input only if known for the pump selected, otherwise a default will be used by the tool)						

For each type of equipment, select only one of the methods to calculate energy and GHG emissions
Enter "0" for all user input values for unused equipment columns or unused methods

BLOWER, COMPRESSOR, MIXER, AND OTHER EQUIPMENT	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose type of equipment from drop down	Compressor	Compressor	Blower	Blower	Blower	Blower
Choose method from drop down	Method 2	Method 2	Method 2	Method 1	Method 1	Method 1
Method 1 - NAME PLATE SPECIFICATIONS ARE KNOWN						
Input equipment horsepower (hp)	0	0	0	0	0	0
Input number of equipments operating	0	0	0	0	0	0
Input operating time for each equipment (hrs)	0	0	0	0	0	0
Input equipment load (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Input motor efficiency (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Method 2 - ELECTRICAL USAGE IS KNOWN						
Input equipment electrical usage, if known (KWh)	1276157	4099680	0.00	0	0	0
Region						
Choose region from drop down menu (scroll right to see figure)	AKGD	AKGD	AKGD	AKGD	AKGD	AKGD

GENERATORS	Generator 1	Generator 2	Generator 3	Generator 4	Generator 5	Generator 6
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Choose horsepower range from drop down menu	3 to 6	3 to 6	3 to 6	3 to 6	3 to 6	3 to 6
Input operating hours (hr)						

AGRICULTURAL EQUIPMENT	Tillage Tractor 1	Tillage Tractor 2	Tillage Tractor 3	Tillage Tractor 4	Tillage Tractor 5	Tillage Tractor 6
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input area to till (acre)						
Choose soil condition from drop down menu	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil
Choose soil type from drop down menu	Clay Soil	Clay Soil	Clay Soil	Clay Soil	Clay Soil	Clay Soil
Input time available (work days)						
Input depth of tillage (in)						

CAPPING EQUIPMENT	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose stabilization equipment type from drop down menu	Roller	Roller	Roller	Roller	Roller	Roller
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input area (ft^2)						
Input time available (work days)						

MIXING EQUIPMENT	Mixer 1	Mixer 2	Mixer 3	Mixer 4	Mixer 5	Mixer 6
Choose fuel type from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Choose horsepower range from drop down menu	1 to 3	1 to 3	1 to 3	1 to 3	1 to 3	1 to 3
Input volume (yd^3)						
Input production rate (yd^3/hr)						
Input estimated fuel consumption rate (gal/hr) (Input only if known for the mixer selected, otherwise a default will be used by the tool)						

RESIDUAL HANDLING

Oil Drum Disposal

RESIDUE DISPOSAL/RECYCLING	Soil Residue	Residual Water	Material Residue	Other Residuals	Other Residuals	Other Residuals
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Input weight of the waste transported to landfill or recycling per trip (tons)			14			
Choose vehicle type from drop down menu	On-road truck	On-road truck	Heavy Duty	On-road truck	On-road truck	On-road truck
Choose fuel used from drop down menu	Gasoline	Gasoline	Diesel	Gasoline	Gasoline	Gasoline
Input total number of trips			1			
Input number of miles per trip			50			

LANDFILL OPERATIONS	Operation 1	Operation 2	Operation 3	Operation 4	Operation 5	Operation 6
Input tons of soil or waste to be incinerated (user must input emission factors in the Look Up Table, Table 7a)						

THERMAL/CATALYTIC OXIDIZERS*	Oxidizer 1	Oxidizer 2	Oxidizer 3	Oxidizer 4	Oxidizer 5	Oxidizer 6
Choose oxidizer type from drop down menu	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer
Choose fuel type from drop down menu	natural gas	Propane	natural gas	natural gas	natural gas	natural gas
Input waste gas flow rate (scfm)						
Input time running (hours)						
Input waste gas inlet temperature (F)						
Input contaminant concentration (ppmV)						

*(Electric blowers are included in the analysis)

P&T

WATER CONSUMPTION	Treatment System 1	Treatment System 2	Treatment System 3	Treatment System 4	Treatment System 5	Treatment System 6
Input water disposed/collected during treatment (gal)	56500					
Input water disposed/collected during site preparation (gal)						
Input water disposed/collected during sampling (gal)						
Input water disposed/collected during site demobilization (gal)						

LANDFILL METHANE EMISSIONS	Landfill 1	Landfill 2	Landfill 3	Landfill 4	Landfill 5	Landfill 6
Input landfill methane emissions (metric tons)						

OTHER KNOWN ONSITE ACTIVITIES	Entire Site
Input energy usage (MMBTU)	6.9E+03
Water consumption (gallon)	1.8E+05
Input CO_2 emission (metric ton)	5.8E+01
Input N_2O emission (metric ton CO_2 e)	1.3E-03
Input CH_4 emissions (metric ton CO_2 e)	0.0E+00
Input NOx emission (metric ton)	0.0E+00
Input SOx emission (metric ton)	5.8E-02
Input PM_{10} emission (metric ton)	2.3E-05
Input fatality risk	0.0E+00
Input injury risk	0.0E+00

Long Term Monitoring

This worksheet allows the user to define material production, transportation, equipment use, and residual handling variables for the remedial alternative

Yellow cells	require the user to choose an input from a drop down menu
White cells	require the user to type in a value

MATERIAL PRODUCTION

WELL MATERIALS	Well Type 1	Well Type 2	Well Type 3	Well Type 4	Well Type 5	Well Type 6
Input number of wells						
Input depth of wells (ft)						
Choose well diameter (in) from drop down menu	1/2	1/2	1/2	1/2	1/2	1/2
Choose material type from drop down menu	PVC	PVC	PVC	PVC	PVC	PVC
Choose specific material schedule from drop down menu	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC

TREATMENT CHEMICALS & MATERIALS	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6
Input number of injection points						
Choose material type from drop down menu	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide
Input amount of material injected at each point (pounds dry mass)						
Input number of injections per injection point						

GAC	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6
Input weight of GAC used (lbs)						
Choose material type from drop down menu	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC

CONSTRUCTION MATERIALS	Material 1	Material 2	Material 3	Material 4	Material 5	Material 6
Choose material type from drop down menu	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner
Input area of material (ft^2)						
Input depth of material (ft)						

WELL DECOMMISSIONING	Well Type 1	Well Type 2	Well Type 3	Well Type 4	Well Type 5	Well Type 6
Input number of wells						
Input depth of wells (ft)						
Input well diameter (in)	1	1	1	1	1	1
Choose material from drop down menu	Soil	Soil	Soil	Soil	Soil	Soil

TRANSPORTATION

		Well maintenance	Annual Inspection	GW Monitoring	GW Monitoring	
PERSONNEL TRANSPORTATION - ROAD	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Choose vehicle type from drop down menu*	Light truck	Light truck	Light truck	Light truck	Light truck	Light truck
Choose fuel used from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input distance traveled per trip (miles)		50	50	50	50	
Input number of trips taken		3	90	96	96	
Input number of travelers		2	2	2	2	
Input estimated vehicular fuel economy (mi/gal) (Input only if known for the vehicle selected, otherwise a default will be used by the tool)						

*For vehicle type 'Other' please enter values in Table 2b in the Look Up Table tab.

PERSONNEL TRANSPORTATION - AIR	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input number of travelers						
Input number of flights taken						

PERSONNEL TRANSPORTATION - RAIL	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Choose vehicle type from drop down menu	Intercity rail	Intercity rail	Intercity rail	Intercity rail	Intercity rail	Intercity rail
Input distance traveled (miles)						
Input number of trips taken						
Input number of travelers						

EQUIPMENT TRANSPORTATION - ROAD	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Choose fuel used from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input distance traveled (miles)						
Input weight of equipment transported (tons)						

EQUIPMENT TRANSPORTATION - AIR	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input weight of equipment transported (tons)						

EQUIPMENT TRANSPORTATION - RAIL	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input weight of load (tons)						

EQUIPMENT TRANSPORTATION - WATER	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (mile)						

Input weight of load (tons)						

EQUIPMENT USE

EARTHWORK	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose earthwork equipment type from drop down menu	Dozer	Dozer	Dozer	Dozer	Dozer	Dozer
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input volume of material to be removed (yd^3)						
Will DIESEL-run equipment be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
DRILLING	**Event 1**	**Event 2**	**Event 3**	**Event 4**	**Event 5**	**Event 6**
Input number of drilling locations						
Choose drilling method from drop down menu	Direct Push	Direct Push	Direct Push	Direct Push	Direct Push	Direct Push
Input time spent drilling at each location (hr)						
Input depth of wells (ft)						
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel

For each pump, select only one of the three methods to calculate energy and GHG emissions
Enter "0" for all user input values for unused pump columns or unused methods

PUMP OPERATION	Pump 1	Pump 2	Pump 3	Pump 4	Pump 5	Pump 6
Choose method from drop down	Method 1	Method 1	Method 1	Method 1	Method 1	Method 1
Method 1 - ELECTRICAL USAGE IS KNOWN						
Input pump electrical usage (KWh)	0	0	0	0	0	0
Method 2 - PUMP HEAD IS KNOWN						
Input flow rate (gpm)	0	0	0	0	0	0
Input total head (ft)	0	0	0	0	0	0
Input number of pumps operating	0	0	0	0	0	0
Input operating time for each pump (hrs)	0	0	0	0	0	0
Pump efficiency times motor efficiency (default already present, user override possible)	0.51	0.51	0.51	0.51	0.51	0.51
Input specific gravity (default already present, user override possible)	1	1	1	1	1	1
Method 3 - NAME PLATE SPECIFICATIONS ARE KNOWN						
Input pump horsepower (hp)	0	0	0	0	0	0
Input number of pumps operating	0	0	0	0	0	0
Input operating time for each pump (hrs)	0	0	0	0	0	0
Input pump load (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Input pump motor efficiency (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Region						
Choose region from drop down menu (scroll right to see figure)	AKGD	AKGD	AKGD	AKGD	AKGD	AKGD

DIESEL AND GASOLINE PUMPS	Pump 1	Pump 2	Pump 3	Pump 4	Pump 5	Pump 6
Choose fuel type from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Choose horsepower range from drop down menu	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1
Equipment operating hours (hrs)						
Input estimated fuel consumption rate (gal/hr) (Input only if known for the pump selected, otherwise a default will be used by the tool)						

For each type of equipment, select only one of the methods to calculate energy and GHG emissions
Enter "0" for all user input values for unused equipment columns or unused methods

BLOWER, COMPRESSOR, MIXER, AND OTHER EQUIPMENT	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose type of equipment from drop down	Blower	Blower	Blower	Blower	Blower	Blower
Choose method from drop down	Method 1	Method 1	Method 1	Method 1	Method 1	Method 1
Method 1 - NAME PLATE SPECIFICATIONS ARE KNOWN						
Input equipment horsepower (hp)	0	0	0	0	0	0
Input number of equipments operating	0	0	0	0	0	0
Input operating time for each equipment (hrs)	0	0	0	0	0	0
Input equipment load (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Input motor efficiency (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Method 2 - ELECTRICAL USAGE IS KNOWN						
Input equipment electrical usage, if known (KWh)	0	0	0	0	0	0
Region						
Choose region from drop down menu (scroll right to see figure)	AKGD	AKGD	AKGD	AKGD	AKGD	AKGD

GENERATORS	Generator 1	Generator 2	Generator 3	Generator 4	Generator 5	Generator 6
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Choose horsepower range from drop down menu	3 to 6	3 to 6	3 to 6	3 to 6	3 to 6	3 to 6
Input operating hours (hr)						

AGRICULTURAL EQUIPMENT	Tillage Tractor 1	Tillage Tractor 2	Tillage Tractor 3	Tillage Tractor 4	Tillage Tractor 5	Tillage Tractor 6
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input area to till (acre)						
Choose soil condition from drop down menu	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil
Choose soil type from drop down menu	Clay Soil	Clay Soil	Clay Soil	Clay Soil	Clay Soil	Clay Soil
Input time available (work days)						
Input depth of tillage (in)						

CAPPING EQUIPMENT	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose stabilization equipment type from drop down menu	Roller	Roller	Roller	Roller	Roller	Roller
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input area (ft^2)						
Input time available (work days)						

MIXING EQUIPMENT	Mixer 1	Mixer 2	Mixer 3	Mixer 4	Mixer 5	Mixer 6
Choose fuel type from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Choose horsepower range from drop down menu	1 to 3	1 to 3	1 to 3	1 to 3	1 to 3	1 to 3
Input volume (yd^3)						
Input production rate (yd^3/hr)						
Input estimated fuel consumption rate (gal/hr) (Input only if known for the mixer selected, otherwise a default will be used by the tool)						

RESIDUAL HANDLING

RESIDUE DISPOSAL/RECYCLING	Soil Residue	Residual Water	Material Residue	Other Residuals	Other Residuals	Other Residuals
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Input weight of the waste transported to landfill or recycling per trip (tons)						
Choose vehicle type from drop down menu	On-road truck	On-road truck	On-road truck	On-road truck	On-road truck	On-road truck
Choose fuel used from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input total number of trips						
Input number of miles per trip						

LANDFILL OPERATIONS	Operation 1	Operation 2	Operation 3	Operation 4	Operation 5	Operation 6
Input tons of soil or waste to be incinerated (user must input emission factors in the Look Up Table, Table 7a)						

THERMAL/CATALYTIC OXIDIZERS*	Oxidizer 1	Oxidizer 2	Oxidizer 3	Oxidizer 4	Oxidizer 5	Oxidizer 6
Choose oxidizer type from drop down menu	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer
Choose fuel type from drop down menu	natural gas	Propane	natural gas	natural gas	natural gas	natural gas
Input waste gas flow rate (scfm)						
Input time running (hours)						
Input waste gas inlet temperature (F)						
Input contaminant concentration (ppmV)						

*(Electric blowers are included in the analysis)

WATER CONSUMPTION	Treatment System 1	Treatment System 2	Treatment System 3	Treatment System 4	Treatment System 5	Treatment System 6
Input water disposed/collected during treatment (gal)						
Input water disposed/collected during site preparation (gal)						
Input water disposed/collected during sampling (gal)						
Input water disposed/collected during site demobilization (gal)						

LANDFILL METHANE EMISSIONS	Landfill 1	Landfill 2	Landfill 3	Landfill 4	Landfill 5	Landfill 6
Input landfill methane emissions (metric tons)						

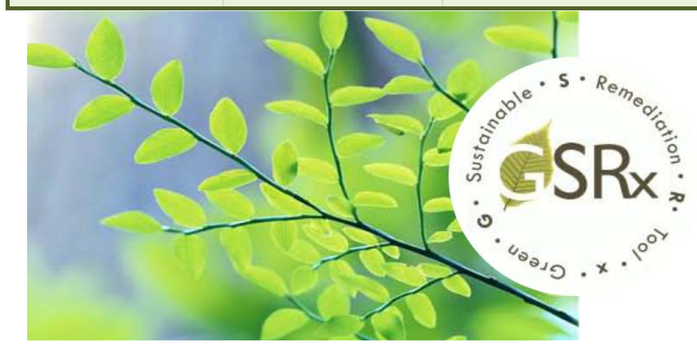
OTHER KNOWN ONSITE ACTIVITIES	Entire Site
Input energy usage (MMBTU)	
Water consumption (gallon)	
Input CO_2 emission (metric ton)	
Input N_2O emission (metric ton CO_2 e)	
Input CH_4 emissions (metric ton CO_2 e)	
Input NOx emission (metric ton)	
Input SOx emission (metric ton)	
Input PM_{10} emission (metric ton)	
Input fatality risk	
Input injury risk	

GSRx - ALTERNATIVE 6
HYBRID SITEWISE EVALUATION
NWIRP CALVERTON
CALVERTON, NEW YORK

Technology Module / Phase	Module Components	Comments / Assumptions	Quantity	(Units)	Greenhouse Gas Emissions				Criteria Pollutant Emission			Energy Consumption	Water Consumption
					$CO_{2\ equiv}$	CO_2	N_20	CH_4	NO_x	SO_x	PM_{10}		
Materials						**Tonnes**						**MWhr**	**gal x 1000**
Monitoring Well Installation	PVC	10 wells x 30', 10 wells x 50', 10 wells x 70' = 1500' @ .682 lb/ft	1023	lbs	1.16	1.16	0.00	0.01	0.00	0.00	0.00	42.30	1.76
Monitoring Well Installation	Steel	30 wells, 4 bollards/well, 8 ft/bollar, 22 lbs/ft	21120	lbs	25.86	25.86	0.00	0.01	0.00	0.02	0.00	445.55	18.98
Monitoring Well Installation	Typical Cement	67 lb/cf	24210	lbs	9.11	9.11	0.00	0.00	0.00	0.00	0.00	68.22	0.00
Monitoring Well Installation	Sand	75 lb/cf	7425	lbs	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.45	0.00
Monitoring Well Installation	Bentonite	93 lb/cf	1841	lbs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EISB Installation	PVC	74 wells, total depth of 3690 feet @ .682 lb/ft	2517	lbs	2.85	2.85	0.01	0.03	0.00	0.01	0.00	104.05	4.33
EISB Installation	Steel	74 wells, 4 bollards/well, 8 ft/bollar, 22 lbs/ft	52096	lbs	63.79	63.79	0.01	0.02	0.00	0.05	0.00	1099.03	46.82
EISB Installation	Typical Cement	67 lb/cf	102769	lbs	38.68	38.68	0.00	0.00	0.00	0.00	0.00	289.58	0.00
EISB Installation	Sand	75 lb/cf	31635	lbs	0.07	0.07	0.00	0.00	0.00	0.00	0.00	1.94	0.00
EISB Installation	Bentonite	93 lb/cf	39227	lbs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Air Sparge Installation	PVC	2400 ft + 8000 ft, 2" PVC	7093	lbs	8.04	8.04	0.02	0.09	0.00	0.03	0.00	293.27	12.20
Air Sparge Installation	Steel	96 wells, 4 8-ft bollards/well, 22 lb/ft + Misc steel piping and fittings (500 lb/site)	68584	lbs	83.98	83.98	0.01	0.02	0.00	0.07	0.00	1446.86	61.63
Air Sparge Installation	Typical Cement	67 lb/cf	205888	lbs	77.50	77.50	0.00	0.00	0.00	0.00	0.00	580.14	0.00
Air Sparge Installation	Sand	75 lb/cf	15840	lbs	0.04	0.04	0.00	0.00	0.00	0.00	0.00	0.97	0.00
Air Sparge Installation	Bentonite	93 lb/cf	7856	lbs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Air Sparge Installation	General concrete	96 concrete pads 1 cy each, 4050 lb/cy	388800	lbs	22.92	22.92	0.00	0.00	0.00	0.00	0.00	226.25	0.00
Air Sparge Installation	Steel	Steel Building Source Area 20'x20', Steel Building River Area 20'x30', 40 lb/sf	40000	lbs	48.98	48.98	0.01	0.01	0.00	0.04	0.00	843.85	35.95
Air Sparge Installation	HDPE	HDPE piping, 400' 4" and 1400' of 2", Source Area, HDPE piping, 800' of 6", 500' 4" and 800' of 2", River Area	7445	lbs	8.78	8.78	0.02	0.06	0.00	0.04	0.01	97.43	2.68
Well Decomissioning	Typical Cement	Monitoring well abandonment, filled with grout, assume 1500'new monitoring wells, 3690' 4" dia EISB wells, 80 wells total 8000', 2" pipe, 48 at 2" total 2400' and assume 50 existing wells avg 45' and are 2", 2" dia =.022 sf, 4" dia = .087 93 lb/cf	58807	lbs	22.14	22.14	0.00	0.00	0.00	0.00	0.00	165.70	0.00
EISB	Vegetable Oil	467 drums/injection, 2 injections, 416.75 lb/drum	389245	lbs	58.25	58.25	0.00	0.00	0.00	0.06	0.00	2026.67	175.83
Subtotal					**413.93**	**413.93**	**0.07**	**0.27**	**0.00**	**0.27**	**0.01**	**5705.59**	**184.33**
Transportation						**Tonnes**						**MWhr**	**gal x 1000**
Input Into Sitewise				miles									
Subtotal					**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0**

GSRx - ALTERNATIVE 6
HYBRID SITEWISE EVALUATION
NWIRP CALVERTON
CALVERTON, NEW YORK

Technology Module / Phase	Module Components	Comments / Assumptions	Quantity	(Units)	Greenhouse Gas Emissions				Criteria Pollutant Emission			Energy Consumption	Water Consumption
					$CO_{2\ equiv}$	CO_2	N_20	CH_4	NO_x	SO_x	PM_{10}		
Materials						**Tonnes**						**MWhr**	**gal x 1000**
Construction Equipment						**Tonnes**						**MWhr**	**gal x 1000**
Monitoring Well Installation	Loader, 100 HP, 2 CY (diesel)	25 days 4 hrs/day	100	hrs	1.65	1.65	0.00	0.00	0.01	0.00	0.00	7.33	
Monitoring Well Installation	Drill Rig, HSA (diesel)	25 days 8 hrs/day	200	hrs	10.89	10.89	0.00	0.01	0.13	0.00	0.01	50.92	
EISB Installation	Loader, 100 HP, 2 CY (diesel)	64 days 4 hrs/day'	256	hrs	4.23	4.23	0.00	0.00	0.03	0.01	0.01	18.77	
EISB Installation	Drill Rig, HSA (diesel)	64 days 8 hrs/day	512	hrs	27.89	27.89	0.00	0.02	0.33	0.01	0.02	130.36	
Air Sparge Installation	Loader, 100 HP, 2 CY (diesel)	138 days 7 hrs/day	966	hrs	15.95	15.95	0.00	0.00	0.13	0.03	0.03	70.83	
Air Sparge Installation	Drill Rig, HSA (diesel)	138 days 8 hrs/day	1104	hrs	60.13	60.13	0.00	0.05	0.70	0.01	0.04	281.08	
Well Decomissioning	Dozer, 335 HP (D8) w/U Blade (diesel)	Demo/Abandoment Equipment 10 days 8 hrs/day	80	hrs	14.47	14.47	0.00	0.00	0.11	0.03	0.01	70.39	
Subtotal					**135.20**	**135.20**	**0.00**	**0.09**	**1.44**	**0.09**	**0.11**	**629.69**	**0**
Operating Consumption						**Tonnes**						**MWhr**	**gal x 1000**
Input Into Sitewise													0
					0	**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0**	**0**
			Total		**549**	**549**	**0.07**	**0.36**	**1.44**	**0.36**	**0.13**	**6,335**	**184**



Alternative 6
Values Input into SiteWise as "Other"

Module	Greenhouse Gas Emissions				Criteria Pollutant Emission			Energy Consumption	Water Consumption
	$CO_{2\ equiv}$	CO_2	N_20 (CO2e)	CH_4 (CO2e)	NO_x	SO_x	PM_{10}		
		Tonnes						**MMBTU**	**gal**
RI									
RAC	5.49E+02	5.49E+02	2.31E+01	7.51E+00	1.44E+00	3.63E-01	1.27E-01	2.16E+04	1.84E+05
RAO	5.83E+01	5.83E+01	1.26E-03	0.00E+00	0.00E+00	5.79E-02	2.29E-05	6.91E+03	1.76E+05
LTM									

Note: 1 MWhr = 3412141.4799 BTU, 1MMTBU = 10^6 BTU

SITE INFORMATION	
Name	Elena Goldstein
Date	3/24/2011
Site	Calverton
Remedial Alternative Name	Alt 7

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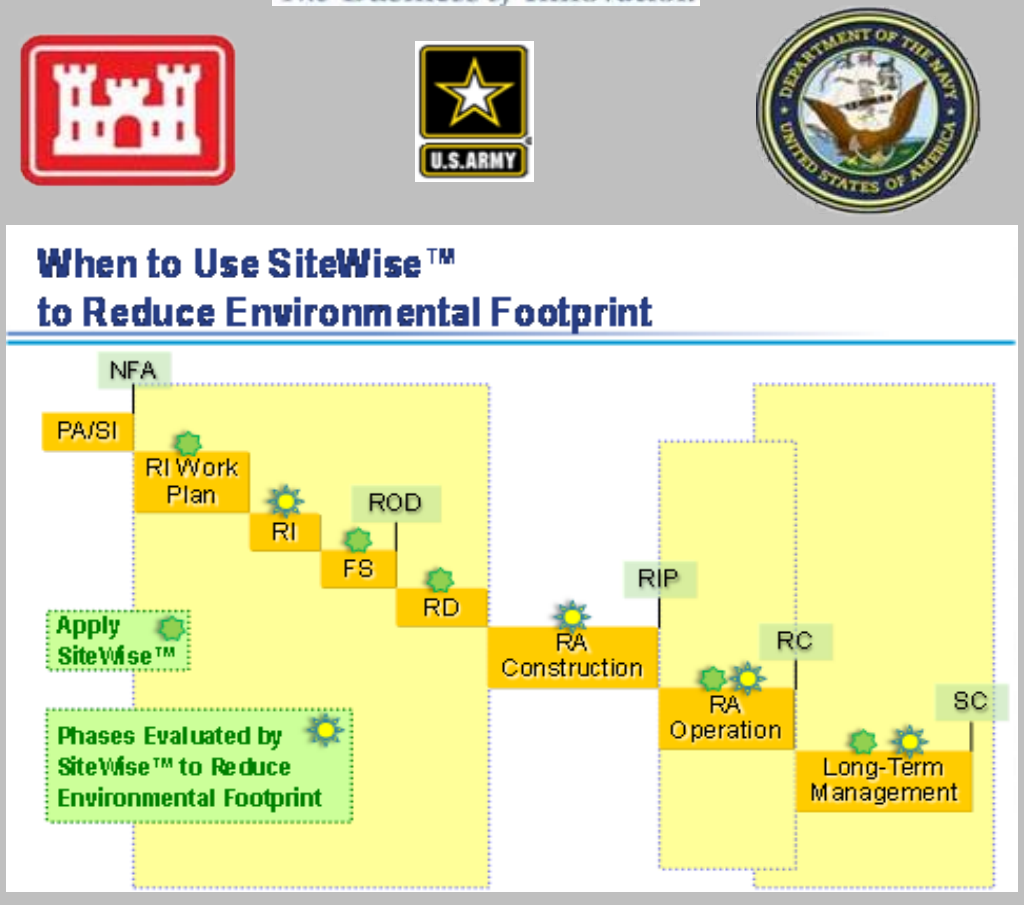


Remedial Action Construction

This worksheet allows the user to define material production, transportation, equipment use, and residual handling variables for the remedial alternative

Yellow cells	require the user to choose an input from a drop down menu
White cells	require the user to type in a value

MATERIAL PRODUCTION

WELL MATERIALS	Well Type 1	Well Type 2	Well Type 3	Well Type 4	Well Type 5	Well Type 6
Input number of wells						
Input depth of wells (ft)						
Choose well diameter (in) from drop down menu	1/2	1/2	1/2	1/2	1/2	1/2
Choose material type from drop down menu	PVC	PVC	PVC	PVC	PVC	PVC
Choose specific material schedule from drop down menu	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC

TREATMENT CHEMICALS & MATERIALS	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6
Input number of injection points						
Choose material type from drop down menu	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide
Input amount of material injected at each point (pounds dry mass)						
Input number of injections per injection point						

GAC	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6
Input weight of GAC used (lbs)						
Choose material type from drop down menu	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC

CONSTRUCTION MATERIALS	Material 1	Material 2	Material 3	Material 4	Material 5	Material 6
Choose material type from drop down menu	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner
Input area of material (ft^2)						
Input depth of material (ft)						

WELL DECOMMISSIONING	Well Type 1	Well Type 2	Well Type 3	Well Type 4	Well Type 5	Well Type 6
Input number of wells						
Input depth of wells (ft)						
Input well diameter (in)	1	1	1	1	1	1
Choose material from drop down menu	Soil	Soil	Soil	Soil	Soil	Soil

TRANSPORTATION

	LUC Instituation	Monitoring well system	Rig Crew	Extraction System	Rig Crew	Demo
PERSONNEL TRANSPORTATION - ROAD	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Choose vehicle type from drop down menu*	Light truck	Light truck	Heavy Duty	Light truck	Heavy Duty	Light truck
Choose fuel used from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input distance traveled per trip (miles)	50	50	50	50	50	50
Input number of trips taken	3	31	90	71	9	10
Input number of travelers	2	2	3	2	3	3
Input estimated vehicular fuel economy (mi/gal) (Input only if known for the vehicle selected, otherwise a default will be used by the tool)						

*For vehicle type 'Other' please enter values in Table 2b in the Look Up Table tab.

PERSONNEL TRANSPORTATION - AIR	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input number of travelers						
Input number of flights taken						

PERSONNEL TRANSPORTATION - RAIL	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Choose vehicle type from drop down menu	Intercity rail	Intercity rail	Intercity rail	Intercity rail	Intercity rail	Intercity rail
Input distance traveled (miles)						
Input number of trips taken						
Input number of travelers						

	Drill Rig/Loader	Materials	Rotary	Pumps, etc	Materials	Dozer
EQUIPMENT TRANSPORTATION - ROAD	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Choose fuel used from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input distance traveled (miles)	200	5,700	100	100	100	100
Input weight of equipment transported (tons)	10	40	10	10	3	32.0

EQUIPMENT TRANSPORTATION - AIR	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input weight of equipment transported (tons)						

EQUIPMENT TRANSPORTATION - RAIL	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input weight of load (tons)						

EQUIPMENT TRANSPORTATION - WATER	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (mile)						
Input weight of load (tons)						

EQUIPMENT USE

EARTHWORK	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose earthwork equipment type from drop down menu	Dozer	Dozer	Dozer	Dozer	Dozer	Dozer
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input volume of material to be removed (yd^3)						
Will DIESEL-run equipment be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
DRILLING	**Event 1**	**Event 2**	**Event 3**	**Event 4**	**Event 5**	**Event 6**
Input number of drilling locations						
Choose drilling method from drop down menu	Direct Push	Direct Push	Direct Push	Direct Push	Direct Push	Direct Push
Input time spent drilling at each location (hr)						
Input depth of wells (ft)						
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel

For each pump, select only one of the three methods to calculate energy and GHG emissions
Enter "0" for all user input values for unused pump columns or unused methods

PUMP OPERATION	Pump 1	Pump 2	Pump 3	Pump 4	Pump 5	Pump 6
Choose method from drop down	Method 2	Method 1	Method 1	Method 1	Method 1	Method 1
Method 1 - ELECTRICAL USAGE IS KNOWN						
Input pump electrical usage (KWh)	0	0	0	0	0	0
Method 2 - PUMP HEAD IS KNOWN						
Input flow rate (gpm)	0	0	0	0	0	0
Input total head (ft)	0	0	0	0	0	0
Input number of pumps operating	0	0	0	0	0	0
Input operating time for each pump (hrs)	0	0	0	0	0	0
Pump efficiency times motor efficiency (default already present, user override possible)	0.51	0.51	0.51	0.51	0.51	0.51
Input specific gravity (default already present, user override possible)	1	1	1	1	1	1
Method 3 - NAME PLATE SPECIFICATIONS ARE KNOWN						
Input pump horsepower (hp)	0	0	0	0	0	0
Input number of pumps operating	0	0	0	0	0	0
Input operating time for each pump (hrs)	0	0	0	0	0	0
Input pump load (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Input pump motor efficiency (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Region						
Choose region from drop down menu (scroll right to see figure)	AKGD	AKGD	AKGD	AKGD	AKGD	AKGD

DIESEL AND GASOLINE PUMPS	Pump 1	Pump 2	Pump 3	Pump 4	Pump 5	Pump 6
Choose fuel type from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Choose horsepower range from drop down menu	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1
Equipment operating hours (hrs)						
Input estimated fuel consumption rate (gal/hr) (Input only if known for the pump selected, otherwise a default will be used by the tool)						

For each type of equipment, select only one of the methods to calculate energy and GHG emissions
Enter "0" for all user input values for unused equipment columns or unused methods

BLOWER, COMPRESSOR, MIXER, AND OTHER EQUIPMENT	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose type of equipment from drop down	Blower	Blower	Blower	Blower	Blower	Blower
Choose method from drop down	Method 1	Method 1	Method 1	Method 1	Method 1	Method 1
Method 1 - NAME PLATE SPECIFICATIONS ARE KNOWN						
Input equipment horsepower (hp)	0	0	0	0	0	0
Input number of equipments operating	0	0	0	0	0	0
Input operating time for each equipment (hrs)	0	0	0	0	0	0
Input equipment load (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Input motor efficiency (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Method 2 - ELECTRICAL USAGE IS KNOWN						
Input equipment electrical usage, if known (KWh)	0	0	0	0	0	0
Region						
Choose region from drop down menu (scroll right to see figure)	AKGD	AKGD	AKGD	AKGD	AKGD	AKGD

GENERATORS	Generator 1	Generator 2	Generator 3	Generator 4	Generator 5	Generator 6
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Choose horsepower range from drop down menu	3 to 6	3 to 6	3 to 6	3 to 6	3 to 6	3 to 6
Input operating hours (hr)						

AGRICULTURAL EQUIPMENT	Tillage Tractor 1	Tillage Tractor 2	Tillage Tractor 3	Tillage Tractor 4	Tillage Tractor 5	Tillage Tractor 6
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input area to till (acre)						
Choose soil condition from drop down menu	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil
Choose soil type from drop down menu	Clay Soil	Clay Soil	Clay Soil	Clay Soil	Clay Soil	Clay Soil
Input time available (work days)						
Input depth of tillage (in)						

CAPPING EQUIPMENT	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose stabilization equipment type from drop down menu	Roller	Roller	Roller	Roller	Roller	Roller
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input area (ft^2)						
Input time available (work days)						

MIXING EQUIPMENT	Mixer 1	Mixer 2	Mixer 3	Mixer 4	Mixer 5	Mixer 6
Choose fuel type from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Choose horsepower range from drop down menu	1 to 3	1 to 3	1 to 3	1 to 3	1 to 3	1 to 3
Input volume (yd^3)						
Input production rate (yd^3/hr)						
Input estimated fuel consumption rate (gal/hr) (Input only if known for the mixer selected, otherwise a default will be used by the tool)						

RESIDUAL HANDLING

RESIDUE DISPOSAL/RECYCLING	Soil Residue	Residual Water	Material Residue	Other Residuals	Other Residuals	Other Residuals
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Input weight of the waste transported to landfill or recycling per trip (tons)	20	18				
Choose vehicle type from drop down menu	Heavy Duty	Heavy Duty	On-road truck	On-road truck	On-road truck	On-road truck
Choose fuel used from drop down menu	Diesel	Diesel	Gasoline	Gasoline	Gasoline	Gasoline
Input total number of trips	1	1				
Input number of miles per trip	50	50				

LANDFILL OPERATIONS	Operation 1	Operation 2	Operation 3	Operation 4	Operation 5	Operation 6
Input tons of soil or waste to be incinerated (user must input emission factors in the Look Up Table, Table 7a)						

THERMAL/CATALYTIC OXIDIZERS*	Oxidizer 1	Oxidizer 2	Oxidizer 3	Oxidizer 4	Oxidizer 5	Oxidizer 6
Choose oxidizer type from drop down menu	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer
Choose fuel type from drop down menu	natural gas	Propane	natural gas	natural gas	natural gas	natural gas
Input waste gas flow rate (scfm)						
Input time running (hours)						
Input waste gas inlet temperature (F)						
Input contaminant concentration (ppmV)						

*(Electric blowers are included in the analysis)

WATER CONSUMPTION	Treatment System 1	Treatment System 2	Treatment System 3	Treatment System 4	Treatment System 5	Treatment System 6
Input water disposed/collected during treatment (gal)	3000					
Input water disposed/collected during site preparation (gal)	1500					
Input water disposed/collected during sampling (gal)						
Input water disposed/collected during site demobilization (gal)						

LANDFILL METHANE EMISSIONS	Landfill 1	Landfill 2	Landfill 3	Landfill 4	Landfill 5	Landfill 6
Input landfill methane emissions (metric tons)						

OTHER KNOWN ONSITE ACTIVITIES	Entire Site
Input energy usage (MMBTU)	1.7E+04
Water consumption (gallon)	1.7E+05
Input CO_2 emission (metric ton)	3.4E+02
Input N_2O emission (metric ton CO_2 e)	1.3E+02
Input CH_4 emissions (metric ton CO_2 e)	2.9E+01
Input NOx emission (metric ton)	2.3E-01
Input SOx emission (metric ton)	8.6E-01
Input PM_{10} emission (metric ton)	1.2E-01
Input fatality risk	0.0E+00
Input injury risk	0.0E+00

Remedial Action Operations

This worksheet allows the user to define material production, transportation, equipment use, and residual handling variables for the remedial alternative

Yellow cells	require the user to choose an input from a drop down menu
White cells	require the user to type in a value

MATERIAL PRODUCTION

WELL MATERIALS	Well Type 1	Well Type 2	Well Type 3	Well Type 4	Well Type 5	Well Type 6
Input number of wells						
Input depth of wells (ft)						
Choose well diameter (in) from drop down menu	1/2	1/2	1/2	1/2	1/2	1/2
Choose material type from drop down menu	PVC	PVC	PVC	PVC	PVC	PVC
Choose specific material schedule from drop down menu	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC

TREATMENT CHEMICALS & MATERIALS	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6
Input number of injection points						
Choose material type from drop down menu	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide
Input amount of material injected at each point (pounds dry mass)						
Input number of injections per injection point						

GAC	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6
Input weight of GAC used (lbs)						
Choose material type from drop down menu	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC

CONSTRUCTION MATERIALS	Material 1	Material 2	Material 3	Material 4	Material 5	Material 6
Choose material type from drop down menu	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner
Input area of material (ft^2)						
Input depth of material (ft)						

WELL DECOMMISSIONING	Well Type 1	Well Type 2	Well Type 3	Well Type 4	Well Type 5	Well Type 6
Input number of wells						
Input depth of wells (ft)						
Input well diameter (in)	1	1	1	1	1	1
Choose material from drop down menu	Soil	Soil	Soil	Soil	Soil	Soil

TRANSPORTATION

	Weekly checks	monthly checks	Sludge Handling	LUCs		
PERSONNEL TRANSPORTATION - ROAD	Trip 1	Trip 2	Trip 3	Trip 1	Trip 5	Trip 6
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Choose vehicle type from drop down menu*	Light truck	Light truck	Light truck	Light truck	Light truck	Light truck
Choose fuel used from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input distance traveled per trip (miles)	50	50	50	50		
Input number of trips taken	832	192	4160	48		
Input number of travelers	1	2	2	2		
Input estimated vehicular fuel economy (mi/gal) (Input only if known for the vehicle selected, otherwise a default will be used by the tool)						

*For vehicle type 'Other' please enter values in Table 2b in the Look Up Table tab.

PERSONNEL TRANSPORTATION - AIR	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input number of travelers						
Input number of flights taken						

PERSONNEL TRANSPORTATION - RAIL	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Choose vehicle type from drop down menu	Intercity rail	Intercity rail	Intercity rail	Intercity rail	Intercity rail	Intercity rail
Input distance traveled (miles)						
Input number of trips taken						
Input number of travelers						

EQUIPMENT TRANSPORTATION - ROAD	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Choose fuel used from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input distance traveled (miles)						
Input weight of equipment transported (tons)						

EQUIPMENT TRANSPORTATION - AIR	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input weight of equipment transported (tons)						

EQUIPMENT TRANSPORTATION - RAIL	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input weight of load (tons)						

EQUIPMENT TRANSPORTATION - WATER	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (mile)						
Input weight of load (tons)						

EQUIPMENT USE

EARTHWORK	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose earthwork equipment type from drop down menu	Dozer	Dozer	Dozer	Dozer	Dozer	Dozer
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input volume of material to be removed (yd^3)						
Will DIESEL-run equipment be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
DRILLING	**Event 1**	**Event 2**	**Event 3**	**Event 4**	**Event 5**	**Event 6**
Input number of drilling locations						
Choose drilling method from drop down menu	Direct Push	Direct Push	Direct Push	Direct Push	Direct Push	Direct Push
Input time spent drilling at each location (hr)						
Input depth of wells (ft)						
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel

For each pump, select only one of the three methods to calculate energy and GHG emissions
Enter "0" for all user input values for unused pump columns or unused methods

PUMP OPERATION	Pump 1	Pump 2	Pump 3	Pump 4	Pump 5	Pump 6
Choose method from drop down	Method 1	Method 1	Method 1	Method 1	Method 1	Method 1
Method 1 - ELECTRICAL USAGE IS KNOWN						
Input pump electrical usage (KWh)	7100506	0	0	0	0	0
Method 2 - PUMP HEAD IS KNOWN						
Input flow rate (gpm)	0	0	0	0	0	0
Input total head (ft)	0	0	0	0	0	0
Input number of pumps operating	0	0	0	0	0	0
Input operating time for each pump (hrs)	0	0	0	0	0	0
Pump efficiency times motor efficiency (default already present, user override possible)	0.51	0.51	0.51	0.51	0.51	0.51
Input specific gravity (default already present, user override possible)	1	1	1	1	1	1
Method 3 - NAME PLATE SPECIFICATIONS ARE KNOWN						
Input pump horsepower (hp)	0	0	0	0	0	0
Input number of pumps operating	0	0	0	0	0	0
Input operating time for each pump (hrs)	0	0	0	0	0	0
Input pump load (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Input pump motor efficiency (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Region						
Choose region from drop down menu (scroll right to see figure)	AKGD	AKGD	AKGD	AKGD	AKGD	AKGD

DIESEL AND GASOLINE PUMPS	Pump 1	Pump 2	Pump 3	Pump 4	Pump 5	Pump 6
Choose fuel type from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Choose horsepower range from drop down menu	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1
Equipment operating hours (hrs)						
Input estimated fuel consumption rate (gal/hr) (Input only if known for the pump selected, otherwise a default will be used by the tool)						

For each type of equipment, select only one of the methods to calculate energy and GHG emissions
Enter "0" for all user input values for unused equipment columns or unused methods

BLOWER, COMPRESSOR, MIXER, AND OTHER EQUIPMENT	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose type of equipment from drop down	Blower	Blower	Blower	Blower	Blower	Blower
Choose method from drop down	Method 2	Method 2	Method 2	Method 1	Method 1	Method 1
Method 1 - NAME PLATE SPECIFICATIONS ARE KNOWN						
Input equipment horsepower (hp)	0	0	0	0	0	0
Input number of equipments operating	0	0	0	0	0	0
Input operating time for each equipment (hrs)	0	0	0	0	0	0
Input equipment load (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Input motor efficiency (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Method 2 - ELECTRICAL USAGE IS KNOWN						
Input equipment electrical usage, if known (KWh)	0.00	0.00	0.00	0	0	0
Region						
Choose region from drop down menu (scroll right to see figure)	AKGD	AKGD	AKGD	AKGD	AKGD	AKGD

GENERATORS	Generator 1	Generator 2	Generator 3	Generator 4	Generator 5	Generator 6
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Choose horsepower range from drop down menu	3 to 6	3 to 6	3 to 6	3 to 6	3 to 6	3 to 6
Input operating hours (hr)						

AGRICULTURAL EQUIPMENT	Tillage Tractor 1	Tillage Tractor 2	Tillage Tractor 3	Tillage Tractor 4	Tillage Tractor 5	Tillage Tractor 6
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input area to till (acre)						
Choose soil condition from drop down menu	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil
Choose soil type from drop down menu	Clay Soil	Clay Soil	Clay Soil	Clay Soil	Clay Soil	Clay Soil
Input time available (work days)						
Input depth of tillage (in)						

CAPPING EQUIPMENT	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose stabilization equipment type from drop down menu	Roller	Roller	Roller	Roller	Roller	Roller
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input area (ft^2)						
Input time available (work days)						

MIXING EQUIPMENT	Mixer 1	Mixer 2	Mixer 3	Mixer 4	Mixer 5	Mixer 6
Choose fuel type from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Choose horsepower range from drop down menu	1 to 3	1 to 3	1 to 3	1 to 3	1 to 3	1 to 3
Input volume (yd^3)						
Input production rate (yd^3/hr)						
Input estimated fuel consumption rate (gal/hr) (Input only if known for the mixer selected, otherwise a default will be used by the tool)						

RESIDUAL HANDLING

RESIDUE DISPOSAL/RECYCLING	Soil Residue	Residual Water	Material Residue	Other Residuals	Other Residuals	Other Residuals
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Input weight of the waste transported to landfill or recycling per trip (tons)			20			
Choose vehicle type from drop down menu	Heavy Duty	On-road truck	Heavy Duty	On-road truck	On-road truck	On-road truck
Choose fuel used from drop down menu	Diesel	Gasoline	Diesel	Gasoline	Gasoline	Gasoline
Input total number of trips			61			
Input number of miles per trip			50			

LANDFILL OPERATIONS	Operation 1	Operation 2	Operation 3	Operation 4	Operation 5	Operation 6
Input tons of soil or waste to be incinerated (user must input emission factors in the Look Up Table, Table 7a)						

THERMAL/CATALYTIC OXIDIZERS*	Oxidizer 1	Oxidizer 2	Oxidizer 3	Oxidizer 4	Oxidizer 5	Oxidizer 6
Choose oxidizer type from drop down menu	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer
Choose fuel type from drop down menu	natural gas	Propane	natural gas	natural gas	natural gas	natural gas
Input waste gas flow rate (scfm)						
Input time running (hours)						
Input waste gas inlet temperature (F)						
Input contaminant concentration (ppmV)						
*(Electric blowers are included in the analysis)	P&T					

WATER CONSUMPTION	Treatment System 1	Treatment System 2	Treatment System 3	Treatment System 4	Treatment System 5	Treatment System 6
Input water disposed/collected during treatment (gal)						
Input water disposed/collected during site preparation (gal)						
Input water disposed/collected during sampling (gal)						
Input water disposed/collected during site demobilization (gal)						

LANDFILL METHANE EMISSIONS	Landfill 1	Landfill 2	Landfill 3	Landfill 4	Landfill 5	Landfill 6
Input landfill methane emissions (metric tons)						

OTHER KNOWN ONSITE ACTIVITIES	Entire Site
Input energy usage (MMBTU)	3.0E+04
Water consumption (gallon)	1.7E+05
Input CO_2 emission (metric ton)	7.4E+02
Input N_2O emission (metric ton CO_2 e)	0.0E+00
Input CH_4 emissions (metric ton CO_2 e)	0.0E+00
Input NOx emission (metric ton)	0.0E+00
Input SOx emission (metric ton)	0.0E+00
Input PM_{10} emission (metric ton)	0.0E+00
Input fatality risk	0.0E+00
Input injury risk	0.0E+00

Long Term Monitoring

This worksheet allows the user to define material production, transportation, equipment use, and residual handling variables for the remedial alternative

Yellow cells	require the user to choose an input from a drop down menu
White cells	require the user to type in a value

MATERIAL PRODUCTION

WELL MATERIALS	Well Type 1	Well Type 2	Well Type 3	Well Type 4	Well Type 5	Well Type 6
Input number of wells						
Input depth of wells (ft)						
Choose well diameter (in) from drop down menu	1/2	1/2	1/2	1/2	1/2	1/2
Choose material type from drop down menu	PVC	PVC	PVC	PVC	PVC	PVC
Choose specific material schedule from drop down menu	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC	Schedule 40 PVC

TREATMENT CHEMICALS & MATERIALS	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6
Input number of injection points						
Choose material type from drop down menu	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide	Hydrogen Peroxide
Input amount of material injected at each point (pounds dry mass)						
Input number of injections per injection point						

GAC	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6
Input weight of GAC used (lbs)						
Choose material type from drop down menu	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC	Virgin GAC

CONSTRUCTION MATERIALS	Material 1	Material 2	Material 3	Material 4	Material 5	Material 6
Choose material type from drop down menu	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner	HDPE Liner
Input area of material (ft^2)						
Input depth of material (ft)						

WELL DECOMMISSIONING	Well Type 1	Well Type 2	Well Type 3	Well Type 4	Well Type 5	Well Type 6
Input number of wells						
Input depth of wells (ft)						
Input well diameter (in)	1	1	1	1	1	1
Choose material from drop down menu	Soil	Soil	Soil	Soil	Soil	Soil

TRANSPORTATION

PERSONNEL TRANSPORTATION - ROAD	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Choose vehicle type from drop down menu*	Light truck	Light truck	Light truck	Light truck	Light truck	Light truck
Choose fuel used from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input distance traveled per trip (miles)		50	50	50		
Input number of trips taken		40	150	9		
Input number of travelers		2	2	2		
Input estimated vehicular fuel economy (mi/gal) (Input only if known for the vehicle selected, otherwise a default will be used by the tool)						

*For vehicle type 'Other' please enter values in Table 2b in the Look Up Table tab.

PERSONNEL TRANSPORTATION - AIR	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input number of travelers						
Input number of flights taken						

PERSONNEL TRANSPORTATION - RAIL	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Choose vehicle type from drop down menu	Intercity rail	Intercity rail	Intercity rail	Intercity rail	Intercity rail	Intercity rail
Input distance traveled (miles)						
Input number of trips taken						
Input number of travelers						

EQUIPMENT TRANSPORTATION - ROAD	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Choose fuel used from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input distance traveled (miles)						
Input weight of equipment transported (tons)						

EQUIPMENT TRANSPORTATION - AIR	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input weight of equipment transported (tons)						

EQUIPMENT TRANSPORTATION - RAIL	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (miles)						
Input weight of load (tons)						

EQUIPMENT TRANSPORTATION - WATER	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Input distance traveled (mile)						

Input weight of load (tons)						

EQUIPMENT USE

EARTHWORK	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose earthwork equipment type from drop down menu	Dozer	Dozer	Dozer	Dozer	Dozer	Dozer
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input volume of material to be removed (yd^3)						
Will DIESEL-run equipment be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
DRILLING	**Event 1**	**Event 2**	**Event 3**	**Event 4**	**Event 5**	**Event 6**
Input number of drilling locations						
Choose drilling method from drop down menu	Direct Push	Direct Push	Direct Push	Direct Push	Direct Push	Direct Push
Input time spent drilling at each location (hr)						
Input depth of wells (ft)						
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel

For each pump, select only one of the three methods to calculate energy and GHG emissions
Enter "0" for all user input values for unused pump columns or unused methods

PUMP OPERATION	Pump 1	Pump 2	Pump 3	Pump 4	Pump 5	Pump 6
Choose method from drop down	Method 1	Method 1	Method 1	Method 1	Method 1	Method 1
Method 1 - ELECTRICAL USAGE IS KNOWN						
Input pump electrical usage (KWh)	0	0	0	0	0	0
Method 2 - PUMP HEAD IS KNOWN						
Input flow rate (gpm)	0	0	0	0	0	0
Input total head (ft)	0	0	0	0	0	0
Input number of pumps operating	0	0	0	0	0	0
Input operating time for each pump (hrs)	0	0	0	0	0	0
Pump efficiency times motor efficiency (default already present, user override possible)	0.51	0.51	0.51	0.51	0.51	0.51
Input specific gravity (default already present, user override possible)	1	1	1	1	1	1
Method 3 - NAME PLATE SPECIFICATIONS ARE KNOWN						
Input pump horsepower (hp)	0	0	0	0	0	0
Input number of pumps operating	0	0	0	0	0	0
Input operating time for each pump (hrs)	0	0	0	0	0	0
Input pump load (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Input pump motor efficiency (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Region						
Choose region from drop down menu (scroll right to see figure)	AKGD	AKGD	AKGD	AKGD	AKGD	AKGD

DIESEL AND GASOLINE PUMPS	Pump 1	Pump 2	Pump 3	Pump 4	Pump 5	Pump 6
Choose fuel type from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Choose horsepower range from drop down menu	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1	2-Stroke: 0 to 1
Equipment operating hours (hrs)						
Input estimated fuel consumption rate (gal/hr) (Input only if known for the pump selected, otherwise a default will be used by the tool)						

For each type of equipment, select only one of the methods to calculate energy and GHG emissions
Enter "0" for all user input values for unused equipment columns or unused methods

BLOWER, COMPRESSOR, MIXER, AND OTHER EQUIPMENT	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose type of equipment from drop down	Blower	Blower	Blower	Blower	Blower	Blower
Choose method from drop down	Method 1	Method 1	Method 1	Method 1	Method 1	Method 1
Method 1 - NAME PLATE SPECIFICATIONS ARE KNOWN						
Input equipment horsepower (hp)	0	0	0	0	0	0
Input number of equipments operating	0	0	0	0	0	0
Input operating time for each equipment (hrs)	0	0	0	0	0	0
Input equipment load (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Input motor efficiency (default already present, user override possible)	0.85	0.85	0.85	0.85	0.85	0.85
Method 2 - ELECTRICAL USAGE IS KNOWN						
Input equipment electrical usage, if known (KWh)	0	0	0	0	0	0
Region						
Choose region from drop down menu (scroll right to see figure)	AKGD	AKGD	AKGD	AKGD	AKGD	AKGD

GENERATORS	Generator 1	Generator 2	Generator 3	Generator 4	Generator 5	Generator 6
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Choose horsepower range from drop down menu	3 to 6	3 to 6	3 to 6	3 to 6	3 to 6	3 to 6
Input operating hours (hr)						

AGRICULTURAL EQUIPMENT	Tillage Tractor 1	Tillage Tractor 2	Tillage Tractor 3	Tillage Tractor 4	Tillage Tractor 5	Tillage Tractor 6
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input area to till (acre)						
Choose soil condition from drop down menu	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil	Firm untilled soil
Choose soil type from drop down menu	Clay Soil	Clay Soil	Clay Soil	Clay Soil	Clay Soil	Clay Soil
Input time available (work days)						
Input depth of tillage (in)						

CAPPING EQUIPMENT	Equipment 1	Equipment 2	Equipment 3	Equipment 4	Equipment 5	Equipment 6
Choose stabilization equipment type from drop down menu	Roller	Roller	Roller	Roller	Roller	Roller
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Input area (ft^2)						
Input time available (work days)						

MIXING EQUIPMENT	Mixer 1	Mixer 2	Mixer 3	Mixer 4	Mixer 5	Mixer 6
Choose fuel type from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Choose horsepower range from drop down menu	1 to 3	1 to 3	1 to 3	1 to 3	1 to 3	1 to 3
Input volume (yd^3)						
Input production rate (yd^3/hr)						
Input estimated fuel consumption rate (gal/hr) (Input only if known for the mixer selected, otherwise a default will be used by the tool)						

RESIDUAL HANDLING

RESIDUE DISPOSAL/RECYCLING	Soil Residue	Residual Water	Material Residue	Other Residuals	Other Residuals	Other Residuals
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Input weight of the waste transported to landfill or recycling per trip (tons)						
Choose vehicle type from drop down menu	On-road truck	On-road truck	On-road truck	On-road truck	On-road truck	On-road truck
Choose fuel used from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input total number of trips						
Input number of miles per trip						

LANDFILL OPERATIONS	Operation 1	Operation 2	Operation 3	Operation 4	Operation 5	Operation 6
Input tons of soil or waste to be incinerated (user must input emission factors in the Look Up Table, Table 7a)						

THERMAL/CATALYTIC OXIDIZERS*	Oxidizer 1	Oxidizer 2	Oxidizer 3	Oxidizer 4	Oxidizer 5	Oxidizer 6
Choose oxidizer type from drop down menu	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer	Simple Thermal Oxidizer
Choose fuel type from drop down menu	natural gas	Propane	natural gas	natural gas	natural gas	natural gas
Input waste gas flow rate (scfm)						
Input time running (hours)						
Input waste gas inlet temperature (F)						
Input contaminant concentration (ppmV)						

*(Electric blowers are included in the analysis)

WATER CONSUMPTION	Treatment System 1	Treatment System 2	Treatment System 3	Treatment System 4	Treatment System 5	Treatment System 6
Input water disposed/collected during treatment (gal)						
Input water disposed/collected during site preparation (gal)						
Input water disposed/collected during sampling (gal)						
Input water disposed/collected during site demobilization (gal)						

LANDFILL METHANE EMISSIONS	Landfill 1	Landfill 2	Landfill 3	Landfill 4	Landfill 5	Landfill 6
Input landfill methane emissions (metric tons)						

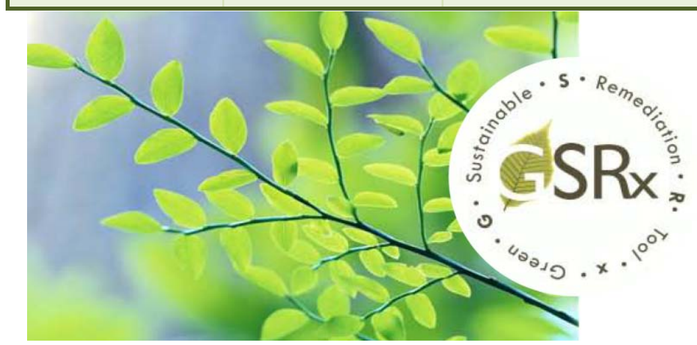
OTHER KNOWN ONSITE ACTIVITIES	Entire Site
Input energy usage (MMBTU)	
Water consumption (gallon)	
Input CO_2 emission (metric ton)	
Input N_2O emission (metric ton CO_2 e)	
Input CH_4 emissions (metric ton CO_2 e)	
Input NOx emission (metric ton)	
Input SOx emission (metric ton)	
Input PM_{10} emission (metric ton)	
Input fatality risk	
Input injury risk	

GSRx - ALTERNATIVE 7
HYBRID SITEWISE EVALUATION
NWIRP CALVERTON
CALVERTON, NEW YORK

Technology Module / Phase	Module Components	Comments / Assumptions	Quantity	(Units)	Greenhouse Gas Emissions				Criteria Pollutant Emission			Energy Consumption	Water Consumption
					$CO_{2\ equiv}$	CO_2	N_20	CH_4	NO_x	SO_x	PM_{10}		
Materials						**Tonnes**						**MWhr**	**gal x 1000**
	PVC	5 wells x 50', 5 wells x 70' = 600' @ .682 lb/ft	409	lbs	0.46	0.46	0.00	0.01	-	0.00	0.00	16.92	0.70
	Steel	10 wells, 4 8-ft bollards/well, 22 lb/ft	7,040	lbs	8.62	8.62	0.00	0.00	0.00	0.01	0.00	148.52	6.33
	Typical Cement	67 lb/cf	10,281	lbs	3.87	3.87	-	-	-	-	0.00	28.97	0.00
	Sand	75 lb/cf	2,475	lbs	0.01	0.01	-	-	-	-	0.00	0.15	0.00
	Bentonite	93 lb/cf	614	lbs	0.00	0.00	-	-	-	-	0.00	0.00	0.00
	Typical Cement	Monitoring well abandonment, 80 wells	9,821	lbs	3.70	3.70	-	-	-	-	0.00	27.67	0.00
	Steel	Steel Bollards for Extraction System + 500 misc piping/fittings	2,612	lbs	3.20	3.20	0.00	0.00	0.00	0.00	0.00	55.10	2.35
	Steel	40'x60' steel building, 40 lb/sf	96,000	lbs	117.55	117.55	0.01	0.03	0.00	0.10	0.00	2025.23	86.27
	HDPE	4" HDPE 1300 ft + 4000 ft, 160 psi, 2.29 lb/ft,	12,137	lbs	14.31	14.31	0.03	0.10	-	0.06	0.01	158.83	4.36
	PVC	6" PVC pipe	17650	lbs	20.01	20.01	0.05	0.23	-	0.08	0.01	729.78	30.35
	HDPE	Geotextile	600	lbs	0.71	0.71	0.00	0.01	-	0.00	0.00	7.85	0.22
	Gravel	150 cy Gravel	425,250	lbs	3.28	3.28	-	-	-	-	0.00	78.15	0.00
	HDPE	20000 Gal Equalization Tank	25,488	lbs	30.05	30.05	0.07	0.22	-	0.13	0.02	333.55	9.16
	HDPE	80000 Gal. Clarifier Tank	64,880	lbs	76.50	76.50	0.18	0.56	-	0.32	0.05	849.05	23.32
	HDPE	20000 Gal Sludge Holding Tank	25488	lbs	30.05	30.05	0.07	0.22	-	0.13	0.02	333.55	9.16
	General Concrete	3 pads, 4050 lb/cy 1 cy each	12150	lbs	0.72	0.72	-	-	-	-	0.00	7.07	0.00
	Soda Ash	Caustic Soda 27 tons/year	806400	lbs	735.09	735.09	-	-	-	-	0.00	8871.51	172.95
Subtotal					**1048.13**	**1048.13**	**0.43**	**1.38**	**0.00**	**0.83**	**0.10**	**13671.89**	**345.17**
Transportation						**Tonnes**						**MWhr**	**gal x 1000**
Input Into Sitewise				miles									
Subtotal					**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0**

GSRx - ALTERNATIVE 7
HYBRID SITEWISE EVALUATION
NWIRP CALVERTON
CALVERTON, NEW YORK

Technology Module / Phase	Module Components	Comments / Assumptions	Quantity	(Units)	Greenhouse Gas Emissions				Criteria Pollutant Emission			Energy Consumption	Water Consumption
					$CO_{2\ equiv}$	CO_2	N_20	CH_4	NO_x	SO_x	PM_{10}		
Materials						**Tonnes**						**MWhr**	**gal x 1000**
Construction Equipment						**Tonnes**						**MWhr**	**gal x 1000**
	Loader, 100 HP, 2 CY (diesel)	9 days 4 hrs/day	36	hrs	0.59	0.59	0.00	0.00	0.00	0.00	0.00	2.64	
	Drill Rig, HSA (diesel)	9 days 8 hrs/day	72	hrs	3.92	3.92	0.00	0.00	0.05	0.00	0.00	18.33	
	Drill Rig, Mud Rotary (diesel)	9 days 8 hrs/day	72	hrs	5.34	5.34	0.00	0.01	0.06	0.00	0.00	41.36	
	Loader, 100 HP, 2 CY (diesel)	9 days 4 hrs/day	36	hrs	0.59	0.59	0.00	0.00	0.00	0.00	0.00	2.64	
	Dozer, 335 HP (D8) w/U Blade (diesel)	Demo Equipment, 10 days 8 hrs/day	80	hrs	14.47	14.47	0.00	0.00	0.11	0.03	0.01	70.39	
Subtotal					**24.92**	**24.92**	**0.00**	**0.01**	**0.23**	**0.03**	**0.02**	**135.36**	**0**
Operating Consumption						**Tonnes**						**MWhr**	**gal x 1000**
Input Into Sitewise													0
					0	**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0**	**0**
			Total		**1,073**	**1,073**	**0.43**	**1.39**	**0.23**	**0.86**	**0.12**	**13,807**	**345**



Alternative 7
Values Input into SiteWise as "Other"

Module	Greenhouse Gas Emissions				Criteria Pollutant Emission			Energy Consumption	Water Consumption
	$CO_{2\ equiv}$	CO_2	N_20 (CO2e)	CH_4 (CO2e)	NO_x	SO_x	PM_{10}		
		Tonnes						**MMBTU**	**gal**
RI									
RAC	3.38E+02	3.38E+02	1.32E+02	2.92E+01	2.26E-01	8.62E-01	1.22E-01	1.68E+04	1.72E+05
RAO	7.35E+02	7.35E+02	0.00E+00	0.00E+00	-	-	0.00E+00	3.03E+04	1.73E+05
LTM									

Note: 1 MWhr = 3412141.4799 BTU, 1MMTBU = 10^6 BTU