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Abbreviated Pre-Feasibility Study Field Investigation Work Plan

for

Site 12 – Town Gut Landfill
Site 41 – Scrap Yard
Site 42 – Olsen Road Landfill

Indian Head Division
Naval Surface Warfare Center

Indian Head, Maryland

Engineering Field Activity Chesapeake
Naval Facilities Engineering Command

Contract Number N62472-90-D-1298

Contract Task Order 0245

September 1999

TETRA TECH NUS, INC.

049920/P

ABBREVIATED PRE-FEASIBILITY STUDY FIELD INVESTIGATION WORK PLAN FOR SITE 12 – TOWN GUT LANDFILL SITE 41 – SCRAP YARD SITE 42 – OLSEN ROAD LANDFILL

INDIAN HEAD DIVISION
NAVAL SURFACE WARFARE CENTER
INDIAN HEAD, MARYLAND

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Engineering Field Activity Chesapeake
Environmental Branch Code 18
Naval Facilities Engineering Command
Washington Navy Yard, Building 212
Washington, D.C. 20374-2121

Submitted by:
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CONTRACT NUMBER N62472-90-D-1298
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SEPTEMBER 1999

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ACRONYMS AND DEFINITIONS

AWQC	Ambient Water Quality Criteria
BTAG	Biological Technical Assistance Group
B&R Environmental	Brown & Root Environmental
bgs	Below Ground Surface
BI	Background Investigation
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CLEAN	Comprehensive Long-Term Environmental Action Navy (CLEAN)
CLP	Contract Laboratory Program
COC	Chemical of Concern
COPC	Chemical of Potential Concern
CRDL	Contract-Required Detection Limit
CTO	Contract Task Order
DI	Deionized
DOT	Department of Transportation
DQO	Data Quality Objective
ECD	Electron Capture Detector
EPA	United States Environmental Protection Agency
ERA	Ecological Risk Assessment
FID	Flame Ionization Detector
FOL	Field Operations Leader
FS	Feasibility Study
FSP	Field Sampling Plan
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
HI	Hazard Index
HMX	Cyclotetramethylene tetranitramine; Octogen; Homocyclonite
IAS	Initial Assessment Study
ICP	Inductively Coupled Plasma
IDW	Investigation Derived Wastes
IHDIV-NSWC	Indian Head Division, Naval Surface Warfare Center
MCL	Maximum Concentration Level
MDE	Maryland Department of the Environment
mg/L	Miligrams per Liter
MS	Mass Spectrometer
MS/MSD	Matrix Spike/Matrix Spike Duplicate

NACIP	Naval Assessment and Control of Installation Pollutants
NEESA	Naval Energy and Environmental Support Activity
NOAA	National Oceanic and Atmospheric Administration
NSWC	Naval Surface Warfare Center
ORNL	Oak Ridge National Laboratory
PCBs	Polychlorinated Biphenyls
PCE	Perchloroethene (Tetrachloroethene)
PCOCs	Preliminary Contaminants of Concern
PPM	Parts Per Million
PQL	Practical Quantitation Limit
PVC	Polyvinyl Chloride
QAPP	Quality Assurance Project Plan
QC	Quality Control
RBC	Risk-Based Concentration
RDX	Hexahydro-1,3,5-trinitro-1,3,5-triazine
RFI	RCRA Facility Investigation
RFI/VI	RCRA Facility Investigation/Verification Investigation
RI	Remedial Investigation
SDG	Sample Delivery Group
SI	Site Investigation
SMDPs	Scientific/Management Decision Points
SOP	Standard Operating Procedures
SOW	Statement of Work
SVOCs	Semivolatile Organic Compounds
TAL	Target Analyte List
TCE	Trichloroethene
TCL	Target Compound List
TNT	2,4,6-Trinitrotoluene
TOC	Total Organic Carbon
TOX	Total Organic Halides
TPH	Total Petroleum Hydrocarbons
TRVs	Toxicity Reference Values
TtNUS	Tetra Tech NUS
USATHAMA	United States Army Toxic and Hazardous Material Agency
USDA	United States Department of Agriculture
$UTL_{95\%}$	95 Percent Upper Tolerance Limit
UXO	Unexploded Ordnance

VI	Verification Investigation
VOCs	Volatile Organic Compounds

EXECUTIVE SUMMARY

This Pre-Feasibility Study Field Investigation Work Plan for investigations at the Indian Head Division Naval Surface Warfare Center (IHDIV-NSWC), Indian Head, Maryland, was prepared by Tetra Tech NUS, Inc. (formerly Brown and Root Environmental) in response to Contract Task Order (CTO) 0245, under the Comprehensive Long-Term Environmental Action Navy (CLEAN), Contract Number N62472-90-D-1298. The purpose of this work plan is to develop and describe the pre-feasibility study field investigation activities to be conducted at Site 12 - Town Gut Landfill, Site 41 - Scrap Yard, and Site 42 - Olsen Road Landfill.

Site 12 is comprised of approximately 2 acres of undeveloped land located in the southwestern side of IHDIV-NSWC. Between 1968 and June 1980, the site was used to dispose of landscaping waste, fill material and rubble. The total fill area is estimated to occupy approximately 1 acre. Interviews conducted as part of past investigations of the site resulted in reports of possible unauthorized dumping of material such as paints, varnishes and other chemical wastes. Portions of the landfill form the shoreline of tidally affected ponds that discharge to Mattawoman Creek.

Site 41 is a currently operating scrap yard. From the 1960s to 1988, electrical transformers were stored at the northwestern end of the site prior to off-site disposal. Following an inspection conducted in 1981, 17 transformers were identified as either PCB contaminated or PCB containing. These transformers were believed to have leaked and contaminated the soil. Additionally, lead batteries were stored in the scrap yard and may have released lead to the surface soils.

Site 42, the Olsen Road Landfill, covers approximately 2 acres containing the paved area to the southwest of Building 1866 and the undeveloped land southwest of the Building. Drainage swales border the western and southern edges of the site. A drainage pipe outfall (IW71) and swale border the eastern side of the former landfill. Runoff from these drainage swales is directed into a ponding area that is located at the southeastern corner of the site. Water in this pond can eventually drain into Mattawoman Creek. Between 1982 and 1987, and prior to construction of the Assembly Building in 1992, the 2-acre area was used as an unauthorized disposal site for solid wastes. In a site assessment report completed by the Naval Energy and Environmental Support Activity (NEESA) (NEESA, 1992), it was reported that unauthorized disposal occurred at the site over a 5-year period in the early and mid-1980s. The site assessment further reported that no indication was found of hazardous waste having been part of the unauthorized dumping.

Sites 12, 41 and 42 were all included in a remedial investigation (RI) report prepared by Tetra Tech NUS, Inc. (TtNUS, 1999). For each of the sites, the RI recommended the preparation of a feasibility study (FS) report to evaluate methods for mitigating human health and/or environmental risks posed by the surface soil at each site, or to address regulatory concerns connected with landfill closure.

This document develops the rationale for, and describes the details of, a field investigation, which will provide additional field data generally intended to resolve questions regarding the extent of contaminated surface soil or the extent of landfilling. The investigation activities at Site 12 are limited to installing test pits to visually define the horizontal extent of the landfill, and delineating the wetlands in the area. At Site 41, the horizontal and vertical extent of contaminated soil will be defined by collecting and analyzing soil samples. The soil samples from Site 41 will be analyzed for arsenic, cadmium, lead and PCBs. For Site 42, test pits will also be employed to visually define the extent of the landfill, and sediment samples will be collected from the downgradient swales to define the extent of silver contamination. Additional work in connection with Site 42 will include wetland delineation and the collection/analysis of sediment samples for toxicity tests to enable more definitive ecological evaluations of the existing contamination. Six of the toxicity tests will be performed on sediment samples collected from locations immediately west and southwest of the site. The five remaining toxicity test samples will be collected from field-determined locations downgradient from the site and extending to Mattawoman Creek. Table ES-1 summarizes the quantity and types of samples planned.

The data collected as a result of the investigations described in this work plan will be utilized in the development of a feasibility study, which will evaluate potential mitigation measures for each of the sites.

TABLE ES-1

SUMMARY OF INVESTIGATION ACTIVITIES
SITES 12, 41 AND 42
INDIAN HEAD DIVISION, NSWC
INDIAN HEAD, MARYLAND

	Test Pits	Surface Soil Samples	Sediment Samples	Toxicity Tests	Other Investigation Activities
Site 12 - Town Gut Landfill	18	---	---	---	Wetlands Delineation
Site 41 - Scrap Yard	---	74	---	---	
Site 42 - Olsen Road Landfill	3	---	49	11	Wetlands Delineation
TOTALS(1)	21	74	49	11	

1 Totals do not include QA/QC samples.

1.0 INTRODUCTION

1.1 PURPOSE OF REPORT

This Pre-Feasibility Study (FS) Field Investigation Work Plan for investigations at the Indian Head Division Naval Surface Warfare Center (IHDIV-NSWC), Indian Head, Maryland, was prepared by Tetra Tech NUS, Inc. (TtNUS; formerly Brown and Root Environmental) in response to Contract Task Order (CTO) 0245, under the Comprehensive Long-Term Environmental Action Navy (CLEAN), Contract Number N62472-90-D-1298. The purpose of this work plan is to develop and describe the pre-feasibility study field investigation activities to be conducted at Site 12 - Town Gut Landfill, Site 41 - Scrap Yard, and Site 42 - Olsen Road Landfill.

1.2 SCOPE AND OBJECTIVE

TtNUS has been tasked to develop a work plan for pre-feasibility study field investigations to be conducted at Site 12 - Town Gut Landfill, Site 41 - Scrap Yard, and Site 42 - Olsen Road Landfill at IHDIV-NSWC, Indian Head, Maryland. A previously prepared remedial investigation (RI) report (TtNUS, 1999) determined the need for remedial activities at the sites. The overall objective of the work described in this Work Plan is to assemble sufficient data regarding the horizontal extent of the areas requiring remediation to support the preparation of a feasibility study.

This work plan is intended to be abbreviated with respect to the investigations and investigation results leading to the preparation of this work plan. This document is not intended to reiterate the details contained in the recently prepared RI report (TtNUS, 1999).

1.3 STATION BACKGROUND

The IHDIV-NSWC is located in northwestern Charles County, Maryland, approximately 25 miles southwest of Washington, DC. The IHDIV-NSWC is a military facility consisting of the main area on the Cornwallis Neck Peninsula and the Annex on Stump Neck, which is located across Mattawoman Creek. The Stump Neck Annex is not contiguous with the main area, has a separate United States Environmental Protection Agency (EPA) identification number, and is operated by a tenant. The main area is bounded by the Potomac River to the northwest, west, and south, Mattawoman Creek to the south and east, and the town of Indian Head to the northeast (Figure 1-1). The locations of the sites to be investigated under this work plan are shown on Figure 1-2.

The primary mission of IHDIV-NSWC is as follows:

- Provide services in energetics for all warfare centers through engineering, fleet and operational support, manufacturing technology, limited production, and industrial base support.

- Provide research, development, testing, and evaluation of energetic materials, ordnance devices and components, and other related ordnance engineering standards, including chemicals, propellants, and their propulsion systems, explosives, pyrotechnics, warheads, and simulators.

- Provide support to all warfare centers, military departments, and the ordnance industry for special weapons, explosive safety, and ordnance environmental issues.

- Execute other responsibilities assigned by the Commander of the Station.

1.4 DATA QUALITY OBJECTIVES

This work plan has been developed using the data quality objective (DQO) process. The data quality objective (DQO) process is a focused, iterative process for developing the data collection strategy to support decision-making. The goal of the process is to conduct investigations in an efficient and effective manner without unnecessary precision and redundancy of data. The seven steps comprising this process are listed in Table 1-1, along with the sections of this work plan that address the steps.

1.5 PROJECT ORGANIZATION

The pre-FS field investigations described in this work plan will be performed by TtNUS with support from the Navy. The Navy RPM will be

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E-mail: jorgensensa@ih.navy.mil

The TtNUS project organization is shown on Figure 1-3.

1.6 DOCUMENT ORGANIZATION

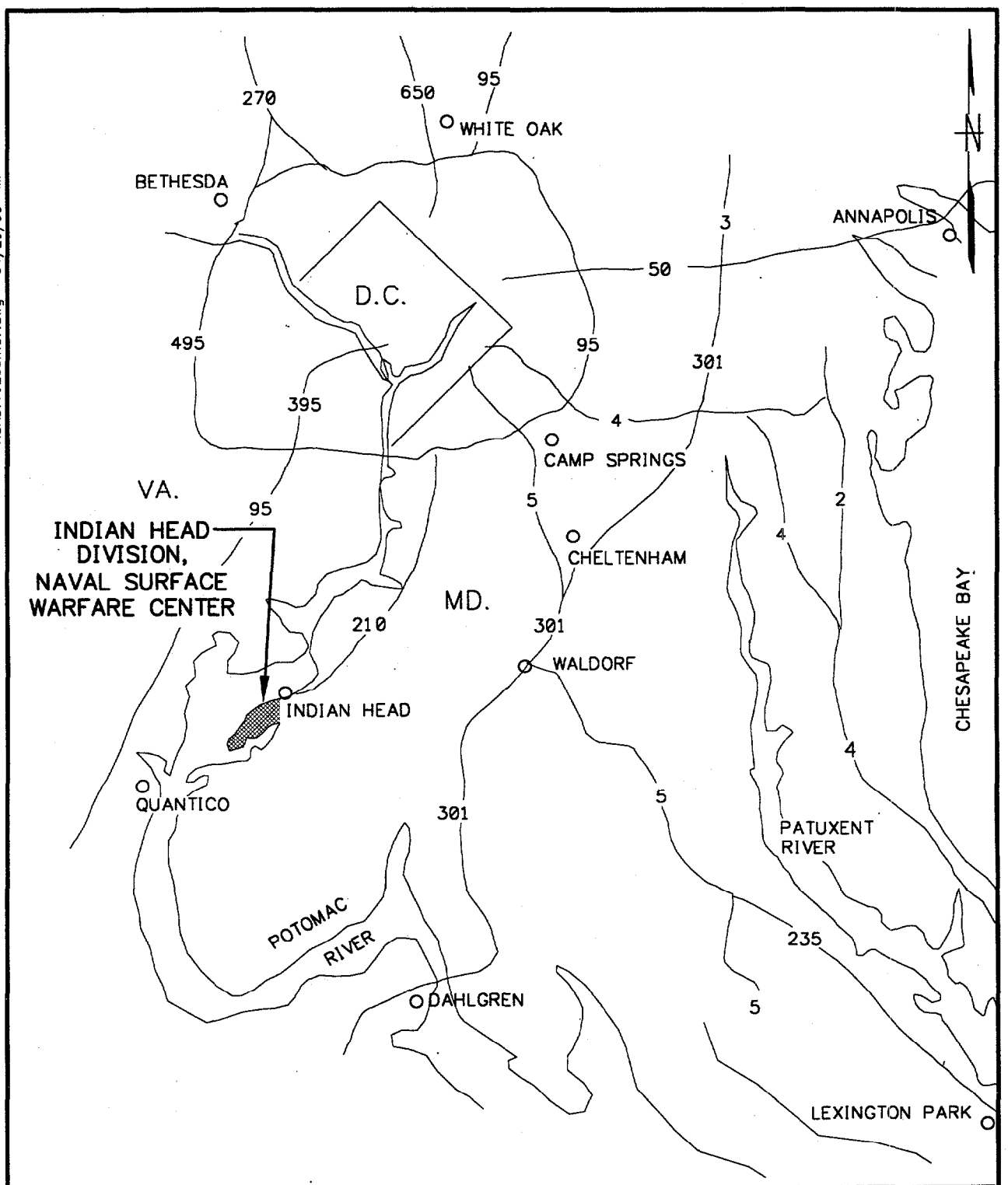
This work plan is intended for use in conjunction with the Master Work Plan for IHDIV-NSWC (B&R Environmental, 1997), which includes the Master Work Plan, the Master Field Sampling Plan (FSP), and the Master Quality Assurance Project Plan (QAPP), each of which provides general information applicable to all sites at IHDIV-NSWC. This work plan includes site-specific information to be used for field investigations at Sites 12 – Town Gut Landfill, 41 – Scrap Yard, and 42 – Olsen Road Landfill. Section 1.0 is the introduction to this site-specific work plan and describes the purpose of the document, outlines the scope and objectives of the work, summarizes the background of the Indian Head facility, explains how the DQO process is addressed in this work plan, and describes the project organization. Sections 2.0, 3.0, and 4.0 develop the rationale for and outline the field investigations to be implemented at Sites 12, 41, and 42, respectively. Section 5.0 provides the details regarding the field investigation activities to be implemented, and Section 6.0 describes the details regarding the in-field implementation of the field investigation. Section 7.0 covers the field investigation and sampling procedures.

TABLE 1-1

INTEGRATION OF DQO PROCESS INTO SITE-SPECIFIC WORK PLAN
SITES 12, 41 AND 42
INDIAN HEAD DIVISION, NAVAL SURFACE WARFARE CENTER
INDIAN HEAD, MARYLAND

DQO Step[1]	Location in Work Plan Document
1. State the Problem	Sections 2.4.3.2, 3.4.3.2, and 4.4.3.2, Statement of the Problem Tables 2-1, 3-1, and 4-1, Development of Data Needs:
2. Identify the Decision	Section 2.4.3.3, 3.4.3.3, and 4.4.3.3, Identify the Decision Tables 2-1, 3-1, and 4-1, Development of Data Needs:
3. Identify the Inputs to the Decision	Section 2.4.4.2, 3.4.4.2, and 4.4.4.2, Inputs to the Decision Tables 2-2, 3-2, and 4-2, Investigation Matrix: • Investigative Technologies • Sample Collection and Analysis
4. Define the Boundaries of the Study	Section 2.4.3.1, 3.4.3.1,and 4.4.3.1, Study Boundaries Table 3-1, Development of Data Needs: • Define Study Boundaries
5. Develop a Decision Rule	Section 2.4.4.3, 3.4.4.3, and 4.4.4.3, Decision Rules Table 2-2, 3-2, and 4-2, Investigative Matrix • Decision Rule • Potential Remedial Actions
6. Specify Tolerable Limits on Decision Efforts	QAPP (Appendix B)
7. Optimize the Design for Obtaining Data	Section 5.0, Detailed Field Activities Tables 2-2, 3-2, and 4-2, Investigation Matrix

1 Source: U.S. EPA, 1994



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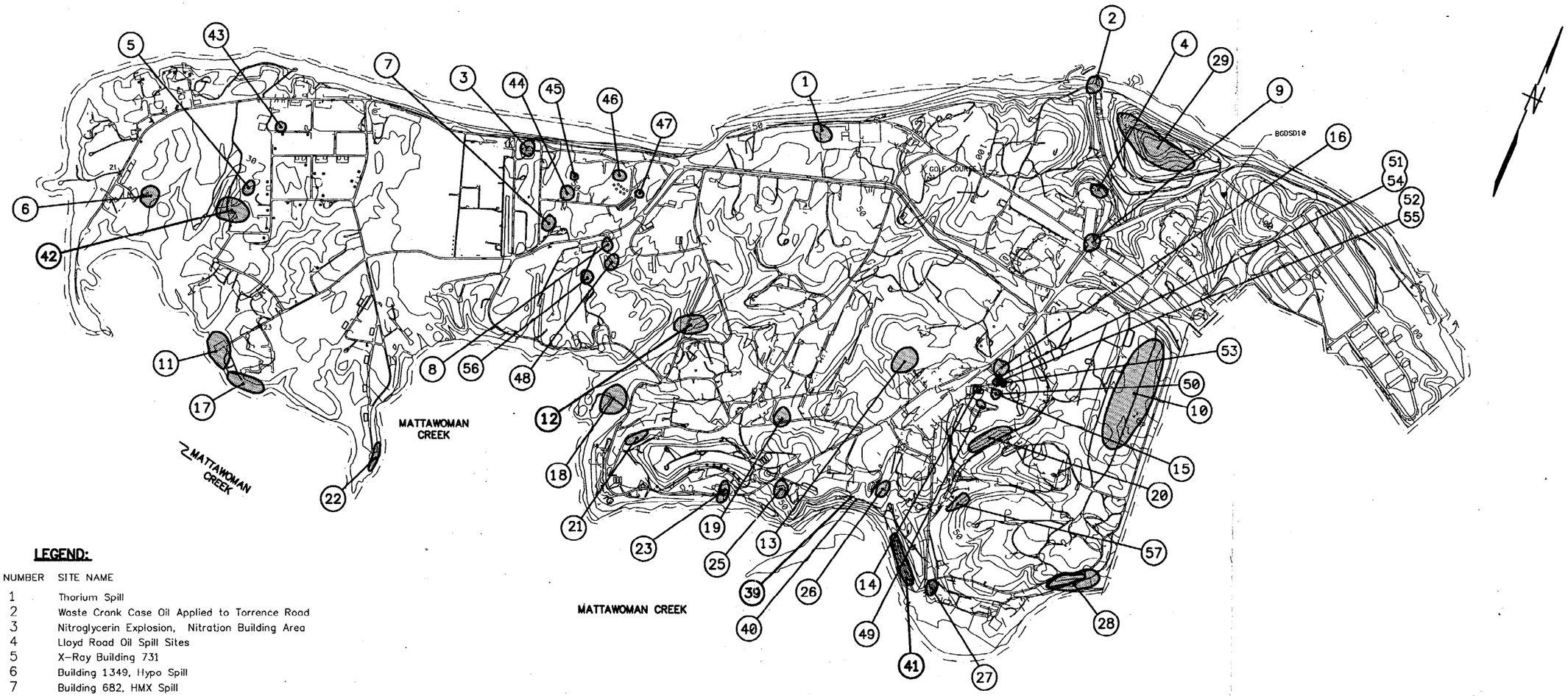
DRAWN BY TAD DATE 4/98	Tetra Tech NUS, Inc.	CONTRACT NO. 7129	OWNER NO. ———
CHECKED BY DATE 5/4/99	VICINITY MAP IHDIV – NSWC, INDIAN HEAD, MARYLAND	APPROVED BY DATE 5/4/99	
COST/SCHED–AREA		APPROVED BY DATE	
SCALE AS NOTED		DRAWING NO. FIGURE 1–1	REV. 0

FORM CADD NO. SOUTH_AV.DWG - REV 0 - 02/07/97

ACAD: 7129cm33.dwg 03/30/99 KW



LEGEND:

SITE NUMBER	SITE NAME
1	Thorium Spill
2	Waste Crank Case Oil Applied to Torrence Road
3	Nitroglycerin Explosion, Nitration Building Area
4	Lloyd Road Oil Spill Sites
5	X-Ray Building 731
6	Building 1349, Hypo Spill
7	Building 682, HMX Spill
8	Building 766, Mercury Deposits
9	Patterson Avenue, Oil Spill
10	Single-base Propellant Grains Spill
11	Caffee Road Landfill
12	**Town Gut Landfill**
13	Paint Solvents Disposal Ground
14	Waste Acid Disposal Pit
15	Mercury Deposits in Manhole, Flourine Lab
16	Laboratory Chemical Disposal
17	Disposal Metal Parts Along Shoreline
18	Hog Island
19	Catch Basins at Chip Collection Houses
20	Single-base Powder Facilities
21	Bronson Road Landfill
22	NG Slums Burning Site
23	Hydraulic Oil Spill Discharges From Extrusion Plant
24	Abandoned Drain Lines
25	Hypo Discharge X-Ray Building No. 2
26	Thermal Destructor 2
27	Thermal Destructor 1
28	Original Burning Ground
29	The Valley
30-38	Stump Neck Annex (SEE FIGURE 3-2)
39	**Organic Plant Outfall**
40	Palladium Catalyst in Sediments
41	**Scrap Yard**
42	**Olson Road Landfill**
43	Toluene Disposal Site
44	Soak Out Area
45	Abandoned Drums
46	Cadmium Sandblast Grit
47	Mercuric Nitrate Disposal Area
48	Nitroglycerine Plant Disposal Area
49	Chemical Disposal Area
50	Building 103, Crawl Space
51	Building 101, Dry Wall
52	Building 102, Dry Wall
53	Mercury Contamination of the Sewage System
54	Building 101
55	Building 102
56	IW87 - Lead Contamination
57	TCE Building 292 Area

APPROXIMATE SWMU LOCATION
INTERMITTENT STREAM
NAVAL RESERVE BOUNDARY
100 CONTOUR INTERVAL 10 FEET
FLOW DIRECTION

0 1600 3200
SCALE IN FEET

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY KW DATE 3/30/99
CHECKED BY DATE 5/11/99
COST/SCHED-AREA
SCALE AS NOTED

Tetra Tech NUS, Inc.

SITE LOCATION MAP
INDIAN HEAD NSWC
INDIAN HEAD, MARYLAND

CONTRACT NO. 7129
OWNER NO.
APPROVED BY DATE 5/11/99
APPROVED BY DATE
DRAWING NO. FIGURE 1-2
REV. 0

FORM CADD NO. SOUTH_BH.DGN - REV 0 - 02/11/97

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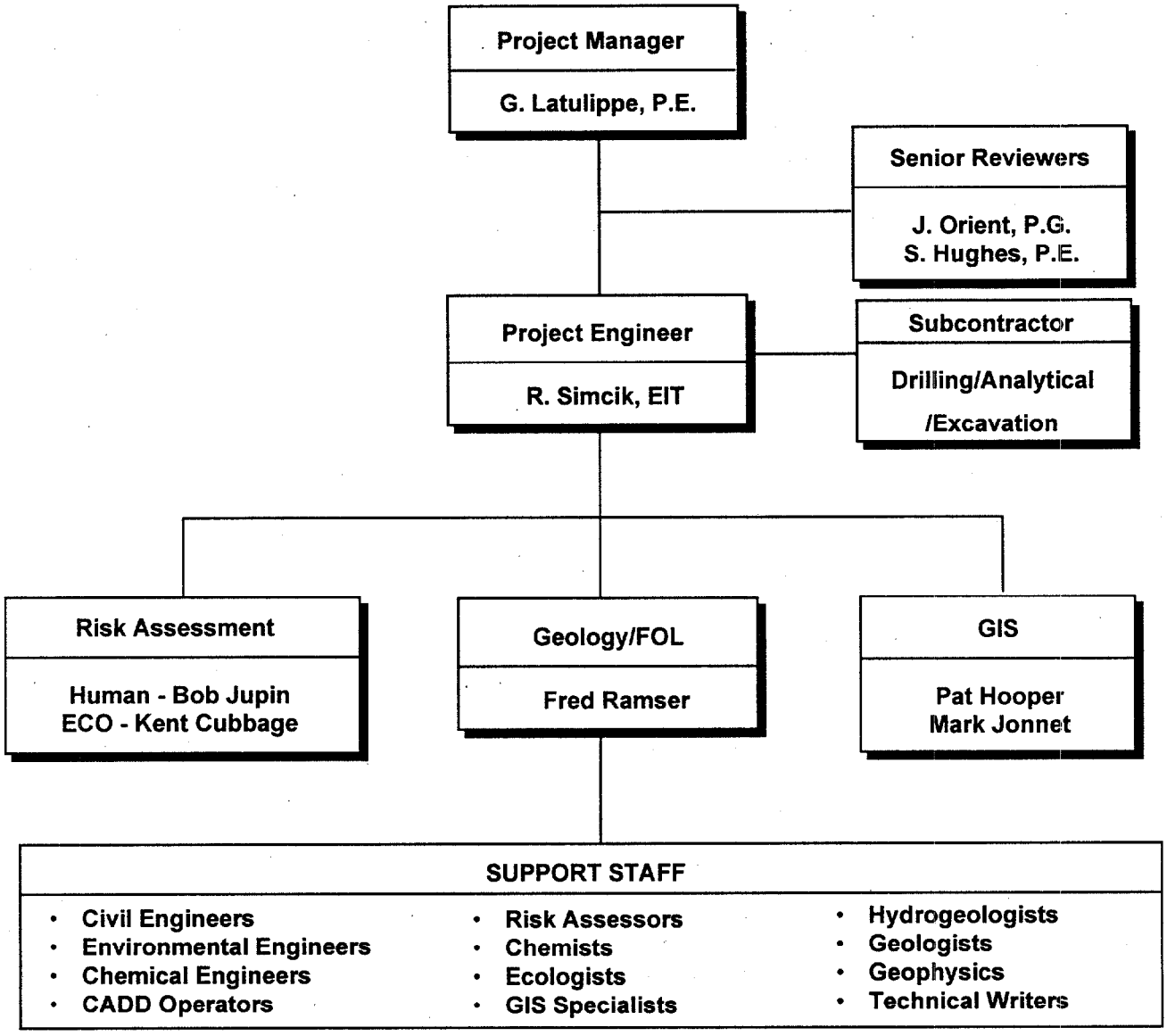
FIGURE 1-3

TETRA TECH NUS,INC. PROJECT ORGANIZATION CHART
PRE-FS FIELD INVESTIGATION INVESTIGATION
SITES 12, 41 AND 42
INDIAN HEAD DIVISION NSWC
INDIAN HEAD, MARYLAND



2.0 TOWN GUT LANDFILL – SITE 12

This section provides the rationale and development of the site-specific field investigation activities for Site 12 – Town Gut Landfill.

2.1 SITE BACKGROUND

Site 12 comprises approximately 2 acres of undeveloped land on the southwestern side of IHDIV-NSWC. The site is bisected by the Atkins Road Extension, which is oriented in a northwest-southeast direction (Figure 2-1, Site Conditions Map). The western and northern edges of Site 12 are bounded by tidal ponds that are connected via a 78-inch metal pipe located under Atkins Road Extension. Runoff from the site flows into these two ponds. The water flow in the western pond can be influenced by tidal changes in Mattawoman Creek, except that a weir located at the point of discharge to Mattawoman Creek controls the water level in the pond.

Between 1968 and June 1980, IHDIV-NSWC used this site to dispose of landscaping waste, fill material, and rubble. Reportedly, material from outside the Station was also deposited at this site until 1972. Based on visual observations and examination of historical maps and aerial photographs, the landfill material appears to have been dumped first on the eastern side of Site 12 in a topographically low area. Dumping then continued in a westward direction. It is estimated that the top of the waste material is currently located 10 to 15 feet above the original ground surface (B&R Environmental, 1997a). The total fill area is estimated to be approximately 1 acre.

Site 12 is estimated to contain approximately 80,000 cubic yards of material or 6,400 tons of mixed solid waste materials, primarily landscaping wastes, tree stumps, and demolition debris (NEESA, 1983). Naval Energy and Environmental Support Activity (NEESA) team interviews indicated that unauthorized dumping of trash may have occurred, although quantity estimates for this unauthorized trash were not available. Some of the unauthorized items reportedly dumped at Site 12 include paints, varnishes, and other chemical wastes.

2.2 HISTORICAL ENVIRONMENTAL DATA

One leachate water sample was collected by NEESA during the IAS (NEESA, 1983). The sample was collected from a small runoff point along the bank of the stream near a partially buried drum (Figure 2-1). Thirty milligrams per liter (mg/L) of arsenic were detected in the leachate sample. The report did not indicate the range of analytes for which the sample was analyzed.

During the 1985 Confirmation Study (CH2M Hill, 1985), one surface water sample and one sediment sample were collected from the edge of the Town Gut Landfill, in the same approximate area as the earlier surface water sample. These samples were analyzed for arsenic, cadmium, lead, mercury, silver, and zinc, in addition to priority pollutant volatile organics. The contaminant concentrations exceeding screening levels (EPA, 1996) are included in the RI report for Site 12 (TtNUS, 1999). For the surface water sample, the values included 0.0003 mg/L and 0.09 mg/L for mercury and zinc, respectively. For the sediment sample, the concentrations were 16.5 mg/Kg, 0.6 mg/L, and 37.2 mg/Kg for arsenic, cadmium, and lead, respectively. Based on an evaluation of the analytical results, the Confirmation Study concluded that Site 12 had no detectable impact on the concentration of metals in the surrounding surficial environment (CH2M Hill, 1985).

In October 1997, TtNUS (then B&R Environmental) collected additional samples from Site 12 as part of an RI. The locations sampled during that field investigation are shown on Figure 2-1. The results of the investigation were presented in an RI report (TtNUS, 1999) that also included consideration of sampling conducted during previous field investigations. The executive summary of the RI report is included in Appendix B of this document.

The October 1997 field investigation activities included a geophysical investigation over a portion of Site 12. For reference purposes, the results of that investigation are included with this document as Appendix C.

2.3 PRE-FS FIELD INVESTIGATION SCOPE DEVELOPMENT

2.3.1 Detailed Objective Development

As described in Section 1.2, the broad objective for the field investigation activities described in this work plan is to assemble sufficient data regarding the horizontal extent of the areas requiring remediation to support the preparation of an FS.

The investigative activities necessary to address the broad RI objectives are determined by first defining the set of detailed objectives that must be met to provide information that is not yet on hand but is necessary to meet the overall objective. In this document, the detailed objectives have been developed by application of the DQO process mentioned in Section 1.3. The process is documented in the text and is summarized for Site 12 in Table 2-1, Development of Data Needs, and Table 2-2, Investigation Matrix.

Tables 2-1 and 2-2 are arranged to identify how the development of detailed objectives and the scoping of the investigation activities parallel the DQO process. The left side of Table 2-1 illustrates how the site has been defined according to media and geographic areas to establish the study boundaries. The

following five columns focus on the "Statement of the Problem" by listing contamination previously identified, the potential contamination transport routes, potential receptors, and the potential for human health and environmental risk. The columns under "Identify the Decision" indicate potential remedial technologies for consideration in addressing the identified problem. The "Data Needs" columns on the right side of Table 2-1 show the questions that need to be answered in order to allow a more complete evaluation of the site.

Table 2-2 restates the "Data Needs" as "Investigation Objectives," then under, "Identify Inputs to the Decision," the specific investigative activities are summarized for addressing each of the objectives. The "Decision Rule" column generally indicates the next step if certain conditions should arise.

2.3.2 Data Needs Development

The Development of Data Needs, as presented in Table 2-1, comprises four main categories: Study Boundary, Statement of the Problem, Identification of the Decision, and Data Needs.

2.3.2.1 Study Boundary

For the purpose of the pre-FS field investigation at Site 12, the study boundaries are defined loosely as the horizontal extent of the landfill which, based on currently available information and pending the results of the field investigation, is expected to be between Atkins Road and Atkins Road Extension, and between Atkins Road Extension and the pond west of Atkins Road Extension (see Figure 2-1). The data collected during the field investigation may allow a refined definition of the site boundary.

2.3.2.2 Statement of the Problem

The statement of the problem includes the identification of site contaminants, the transport mechanisms that carry contaminants to receptors, and the identification of the receptors. The RI report (TtNUS, 1999) prepared for Site 12 served as the source of the information shown in Table 2-1.

As determined in the RI, the primary contaminants are aluminum, arsenic, chromium, iron, lead, mercury, silver, and Aroclor 1254.

The human health risk assessment in the RI examined several exposure scenarios and found only one surface soil scenario for which a potential risk exists (see Appendix B). For the future resident child scenario, the hazard index (HI) exceeded 1.0 (i.e., HI=2.9). For that scenario, the chief contributors to the hazard index were aluminum (HI=0.28), arsenic (HI=0.79), iron (HI=1.07), and silver (HI=0.35). The surface soil scenario for the future resident child included consideration of ingestion, dermal contact, and

particulate inhalation as possible exposure routes. However, the future resident scenarios were included in the RI for completeness. It is viewed as unlikely that the site will be re-zoned at a future date and developed for residential use.

The ecological risk assessment in the RI determined that potential risk to terrestrial mammals exists from exposure to mercury, silver and Aroclor 1254 via the foodchain. To a lesser degree, arsenic, chromium, and lead also pose potential risks.

2.3.2.3 Identify the Decision

Identifying the decision typically involves setting the remedial objectives, determining the risk-related or regulatory drivers for taking mitigative action, defining the potential response actions that will provide the necessary mitigation, and identifying potential remedial technologies required to implement the remedial technologies.

This project is designed to provide data useful for two primary purposes. One is to provide toxicity data to support the development of cleanup goals in the feasibility study that follows the pre-FS field investigation. The other is to provide data regarding the horizontal and vertical extent of contamination to permit more accurate estimates of the volume of material requiring cleanup, as well as the associated costs.

The depth of 18" has been selected for sampling surface soil and sediment because potential surface soil remedial actions are not expected to require excavation in excess of 18-inches, if at all. The decision statement supporting this project is:

> Determine the horizontal extent of chemical concentrations greater than the reporting limits identified in the Quality Assurance Project Plan. Utilize the analytical data within the Feasibility Study to evaluate chemical concentrations relative to cleanup levels developed in the Feasibility Study.

Potential risks from exposures to surface soil contamination may be mitigated by eliminating the pathways for the exposure of humans and terrestrial mammals. Because Site 12 having functioned in the past as a landfill, the Code of Maryland Regulations (i.e., COMAR 26.04.07, Solid Waste Management) includes requirements for landfill closure, including the installation of landfill caps.

2.3.2.4 Data Needs

The data needs indicated in Table 2-1 are in the form of questions intended to identify the concerns associated with preparing an FS to examine potential remedial technologies identified for the site. The questions posed in the table are shown as statements in Table 2-2 under the heading of Investigation Objectives. The locations pertinent to the proposed field investigation activities are shown on Figure 2-2.

2.3.3 Investigation Matrix

The investigation matrix for Site 12 (Table 2-2) is comprised of three main categories: the Investigation Objectives, the Inputs to the Decision, and the Decision Rule.

2.3.3.1 Investigation Objectives

The data needs, presented as questions in Table 2-1, are presented as investigation objectives in Table 2-2. The investigative activities identified in the Table 2-2 are intended to address the investigation objectives (i.e., answer the questions developed in Table 2-1).

In the case of Table 2-2, several objectives are listed, in addition to the basic objective of "Determine the horizontal extent of the landfill." The additional objectives reflect the identification of more detailed data needed to determine the extent of the landfill. For instance, during the October 1997 geophysical investigation at Site 12 (see Appendix C), anomalies were identified that may indicate the presence of landfilled material. Some of the test pits are intended to determine if the anomalies do, in fact, indicate landfilled material. Other objectives in the table are self-explanatory.

2.3.3.2 Inputs to the Decision

The inputs to the decision have been developed to identify the means by which data will be collected to satisfy the investigation objectives. The approach for collecting the data is identified in the table as the Investigative Technique. Subsequent columns in the table describe the locations where the techniques are to be applied and reference the figure where the locations are shown. When samples are to be collected for chemical analysis, the final three columns under Inputs to the Decision indicate the quantity of samples, the media to be sampled, and the analyses to be performed on the samples.

For Site 12, the field activities will be limited to test pits and the delineation of wetlands.

2.3.3.3 Decision Rules

The final column in Table 2-2 presents a series of decision rules by which decisions will be made based on the results of the field investigations. The decision rules are in the form of "If ..., then ..." statements, which indicate the direction the RI should take if certain conditions are present.

For the overall field investigation effort, the decision rule applicable to sites 12, 41 and 42 is:

> If the field investigation defined in this work plan sufficiently defines the extent of contamination for the purpose of preparing a feasibility study, proceed with the preparation of a feasibility study report. If the extent of contamination is not sufficiently defined for the purpose of preparing a feasibility study, consider either collecting additional samples or including verification sampling in any proposed remedial actions developed in the feasibility study.

Delineation of the contamination boundary means identifying the spatial region over which contaminant concentrations change from an actual or presumed concentration exceeding cleanup goals to concentrations that are less than cleanup goals. Depending on the site, the decision limits may be chemical concentrations or they may be the visual identification of landfill material. Cleanup goals will be developed as part of the development of the FS. The in-field visual identification of landfill material will be based on the professional judgement of field personnel subject to the approval of the TtNUS Project Manager.

TABLE 2-1

DEVELOPMENT OF DATA NEEDS
SITE 12 - TOWN GUT LANDFILL
INDIAN HEAD DIVISION, NSWC
INDIAN HEAD, MARYLAND

STUDY BOUNDARY			STATEMENT OF THE PROBLEM [1]					IDENTIFY THE DECISION				DATA NEEDS
						Potential for Risk						
Population: Contaminant Source	Spacial	Temporal	Identified Contamination	Potential Transport /Exposure Pathway	Potential Receptors	Human Health	Ecological	Remedial Objectives	Mitigation Driver	Potential Response Action	Potential Remedial Technologies	Engineering
Landfill Surface	Horizontal limits of landfill between Adkins Road and Adkins Road Extension and between Adkins Road Extension and the pond west of Adkins Road Extension)	Conduct field investigation prior to conducting feasibility study	The primary soil contaminants with respect to humans are aluminum, arsenic, iron, and silver.	Soil ingestion, dermal contact, particulate inhalation.	Future resident child.	Hazard Index exceeded 1.0 (HI=2.9)		Eliminate access by humans and terrestrial mammals to contaminated surface soil.	Code of Maryland Regulations 26.04.07, Solid Waste Management (ARAR)	Cover landfill surface.	Place a soil cover over the landfill. Place a "cap" over the landfill.	What is the horizontal extent of the landfill?
			The primary soil contaminants with respect to ecological receptors are mercury, silver, arsenic, chromium, lead, and aroclor 1254	Food chain	Terrestrial animals.		Potential risk exists from mercury, silver and aroclor 1254. Lower potential risk exists from arsenic, chromium and lead.					What is the horizontal extent of wetlands that may be affected by a remedial action?

1 TtNUS, 1999

TABLE 2-2

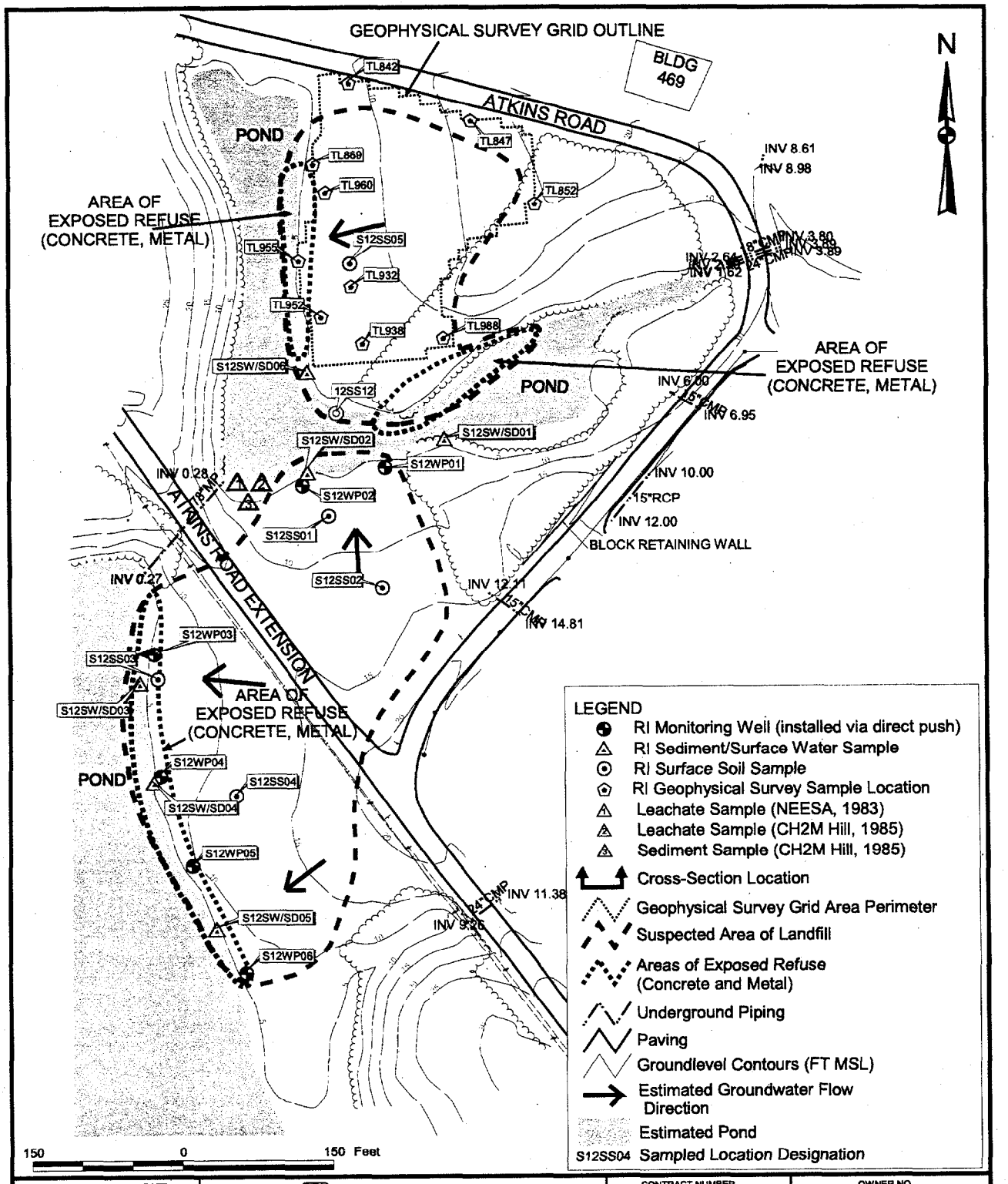
INVESTIGATION MATRIX
SITE 12 - TOWN GUT LANDFILL
INDIAN HEAD DIVISION, NSWC
INDIAN HEAD, MARYLAND

STUDY BOUNDARY			INVESTIGATION OBJECTIVES	IDENTIFY INPUTS TO THE DECISION						DECISION RULE
Population: Contaminant Source	Spacial	Temporal		Investigative Technique	Location	Work Plan Figure	Quantity of Samples	Matrix	Analytical Parameter	
Landfill Surface	Horizontal limits of landfill between Atkins Road and Atkins Road Extension and between Atkins Road Extension and the pond west of Atkins Road Extension).	Conduct field investigation prior to conducting feasibility study.	Determine the horizontal extent of the landfill.	Test Pits: Determine the presence or absence of landfill material by visual observation.		2-2	0	Soil	None	
			Verify that the geophysical anomoly indicates the presence of landfill material.		S12TP001					Determine if facility personnel have a record of buried utilities along the south side of Atkins Road near the proposed S12TP001. If facility records indicate the presence of utilities, assume that the geophysical anomoly results from the utilities and not landfill material, and do not install the test pit. If the records do not indicate the presence of utililties, install the test pit.
			Determine the limits of the landfill.		S12TP017					If no landfill material is identified in S12TP017, move to S12TP018.
			Determine the limits of the landfill.		S12TP018					If no landfill material is identified in S12TP018, assume the eastern limit of the landfill to be defined by S12TP003. S12TP004 and S12TP005. If landfill material is identified in S12TP018, assume that it defines the eastern limit of the landfill.
			Determine the limits of the landfill.		S12TP003					If no landfill material is identified in S12TP003, move to locations S12TP002 and S12TP004. If landfill material is identified, do not install S12TP002, S12TP004 and S12TP005.
			Determine the limits of the landfill.		S12TP002					Install only if no landfill material is identified in S12TP003. If no landfill material is identified in S12TP002, install S12TP006.
			Determine the limits of the landfill.		S12TP004					If no landfill material is identified, move to location S12TP005. If landfill material is identified, do not install S12TP005.
			Verify that the geophysical anomoly indicates the presence of landfill material.		S12TP006					If no landfill material is identified in S12TP006, assume that the geophysical anomoly does not indicate the presence of landfill material.
			Determine the limits of the landfill.		S12TP005					Install only if no landfill material is identified in S12TP004. If no landfill material is identified in S12TP005, asume that the geophysical anomoly does not indicate the presence of landfill material.
			Determine the limits of the landfill.		S12TP007					If no landfill material is identified, consider the landfill to extend no further eastward than S12TP008.
			Determine the limits of the landfill.		S12TP008					If no landfill material is identified, consider the landfill to extend no further toward the east than S12TP008. If S12TP008, S12TP009, and S12TP010 have no landfill material, install S12TP012.

TABLE 2-2

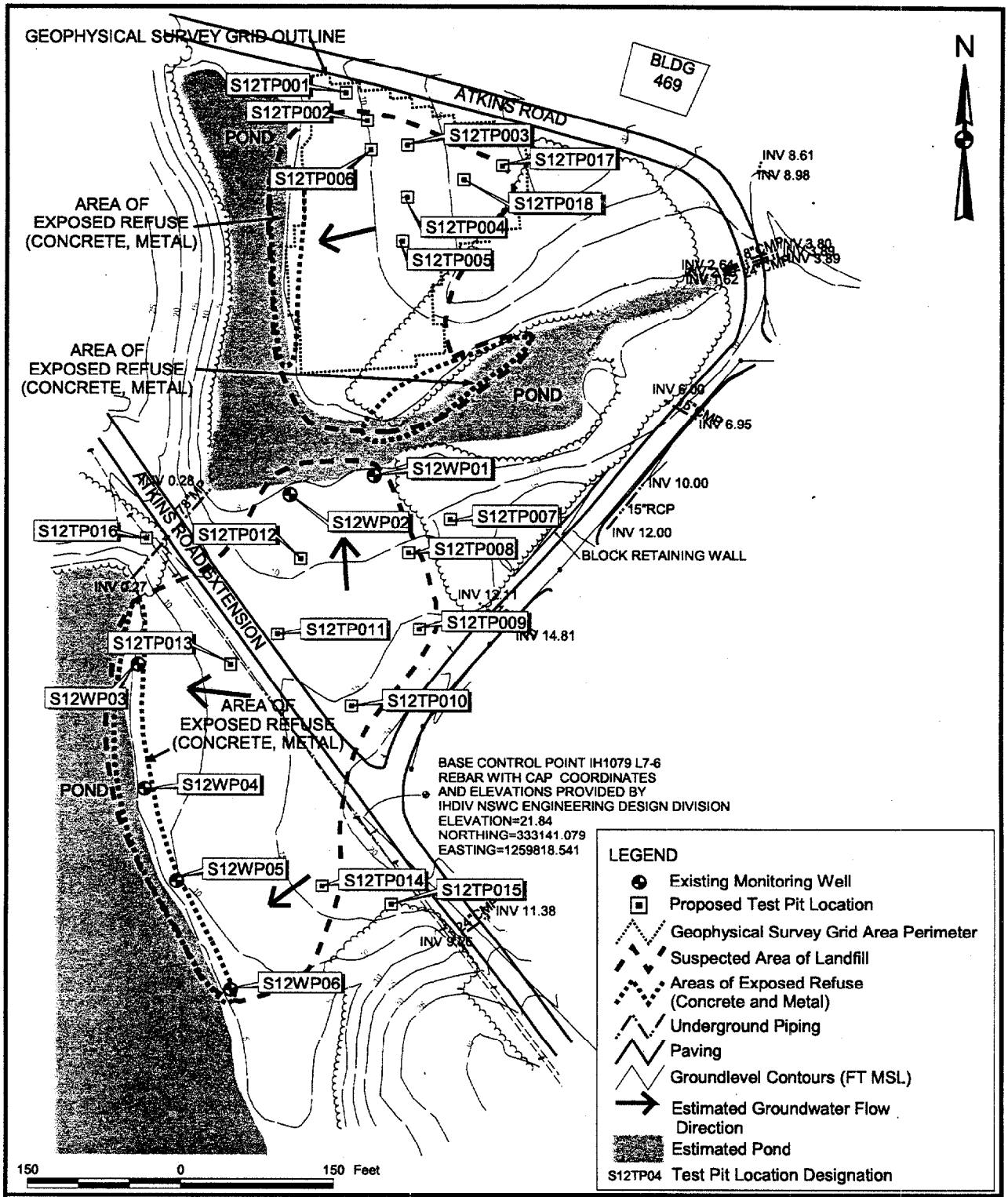
INVESTIGATION MATRIX
SITE 12 - TOWN GUT LANDFILL
INDIAN HEAD DIVISION, NSWC
INDIAN HEAD, MARYLAND

STUDY BOUNDARY			INVESTIGATION OBJECTIVES	IDENTIFY INPUTS TO THE DECISION						DECISION RULE
Population: Contaminant Source	Spacial	Temporal		Investigative Technique	Location	Work Plan Figure	Quantity of Samples	Matrix	Analytical Parameter	
Landfill Surface (Continued)			Determine the limits of the landfill.		S12TP009					If no landfill material is identified, consider the landfill to extend no further toward the southeast than S12TP009. If S12TP008, S12TP009 and S12TP010 have no landfill material, install S12TP012.
			Determine the limits of the landfill.		S12TP010					If no landfill material is identified, consider the landfill to extend no further toward the south than S12TP010. If S12TP008, S12TP009 and S12TP010 have no landfill material, install S12TP012.
			Determine if the landfill exists on the northeast side of Atkins Road Extension.		S12TP012					If no landfill material is found, assume that the landfill does not exist in the area northeast of Atkins Road Extension and south of the pond. If landfill material is found, asume the landfill extends to the location of S12TP012.
			Determine if the limits of the landfill extend under Atkins Road Extension.		S12TP011					If no landfill material is identified in both S12TP011 and S12TP013, assume that landfill material does not extend under Atkins Road Extension. If landfill material is found, assume that the road was constructed over landfill material.
			Determine if the limits of the landfill extend under Atkins Road Extension.		S12TP013					If no landfill material is identified in both S12TP011 and S12TP013, assume that landfill material does not extend under Atkins Road Extension. If landfill material is found, assume that the road was constructed over landfill material.
			Determine the depth of soil cover over the landfill.		S12TP014					Maximum depth of existing cover assumed based on the depth of cover determined in S12TP014.
			Determine the extent of the landfill.		S12TP015					If no landfill material is identified in S12TP015, assume that the landfill extends to S12TP014. If landfill material is identified, assume the landfill extends to S12TP015.
			Determine the extent of the landfill.		S12TP016					If no landfill material is identified in S12TP016, assume that the landfill extends no further toward the north than the south side of the metal pipe culvert. If landfill material is identified, assume the landfill extends to S12TP016.
			Determine the horizontal extent of wetlands that may be affected by a remedial action.	Onsite visual determination.	Determine in the field.		None			If wetlands are identified in the field, stake the perimiter of the wetland.



DRAWN BY D. PERRY	DATE 5-MAY-99	Tetra Tech NUS, Inc.	CONTRACT NUMBER — / OWNER NO. —
CHECKED BY	DATE 5/11/99	SITE CONDITIONS MAP SITE 12 - TOWN GUT LANDFILL IHDIV-NSWC, INDIAN HEAD, MARYLAND	APPROVED BY / DATE 5/11/99
COST/SCHEDULE-AREA			APPROVED BY — / DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 2-1 / REV 0

P:\GIS\NSWC_INDIAN_HEAD\7129.APR 5-MAY-99 DNP SITE 12 - TGL SITE CONDITIONS (AV) LAYOUT



DRAWN BY D. PERRY	DATE 5-MAY-99	Tetra Tech NUS, Inc.	CONTRACT NUMBER — / OWNER NO. —
CHECKED BY —	DATE —		APPROVED BY — / DATE —
COST/SCHEDULE-AREA		FIELD INVESTIGATION MAP SITE 12 - TOWN GUT LANDFILL IHDIV-NSWC, INDIAN HEAD, MARYLAND	APPROVED BY — / DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 2-2 / REV 0

P:\GIS\NSWC_INDIAN_HEAD\7129.APR 5-MAY-99 DNP SITE 12 - FIELD INVESTIGATION MAP LAYOUT

3.0 SCRAP YARD – SITE 41

This section provides the rationale and development of the site-specific field investigation activities for Site 41 – Scrap Yard.

3.1 SITE BACKGROUND

From the 1960s to 1988, electrical transformers were stored at the northwestern end of Site 41 prior to off-site disposal. Following an inspection conducted in 1981, 17 transformers were identified as either polychlorinated biphenyls (PCB) contaminated or PCB containing (NEESA, 1983). These transformers were believed to have leaked and contaminated the soil in this portion of Site 41. Additionally, lead batteries were stored in the Site 41 scrap yard and may have released lead to the surface soils (E/A&H, 1994). Runoff from Site 41 flows southwest, into Mattawoman Creek, upstream of Site 39.

3.2 HISTORICAL ENVIRONMENTAL DATA

During a Phase II site inspection; Site 41 was investigated to determine if PCBs, solvents, or lead had contaminated the shallow soil zone, shallow groundwater, and/or creek sediments. Figure 3-1 shows the locations sampled. The results of the original study were presented in a Phase II Site Inspection (SI) Report (E/A&H, 1994). The data were included, in summary form, in the more recent RI report described below.

In October 1997, TtNUS (then B&R Environmental) collected additional samples from Site 41 as part of an RI. The locations sampled during that field investigation are shown on Figure 3-1. The results of the investigation were presented in an RI report (TtNUS, 1999) that also included consideration of sampling conducted during previous field investigations. The executive summary of the RI report is included in Appendix B of this document.

3.3 PRE-FS FIELD INVESTIGATION SCOPE DEVELOPMENT

3.3.1 Detailed Objective Development

As described in Section 1.2, the broad objective for the field investigation activities described in this work plan is to assemble sufficient data regarding the horizontal extent of the areas requiring remediation to support the preparation of an FS.

The investigative activities necessary to address the broad RI objectives are determined by first defining the set of detailed objectives that must be met to provide information that is not yet on hand but is

necessary to meet the overall objective. In this document, the detailed objectives have been developed by application of the DQO process mentioned in Section 1.3. The process is documented in the text and is summarized for Site 41 in Table 3-1, Development of Data Needs, and Table 3-2, Investigation Matrix.

Section 2.3 illustrates how the tables support the DQO process in this work plan.

3.3.2 Data Needs Development

The Development of Data Needs, as presented in Table 3-1, comprises four main categories: Study Boundary, Statement of the Problem, Identification of the Decision, and Data Needs.

3.3.2.1 Study Boundary

For the purpose of the pre-FS field investigation at Site 41, the study boundaries are defined loosely as the surface soil and pavement within and near the Scrap Yard. Subject to possible modification in the field during field investigation activities, "near" is taken to be within 50 feet of the Scrap Yard perimeter fence (see Figure 3-1).

3.3.2.2 Statement of the Problem

The statement of the problem includes the identification of site contaminants, the transport mechanisms that carry contaminants to receptors, and the identification of the receptors. The RI report (TtNUS, 1999) prepared for Site 41 served as the source of the information shown in Table 3-1.

As determined in the RI, the primary contaminants are arsenic, cadmium, lead, iron and Aroclor 1260. Less important contaminants include copper, mercury, selenium, and zinc.

The human health risk assessment in the RI examined several exposure scenarios and found arsenic and Aroclor 1260 to be the surface contaminants of chief concern. Surface contamination was found to present a potential risk to full-time employees, construction workers, future child residents, and future adult residents. For those receptors, the HI were 2.4, 14.3, 21.6, and 5.0, respectively. For the full-time employee and the lifelong resident, the incremental lifetime cancer risks were 6.4×10^{-4} and 2.6×10^{-3}, respectively.

The ecological risk assessment in the RI determined that the potential exists for contaminated surface runoff from the Scrap Yard to enter Mattawoman Creek. Additionally, terrestrial mammals may be at risk from exposure to surface soil contaminated with arsenic, cadmium, lead, and Aroclor 1260 via the food chain, direct ingestion, and direct contact.

3.3.2.3 Identify the Decision

Identifying the decision involves setting the remedial objectives, determining the risk-related or regulatory drivers for taking mitigative action, defining the potential response actions that will provide the necessary mitigation, and identifying potential remedial technologies required to implement the remedial technologies.

Potential risks from exposures to surface soil contamination may be mitigated by eliminating the pathways for the exposure of humans and terrestrial mammals. Covering or removing contaminated soil would either eliminate the source of contamination (i.e., contaminated surface soil) or prohibit the passage of contamination to receptors (e.g., via direct contact, dust inhalation, stormwater sediment transport to Mattawoman Creek, etc.).

3.3.2.4 Data Needs

The data needs indicated in Table 3-1 are in the form of questions intended to identify the concerns associated with preparing an FS for implementing potential remedial technologies identified for the site. The questions posed in the table are shown as statements in Table 3-2 under the heading of Investigation Objectives. The locations pertinent to the proposed field investigation activities are shown on Figure 3-2.

3.3.3 Investigation Matrix

The investigation matrix for Site 41 (Table 3-2) is comprised of three main categories: the Investigation Objectives, the Inputs to the Decision, and the Decision Rule.

3.3.3.1 Investigation Objectives

The data needs, presented as questions in Table 3-1, are presented as investigation objectives in Table 3-2. The investigative activities identified in the Table 3-2 are intended to address the investigation objectives (i.e., answer the questions developed in Table 3-1).

Based on past visual determinations in the field, it is known that part (perhaps half) of the scrap yard is paved with a concrete surface. However, is also appears that much of the pavement has become covered with a layer of soil over the years. For the purpose of conducting an FS, it is important to understand where the limits of the pavement are. The need to address that issue results in a second objective for the pre-FS field investigation.

3.3.3.2 Inputs to the Decision

The inputs to the decision have been developed to identify the means by which data will be collected to satisfy the investigation objectives. The approach for collecting the data is identified in the table as the Investigative Technique. Subsequent columns in the table describe the locations where the techniques are to be applied and reference the figure where the locations are shown. When samples are to be collected for chemical analysis, the final three columns under Inputs to the Decision indicate the quantity of samples, the media to be sampled, and the analyses to be performed on the samples.

For Site 41, the field activities for determining the horizontal extent of surface soil contamination will be limited to the collection of surface soil samples for analysis of arsenic, Aroclor 1260, lead and iron. Surface soil samples will actually be collected from two depths (0 to 6 inches and 12 to 18 inches) to establish a definition of the vertical extent of contamination.

The horizontal extent of the concrete pavement within the Scrap Yard will be investigated by driving a rod into the soil at field-determined locations and determining if pavement exist within 24 inches of the surface.

3.3.3.3 Decision Rules

The final column in Table 3-2 presents a series of decision rules by which decisions will be made based on the results of the field investigations. The decision rules are in the form of "If ..., then ..." statements, which indicate the direction the RI should take if certain conditions are present.

TABLE 3-1

DEVELOPMENT OF DATA NEEDS
SITE 41 - SCRAP YARD
INDIAN HEAD DIVISION, NSWC
INDIAN HEAD, MARYLAND
PAGE 1 OF 2

STUDY BOUNDARY			STATEMENT OF THE PROBLEM [1]					IDENTIFY THE DECISION				DATA NEEDS
						Potential for Risk						
Population: Contaminant Source	Spacial	Temporal	Identified Contamination	Potential Transport /Exposure Pathway	Potential Receptors	Human Health	Ecological	Remedial Objectives	Mitigation Driver	Potential Response Action	Potential Remedial Technologies	Engineering
Surface soil/ pavement within and near the Scrap Yard.	Horizontal limits within 50 feet of the Scrap Yard perimeter fence.	Conduct field investigation prior to conducting feasibility study.										
			The primary contaminants with respect to humans are arsenic, Aroclor 1260, iron and lead.		Full-time employee, construction worker, future child resident, and future adult resident.	Hazard Index exceeds 1.0 (HI = 2.4, 14.3, 21.6, and 5.0, respectively)		Eliminate access by humans to contaminated surface soil.		- Remove contaminated surface soil. - Cover contaminated surface soil.	- Excavation. - Cap (e.g., pave).	What is the extent of the surface soil contamination within the Scrap Yard and around the Scrap Yard perimeter? What is the horizontal extent of the paved surface within the Scrap Yard perimeter?
					Full-time employee and lifelong resident.	Incremental lifetime cancer risk exceeds EPA target risk range. (6.4×10^{-4} and 2.6×10^{-3}, respectively)						

TABLE 3-1

DEVELOPMENT OF DATA NEEDS
SITE 41 - SCRAP YARD
INDIAN HEAD DIVISION, NSWC
INDIAN HEAD, MARYLAND
PAGE 2 OF 2

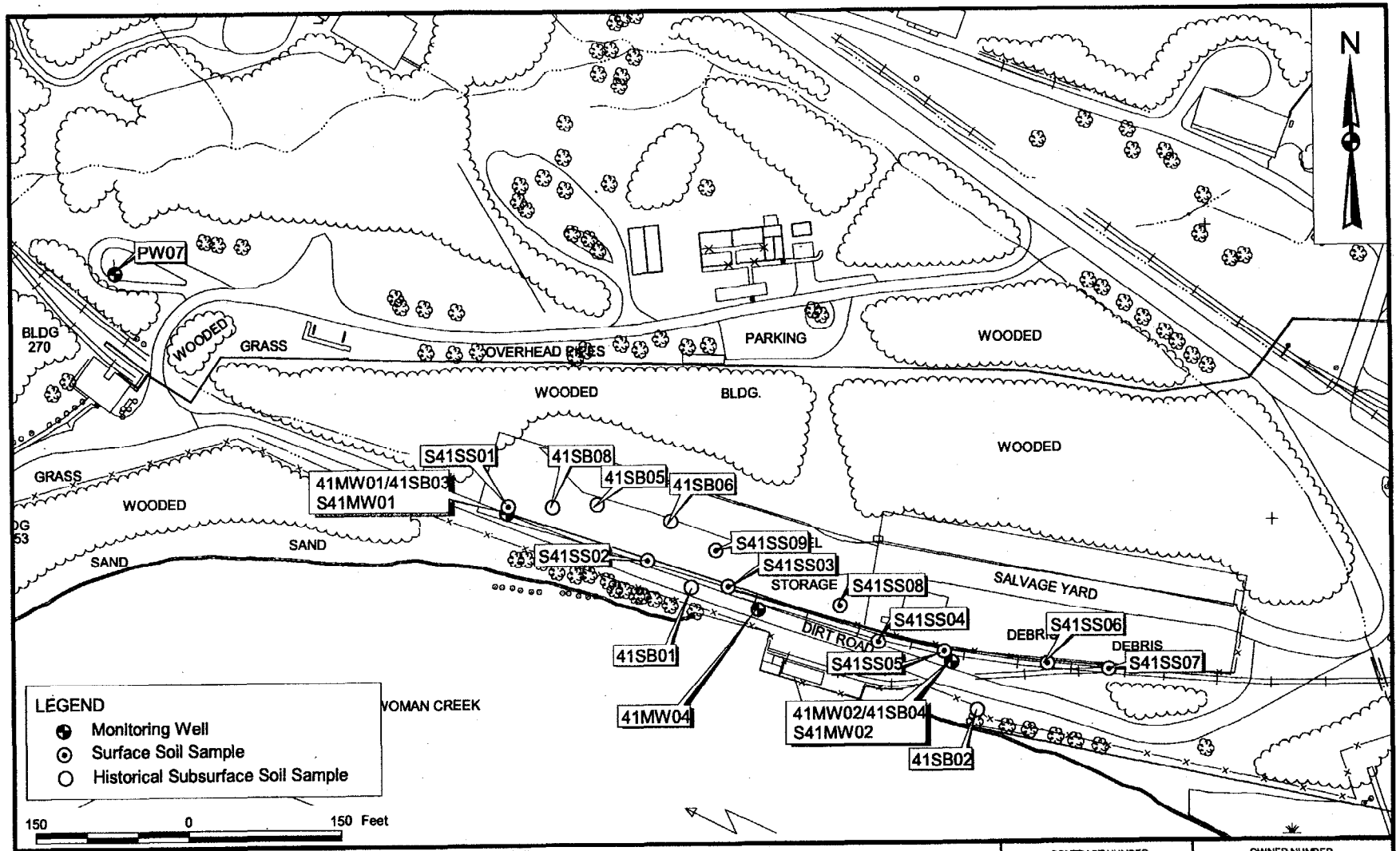
STUDY BOUNDARY			STATEMENT OF THE PROBLEM [1]					IDENTIFY THE DECISION				DATA NEEDS
						Potential for Risk						
Population: Contaminant Source	Spacial	Temporal	Identified Contamination	Potential Transport /Exposure Pathway	Potential Receptors	Human Health	Ecological	Remedial Objectives	Mitigation Driver	Potential Response Action	Potential Remedial Technologies	Engineering
			The primary contaminants with respect to ecological receptors are arsenic, cadmium, lead, and Aroclor 1260. Less important contaminants include copper, mercury, selenium,	Surface water transport to Mattawoman Creek.	Mattawoman Creek		Risk of damaging water quality in Mattawoman Creek.	Eliminate stormwater access to contaminated surface soil.		- Remove contaminated surface soil. - Cover contaminated surface soil.	- Excavation. - Cap (e.g., pave).	What is the extent of the surface soil contamination within the Scrap Yard and around the Scrap Yard perimeter?
				Food chain, direct ingestion, and direct contact.	Terrestrial mammals		Potential risk from Aroclor 1260, arsenic cadmium, and lead. Lower potential risk from copper, mercury, selenium and zinc.	Eliminate access by terrestrial mammals to contaminated surface soils.				

1 TtNUS, 1999

TABLE 3-2

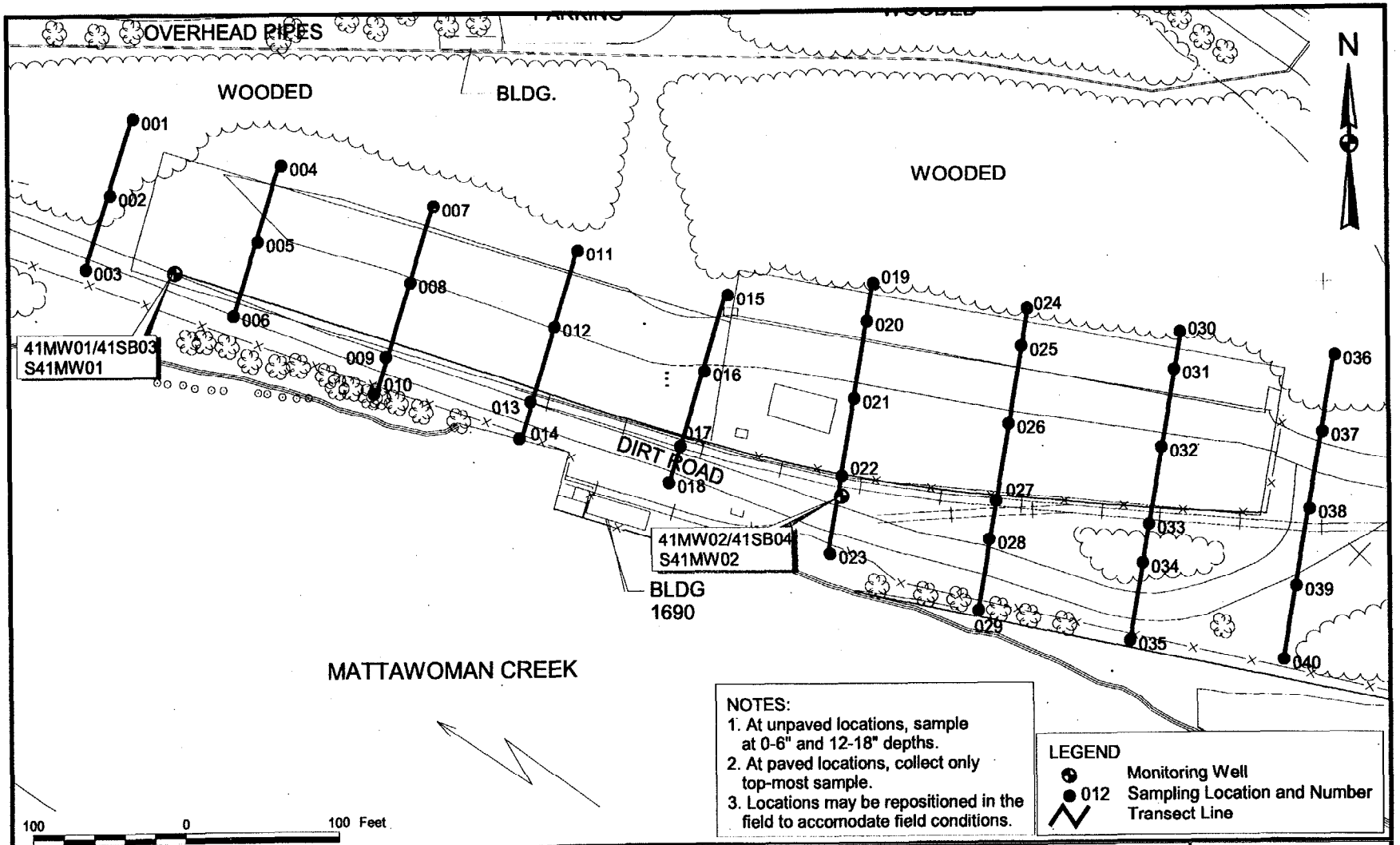
INVESTIGATION MATRIX
SITE 41 - SCRAP YARD
INDIAN HEAD DIVISION, NSWC
INDIAN HEAD, MARYLAND

STUDY BOUNDARY			INVESTIGATION OBJECTIVES	IDENTIFY INPUTS TO THE DECISION						DECISION RULE
Population: Contaminant Source	Spacial	Temporal		Investigative Technique	Location	Work Plan Figure	Quantity of Samples	Matrix	Analytical Parameter	
Surface soil/ pavement within and near the Scrap Yard.	Horizontal limits within 50 feet of the Scrap Yard perimeter fence.	Conduct field investigation prior to conducting feasibility study.	Determine the extent of the surface soil contamination within the Scrap Yard and around the Scrap Yard perimeter.	Collect surface soil samples. Set transects and sample locations approximately as shown on Figure 3-2. Adjust sample quantity and locations in field to accomodate detailed topography and the presence of scrap. At each unpaved location, collect samples from 0-6 inches and 12-18 inches. At paved locations, collect only top-most sample.	S41SS0010006 through S41SS0400106	3-2	76	Soil	Arsenic, cadmium, iron, lead, and Aroclor 1260	Define the vertical and horizontal limits of contamination hased on the analytical results from the samples.
			Determine the horizontal extent of the paved surface within the Scrap yard.	Determine if old facility drawngs indicate the extent of concrete pavement. At locations selected in the field, drive a rod into the soil to determine if pavement exists below the soil.	Locations to be determined in the field.		Determine in the field.	Soil/ Pavement	None	If no pavement is encountered within 24 inches below ground surface, assume it is an unpaved area.



DRAWN BY J. BELLONE — DATE 19-AUG-99	Tetra Tech NUS, Inc.	CONTRACT NUMBER —	OWNER NUMBER —
CHECKED BY — DATE —	SITE CONDITIONS MAP SITE 41 - SCRAP YARD IHDIV-NSWC, INDIAN HEAD, MARYLAND	APPROVED BY — DATE —	
COST/SCHEDULE-AREA		APPROVED BY — DATE —	
SCALE AS NOTED		DRAWING NO. FIGURE 3-1	REV 0

P:\GIS\NSWC_INDIAN_HEAD\7129.APR 5-MAY-99 DNP SITE 41 - SITE CONDITIONS LAYOUT



DRAWN BY	DATE	Tetra Tech NUS, Inc.	CONTRACT NUMBER	OWNER NUMBER
D. PERRY	30-APR-99		—	—
CHECKED BY	DATE	FIELD INVESTIGATION MAP SITE 41 - SCRAP YARD IHDIV-NSWC, INDIAN HEAD, MARYLAND	APPROVED BY	DATE 5/14/99
COST/SCHEDULE-AREA			APPROVED BY	DATE
SCALE AS NOTED			DRAWING NO. FIGURE 3-2	REV 0

P:\GIS\NSWC_INDIAN_HEAD\7129.APR 5-MAY-99 DNP SITE 41 - FIELD INVESTIGATION MAP LAYOUT

4.0 OLSEN ROAD LANDFILL – SITE 42

This section provides the rationale and development of the site-specific field investigation activities for Site 42 – Olsen Road Landfill.

4.1 SITE BACKGROUND

The Olsen Road Landfill includes the 2-acre area containing the paved area behind the Assembly Building (Building 1866), and the undeveloped land southwest of the building (Figure 4-1). The site slopes gently to the south in the area of Building 1866, with steeper grades to the southwest and west in the undeveloped portion of the site. Scattered debris visible in the undeveloped portion of the site includes construction rubble (asphalt and concrete), unlabeled cans and drums, wooden pallets, and branches. According to a previous SI report (E/A&H, 1992), early maps of the site indicate that the topography has changed over time, indicating the possibility of filling.

Between 1982 and 1987 and prior to construction of the Assembly Building in 1992, the 2-acre area was used as an unauthorized disposal site for solid wastes. A limited site assessment completed by NEESA (NEESA, 1992) concluded that unauthorized disposal occurred at the site over a 5-year period in the early and mid-1980s; however, the report also noted that there was no record of hazardous waste disposal nor was such disposal recalled by facility personnel.

Drainage swales border the western and southern edges of the site. A drainage pipe outfall (IW71) and swale border the eastern side of the former landfill. Runoff from these drainage swales is directed into a pond that is located at the southeastern corner of the site. Water in this pond eventually drains into Mattawoman Creek.

4.2 HISTORICAL ENVIRONMENTAL DATA

A Phase I SI was performed by ENSAFE/Allen & Hoshall during two sampling events in 1991 and 1992. Figure 4-1 shows the locations sampled. The results of the original study were presented in an SI report (Phase I) (E/A&H, 1992). The data were included, in summary form, in the more recent remedial investigation report described below.

In October 1997, TtNUS (then B&R Environmental) collected additional samples from Site 42 as part of an RI. The locations sampled during that field investigation are shown on Figure 4-1. The results of the investigation were presented in an RI report (TtNUS, 1999) that also included consideration of sampling

conducted during previous field investigations. The executive summary of the RI report is included in Appendix B of this document.

Removal actions to mitigate silver contamination were performed on two swales that drain from Site 5, the Grain Manufacture and X-Ray Building, into the swales located west and south of Site 42. From November 1992 to January 1993 and later in December 1994, soils and sediments from Swale 1 of Site 5, which drains into the drainage swale south of Site 42, were excavated and removed to action levels of 10 mg/kg of silver. Silver-contaminated soil from Swale 2 of Site 5, which drains into the drainage swale west of Site 42, was excavated and removed in December 1994 to the same action levels as Swale 1. An area adjacent to the northwestern part of Olsen Road Landfill and a portion of the western swale of Site 42 were included in the removal actions for Swale 1 of Site 5.

4.3 PRE-FS FIELD INVESTIGATION SCOPE DEVELOPMENT

4.3.1 Detailed Objective Development

As described in Section 1.2, the broad objective for the field investigation activities described in this work plan is to assemble sufficient data regarding the horizontal extent of the areas requiring remediation to support the preparation of a feasibility study.

The investigative activities necessary to address the broad RI objectives are determined by first defining the set of detailed objectives that must be met to provide information which is not yet on hand but is necessary to meet the overall objective. In this document, the detailed objectives have been developed by application of the DQO process mentioned in Section 1.3. The process is documented in the text and is summarized for Site 42 in Table 4-1, Development of Data Needs, and Table 4-2, Investigation Matrix.

Section 2.3 illustrates how the tables support the DQO process in this work plan.

4.3.2 Data Needs Development

The Development of Data Needs, as presented in Table 4-1, comprises four main categories: Study Boundary, Statement of the Problem, Identification of the Decision, and Data Needs.

4.3.2.1 Study Boundary

For the purpose of the pre-FS field investigation at Site 42, the study boundaries are defined loosely as the horizontal extent of the landfill, in addition to the unnamed creek located west and south of Building 1866 (see Figure 4-1). Based on currently available information and pending the results of the field investigation, the landfill is generally expected to be between the southern edge of the Building 1866

parking lot and the unnamed creek. The segment of the creek under study runs from a point near the western corner of the Building 1866 parking lot to the confluence of creeks northwest of IW71.

4.3.2.2 Statement of the Problem

The statement of the problem includes the identification of site contaminants, the transport mechanisms that carry contaminants to receptors, and the identification of the receptors. The remedial investigation report (TtNUS, 1999) prepared for Site 42 served as the source of the information shown in Table 4-1.

As determined in the RI, the primary contaminants are iron and silver and, to a lesser extent, aluminum and zinc.

The human health risk assessment in the RI examined several exposure scenarios and found only one surface soil scenario for which a potential unacceptable risk exists (see Appendix B). For the future resident child scenario, the HI exceeded 1.0 (i.e., HI=1.8). For that scenario, the chief contributors to the HI were aluminum (HI=0.2) and iron (HI=1.3). The surface soil scenario for the future resident child included consideration of ingestion, dermal contact, and particulate inhalation as possible exposure routes. However, the future resident scenarios were included in the RI for completeness. It is viewed as unlikely that the site will be re-zoned at a future date and developed for residential use.

The ecological risk assessment in the RI determined that potential risks exist with respect to the aquatic food chain and potential degradation to habitat in and downstream of the unnamed creek. The chief sediment contaminants are silver and, to a lesser extent, zinc.

4.3.2.3 Identify the Decision

Identifying the decision involves setting the remedial objectives, determining the risk-related or regulatory drivers for taking mitigative action, defining the potential response actions that will provide the necessary mitigation, and identifying potential remedial technologies required to implement the remedial technologies.

Potential risks from exposures to surface soil contamination may be mitigated by eliminating the pathways for the exposure of humans and terrestrial mammals. Because Site 42 functioned in the past as a landfill, the Code of Maryland Regulations (i.e., COMAR 26.04.07, Solid Waste Management) includes requirements for landfill closure, including the installation of landfill caps.

Potential ecological risks due to contamination in sediments along the unnamed creek may be mitigated by removing the contaminated sediments from the creek and restoring the creek cross section.

4.3.2.4 Data Needs

The data needs indicated in Table 4-1 are in the form of questions intended to identify the concerns associated with preparing an FS for implementing potential remedial technologies identified for the site. The questions posed in the table are shown as statements in Table 4-2 under the heading of Investigation Objectives. The locations pertinent to the proposed field investigation activities are shown on Figure 4-2.

4.3.3 Investigation Matrix

The investigation matrix for Site 42 (Table 4-2) comprises three main categories: the Investigation Objectives, the Inputs to the Decision, and the Decision Rule.

4.3.3.1 Inputs to the Decision

The data needs, presented as questions in Table 4-1, are presented as investigation objectives in Table 4-2. The investigative activities identified in the Table 4-2 are intended to address the investigation objectives (i.e., answer the questions developed in Table 4-1).

For Site 42, the objectives focus on determining the horizontal extent of the landfill, the horizontal extent of contamination along the unnamed creek, and the toxicity of sediments.

4.3.3.2 Inputs to the Decision

The inputs to the decision have been developed to identify the means by which data will be collected to satisfy the investigation objectives. The approach for collecting the data is identified in the table as the Investigative Technique. Subsequent columns in the table describe the locations where the techniques are to be applied and reference the figure where the locations are shown. When samples are to be collected for chemical analysis, the final three columns under Inputs to the Decision indicate the quantity of samples, the media to be sampled, and the analyses to be performed on the samples.

For Site 42, test pits will be utilized for determining the limits of the landfill. Sediment samples will serve to define the limits of contamination along the unnamed creek. The sediment samples will be collected at two depths to define the vertical extent of contamination. Toxicity tests will be performed on samples collected along the unnamed creek to determine the toxicity of sediments. Wetland delineation will be performed to establish the presence of wetlands that may be affected by remedial activities.

4.3.3.3 Decision Rules

The final column in Table 4-2 presents a series of decision rules by which decisions will be made based on the results of the field investigations. The decision rules are in the form of "If ..., then ..." statements, which indicate the direction the RI should take if certain conditions are present.

TABLE 4-1

DEVELOPMENT OF DATA NEEDS
SITE 42 - OLSEN ROAD LANDFILL
INDIAN HEAD DIVISION, NSWC
INDIAN HEAD, MARYLAND

STUDY BOUNDARY			STATEMENT OF THE PROBLEM [1]					IDENTIFY THE DECISION				DATA NEEDS
						Potential for Risk						
Population: Contaminant Source	Spacial	Temporal	Identified Contamination	Potential Transport /Exposure Pathway	Potential Receptors	Human Health	Ecological	Remedial Objectives	Mitigation Driver	Potential Response Action	Potential Remedial Technologies	Engineering
Landfill Surface	Area located southwest of Building 1866 parking lot to the unnamed creek.	Conduct field investigation prior to conducting feasibility study.	The primary soil contaminants with respect to humans are iron and to a lesser extent, aluminum.	Soil ingestion, dermal contact, particulate inhalation.	Future child resident.	Hazard Index exceeded 1.0 (HI=1.8).		Eliminate access to contaminated surface soil.	Code of Maryland Regulations 26.04.07, Solid Waste Management. (ARAR)	Cover exposed landfill surface.	- Place a soil cover over the exposed landfill surface. - Place a "cap" over the exposed landfill surface.	What is the horizontal extent of the landfill?
Sediments in Unnamed Creek	From unnamed creek near western corner of Buliding 1866 parking lot to confluence of creeks northwest of IW71.	Conduct field investigation prior to conducting feasibility study.	The primary sediment contaminant is silver, and, to a lesser extent, zinc and bis(2-ethylhexyl)phthalate.	Sediment transport.	Downstream creek sediments.		Existing silver levels exceed background levels.	Reduce excessive contaminant levels in the creek sediments.		Remove contaminated silver contaminated sediments (at the same time mitigating zinc contamination).		What is the extent of the silver contamination in the creek? What is the extent of wetlands that may be affected by a remedial action? What concentration of silver is toxic to organisms? What concentration of bis(2-ethylhexyl)phthalate is toxic to organisms? How far south does the silver contamination extend along the flowpath?

1 TtNUS, 1999

TABLE 4-2

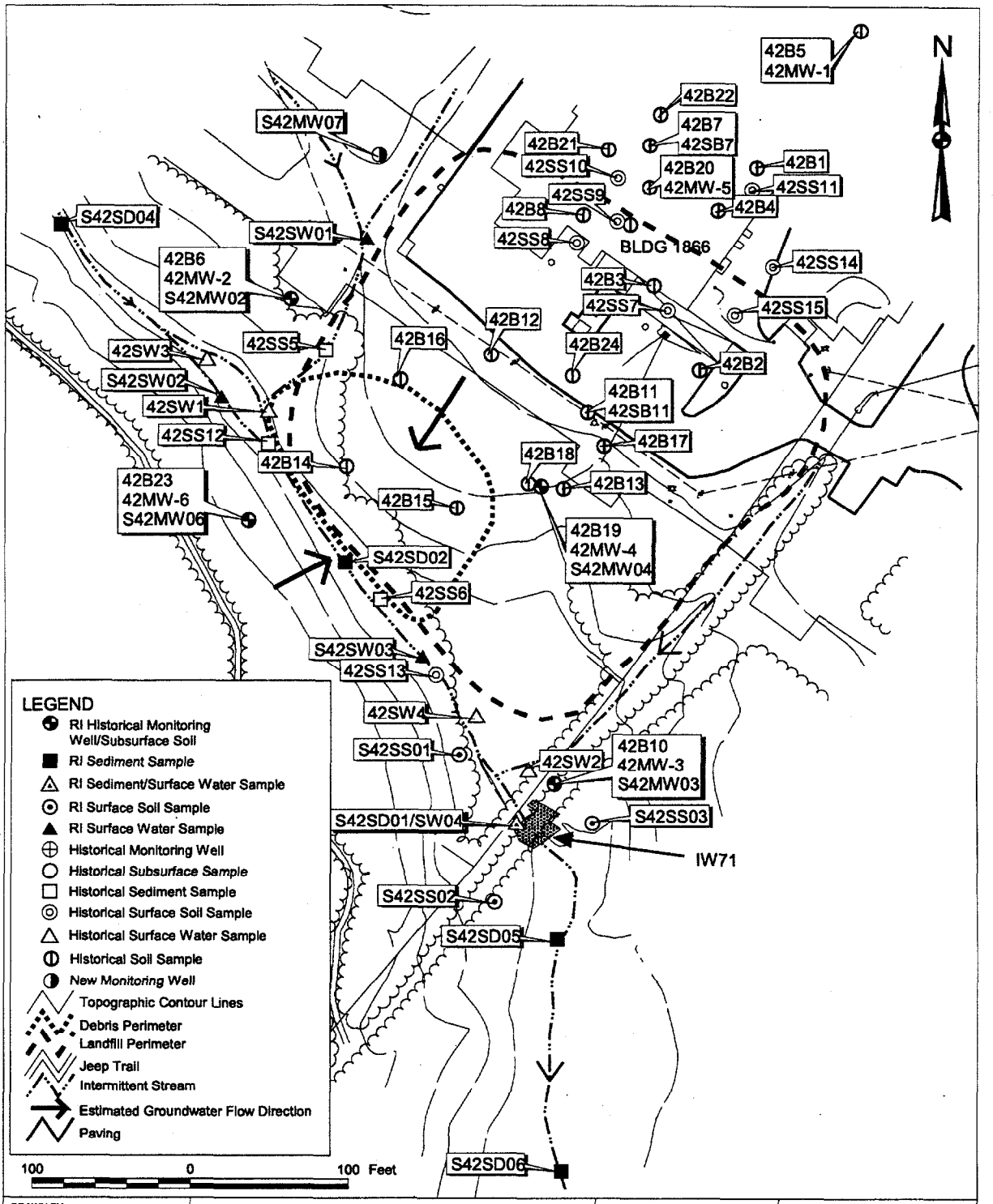
INVESTIGATION MATRIX
SITE 42 - OLSEN ROAD LANDFILL
INDIAN HEAD DIVISION, NSWC
INDIAN HEAD, MARYLAND
PAGE 1 OF 2

STUDY BOUNDARY			INVESTIGATION OBJECTIVES	IDENTIFY INPUTS TO THE DECISION						DECISION RULE
Population: Contaminant Source	Spacial	Temporal		Investigative Technique	Location	Work Plan Figure	Quantity of Samples	Matrix	Analytical Parameter	
Landfill Surface	Area located southwest of Building 1866 parking lot to the unnamed creek.	Conduct field investigation prior to conducting feasibility study.	Determine the horizontal extent of the landfill.	Test Pits: Determine the presence or absence of landfill material by visual observation.		4-2	0	Soil	None	
			Determine if the landfill extends to the west of the northeast-to-southwest drainage path.		S42TP001					If no landfill material is identified, assume the landfill extends only to the east bank of the drainage path, and do not install S42TP02. If landfill material is identified, install S42TP02.
			Same as above		S42TP002					Install only if landfill material is identified in S42TP01.
			Determine the horizontal extent of the landfill.		S42TP003					If no landfill material is identified, assume the landfill extends no further toward the southeast than S42TP03.

TABLE 4-2

INVESTIGATION MATRIX
SITE 42 - OLSEN ROAD LANDFILL
INDIAN HEAD DIVISION, NSWC
INDIAN HEAD, MARYLAND
PAGE 2 OF 2

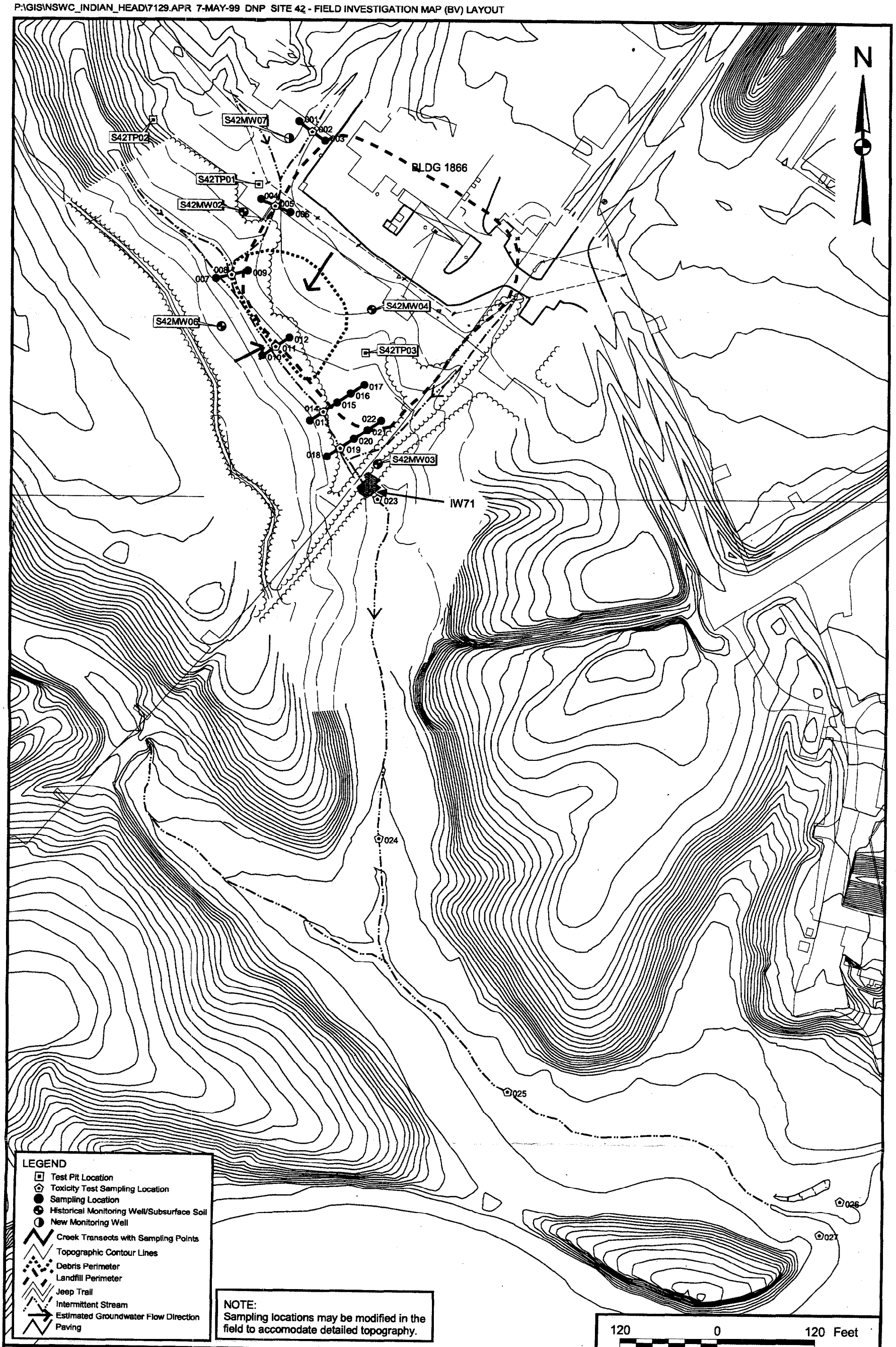
STUDY BOUNDARY			INVESTIGATION OBJECTIVES	IDENTIFY INPUTS TO THE DECISION						DECISION RULE
Population: Contaminant Source	Spacial	Temporal		Investigative Technique	Location	Work Plan Figure	Quantity of Samples	Matrix	Analytical Parameter	
Sediments in Unnamed Creek	From unnamed creek near western corner of Buliding 1866 parking lot to confluence of creeks northwest of IW71.	Conduct field investigation prior to conducting feasibility study.	Determine the extent of silver contamination along the creek and on the creek banks.	Collect sediment samples. Set sample locations on transects approximately as shown on Figure 4-2. Adjust sample locations in field to accommodate detailed topography. Collect samples at two depths: 0 to 6 inches and 12 to 18 inches.	S42SD0010006 through S42SD0220106	4-2	44	soil/ sediment	silver	Define the limits of contamination based on the analytical results from the samples.
			Determine the extent of wetlands that may be affected by a remedial action.	On-site visual determination.	Determine in the field.		None			If wetlands are identified in the field, stake the perimiter of the wetland.
			Determine the concentration of silver that is toxic to organisms and the extent of silver migration along the unnamed creek south of IW71 and to Mattawoman Creek.	Collect 5 samples north of IW71 and 5 samples south of IW71, all from sediments along the unnamed creek for toxicity tests. Use samples from 0 to 6 inch depth.	S42SD0020006 S42SD0050006 S42SD0080006 S42SD0110006 S42SD0180006 S42SD0230006 S42SD0240006 S42SD0250006 S42SD0260006 S42SD0270006	4-2	10	Soil/ Sediment	Toxicity Testing, TAL metals, TOC, Grain size.	Define the toxicity of silver to organisms based on an evaluation of the tests and analytical results.
			Determine the concentration of bis(2-ethylhexyl)phthalate that is toxic to organisms.	Select location near highest historical concentration of bis(2-ethylhexyl)phthalate for toxicity testing. Use sample from 0 to 6 inch depth.	S42SD0140006	4-2	1	Soil/ Sediment	Toxicity testing, BNAs, TOC, Grain size.	Define the toxicity of bis(2-ethylhexyl)phthalate to organisms based on an evaluation of the tests and analytical results.



DRAWN BY D. PERRY	DATE 1-MAY-98	Tetra Tech NUS, Inc.	CONTRACT NUMBER — / OWNER No. —
CHECKED BY GJL	DATE 11-MAY-99	SITE CONDITIONS MAP SITE 42 - OLSEN ROAD LANDFILL IHDIV-NSWC, INDIAN HEAD, MARYLAND	APPROVED BY GJL / DATE 11-MAY-99
COST/SCHEDULE-AREA			APPROVED BY — / DATE —
SCALE AS NOTED			DRAWING No. FIGURE 4-1 / REV 0

P:\GIS\NSWC_INDIAN_HEAD\7129.APR 20-JULY-99 JCB SITE 42 - OLSON ROAD LANDFILL LAYOUT

P:\GIS\NSWC_INDIAN_HEAD\7129.APR 7-MAY-99 DNP SITE 42 - FIELD INVESTIGATION MAP (BV) LAYOUT



DRAWN BY D. PERRY	DATE 7-MAY-99	Tetra Tech NUS, Inc.	CONTRACT NUMBER — / OWNER NUMBER —
CHECKED BY GJL	DATE 11-MAY-99	FIELD INVESTIGATION MAP SITE 42 - OLSEN ROAD LANDFILL IHDIV-NSWC, INDIAN HEAD, MARYLAND	APPROVED BY GJL / DATE 11-MAY-99
COST/SCHEDULE-AREA			APPROVED BY — / DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 4-2 / REV 0

00557D02Z

5.0 DETAILED FIELD ACTIVITIES

This section describes the specific field activities that will be conducted to secure the data required for FS report preparation. Tables 2-1, 3-1, and 4-1 show the development and identification of data needs for Sites 12, 41, and 42. Tables 2-2, 3-2, and 4-2 show the field investigation activities planned for collecting the needed data. Table 5-1, Summary of Investigation Activities, presents a gross summary of the field activities planned for each site. Table 5-2, Environmental Sampling and Analysis Summary, lists the environmental samples planned for collection and the analyses anticipated for each.

Figures 2-2, 3-2, and 4-2 are all field investigation maps that indicate the locations of the test pitting and/or sampling planned for Sites 12, 41, and 42. The maps are presented for planning purposes. Field conditions are likely to dictate that sample locations be shifted to accommodate existing detained topography, the presence of scrap (in the case of Site 41), or the need to sample depositional sediments (in the case of Site 42).

Taken together, these tables and figures are intended to provide a view of the overall pre-FS field investigation activities and their rationale.

The following subsections are not intended to reiterate information already presented in the tables and figures. The text that follows is intended to complement the tables and figures by clarifying points not specifically covered by them. This section, along with the tables and figures, provides a comprehensive view of the pre-FS field investigation.

5.1 SURFACE SOIL INVESTIGATION

Surface soil sampling is planned only for Site 41 – Scrap Yard. As proposed, surface soil sampling consists of collecting soil from the 0- to 6-inch and the 12- to 18-inch soil depth at each sampling location. At Site 41 – Scrap Yard, some sampling locations may have only a thin layer of soil that has accumulated over paved surfaces. In those instances, the soil will be removed from over the pavement to provide sufficient sample quantity, and no sample will be collected from the 12- to 18-inch depth. All of the collected surface soil samples will be subjected to analysis for arsenic, cadmium, lead, and PCBs.

5.2 SEDIMENT INVESTIGATION

As proposed in this work plan, sediment investigation is limited to Site 42 – Olsen Road Landfill. Although it might be argued that some of the proposed samples are actually surface soil samples, the demarcation between sediments and soil along the unnamed stream is not distinct due to varying water

levels in the creek. For the sake of consistent sample designations, all the surface soil/sediment samples collected in an effort to define the extent of contamination along the creek will be designated sediment samples.

Sediment samples will be collected at two depths (0 to 6 inches and 12 to 18 inches) to define the vertical extent of contamination. All sediment samples will be analyzed for silver.

As indicated by Figure 4-2 and Table 5-2, some of the sediment samples will be subjected to toxicity tests. Ten sediment samples will be tested to determine the toxicity of silver. Those samples will additionally be subjected to analysis for Target Analyte List (TAL) metals, total organic carbon (TOC) and grain size analysis, to provide additional information necessary for the evaluation of silver toxicity. Correspondingly, the single sample collected for bis(2-ethylhexyl)phthalate toxicity testing will be analyzed for base neutral extractable (BNA) organic compounds, TOC and grain size. The sample for bis(2-ethylhexyl)phthalate testing will be collected from a location as close as possible to the point of highest concentration along the unnamed creek, based on past sample analyses.

5.3 TEST PIT INVESTIGATION

It is anticipated that each test pit will be no more than 10 feet deep. If landfill-like material is encountered in a test pit, the excavation will be terminated as soon as field personnel determine that the presence of landfill material has been verified.

It is planned that material excavated from test pits will be returned to the excavation upon completion of each excavation. Test pits will be backfilled before completion of each day's work activities.

Under no circumstances will personnel be permitted to enter a test pit. The field geologist will complete a test pit log for each test pit. The location of each test pit will be staked in the field prior to excavation.

5.4 WETLAND DELINEATION

Wetlands will be delineated at both Sites 12 and 42. The delineated areas will serve to identify areas that may require special consideration when remedial alternatives are formulated in the feasibility study.

TABLE 5-1

SUMMARY OF PRE-FEASIBILITY STUDY INVESTIGATION ACTIVITIES
SITES 12, 41 AND 42
INDIAN HEAD DIVISION NSWC
INDIAN HEAD, MARYLAND

Site Name	Quantity of Surface Soil / Sediment Samples	Quantity of Toxicity Tests	Quantity of Test Pits	Comments / Other Work
Site 12 – Town Gut Landfill			18	Delineate wetlands.
Site 41 – Scrap Yard	74			Determine if the extent of the concrete pavement is indicated on old facility drawings. Determine extent of concrete pavement using rod-and-hammer technique.
Site 42 – Olsen Road Landfill	49	11	3	Delineate wetlands.
Total Samples(1)	123	11	21	---

1 Totals do not include QA/QC samples. QA/QC samples include
Field Duplicates: One field duplicate per 10 investigative samples or one per matrix per day whichever is greater.
Trip Blanks: One trip blank per shipping container containing samples to be evaluated for VOCs.
Field Blanks: One field blank per potable and dionized water source used for decontamination.
Equipment Rinsate / Field Blanks: One rinsate blank per type of sampling equipment used per day with a minimum frequency of 10 percent.
MS/MSD: One MS/MSD sample per 20 investigative samples of each sample matrix will be submitted to the laboratory. No extra volume is required for soil samples; however, aqueous samples require triple the volume for VOCs and double the volume for extractable organics.

TABLE 5-2

ENVIRONMENTAL SAMPLING AND ANALYSIS SUMMARY
SITES 12, 41 and 42
INDIAN HEAD DIVISION NSWC
INDIAN HEAD, MARYLAND

Location	Sample Designation	Sample Depth (inches below ground surface)	Arsenic	Cadmium	Iron	Lead	TCL PCBs	Silver	Toxicity Test	TAL Metals	TOC	Grain Size	BNAs	Explosives [1]	Landfill Material
SURFACE SOIL – Site 41 – Scrap Yard															
S41SS001	S41SS0010006	0 – 6	•	•	•	•	•								
S41SS001	S41SS0010106	12 – 18	•	•	•	•	•								
S41SS002	S41SS0020006	0 – 6	•	•	•	•	•								
S41SS002	S41SS0020106	12 - 18	•	•	•	•	•								
S41SS003	S41SS0030006	0 – 6	•	•	•	•	•								
S41SS003	S41SS0030106	12 - 18	•	•	•	•	•								
S41SS004	S41SS0040006	0 – 6	•	•	•	•	•								
S41SS004	S41SS0040106	12 - 18	•	•	•	•	•								
S41SS005	S41SS0050006	0 – 6	•	•	•	•	•								
S41SS005	S41SS0050106	12 - 18	•	•	•	•	•								
S41SS006	S41SS0060006	0 – 6	•	•	•	•	•								
S41SS006	S41SS0060106	12 - 18	•	•	•	•	•								
S41SS007	S41SS0070006	0 – 6	•	•	•	•	•								
S41SS007	S41SS0070106	12 - 18	•	•	•	•	•								
S41SS008	S41SS0080006	0 – 6	•	•	•	•	•								
S41SS008	S41SS0080106	12 - 18	•	•	•	•	•								
S41SS009	S41SS0090006	0 – 6	•	•	•	•	•								
S41SS009	S41SS0090106	12 - 18	•	•	•	•	•								
S41SS0010	S41SS0100006	0 – 6	•	•	•	•	•								
S41SS0010	S41SS0100106	12 - 18	•	•	•	•	•								
S41SS0011	S41SS0110006	0 – 6	•	•	•	•	•								
S41SS0011	S41SS0110106	12 - 18	•	•	•	•	•								
S41SS0012	S41SS0120006	0 – 6	•	•	•	•	•								
S41SS0012	S41SS0120106	12 - 18	•	•	•	•	•								
S41SS0013	S41SS0130006	0 – 6	•	•	•	•	•								
S41SS0013	S41SS0130106	12 - 18	•	•	•	•	•								
S41SS0014	S41SS0140006	0 – 6	•	•	•	•	•								

TABLE 5-2

ENVIRONMENTAL SAMPLING AND ANALYSIS SUMMARY
SITES 12, 41 and 42
INDIAN HEAD DIVISION NSWC
INDIAN HEAD, MARYLAND

Location	Sample Designation	Sample Depth (inches below ground surface)	Arsenic	Cadmium	Iron	Lead	TCL PCBs	Silver	Toxicity Test	TAL Metals	TOC	Grain Size	BNAs	Explosives (1)	Landfill Material
S41SS0014	S41SS0140106	12 - 18	•	•	•	•	•								
S41SS0015	S41SS0150006	0 – 6	•	•	•	•	•								
S41SS0015	S41SS0150106	12 - 18	•	•	•	•	•								
S41SS0016	S41SS0160006	0 – 6	•	•	•	•	•								
S41SS0016	S41SS0160106	12 - 18	•	•	•	•	•								
S41SS0017	S41SS0170006	0 – 6	•	•	•	•	•								
S41SS0017	S41SS0170106	12 - 18	•	•	•	•	•								
S41SS0018	S41SS0180006	0 – 6	•	•	•	•	•								
S41SS0018	S41SS0180106	12 - 18	•	•	•	•	•								
S41SS0019	S41SS0190006	0 – 6	•	•	•	•	•								
S41SS0019	S41SS0190106	12 - 18	•	•	•	•	•								
S41SS0020	S41SS0200006	0 – 6	•	•	•	•	•								
S41SS0021	S41SS0210006	0 – 6	•	•	•	•	•								
S41SS0022	S41SS0220006	0 – 6	•	•	•	•	•								
S41SS0022	S41SS0220106	12 - 18	•	•	•	•	•								
S41SS0023	S41SS0230006	0 – 6	•	•	•	•	•								
S41SS0023	S41SS0230106	12 - 18	•	•	•	•	•								
S41SS0024	S41SS0240006	0 – 6	•	•	•	•	•								
S41SS0024	S41SS0240106	12 - 18	•	•	•	•	•								
S41SS0025	S41SS0250006	0 – 6	•	•	•	•	•								
S41SS0026	S41SS0260006	0 – 6	•	•	•	•	•								
S41SS0027	S41SS0270006	0 – 6	•	•	•	•	•								
S41SS0027	S41SS0270106	12 - 18	•	•	•	•	•								
S41SS0028	S41SS0280006	0 – 6	•	•	•	•	•								
S41SS0028	S41SS0280106	12 - 18	•	•	•	•	•								
S41SS0029	S41SS0290006	0 – 6	•	•	•	•	•								
S41SS0029	S41SS0290106	12 - 18	•	•	•	•	•								
S41SS0030	S41SS0300006	0 – 6	•	•	•	•	•								

TABLE 5-2

ENVIRONMENTAL SAMPLING AND ANALYSIS SUMMARY
SITES 12, 41 and 42
INDIAN HEAD DIVISION NSWC
INDIAN HEAD, MARYLAND

Location	Sample Designation	Sample Depth (inches below ground surface)	Arsenic	Cadmium	Iron	Lead	TCL PCBs	Silver	Toxicity Test	TAL Metals	TOC	Grain Size	BNAs	Explosives (1)	Landfill Material
S41SS0030	S41SS0300106	12 - 18	•	•	•	•	•								
S41SS0031	S41SS0310006	0 – 6	•	•	•	•	•								
S41SS0032	S41SS0320006	0 – 6	•	•	•	•	•								
S41SS0032	S41SS0320106	12 - 18	•	•	•	•	•								
S41SS0033	S41SS0330006	0 – 6	•	•	•	•	•								
S41SS0034	S41SS0340006	0 – 6	•	•	•	•	•								
S41SS0034	S41SS0340106	12 - 18	•	•	•	•	•								
S41SS0035	S41SS0350006	0 – 6	•	•	•	•	•								
S41SS0035	S41SS0350106	12 - 18	•	•	•	•	•								
S41SS0036	S41SS0360006	0 – 6	•	•	•	•	•								
S41SS0036	S41SS0360106	12 - 18	•	•	•	•	•								
S41SS0037	S41SS0370006	0 – 6	•	•	•	•	•								
S41SS0037	S41SS0370106	12 - 18	•	•	•	•	•								
S41SS0038	S41SS0380006	0 – 6	•	•	•	•	•								
S41SS0038	S41SS0380106	12 - 18	•	•	•	•	•								
S41SS0039	S41SS0390006	0 – 6	•	•	•	•	•								
S41SS0039	S41SS0390106	12 - 18	•	•	•	•	•								
S41SS0040	S41SS0400006	0 – 6	•	•	•	•	•								
S41SS0040	S41SS0400106	12 - 18	•	•	•	•	•								
Blind Duplicate	S42SSDUP006 (Typical)		•	•	•	•	•								
S42SD001	S42SD0010001	0 – 6						•							
S42SD001	S42SD0010101	12 – 18						•							
S42SD002	S42SD0020006	0 – 6							•	•	•	•			
S42SD002	S42SD0020106	12 – 18						•							
S42SD003	S42SD0030006	0 – 6						•							
S42SD003	S42SD0030106	12 – 18						•							
S42SD004	S42SD0040006	0 – 6						•							

TABLE 5-2

ENVIRONMENTAL SAMPLING AND ANALYSIS SUMMARY
SITES 12, 41 and 42
INDIAN HEAD DIVISION NSWC
INDIAN HEAD, MARYLAND

Location	Sample Designation	Sample Depth (inches below ground surface)	Arsenic	Cadmium	Iron	Lead	TCL PCBs	Silver	Toxicity Test	TAL Metals	TOC	Grain Size	BNAs	Explosives (1)	Landfill Material
S42SD004	S42SD0040106	12 – 18						•							
S42SD005	S42SD0050006	0 – 6							•	•	•	•			
S42SD005	S42SD0050106	12 – 18						•							
S42SD006	S42SD0060006	0 – 6						•							
S42SD006	S42SD0060106	12 – 18						•							
S42SD007	S42SD0070006	0 – 6						•							
S42SD007	S42SD0070106	12 – 18						•							
S42SD008	S42SD0080006	0 – 6							•	•	•	•			
S42SD008	S42SD0080106	12 – 18						•							
S42SD009	S42SD0090006	0 – 6						•							
S42SD009	S42SD0090106	12 – 18						•							
S42SD010	S42SD0100006	0 – 6						•							
S42SD010	S42SD0100106	12 – 18						•							
S42SD011	S42SD0110006	0 – 6							•	•	•	•			
S42SD011	S42SD0110106	12 – 18						•							
S42SD012	S42SD0120006	0 – 6						•							
S42SD012	S42SD0120106	12 – 18						•							
S42SD013	S42SD0130006	0 – 6						•							
S42SD013	S42SD0130106	12 – 18						•							
S42SD014	S42SD0140006	0 – 6						•	•		•	•	•		
S42SD014	S42SD0140106	12 – 18						•							
S42SD015	S42SD0150006	0 – 6						•							
S42SD015	S42SD0150106	12 – 18						•							
S42SD016	S42SD0160006	0 – 6						•							
S42SD016	S42SD0160106	12 – 18						•							
S42SD017	S42SD0170006	0 – 6						•							
S42SD017	S42SD0170106	12 – 18						•							

TABLE 5-2

ENVIRONMENTAL SAMPLING AND ANALYSIS SUMMARY
SITES 12, 41 and 42
INDIAN HEAD DIVISION NSWC
INDIAN HEAD, MARYLAND

Location	Sample Designation	Sample Depth (inches below ground surface)	Arsenic	Cadmium	Iron	Lead	TCL PCBs	Silver	Toxicity Test	TAL Metals	TOC	Grain Size	BNAs	Explosives [1]	Landfill Material
S42SD018	S42SD0180006	0 – 6						•							
S42SD018	S42SD0180106	12 – 18						•							
S42SD019	S42SD0190006	0 – 6							•	•	•	•			
S42SD019	S42SD0190106	12 – 18						•							
S42SD020	S42SD0200006	0 – 6						•							
S42SD020	S42SD0200106	12 – 18						•							
S42SD021	S42SD0210006	0 – 6						•							
S42SD021	S42SD0210106	12 – 18						•							
S42SD022	S42SD0220006	0 – 6						•							
S42SD022	S42SD0220106	12 – 18						•							
S42SD023	S42SD0230006	0 – 6							•	•	•	•			
S42SD024	S42SD0240006	0 – 6							•	•	•	•			
S42SD025	S42SD0250006	0 – 6							•	•	•	•			
S42SD026	S42SD0260006	0 – 6							•	•	•	•		•	
S42SD027	S42SD0270006	0 – 6							•	•	•	•		•	
Blind Duplicate	S42SDDUP006 (Typical)								•	•	•	•			

SUBSURFACE SOIL – Site 12 – Town Gut Landfill

S12TP001 Through S12TP018	None														Visual inspection in field

SUBSURFACE SOIL – Site 42 – Olson Road Landfill

S42TP001 S42TP002 S42TP003	None														Visual inspection in field

1 Explosives including nitrocellulose, nitroguanidine, and nitroglycerine

6.0 ENVIRONMENTAL SAMPLING PROCEDURES

This section describes the procedures for environmental sampling and sample-handling requirements.

6.1 SAMPLING PROCEDURES

This section details the field sampling procedures to be used for the collection of environmental samples. General field sampling procedures are described in both the Master FSP (B&R Environmental, 1997) and Station SOPs.

6.1.1 Surface Soil Sampling

Surface soil samples will be collected in accordance with the Master FSP, Section 3.1.3.

6.1.2 Sediment Sampling

It is expected that there will be little to no flow in the unnamed creek at Site 42 at the time of the field activities. The sediment to be sampled is expected to be more representative of soil. The sampling will therefore follow the procedures detailed in the Master FSP Section 3.1.3 and Facility SOP SA-03.

6.1.6 QA/QC Samples

To assure data obtained during the investigation are accurate, various QA/QC requirements have been established for conducting the fieldwork, laboratory analysis of the samples collected, and validation of the analytical results obtained from the laboratory. Detailed information regarding this subject is presented in the Master QAPP. Information relevant to this work is presented in the site specific QAPP in Appendix B.

The field quality control samples consist of field duplicates, field blanks, trip blanks, and equipment (rinsate) blanks. Each of these types of field QC samples shall undergo the same preservation, analysis, and reporting procedures as the related environmental samples. A detailed description of each type of sample is presented in the Master QAPP in Section 3.6. The frequency and type of field QA/QC samples to be collected for this investigation are as follows:

Type of Sample	Organic	Inorganic
Field Duplicate	1/10 samples/medium	1/10 samples/medium
Field Blank	1/source/sample event	1/source/sample event
Equipment Rinsate Blank	1/20/sampling equipment	1/20/sampling equipment

The quality control measures the laboratory needs to follow are outlined in detail during the procurement process; however, it is necessary to collect additional volume for laboratory matrix spike/matrix spike duplicate (MS/MSD) analysis of aqueous samples. All other internal checks will be conducted using the samples provided. The additional aqueous sample required for MS/MSD analysis is three times the volume for VOC analysis and two times the volume for extractable organics. One MS/MSD will be analyzed for every 20 or fewer investigative samples.

Validation of the analytical results is discussed in detail in Section 9.0 of the Master QAPP. The data generated are validated in accordance with the EPA National Functional Guidelines and subsequent amendments (EPA, 1994a).

Most of the analytical data to be collected under this work plan are intended for supporting engineering decisions in a subsequent FS. Only the sediment samples collected from Site 42 and subjected to toxicity tests or analyses that are intended to support the toxicity tests will undergo full analytical data validation by TtNUS chemists. TtNUS chemists will review the remaining data to identify and discard false positive and false negative results to prevent corruption of the database by gross errors. False positive and false negative results will be identified to the project manager so a decision can be made concerning the need for more intensive validation of the non-toxicity-related data.

6.2 SAMPLE HANDLING

This section details sample-handling procedures including the field-related considerations concerning the selection of sample containers, preservatives, and allowable holding times for analyses requested. In addition, sample identification, packaging, and shipping will be addressed in this section.

6.2.1 Field Documentation

Field documentation shall be conducted as described in the Master FSP Section 3.2.1. Completed chains-of-custody will be faxed to the TtNUS project manager on a daily basis.

6.2.2 Sample Nomenclature

Each collected sample will be assigned a unique sample tracking number. The sample tracking number will consist of a 12-digit alphanumeric code, in accordance with Station SOP CT-02. Any other pertinent information regarding sample identification will be recorded in the field logbooks and on the sample log sheet.

The alphanumeric code to be used in the sample system is explained below:

Character Type:

A	=	Alpha
N	=	Numeric
E	=	Either alpha or numeric

(ANN)	(AA)	(EEE)	(NN)	(NN)
[Site]	[Sample Type]	[Location]	[Depth]	[Round]

No dashes are to be used in the sample number.

Site: S12

Sample Type :

SS	=	Surface soil
SD	=	Sediment collected from a stream or storm sewer

This field may also be used for QA/QC designation:

FB	=	Field blank
RB	=	Rinsate blank
FD	=	Field duplicate
TB	=	Trip blank

Sample location :

EEE = Assigned sample number for each sample location of a particular media; QA/QC sample will be numbered sequentially in the order of collection, beginning with 001.

Example of the second rinsate blank collected during the first field effort:

S12RB0020001

Sample Depth:

NN = Number sequentially in the order the sample is collected from a single location and representing a unique sampling depth.

For example, if two surface soil samples (one from 0- to 6-inch depth, and one from 12- to 18-inch depth) are collected for chemical analysis from location number two, they would be designated as

Sample from 0 to 6-inches: S12SS0020001
Sample from 12 to 18-inches: S12SS0020101

Sampling round:

NN = The sampling round is straightforward. It can range from 01 to 99.

Field duplicate samples shall be reported blind to the laboratory. The three-digit sample location identifier field will be assigned with the designation "DUP." The sample depth field will be assigned the duplicate number collected for that specific matrix. The time designated on the sample label and chain-of-custody shall be 0000 hours. The location at which the duplicate is collected will be noted on the sample log sheet and in the field notebook.

For example, the third surface soil duplicate sample collected during the sixth field effort would be labeled:

S12SSDUP0306

Additional guidance is provided in the IHDIV-NSWC SOP CT-02.

6.2.3 Sample Containers, Preservatives, and Holding Times

The EPA User's Guide to the Contract Laboratory Program (EPA, 1986), and the Federal Register (EPA, October 26, 1984) address the topics of containers and sample preservations. Table 6-1 provides a summary of the analysis, methodology, bottle requirements, preservation requirements, and holding times for the sampling to be submitted for analysis.

6.2.4 Sample Packaging and Shipping

Samples will be packaged in accordance with the Master FSP Section 3.2.4 and Feasibility SOPs SA-6.1. Once the samples are containerized, they will be placed on ice and in a cooler and, within a reasonable period of time, relinquished to the fixed-base laboratory carrier at the Facility main gate. Sample

containers provided by the laboratory are pre-preserved. The Field Operations Leader (FOL) will be responsible for completion of the following forms:

- Sample labels
- Chain-of-custody forms
- Chain-of-custody labels

6.3 SAMPLE CUSTODY

Custody of samples must be maintained and documented at all times. Chain-of-custody begins with the collection of the samples in the field. The Master FSP Section 3.3 and the Station SOPs SA-12 provide additional guidance for sample custody procedures. A chain-of-custody form provided by the subcontracted laboratory shall be used during the sample-handling process.

TABLE 6-1

SUMMARY OF ANALYSIS, METHODOLOGY, BOTTLE REQUIREMENTS, PRESERVATION REQUIREMENTS, AND HOLDING TIMES
SITES12, 41 AND 42
INDIAN HEAD DIVISION NSWC
INDIAN HEAD, MARYLAND

Analysis	Analytical Method or SOP	Quantity of Samples[1]	Quantity of Containers per Sample	Container Type	Preservation Requirements	Holding Times
SOIL MATRIX						
TCL SVOCs	CLP SOW OLM0 3.1	1	1	8 oz wide mouth glass with Teflon cap liner.	Cool to 4°C ± 2°C	7 days until extraction; analysis within 40 days after extraction
TCL PCBs	CLP SOW OLM0 3.1	74	1	8 oz wide mouth glass with Teflon cap liner.		7 days until extraction; analysis within 40 days after extraction
TAL Metals (Total) (with cyanide)	CLP SOW ILM0 4.0	10	1	8 oz wide mouth glass	Cool to 4°C ± 2°C	6 months to analysis (Cyanide - 14 days)
Arsenic Cadmium Lead	CLP SOW ILM0 4.0	74	1	8 oz wide mouth glass	Cool to 4°C ± 2°C	6 months to analysis
Silver	CLP SOW ILM0 4.0	39	1	8 oz wide mouth glass	Cool to 4°C ± 2°C	6 months to analysis
Explosives	SW-846 8330	2	1	8 oz wide mouth glass	Cool to 4°C ± 2°C	7 days to extraction; analysis within 40 days after extraction
Nitroglycerin	SW-846 8332	2	1	8 oz wide mouth glass	Cool to 4°C ± 2°C	7 days to extraction; analysis within 40 days after extraction
Nitrocellulose and Nitroguanidine	USATHAMA	2	1	8 oz wide mouth glass	Cool to 4°C ± 2°C	7 days to extraction; analysis within 40 days after extraction

TABLE 6-1

SUMMARY OF ANALYSIS, METHODOLOGY, BOTTLE REQUIREMENTS, PRESERVATION REQUIREMENTS, AND HOLDING TIMES
SITES12, 41 AND 42
INDIAN HEAD DIVISION NSWC
INDIAN HEAD, MARYLAND

Analysis	Analytical Method or SOP	Quantity of Samples[1]	Quantity of Containers per Sample	Container Type	Preservation Requirements	Holding Times
Grain Size Distribution	ASTM D422	11	1	1 Liter wide mouth plastic or Shelby Tube	NA	NA
TOC	EPA 415.1	11	1	1 Liter wide mouth plastic or Shelby Tube	Cool to 4°C ± 2°C	28 days to analysis
Sediment Toxicity	E1706-95b or comparable method	11	1	1 Liter wide mouth high density polyethylene	Cool to 4°C ± 2°C;protect from light.	Toxicity testing to be started as soon as possible, but no more than two weeks, after collection.

WATER MATRIX

TCL SVOCs	CLP SOW OLC0 2.1	TBD[2]	2	1 liter amber glass jar with Teflon-lined screw cap.	Cool to 4°C ± 2°C	7 days until extraction; analysis within 40 days after extraction
TCL PCBs	CLP SOW OLC0 2.1	TBD[2]	1	1 liter amber glass jar with Teflon-lined screw cap.	Cool to 4°C ± 2°C	7 days until extraction; analysis within 40 days after extraction
TAL Metals (Total)	CLP SOW ILM0 4.0	TBD[2]	1	1 liter high-density polyethylene	HNO3 to pH ≤ 2	6 months to analysis
Cyanide	CLP SOW ILM0 4.0	TBD[2]	1	1 liter High-density polyethylene	NaOH to pH > 12 Cool to 4°C	14 days to analysis

TABLE 6-1

SUMMARY OF ANALYSIS, METHODOLOGY, BOTTLE REQUIREMENTS, PRESERVATION REQUIREMENTS, AND HOLDING TIMES
SITES12, 41 AND 42
INDIAN HEAD DIVISION NSWC
INDIAN HEAD, MARYLAND

Analysis	Analytical Method or SOP	Quantity of Samples[1]	Quantity of Containers per Sample	Container Type	Preservation Requirements	Holding Times
Arsenic Cadmium Lead	CLP SOW ILM0 4.0	TBD[2]	1	1 liter High-density polyethylene	HNO3 to pH ≤ 2	6 months to analysis
Explosives	SW-846 8330	TBD[2]	1	1 liter amber glass jar	Cool to 4°C; if residual chlorine present, 0.008% $Na_2S_2O_3$	7 days to extraction; 40 days after extraction
Nitroglycerin	SW-846 8332	TBD[2]	1	1 liter amber glass jar	Cool to 4°C ; if residual chlorine present, 0.008% $Na_2S_2O_3$	7 days to extraction; 40 days after extraction
Nitrocellulose and Nitroguanidine	Laboratory SOP USATHAMA	TBD[2]	1	1 liter amber glass jar	Cool to 4°; if residual chlorine present, 0.008% $Na_2S_2O_3$	7 days to extraction; 40 days after extraction

1 Number does not include QA/QC samples to be analyzed.
2 To Be Determined. Water matrix is for QA/QC samples only.
SVOCs Semivolatile Organic Compounds.
PCBs Polychlorinated Biphenyls.
TOC Total Organic Carbon.

REFERENCES

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EPA, 1994. Guidance for the Data Quality Objectives Process, EPA QA/G-4, United States Environmental Protection Agency Quality Assurance Management Staff, Washington, DC 20460, Final, September.

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EPA, 1996. EPA Region III, January - June communication from Roy L. Smith to RBC Table Mailing List.

NEESA, (Naval Energy and Environmental Support Activity), 1992. Supplemental Preliminary Assessment Report, Naval Ordinance Station, Indian Head, Maryland. (13-021A)

NEESA 1983. Initial Assessment Study of Naval Ordnance Station, Indian Head, Maryland, (13-021), May.

TtNUS (Tetra Tech NUS, Inc.), 1999. Remedial Investigation Report, Site 12 - Town Gut Landfill, Site 39/41 – Organics Plant/Scrap Yard, Site 42 – Olson Road Landfill, Site 44 – Soak Out Area, Indian Head Division, Naval Surface Warfare Center, Indian Head, Maryland, July.

APPENDIX A

PROJECT-SPECIFIC
HEALTH AND SAFETY PLAN

(To be used in conjunction with the Master Health and Safety Plan)

Health and Safety Plan Addendum
for
Pre-Feasibility Study
Field Investigation Work Plan
for
Site 12 – Town Gut Landfill
Site 41 – Scrap Yard
Site 42 – Olson Road Landfill

Indian Head Division
Naval Surface Warfare Center
Indian Head, Maryland

Engineering Field Activity Chesapeake
Naval Facilities Engineering Command
Contract No. N62472-90-D-1298
Contract Task Order 0245

August 1999

HEALTH AND SAFETY PLAN ADDENDUM
FOR
PRE-FEASIBILITY STUDY
FIELD INVESTIGATION WORK PLAN

INDIAN HEAD DIVISION – NAVAL SURFACE WARFARE CENTER
INDIAN HEAD, MARYLAND
COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:

Engineering Field Activity, Chesapeake
Environmental Branch Code 18
Naval Facilities Engineering Command
Washington Navy Yard, Building 212
Washington, D.C. 20374-2121

Submitted by:

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CONTRACT NUMBER N62472-90-D-1298
CONTRACT TASK ORDER 0245

August 1999

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1.0 INTRODUCTION

The following information represents modifications to the Health and Safety Plan (HASP) for the Pre-Feasibility Study Field Investigation Work Plan for Site 12-Town Gut Landfill; Site 41-Scrap Yard; and Site 42-Olson Road Landfill for Indian Head Division (IHDIV) Naval Surface Warfare Center (NSWC) Indian Head, Maryland. This document is incorporated as an Addendum to the aforementioned HASP dated May 1999. These modifications address the additional activities of:

- Drum Management – The handling, staging, sampling, characterization, and disposal of drums and their contents, if any are discovered during test pitting activities.

The following sections and tables of the HASP are addended by this document:

Section 2.6, Table 2-1	Emergency Contacts
Section 4.0	Scope of Work
Table 5-1	Tasks/Hazards/Control Measures Summarization
Section 8.2, Figure 8-2	Site-Specific Training Documentation
Attachment I	Drum Management Plan
Attachment II	Safe Work Permit
Attachment III	Utility Locating and Excavation Clearance

It is the responsibility of the Project Manager (PM) to forward copies of this Addendum to the field crew to be inserted into the field copies of the HASP. It is the FOL's responsibility to ensure that all members of the field crew review this Addendum. The FOL will ensure all field crew members sign the site-specific training documentation sheet indicating they have reviewed the elements of this Addendum and the HASP, understand its requirements, and any questions they may have had have been answered to their satisfaction.

The modifications to the individual sections are as follows.

2.6 EMERGENCY CONTACTS

This section has been modified to reflect the addition of Shawn Jorgensen's number as the primary point of contact for UXO related concerns. In addition, a direct line has been provided for the Fire Department for information and assistance.

TABLE 2-1

EMERGENCY REFERENCE
IHDIV-NSWC
INDIAN HEAD, MARYLAND

AGENCY	TELEPHONE
EMERGENCY (fire, ambulance, rescue, police)	911
Fire Department	(301) 744-4333
Site Point of Contact Shawn Jorgensen	(301)743-6745
Unexploded Ordnance (UXO) Shawn Jorgensen/Whoever answers after hours	(301)743-6745
Hospital: Physicians Memorial Hospital	(301) 645-0100
Hospital: Southern Maryland Hospital	(301) 868-8000
Chemtrec National Response Center	(800) 424-9300 (800) 424-8802
TtNUS, Pittsburgh Office	(412) 921-7090
Health and Safety Manager Matthew M. Soltis, CIH, CSP	(412) 921-8912
Project Health and Safety Officer Delwyn E. Kubeldis, CIH, CSP	(412) 921-8529
Project Manager George Latulippe, PE	(412) 921-8684

4.1 ADDENDED SCOPE OF WORK

Activities to be conducted under this Addendum include the following:

- Drum management and sampling of those drums encountered during test pitting operations at Site 12 – Town Gut Landfill and Site 42 – Olson Road Landfill.

5.0 TASKS/HAZARDS/ASSOCIATED CONTROL MEASURES SUMMARIZATION

The potential hazards and control measures to be implemented for the activity of drum management is discussed in the Table 5-1. Additionally, a Safe Work Permit for this task is also included as Attachment II.

TABLE 5-1

TASKS/HAZARDS/CONTROL MEASURES SUMMARIZATION FOR NAVAL SURFACE WARFARE CENTER-INDIAN HEAD DIVISION, INDIAN HEAD, MARYLAND

Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring – Type & Action Levels	Personal Protective Equipment	Decontamination Procedures
Handling, sampling, and staging of excavated drums	***Chemical hazards:*** 1) The historical usage of the area was a landfill. The scope of work for this project is to define the borders of this landfill through test pitting activities. It is during these activities that drums of an unknown origin and content may be encountered. Site characterization with monitoring instruments will be conducted initially (i.e., prior to intrusive activities) and continuously during intrusive activities in an attempt to identify contaminants. Certain site-specific contaminants associated with the landfill have been identified. These chemicals are listed in Table 6-1. Should more information become available concerning chemical hazards through site efforts, Table 6-1 will be modified accordingly and the changes communicated to site personnel. 2) Transfer of contamination into clean areas or onto persons. ***Physical hazards:*** 3) Heavy equipment/machinery hazards (moving equipment, struck by hazards, etc.) 4) Noise in excess of 85 dBA 5) Strain from heavy lifting 6) Cuts, abrasions, and lacerations 7) Slip, trips, and falls 8) Vehicular and equipment traffic 9) Ambient temperature extremes (heat stress) ***Natural hazards:*** 10) Inclement weather 11) Insect/animal bites and stings, poisonous plants, etc.	1) Once site contaminants are accurately characterized, appropriate control methods will be identified and implemented. At a minimum, however, Level B PPE will be worn during all drum handling, sampling, and staging activities. This level of PPE is necessary based on the unknown characteristics of intact containers. As a general rule, avoiding contact with contaminated media (air, water, soils, etc.) and free product will be a universal control measure. 2) Decontaminate all equipment and supplies between activities and prior to leaving the site. 3) All personnel not directly supporting the drum removal, handling, or sampling operation will remain at least 25 feet from the point of operation. - Excavated drums will be placed in DOT-approved overpack containers and secured on-site until analytical results are received. - If the integrity of an excavated drum is compromised (cracked, punctured, etc.), then a sample will be collected from any liquid contained inside the drum. If an excavated drum contains liquids, but the integrity has not been compromised, then the drum will be staged and sampled at a later date. - Whenever possible drum handling will be kept to a minimum. - Personnel will not use picks, chisels, or other potential sparking tool to open drums. - All loose clothing/protective equipment will be secured to avoid possible entanglement with the excavator - Hand signals will be established prior to the commencement of excavation. 4) Hearing protection will be used during all subsurface activities. 5) Use machinery or multiple personnel for heavy lifts. Use proper lifting techniques. 6) Avoid contacting sharp or jagged edges of containers or debris. Wear leather or cut-resistant gloves when handling excavated/sharp objects. 7) Preview work locations for unstable/uneven terrain. 8) Traffic and equipment considerations are to include the following: - Establish safe zones of approach (i.e. Length of Boom + 5 feet). - Personnel must wear reflective vests in traffic areas. - All self propelled equipment shall be equipped with movement warning systems. - All activities are to be conducted consistent with the Base requirements, this HASP, Safe Work Permit, and the Drum Management Plan. 9) Wear appropriate clothing for weather conditions. Provide acceptable shelter and liquids for field crews. Additional information regarding heat stress concerns are provided in Section 4.0 of the Health and Safety Guidance Manual. 10) Suspend or terminate operations until directed otherwise by SSO 11) Wear appropriate clothing and PPE. Avoid potential nesting areas and suspicious vegetation (poison ivy, poison oak, etc.). Report potential hazards to the SSO. When feasible and necessary, use commercially available insect repellents. Refer to Section 6.3 and Section 4.0 of the Health and Safety Guidance Manual for additional information.	**Continuous monitoring will be performed during operations to ensure safe work conditions do not change as a result of work being performed or other external factors. Monitoring of each excavation activity, in particular, will be performed *in an attempt to anticipate and characterize site contaminants.*** The following instruments will be employed as a general screening during excavation activities: PID w/10.6 eV lamp – Volatiles & Semi-volatiles Action Level: Positive sustained readings above background levels in worker breathing zones requires site activities to be suspended until readings return to background levels or the contaminant of concern is identified through additional air monitoring activities determined by the SSO. FID – Organics only Action Level: Positive sustained readings above background levels in worker breathing zones requires site activities to be suspended until readings return to background levels or the contaminant of concern is identified through additional air monitoring activities determined by the SSO. These action levels have been instituted for Level D protection level. Once personnel ascend to Level B protection to handle, stage, and/or sample drums these action levels will not apply. Radiation Survey meter w/pancake probe Action Level: > 50 mR/Hr suspended activities until source is confirmed. The above instruments will be used to screen excavated soils in Level D protection. These instruments will also be employed during any drum/container handling or sampling activities to characterize the contents. This activity will be conducted in Level B protection. If a drum/container is located the following instruments will be employed with the general screening instruments: • Draeger Multi-test • 4-Gas Meter (LEL/O2) Although not anticipated as this activity will take place outdoors, the following action levels will be applied to the use of the 4-gas meter. Oxygen readings ranging between 19.5% to 23.5% - continue working and monitoring Oxygen readings < 19.5% - combine use of this instrument with PID or FID to estimate combustible gas levels (an oxygen deficient atmosphere exists and combustible gas readings cannot be accurately determined). Oxygen readings > 23.5% - discontinue work until levels return to background (an oxygen enriched atmosphere exists). LEL readings < 10% - continue to work , continue to monitor LEL readings > 10% - discontinue work (a potentially combustible atmosphere exists) and evacuate to a safe area. Use a PID, FID, or other appropriate instrument to monitor for volatile compounds. Colorimetric (Draeger) tubes may also be used to further define the nature and identity of site contaminants as suggested by PID and/or FID readings. Unless further information is learned regarding the history of the site and the nature of specific drum contents, initial characterization with colorimetric tubes will first be on a class-wide basis (petroleum hydrocarbons, halogenated compounds, etc.), followed by attempts to identify specific compounds. NOTE: Radioactive contaminants are not anticipated, however, during this task a general screening of the spoils removed from the test pit and excavated drums will be performed.	Prior to actually handling drums or as warranted based on the results of hazard monitoring, some work tasks may be performed in Level D PPE until the need for Level B is identified. Level D PPE (Minimum Requirements) includes: - Standard field attire (Sleeved shirt; long pants) - Safety shoes (steel toe/shank) - Safety glasses - Surgical style gloves (double-layered if necessary) All handling, sampling, and staging of drums will be performed in Level B protection, including the following articles: - Standard field dress (long pants, Sleeved shirts) - Steel toe safety shoes or work boots - Hard hat - Chemical splash suit or Rainsuit (coated PVC, Saranex, etc.) - Self-Contained Breathing Apparatus (SCBA) or airline respirator with emergency escape capabilties. (Grade D breathing air will be used to support this operation. Certification from the vendor attesting to the quality will be obtained by the FOL or SSO upon delivery). -Nitrile outer gloves with surgical style inner gloves. If activities require direct contact with drum contents Silver shield glove liners are recommended. - Impermeable boot covers All joints in the ensemble (wrists, ankles, etc.) must be securely taped. Personnel must closely inspect all PPE prior to beginning any on-site activities. **Given the uncertainty associated with the content and composition of the buried drums, any modifications to this PPE level must be approved by the PHSO or HSM.** **Note:** The Safe Work Permit(s) for this task will be issued at the beginning of each day to address the tasks planned for that day. As part of this task, additional PPE may be assigned to reflect site-specific conditions or special considerations or conditions associated with any identified task.	**Personnel Decontamination** – This decontamination procedure for Level B protection will consist of - Equipment drop - Soap/water wash and rinse of outer gloves, boots, coveralls, and SCBA Removal of PPE in the following order: 1. SCBA backpack, 2. Outer gloves, 3. Boot covers. 4. Chemical-resistant coverall, 5. Inner glove wash and rinse 6. SCBA face piece removal 7. Inner glove removal 8. Wash hands and face, leave contamination reduction zone 9. Report for any heat stress surveillance. Note: As site contaminants are identified, this decontamination procedure and solutions may be modified to reflect chemical, physical, or other properties associated with site contaminants.

6.1 CHEMICAL HAZARDS

The chemical hazards listed in the May 1999 HASP represent potential chemical hazards which may be present at the site. The drum management activities represent increased hazards of this nature due to a collection and concentration of these chemical hazards at one specific location. In addition, it has been determined that the existence of drums/containers may represent the addition of chemical hazards yet unknown. For this reason all drum management activities will be conducted under Level B protection. Level B protection will constitute the following

- Airline respirator with Self-Contained Breathing Apparatus (SCBA) or 5-minute Emergency escape bottle.
- Rain-suits(PE or PVC construction) or other impermeable garments for dermal protection.
- Nitrile inner & outer gloves (Note: If the activities during the drum/container contents characterization requires direct contact with the contents, Silver shield glove liners should be added to provide additional hand protection).

In addition to the Personal Protective Equipment (PPE) employed above, measures will be taken to stage emergency equipment at the drum/container handling area. This equipment will include:

- Stretcher
- First-aid kit
- Emergency eyewash and shower capabilities (Potable water suitable for drenching contaminated persons)
- Fire Extinguishers (ABC 10-pound rating)

Lastly, Safe Work Practices will be employed during drum opening and content characterization including, but not limited to,

- Teams will comprise of 2 entry members and 1 back-up at the ready.
- Only one member of the drum investigation team will approach the container to be moved and/or opened. This person will be attached to a lifeline to facilitate extraction from the drums/containers from a safe upwind location.
- All containers will be accessed through opportunistic opening first (i.e., rusted holes, cuts or punctures in the outer shells). If this is not possible, access through bungs or top removal will be facilitated.

- If the drums/containers show no signs of stress (i.e., rupture due to pressure, shock sensitive materials) entry will occur. Pressurized containers will be opened by remote means at another time.

- Upon entry, a sample aliquot will be obtained for characterization. This aliquot will be taken to an evaluation station away from the drum/container to begin characterization.

- All drums/containers opened and sampled will be immediately resealed or patched to minimize airborne vapor/gas contribution.

All personnel will be monitored leaving the exclusion zone for signs of heat stress to determine work rest regimens for field personnel engaged in the drum management activities.

It has been determined that these actions will sufficiently protect site personnel during drum management activities from chemical, physical, and physiological-based hazards or provide them the level of protection necessary to escape.

Once characterization is complete Table 6-1 may be changed if new information or general chemical groups are determined to be present which have not been previously identified.

8.2 SITE SPECIFIC TRAINING

This section has been modified to reflect the additional elements of training required to carry out the additional task of drum management. Items to be included in the site-specific training include the following:

- The use of airline and SCBA equipment
- The use of emergency equipment (i.e., emergency showers and eyewashes, fire extinguishers, etc.)
- Elements of the Drum Management Plan
- Elements of this HASP Addendum

SITE-SPECIFIC TRAINING DOCUMENTATION

My signature below indicates that I am aware of the potential hazardous nature of performing investigation activities at IH-DIV NSWC Indian Head, Maryland, and that I have received site-specific training, which included the elements, presented below:

- Names of personnel and alternates responsible for site safety and health
- Safety, health and other hazards present on site
- Use of personal protective equipment with emphasis on the use of airline and SCBA equipment
- The use of emergency equipment (i.e., emergency showers and eyewashes, fire extinguishers, etc.)
- Work practices to minimize risks from hazards
- Safe use of engineering controls and equipment
- Medical surveillance requirements
- Signs and symptoms of overexposure
- The contents of the health and safety plan and addendum
- Emergency response procedures (evacuation and assembly points)
- Elements of the Drum Management Plan
- Review contents of relevant Material Safety Data Sheets
- Review of the use of Safe Work Permits

My signature below indicates that I have been given the opportunity to ask questions and that all of my questions have been answered to my satisfaction, and that the dates of my training and medical surveillance indicated below are accurate.

Name (Printed and Signature)	Site-Specific Training Date	40-Hour Training (Date)	8-Hour Refresher Training (Date)	8-Hour Supervisory Training (Date)	Medical Exam

ATTACHMENT I

DRUM MANAGEMENT PLAN

DRUM/CONTAINER MANAGEMENT PLAN

1.0 INTRODUCTION

Accidents may occur during handling of drums and other hazardous waste containers. Hazards include detonations, fires, explosions, vapor generation, and physical injury resulting from sudden pressure releases, moving heavy containers by hand and working around stacked drums, heavy equipment, and deteriorated drums. While these hazards may always be present, proper work practices such as minimizing drum handling, and using equipment or procedures that isolate workers from hazardous substances, can minimize the risks to site personnel.

This plan defines practices and procedures for safe handling of drums and other hazardous waste containers. It is intended to aid the Task Order Manager/Project Manager in setting up a waste container handling program. Information contained in this plan was obtained from the NIOSH/OSHA/USCG/EPA Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (1985), and OSHA 29 CFR 1910.120 (j), Handling drums and containers.

2.0 INSPECTION

The appropriate procedures for handling drums/containers depend on the contents. Thus, prior to any handling, drums/containers should be visually inspected to gain as much information as possible about their contents. The inspection should include looking for the following items:

- Symbols, words, or other marks on the drum indicating that its contents are hazardous, (e.g., radioactive, explosive, corrosive, toxic, flammable).
- Signs of deterioration such as corrosion, rust, and leaks.
- Drum type (see Table 2-1 "Special Drum Types"). Drums and containers which do not meet these definitions will be addressed accordingly.
- Configuration of the drumhead (see Table 2-2)

Conditions in the immediate vicinity of the drums may provide information about drum contents and their associated hazards. Monitoring shall be conducted around the drums/containers using instruments for measuring atmospheric concentrations of contaminants (radiation survey meter, organic vapor monitors [PID andFID], and/or a LEL/O_2 meter).

The results of this survey can be used to classify the drums into preliminary hazard categories, for example:

- Radioactive
- Leaking/deteriorated
- Bulging
- Explosive/shock sensitive
- Contains small-volume individual containers of laboratory waste or other dangerous materials.
- Non-hazardous waste

Note: This preliminary assessment is impacted by the limitation of the instruments employed.

As a precautionary measure, personnel should assume that unlabelled drums contain hazardous materials until their contents are characterized. Also, they should keep in mind that drums are frequently mislabelled, particularly drums that are reused. Thus, a drum's label may not accurately describe its contents.

TABLE 2-1

SPECIAL DRUM TYPES AND THEIR ASSOCIATED HAZARDS

Polyethylene or PVC - Lined Drums	Often contain strong acids or bases. If the lining is punctured, the substance may quickly corrode the steel, resulting in a significant leak or spill.
Exotic Metal Drums (Aluminum, nickel, stainless steel, steel, or other unusual metal)	Very expensive drums that usually contain an extremely dangerous material.
Single-Walled Drums Used as a Pressure Vessel	These drums have fittings for both product filling and placement of an inert gas, such as nitrogen. May contain reactive, flammable, or explosive substances.
Laboratory Packs	Used for disposal of expired chemicals and process samples form university laboratories, hospitals, and similar institutions.

TABLE 2-2

INFORMATION PROVIDED BY DRUMHEAD CONFIGURATION

CONFIGURATION	INFORMATION
Whole lid of drum is removable	Designated to contain solid material.
Drum lid is removable with bung	Designated to contain solid or liquid material
Drum lid has a bung	Designated to contain a liquid.
Contains a liner	May contain a highly corrosive or otherwise hazardous material.

Valuable information can be obtained from drum markings. There are primarily two types of drum markings that could be encountered on a drum. These types of markings include those which employ a typical United Nations classification marking and approval and the second is one derived from United States DOT. Examples of these types of markings are presented below.

United Nations Classification

U N 1A2/Y150/S/89/USA/VL825

INFORMATION PROVIDED BY DRUM MARKINGS

Packaging Symbol	Information
United Nations	Indicates packaging complies with United Nations packaging requirements.
1A2	Indicates packaging type which are as follows: 1 – Drum; 2 – Wooden barrel; 3 – jerrican; 4 – Box; 5 – Bag; 6 – Composite package; 7 – Pressure receptacle
1**A**2	Indicates types of materials which are as follows: A – Steel (All types and surface treatments); B – Aluminum; C – Natural wood; D – Plywood; F – Reconstituted wood; G – Fibreboard; H – Plastic materials; L – Textile; M – Paper (Multi-wall); N – Metal; P – Glass, porcelain, & stoneware
1A2/**Y**	This letter designates the packaging group or degree of hazard. The letter designation is as follows: X – Packaging Groups I, II, and III Y - Packaging Groups II, and III Z - Packaging Group III only
1A2/Y**150**	Indicates package was tested to hold 150 kilograms
1A2/Y150/**S**/	Indicates the packaging is intended to contain solids
1A2/Y150/S/**89**/	Year the package was made
1A2/Y150/S/89/**USA**	Where the package was made
1A2/Y150/S/89/USA/**VL825**	Manufacturer's Registered Symbol

Additional markings which may be seen include "**R**" for reconditioned such as 1A2/Y150/S/89/USA/RB/90**R**. Additional marking of a "**T**" indicates salvage or over-pack container such as 1A2**T**/Y300/S/94/USA.

United States Department of Transportation(DOT)

Former U.S. DOT designations were more abbreviated. Examples of the two typically seen are:

- U.S. DOT 17E – Closed or tight end. The top is not removable. This top will have bung openings for the introduction of liquids.
- U.S. DOT 17H – Open top. The top is removable. This top may or may not have bung openings.

In addition, to carry this qualification (17 E or H) the drum had to be constructed of at least 16 or 18 gauge material. Which gauge was selected was based on material to be transported and the density or specific gravity of the substance to be transported.

It should be noted that in October of 1991, U.S. DOT adopted HM-181 charter aligning DOT's requirements with the international community. In doing so adopted container designations, hazard classifications (some, DOT still retains some of their own for transportation of dangerous goods in the continental U.S.), and many of the United Nations rules and regulations for the transportation of dangerous goods.

3.0 PLANNING

Since several hazards are associated with drum handling, every step of the operation should be carefully planned, based on all the information available at the time. The results of the preliminary inspection can be used to determine: (1) if any hazards are present and the appropriate response, (2) where opportunistic openings exist (i.e.,

rust holes, breaks in the shell) and can be accessed for sampling the drums content, and (3) which drums need to be moved in order to be opened and sampled.

3.1 Sampling

Excavated drums will be placed in DOT-approved overpack containers and secured on-site until analytical results of the soil samples are received. Whenever possible, excavated materials will be returned to the appropriate excavation. If the integrity of an excavated drum is compromised (cracked, punctured, etc.), then a sample will be collected from any liquid contained inside of the drum. If an excavated drum contains liquids, but the integrity has not been compromised, then the drum will be sampled at a later date. If necessary, drums that are deteriorated or otherwise breached and contain liquids, sludges, or semi-solids, will be sampled through opportunistic routes such as holes or other openings. Once containers or overpacks have been opened to permit sample acquisition they will be resealed upon completion of the sampling.

4.0 HANDLING

The purpose of handling the drums/containers is to: (1) respond to any obvious problems that might impair worker safety, such as radioactivity, leakage, or the presence of explosive substances, (2) unstack and orient drums for sampling, and (3) if necessary, to organize drums into different areas on site to facilitate characterization and remedial action. Drum/container movement for sample acquisition in support of this operation will be held to a minimum whenever possible.

Since accidents occur frequently during drum/container handling (particularly initial handling), drum/container movement will be minimized. Prior to drum/container mobilization, all personnel will be warned about the potential hazards associated with movement and handling of the drum/container. In all phases of drum/container management, personnel should be alert for new information about potential hazards.

The following procedures will be used to maximize worker safety during drum handling and movement:

1. Where possible use mechanized equipment to move and stage drums.

2. All equipment used in support of drum handling, staging, sampling, and disposal should be inspected and in good working order. This includes nylon slings, cargo net slings, and drum grapplers all used for drum handling.

3. Remove all non-essential personnel when moving drums from their originating location to the staging area. Personnel will only be introduced if they are needed for controlling the load or hook-up and release of the load.

4. Train personnel in proper lifting and moving techniques to prevent back injuries.

5. Have overpacks, spill material, and emergency aid equipment ready before any attempt is made to move drums.

6. Before moving anything, determine the most appropriate sequence in which the various drums and containers should be moved.

7. Exercise extreme caution in handling drums/containers that are not intact and tightly sealed.

8. Wear appropriate PPE as directed by the HASP and/or the Safe Work Permit.

4.1 Hoisting and Rigging – Drums/Containers

All hoisting and rigging of drums/containers shall be performed by knowledgeable person(s) educated in the selection and use of rigging devices.

All rigging apparatus/appliances received on the site will be inspected

- Prior to each use
- Acid/caustic burns
- Melting or charring of the nylon
- Snags, punctures, tears, or cuts
- Wear or elongation exceeding the manufacturer allotted amount.
- Distortion of fittings
- Apparent defects
- Lifting capacity not tagged
- Hooks
    - Cracked
    - Wear exceeding 10% original dimension
    - A bend exceeding 10 degrees out of plane from an unbent hook
    - Increased throat opening exceeding 15% from new condition
    - If safety latch is provided, it is in working order

Other rigging appliances may also be used including shackles, lifting bars and spreaders. The important thing to remember is the inspection is identifying physical damage and distortion. These items along with the lifting capacity will be the focus of the inspection. The FOL and/or the SSO will be responsible for inspecting and documenting the inspection of equipment of this nature.

The scope of this work under CTO 0245 identifies drums to be handled as part of this Drum Management Plan as those which may be encountered during test pit operations. To accomplish rigging an intact drum/container out of a test pit the following steps will be required:

- Excavate around the drum/container being careful not to contact the container.

- A nylon sling looped back through an end loop (forming a choker) will be lower from the side of the excavation over the drumhead to below the first structural ring.

AT NO TIME WILL ANYONE UNDER ANY CIRCUMSTANCES ENTER A TEST PIT TO HOOK-UP A DRUM/CONTAINER.

- The choker will be tightened and attached to the backhoe bucket.

- The backhoe will extract the drum from the pit and place it into a secondary containment structure outside the pit.

To remove a drum/container whose structural integrity is damaged it is recommended that the backhoe attempt to scoop the drum/container with the bucket as gentle as possible.

Note: All of the above activities will take place employing the precautions identified in this Drum Management Plan, the HASP, and the Safe Work Permit.

4.2 Spill Management

Bulk hazardous materials (over 55-gallons) may be handled during some of the site activities conducted as part of the scope of work. Independent of the contents of any drums/containers that are excavated, at a minimum Investigative-Derived Wastes (IDW) will be produced. Depending on the nature and identity of site contaminants that are identified, spills of drums/containers may constitute a danger to human health or the

environment. As site contaminants are identified and characterized, the Spill Management Program will be modified to reflect the nature of the contaminants.

4.2.1 Potential Spill Areas

To prevent and control further potential contamination of the environment, vulnerable areas to this hazard include

- the area surrounding the drums/containers.
- areas used for staging area.
- the handling, loading and unloading areas.
- resource staging and storage area.

4.2.2 55-Gallon Drums

All drums containing liquids or solids which require overpacking and/or transfer of its contents will be staged, as necessary, within a lined berm capable of holding a maximum of the drum(s) contents plus volumes reduced caused by the displacement of the drums. Capacity of the bermed area is generally fixed at approximately 110% of the total volume stored. Rainwater capture inside the lined area will be allowed to evaporate providing it does not exceed 1% of the bermed areas capacity.

4.2.3 Leak and Spill Detection

The early detection of potential spills or leaks will be accomplished through the initial inspection to identify deteriorated drums/containers. If a leak is detected the drum contents will be transferred using a hand pump into a new 55-gallon drum. The leak will be collected and contained using absorbents such as Oil-dry, vermiculite, or sand, stored at the staging area in a drum conspicuously marked. This material too, will be containerized for disposal pending analyses. All inspections will be documented in the Project logbook.

4.2.4 Personnel Training and Spill Prevention

All personnel will be instructed on the procedures for spill prevention, containment, and collection of hazardous materials in the site specific training. The FOL and the SSO will serve as the Spill Response Coordinator for this operation should the need arise.

4.2.5 Spill Prevention and Containment Equipment

The following represents the minimum equipment which will be maintained at the staging area at all times for the purpose of supporting this Spill Prevention/Containment Program.

- Sand, clean fill, vermiculite, or other noncombustible absorbent (oil-dry);
- Drums (55-gallon U.N.1A2)
- Overpacks (U.N. 1A2T/Y300)
- Shovels, rakes, and brooms
- Hand operated drum pump with hose
- Labels
- Drum Patch kit
- Potable water (emergency drenching purposes- minimum 55 gallons)

- PPE:

  - SCBA's or Airline respirators with escape capabilities (3 sets – 2 in and 1 back-up)
  - Rainsuits with hoods
  - Nitrile inner and outer gloves
  - Silver shield glove liners
  - Hardhats
  - Rubber overboots

4.2.6 Spill Control Plan

This section describes the procedures the TtNUS field crew members will employ upon the detection of a spill or leak.

1. Notify the SSO or FOL immediately upon detection of a leak or spill. Activate emergency alerting procedures for that area to remove all non-essential personnel.

2. Employ the personal protective equipment stored at the staging area. Take immediate actions to stop the leak or spill by plugging or patching the container or raising the leak to the highest point in the vessel. Spread the absorbent material in the area of the spill, covering it completely.

3. Transfer the material to a new vessel; collect and containerize the absorbent material. Label the new container appropriately. Await analyses for treatment and disposal options.

4. Recontainerize spills, including top cover impacted by the spill. Await test results for treatment or disposal options.

It is not anticipated that a spill will occur that the field crew cannot handle. Should this occur, notification of the appropriate Emergency Response agencies will be carried out by the FOL or SSO following direction provided in the HASP.

Overpack drums (larger drums in which leaking or damaged drums/containers are placed for storage or shipment) and an adequate volume of absorbent will be kept near areas where minor spills may occur.

4.3 Drums Containing Radioactive Waste

It is not anticipated that any drums located at this site will contain radioactive waste. However, due to the uncertainty associated with the site, all containers encountered will be screened as part of the monitoring activity. If any drums/containers are identified that have radiation levels significantly above background level (> 50 microroentgens/hour), immediately contact the PHSO or HSM.

4.4 Drums that May Contain Explosive or Shock-Sensitive Waste

It is not anticipated to encounter explosive or shock sensitive waste material. However, if a drum is suspected to contain explosive or shock-sensitive waste as determined by visual inspection, this drum/container will be barricaded and left alone until specialized equipment and assistance may be obtained before handling.

4.5 Bulging Drums

Pressurized drums are extremely hazardous. This condition is not anticipated for this project. However where pressurized drums/containers are encountered they will be handled in the same manner as explosive or shock sensitive materials.

4.6 Leaking, Open, and Deteriorated Drums

As discussed under Section 3.1, excavated drums will be placed in DOT-approved overpack containers and secured on-site until analytical results of the soil samples are received. If the integrity of an excavated drum is compromised (cracked, punctured, etc.), then a sample will be collected from any liquid contained inside of the drum. If an excavated drum contains liquids, but the integrity has not been compromised, then the drum will be sampled at a later date. Leaking, open, and/or deteriorated drums may not be able to be moved without rupture or compromising the integrity of the drums.
All drums/containers used as part of this operation should be compatible with the type of material to be introduced. If you are overpacking a plastic drum, then it should be placed in a plastic overpack. The same shall apply when transferring from one container to another. All containers used for these purposes shall meet or exceed the appropriate DOT, OSHA, or EPA regulations for the wastes containerized. These drums/containers will be staged at a predetermined location.

5.0 OPENING

Drums/containers may be opened and sampled during this site operation. However, drums/containers of a suspicious nature will be handled at a later time once incidental drums/containers can be removed and conditions for specialized operations structured. Procedures for opening drums/containers are the same, regardless of where the drums are opened. To enhance the efficiency and safety of drum-opening personnel, the following procedures will be instituted:

- Personnel will use supplied-air respiratory protection, preferably airline respirators with a bank of air cylinders located outside the work area which supply air to the operators via airlines and escape SCBA.

- Site control will keep nonessential personnel at a safe distance from the drums/containers being opened. Drums/containers of a suspicious nature will be handled remotely where possible. Drum opening equipment, monitoring equipment, fire suppression equipment (i.e., fire extinguishers), emergency aid equipment (i.e., First-aid, stretcher, etc.) will be placed at an accessible distance to support the operation.

- Use the following remote-controlled devices will be employed for high hazard drum opening operations including exotic metal drums, bulging drums:

  - Remote operated pneumatically operated impact wrench to remove drum bungs.
  - Remote operated hydraulically or pneumatically operated drum piercers.
  - Backhoes with shielded cabs equipped with bronze spikes for penetrating drum tops in large-scale operations.

- Personnel will **not** use picks, chisels, or other potential sparking media to open drums.

- If any drum/container shows signs of swelling of bulging (positive pressure), it will be left alone until the appropriate barriers and equipment can be mobilized to support relieving excess pressure prior to opening.

- Monitor the air continuously during drum/container opening exercises. Place probes of monitoring equipment (PID, FID, and LEL/O_2) as close as possible to the source of contaminants.

- Polyethylene or polyvinyl chloride-lined (PVC-lined) drums can be accessed through the bung by removal or drilling. Exercise extreme caution when manipulating these containers.

- Do **not** open or sample individual containers within laboratory packs.

- Reseal open bungs and drill openings as soon as possible with new bungs or plugs to avoid explosions and/or vapor generation. If an open drum cannot be resealed, place the drum into an overpak. Plug any

openings in pressurized drums with pressure-venting caps set at a 5-psi release to allow venting of vapor pressure.

- All drum/container opening will be done so using spark proof tools with all potential ignition sources removed.
- Decontaminate equipment after each use to avoid mixing incompatible wastes.
- Employees shall not stand or work from atop any drum/container.

6.0 SAMPLING

Drum sampling can be one of the most hazardous activities to worker safety and health because it presents direct contact with unidentified wastes. Prior to collecting a sample, the following steps have been executed to minimize the potential hazards involved in this operation.

- Research background information about the waste as thoroughly as possible.
- Determine how the drums/containers should be sampled.
- Select the appropriate sampling device(s) and container(s).
- Develop a sampling plan which includes the number, volume, and locations of samples to be taken.
- Develop Standard Operating Procedures for opening drums/containers, sampling, and sample packaging and transportation.
- The SSO is part of the sampling team and will offer assistance based on available information about the waste and site conditions, the appropriate actions, personal protection modifications to be used during sampling and decontamination activities. Guidelines for PPE usage have been established as part of this HASP.

When manually sampling from a drum, use the following techniques:

- Of the two men team to perform the sampling, one will open the drum/container, and perform the initial monitoring, while the sampling team member maintains a safe distance. Both members will participate in the closure of the drums/containers. During all operations of this nature, a back-up member will remain at the ready to assist if needed.
- Cover drum tops with plastic sheeting or other suitable non-contaminated materials to avoid excessive contact with the drum tops.

7.0 CHARACTERIZATION

The goal of characterization is to obtain the data necessary to determine how to safely and effectively package, transport, and manage the waste for treatment and/or disposal. If wastes are bulked, they must be sufficiently characterized to determine which of them can be safely combined. As a first step in obtaining these data, standard tests should be used to classify the wastes into general categories, including auto reactives, water reactives, inorganic acids, organic acids, heavy metals, pesticides, cyanides, inorganic oxidizers, and organic oxidizers. In some cases further analysis should be conducted to more precisely identify the waste materials. A complete and detailed description of the analysis may be obtained from the Sampling and Analysis Plan. The Drum/Container Characterization Sheet (Figure 1) will aid field personnel in the general field characterization of the contents of the unidentified drums.

Figure 1
DRUM/CONTAINER CHARACTERIZATION SHEET

Site Name:_____	**Date:**_____	**Project #:**_____
Project Description: _____ _____	**Drum #**	**Field Crew/Role:** _____ _____

Drum Size	**Drum Type**	**Head Configuration**	**Identifiable markings:**
Unknown	Steel	Ring top (no bungs)	Sketch drum/container position
30 gallon	Aluminum	Ring top (bungs)	
55 gallon	Plastic	Closed top	
80 Gallon	Glass	Unknown	
Other (Specify) _____ _____ _____ _____ _____	Metal/Other (Specify Type) _____ _____ _____ _____ _____	Other (Specify) _____ _____ _____ _____ _____	
Estimated Volume: _____			

General condition of the drum/container: _____ _____	**Can it be handled/moved and re-staged or over-packed?**_____ _____

Screening Data		**Drum Contents (Indicate % if mixture of more than one media)**	
Radioactivity _____mR Background	_____mR	Solids Classification	Liquids Viscosity
PID _____eV Lamp _____ ppm (background)	_____ppm	Trash	Other
FID____ ppm (background)	_____ppm	**Drum Contents (Color)**	
Combustibility	_____%LEL_____%O2	Unknown	Red
Draeger Multi-test	_____	Cream	Yellow
Air Reactive	_____Δ Temp	Clear	Amber
Water Reactive	_____Δ Temp	White	Purple
Water solubility	_____Yes _____ No _____ % Partial	Gray	Black
Flammable	_____Yes _____No	Orange	Brown
pH	_____	Green	Other:
Cyanide	_____ ppm (Draeger Tube over Water Bath)	Greenish Blue	

Area surrounding drums/containers (stressed vegetation, distribution pathways):
_____
_____

Comments:
_____
_____
_____

_____**See Attached Safe Work Permit for Protective/Hazard Control Measures**
_____**See Attached Drum/Container Inventory**

It should be noted that once a sample aliquot is removed from the drum to be characterized and sampled, the characterization of this media should occur a safe distance from the drum. This activity is best accomplished at a remote work station slightly removed from the drums in question. This will permit the control of the hazards associated with the sample aliquot and will permit quick characterization as all testing stations can be previously constructed and ready for use.

8.0 LABELING

All containers once characterized will be labeled for purposes of hazard communication. For this purpose the following three label choices will be employed.

Non-hazardous Material labels – These labels will be used only when the opening, characterization and/or analytical results confirm that this material is non-hazardous.

Hazardous Material labels – These labels will be employed when through drum characterization or analytical results a material falls into a hazard class definition as per DOT and/or RCRA 40 CFR 261.

Investigative Derived Waste (IDW) labels – These labels will be employed when the information derived from all characterization efforts are negative in determining the physical, chemical, radioactive, or reactive properties of the substance being tested.

Once the material is subjected to analytical testing and results obtained, the material in question will be relabeled for purposes of hazard communication, transportation, and disposal. The FOL and/or the SSO will be responsible for this activity.

8.1 DRUM INVENTORY

All drums/containers which are uncovered as part of this field effort will be numbered and inventoried. Drum characterization sheets will be referenced to the drum number. See Figure 2 for the Drum Inventory sheet.

9.0 STAGING

Every attempt will be made to minimize drum handling until characterization. Staging involves a trade-off between the increased hazards associated with drum movement and the decreased hazards associated with the enhanced organization and accessibility of the waste materials.

One staging area will be created to support this operation should it be required. It is not anticipated this staging area will be used as the reconnaissance indicated all drums/containers were accessible and therefore movement would not be required.

10.0 BULKING

Wastes that have been characterized are often mixed together and placed in bulk containers for shipment to treatment or disposal facilities. This increases the efficiency of transportation. Bulking will only be performed after thorough waste characterization.

Figure 2
DRUM INVENTORY LOG

Drum Number #	Drum/Container Type	Media (Contents)	Estimated Volume	Date - Contents Characterized Sampled	Recommended Sample Analyses	Comments

ATTACHMENT II

SAFE WORK PERMIT

FOR

DRUM MANAGEMENT ACTIVITIES

SAFE WORK PERMIT FOR

HANDLING, SAMPLING, AND STAGING OF DRUMS

Permit No. _____ Date: _____ Time: From _____ to _____

SECTION I: General Job Scope

I. **Work limited to the following (description, area, equipment used):** Handling, sampling, and staging of excavated drums.

II. **Required Monitoring Instruments:** FID and PID, LEL/O2, and radiation survey meter. Colorimetric tubes may also be used as necessary to identify and characterized site contaminants.

III. **Field Crew:** _____

IV. **On-site Inspection conducted** ☐ Yes ☐ No Initials of Inspector _____ TtNUS _____ Subcontractor

SECTION II: General Safety Requirements (To be filled in by permit issuer)

IV. Protective equipment required

Level D ☐ Level B ☒
Level C ☐ Level A ☐
Detailed on Reverse

Respiratory equipment required

Full face APR	☐	Escape Pack	☒
Half face APR	☐	Airline/SCBA	☒
SKA-PAC SAR	☐	Bottle trailer	☐
Skid Rig	☐	None	☐

Modifications/Exceptions: Any indication of potential exposure – Irritation of skin, odors, headaches, nausea, drowsiness will require all activities to be suspended until further investigation. The supplied air source will be Grade D or better. This will be validated and documented by the supplier. The FOL and/or the SSO will be responsible for assuring Grade D breathing air quality.

V.

Chemicals of Concern	Action Level(s)	Response Measures
Oxygen concentrations	O2 levels <19.5% or >23.5%	Report to an unaffected area
Flammable gas concentrations	LEL levels <10% or >10%	Report to an unaffected area
Radioactivity levels	50 mr/hr	Report to an unaffected area

VI. Additional Safety Equipment/Procedures

Hard-hat	☒ Yes	☐ No	Hearing Protection (Plugs/Muffs)	☒ Yes	☐ No
Safety Glasses	☐ Yes	☒ No	Safety belt/harness	☒ Yes	☐ No
Chemical/splash goggles	☐ Yes	☒ No	Radio	☐ Yes	☒ No
Splash Shield	☐ Yes	☒ No	Barricades	☒ Yes	☐ No
Splash suits/coveralls	☒ Yes	☐ No	Gloves (Nitrile Inner & Outer)	☒ Yes	☐ No
Steel toe Work shoes or boots	☒ Yes	☐ No	Work/rest regimen	☒ Yes	☐ No

Modifications/Exceptions: Tape joints (wrists, ankles, etc.) and inspect PPE before beginning on-site activities. Work/rest regimen to be determined by SSO & site personnel. If contact with drum contents anticipated, add Silver Shield Glove Liners to the glove protection level.

VII. Procedure review with permit acceptors

	Yes	NA		Yes	NA
Safety shower/eyewash (Location & Use)	☒	☐	Emergency alarms	☒	☐
Procedure for safe job completion	☒	☐	Evacuation routes	☒	☐
Contractor tools/equipment/PPE inspected	☒	☐	Assembly points	☒	☐

VIII. Equipment Preparation

	Yes	NA
Equipment drained/depressurized	☐	☐
Equipment purged/cleaned	☐	☐
Isolation checklist completed	☐	☐
Electrical lockout required/field switch tested	☐	☐
Blinds/misalignments/blocks & bleeds in place	☐	☐
Hazardous materials on walls/behind liners considered	☐	☐

IX. Site Preparation

Exclusion zone boundaries established	☒ Yes	☐ No
Utility clearances completed for subsurface activities	☒ Yes	☐ No

X. Additional Permits required (Hot work, confined space entry, excavation etc.) ☒ Yes ☐ No

If yes, complete permit required or contact Health Sciences, Pittsburgh Office

XI. Special instructions, precautions: Follow Drum/Container Management Plan (Attachment I) of HASP Addendum.

Permit Issued by: _____ Permit Accepted by: _____

ATTACHMENT III

UTILITY LOCATING AND EXCAVATION CLEARANCE

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1.0 PURPOSE

Utilities such as electric service lines, natural or propane gas lines, water and sewage lines, telecommunications, and steam lines are very often in the immediate vicinity of work locations.
Contact with underground or overhead utilities can have serious consequences including employee injury/fatality, property and equipment damage, substantial financial impacts, and loss of utility service to users.

The purpose of this procedure is to provide minimum requirements and technical guidelines regarding the appropriate procedures to be followed when performing subsurface and overhead utility service locating and excavation clearance. It is the policy of TtNUS to provide a safe and healthful work environment for the protection of our employees. The purpose of this SOP is to aid in achieving the objectives of the TtNUS Utility Locating and Clearance Policy. The TtNUS Utility Locating and Clearance Policy should be reviewed by anyone involved with underground or overhead utility services.

2.0 SCOPE

This procedure applies to all TtNUS field activities where there may be potential contact with underground or overhead utilities. This procedure provides a description of the principles of operation, instrumentation, applicability, and implementability of methods used to determine the presence or absence of utility services.
This procedure is intended to assist with work planning and scheduling, resource planning, field implementation, and subcontractor procurement. Utility locating and excavation clearance requires site-specific information prior to development of detailed operating procedures. This guidance is not intended to provide a detailed description of methodology and operation. Specialized expertise during both planning and execution of several of the geophysical methods may also be required.

3.0 GLOSSARY

Electromagnetic Induction (EMI) Survey - A geophysical exploration method whereby electromagnetic fields are induced in the ground and the resultant secondary electromagnetic fields are detected as a measure of ground conductivity.

Magnetometer -- A device used for precise and sensitive measurements of magnetic fields.

Magnetic Survey -- A geophysical survey method that depends on detection of magnetic anomalies caused by the presence of buried ferromagnetic objects.

Metal detection -- A geophysical survey method that is based on electromagnetic coupling caused by underground conductive objects.

Vertical Gradiometer -- A magnetometer equipped with two sensors that are vertically separated a fixed distance apart. It is best suited to map near surface features and is less susceptible to deep geologic features.

Ground Penetrating Radar -- Ground Penetrating Radar (GPR) involves specialized radar equipment whereby a signal is sent into the ground via a transmitter. Some portion of the signal will be reflected from the subsurface material, which is then recorded with a receiver and electronically converted into a graphic picture.

4.0 RESPONSIBILITIES

Project Manager - Responsible for ensuring that all field activities are conducted in accordance with this procedure and the TtNUS Utility Locating and Clearance Policy.

Site Manager (SM) or Field Operations Leader (FOL) - Responsible for the onsite verification that all field activities are performed in compliance with approved Standards Operating Procedures or as otherwise dictated by the approved project plan(s).

Site Health & Safety Officer (HSO) – Responsible to provide technical assistance and verify full compliance with this SOP and the TtNUS Utility Locating and Clearance Policy. The HSO is also responsible for reporting any deficiencies to the Corporate Health and Safety Manager and to the Project Manager.

5.0 PROCEDURES

This procedure addresses the requirements and technical procedures that must be performed to minimize the potential for contact with underground and overhead utility services. These procedures are addressed from a buried and overhead standpoint.

5.1 Buried Utilities

Buried utilities present a heightened concern because their location is not typically obvious by visual observation, and it is common that their presence and/or location is unknown on client properties. The following procedure must be followed prior to beginning any excavation that might potentially be in the vicinity of underground utility services.

Where the positive identification and de-energizing of underground utilities cannot be obtained and confirmed using the following steps, the PM is responsible for arranging for the procurement of a qualified, experienced, utility locating contractor who will accomplish the utility location and demarcation duties specified herein.

1. A comprehensive review must be made of any available property maps, blue lines, or as-builts prior to site activities. Interviews with local personnel familiar with the area should be performed to provide additional information concerning the location of potential underground utilities. Information regarding utility locations shall be added to project maps upon completion of this exercise.

2. A site inspection must be performed to compare the site plan information to actual conditions. Any findings must be documented and the site plan/maps revised. The area(s) of proposed excavation must be marked at the site in white paint or pin flags to notify personnel of the proposed excavation activities. The site inspection should focus on locating surface indications of potential underground utilities. Items of interest include the presence of nearby area lights, telephone service, drainage grates, fire hydrants, asphalt/concrete scares and patches, and topographical depressions. Note the location of any emergency shut off switches. Any additional Information regarding utility locations shall be added to project maps upon completion of this exercise.

3. If the planned work is to be conducted on private property (e.g., military installations, manufacturing facilities, etc.) the FOL must identify and contact appropriate facility personnel (e.g., public works or facility engineering) before any intrusive work begins to inquire on (and comply with) property owner requirements. It is important to note that private property owners may require from several days to several weeks advance notice prior to locating utilities.

4. If the work location is on public property, the state agency that performs utility clearances must be notified (see Attachment 1). State "one-call" services must be notified prior to commencing fieldwork per their requirements. Most one-call services require, by law, 48- to 72-hour advance notice prior to beginning any excavation. Such services typically assign a "ticket" number to the

particular site. This ticket number must be recorded for future reference and is valid for a specific period of time, but may be extended by contacting the service again. The utility service will notify utility representatives who are to mark their respective lines within the specified time frame.

5. Utilities must be identified and their locations plainly marked using pin flags, spray paint, or other means. The location of all utilities must be noted on a field sketch for future inclusion on project maps. Utility locations are to be identified using the following industry-standard color code scheme, unless the property owner or utility locator service uses a different color code:

white	excavation location
red	electrical
yellow	gas, oil, steam
orange	telephone, communications
blue	water, irrigation, slurry
green	sewer, drain

6. Where utility locations are not confirmed with a high degree of confidence through drawings, schematics, location services, etc., the work area must be thoroughly investigated prior to beginning the excavation. In these situations, utilities must be identified using such methods as passive and intrusive surveys, physical probing, or hand auguring. Each method has advantages and disadvantages including complexity, applicability, and price.

7. At each location where trenching or excavating will occur using a backhoe or other heavy equipment and utility identifications and locations cannot be confirmed prior to groundbreaking, the soil must be probed with a hand augur or pole made of non-conductive material. If these efforts are not successful in clearing the excavation area of suspect utilities, hand shoveling must be performed for the perimeter of the intended excavation.

8. All uncovered utilities must be supported. Unless necessary as an emergency corrective measure, TtNUS shall not make any repairs or modifications to existing utility lines without prior permission of the utility owner, property owner, and Corporate Health and Safety Manager. All repairs require that the line be locked-out/tagged-out prior to work.

5.2 Overhead Power Lines

If it is necessary to work within the minimum clearance distance of an overhead power line, the overhead line must be de-energized and grounded, or re-routed by the utility company or a registered electrician. If protective measures such as guarding, isolating, or insulating are provided, these precautions must be adequate to prevent employees from contacting such lines directly with any part of their body or indirectly though conductive materials, tools, or equipment.

The following table provides the required minimum clearances for working in proximity to overhead power lines.

Nominal Voltage	Minimum Clearance
0 -50 kV	10 feet, or one mast length; whichever is greater
50+ kV	10 feet plus 4 inches for every 10 kV over 50 kV or 1.5 mast lengths; whichever is greater

6.0 UNDERGROUND LOCATING TECHNIQUES

6.1 Geophysical Methods

Geophysical methods include electromagnetics, magnetics, and ground penetrating radar. Additional details concerning the design and implementation of electromagnetic, magnetics, and ground penetrating radar surveys can be found in one or more of the TtNUS SOPs included in the References in Section 6.0.

Electromagnetics

Electromagnetic (EM) line locators operate either by locating a background signal or by locating a signal introduced into the utility line using a transmitter. A utility line acts like a radio antenna, producing electrons, which can be picked up with a radiofrequency receiver. Electrical current carrying conductors have a 60HZ signal associated with them. This signal occurs in all power lines regardless of voltage. Utilities in close proximity to power lines or used as grounds may also have a 60HZ signal, which can be picked up with an EM receiver. A good example of this type of geophysical equipment is an EM-61.

EM locators specifically designed for utility locating use a special signal that is either indirectly induced onto a utility line by placing the transmitter above the line or directly induced using an induction clamp. The clamp induces a signal on the specific utility and is the preferred method of tracing since there is little chance of the resulting signals being interfered with. A good example of this type of equipment is the Schonstedt® MAC-51B locator. The MAC-51B performs inductively traced EM surveys, simple magnetic locating and traced nonmetallic surveys.

When access can be gained to a conduit, a flexible insulated trace wire can also be used. This is very useful for non-metallic conduits but is limited by the availability of gaining access inside the pipe.

Magnetics

Magnetic locators operate by detecting the relative amounts of buried ferrous metal. They are incapable of locating or identifying nonferrous utility lines but can be very useful for locating underground storage tanks (UST's) and steel utility lines. A good example of this type of equipment is the Schonstedt® GA-52Cx locator. The GA-52Cx is capable of locating 4-inch steel pipe up to 8 feet deep.

Ground Penetrating Radar

Ground Penetrating Radar (GPR) involves specialized radar equipment whereby a signal is sent into the ground via a transmitter. Some portion of the signal will be reflected from the subsurface material, which is then recorded with a receiver and electronically converted into a graphic picture. In general, an object which is harder than the surrounding soil will reflect a stronger signal. Utilities, tunnels, UST's, and footings will reflect a stronger signal than the surrounding soil. Although this surface detection method may determine the location of a utility, this method does not specifically identify utilities (i.e., water vs. gas, electrical vs. telephone), hence, verification is necessary using other methods. This method is somewhat limited when used in areas with clay soil types or with a high water table.

6.2 Passive Detection Surveys

Acoustic Surveys

Acoustic location methods are generally most applicable to waterlines. A highly sensitive Acoustic Receiver listens for background sounds of water flowing (at joints, leaks, etc.) or to sounds introduced into

the water main using a transducer. Acoustics may also be applicable to determine the location of plastic gas lines.

Thermal Imaging

Thermal (i.e., infrared) imaging is a passive method for detecting the heat emitted by an object. Electronics in the infrared camera convert subtle heat differentials into a visual image on the viewfinder or a monitor. The operator does not look for an exact temperature; rather they look for heat anomalies (either elevated or suppressed temperatures) characteristic of a potential utility line.

The thermal fingerprint of underground utilities results from differences in temperature between the atmosphere and the fluid present in a pipe or the heat generated by electrical resistance. In addition, infrared scanners may be capable of detecting differences in the compaction, temperature and moisture content of underground utility trenches. High-performance thermal imagery can detect temperature differences to hundredths of a degree. High-quality hand-held thermal imagers are available from $15,000 to $30,000, with prices decreasing as new systems are introduced.

6.3 Intrusive Detection Surveys

Vacuum Excavation

Vacuum excavation is used to determine the exact horizontal and vertical location of utility services. The process involves removing the surface material over approximately a 1' x 1' area at the site location. The air-vacuum process proceeds with the simultaneous action of compressed air-jets to loosen soil and vacuum extraction of the resulting debris. This process ensures the integrity of the utility line during the excavation process, as no hammers, blades, or heavy mechanical equipment comes into contact with the utility line, eliminating the risk of damage to utilities. The process continues until the utility is uncovered. Vacuum excavation can be used at the proposed site location to excavate below the "utility window" which is usually 8 feet.

Hand-auger Surveys

When the identification and location of underground utilities cannot be positively confirmed through document reviews and/or other physical methods, borings must be hand-augured for all locations where there is a potential to impact buried utilities. Hand auguring must be performed to depths of no less than 4 feet. The minimum hand auger depth that must be reached is to be determined considering the geographical location of the work site. This approach recognizes that the placement of buried utilities is influenced by frost line depths that vary by geographical region. Attachment 3 presents frost line depths for the regions of the continental United States. At a minimum, hand auger depths must be at least to the frost line depth plus two (2) feet, but never less than 4 feet below ground surface (bgs). For auguring, the hole must be reamed by hand to at least the diameter of the drill rig auger or bit prior to drilling. For soil gas surveys, the survey probe shall be placed as close as possible to the cleared hand auger. It is important that a post-hole digger is not used in place of a hand augur.

Tile Probe Surveys

For some soil types, site conditions, and excavation requirements, tile probes may be used instead of or in addition to hand augurs. Tile probes must be performed to the same depth requirements as hand augurs. Depending upon the site conditions and intended probe usage, tile probes should be made of non-conductive material such as fiberglass.

7.0 REFERENCES

TtNUS Utility Locating and Clearance Policy

TtNUS SOP GH-3.1; Resistivity and Electromagnetic Induction

TtNUS SOP GH-3.2; Magnetic and Metal Detection Surveys

TtNUS SOP GH-3.4; Ground-penetrating Radar Surveys

ATTACHMENT 1
LISTING OF UNDERGROUND UTILITY CLEARANCE RESOURCES

Alabama
Alabama Line Location (800) 292-8525
Tucson Blue Stake Center (800) 782-5348

Alaska
Locate Call Center of Alaska Inc. (800) 478-3121

Arizona
Arizona Blue Stake Inc. (800) 782-5348

Arkansas
Arkansas One Call System Inc. (800) 482-8998

California
Underground Service Alert North (800) 227-2600
Underground Service Alert South (800) 227-2600

Colorado
Utility Notification Center of Colorado
(800) 922-1987

Connecticut
Call Before You Dig (800) 922-4455

Delaware
Miss Utility of Delmarva
(800) 282-8555

District of Columbia
Miss Utility (800) 257-7777

Florida
Call Sunshine (800) 432-4770

Georgia
Utilities Protection Center Inc.
(800) 282-7411

Idaho
Palouse Empire Underground Coordinating Council
(800) 882-1974
Utilities Underground Location Center
(800) 424-5555
Kootenai Country Utility Coordinating Council
(800) 428-4950
Shoshone County One Call (800) 398-3285
Dig Line (800) 342-1585
One Call Concepts (800) 626-4950

Illinois
Julie Inc. (800) 892-0123
Digger (Chicago Utility Alert Network)
(312) 744-7000

Indiana
Indiana Underground Plant Protection Services
(800) 382-5544

Iowa
Underground Plant Location Service Inc.
(800) 292-8989

Kansas
Kansas One-Call Center (800) 344-7233

Kentucky
Kentucky Underground Protection Inc.
(800) 752-6007

Louisiana
Louisiana One Call (800) 272-3020

Maine
Dig Safe – Maine (800) 225-4977

Maryland
Miss Utility (800) 257-777
Miss Utility of Delmarva (800) 282-8555

Massachusetts
Dig Safe – Massachusetts (800) 322-4844

Michigan
Miss Dig System (800) 482-7171

Minnesota
Gopher State One Call (800) 252-1166

Mississippi
Mississippi One-Call System Inc. (800) 227-6477

Missouri
Missouri One Call System Inc. (800) 344-7483

Montana
Utilities Underground Location Center
(800) 424-5555
Montana One Call Center (800) 551-8344

Nebraska
Diggers Hotline of Nebraska (800) 331-5666

Nevada
Underground Service Alert North (800) 227-2600

New Hampshire
Dig Safe – New Hampshire (800) 225-4977

New Jersey
New Jersey One Call (800) 272-1000

New Mexico
New Mexico One Call System Inc.
(800) 321-ALERT
Las Cruces-Dona Utility Council (505) 526-0400

New York
Underground Facilities Protection Organization
(800) 962-7962
New York City: Long Island One Call Center
(800) 272-4480

North Carolina
The North Carolina One-Call Center Inc.
(800) 632-4949

North Dakota
Utilities Underground Location Center
(800) 795-0555

Ohio
Ohio Utilities Protection Service
(800) 362-2764

Oil & Gas Producers Underground Protection Service (800) 925-0988

Oklahoma
Call Okie (800) 522-6543

Oregon
Utilities Underground Location Center
(800) 424-5555

Douglas Utilities Coordinating Council
(503) 673-6676

Josephine Utilities Coordinating Council
(503) 476-6676

Rogue Basin Utility Coordinating Council
(503) 779-6676

Utilities Notification Center
(800) 332-2344

Pennsylvania
Pennsylvania One Call System Inc.
(800) 242-1776

Rhode Island
Dig Safe – Rhode Island (800) 225-4977

South Carolina
Palmetto Utility Protection Service Inc.
(800) 922-0983

South Dakota
South Dakota One Call (800) 781-7474

Tennessee
Tennessee One-Call System (800) 351-1111

Texas
Texas One Call System (800) 245-4545

Texas Excavation Safety System (800) 344-8377

Lone Star Notification Center (800) 669-8344

Utah
Blue Stakes Location Center (800) 662-4111

Vermont
Dig Safe – Vermont (800) 225-4977

Virginia
Miss Utility of Virginia (800) 552-7001

Miss Utility (800) 257-7777

Miss Utility of Delmarva (800) 441-8355

Washington
Utilities Underground Location Center
(800) 424-5555

Grays Harbor & Pacific County
Utility Coordinating Council
(206) 535-3550

Utilities County of Cowlitz County
(360) 425-2506

Chelan-Douglas Utilities Coordinating Council
(509) 663-6111

Upper Yakima County
Underground Utilities Council
(800) 553-4344

Inland Empire Utility Coordinating Council
(509) 456-8000

Palouse Empire Utilities Coordinating Council
(800) 822-1974

Utilities Notification Center (800) 332-2344

West Virginia
Miss Utility of West Virginia Inc. (800) 245-4848

Wisconsin
Diggers Hotline Inc. (800) 242-8511

Wyoming
West Park Utility Coordinating Council
(307) 587-4800

Call-In Dig-In Safety Council (800) 300-9811

Fremont County Utility Coordinating Council
(800) 489-8023

Central Wyoming Utilities Coordinating Council
(800) 759-8035

Southwest Wyoming One Call (307) 362-8888

Carbon County Utility
Utility Coordinating Council (307) 324-6666

Albany County Utility Coordinating Council
(307) 742-3615

Southeast Wyoming Utilities Coordinating Council
(307) 638-6666

Wyoming One-Call
(800) 348-1030

Utilities Underground Location Center
(800) 454-5555

Converse County Utility Coordination Council
(800) 562-5561

ATTACHMENT 2
UTILITY CLEARANCE FORM

Project No.: _____ Completed by: _____

Site Location: _____ Work Date: _____

Excavation Method/Overhead Equipment: _____

			Circle One		
1.	Underground Utilities				
	a)	Review of existing maps?	yes	no	N/A
	b)	Interview local personnel?	yes	no	N/A
	c)	Site visit and inspection?	yes	no	N/A
	b)	Excavation areas marked in the field?	yes	no	N/A
	e)	Utilities located in the field?	yes	no	N/A
	f)	Located utilities added to site maps?	yes	no	N/A
	g)	State One-Call agency called?	yes	no	N/A
		Caller: _____			
		Ticket Number: _____ Date: _____			
	h)	Geophysical survey performed?	yes	no	N/A
		Survey performed by: _____			
		Method: _____ Date: _____			
	i)	Hand auguring performed?	yes	no	N/A
		Auguring completed by: _____			
		Total depth: _____ feet Date: _____			
	j)	Trench/excavation probed?	yes	no	N/A
		Probing completed by: _____			
		Depth/frequency: _____ Date: _____			
2.	Overhead Utilities		Present	Absent	
	a)	Determination of nominal voltage	yes	no	N/A
	b)	Marked on site maps	yes	no	N/A
	c)	Necessary to lockout/insulate/re-route	yes	no	N/A
	d)	Document procedures used to lockout/insulate/re-route	yes	no	N/A
	e)	Minimum acceptable clearance (SOP Section 5.2): _____			

6. Approval:

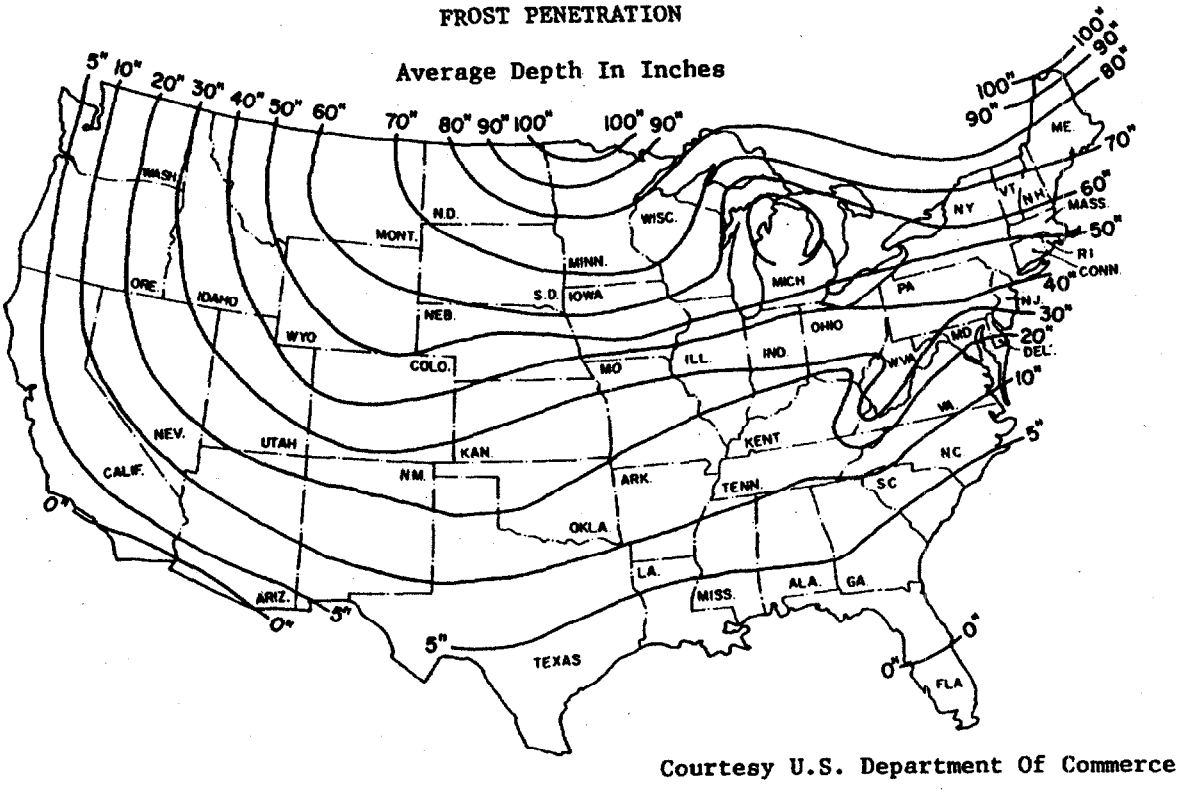
_____ _____

Site Manager/Field Operations Leader Date

cc: PM/Project File
Program File

ATTACHMENT 3

FROST LINE PENETRATION DEPTHS BY GEOGRAPHIC LOCATION



Courtesy U.S. Department Of Commerce

APPENDIX B

REMEDIAL INVESTIGATION REPORT DOCUMENT SUMMARY

The Document Summary included in this appendix was extracted from

TtNUS (Tetra Tech NUS), 1999. Remedial Investigation Report, Site 12 - Town Gut Landfill, Site 39/41 – Organics Plant/Scrap Yard, Site 42 – Olsen Road Landfill, Site 44 – Soak Out Area, Indian Head Division, Naval Surface Warfare Center, Indian Head, Maryland, March.

DOCUMENT SUMMARY

This remedial investigation (RI) report for the Indian Head Division Naval Surface Warfare Center (IHDIV-NSWC), Indian Head, Maryland, was prepared by Tetra Tech NUS, Inc. (formerly Brown and Root Environmental) in response to Contract Task Order (CTO) 0245, under the Comprehensive Long-Term Environmental Action Navy (CLEAN), Contract Number N62472-90-D-1298. The purpose of this RI report is to evaluate field data collected in October 1997, in addition to field data collected in 1992 in connection with previous field investigations, to determine the human health and environmental risks resulting from compounds determined to be present at the Site 12 - Town Gut Landfill, Sites 39/41 - Organics Plant/Scrap Yard, Site 42 - Olsen Road Landfill, and Site 44 - Soak Out Area.

Field investigations leading to this report were outlined in a site-specific work plan (B&R Environmental, 1997c) which examined historical data and detailed the additional environmental samples and analytical methods needed to better define conditions at each of the sites. The historical data was published in site inspection (SI) reports (E/A&H, 1992 and E/A&H, 1994) previously prepared by another firm. The additional field sampling described in the site-specific work plan was collected by Brown & Root Environmental (B&R Environmental) in October 1997. Environmental data from the SI reports were included along with the data from the October 1997 field investigations in the analytical data base prepared in support of this RI report.

The following paragraphs provide summaries of the investigations, conclusions and recommendations for each of the sites addressed in this report. Table DS-1 summarizes the estimated cancer risks and the non-carcinogenic hazard indices for each site.

D.1 SITE 12 - TOWN GUT LANDFILL

D.1.1 Site Characterization Summary

The following items summarize the field investigations conducted at Site 12.

1. A geophysical investigation was conducted over the field immediately south of Atkins Road and east of the nearby pond for the purpose of determining if landfill activity may have occurred at that location. The results of the survey indicate the presence of buried metal objects, leading to the conclusion that landfilling did occur in the area of the survey.

2. Field work included drilling and logging six borings, each of which was completed as a shallow groundwater monitoring well. Environmental samples included six groundwater samples (from

the installed monitoring wells), five surface soil samples, six surface water samples, and six sediment samples. Solids samples were analyzed for a full list of TCL and TAL compounds plus explosives. Additionally, the sediment samples were analyzed for AVS/SEM. Aqueous samples were analyzed for a full list of TCL and TAL compounds. Both filtered and unfiltered shallow groundwater samples were analyzed for TAL metals.

3. No historical samples had been collected from the site as part of previous site investigations.

4. The borings installed at the site revealed that subsurface conditions consisted of silt, sand, and gravel (fill) overlying refuse material (wood, plastic, cloth, concrete, and tar shingles) mixed with silt, sand, gravel and interspersed with void spaces.

5. Installed monitoring wells were all in close proximity to water bodies or marshy areas. The water-table aquifer consisted primarily of the refuse material mixed with silt, sand, and gravel. The shallow groundwater depth ranged from 1 foot bgs to 4 feet bgs. The elevation of the shallow groundwater surface varied from 5.01 to 5.21 feet above mean sea level.

D.1.2 Nature and Extent of Contamination Summary

The following items summarize the nature and extent of contamination at Site 12:

1. With the exception of two pesticides detected at relatively low concentrations (endosulfan II and heptachlor epoxide at concentrations ranging from 0.001 µg/L to 0.006 µg/L) and a few metals detected at concentrations exceeding ambient water quality criteria (arsenic, iron, manganese, and mercury), analytical data for Site 12 surface water samples suggest that historic activities at Site 12 have had minimal impact on Site 12 surface water quality.

2. Vinyl chloride and cis-1,2-dichloroethene were detected at concentrations of 317 µg/L and 306 µg/L, respectively, in the shallow groundwater sample collected from well S12WP01. With these exceptions, VOCs were detected infrequently and, in general, at low concentrations in all Site 12 samples regardless of matrix.

3. Several SVOCs, primarily PAHs, were detected in Site 12 surface soil samples. The same list of SVOCs that was detected in surface soil samples was also detected in Site 12 sediment samples. However, maximum concentrations of SVOCs detected in Site 12 sediment samples were generally from 10 to 20 times greater than maximum concentrations of SVOCs detected in Site 12 surface soil samples. The maximum concentrations of all the SVOCs except bis(2-ethylhexyl) phthalate detected in surface soil samples were associated with the surface soil sample collected from

location S12SS01, located south of the northern pond. With the exception of bis(2-ethylhexyl) phthalate, the maximum concentrations of all SVOCs detected in sediment samples were associated with the sediment sample collected from location SD/SW06, located in the northern portion of Site 12. SVOCs were detected infrequently and at low concentrations (ranging from 2 µg/L to 17 µg/L) in Site 12 shallow groundwater samples.

4. 4,4'-DDT and its degradation products were detected in most or all the Site 12 surface soil and sediment samples. Concentrations of these three pesticides in surface soil samples ranged from 0.93 µg/kg to 21 µg/kg, and concentrations of these pesticides in sediment samples ranged from 1.5 µg/kg to 53 µg/kg. A few additional pesticides were sporadically detected in Site 12 surface soil and sediment samples. In addition, Aroclor 1254 was detected in a single surface soil sample, and Aroclor 1260 was detected in a single sediment sample. 4,4'-DDT and its derivatives were not detected in any of the Site 12 shallow groundwater samples. However, four other pesticides were detected (each in only a single sample) at low concentrations (ranging from 0.002 µg/L to 0.005 µg/L) in Site 12 shallow groundwater samples.

5. Nitrocellulose was detected in a single Site 12 surface soil sample (46,200 µg/kg). However, nitrocellulose was detected in four of six Site 12 sediment samples at concentrations ranging from 26,700 µg/kg to 471,000 µg/kg. No other explosives were detected in Site 12 surface soil or sediment samples.

6. Several metals (e.g., arsenic, cadmium, mercury, and silver) were detected in surface soil, shallow groundwater, and/or sediment sampling locations at concentrations exceeding basewide background concentrations.

D.1.3 Summary of Risk Assessment

The following items summarize the human health risk assessment for the Town Gut Landfill:

1. The human health risk assessment for the Town Gut Landfill considered current/future maintenance workers and current/future full-time employees exposed to surface soil and sediment; current/future adolescent trespassers exposed to surface soil, surface water, sediment, and fish; future construction workers exposed to surface soil, shallow groundwater, and sediment; and hypothetical future residents exposed to surface soil, shallow groundwater, surface water, sediment, and fish.

2. Hazard indices for maintenance workers and adolescent trespassers were less than 1.0 indicating that there is minimal potential for adverse noncarcinogenic health effects under the conditions established in the exposure assessment.

3. Hazard indices for investigation of fish by adolescent trespassers were above the acceptable level of 1.0. Di-n-butylphthalate was the main contributor to the hazard index.

4. Hazard indices for the full-time employee and construction worker exceed 1.0 for the RME scenario, but the hazard indices for the effected target organs were less than 1.0, indicating that there is minimal potential for adverse noncarcinogenic health effects under the conditions established in the exposure assessment.

5. The hazard indices for a future child resident exposed to soil and shallow groundwater and a future adult resident exposed to shallow groundwater and ingestion of fish were above the acceptable level of 1.0. Arsenic and iron were the main contributors to the hazard index for soil. Arsenic, iron, and manganese were the main contributors to the hazard index for shallow groundwater. Di-n-butylphthalate was the main contributor to the hazard index for ingestion of fish.

6. Incremental lifetime cancer risks for maintenance workers, full-time employees, construction workers, and adolescent trespassers were within or less than EPA's target risk range of 10^{-4} to 10^{-6}.

7. The incremental lifetime cancer risk for a lifelong resident exposed to shallow groundwater exceeded EPA's target risk range of 10^{-4} to 10^{-6}. Arsenic and vinyl chloride were the main contributors to the cancer risk for the lifelong adult resident.

8. The maximum detected concentration of lead in shallow groundwater exceeds the Federal action level of 15 µg/L. The IEUBK Model was used to evaluate exposures to lead in soil and shallow groundwater by hypothetical resident children. The IUEBK Model results indicate that adverse effects due to lead exposure are anticipated for children routinely consuming shallow groundwater under a residential scenario.

D.1.4 Ecological Risk Assessment Summary

The following items summarize the ecological risk assessment conducted for Site 12:

1. Some potential ecological risks are present from mercury, chromium, nickel, and PAHs in sediments. Potential risks are present from lead in surface water and the aquatic foodchain.

2. The presence of nitrocellulose could potentially degrade the physical quality of Site 12 sediments.

3. Potential ecological risks are present from hot-spots of mercury, silver, and Aroclor 1254 in Site 12 surface soils. To a lesser degree, some potential risks from arsenic, chromium, and lead are also present in surface soils.

4. Extensive biomonitoring in the ponds was conducted as part of Site 8 investigations. The biomonitoring concluded that the generally low diversity and abundance of aquatic biota in the Site 12 ponds was due to naturally poor physic-chemical conditions and probably not a result of chemical contamination. The biomonitoring also indicated that lead and mercury were not in readily available forms. The absence of apparent adverse effects from chemicals in the ponds suggests that organics also may not eliciting toxicity.

D.1.5 Recommendations

- Conditioned on continuation of the site's current use, the potential risks to human health do not warrant additional action at this time. The minimal potential risks present under the current land use are within the range of acceptable values. The need for future action should be reconsidered if plans evolve for modifying the land use (e.g., to a residential land use).

- Analytical data from environmental media indicate that the possibility for ecological risk exists at Site 12. However, previous biomonitoring investigations conducted in the pond adjacent to Site 12 in connection with the upgradient Site 8 (Nitroglycerine Plant Office) concluded that contaminants in the ponds were apparently not in a bioavailable form, and are not adversely impacting aquatic communities. Therefore, additional ecological study in connection with Site 12, is not recommended.

- An action such as the placement of a cap may be necessary at Site 12 to mitigate the surface soil ecological exposure routes and the transport of surface soil chemicals to the ponds in runoff. If ecological PRGs for surface soils are necessary in the closure process, they should be calculated for mercury, silver, and Aroclor 1254.

- Given the site's past use as a landfill, it is recommended that a feasibility study be prepared to examine options for closing the landfill in response to COMAR 26.04.07.

D.2 SITE 39/41 - ORGANICS PLANT/SCRAP YARD

D.2.1 Site Characterization Summary

The following items summarize the field investigations conducted at Site 39/41.

1. Historical environmental data reported in the Phase II SI report (E/A&H, 1994) were incorporated into the database for this RI report. (However, because more current groundwater data was available from the 1997 field investigations, historical groundwater data was not included in the database.) Environmental samples collected as part of that work included 11 sediment samples from Mattawoman Creek near Sites 39, 40, and 41, and three sediment samples at the Site 39 outfall pipe; 23 surface and subsurface soil samples from Site 41; and shallow groundwater samples from three monitoring wells installed at the Site 41. All samples related to Site 41 were analyzed for the full list of TCL and TAL compounds, plus TPH, except that surface water was not analyzed for TPH. Sediment samples for Site 39 were analyzed for TCL VOCs and SVOCs, TAL compounds, and explosives. Sediment samples for Site 40 were analyzed for palladium only (no detections occurred).

2. The October 1997 field activities included the collection of four shallow groundwater samples (one from each of three existing monitoring wells, and one from potable water well PW-7), nine surface soil samples, eight sediment samples and six surface water samples for fixed-base laboratory analysis. Groundwater samples were submitted to the laboratory as both filtered and unfiltered samples. Solids samples were analyzed for a full suite of TCL and TAL compounds in addition to explosives. Aqueous samples were analyzed for TCL VOCs, TCL SVOCs, and TAL metals. Groundwater samples were additionally subjected to analysis for TCL pesticides/PCBs and explosives. Both filtered and unfiltered groundwater samples were submitted for TAL metals analysis.

3. Subsurface conditions for Site 41 were evaluated based on data in the Phase II SI report (E/A&H, 1994). The subsurface materials generally consist of clayey sand interlayered with clayey gravel and sand lenses underlain by green-gray clay, except on the northern portion of the site where it is underlain by a brown sandy clay. Two- to 5-feet-thick layers of slag and coal were encountered in the most southern and northern portions of the study area, outside the fence surrounding the scrap yard.

4. Hydrogeologic conditions were evaluated based on data in the Phase II SI report, supplemented by groundwater level measurements made during the October 1997 field activities. The depth to shallow groundwater ranged from approximately 2 to 4 feet bgs. Shallow groundwater elevations

vary from 4.55 to 8.58 feet msl. Data indicate that shallow groundwater is flowing toward Mattawoman Creek, but the tidal nature of the creek may affect the groundwater flow patterns. The green-gray clay underlying the site at approximately 15 feet bgs probably impedes the downward migration of the shallow groundwater to deeper aquifers.

D.2.2 Nature and Extent of Contamination Summary

The following items summarize the nature and extent of contamination at Site 39/41:

1. Analytical data for Site 39/41 shallow groundwater and surface water samples suggest that historic activities at Site 39/41 have had minimal impact on shallow groundwater and surface water quality in the vicinity of Site 39/41.

2. Regardless of matrix, VOCs were detected infrequently and, in general, at low concentrations in all Site 39/41 samples. Several SVOCs, primarily PAHs, were detected in Site 41 surface soil samples. All but three of the PAHs were detected in more than half of the surface soil samples. PAH concentrations in surface soil samples ranged from 42 µg/kg to 6,100 µg/kg. 1,2,4-Trichlorobenzene was also detected in more than half of the surface soil samples at concentrations ranging from 50 µg/kg to 4,800 µg/kg. SVOCs were detected on only two of the 22 Site 39/41 subsurface soil samples at concentrations generally from five to 20 times less than surface soil concentrations. 1,2,4-Trichlorobenzene was not detected in any of the subsurface soil samples.

3. 1,1-Dimethylhydrazine was detected in three of six sediment samples collected from locations near the Site 39 outfall at concentrations ranging from 57,500 µg/kg to 85,500 µg/kg. N-Nitrosodiphenylamine was detected in seven of 24 Site 39/41 sediment samples at concentrations ranging from 120 µg/kg to 3,100 µg/kg. Several PAHs were also detected in Site 39/41 sediment samples. However, PAHs were generally detected with less frequency and at lesser concentrations in Site 39/41 sediment samples than in Site 41 surface soil samples.

4. Pesticides were sporadically detected in Site 41 surface and subsurface soil samples. The subsurface soil sample collected at a depth interval of 5 to 7 feet from boring 41SB0201 contained the greatest number and greatest total concentration of pesticides, including 4,4'-DDT at a concentration of 980 µg/kg. However, only 4,4'-DDT (5.9 µg/kg) was detected in the subsurface soil sample collected at a depth interval of 10 to 12 feet from this same boring. Several pesticides were detected in Site 39/41 sediment samples, although the maximum concentration of any of these pesticides was 11 µg/kg (4,4'-DDT). 4,4'-DDT and its two derivatives were each detected in at least one-third of the Site 39/41 sediment samples.

5. Widespread PCB contamination is evident in the surface soils at Site 41, with detected concentrations of Aroclor 1260 in ranging from 330 µg/kg to 180,000 µg/kg. However, PCBs were not detected in the subsurface soil samples collected from Site 41 or in the Site 39/41 sediment samples.

6. Nitrocellulose was detected in two of the Site 41 surface soil samples at a maximum concentration of 288 µg/kg. However, nitrocellulose was detected in 12 of 14 Site 39/41 sediment samples at concentrations ranging from 9,900 µg/kg to 1,580,000 µg/kg. Nitroguanidine was detected in over one-half of the Site 41 surface soil samples, at concentrations ranging from 24,400 µg/kg to 33,200 µg/kg, but was detected in only two of 14 Site 39/41 sediment samples at concentrations ranging from 178 µg/kg to 1880 µg/kg. Analyses for explosives were not performed for any of the Site 39/41 subsurface soil samples.

7. Several metals (e.g., arsenic, cadmium, lead, mercury, and silver) were detected at sampling locations at concentrations exceeding basewide background concentrations. Lead and arsenic were each detected in all 10 Site 39/41 surface soil samples at concentrations ranging from 22.5 mg/kg to 3,540 mg/kg (lead) and from 21.8 mg/kg to 216 mg/kg (arsenic). Cadmium was detected in 9 of 10 surface soil samples at concentrations ranging form 0.56 mg/kg to 45.6 mg/kg. The maximum concentrations of most metals in subsurface soil samples were less than the maximum concentrations of the respective metals in surface soil samples.

8. Maximum concentrations of most metals detected in Site 39/41 sediment samples were less than maximum concentrations of metals detected in Site 41 surface soil samples. However, notable detections of metals in Site 39/41 sediment samples include concentrations of mercury ranging from 0.02 mg/kg to 9.5 mg/kg in 16 of 24 samples and concentrations of silver ranging from 0.27 mg/kg to 308 mg/kg in 20 of 24 samples. The maximum concentrations of mercury and silver were detected in sediment samples collected downstream of the Site 39 outfall.

E.2.3 Summary of Risk Assessment

The following items summarize the human health risk assessment for the Organics Plant/Scrap Yard:

1. The human health risk assessment for the Organics Plant considered current/future adult recreational users exposed to surface water, sediment, and fish and future construction workers exposed to sediment. No surface soil or subsurface soil samples were collected at the Organics Plant, therefore exposures were not evaluated for current/future maintenance workers, current/future full-time employees, and hypothetical future residents.

The human health risk assessment for the Scrap Yard considered current/future maintenance workers exposed to surface soil; current/future full-time employees exposed to surface soil; current/future adolescent trespassers exposed to surface soil; future construction workers exposed to surface/subsurface soil, shallow groundwater, and sediment; hypothetical future residents exposed to surface/subsurface soil, shallow groundwater, and sediment, and adult recreational user exposed to sediment.

2. Hazard indices for maintenance workers, adolescent trespassers, adult recreational users at the Scrap Yard and adult recreational users and construction workers at the Organic Plant were less than 1.0 indicating that there is minimal potential for adverse noncarcinogenic health effects under the conditions established in the exposure assessment.

3. Hazard indices for the full-time employee, the construction worker, future child resident and future adult resident at the Scrap Yard exceed 1.0. Arsenic and iron were the main contributors to the hazard index for soil for all the receptors and arsenic was the main contributor to the hazard index for shallow groundwater for the future child and adult resident.

4. Incremental lifetime cancer risks for maintenance workers, adolescent trespassers, construction workers, and adult recreation users were within or less than EPA's target risk range of 10^{-4} to 10^{-6}.

5. Incremental lifetime cancer risks for the full-time employee and lifelong resident exceed the EPA's target risk range for exposures to soil at the Scrap Yard. Arsenic and Aroclor-1260 were the main contributors to the cancer risk.

6. The maximum detected concentration of lead in soil exceeded the OSWER soil screening level of 400 mg/kg for residential land use (EPA, 1994) and the EPA Region III screening level of 1000 mg/kg for industrial use. The average lead concentration was less than the residential and industrial screening levels. The IEUBK Model was used to evaluate exposures to lead in soil and shallow groundwater by hypothetical resident children. The IUEBK Model results indicate that adverse effects due to lead exposure are anticipated for children routinely consuming shallow groundwater under a residential scenario. A slope-factor approach developed by the EPA Technical Review Workgroup for was used to evaluate exposures to lead in soil by full-time employees and construction workers. The results of the slope-factor approach indicate that adverse effects are anticipated for fetuses of pregnant workers exposed to lead in soil at the Scrap Yard.

D.2.4 Ecological Risk Assessment Summary

The following items summarize the ecological risk assessment conducted for Sites 39 and 41:

1. Several inorganic and organic chemicals are present in aquatic media in Mattawoman Creek adjacent to Sites 39 and 41 that pose potential risks to aquatic, semi-aquatic, and benthic ecological receptors.

2. Potential risks are present from arsenic, cadmium, lead, and Aroclor 1260, and to a lesser degree copper, mercury, selenium, and zinc in surface soils in the Scrap Yard.

D.2.5 Recommendations

- Potential human health risks under the current land use exceed guidelines only for the full-time worker scenario. Although the current land use does not include true full-time workers, it is recommended that a feasibility study be prepared to examine options for reducing the full-time worker exposure to contamination to acceptable levels. The need for future additional action should be reconsidered if plans evolve for modifying the land use (e.g., to a residential land use).

- Potential ecological risks are present from chemicals in surface water and sediment in Mattawoman Creek near Sites 39 and 41. It is recommended that a more complete ecological assessment of Mattawoman Creek be considered as a separate study.

- Potential ecological risks are present from chemicals in Scrap Yard surface soils. A feasibility should be initiated to examine methods for mitigating the transport of surface soil chemicals from the Scrap Yard to Mattawoman Creek via runoff. Additional ecological study is warranted in this event to develop ecological PRGs for several inorganics and Aroclor 1260 in site surface soils.

D.3 SITE 42 - OLSON ROAD LANDFILL

D.3.1 Site Characterization Summary

The following items summarize the field investigations conducted at Site 42.

1. Historical environmental data reported in the Phase I SI report (E/A&H, 1992) was incorporated into the data base for this RI report. (However, because more current shallow groundwater data was available from the 1997 field investigations, historical groundwater data was not included in the database.) Environmental samples collected as part of that work included seventy-seven soil

samples from soil borings, seven surface soil samples, four sediment samples, four surface water samples and seven shallow groundwater samples. The samples were analyzed for TCL VOCs, SVOCs and pesticide/PCBs, in addition to TAL metals.

2. During the field activities in October 1997, the samples collected included three from surface soil; four from existing monitoring wells, and one from a newly installed monitoring well; four from surface water; and six from sediment. Surface soil samples were analyzed for TCL VOCs, SVOCs and pesticides/PCBs. Shallow groundwater samples were analyzed for TCL VOCs and SVOCs, as well as TAL metals plus cyanide. Surface water samples were analyzed for TAL metals only. Sediment samples were analyzed for TAL metals plus cyanide, total organic carbon (TOC) and acid volatile sulfides/simultaneous extractable metals (AVS/SEM).

3. The upper of the two units making up the site's shallow subsurface materials consists of a reddish to brown silty clay with some organic material and iron staining. The second, lower unit consists of a brown and gray, poor to moderately sorted, medium- to fine-grained sand with minor amounts of silt and clay. No fill material was encountered during the field investigation.

4. The groundwater surface under the site ranges from 5.96 to 18.46 feet above mean sea level (msl). Shallow groundwater appears to be flowing toward and discharging into the stream located southwest of Building 1866. The shallow groundwater is primarily recharged by downward migration of precipitation through the unsaturated zone to the water table.

E.3.2 Nature and Extent of Contamination Summary

The following items summarize the nature and extent of contamination at Site 42:

1. Localized areas of contamination or "hot spots" appear to be present in Site 42 soils and shallow groundwater. The presence of these hot spots is consistent with the use of Site 42 as a landfill since materials placed in the landfill may serve as sources of contamination in the limited area surrounding the placement of the material. For example, reported concentrations of ethylbenzene, toluene, and total xylenes suggest a release of fuel-related contaminants in the subsurface soils near boring 42B16, located along the perimeter of the area of debris in the undeveloped portion of Site 42. In addition, TCE and its degradation products were detected at concentrations ranging from 9 µg/L to 5,210 µg/L in the shallow groundwater sample collected from well S42MW04 and at concentrations ranging from 1 µg/kg to 180 µg/kg in the subsurface soil samples collected in the vicinity of this well. This suggests the presence of a hot spot of TCE in the area southwest of the southeastern corner of Building 1688.

2. Toluene was detected in two Site 42 surface soil samples collected on the southeastern side of Building 1688. 1,4-Dichlorobenzene and 4-methylphenol were detected in a single surface soil sample collected on the southeastern side of Building 1688. From one to six PAHs were detected at relatively low concentrations (ranging from 42 μg/kg to 76 μg/kg) in the surface soil samples collected from the three sampling points located near the southeastern portion of Site 42. In addition, 4,4'-DDT was detected at concentrations ranging from 4.9 μg/kg to 23 μg/kg in the five surface soil samples collected within or adjacent to Building 1688. No other SVOCs, pesticides, or PCBs were detected in Site 42 surface soil samples. Analyses for metals were not performed for surface soil samples.

3. Bis(2-ethylhexyl) phthalate was detected in Site 42 surface, subsurface, and sediment samples at concentrations ranging from 1,700 μg/kg to 28,000 μg/kg. Although phthalates are common field and laboratory contaminants, concentrations consistently reported at these levels suggest that significant concentrations (i.e., concentrations exceeding background) of bis(2-ethylhexyl) phthalate may be present in the soils and sediment at Site 42. With the exceptions of bis(2-ethyhexyl) phthalate and di-n-butyl phthalate, several SVOCs, primarily PAHs, were infrequently detected in Site 42 subsurface soil samples. These SVOCs were detected in only four of the 77 subsurface soil samples collected, and these four samples were all collected southwest of Building 1688 within or near the area of debris.

4. Several pesticides were detected in Site 42 subsurface soil samples. Endosulfan sulfate and 4,4'-DDT were detected in 22 and 14 of 77 samples, respectively, at concentrations ranging from 4 μg/kg to 24 μg/kg. The remaining pesticides were each detected in from one to five samples. Pesticides were detected at various depth intervals in the subsurface soils throughout Site 42. However, in general, the greatest total number and the maximum concentrations of pesticides were associated with subsurface soil samples collected from the area of debris in the undeveloped portion of the site.

5. The maximum concentrations of several metals detected in Site 42 subsurface soil samples exceeded basewide background concentrations. However, with the exceptions of lead, nickel, and zinc, all reported concentrations were within the available concentration ranges reported in the literature for soils of the eastern United States and/or the state of Maryland.

6. As previously noted, concentrations of TCE and some of its degradation products in the shallow groundwater collected from well S42MW04 suggest the presence of a hot spot of TCE. With this exception, VOCs and SVOCs were infrequently detected at low concentrations in Site 42 shallow groundwater samples. Several metals were detected in the unfiltered and filtered groundwater

samples collected from well S42MW07, located upgradient of the other Site 42 wells and crossgradient with Building 1688, at concentrations from two to 60 times greater than basewide background levels. Few reported results for metals in other Site 42 shallow groundwater samples exceeded background levels. This suggests that the source of metals contamination in the shallow groundwater collected from well S42MW07 may be upgradient of Site 42. The maximum concentrations of a majority of the metals detected in Site 42 surface water samples were detected in a surface water sample collected southwest of well S42MW07, also suggesting the possibility of an off-site upstream source of metals contamination.

7. Few VOCs or SVOCs were detected in Site 42 sediment samples. Acetone, 2-butanone, di-n-butyl phthalate, and bis(2-ethylhexyl) phthalate were also detected in Site 42 sediment samples. Seven pesticides were sporadically detected in Site 42 sediment samples. However, no particular pattern of pesticide concentrations was apparent from upstream to downstream sediment sampling locations.

8. Silver was detected in all Site 42 sediment samples at concentrations ranging from 1 mg/kg to 99 mg/kg. Concentrations of cadmium and sodium in Site 42 sediment samples also exceeded basewide background levels.

D.3.3 Summary of Risk Assessment

The following items summarize the human health risk assessment for the Olsen Road Landfill:

1. The human health risk assessment for the Olsen Road Landfill considered current/future maintenance workers and current/future full-time employees exposed to surface soil and sediment; current/future adolescent trespassers exposed to surface soil, surface water, and sediment; future construction workers exposed to surface/subsurface soil, shallow groundwater, and sediment; and hypothetical future residents exposed to surface/subsurface soil, shallow groundwater, surface water, and sediment.

2. Hazard indices for maintenance workers, full-time employee, and adolescent trespassers were less than 1.0 indicating that there is minimal potential for adverse noncarcinogenic health effects under the conditions established in the exposure assessment.

3. Hazard indices for the construction worker exceed 1.0 for the RME scenario, but the hazard indices for the effected target organs were less than 1.0; indicating that there is minimal potential for adverse noncarcinogenic health effects under the conditions established in the exposure assessment.

4. The hazard indices for a future child resident exposed to soil and shallow groundwater and a future adult resident exposed to shallow groundwater were above the acceptable level of 1.0. Iron was the main contributor to the hazard index for soil. Trichloroethene, arsenic, chromium, iron, and vanadium were the main contributors to the hazard index for shallow groundwater for the child resident. Trichloroethene, arsenic, and iron were the main contributors to the hazard index for shallow groundwater for the adult resident.

5. Incremental lifetime cancer risks for maintenance workers, full-time employees, constructions workers, and adolescent trespassers were within or less than EPA's target risk range of 10^{-4} to 10^{-6}.

6. The incremental lifetime cancer risk for a lifelong resident exposed to shallow groundwater exceeded EPA's target risk range of 10^{-4} to 10^{-6}. Trichloroethene and vinyl chloride were the main contributors to the cancer risk.

7. The maximum detected concentration of lead in shallow groundwater exceeds the Federal action level of 15 µg/L. The IEUBK Model was used to evaluate exposures to lead in soil and shallow groundwater by hypothetical resident children. The IUEBK Model results indicate that adverse effects due to lead exposure are anticipated for children routinely consuming shallow groundwater under a residential scenario.

D.3.4 Ecological Risk Assessment Summary

The following items summarize the ecological risk assessment conducted for Sites 42:

1. Potential risks are present from silver, zinc, and bis(2-ethylhexyl)phthalate in site sediments. Silver appears to be elevated to much more significant degree than zinc and bis(2-ethylhexyl)phthalate.

2. Several inorganics were elevated in a site surface water sample and a shallow groundwater sample collected near that surface water sample. In general, the elevated inorganics in these samples do not appear to be accumulating in sediments, but the shallow groundwater discharge pathway to surface water and surface water risks may exist.

D.3.5 Recommendations

- Incremental lifetime cancer risks for maintenance workers, full-time employees, construction workers and adolescent trespassers were within EPA guidelines. For all other scenarios, either the human health risks were below EPA guidelines of the scenarios were based on future conditions. Based on maintaining the current land use, potential human health risks do not warrant further action at this time. The need for future action should be reconsidered if plans evolve for modifying the land use (e.g., to a residential land use).

- Additional ecological study is necessary to more fully characterize potential risks from silver in sediments. These data could be used to calculate ecological PRGs for silver. Any removal action for silver in sediments would additionally mitigate the lesser risks from zinc and bis(2-ethylhexyl)phthalate in the site sediments.

- Given the site's past use as a landfill, it is recommended that a feasibility strictly be prepared to examine options for closing the landfill in response to COMAR 26.04.07..

D.4 SITE 44 - SOAK OUT AREA

D.4.1 Site Characterization Summary

The following items summarize the field investigations conducted at Site 44.

1. Historical environmental data reported in the Phase II Site Inspection Report (E/A&H, 1994) was incorporated into the data base for the RI report. (However, because more current shallow groundwater data was available from the 1997 field investigation, historical groundwater data was not included in the database.) Environmental samples collected as part of that work included fifteen soil samples, two sediment samples, and six shallow groundwater samples from each of three monitoring wells installed in three converted soil borings. The collected samples were analyzed for TCL VOCs, SVOCs and pesticide/PCBs in addition to total petroleum hydrocarbons (TPH).

2. The October 1997 field investigations included the collection of three shallow groundwater samples from the existing monitoring wells. Shallow groundwater samples were analyzed for TCL VOCs and SVOCs, explosives in addition to nitroglycerin, nitrocellulose and nitroquanidine, and TAL metals plus cyanide. Four surface soil samples were collected and analyzed for explosives and TAL metals plus cyanide. Shallow groundwater samples were analyzed for TCL

VOCs and SVOCs, explosives in addition to nitroglycerin, nitrocellulose and nitroguanidine, and TAL metals plus cyanide.

3. Based on the Phase II Site Inspection Report (E/A&H, 1994), the descending order of subsurface materials at the site consisted of a fine- to medium-grain sand layer, clayey sand and gravel layer, and green clay to the bottom of the borings.

4. Water level measurements were made during the 1997 field investigations. The elevation of the shallow groundwater surface ranged from 34.58 to 36.45 feet above mean sea level (msl), and 3 to 5 feet below ground surface. Shallow groundwater flows toward the northeast toward the rip-rap drainage ditch. It is suspected that the green clay that underlies the site at about 10-12-feet bgs probably impedes downward migration to the shallow groundwater.

D.4.2 Nature and Extent of Contamination Summary

The following items summarize the nature and extent of contamination at Site 44:

1. Analytical data for Site 44 soil, shallow groundwater, and sediment samples suggest that historic activities at Site 44 have had minimal impact on the soil, shallow groundwater, and sediment quality in the vicinity of Site 44.

2. Few organic compounds were detected in Site 44 samples. Nitrocellulose was detected in three of four Site 44 surface soil samples at concentrations ranging from 20,300 µg/kg to 25,300 µg/kg. Three PAHs were detected at relatively low concentrations (ranging from 61 µg/kg to 340 µg/kg) in one or two of the Site 44 subsurface soil samples. TCE was detected at a concentration of 1 µg/L in a single Site 44 shallow groundwater sample. Acetone, a common laboratory contaminant, was detected in one of the Site 44 sediment samples.

3. Six metals were detected in Site 44 surface soil samples at concentrations exceeding basewide background concentrations. However, reported concentrations of all these metals were within the concentration ranges reported in the literature for soils in the eastern United States, and only the maximum detected concentration of zinc slightly exceeded the concentration range reported in the literature for Maryland soils. Reported concentrations of barium and zinc in Site 44 filtered shallow groundwater samples also exceeded basewide background concentrations.

4. TPH was detected at a concentration of 14.6 mg/kg in one Site 44 surface soil sample and at a concentration of 17 mg/kg in one Site 44 subsurface soil sample. Both of these concentrations are less than the respective basewide background concentrations for TPH. Fuel-related

components such as benzene, toluene, ethylbenzene, and xylene were not detected in the environmental media sampled at Site 44.

D.4.3 Summary of Risk Assessment

The following items summarize the human health risk assessment for the Soak Out Area:

1. The human health risk assessment for the Soak Out Area considered current/future maintenance workers and current/future full-time employees exposed to surface soil and sediment; current/future adolescent trespassers exposed to surface soil and sediment; future construction workers exposed to surface/subsurface soil, shallow groundwater, and sediment; and hypothetical future residents exposed to surface/subsurface soil, shallow groundwater, and sediment.

2. All hazard indices for all receptors were less than the acceptable level of 1.0 indicating that no adverse health effects are anticipated for these receptors under the assumed exposure conditions.

3. The excess lifetime cancer risks for all receptors were within or below the EPA target risk range of 10^{-4} to 10^{-6}. Cancer risks for the full-time employee and the lifelong resident exposed to arsenic in soil under the RME scenario exceed 1×10^{-6}.

4. Since exposures of residents to subsurface soil were within acceptable levels, exposures of other receptors to subsurface soil would also be within acceptable levels.

D.4.4 Ecological Risk Assessment Summary

- In the project-specific work plan (B&R Environmental, 1997c) it was determined that the potential for risks to ecological receptors at Site 44 was insignificant. Consequently, no quantitative ecological risk assessment was developed for Site 44.

D.4.5 Recommendations

- For all scenarios examined, all potential human health risks are within EPA guidelines. No further action is warranted at this site for the current land use

APPENDIX C

SITE 12 GEOPHYSICAL INVESTIGATION – OCTOBER 1997

This appendix was extracted from

TtNUS (Tetra Tech NUS), 1999. Remedial Investigation Report, Site 12 - Town Gut Landfill, Site 39/41 – Organics Plant/Scrap Yard, Site 42 – Olson Road Landfill, Site 44 – Soak Out Area, Indian Head Division, Naval Surface Warfare Center, Indian Head, Maryland, March.

APPENDIX C

GEOPHYSICAL INVESTIGATION
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

1.0 INTRODUCTION

Magnetic surveys are used to map the presence of perturbations in the earth's magnetic field caused by anomalous geologic structure, stratigraphy or anthropogenic features. The earth's magnetic field is composed of both spatial and temporal variations. Spatially, the earth's magnetic field is not perfectly symmetrical. It's axis is offset approximately 1,000 miles from the earth's geographic north pole. Numerous other high order poles and large anomalous regions also exist. These are primarily thought to be due to the characteristics of the earth's iron-nickel core. In addition, the solar wind distorts the earth's magnetic field to a tear-drop shape with the blunt end pointing towards the sun. Temporally, sun spots and solar storms also cause further short term distortion of the earth's magnetic field. Drift of the magnetic field due to solar storm activity is commonly referred to as diurnal drift and is generally only present during the daylight hours. On a local scale, the earth's magnetic field is further distorted by the presence of magnetic minerals or buried metallic objects.

Localized magnetic anomalies in the earth's magnetic field are caused by two different kinds of magnetism: induced or remanent magnetization. Induced magnetization occurs when the ferrous material acts as a magnet as a result of being in the presence of the magnetic field. Objects that exhibit induced magnetization enhance the local magnetic field. The ability of an object to exhibit induced magnetization depends upon the amount of ferrous material present. Remanent magnetism occurs when material is heated to a high temperature and the magnetic domains re-orient themselves in the direction of the ambient magnetic field. Objects that exhibit remanent magnetism can enhance or decrease the ambient field.

The presence of a buried metallic object can affect the local magnetic field differently depending on the direction of its induced and remanent magnetization relative to the ambient field and the orientation of the object. The direction of data collection can also affect how the anomaly is recorded. For instance, a buried steel drum can produce a positive, negative or combination of both depending upon its remanent magnetization, the direction of the ambient field and the direction of data collection. The magnetometers response is generally maximized when data are collected along north-south oriented survey lines.

Depth to the target features can also be estimated. Depths or distance from the sensor to the target features are approximately equal to one half the width of the anomaly. A table is attached that demonstrates the mass of various ferrous materials verses depth of burial verses instrument response.

Methodology

High resolution total field and vertical magnetic gradient data were collected on August 16, 1997 at Site 12, the Town Gut Landfill. Approximately 2,100 data points were collected along east-west trending survey lines spaced 10 feet apart. Data were collected using a Geometrix Model #858 cesium vapor magnetometer/gradiometer. The device utilized for this survey was equipped with two magnetic field sensors attached to an aluminum pole. The first sensor is located about one foot from the ground surface and the second sensor is located approximately three feet above the first. Both sensors record the earth's total magnetic field at intervals of one second or less. Total field data are commonly used to identify large or deeply buried features such as geologic structure or stratigraphic changes or to identify the presence of buried ferrous materials. Vertical gradient data are obtained by subtracting the top sensors reading from the bottom sensors reading and dividing by the separation distance. Vertical gradient data are not affected by diurnal drift or by the presence of large geologic structures. For this reason, the vertical gradient data are used to identify buried anthropogenic features such as drums, metallic debris, etc.

Total field data are collected in units of nanoTeslas (nT) in SI units where:

$$1 \text{ nanoTesla} = 1 \text{ gamma} = 10^{-5} \text{ Oersted}$$

Vertical gradient magnetic data are collected in units of nanoTeslas per meter (nT/m)

The frequency and amplitude of the anomaly is used to determine the mass and depth of the ferrous material present. The polarity of the anomaly is not considered as it will change depending upon the direction of data collection and the direction of the objects magnetism relative to the ambient magnetic field. For this reason, the absolute value of the vertical gradient data were taken and used for contouring and data interpretation.

2.0 RESULTS

The vertical magnetic gradient data are presented as Figure C-1. These data were color contoured such that shades of deep blue represent background conditions in respect to an absence of ferrous materials. Background conditions were observed only in the eastern areas of the site. These areas are anticipated

to have minimal amounts of metallic debris present on the surface or in the subsurface. The presence of non-metallic wastes at these background locations is possible.

Areas that represent the presence of buried metallic debris and metallic objects are shown in color contour shades of light blue, green, yellow, red and purple. This area includes the southern, western and central areas of the site. The anomalous response observed in the extreme northern areas of the site are believed to be due to the presence of metallic utilities that parallel Atkins Road. The boundary and extent of the landfill as defined by the presence or absence of metallic wastes, can be approximated by tracing the light blue and green color contour line. The landfill extent was not defined in the west due to the presence of a pond. The landfill appears to extend to the edges of the pond and metallic wastes are possibly present within the near shore areas of the pond.

The presence of large metallic objects, clusters of metallic objects or clusters of metallic debris can be identified within the landfilled area. These features are presented as anomalous responses shown in shades of orange, red and purple. Examples of objects that commonly result in similar magnitudes of vertical magnetic gradient are clusters of steel drums, sheet metal, metallic household appliances such as washers or dryers, car or truck engines, etc.

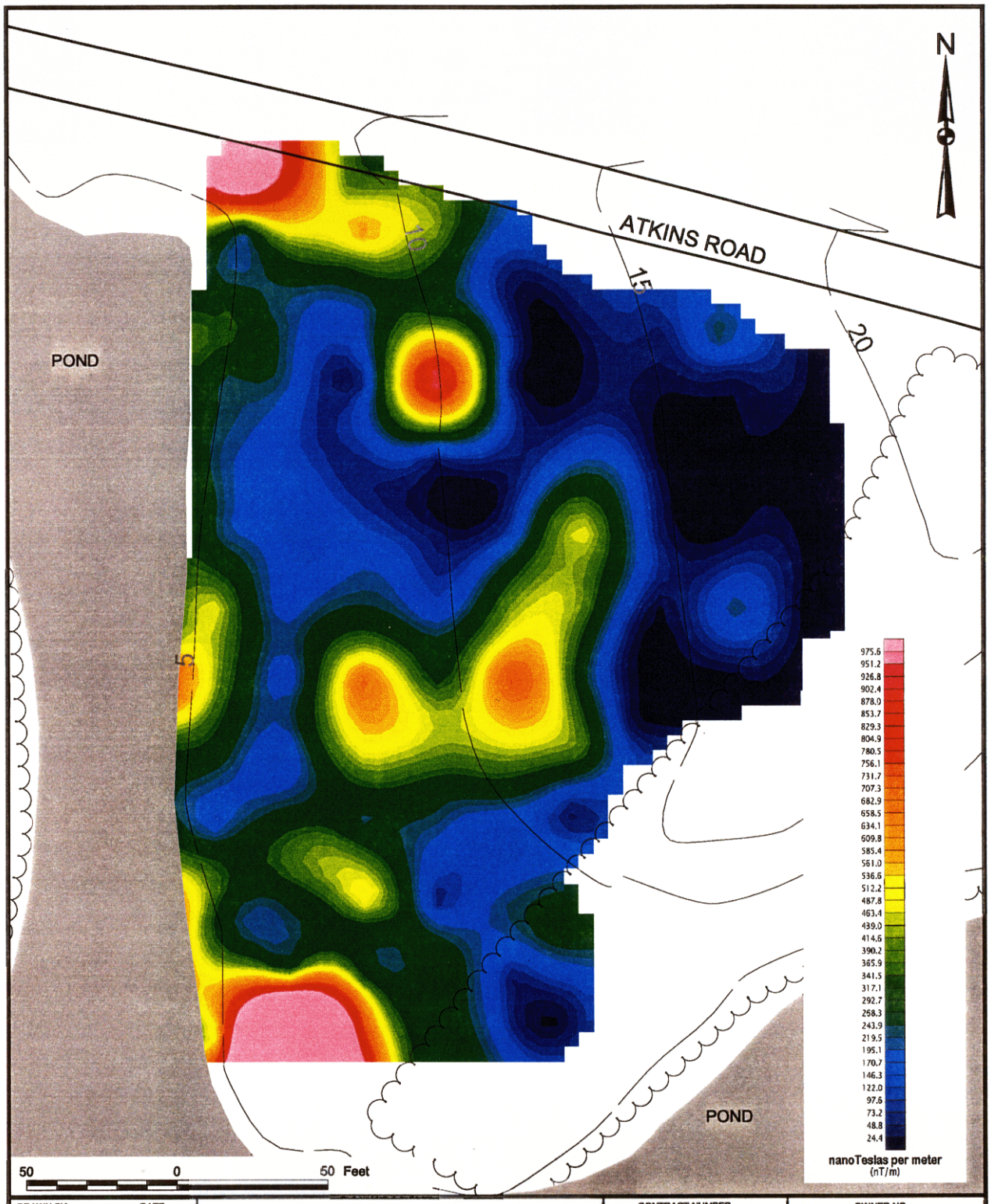
The remaining landfilled area is color contoured in shades light blue, green, yellow and orange. These anomalous responses probably represent the presence of small metallic objects and metallic debris. Examples of objects and clusters of objects that commonly result in similar magnitudes of vertical magnetic gradient are paint cans, car or truck parts, metallic food or drink containers, scrap wire or cable, metals from construction and demolition activities, etc.

3.0 CONCLUSIONS

The eastern and northeastern extents of the landfill have been defined by the magnetometer survey. The presence of Atkins Road and related buried utilities has prevented the definition of the landfill extent in the northwestern area of the site. Additional magnetometer data collected from north of Atkins Road may confirm that the road represents the northern boundary of landfilling.

The western extent of the landfill was not defined by the land-based field investigation due to the presence of the pond. The southern extent of the landfill was also not completely defined because the apparent landfilling activity extended further south than the pre-defined limits of the geophysical survey. The western extent of landfilling could be better defined by collecting magnetic data in the pond using a non-ferrous boat equipped with a magnetometer and sub-meter accuracy global positioning system (GPS)

DRAFT



DRAWN BY D. PERRY	DATE 15-MAY-98	CONTRACT NUMBER	OWNER NO.
CHECKED BY	DATE 5/18/98	APPROVED BY	DATE 5/18/98
COST/SCHEDULE-AREA	VERTICAL MAGNETIC GRADIENT RESULTS SITE 12 - TOWN GUT LANDFILL IHDIV-NSWC, INDIANHEAD, MARYLAND	APPROVED BY	DATE
SCALE AS NOTED		DRAWING NO FIGURE C-1	REV 0

P:\GIS\INDIANHD\7129.APR 15-MAY-98 DNP SITE 12 - VERTICAL MAGNETIC GRADIENT RESULTS LAYOUT

APPENDIX D

PROJECT-SPECIFIC
QUALITY ASSURANCE PROJECT PLAN

(To be used in conjunction with the Master Quality Assurance Project Plan)

Quality Assurance Project Plan

for

Sites 12, 41 and 42
Indian Head Division
Naval Surface Warfare Center

Indian Head, Maryland

Engineering Field Activity Chesapeake
Naval Facilities Engineering Command

Contract Number N62472-90-D-1298

Contract Task Order 0245

May 1999

QUALITY ASSURANCE PROJECT PLAN
FOR
SITES 12, 41 AND 42
INDIAN HEAD DIVISION
NAVAL SURFACE WARFARE CENTER
INDIAN HEAD, MARYLAND

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Engineering Field Activity Chesapeake
Environmental Branch Code 18
Naval Facilities Engineering Command
Washington Navy Yard, Building 212
Washington, D.C. 20374-2121

Submitted by:
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CONTRACT NUMBER N62472-90-D-1298
CONTRACT TASK ORDER 0245

MAY 1999

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1.0 PROJECT DESCRIPTION

1.1 INTRODUCTION

This project-specific Quality Assurance Project Plan (QAPP) has been prepared by Tetra Tech NUS, Inc. (TtNUS) on behalf of the United States Navy Engineering Field Activity Chesapeake Naval Facilities Engineering Command and the Indian Head Division Naval Surface Warfare Center (the facility) under the Comprehensive Long-Term Environmental Action Navy Contract N62472-90-D-1298, Contract Task Order 0245.

This document is intended to be used in conjunction with the Master Quality Assurance Project Plan (QAPP) dated April 1997 and is limited to the sections and information specific to Site 12 – Town Gut Landfill, Site 41 – Scrap Yard, and Site 42 – Olsen Road Landfill. This document is not intended to be used by itself.

1.1.1 Overall Project Objectives

The Master QAPP provides general quality assurance (QA) guidelines that are common to multiple site investigations to be conducted at the facility. It outlines QA issues for what are expected to be the most common types of field efforts and analyses during RIs. Specific project objectives are identified in the Project-Specific Work Plans. Additional QA issues are addressed in addenda to the Master QAPP as necessary and are to be provided as appendices to the Project-Specific Work Plans.

Important companion documents to the Master QAPP and the Project-Specific Work Plan include the Indian Head NSWC Master Standard Operating Procedures and the Master Plans for RIs (Master Work Plan), dated April 1997.

1.1.2 QAPP Preparation Guidelines

The project-specific QAPP has been prepared to be used in conjunction with the Master QAPP to fulfill the general requirements outlined in Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans, dated December 29, 1980 (QAMS-005/80).

1.2 FACILITY DESCRIPTION

A facility description, including the location and general description, station history, land use, water sources and usage, population, physiography and topography, geology, soils, hydrogeology, hydrology, ecology, and meteorology, is provided in the Master Work Plan.

1.3 PROJECT TARGET PARAMETERS AND INTENDED DATA USES

This section discusses typical field and laboratory analytical information to be generated during the course of the field investigation efforts for sites 12, 41 and 42. Field parameters and intended data uses are discussed in Section 1.3.1. Laboratory parameters and intended data uses are discussed in Section 1.3.2.

1.3.1 Field Parameters

Field parameters will typically include those associated with the collection of surface soil samples and sediment samples.

Field measurements of total volatile organics will be completed using a photoionization detector (PID). These measurements will be used for health and safety purposes.

1.3.2 Laboratory Parameters

Laboratory parameters will generally include Target Compound List (TCL) semivolatile organics and polychlorinated biphenyls, as well as Target Analyte List (TAL) metals. Tables 1-1 and 1-2 provide a summary of all target laboratory analytes and associated contract-required quantitation limits (organics) and contract-required detection limits (inorganics). If additional analyses become necessary on a project-specific basis, then addenda to the Master QAPP and the project-specific QAPP will be added to the Project-Specific Work Plan appendix.

At Site 42 (Olsen Road Landfill), concentrations of Target Aanlayt List (TAL) metals plus cyanide will be of interest only for those samples used in toxicity testing. Otherwise, silver and zinc will be the metals of primary concern at site 42. The reason for including additional metal analyses on samples used in toxicity testing is to provide a check on the potential toxicity the other metals. Bis(2-ethylhexyl)phthalate will be the organic chemical of primary concern at Site 42 and will be determined in one sample only. Because several other base-neutral/acid (BNA) compounds will be determined along with bis(2-ethylhexyl)phthalate, all results from the BNA analyses will be reported and evaluated collectively as

semivolatile organic compounds (SVOCs). Nitroaromatics and nitramines will be reported for two samples along with nitrocellulose, nitroguanidine and nitroglycerin. Soil grain size and total organic carbon (TOC) will also be determined in select samples to support the toxicity evaluations. Toxicity testing of Site 42 sediments will be performed using ASTM method E1706-95b or comparable method with *Hyalella azteca* (*H. azteca*) as the test species.

At site 41 (Scrap Yard), arsenic, cadmium, lead and PCBs are the chemicals of primary concern. The arsenic, cadmium, lead concentrations determinations will be requested at Site 12 via graphite furnace atomic absorption (GFAA) spectroscopy methods 206.2 CLP-M, 213.2 CLP-M and 239.2 CLP-M, respectively. Alternatively, axial view ICP may be used for those metal determinations if detection limtis are comparable to GFAA methods.

At Site 12 (Town Gut Landfill) no chemical anlayses are planned as the strategy is to use test pitting to determine the extent of landfill material.

Without toxicity data, which will be collected as part of this investigation, it is not possible to know for certain the detection limits required to measure toxic concentrations of analytes. However, initial review of laboratory reporting and detection limits indicates that detection limits reported when meeting CLP Contract Required Detection Limits (metals) and Contract Required Quantitation Limits (organic chemicals) should suffice, especially when using axial view ICP-EAS or GFAA when conducting metals analyses. Axial view ICP-AES analyses will be requested for all TAL metals analyses and GFAA will be requested for individual metal analyses.

A seven-day turnaround time will be requested for chemical analyses of samples used in toxicity testing.

TABLE 1-1

ANALYTICAL DETECTION LIMITS - ORGANICS
INDIAN HEAD DIVISION NSWC, INDIAN HEAD, MARYLAND
PAGE 1 OF 3

Parameter	Mid-Concentration CRQL(1)		Low-Concentration CRQL(2)
	Aqueous	Solid	Aqueous
Semivolatile Organic Compounds	µg/L	µg/kg	µg/L
Acenaphthene	10	330	5
Acenaphthylene	10	330	5
Anthracene	10	330	5
Benzo(a)anthracene	10	330	5
Benzo(a)pyrene	10	330	5
Benzo(b)fluoranthene	10	330	5
Benzo(g,h,i)perylene	10	330	5
Benzo(k)fluoranthene	10	330	5
Bis(2-chloroethoxy)methane	10	330	5
Bis(2-chloroethyl)ether	10	330	5
Bis(2-ethylhexyl)phthalate	10	330	5
4-Bromophenyl-phenylether	10	330	5
Butylbenzylphthalate	10	330	5
Carbazole	10	330	NA
4-Chloro-3-methylphenol	10	330	5
4-Chloroaniline	10	330	5
2-Chloronaphthalene	10	330	5
2-Chlorophenol	10	330	5
4-Chlorophenyl-phenylether	10	330	5
Chrysene	10	330	5
Dibenz(a,h)anthracene	10	330	5
Dibenzofuran	10	330	5
3,3'-Dichlorobenzidine	10	330	5
Diethylphthalate	10	330	5
Di-n-butylphthalate	10	330	5
Di-n-octylphthalate	10	330	5
4,6-Dinitro-2-methylphenol	25	830	20
2,4-Dinitrophenol	25	830	520
2,4-Dinitrotoluene	10	330	5
1,2-Dichlorobenzene	10	330	NA
1,3-Dichlorobenzene	10	330	NA
1,4-Dichlorobenzene	10	330	NA
2,4-Dichlorophenol	10	330	NA

TABLE 1-1

ANALYTICAL DETECTION LIMITS - ORGANICS
INDIAN HEAD DIVISION NSWC, INDIAN HEAD, MARYLAND
PAGE 2 OF 3

Parameter	Mid-Concentration CRQL(1)		Low-Concentration CRQL(2)
	Aqueous	Solid	Aqueous
Semivolatile Organic Compounds	µg/L	µg/kg	µg/L
Dimethylphthalate	10	330	5
2,4-Dimethylphenol	10	330	5
2,6-Dinitrotoluene	10	330	5
Fluoranthene	10	330	5
Fluorene	10	330	5
Hexachlorobenzene	10	330	5
Hexachlorobutadiene	10	330	5
Hexachlorocyclopentadiene	10	330	5
Hexachloroethane	10	330	5
Indeno(1,2,3-cd)pyrene	10	330	5
Isophorone	10	330	5
2-Methylnaphthalene	10	330	5
2-Methylphenol	10	330	5
4-Methylphenol	10	330	5
Naphthalene	10	330	5
2-Nitroaniline	25	830	20
3-Nitroaniline	25	830	20
4-Nitroaniline	25	830	20
Nitrobenzene	10	330	5
2-Nitrophenol	10	330	5
4-Nitrophenol	25	830	20
N-nitroso-di-n-propylamine	10	330	5
N-nitrosodiphenylamine	10	330	5
2,2'-Oxybis(1-chloropropane)	10	330	5
Pentachlorophenol	25	830	20
Phenanthrene	10	330	5
Phenol	10	330	5
Pyrene	10	330	5
1,2,4-Trichlorobenzene	10	330	5
2,4,5-Trichlorophenol	25	830	20
2,4,6-Trichlorophenol	10	330	5

TABLE 1-1

ANALYTICAL DETECTION LIMITS - ORGANICS
INDIAN HEAD DIVISION NSWC, INDIAN HEAD, MARYLAND
PAGE 3 OF 3

Parameter	Mid-Concentration CRQL(1)		Low-Concentration CRQL(2)
	Aqueous	Solid	Aqueous
Polychlorinated biphenyls	µg/L	µg/kg	µg/L
Aroclor-1016	1.0	33	0.20
Aroclor-1221	2.0	67	0.04
Aroclor-1232	1.0	33	0.20
Aroclor-1242	1.0	33	0.20
Aroclor-1248	1.0	33	0.20
Aroclor-1254	1.0	33	0.20
Aroclor-1260	1.0	33	0.20
Explosives(3)			
1,3,5-Trinitrobenzene	1.2	250	NA
1,3-Dinitrobenzene	1.2	250	NA
2,4,6-Trinitrotoluene	1.2	250	NA
2,4-Dinitrotoluene	1.2	250	NA
2,6-Dinitrotoluene	1.2	250	NA
2-Amino-4,6-dinitrotoluene	1.2	250	NA
2-Nitrotoluene	2.6	500	NA
3-Nitrotoluene	2.6	500	NA
4-Amino-2,6-dinitrotoluene	1.2	250	NA
4-Nitrotoluene	2.6	500	NA
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2.6	500	NA
Nitrobenzene	1.2	250	NA
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	2.6	500	NA
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	2.6	500	NA
Nitroglycerin	13	5000	NA
Nitroguanidine	5	510	NA
Nitrocellulose	180	18000	NA

1 CRQL: Contract Required Quantitation Limit; as specified in CLP SOW OLM03.1.
2 CRQL: Contract Required Quantitation Limit; as specified in CLP SOW OLC02.1
3 Detection limits for explosives are based on in-lab testing by GP Environmental, the analytical laboratory for the work covered by this QAPP.

TABLE 1-2

ANALYTICAL DETECTION LIMITS - INORGANICS
INDIAN HEAD DIVISION NSWC, INDIAN HEAD, MARYLAND

Parameter	CRDL(1)	
	Aqueous	Solid
Target Analyte List Metals	**µg/L**	**mg/kg**
Aluminum	200	40
Antimony	60	12
Arsenic	10	2
Barium	200	40
Beryllium	5	1
Cadmium	5	1
Calcium	5000	1000
Chromium	10	2
Cobalt	50	10
Copper	25	5
Cyanide	10	10
Iron	100	20
Lead	3	2
Magnesium	5000	1000
Manganese	15	3
Mercury	0.2	0.1
Nickel	40	8
Potassium	5000	1000
Selenium	5	1
Silver	10	2
Sodium	5000	1000
Thallium	10	2
Vanadium	50	10
Zinc	20	4

1 CRDL: Contract Required Detection Limit; as specified in CLP SOW ILM04.0.

Method 8330 will be used for nitroaromatic and nitramine compounds, and nitroglycerin. Samples will be analyzed for nitroguanidine and nitrocellulose using analytical methods developed by the laboratory and demonstrated to be suitable for determining those analyte concentrations in soil, sediment and water.

1.4 DATA QUALITY OBJECTIVES

Data quality objectives are discussed in the Project-Specific Work Plan.

1.5 SAMPLE NETWORK DESIGN AND RATIONALE

Sample network design and rationale are provided in the Project-Specific Work Plan.

1.6 PROJECT SCHEDULE

The project schedule has not been determined to date and will be provided as an addendum to the Project-Specific Work Plan.

2.0 PROJECT ORGANIZATION

The project organization for the pre-Feasibility Study Field Investigation activities is project specific. The project organization is provided in the work plan in Section 1.5. Personnel expected to be involved with the field investigation activities at a programmatic level for the foreseeable future include the Navy remedial project manager (RPM), the facility point of contact, and the current contractor's program manager and quality manager, as follows:

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3.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

The Master QAPP discusses specific topics related to sampling, chain-of-custody, laboratory instrument calibration, laboratory analysis, reporting of data, internal quality control, audits, preventive maintenance of field equipment, and corrective action.

4.0 SAMPLING PROCEDURES

Field sampling procedures for NSWC Indian Head investigative activities are discussed in detail in the Master Standard Operating Procedures (SOPs). Specific sampling information contained in the Master SOPs, and discussed in the Project-Specific Work Plan include the following.

- Field sampling by matrix
- Field quality control sample collection/preparation procedures
- Sample containers, preservatives, and volume requirements
- Decontamination procedures
- Sample packaging and shipping procedures
- Mobilization/demobilization
- Monitoring well installation
- Monitoring well development
- Groundwater sampling
- Water level measurements
- Soil sampling procedures
- Surveying
- Aquifer testing
- Investigation Derived Waste (IDW) handling and disposal
- Quality control sample procedures
- Field measurements/screening
- Preventive maintenance procedures/schedule