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REMEDIAL ACTION FINDINGS REPORT FOR SOIL AND WASTEWATER AT SITE 5 NSWC INDIAN HEAD MD

5/1/1993

NAVFAC CHESAPEAKE

REMEDIAL ACTION FINDINGS REPORT

Naval Surface Warfare Center
Site 5
Indian Head, Maryland

Prepared For:

Environmental Engineering Branch
Chesapeake Division (Code 114)
Naval Facilities Engineering Command
Washington, DC

and

Air and Hazardous Waste Management Branch
Naval Surface Warfare Center
Indian Head, Maryland

Prepared By:

ABB ENVIRONMENTAL SERVICES, INC.
Washington, D.C.

Contract No. N62477-91D0043
Delivery Order No. 0001
Job No. 6942-00

May, 1993

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LIST OF ACRONYMS USED

AA	Atomic Absorption
ABB-ES	ABB Environmental Services, Inc.
Ag	Silver
bgs	below ground surface
BOD_5	5-day Biochemical Oxygen Demand
CIH	Certified Industrial Hygienist
CLP	Contract Laboratory Procedures
CY	Cubic Yards
EPA	U.S. Environmental Protection Agency
ICP	Inductively Coupled Plasma
Jowett	Jowett, Inc.
mg/kg	milligrams per kilogram
mg/l	milligrams per liter
MILCON	Military Construction
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NAVSURWARCEN	Naval Surface Warfare Center
OBG Tech	OBG Technical Services, Inc.
OTC	Olde Town Contracting, Inc.
PARCC	Precision, Accuracy, Representativeness, Completeness, and Comparability
PEL	Permissible Exposure Limit
ROICC	Resident Officer in Charge of Construction
RPD	Relative Percent Difference
S/S	Solidification/Stabilization
TCLP	Toxicity Characteristic Leaching Procedure
TSS	Total Suspended Solids
TWA	Time-Weighted Average
USGS	United States Geological Survey
WWTP	Wastewater Treatment Plant

Is this a remedial action?

1. INTRODUCTION

This report documents the objectives, procedures, and results of a remedial action performed at Site 5, Naval Surface Warfare Center (NAVSURWARCEN), Indian Head, Maryland (Facility) (See Figure 1-1). ABB Environmental Services, Inc. (ABB-ES) provided preconstruction support and Title II services throughout the remedial action. The remedial action consisted of the excavation, treatment, placement and capping of silver-contaminated soils and sediments from the easternmost of two drainage swales that emanate from Building 731. In the past, silver-laden photographic processing wastewater was released from the building and impacted the drainage swales. Data from past characterization studies indicated that soils/sediments in both swales contained silver in quantities above the target remediation level of 10 milligrams per kilogram (mg/kg). This State-approved target level was established based on the findings of the *Site Characterization and Remediation Evaluation, Naval Ordnance Station, Site 5* Report, submitted to the Navy in September of 1991. The Navy elected to remediate the man-made portions of the drainage swales through: (1) excavation of all soils or sediments exhibiting silver concentrations greater than 10 mg/kg; (2) treatment of the excavated material utilizing solidification/stabilization (S/S) technology; and (3) long-term on-site management through incorporation of the treated material into the proposed earthen explosion barrier expansion, as shown in Figure 1-2.

The project was implemented through a modification of the general Military Construction (MILCON) contract for the construction of the mix, assemble, and cure facility (MILCON P-059). The eastern drainage swale passes through an area significantly impacted by construction, establishing a need for remediation before the commencement of construction. The western swale is not in an area impacted by the current phase of construction.

This report is designed to document that activities associated with the remedial action were performed in conformance with the remediation specification developed under Contract No. N62477-91-D0043-0001, *Plans and Specifications, Remedial Action, Naval Ordnance Station, Site 5, Indian Head Maryland* (Specifications). The final version of this document is dated March 10, 1992. This Remediation Findings Report provides documentation of: Remediation Contractor (Contractor) submittal reviews; project personnel; the field analytical program (and all relevant quality assurance issues); and the sequence, progress, and results of the remedial action construction work, along with nonconformance issues with the project specifications. This document also provides the final Contractor submittals, all analytical data packages, and the log maintained by the ABB-ES field engineer. The remainder of this report is organized as follows:

Section 2. **Pre-Remediation Services**
Section 3. **Remediation/Construction Documentation**
Appendices:

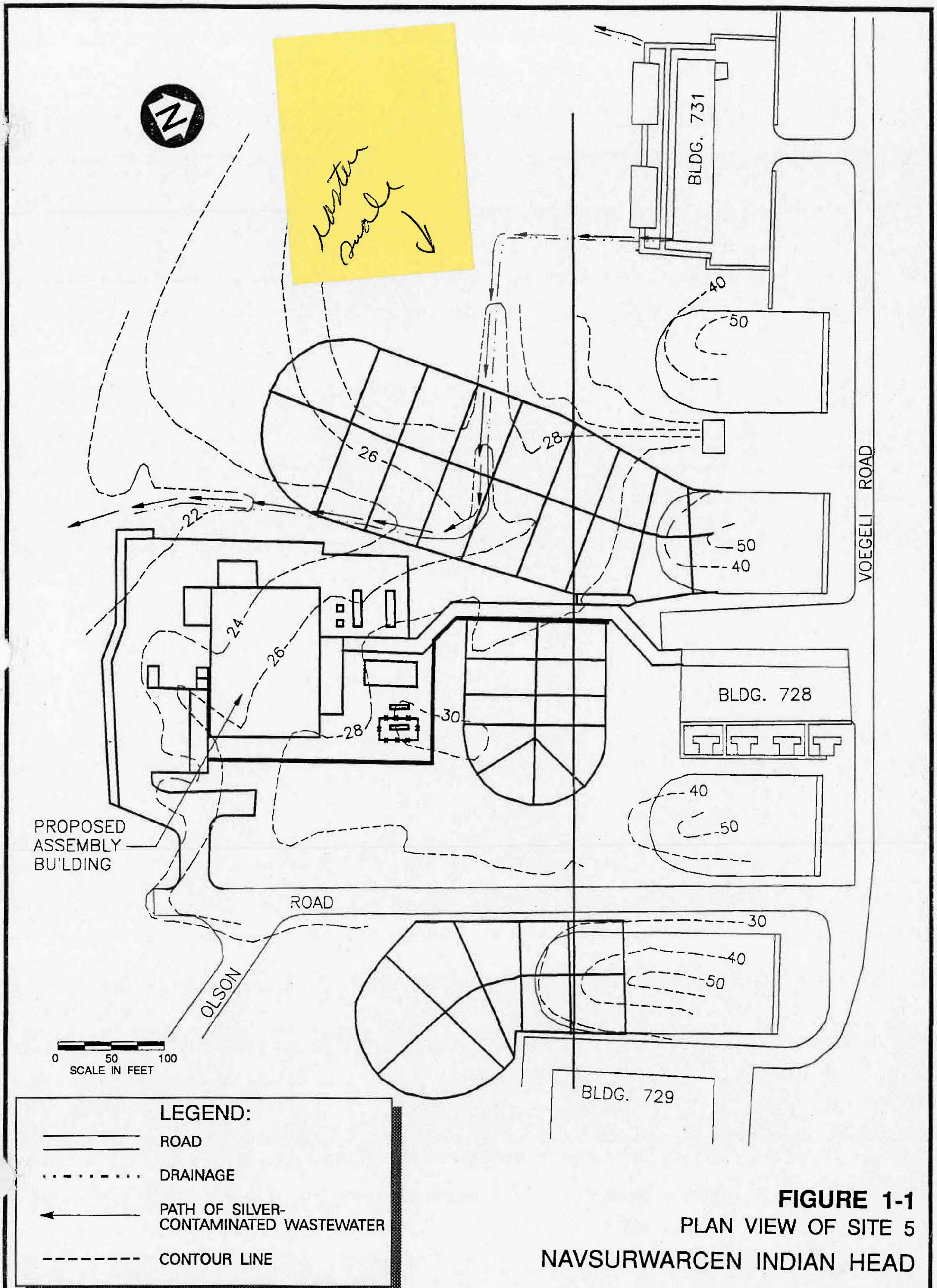

FIGURE 1-1
PLAN VIEW OF SITE 5
NAVSURWARCEN INDIAN HEAD

ABB Environmental Services, Inc.

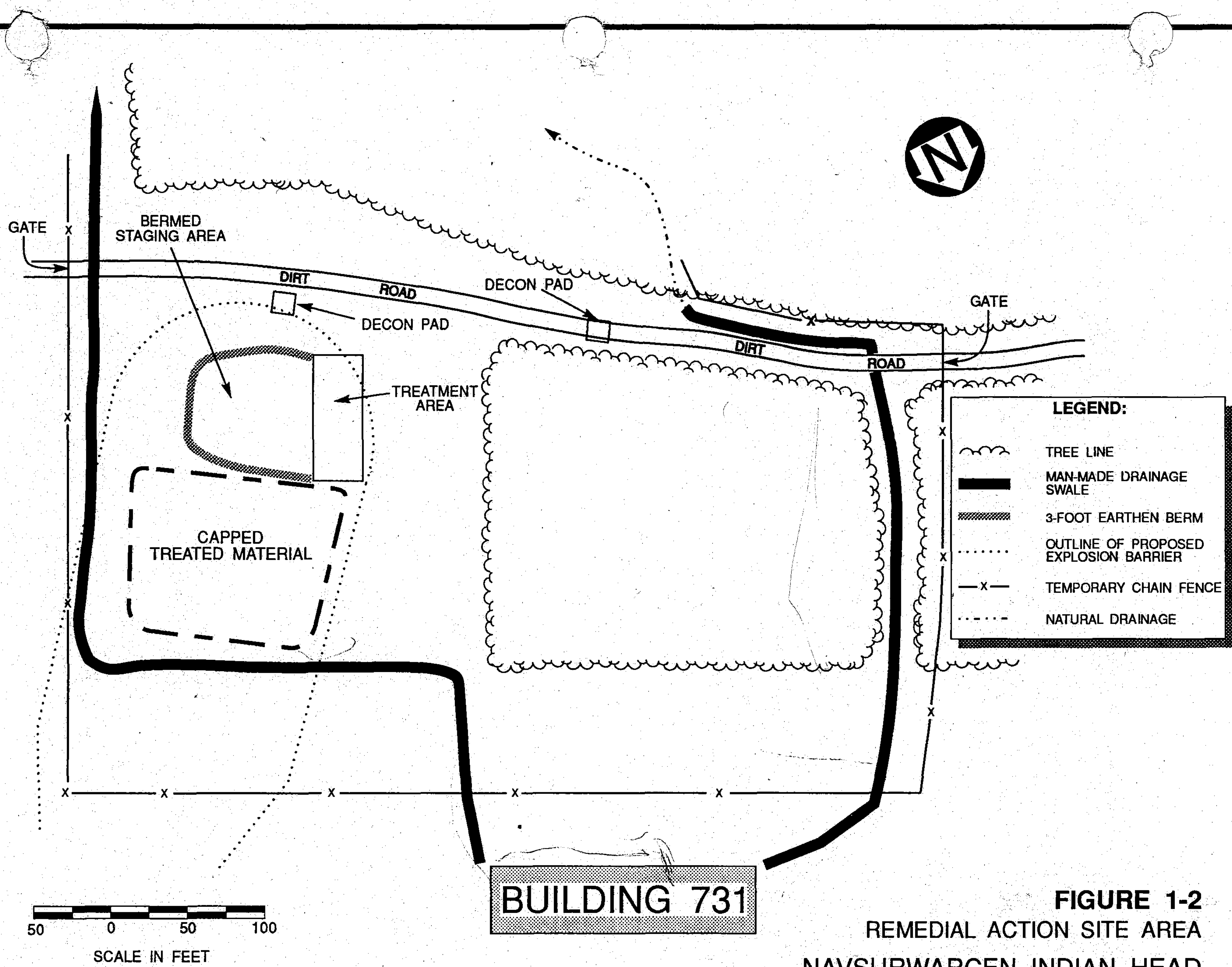

FIGURE 1-2
REMEDIAL ACTION SITE AREA
NAVSURWARCEN INDIAN HEAD

ABB Environmental Services, Inc.

- **Submittal Review Documentation:** Correspondence with the Navy identifying Government Representative concerns and comments on specification required project planning Contractor submittals
- **Contractor Final Submittals:** Final Contractor submittals as received by the Government Representative

- **Analytical Data Packages:** All laboratory-prepared data packages; includes data on samples of: soils and sediments; surface water; decontamination water; treated material; and unknown material as found in an unearthed 55-gallon drum

- **1991 ABB-ES Prepared Field Sampling Plan:** The Field Sampling Plan used for previous site characterization work; ABB-ES-acquired samples from the remedial action follow protocols established in this document

- **Atomic Absorption Analysis Standard Operating Procedures:** The ABB-ES-developed protocol for field analysis with an Atomic Absorption unit

- **Field Log:** The bound notebook containing all of the project engineer's field notes and documentation. Provides a day-by-day account of the remediation progress, as well as details of discussions, decisions, and meeting summaries.

The remainder of this section includes a discussion of the project objectives and scope, a summary of previous work, a description of the Title II services, and a list of the project personnel.

1.1 Objectives and Scope

The primary objectives of this remedial action were to: (1) remove from the drainage swales all soils and sediments with silver concentrations above 10 mg/kg, in order to prevent future migration of the silver from high silver concentration areas and protect construction personnel working near the swales during the MILCON; (2) to treat and manage on-site the excavated material by incorporation into an adjacent explosion barrier; and (3) restore excavated drainage ditches. Implementation of the remedial action was coordinated to minimize impact to the MILCON project schedule, and to make use of one of the planned earthen structures for containment and long-term management of the treated and capped contaminated soil.

All excavation associated with the remedial action was limited to areas within or immediately adjacent to the easternmost drainage swale. The quantity of soils/sediments with silver contamination of greater than 10 mg/kg was estimated to be 1,077 cubic yards (cy). This estimate was based on data generated through a limited characterization study that was performed in the summer of 1991. Characterization data generated by the on-site laboratory during the remedial action indicated that the original quantity of contaminated materials above target remediation levels was low and addition excavation of media with silver concentrations greater than 10 mg/kg was required. Consequently, excavation took place in a wider area than the 10-foot wide trench described in the specification.

1.2 PROJECT COMPONENTS

This remedial action consisted of three main components: (1) the removal of contaminated soils and sediments from the drainage ditches that exhibited silver concentrations greater than 10 mg/kg, coupled with sampling and on-site analysis to ensure that cleanup levels were achieved; (2) the treatment of the contaminated media, utilizing ex-situ, on-site S/S technology, and (3) the placement and capping of contaminated soils and sediments within the proposed area of a large earthen explosion barrier.

1.2.1 Removal Activities

The removal component of the remedial action was comprised of several tasks, as defined by the referenced Specifications document, and included:

- Diverting of process water inflow from the drainage ditches;
- Clearing of trees, brush and other debris from the contaminated zones;
- Decontamination of removed trees, brush and debris that were in contact with contaminated media;
- Proper management of all excavated waste materials not suitable for S/S treatment;
- Management of diverted stormwater and process water;
- Removal of contaminated soils and sediments;
- Transport of contaminated material to treatment staging area;
- Confirmatory sampling to ensure that remediation target cleanup levels of 10 mg/kg were achieved; and
- Additional removal and confirmatory, if necessary.

1.2.2 Treatment Activities

Treatment of contaminated soils and sediments consisted of basic dewatering, shredding, and mixing with kiln dust. Through treatability studies performed by the Contractor, a design mix was developed such that the resulting product was geotechnically suitable for incorporation into the earthen barrier. Toxicity Characteristic Leaching Procedure (TCLP) tests on the design mix yielded silver concentrations in the test leachate below detection limits. Treatment comprised the following tasks:

- Establishment of a diked staging area for treatment and stockpiling of contaminated soils and sediments;
- Mobilization and set up of ex-situ, on-site S/S treatment equipment, including a hammermill, a mixer/shredder, a pugmill, and a stack conveyor; and
- Treatment by mixing with cement kiln dust in proportions as established in the selected design mix.

The staging area was established to effectively store excavated soils and sediments, and to prevent migration before treatment and placement. Stored contaminated soils and sediments were loaded into the S/S mixing equipment, which broke down and mixed the material with the kiln dust additive. The resulting mixture was released to a stack conveyor, which created mounds of treated material in an area immediately adjacent to the final placement area.

1.2.3 Placement/Long-term Management

The treated material was spread out in six-inch lifts within the placement area (Figure 1-2). The first lift was placed over scarified native soil and compacted. Each successive lift was also compacted, and density tests were performed at various locations and elevations. The tests were performed by EMSI Engineering, Inc., a geotechnical engineering firm contracted by Jowett. Upon compaction of the final lift of treated material, a one-foot soil cover was installed and compacted. The soil used was equivalent to that used in building the earthen explosion barrier expansion.

1.3 Title II Services

As the Navy's Representative, ABB-ES performed Title II services for the Navy, including:

- pre-remediation submittal reviews;
- constructability and feasibility reviews; and

- oversight of all field work.

Upon receipt of the Contractor's Work Plan, ABB-ES personnel reviewed its content for completeness, conformance with the requirements of the project specifications, and technical feasibility. Any aspects of the Work Plan in need of revision were fully documented and reported to the Resident Officer in Charge of Construction (ROICC) and to the Contractor. Resubmittals were also reviewed for conformance with project specifications.

Site work began after approval of the Contractor's Work Plan and related documents. As the Government Representative, ABB-ES personnel performed the following field-related duties:

- Documentation, and communication to the ROICC of field work progress, quality, and adherence to schedule;
- Inspection and surveillance of work as directed by the ROICC;
- Consultation with the Navy, and providing guidance of the Contractor, as directed by the ROICC;
- Collection and on-site analysis of confirmatory target-level samples;
- Collection of 10 percent of confirmatory target-level samples for off-site quality assurance analysis;
- Collection of quality assurance samples of treated decontamination water for total suspended solids (TSS) testing;
- Collection of quality assurance samples of treated soils/sediments for TCLP analysis;
- Inspection of decontaminated equipment;
- Supervision for all backfilling and compaction activities; and
- Supervision for all site restoration activities.

1.4 Project Personnel

The project was implemented through a modification of the general MILCON P-059 contract for the construction of the mix, assemble, and cure facility. The general construction contractor for the ongoing MILCON P-059 project is Jowett, Inc. (Jowett); the remediation contractor (Contractor) was a subcontractor to Jowett. Jowett, as the General Contractor, completed site clearing and grubbing work and installed fencing associated with the remedial action. The Contractor for this remedial action was OBG Technical Services, Inc. (OBG Tech) of East Syracuse, NY. OBG Tech personnel provided the equipment and services for treatment of the contaminated soil/sediment. OBG Tech sub contracted the excavation, contaminated soil/sediment handling, and restoration earth work, labor, and decontamination services to Olde Town Contracting, Inc. (OTC) of Bowie, MD. ABB-ES-performed audits showed that OBG Tech and OTC on-site personnel were 40-hour Hazardous Waste Safety trained, in accordance with Occupational Safety and Health Administration (OSHA)-established regulations (29CFR 1910.120), as required by the Specifications.

2. PRE-REMEDIATION SERVICES

This section describes the tasks completed prior to initiation of on-site remediation activities under the Task Order, ABB-ES provided the following services:

- Technical reviews of Contractor submittals; and
- Technical consultation in support of remediation contract negotiations.

The following sections provide a summary of activities associated with the pre-remediation elements of the project.

2.1 Submittal Reviews

The Contractor-prepared Work Plan and Health and Safety Plan are contained in the document entitled: *Remedial Work Plan; Naval Ordnance Station.* This document, dated October 23, 1992, was reviewed by ABB-ES personnel for technical accuracy, completeness, and constructability. Results of the review were forwarded to the ROICC in correspondence addressed to Jim Behrend, dated November 2, 1992. This correspondence is provided as Appendix A.

The Work Plan as submitted did not adequately address all Contractor requirements as indicated in the project specifications. In general, the document lacked detail in areas such as: scheduling; sampling protocol; design sketches and construction details; and treatability study parameters and results. Also, several key elements were omitted, such as the S/S Plan and the Off-Site Disposal Plan. The original Work Plan is provided as Appendix B.

OBG Tech addressed these concerns by developing a supplemental document entitled: *Remedial Work Plan; Naval Ordnance Station: Appendix A*, dated November, 1992. This addendum addressed concerns and deficiencies of the original document. It contained direct responses to the comments of the November 2 correspondence. Also, it provided a copy of the quality assurance manual of OBG Tech's chosen off-site laboratory. The Work Plan addendum is provided as Appendix C.

Copies of the two Work Plan documents were forwarded to the environmental department of NAVSURWARCEN Indian Head, addressed to Shawn Jorgensen. These copies were to be submitted for State review. State environmental officials had reviewed and accepted the remedial action Plans Specifications.

2.2 Negotiation Support Summary

ABB-ES provided the Resident Officer in Charge of Construction (ROICC) technical support in elevation of remedial action bids and assistance throughout negotiations. Specific services included:

- Evaluating the responsiveness of bids to requirements of the Plans and Specifications.

- Assisting during negotiations by providing technical and economic information to the ROICC.

3. REMEDIATION/CONSTRUCTION DOCUMENTATION

This section documents the performance of remedial treatment and construction work as it progressed from mobilization to demobilization. The work described in this section is grouped into two categories: (1) Contractor-performed tasks; and (2) government representative-performed tasks. The Contractor-performed work is composed of the actual construction and treatment work involved in remediating the drainage swale. Example tasks include:

- Mobilization of construction and treatment equipment;
- Stormwater management;
- Excavation/hauling;
- Treatment/placement; and
- Backfilling/site restoration.

The Government Representative, in addition to general oversight and documentation tasks, also performed remediation-related tasks, such as:

- Confirmatory (after excavation) sampling and on-site analysis;
- Quality assurance for Contractor-collected and ABB-ES-collected samples; and
- Air monitoring.

The subsection that follows documents the performance of the Contractor's work by examining each relevant specification section; Contractor performance is compared with specification requirements. Any nonconformances, unusual or emergency circumstances, and safety issues are explained in detail.

3.1 CONTRACTOR-PERFORMED TASKS

The remedial Contractor, OBG Tech, was responsible for all construction- and treatment-related tasks associated with the remedial action. OBG Tech personnel arrived on-site the morning of Monday, November 16 1992, one week after ABB-ES personnel had begun mobilization of the on-site laboratory. OTC personnel, subcontracted for the construction and hauling tasks, arrived simultaneously with OBG Tech personnel.

The documentation of the remedial action work performed by OBG Tech and its subcontractors is presented in the subsections that follow. All work described is categorized by its according specification section, in the Specifications document. Contractor requirements are contained in the following specification sections:

- 01012 Summary of Work*
- 01030 Special Project Procedures* †
- 01410 Sampling and Analysis* †
- 01510 Temporary Facilities* †
- 01710 Site Maintenance†
- 01712 Mobilization/Demobilization†
- 01721 Project Record Documents†
- 02081 Off-Site Transportation†
- 02082 Off-Site Disposal* †
- 02100 Off-Site Preparation†
- 02205 Waste Excavation†
- 02221 Drainage Ditch Restoration†
- 02240 Solidification/Stabilization* †

3.1.1 Pre-Mobilization Requirements

Pre-mobilization Contractor requirements are specified in seven of the 13 sections listed above. These requirements consist of tasks and submittals that must be completed before arrival on-site. The performance of these requirements is discussed in the paragraphs that follow; all are categorized by the Specifications section in which they appear.

Summary of Work

The first section of the Specifications document provides a synopsis of all remedial action work to be accomplished, as well as detailed descriptions of the pre-mobilization Contractor requirements. Remediation-related requirements are presented in greater detail in the "Site Work" division of the Specifications (Division II). Documentation of the work actually performed under this division of the specification package is provided in subsection 3.1.3.

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*This section specifies Contractor requirements to be performed before arrival on site.

†This section specifies Contractor requirements to be performed after arrival on site.

The primary pre-remediation Contractor requirement was the preparation and submittal of the Remediation Work Plan. This document was intended to define in detail all project tasks and the procedures to accomplish them. Additional requirements of the Remediation Work Plan were: presentation of work schedules, establishment and presentation of quality assurance/quality control systems and procedures, as well as health and safety, environmental protection, contingency, and security project components.

The Work Plan as originally submitted by OBG Tech (*Remedial Work Plan*, October, 1992) did not adequately address all Work Plan requirements, as indicated in the project specifications. This document is presented in Appendix B. In general, the document lacked detail in areas such as: scheduling; sampling protocol; design sketches and construction details; and treatability study parameters. Also, several key elements were missing, such as presentations of methods and techniques the Contractor would use to execute sampling and analytical tasks. ABB-ES developed a detailed assessment of the Work Plan, and forwarded it to the ROICC's office addressed to Jim Behrend. This correspondence is provided as Appendix A.

In response to the nonconformances illustrated in the correspondence, OBG Tech developed a supplemental document entitled: *Remedial Work Plan; Naval Ordnance Station: Appendix A*, (Appendix B) dated November, 1992. This document was thoroughly reviewed and judged by ABB-ES to be sufficiently in compliance with the requirements of the specification.

Copies of the Work Plan documents were forwarded to the environmental staff of NAVSURWARCEN Indian Head, addressed to Shawn Jorgensen. The documents were to be submitted for State review. State environmental officials had approved the design of the remedial action based on the project Plans and Specifications.

Prior to mobilization, the Contractor was required to prepare a Erosion and Sediment Control Plan, to allow execution of the remedial action work under the existing MILCON Erosion and Sediment Control Permit. Because OBG Tech was a subcontractor to Jowett, Jowett took responsibility for this permitting requirement and modified its MILCON Sediment and Erosion Control Plan to accommodate the remedial action work. The Contractor's proposed sediment control measures are presented in the Remediation Work Plan (Appendix B). Jowett also maintained responsibility for specific site preparation activities including installing remedial action site access control fencing, clearing and grubbing of the remediation action areas, and all off-site disposal of solid and hazardous waste generated through execution of the remedial action.

Special Project Procedures

This section of the specifications package indicates certain procedures and requirements unique to this remedial action. In general, the section requires the Contractor to develop and submit (as part of the Work Plan) plans for prevention and contingency measures for several site-specific elements of the remedial action. The contractor was required to develop plans for:

- Health and Safety
- Spill Control
- Dust Control
- Runoff Control
- Air Quality Control
- Remediation-Related Wastewater Control
- Quality Control

These plans were satisfactorily submitted in the two Remedial Work Plan documents.

In addition to the above plans, the Contractor was required to submit certification that all employees working on-site are current in their training for that level required by their job function and responsibility

Sampling and Analysis

Section 01410 of the specifications package provides the Contractor requirements associated with sampling and analysis. The specific pre-construction requirement found in this section is the development and submittal of a Sampling and Analysis Plan, to delineate sample collection, handling, and analytical techniques. The Contractor was responsible for the sampling and analysis of treated contaminated material, remediation-generated wastewater, and inhalable air. The Contractor's Sampling and Analysis Plan was submitted as part of the Work Plan addendum (Appendix C).

The Contractor was also required to propose a laboratory (or laboratories) for remediation-related analytical work. OBG Tech proposed the use of the American Environmental Network of Maryland for TCLP, total silver, and TSS analyses. The use of this lab was approved when qualifications and QA/QC protocols were judged adequate for analytical requirements of the remedial action.

Temporary Facilities

The Contractor was required to submit final details for the construction of two temporary facilities: (1) the decontamination facilities, and (2) the contaminated soil staging area. The details are specified to be submitted as components of the Remedial Action Work Plan.

In the original Work Plan, OBG Tech provided plans for the construction of two 15-foot by 25-foot decontamination pads, to be installed in the locations specified in the Specifications document. The pads, as designed were judged to be adequate for the decontamination needs of the project; however, certain design parameters were missing, such as sump capacity, and containerization procedures for the water pumped from the sump. These details were provided in the addendum to the Work Plan. No details were provided for the personnel decontamination facility, because the facility was not to be constructed. The Contractor procured a commercially-available decontamination shower trailer.

OBG Tech provided a written description of the planned construction of the staging area, as well as a plan view drawing of the area. Detailed drawings were judged unnecessary because of the straightforward design and construction of the area (an approximately 6,000-square-foot, square-shaped area surrounded on the three lower gradient sides by a 3-foot tall earthen berm).

Off-Site Transportation/Disposal

The Contractor was required to prepare and submit an Off-Site Disposal Plan, to identify the proposed disposal facility, and to identify the anticipated remediation-generated waste materials to be removed from the site. As indicated in the previous paragraph, all off-site disposal and transportation responsibilities were maintained by Jowett; it is assumed that off-site transport and disposal planning was completed to the satisfaction of the Navy, as part the MILCON contract to construct the mix, assemble, and cure facility. All remedial action wastes requiring offsite transportation or disposal was completed by Jowett.

Solidification/Stabilization

As a component of the Remedial Action Work Plan, the Contractor was required to develop a S/S Plan, addressing all S/S tasks associated with the remedial action. Of primary importance was the Treatability Study, used to develop a suitable design mix that meets the chemical and structural criteria indicated in the Specifications.

OBG Tech performed the treatability study using three different additives in 20 different soil samples (acquired from three points along the western stream). The three additives used in the treatability study were: K-10 pozzolanic binder (30 percent of wet weight of sample); ICC cement kiln dust (20 percent by wet weight of sample); and Portland cement (in varying percentages of wet sample weight). The delay of compaction, in days, was varied from zero to five, to test the resultant effect on moisture content (ASTM D2216), compaction (ASTM D1557), and unconfined compressive strength (ASTM D2166). The treatability study results were not available until after the submission of the Work Plan documents; ABB-ES personnel received the results on November 19, 1992, with adequate time for review before the commencement of excavation and S/S. The selected additive was cement kiln dust (ICC CKD), to be added in quantities of 20% of the wet weight of the contaminated material. This mixture exhibited acceptable dry density and unconfined compression strength characteristics. Treatability Study results are provided in Appendix D of this document.

The S/S Plan as submitted in the Work Plan adequately described the procedures, methodologies, and sequence of work planned to complete the treatment of excavated soils and sediments. A remedial construction schedule was submitted with the Work Plan addendum.

3.1.2 Site Work Requirements

This subsection discusses the requirements and performance of all site work related to the remedial action, starting from mobilization of the first equipment, through site restoration. All of the 13 Specifications sections listed above contain site work requirements. In the performance discussion that follows, site work requirements are categorized by the Specifications section in which they appear.

Special Project Procedures

The Special Project Procedures section (Section 01030) establishes several on-site requirements related to the implementation of certain Work Plan components. Implementation of the Spill Control Plan, the Runoff and Wastewater Control Plans, and the Air Quality Control Plan all specify certain on-site requirements, regardless of whether site conditions necessitate the execution of the Plan.

As part of the Spill Control Plan requirements, the Contractor was required to maintain noncombustible sorbent material, a front-end loader, 55-gallon drums (DOT 17-E or 17-H), and shovels. These materials were mobilized by OTC and were available on-site until demobilization of treatment and excavation equipment.

The Contractor was required to remove all water, whether stormwater runoff or decontamination water, from the decontamination pad sump. The Contractor frequently pumped water from the sump into plastic storage containers, never exceeding the 1,000-gallon maximum storage volume. Water was only stored in these containers until sampling results were obtained, at which time the water was properly disposed of.

Air monitoring requirements specified the full-time presence of a Certified Industrial Hygienist (CIH) during all excavation and treatment activities. OBG Tech provided a CIH, with the requisite two years of experience, to perform ambient air monitoring. Due to the nature of the soils and sediments, the additive material, and the unusual quantities of rain that fell throughout the performance of the remedial action, no additional engineering controls were required.

Sampling and Analysis

All sampling- and analysis-related Contractor requirements are presented in this section. While on-site, the Contractor was required to perform the following sampling tasks:

- Sampling of the treated material. After every 100 cy of treated material produced by S/S, the Contractor was required to acquire a sample for TCLP analysis. OBG Tech did this at greater than the required frequency, by submitting a total of 17 samples for TCLP analysis. All samples, including the two (ten percent) QA samples collected by ABB-ES showed silver concentrations in the test leachate to be below detection limits. All Contractor-generated TCLP data were made available within the seven-day limit as specified.

- Wastewater-related sampling. The Contractor was required to sample the water removed from the decontamination pad sump, to determine its suitability for disposal into the Facility's wastewater treatment plant (WWTP). The Specification required the Contractor to test the water for 5-day biochemical oxygen demand (BOD_5) and TSS. However, the BOD_5 requirement was waived because the test requires at least five days for completion, and the Facility prohibited storage of wastewater for longer than two days. Analyses on the first wastewater sample showed TSS levels in excess of the Facility-directed level of 30 milligrams per liter (mg/l). Before release to the WWTP was permitted, the Contractor was directed to treat the water such that a TSS level in compliance with the Specifications could be achieved. The contractor filtered the stored water. A fine-mesh bag filter was used for this treatment. However, the Contractor released this batch of stored water to the WWTP without analyzing the filtered water first. Subsequent tests on the filtered water showed TSS levels to be in compliance with the 30 mg/l target level.

- Air Monitoring. The Contractor was required to provide full-shift air monitoring within the excavation zone during treatment and excavation activities. The OBG Tech provided a CIH to perform this testing, which never indicated particulate levels high enough to be dangerous or induce irritation. The one exception was for workers working *directly* with the cement kiln dust additive. Occasionally particulate levels of this additive reached levels (for workers in close proximity) that may have caused respiratory irritation. These personnel wore suitable personal protective equipment (mask with appropriate cartridge) to eliminate this risk.

Temporary Facilities

The Contractor was required to install several temporary facilities, generally to facilitate decontamination and waste management. These facilities were to be in place only for the duration of the remedial action; their complete removal upon demobilization was required.

Decontamination equipment required by the Specifications included:

- High-pressure steam generating unit with self-contained water tank and pressurizing system, capable of providing 500 pounds per square-inch of pressure with a 0.5 to five gallons per minute flow range and a nominal temperature of 200° Fahrenheit;
- Minimum 50-foot length of wash hose;
- Storage Tank(s), from 200 to 1000 gallons total storage; and
- Sump pumping equipment to drain sump into storage tank.
- A personnel decontamination facility with at least two showers, locker facilities, and changing room facilities.

All designated decontamination equipment was mobilized and installed in compliance with the specification.

For accurate measurement of excavated and treated material, the temporary installation of a State-certified scale was specified. Such a scale was not mobilized and installed; all measurements of excavated soils and sediments and treated material were made in terms of volume.

Dumpsters were required for the collection of general site-generated non-hazardous waste. Dumpsters were installed, but not for the collection of bulk waste or any particularly large items. Large waste items (such as decontaminated debris that was removed during excavation) were stockpiled for future removal by a Jowett-contracted firm. The contractors periodically emptied the dumpsters and disposed of the trash off-site.

The Specifications required that all temporary structures be provided with non-toxic, dry chemical fire extinguishers meeting UL approval for Class A, B, and C fires. An audit performed by ABB-ES, after all the installation of all specified facilities, showed that the contractor was in compliance with this requirement.

The decontamination pad and diked staging area were installed according to the approved plans for said items in the Remediation Work Plan.

Site Maintenance

This section presents requirements relating to the management of accumulated waste, debris, and rubbish generated through site operations. Also, the Contractor was required to remove all Contractor equipment and temporary facilities upon completion of remediation. An inspection performed by ABB-ES personnel indicated that the Contractor had complied fully with these requirements.

Site maintenance-related safety standards, which the Contractor was required to meet, were presented in this section. These included:

- Posting of Material Safety Data Sheets in appropriate locations.
- Execution of all cleaning operations in accordance with the approved Remediation Work Plan, and in compliance with any local ordinances and anti-pollution laws.
- The prohibition of disposal of any waste at the Facility.
- Prevention of accumulation of waste that could create hazardous condition.

Throughout the performance of the remedial action, the Contractor was in compliance with the above requirements.

Also specified in this section were permissible decontamination materials. Solvents and other volatile materials were not allowed for decontamination purposes, nor were materials that generate a listed or characteristically hazardous waste. The only material the Contractor actually used for decontamination purposes was a stream of pressurized hot water.

The Contractor was required to comply with other performance standards. These included: disposal of waste materials at regular, reasonable intervals, and management of waste materials with minimal handling. The Contractor was required to conduct a final inspection of the site upon completion of work. This inspection was conducted with ABB-ES personnel present; the site was judged to be restored adequately and in a manner consistent with the Specifications requirements.

Mobilization/Demobilization

This section presents the required elements of proper mobilization and demobilization for this remedial action. Proper mobilization included the following elements:

- Installation of fencing around the remediation area;
- Establishment of temporary facilities;
- Establishment of the staging area;
- Establishment of decontamination area (pads);
- Delineation of exclusion zone(s);
- Delineation of areas to be cleared; and
- Delivery on-site of all equipment necessary to complete all stages of the remedial action.

Except for the delineation of areas to be cleared, OBG Tech and OTC performed all mobilization tasks in accordance with the Specifications, and, where applicable, with plans provided in the approved Remediation Work Plan. Clearing activities were performed before both the Contractor and ABB-ES personnel arrived on-site; therefore, clearing activities were executed without Government Representative oversight. A detailed discussion of this element of the Remedial Action, and the nonconformances associated with its performance, is presented in the Paragraph entitled: "Site Preparation."

Demobilization work activities, as listed in the Specifications, included the following general tasks:

- Decontamination and removal from the site of all Contractor equipment and materials;
- Collection and disposal of all Contractor-generated contaminated materials and equipment for which decontamination is inappropriate; and
- Removal and disposal or return of project temporary facilities.

Final inspections performed by the ABB-ES site engineer indicated that adequate decontamination of all materials coming in contact with silver-contaminated soils and sediments was achieved.

This section of the Specifications also required the Contractor to remove the chain-link fence around the site. This was not performed. The Contractor stated that the general MILCON contractor (Jowett) had maintained control of fencing tasks, both installation and removal. Therefore, the fence remained in place after completion of the Remedial Action.

Demobilization of all facilities and equipment was executed as designated in the Specifications; however, the order in which two of the pieces were decontaminated/demobilized was reversed. The Specifications require the removal of the decontamination pad(s) before dismantlement of the S/S machinery; in fact, the operational decontamination pad was necessary for the successful decontamination of the machinery. The decontamination pads were the *last* items to be demobilized, because decontamination of the pads consisted only of hot water high-pressure washes. All washwater was then collected, filtered, tested, and disposed of as specified. Suspended solids removed from the filters were manually treated with the additive in the proper proportion, then added to the rest of the treated material. The decontamination pad was then broken up and disposed of by hauling to a concrete recycling facility.

Project Record Documents

To comply with the conditions of this section of the Specifications, the Contractor was required to maintain on-site copies of several documents and sets of documents relevant to the Remedial documents. These included:

- Drawings showing progress of work;
- Project Specifications[1];
- Addenda, Change Orders, other Modifications to Contract;
- Contractors Progress (Photographs, Manifest Documents, Chain-of-Custody Documents, Laboratory Data, Reports on Safety/Accident Incidents, etc.);

The Contractor adequately satisfied these requirements throughout the project. A significant omission was photographs; Facility personnel forbade the taking of photographs by anyone other than authorized Facility or Navy personnel. Representatives from the ROICC's Office periodically photographed the progress of the site work, but copies of these pictures were not made available for the Contractor to maintain on the site.

Upon completion of the project, the Contractor was required to deliver all specified documents to the Government Representative. ABB-ES received this delivery within a reasonable time.

[1]The copy of the Specifications maintained by the Contractor was the copy received from Jowett. The copy Jowett received from the Navy was the draft *Plans and Specifications* document, not the final. (The final was dated March 10, 1992, and the draft was dated February 20, 1992.) Although the draft was the version the contractor used to develop the bid and Work Plan, OBG Tech and OTC agreed to proceed with work as specified in the final document, which was the version approved by the Navy and the State of Maryland. It is unclear why Jowett and OBG Tech were in possession only of the draft document.

Off-Site Transportation

This section of the Specifications presents Contractor requirements pertaining to off-site transportation of Remedial Action-generated waste materials. The Contractor provided removal services for only two types of waste:

- small-volume personal wastes, such as food waste, office waste, etc.; and
- used personal protective equipment.

All waste in these categories was removed from the site in the Contractor's own vehicles used for daily transportation to and from the Facility. The materials were disposed of properly off-site.

Although the off-site transport and disposal of remedial-action-generated waste were required elements of the remedial action, the Contractor was not contracted to perform these tasks. These tasks were retained by Jowett, and were performed entirely after the completion of the project and the demobilization of the Contractor and associated remediation equipment. The Contractor decontaminated and stockpiled all non-hazardous waste materials, in preparation for their being removed later. For the management of potentially hazardous waste materials (such as unidentified 55-gallon drums and spent rocket motor casings), qualified NSWC Facility personnel were retained for collection and proper disposal. Because all hazardous and potentially hazardous wastes and materials were removed before the commencement of solid waste collection, the possibility of improper vehicular contamination was eliminated. Accordingly, vehicle decontamination activities (which were a requirement of the Specifications) were neither performed nor needed.

The system employed for the off-site disposal of waste materials rendered other requirements of this section inapplicable. For example, as part of the Remediation Work Plan, a transportation plan was to have been submitted, delineating the procedures for loading and transporting, routing, name and address of transporter, vehicle type, and other transportation-related information. ABB-ES did not receive such a plan from either the Contractor or Jowett.

Off-Site Disposal

In order to ensure proper management of remedial-action-generated wastes, the Specifications present Contractor requirements pertaining to off-site disposal of Remedial Action-generated waste materials. As stated previously, the Contractor provided removal services for only two types of waste:

- small-volume personal wastes, such as food waste, office waste, etc.; and
- used personal protective equipment.

All waste in these categories was removed from the site in the Contractor's own vehicles used for daily transportation to and from the Facility. The materials were disposed of properly off-site.

As discussed above, the off-site disposal and transport of remedial-action-generated waste were required elements of the remedial action, but were performed by Jowett after the completion of the project and the demobilization of the Contractor and associated equipment. The contractor decontaminated and stockpiled all non-hazardous waste materials, in preparation for their being removed later. For the management of potentially hazardous waste materials (such as unidentified 55-gallon drums and spent rocket motor casings), qualified NSWC Facility personnel were retained for collection and proper disposal. Because all hazardous and potentially hazardous wastes and materials were removed before the commencement of solid waste collection, the possibility of improper vehicular contamination was eliminated.

One of the requirements presented in this section was the delivery, to the Government Representative, of all documentation and records verifying receipt and quantity received of waste loads at the disposal facility. Jowett has not provided ABB-ES with this documentation; it is assumed that Jowett maintained these records, and has submitted or will submit them directly to the Navy.

Site Preparation

This section of the Specifications addresses requirements for preparation of the site for all activities associated with the remedial action. Two main preparation requirements were established: (1) clearing and grubbing, to remove from areas to be excavated or graded all timber and materials not amenable to the treatment process; and (2) grading, as necessary for the establishment of items including but not limited to temporary facilities, the staging area, and access routes.

The Contractor was required to clear the ground surface, within areas to be excavated or graded, of timber, brush, stumps, roots, grass, weeds, rubbish, or other debris. Grubbing was to consist of the complete removal of all stumps, large-diameter roots, brush, timber, logs, and any other organic material or debris, from the surface of the ground to a depth of 18 inches below ground surface (bgs). The areal extent of grubbing was defined to be the area designated for excavation, as depicted in the Specifications's design sketches. The Specifications further require that all materials removed through clearing and grubbing activities be segregated according to whether they were removed from contaminated or uncontaminated soils and sediments. This requirement would ensure maximum efficiency of the debris decontamination work scheduled to follow clearing and grubbing.

The clearing and grubbing tasks were retained by Jowett, who had mobilized a crew to begin this work before approval of the Contractor's Work Plan. As a consequence, ABB-ES personnel were not present on-site during the execution of these tasks. Clearing and grubbing was not performed in compliance with the Specifications. The Specifications require the ground surface, within areas to be excavated, to be "completely cleared" of the materials as listed above. Additionally, the Specifications state that the Contractor is required to provide for the "complete removal" of all above-listed materials to a depth of 18-inches bgs. Neither of these requirements was fully satisfied. Trees and other growth in the areas to be excavated were felled in place and not removed. Grubbing was not performed other than the tree root systems that were unearthed by leveled trees. Trees were pushed over with earth-moving equipment, apparently either a bulldozer or a front-end loader. This tree-clearing method created two significant problems: (1) *An increase of material requiring decontamination.* Before the commencement of clearing, standing trees to be cleared were assumed uncontaminated except for their root systems (the only part of the tree in physical contact with contaminated soils or sediments). Pushing them over into contaminated soils and sediments resulted in a substantial increase in the quantity of material requiring subsequent decontamination, a time-consuming and expensive process. (2) *Migration of contaminated soils and sediments.* Tracks left in the moist earth of the streambeds indicate that the equipment used for felling the trees was driven directly into and out of contaminated zones. Potential ramifications of this include vertical and horizontal migration of silver-contaminated soils and sediments, and the tracking of contaminated materials into previously uncontaminated areas. Such dissemination of contaminated soils and sediments is expressly prohibited in the specification.

The second main element of site preparation as provided by the Specifications is grading. All grading activities were performed in conformance with the section's requirements. As specified, the subgrade was maintained such that adequate drainage was preserved. All activities were closely examined by ABB-ES personnel.

Waste Excavation

This section of the Specifications addresses activities necessary to actually remove the contaminated soils from the two drainage ditches. Although the Specifications required removal and treatment of contaminated materials from both ditches, only one of the two ditches was remediated during this remedial action. Soils and sediments from the westernmost of the two ditches were not excavated and treated; the Navy plans to accomplish this work in the future.

Field-analyzed samples (acquired and analyzed by ABB-ES personnel) showed that original estimated quantities of contaminated soil/sediments above target remediation levels were low. The Specifications require the Contractor to excavate and remove the volume of soil and sediments five feet laterally from center stream (10-foot total width), and to a depth of two feet bgs, for the entire man-made lengths of each of the drainage swales. The total estimated volume of soil to be removed is given as 1,077 cy. It was necessary to modify the dimensions of the zones to be excavated, both in depth and in width, to achieve target silver cleanup levels. The Navy was promptly notified of the increase in soils and sediments above target remediation levels, and was informed of proposed excavation volume increases that would be necessary to achieve the target level for unexcavated soils of ≤ 10 mg/kg. Upon approval of these modifications, new design sketches delineating the estimated actual areas of contamination were submitted to the contractor; excavation personnel were instructed to excavate according to the sketches. (These sketches and excavation volume estimates are provided as Appendix D.) Confirmatory samples, that is, samples acquired from the drainage area after excavation but before backfilling, showed that the quantity of soils removed was adequate, but not excessive. Analyses identified silver concentrations in unexcavated soils/sediments of less than 10 mg/kg, but most samples showed a detectable quantity of silver, generally in the range of two to eight mg/kg (see analytical data packages, Appendix F). These data suggest that the amount of soils and sediments removed approached the minimum that would still allow achievement of target remediation levels.

Estimates of the quantity of soil removed were developed, based on actual measurements of the excavation trench (Appendix E). ABB-ES personnel measured the width, depth, and length of all portions of the excavation of the eastern swale. The estimate developed from these measurements was 1,111 cy. This number is very close to the original volume estimate of material excavated from *both* streams. The Contractor halted excavation after the first (eastern) stream was completely excavated. OBG Tech announced that unless they received in writing a contract modification stating that they would receive payment for additional excavation and treatment not in the original contract scope, they would demobilize after completion of the first ditch and restoration of the areas affected by excavation and treatment. This position was made known to Jowett, the Navy, and the Government Representative. Ultimately, the Contractor did demobilize after completion of excavation and treatment of eastern stream materials, and the restoration of areas affected by excavation and treatment.

To the knowledge of the Government Representative, no work has been performed in the western stream area since Contractor demobilization. Felled trees are still in place, many of which have been introduced to contaminated soils and sediments. The only additional work items executed within the unexecuted ditch since the tree clearing event are the following: (1) The Contractor installed a culvert several inches below the road surface to prevent surface water from flowing along the road; the original culvert was evidently clogged or blocked during the original tree clearing effort. (2) The silt fence that was installed in the vicinity of the ditch for sediment and erosion control purposes is still in place, at the order of the Navy.

In terms of the general requirements of excavation activities, the Contractor's work was in compliance with the Specifications. An important excavation-specific requirement was the proper control of surface water in excavation areas. The process/cooling water flowing from Building 731 outfalls required diversion. A small diversionary channel was dug with a backhoe, being careful to remain out of contaminated zones. The small part of the channel that was in a contaminated area was dug by hand, so that the shovel used was the only equipment requiring decontamination. The diverted water was pumped into the sanitary sewer system of the facility.

Contaminated soil and sediment was handled in accordance with the Specifications. Full-time supervision by ABB-ES personnel ensured that no contaminated material was released to the environment, inadvertently or otherwise. The excavator remained within the ditch's bed area (and therefore within the contaminated material) until the completion of excavation. The excavator was never removed from the center of the ditch until completion, at which time the excavator was driven directly to the decontamination pad for cleaning. While digging, the excavator filled a 14-cy dumptruck, which when full was driven to the staging area. The dumptruck released its contents by backing to the berm and dumping so that material fell over the berm and into the diked area. Upon completion of contaminated material hauling, the bucket of this truck was decontaminated at the decontamination pad.

Throughout the excavation, hauling, and treatment phases of the project, no evidence of tracking of contaminated material was noted by the Government Representative. This contaminated material dissemination is expressly prohibited by the Specifications.

All debris encountered during excavation was managed according to the Specifications. Solid waste material, including organics such as tree branches, logs, and timber, decontaminated and stockpiled for proper management. The Contractor also unearthed some unknown materials that were considered potentially hazardous. For example, near the end of the excavation of the west stream, the Contractor dug up and punctured an unmarked 55-gallon drum. This resulted in the cessation of excavation until the contents of the drum were sampled and identified. The Government Representative immediately notified the Navy and personnel of the NSWC Environmental department. The Facility deployed a hazardous materials crew for the collection of drum contents samples. Analysis of the samples was arranged by ABB-ES through an outside laboratory. The work delay experienced in waiting for the analytical results was substantial, largely because it was compounded by delays associated with the winter holidays. Lab data showed the material to be free of explosive material and hazardous material except for small quantities of acetone (the material in the drum is believed to be the shavings of removed paint). This drum was removed from the immediate stream area and placed within the diked staging area until proper disposal, to be performed by Facility personnel. Very soon after excavation resumed, another potentially hazardous item was unearthed: a rocket motor casing. This caused more delays in waiting for a safety assessment by the Facility's explosives experts. They assured the Contractor that the rocket motor was harmless, as would be any others encountered while digging in the eastern stream. To prevent similar delays the Contractor was instructed to, assume that objects buried beneath the eastern ditch would be harmless to the excavation crew. Potentially hazardous materials were to be segregated from other materials and stockpiled for proper management. The Facility agreed to perform all disposal of potentially hazardous materials.

The final requirement of this section required the Contractor to begin backfilling of the excavated areas only after confirmatory samples indicated that unexcavated soils are within target remediation levels. The Contractor did not begin backfilling activities until receipt of approval from the Government Representative.

Drainage Ditch Restoration

Drainage ditch restoration was initiated after all contaminated media was removed, treated, and placed. Drainage ditch restoration consisted of restoring the ditch to pre-remediation conditions and included replacement of removed soils/sediments with clean backfill, compaction, placement of erosion control fabric, and seeding of adjacent areas. Drainage ditch restoration was completed to project plans and specifications requirements by the contractor.

Solidification/Stabilization

Solidification/stabilization of contaminated media was completed in conformance of project plans and specification requirements. The treatment was completed in a square-shaped, approximately 6,000-square-foot area surrounded on three sides by a three-foot-tall earthen dike, constructed of the scraped material removed in grading the area. The un-diked side was the side of highest elevation; the S/S treatment equipment was installed there.

The treatment process began with the stockpiled contaminated soils and sediments being loaded into the hopper of a diesel-powered hammermill. This pre-mixing step was necessary due to the high moisture and organic content in most of the excavated materials. The hammermill broke down soil clumps, roots, and other organic matter to a composition more amenable to mixing with the additive. The material was then fed via conveyor to a shredding/mixing machine. This further broke down the incoming soil/sediment material; the additive material was introduced at this step. The additive, stored in a silo, was released to the mixing machine in precise quantities. The additive/contaminated material blend then progressed to a pugmill, which provided thorough mixing. . . A stack conveyor built stockpile mounds of the treated material. Samples, when needed, were acquired from these piles, which were then spread into the placement area and compacted in six inch lifts.

3.2 GOVERNMENT REPRESENTATIVE-PERFORMED TASKS

ABB-ES, as the Government Representative for this project, performed three main field-related tasks: (1) confirmatory sampling and analysis of environmental media, to ensure that target clean-up levels of 10 mg/kg were achieved; (2) performance of sample quality assurance, both on ABB-ES-collected and Contractor-collected samples; and (3) perimeter air monitoring, to monitor air quality along the exclusion zone boundary.

3.2.1 Confirmatory Sampling/Analysis

ABB-ES was tasked with developing an accurate field analytical program, using an on-site mobile laboratory that could supply same day turnaround for silver analyses. Samples were collected and analyzed to ensure that silver concentrations in-place soils/sediments were less than or equal to 10 mg/kg. All confirmatory samples were acquired along the transects depicted in Figure 3-1. Three samples were collected at each transect: (1) one at ground surface on the left edge of the excavation (location 'A' on sample identification codes); (2) one at the center of the excavation trench (location 'B'); and (3) one at ground surface on the right edge of the excavation (location 'C'). This sampling regimen enabled ABB-ES personnel to evaluate the lateral and vertical limits of silver contamination.

Several of these samples yielded analytical data of greater than 10 mg/kg. In these instances, more soil/sediment was removed from the vicinity of the sampling point. (The quantity of removed soil was based on how high the contamination was at that point.) A second sample was then collected from the according point along the same transect, that is, the sample was taken from the newly-established boundary of excavation. This routine allowed for efficient removal of the contaminated soil/sediment, avoiding the removal of too much non-contaminated soil and sediment. All sample acquisition, storage, handling, and decontamination procedures were performed in conformance with the ABB-ES-prepared document: *Field Sampling Plan; Naval Ordnance Station, Site 5, Indian Head, MD*, dated July, 1991. This document is provided as Appendix G.

The analytical work was performed in a mobile laboratory trailer, properly equipped for Atomic Absorption (AA) analyses. An AA unit was set up for silver analyses under the guidance and supervision of factory technical representatives. All analytical techniques were performed in accordance with ABB-ES Standard Operating Procedures (SOPs) established March, 1991, for field use of AA units. These SOPs are provided as Appendix H.

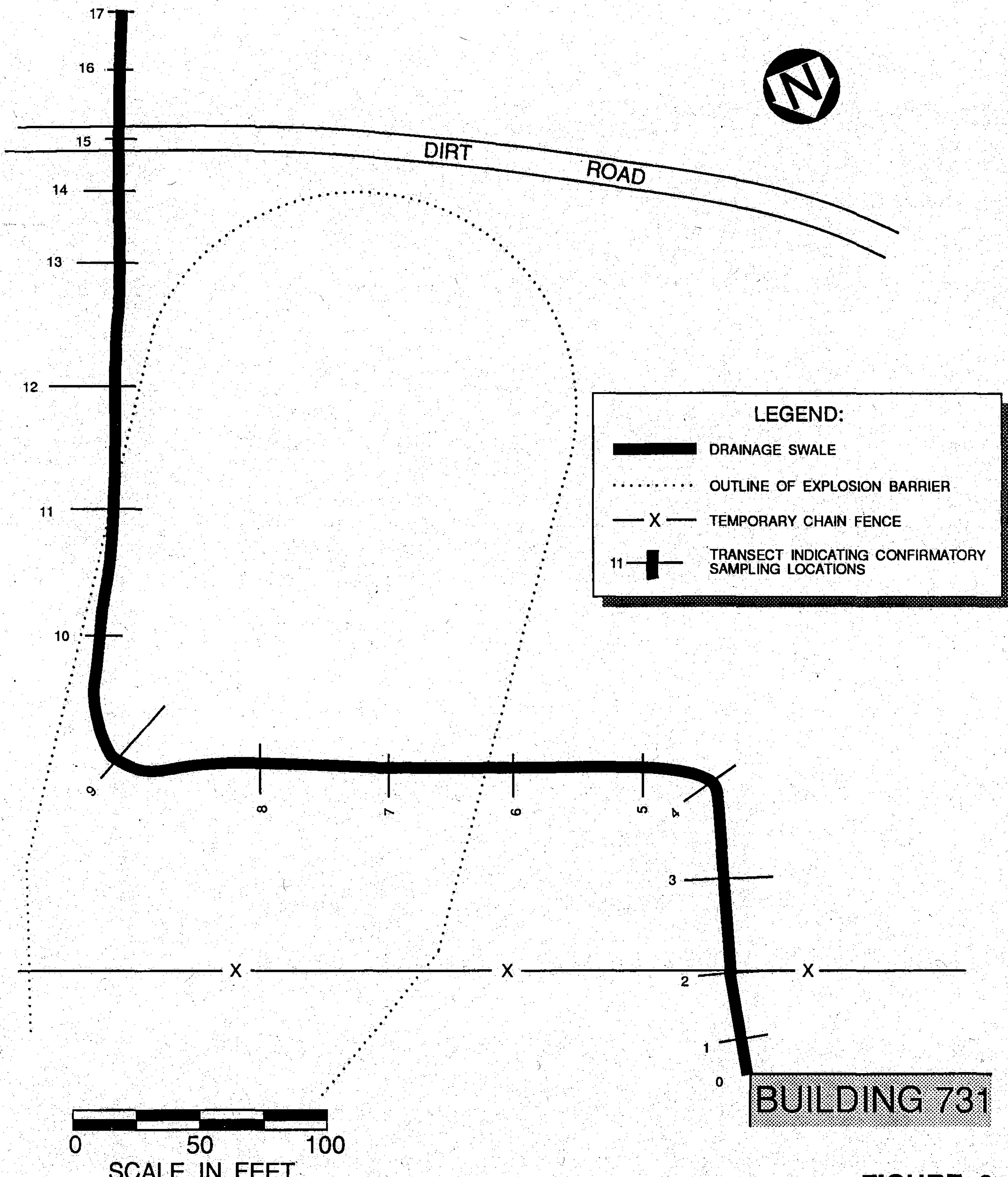

FIGURE 3-1

SAMPLING TRANSECT LOCATIONS AT EAST SWALE

NAVSURWARCEN INDIAN HEAD

ABB Environmental Services, Inc.

3.2.2 Analytical Quality Assurance

Data quality is the degree of uncertainty of the analyses, with respect to precision, accuracy, representativeness, completeness, and comparability (PARCC). Data quality with associated quality assurance/quality control of field analysis is of U.S. Environmental Protection Agency (EPA) Level II data quality and useability. The PARCC parameters and field data quality in terms of meeting the PARCC objectives are discussed in the following paragraphs.

Precision and Accuracy

For the purposes of lab quality assurance, *precision* denotes the ability to replicate a value, and *accuracy* denotes the ability to obtain a true value. Precision and accuracy of the field data were monitored through review of duplicate analyses (precision), and spike recovery (accuracy). In general, the field analytical results provided more-than-acceptable precision and accuracy.

Two-hundred forty-one samples were analyzed on-site. In addition, 22 replicates were completed with relative percent differences (RPDs) ranging from zero to 28 percent, with one sample exhibiting 48 percent RPD (an outlier). Twenty-five matrix spikes were completed, with percent recoveries ranging from 74 to 102. Method blanks, water blanks, and preparation blanks were also used to demonstrate that reagents and preparations were clean for each analytical episode. The operating instrument calibration encompassed one to 50 mg/kg for silver across the linear range. Check standards at one and 10 mg/kg were used for each analytical episode to demonstrate instrument stability and consistency. Check standard values ranged from zero to 9 percent from the true concentration. Check standard acceptance limits are plus or minus 30 percent of the true concentration. United States Geological Survey (USGS) solid matrix standards were utilized to monitor digestion efficiency. USGS standards used were GXR-1 and GXR-2. GXR-1 and GXR-2 values obtained by the field lab ranged from 31 to 44 mg/kg and 16 to 24 mg/kg, respectively. All USGS standard values obtained on-site fell within the acceptance range listed in the USGS standards guide for inorganic analyses.

Representativeness

Measurements were taken so that field results were as representative of the media (soil or water) and environmental conditions as possible. Sampling protocols in the ABB-ES's Field Sampling Plan were developed to ensure that samples collected properly represent the media. Sample handling protocols (such as chain-of-custody maintenance and proper storage times and techniques) were sufficient to protect the representativeness of the sample. Proper documentation established that protocols were followed and sample identification and integrity were ensured. Analytical sample preparations ensured sample homogeneity and representativeness, prior to analysis.

Completeness

The characteristic of completeness is a measure of the amount of valid data obtained compared to the amount expected to be obtained in the AA SOPs. Completeness for this field program was acceptable.

Comparability

The characteristics of comparability reflect both internal consistency of measurements made at the site and the expression of results consistent with other organizations (such as an outside lab). The requirement has been met through the use of standardized field screening protocols and through the data evaluation process. Of the 241 samples collected and analyzed, 20 split samples (nine percent) went to an outside lab for confirmatory analysis (total Ag). Another two samples of treated material was sent out for confirmatory TCLP analysis. TCLP analysis demonstrated that silver was not detected (less than 0.50 mg per liter) in the leachate in tests performed on the treated material. The method used for comparative off-site total silver analysis was EPA Method 6010 with a level B (NAVY) data package. EPA Method 6010 utilizes Inductively Coupled Plasma (ICP) instrumentation with a 3050 digestion. Both ICP and AA instrumentation/methods produce data that is generally very comparable.

Comparison of On-Site and Off-Site Laboratory Results

Data obtained from the off-site lab demonstrated excellent correlation with field-generated data. Of the 20 samples submitted for total silver analysis, four were outliers with respect to comparability (56 to 95 percent deviation). The other 16 exhibited zero to 40 percent deviations, which are acceptable relative concentration deviations. The four outlying values may be attributed to particle effect of two separate aliquots within the same sample. See the data tables provided in Appendix F.

Evaluation of Laboratory Data

Data quality objectives for the project fall under the level B data package. The data receivables met specified criteria under typical Contract Laboratory Procedures/Protocol (EPA/CLP Region I), even though the contracted lab was not CLP-certified for inorganic work. Typical data packages would include: matrix spikes/matrix spike duplicates (MS/MSDs); water blanks; method blanks; duplicates; calibration; and continuing calibration criteria. All criteria were acceptable, with the exception of the MS/MSDs. Two sets of MS/MSDs were completed with recoveries yielding zero to 411 percent. These recoveries were due to the minute amount (10 micrograms, or 0.1 mg/kg final concentration) of silver added to two randomly-selected samples prior to sample preparation. The samples selected for spiking had reported silver concentrations of approximately 100 mg/kg each. The addition of 0.1 mg/kg to 100 mg/kg does not allow for precise evaluation of spiked material/matrix or any inter-element effects that may exist. It does suggest that there is slight concentration variability between aliquots of the same sample (that is, 100 mg/kg to 141.1 mg/kg = 411 percent recovery or 99.5 mg/kg to 100 mg/kg = zero percent recovery).

This does not affect the data quality or invalidate the data. It does suggest that the spiking concentration was too low for the sample selected for MS/MSD. Spikes are typically done on non-detect samples, or they are done proportionally to the expected sample concentration. For this on-site lab, CLP protocol was not breached and EPA spiking criteria were met.

Other Quality Assurance Tasks

Quality assurance was also performed on data generated from Contractor-acquired samples of solidified and stabilized treated material. ABB-ES personnel received duplicates of approximately 10 percent of the samples collected by the Contractor. These samples were subject to TCLP testing for metals; both the original samples and the duplicates yielded no detectable silver in the test leachate.

3.2.3 Air Monitoring

Air monitoring was performed to determine the need for dust-reducing controls during excavation and treatment. The potential existed that excavation and S/S treatment procedures could generate significant quantities of potentially contaminated dust. A requirement of the project specifications included the prevention of airborne silver contamination from reaching levels dangerous to on-site personnel.

In addition to the particulate concentration measurements made by the Contractor, ABB-ES personnel set up three mini-ram units along the perimeter of the exclusion zone. These instruments were activated at the time excavation and/or treatment was initiated each day, and ran continuously for slightly over eight hours. The units measured the time weighted average (TWA) concentration of all particulates in air (it was assumed that all dust detected by the mini-ram equipment was remediation-related).

Action levels for particulate concentrations were based on two factors: (1) the Permissible Exposure Limit (PEL) of silver, which is 0.01 milligrams per cubic meter (mg/m^3); and (2) applicable soil contamination data, derived from the 1991 site characterization study. The worst-case average concentration of silver in soils/sediments is 151 mg/kg, as indicated in the specifications. This means that the TWA particulate concentration would have to be greater than 66 mg/m^3 in order to achieve the PEL of silver (a TWA of 0.01 mg/m^3). The highest eight-hour TWA particulate concentration, as measured by the mini-ram, was 0.04 mg/m^3, equivalent to an estimated worst case airborne silver concentration of 6 x 10^{-6} mg/m^3. Because dust concentration action levels were never reached, dust reducing controls were not necessary. All mini-ram data is provided in the Field Log Book (Appendix I).

APPENDICES

APPENDIX A: SUBMITTAL REVIEW CORRESPONDENCE

ASEA BROWN BOVERI

November 2, 1992

Jim Behrend, ROICC
Building 351
Naval Surface Warfare Center
Indian Head, MD 20640-5035

Subject: Remedial Work Plan Deficiencies, Naval Surface Warfare Center, Indian Head, MD. Building 731/Silver-contaminated Drainage Ditch Contract No. ND62477-91D0043

Dear Jim:

As oversight contractor for the silver-contaminated drainage ditch (Building 731) remediation project, ABB Environmental Services, Inc. (ABB-ES), has identified several deficiencies in the Remedial Work Plan provided by the remediation contractor, OBG Technical Services (OBG Tech). These issues must be addressed and resolved: (1) before work can begin on the site; and (2) to receive project start-up approval from the State. The following list identifies individual specifications (as provided in the ABB-ES-prepared document: *Plans and Specifications: Remedial Action*; March 10, 1992) that are not adequately satisfied by the content of the work plan, along with other deficiencies that may impede the successful completion of the project:

- Section 01012 — A general schedule for all remedial tasks is required, as specified in subsection 1.3.1.1. This schedule has not been provided in the Remedial Work Plan.

- Section 01410 — The Sampling and Analysis Plan does not fully meet the specifications. The following items require resolution:

  - For wastewater sample acquisition, no specifics are given of the number of samples, sample sizes, the preservatives to be used, or the analyses to be performed.

  - For treated material sampling, sample sizes, numbers of samples, and preservatives are not discussed.

  - There is no discussion of sampling equipment, decon procedures, handling procedures, and QA/QC procedures.

  - There is no discussion of sample identification procedures. A minimum process would include a field notebook documenting all relevant sampling information.

- Section 01510 — OBG Tech is required to provide construction details of the staging area as part of the Remedial Work Plan, as specified in Section 01510 (page 01510-1) of the Plans and Specifications. These plans/details are not included in OBG Tech's work plan. Also, the details that are submitted for the decon pad are not adequate. At a minimum, the capacity of the sump, and details about the berm/dike construction should be provided.

- Section 02081 — No information about proposed measurement techniques has been provided. As discussed in subsection 3.3.1, the method used for weighing waste materials and other items must be specified in the Remedial Work Plan.

- Section 02082 — OBG Tech has not provided an Off-Site Disposal Plan, which is specified in subsection 1.3.1.

- Section 02205 — The excavated volume is specified to be a ten-foot-wide by two-foot-deep section extending the entire man-made length of the drainage ditch. On page 4 of OBG Tech's work plan, as well as in Attachment 1, it is indicated that a *twelve*-foot width of soil is to be excavated. This is acceptable; however, OBG Tech will not be paid for any volume of soil excavated in excess of 1077 cubic yards, unless confirmatory sampling data dictate that more soil be removed to reach acceptable levels of silver. This decision will be made by the Government Representative/site engineer. OBG Tech may not attain 1077 cubic yards of excavated material by increasing the width of the path and reducing the length; excavation of the entire man-made length of the drainage ditch is required. The areas to be excavated are clearly delineated on page 02205-1, Limits of Excavation, and in Section II, Design Sketches.

- Section 02240 — A solidification/stabilization (S/S) plan is required. The Remedial Work Plan shall include the following S/S plan items:

  - Treatability study results, along with OBG Tech's proposed design mix for remediation;

  - Details of S/S methodologies, procedures, and sequence necessary to accomplish remediation work activities;

  - A construction schedule identifying the critical path for all S/S activities; and

  - Construction quality control procedures.

Additionally, OBG Tech must indicate that they have obtained certain permits/approvals, such as solid waste/hazardous waste disposal permits, and provide certification that an off-site landfill will accept remediation-generated wastes. OBG Tech must provide ABB-ES with Proctor Test results on both the clean fill and on the treated material generated during the treatability study, and they must certify that the fill is indeed clean.

Other potential problems with the Remedial Work Plan include the following:

- Telephone numbers of OBG Tech Project Personnel are missing; Appendix A of the HASP indicates that these numbers are provided, but they are not.

- OBG Tech states that fill material used for constructing the staging area will be "used later as soil cover." This should *not* be done since the soil is likely to be contaminated. This soil will require testing and either (1) proper disposal or (2) treatment and incorporation into the berm at no additional cost to the Government.

- OBG Tech must indicate whether the treatability study was performed with weight or volume as the key measurement. This information is necessary to maintain the correct proportions of the selected mix.

- The specific seed mixture(s) for all revegetation tasks must be provided.

- OBG Tech should provide a traffic plan, to organize truck routes and schedules.

- The Plans and Specifications for the remedial action indicate that during placement of treated material within the explosion barrier, the native soil will be scarified and hydrated in a specific manner. OBG Tech should indicate exactly the material is to be placed so that the specifications are met.

- OBG Tech should indicate what the minimum density for compacted material will be. Also, OBG Tech should consult the MILCON construction specification so that the geotechnical properties of the treated material meet the requirements of the rest of the fill to be used for the explosion barrier.

It is our feeling that these items can be provided quickly to support a project start date of November 11, 1992. If you have any questions about this list, or if you have any other concerns or comments, please do not hesitate to call either myself or Franco Godoy. My direct telephone number is (202) 797-6530.

Sincerely,

Douglas von Bushberger
Environmental Engineer

cc: Shawn Jorgensen

APPENDIX B: ORIGINAL REMEDIAL WORK PLAN

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Appendix A

Naval Ordnance Station

Building 731
Indian Head, Maryland

HEALTH AND SAFETY PLAN

October 1992

OBG TECHNICAL SERVICES, INC.
5000 Brittonfield Pkwy.
E. Syracuse, NY 13057
(315) 437-6400

OBG TECHNICAL SERVICES, INC.
5221 Militia Hill Rd.
Plymouth Meeting, PA 19462
(215) 940-1160

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SECTION 1 - INTRODUCTION

The following Health and Safety Plan (HSP) has been developed in accordance with the requirements set forth in 29 CFR Part 1910.120, *Hazardous Waste Operations and Emergency Response* and in conjunction with the OBG Technical Services (OBG Tech) Hazardous Waste Operations Standard Operating Procedures (see Appendices A through F).

The purpose of this HSP is to assign site-specific responsibilities, site-specific training requirements, establish site-specific personnel protective requirements, and to provide guidance for site-specific contingencies that may arise.

SECTION 2 - SITE BACKGROUND INFORMATION AND PROJECT PERSONNEL

2.01 Site Location

The remedial action site (Site 5) is comprised of two drainage ditches emanating from the southwest facing corners of Building 731, Naval Ordnance Station, Indian Head, MD.

2.02 Project Description and Scope of Work

The drainage ditches have been impacted by past photographic waste management practices originating within the building. These practices have resulted in elevated silver concentrations within ditch soils/sediments. Portions of the drainage ditch are within areas designated for a military construction project (MILCON P-059) and a segment of the ditch network lies in an area scheduled for expansion of the explosion berm. The Navy has elected to remediate the manmade segments of the drainage ditch network through excavation of soils/sediments exhibiting silver concentrations greater than 10 mg/kg, treatment of the excavate utilizing solidification/stabilization technology, followed by long-term on-site management through incorporation of the treated material within the on-site explosion berm expansion.

The following provides a breakdown of tasks included in the scope of work:

1. **Mobilization and Site Preparation**

   Any additional access roads/routes will be constructed as necessary. Support facilities will be mobilized to provide for personnel decontamination. The Contaminated Soils/Sediments Staging Area will be constructed adjacent to the treatment area. Silt fence will be installed along the exclusion zone. Two decontamination pads will be constructed for vehicle decontamination.

2. **Waste Excavation and Handling**

   The silver contaminated soils/sediment will be excavated from the areas as noted on Figure 1. The excavated soil will be transported to the Staging Area for storage until it is treated. The contaminated areas depicted in Figure 1 will be excavated as shown in Figure 4.

3. **Solidification/Stabilization**

   The excavated soil will be treated with the admixture approved by the Government Representative. The soils/sediment and additive will be mixed and sampled for TCLP metals.

4. **Placement/Compaction of Treated Material**

The treated soil will be placed in the foot print of the explosion berm and compacted as outlined in Section 02240.

5. **Ambient Air Monitoring**

Real-time exclusion zone air monitoring will be performed.

6. **Soil Cover**

A one-foot soil cover will be placed over the compacted treated soil.

7. **Stump Decontamination**

The up-righted stumps from the swale will be removed and decontaminated for disposal. The contaminated soil will be removed from the roots and the roots wash so that the stumps can be disposed off-site.

8. The restoration of the drainage ditch will be in accordance with Section 02221 and the disturbed grass areas will be restored in accordance with Section 02930. Upon completion of the restoration, the equipment brought to the site will be demobilized.

2.03 Project Personnel

Project Manager:	David M. Schramm
Project Supervisor:	Thomas Wehrle
Site Health and Safety Coordinator (SSHC):	Caroline W. Miller, CIH
Alternate SSHC:	Thomas Wehrle

SECTION 3 - HAZARD EVALUATION AND PERSONAL PROTECTIVE EQUIPMENT

3.01 Potential Health Hazards

CHEMICAL	PEL	IDLH	CHARACTERISTICS	ROUTES OF EXPOSURE	SYMPTOMS OF EXPOSURE
Silver	0.01 mg/m^3	No evidence	Metal: White, lustrous solid	Inhalation Ingestion Contact	Blue-gray eyes, nasal septum, throat, skin; irritation of the skin causing ulcerations; Gastro-intestinal disturbances.

3.02 Operations and Tasks to be performed

OPERATION/TASK	HAZARD	PPE REQUIRED
Mobilization and Site Preparation	Minimal	Level D
Waste Excavation and Handling	Inhalation Contact	Level C w/o respirator (immediately available)
Solidification/Stabilization	Inhalation Contact	Level C w/o respirator (immediately available)
Placement/Compaction of Treated Material	Inhalation Contact	Level C w/o respirator (immediately available)
Ambient Air Monitoring	Inhalation Contact	Level C w/o respirator (immediately available)
Soil Cover	Minimal	Level D
Stump Decontamination	Inhalation Contact	Level C w/o respirators (immediately available)
Restoration/Demobilization	Minimal	Level D

3.03 Site-specific Personal Protection

Coveralls: Tyvek®

Outer Gloves: Neoprene or Nitrile Gloves

Respirator: Full-face or half-face respirator with HEPA Cartridges

SECTION 4 - AIR MONITORING AND ACTION LEVELS

4.01 Air Monitoring Equipment to be used

MIE RAM Portable Real-Time Aerosol Monitor with Datalogger

4.02 Air Monitoring Procedures and Action Levels

Type	Frequency	Action Level	Action
Particulates (exclusion zone)	Continuously	0.875 mg/m^3 above background	Employ dust suppression techniques as outlined in the Dust Control Plan
Particulates (breathing zone)	Periodically	8.75 mg/m^3 Total	Don respiratory protection

Note: The action level was derived by taking the highest silver concentration in soil (571 mg/kg) from the 1991 sample events and the OSHA PEL for silver (0.01 mg/m^3), and deriving a concentration in the air comparable to the soil concentrations. The calculated airborne soil concentration is 17.5 mg/m^3. The breathing zone Action Level is conservatively assigned as 1/2 of 17.5 mg/m^3 or 8.75 mg/m^3. To be more conservative for general exclusion zone monitoring, the Action Level has be selected as 1/10 of the Action Level for the breathing zone: 0.875 mg/m^3.

4.03 Potential Confined Space Areas

The excavation does not poses a potential confined space entry area due to its size (2' deep by 12' wide). However, air monitoring for oxygen deficiency, LEL, and organic vapors will be performed should the excavation be greater than 4 feet deep. The SSHC is responsible for complying with Section 10.06 of the Corporate Health & Safety Manual, such as water accumulation, loose rock or soil, and protective systems.

SECTION 5 - EMERGENCY RESPONSE

5.01 Directions to Hospital

Take Route 210 to Route 225 East. Rt. 225 to LaPlata. Turn right on Rt. 301. At second stoplight, turn left on Rt. 6 (East Troll Street). The Hospital is 1/4 mile on right at 701 East Troll Street.

5.02 Location of Nearest Available Telephone

A telephone will be located in the office trailer.

5.03 Emergency Telephone numbers

Indian Head Fire/Ambulance	301-743-3900
Charles County Sheriff	301-743-2222
Physicians Hospital - LaPlata, MD	301-609-4000
OBG Technical Services' Syracuse, NY Office Caroline Miller, CIH	315-437-6400
OBG Technical Services' Plymouth Meeting, PA Office David Schramm Thomas Wehrle	215-940-1160

5.04 Safe Refuge

The on-site trailer will serve as the safe refuge. Company or personnel vehicle will serve as the alternate safe refuge.

Section 4.05 Hazardous Waste Operations

A. Introduction

Due to the nature of the business conducted by OBG Tech, employees may be working on hazardous waste sites. OSHA has requirements for such things as air monitoring, health and safety plans, site control, and emergency response. This section is to define OBG Tech's Standard Operating Procedures (SOPs) for hazardous waste sites and to outline the elements for inclusion in the Site-specific Health and Safety Plan.

B. Other Pertinent Sections of OBG Tech's Health and Safety Manual

Section	Topic
1.01	Safety Policy
2.01	Health and Safety Records
2.02	Health and Safety Training
2.03	Injury/Illness and Accident Report Process
2.04	Medical Surveillance
2.05	Exposure Monitoring
2.09	General Safety Rules
3.01	Medical Services and First Aid
3.02	Sanitation
3.03	Emergency Action
3.04	Confined Space Entry
4.01	Occupational Noise Exposure
4.02	Radiation Exposure
4.03	Airborne Materials Exposure
5	Personal Protective and Life Saving Equipment
6	Fire Protection and Prevention
8	Materials, Handling, Storage, Use, and Disposal

C. Hazardous Waste Standard Operating Procedures

1. Contractors and Sub-contractors

All contractors and sub-contractors retained by OBG Tech for work in hazardous waste will be informed of emergency response procedures and any potential fire, explosion, health, safety, or other hazards of the hazardous waste operation that have been identified by OBG Tech.

2. Program Availability

The written safety and health program will be made available to: any contractor or sub-contractor; OBG Tech employees; OSHA personnel; and to personnel of other Federal, State, or local agencies.

3. Project Personnel

Certain individuals have specifically designated responsibilities on hazardous waste sites.

Project Manager - The Project Manager is responsible for the over-all management of the project. The Project Manager manages administrative requirements.

Project Supervisor - The Project Supervisor is responsible for coordinating between office and field personnel. The Project Supervisor is responsible for the day-to-day activities of the project. The Project Supervisor will oversee field and related activities.

Site Safety and Health Coordinator - The Site Safety and Health Coordinator (SSHC) will establish operating standards and coordinate overall project safety and health activities for the site. The SSHC will review project plans and revisions to plans to determine that safety and health procedures are maintained throughout the project. The specific responsibilities of the SSHO are outlined in Part 16, below.

4. Pre-entry Briefing

Pre-entry briefings will be held prior to initiating any site activity and at other times as necessary to inform employees of the site-specific health and safety plan. In situations covered by OBG Tech's Haz Com Program or the 40-hour Hazardous Waste Operations Health and Safety Training, training required by that program need not be duplicated.

5. Effectiveness of site-specific health and safety plan

Inspections will be made by the Site Health and Safety Coordinator or the Project Supervisor to determine the effectiveness of the site safety and health plan.

6. Personal Protective Equipment

Personal protective equipment (PPE) will be provided in accordance with Section 5 of this Health and Safety Manual. PPE will be selected and used which will provide protection against known or suspected hazardous substances and health hazards.

7. Initial Site Entry Monitoring

When information on the site shows that the potential for ionizing radiation, for IDLH conditions, or when site information is not sufficient to reasonably eliminate the following conditions:

a. Monitoring with direct-reading instruments for hazardous levels of ionizing radiation (See Section 4.02).
b. Monitoring the air with direct-reading instruments for IDLH conditions (See Section 4.03).
c. Visually observing for signs of actual of potential IDLH or other dangerous conditions.

8. On-going Air Monitoring Program

An on-going monitoring program will be established for every site where there is a potential for employee exposure to hazardous concentrations of hazardous substances. This on-going monitoring is to evaluate proper selection engineering controls, work practices, and PPE, so that employees are not exposed above OSHA PELs and published exposure levels. Specifically the on-going monitoring will be conducted:

- when work begins on a different part of the site;
- when contaminants other than those previously identified are being handled;
- when a different type of operation is initiated;
- when employees are handling leaking drums or containers or working in areas with obvious liquid contamination (e.g. spill or lagoon)

Personal monitoring will be performed on those employees likely to have the highest exposures to airborne materials in accordance with Section 4.03 of this Health and Safety Manual.

9. Site Control

The elements of the site control program will include a site map; site work zones; site communications, including alerting means for emergencies; and identification of nearest medical assistance. OSHA also requires the use of the "buddy" system, which is defined below and standard operating procedures, which are encompassed into this Health and Safety Manual. These need not be repeated in the site-specific health and safety plan when this Health and Safety Manual is on-site.

a. Site Work Zones

- *Exclusion Zone*: The exclusion zone or the Hot Zone is the area where contamination does or could occur. The exclusion zone boundary should be clearly marked by lines, placards, hazard tape and/or signs or enclosed by physical barriers, such as chains, fences, or ropes. Access control points should be established at the periphery of the exclusion zone to regulate the flow of personal and equipment into an out of the zone and to help verify that proper procedures for entering and exiting are followed.

The required level of PPE in the exclusion zone can vary according to job assignment. This will allow a flexible, effective, and less costly operation, while still maintaining a high degree of safety.

- *Contamination Reduction Zone*: The contamination reduction zone or the decontamination zone is the transition area between the contaminated area and the clean area. At least two lines of decontamination stations should be set up within the contamination reduction zone: one for personnel and one for heavy equipment. Personnel entering the contamination reduction zone should be required to wear PPE prescribed for working in the contamination reduction zone. To reenter the support zone, workers must remove any PPE. Personnel stationed in the contamination reduction zone includes the Site Health and Safety Coordinator, the Project Supervisor, personnel assisting in decontamination procedures, and emergency response personnel.

The contamination reduction zone should be designed to facilitate: decontamination, emergency response, equipment resupply, sample packaging, and temporary work rest area.

- *Support Zone*: The support zone is the location of the administrative and other support functions needed to keep the operations in the exclusion and contamination reduction zone running smoothly. Any function that need not or cannot be performed in a hazardous atmosphere is performed here. Personnel may wear normal work clothes within this zone. Any potentially contaminated clothing, equipment and samples must remain in the contamination reduction zone until decontaminated. All emergency telephone numbers, change for the telephone (if necessary), evacuation route maps, and vehicle keys should be kept in the support zone.

b. "Buddy" System

Most activities in a contaminated or otherwise hazardous areas should be conducted with a buddy who is able to:

- Provide his or her partner with assistance.
- Observe his or her partner for signs of chemical or heat exposure.
- Periodically check the integrity of his or her partner's protective clothing.
- Notify the Project Supervisor or the Site Health and Safety Coordinator if emergency help is needed.

c. Site Communication

Internal communication among personnel on site and external communication between on site and off site personnel should be established.

Verbal communication at a site can be impeded by on-site background noise and the use of personal protective equipment. In the absence of site-specific communication signals, the following will be used for emergencies:

Hand clutching throat: Out of air/can't breathe

Thumbs up: OK/I'm alright/I understand

Grip partner's wrist or both hands around partner's waist: Leave area immediately

10. Site Security

Site security is necessary to prevent the exposure of unauthorized, unprotected people to the site, to avoid the increased hazards of vandals, to prevent theft, and to avoid interference with safe working procedures.

The Site-specific health and safety plan will include provisions for maintaining security at the Site.

11. Engineering Controls, work practices, and personal protective equipment for employee protection

Engineering controls and work practices must be first instituted to reduce and maintain employee exposure to or below the OSHA PELs, except to the extent that such controls and work practices are not feasible.

Engineering controls which may be feasible include the use of remotely operated material handling equipment. Work practices which may be feasible include wetting down dusty operations and locating employees upwind of possible hazards.

Whenever engineering controls and work practices are not feasible, PPE will be used in accordance with Section 5 of this Health and Safety Manual to reduce employee exposure to or below the OSHA PELs.

Engineering controls, work practices, and personal protective equipment will be used to reduce and maintain employee exposure to or below published exposure levels not regulated by OSHA. PPE will be used in accordance with Section 5 of this Health and Safety Manual to reduce employee exposure to or below the published exposure levels.

Guidance for PPE selection can be obtained from 29 CFR 1910.120 Appendix B or the NIOSH/OSHA/USCG/EPA document "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities." The guidance document is usually handed out in the OSHA 40-hour course. However, should an employee desire a copy of 29 CFR 1910.120 Appendix B or the guidance document, the safety coordinator can provide one.

12. Levels of Protection

OBG Tech often employs the use of PPE based upon the EPA Levels of Protection. They are listed in Section 5 as a starting point, however site-specific PPE may be required. Site-specific PPE will be addressed in the site-specific health and safety plan. The type of equipment used and the overall level of protection should be re-evaluated periodically as the amount of information about the site increases and as workers as required to perform different tasks.

13. PPE Decontamination Procedures

General PPE decontamination procedures are outlined in Section 5.01. Site-specific decontamination procedures, if any, will be included in the Site-specific Health and Safety Plan.

14. Emergency Response Procedures

The nature of hazardous waste work makes emergencies a continuous potential, no matter how infrequently they occur. The communications network, as outlined in Section 4.05, part 8.c, must be conveyed to all workers so that emergency information may quickly distributed. Equipment will be necessary for emergency situations. At a minimum each site will be equipped with a fire extinguisher, eye wash bottle, and first aid kit. Other equipment, which should be considered on a project by project basis, are emergency showers, safety harnesses, and spill-containment equipment.

Follow-up procedures, as follows, must be implemented before activities resume on-site:

- Appropriate governmental agencies must be notified as required.
- Restock, replace, and/or clean all equipment and supplies.
- The Site Health and Safety Coordinator, the Project Supervisor, and the employee affected should fill out an accident report, as outlined in Section 2.03.

15. Hazards of hazardous waste sites

Chemical

Most sites contain a variety of chemicals that may be in a gaseous, liquid, or solid form. These substances can be hazardous through inhalation, skin absorption, ingestion, or through injection (a puncture wound).

Acute chemical exposures usually occur during or shortly after exposure to a high concentration of a chemical. *Chronic* usually refers to exposures to low concentrations of a chemical over a long period of time. Both of these are dependant on the chemical and may be temporary or reversible or may be permanent. Some chemicals may exhibit warning signs, while other chemicals are odorless, colorless, and tasteless.

Inhalation is the primary route of exposure at a hazardous waste site. Therefore the selection and use of the proper respiratory protection is extremely important where there is a potential for inhalation of hazardous materials. Direct skin and eyes contact is also a potential route of exposure, therefore proper selection and use of PPE is extremely important. Ingestion and injection are the least significant routes of exposure at a hazardous waste site. However, personal habits such as eating, drinking, or smoking, and safety hazards such as puncture wounds can be potential routes, therefore following SOPs and use of PPE can reduce the hazards from both of these routes of exposure.

Further information is presented in OBG Tech's Haz Com and OSHA 40-hour hazardous waste operations health and safety training.

Explosion and Fire

Due to the nature of activities at hazardous waste sites, there is a potential for explosions and fires. To minimize the hazards from fire and explosion: monitor for explosive and flammable atmospheres following the procedures in Section 3.04; keep all potential ignition sources away from an explosive or flammable environment: use non-sparking, explosion-proof equipment; and follow safe work practices.

Oxygen Deficiency

Oxygen deficiency may result from the displacement of oxygen by another gas, or the consumption of oxygen by another chemical reaction. Confined spaces and low-lying areas are particularly vulnerable and should always be monitored prior to entry following the procedures in Section 3.04.

Ionizing Radiation

Monitoring for ionization radiation is required to be performed when there is not sufficient information to eliminate the possibility of it being present on-site (e.g. uncontrolled hazardous waste sites, where little or no information is available on past history). The procedure in Section 4.02 will be followed for monitoring.

Biological Hazards

Wastes from hospitals and research facilities may contain biological materials that may cause infections to site personnel. Other biological hazards that may be present at hazardous waste sites include poisonous plants, insects, and animals. PPE can reduce the potential for exposure. The Safety Coordinator can assist in determining the correct PPE for the hazard present.

Safety Hazards

Hazardous waste sites contain numerous potential safety hazards such as: holes, ditches, drums, boards, nails, broken glass, slippery surfaces, steep grades, and uneven terrains. The work itself may be a potential safety hazard. Site personnel should constantly look out for potential safety hazards and should immediately inform the Project Supervisor or the Site Health and Safety Coordinator of any new hazards.

Electrical Hazards

As in all construction work, overhead power lines, electrical wires and cables, site electrical equipment, and lightning also pose a potential hazard to site workers. Section 10.02 provides guidance on safe electrical practices.

Heat Stress

Heat stress is potentially a major hazard for workers wearing protective clothing. Due to the impervious nature of the PPE to keep chemicals away from the skin, body heat and moisture are trapped within the PPE. Careful training and frequent monitoring of personal who wear protective clothing, scheduling of work and rest periods, and the frequent replacement of fluids can protect against this hazard.

Heat stress can be minimized by taking the following steps:

- Adjusting work schedules
- Provided air conditioned or shaded rest areas
- A total of 1 to 1.6 gallons of fluid intake recommended, but more may be necessary to maintain body weight
- Acclimatize workers to site work conditions
- Provide cooling devices to aid natural body heat exchange during prolonged work or severe heat exposure
- Review recognition and treatment of heat stress with workers

For workers wearing semi-permeable or impermeable PPE and when the temperature in the work area is above 70°F, measure:

- Heart Rate: count the radial pulse during a 30-second period as early as possible in the rest period.

  If heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the work cycle by one-third and keep the rest period the same.

  If the heart rate exceeds 110 beats per minute at the next rest period, shorten the following work cycle by one-third.

- Oral Temperature: use a clinical thermometer or similar device to measure the oral temperature at the end of the work period (before intake of fluids).

  If the oral temperature exceeds 99.6°F, shorten the next work cycle by one-third without changing the rest period.

  If the oral temperature still exceeds 99.6°F at the beginning of the next rest cycle, shorten the following work cycle by one-third.

- Body Water Loss, if possible: measure weight on a scale accurate to +/- 0.25 lb at the beginning and end of each work day to see if enough fluids are being taken to prevent dehydration. Weights should taken while the employee is wearing similar clothing each day. The body water loss should not exceed 1.5 percent total body weight loss in a work day.

The frequency of physiological monitoring depends on the air temperature adjusted for solar radiation and the level of physical work. The suggested frequency of physiological monitoring for fit and acclimatized workers.

Adjusted Temp.	Normal Work Ensemble	Impermeable Ensemble
90°F and above	45 minutes	15 minutes
87.5°F to 90°F	60 minute	30 minutes
82.5°F to 87.5°F	90 minutes	60 minutes
77.5°F to 82.5°F	120 minutes	90 minutes
72.5°F to 77.5°F	150 minutes	120 minutes

Cold Exposure

Cold stress and impaired ability to work are dangers at low temperatures and when the wind-chill factor is low. To guard against cold stress: wear appropriate clothing; have warm clothing and warm shelter readily available; and carefully monitor workers' physical conditions.

Noise

Work around large equipment often creates excess noise. The procedures set forth in Section 4.01 for occupation noise exposure and Section 5.03 for hearing protection should be followed.

16. Responsibilities of Site Health and Safety Coordinator

The Site Health and Safety Coordinator advises the Project Manager and the Project Supervisor on the matters of health and safety on the site. Specifically the responsibilities of the Site Health and Safety Coordinator include:

a. Aiding the selection of protective clothing and equipment.
b. Periodically inspecting protective clothing and equipment.
c. Maintaining proper storage of protective clothing and equipment.
d. Monitors the workers for signs of heat stress, cold stress, and fatigue.
e. Monitors on-site hazards and conditions.
f. Conducts periodic surveillance to evaluate effectiveness of Site-specific Health and Safety Plan.
g. Has knowledge of emergency procedures, evacuation routes, and the telephone numbers of the ambulance, local hospital, poison control center, fire department, and police department.
h. Posts the directions to the hospital and the telephone numbers of the ambulance, local hospital, poison control center, fire department, and police department.

i. Notifies, when necessary, local public emergency officials.
j. Coordinates emergency medical care.

17. Safe Work Practices

a. No eating, smoking, eating, drinking, or application of cosmetics in the Contamination Reduction Zone or the Exclusion Zone.
b. No matches or lighters in the Contamination Reduction Zone or the Exclusion Zone.
c. Enter and exit following procedures in the Site-specific Health and Safety Plan.
d. Wear the PPE specified in the site-specific Health and Safety Plan in the Exclusion Zone.
e. Use the "buddy" system.
f. Report any unusual conditions to the Project Supervisor or the Site Health and Safety Coordinator immediately.

D. Requirements for Site-Specific Health and Safety Plans

As a company policy, site-specific health and safety plans are required on projects. The following site-specific information must be included in the health and safety plan, as well as this manual attached as an appendix. The Safety Coordinator will prepare and/or review each site-specific health and safety plan.

1. Organizational structure of site program

The following information, at a minimum, will be included in the site-specific health and safety plan:

- Project Manager's name and telephone number
- Project Supervisor's name and telephone number
- Site Safety and Health Coordinator's name and telephone number
- Other personnel needed for emergency response

This organizational structure will be reviewed and updated as necessary to reflect the current status of the hazardous waste site operations.

2. Workplan Summary

A summary of the workplan, including location and approximate size of the site, will be included in the site-specific health and safety plan addressing the anticipated activities.

3. Safety and Health Hazard Analysis

A safety and health hazard analysis will be prepared for the site-specific health and safety plan, including pathways for hazardous substance dispersion. The safety and health hazard analysis will include hazardous substances and health hazards involved or expected at the site, and their chemical and physical properties.

Information to consider to include in the site-specific health and safety plan:

- Exposures exceeding the permissible exposure limits and published exposure levels
- IDLH situations
- Potential skin absorption and irritation sources
- Potential eye irritation sources
- Explosion sensitivity and flammability ranges
- Oxygen deficiency

4. Site-specific Training Assignments

Initial 40-hour worker, Supervisor, and Refresher training are addressed in Section 2.02, Health and Safety Training. Hazard Communication training is also addressed in this section. Training specific to the site will be addressed in the site-specific health and safety plan.

5. Personal Protective Equipment

Personal protective equipment to be used by employees for each of the site tasks and operations being conducted will be addressed in the site-specific health and safety plan. The following information will be included in the site-specific plan: PPE selection based upon site hazards; work mission duration; site-specific information on PPE decontamination and disposal;

6. Frequency and types of air monitoring

Frequency and types of air monitoring, personnel monitoring, and environmental sampling techniques and instrumentation to be used will be addressed in the site-specific health and safety plan. Methods of maintenance and calibration of monitoring equipment can be found in Section 4.03.

7. Site Control Program

The site-specific site control program will include a site map and the identification of the nearest medical assistance.

9. Site Security

Site-specific information for maintaining security will be included in the site-specific health and safety plan.

8. Emergency Response Plan

Site-specific information such as safe distances and places of refuge, evacuation routes and procedures, and procedures for reporting incidents to local, state, and federal agencies not covered in OBG Tech's SOPs will be covered in the site-specific health and safety plan. The nearest telephone for emergency communication will be identified in the site-specific emergency response plan.

9. Spill Containment Program

A spill containment program unique to the site will be developed for the site-specific health and safety plan. if applicable.

10. Site-specific information other than in SOPs

a. Medical surveillance requirements unique to the site, other than what is covered in OBG Tech's SOP in Section 2.04.
b. Employee training assignments unique to the site other than what is covered in OBG Tech's SOP in Section 2.02.
c. Decontamination procedures which are unique to the site other than what is covered in OBG Tech's SOP in Section 4.04 (E).
d. Safe work practices unique to the site, other than what is covered in OBG Tech's SOP in above.

Appendix B

Section 5.01 EPA Levels of Personal Protective Equipment

A. Introduction

Due to the nature of the business of OBG Tech, employees may be required to work on hazardous waste sites. Use of personal protective equipment (PPE) is required by OSHA. EPA has defined four Levels of Protection: Levels A, B, C, and D. These levels are defined below and may be used as a starting point for PPE on sites, but must be tailored to the specific situation.

B. Levels of Personal Protection

Level A

Level A protection provides the highest available level of respiratory, skin and eye protection. The material in the suit, gloves, and boots must be compatible with the substances involved.

1. Positive pressure, full-facepiece SCBA or positive pressure supplied-air respirator with escape SCBA, approved by the National Institute for Occupational Safety and Health (NIOSH).
2. Fully-encapsulating, chemical-resistant suit.
3. Outer chemical-resistant gloves.
4. Inner chemical-resistant gloves.
5. Chemical-resistant safety boots.
6. Two-way communications.

Options:

1. Cooling unit.
2. Coveralls.
3. Long-underwear.
4. Other PPE as required in Section 5.02 through 5.09 of this Health and Safety Manual.

Level B

Level B protection provides the highest level of respiratory protection but less skin protection than Level A. Use only when airborne chemicals are not hazardous to the skin or not capable of being absorbed through the intact skin.

1. Positive-pressure, full-facepiece SCBA or positive-pressure supplied-air respirator

with escape SCBA (NIOSH approved).

2. Chemical-resistant suit.

3. Inner and outer chemical-resistant gloves.

4. Chemical-resistant safety boots.

5. Two-way communications.

Options:

1. Cooling unit.
2. Coveralls.
3. Long-underwear.
4. Other PPE as required in Section 5.02 through 5.09 of this Health and Safety Manual.

Level C

Level C protection provides less skin protection as Level A and a lower level of respiratory protection than Levels A and B.

1. Full-facepiece, air-purifying, canister-equipped respirator (NIOSH approved).

2. Chemical-resistant suit.

3. Inner and outer chemical-resistant gloves.

4. Chemical-resistant safety boots or chemical-resistant boot covers.

5. Two-way communications.

Options:

1. Cooling unit.
2. Coveralls.
3. Long underwear.
4. Other PPE as required in Sections 5.02 through 5.09 of this Health and Safety Manual.

Level D

Level D protection provides minimal skin protection and no respiratory protection.

1. Coveralls or long pants and long-sleeved shirt.

2. Safety boots.

Options:

1. Other PPE as required in Sections 5.02 through 5.09 of this Health and Safety Manual.

C. PPE donning procedures

1. Inspect the PPE before donning with the procedures outlined in Sections 5.02 through 5.09.
2. Make adjustments to hard hat to fit user's head, if necessary.
3. Standing or sitting, step into legs of the suit; evaluate proper placement of feet within the suit; then gather suit and pull sleeves over arms and secure suit front.
4. Put on chemical-resistant safety boots over the feet of the suit. Tape the leg cuff over the tops of the boots.
5. Put on air tanks and harness assembly of the SCBA (if applicable). Don the facepiece or respirator and adjust it to be secure, but comfortable. Do *not* connect the breathing hose of the SCBA. Open valve on the air tank (if applicable).
6. Perform negative and positive respirator facepiece seal test procedures.
7. Put on inner gloves.
8. Put on other PPE (e.g hard hat, hearing protectors).
9. Raise hood over head carefully so that the face seal of the respirator is not disrupted.
10. Connect the breathing hose while opening the main valve (if applicable).
11. Have assistant observe the wearer for a period of time to evaluate whether the wearer is comfortable, stable, and that the PPE is functioning properly.

D. PPE Decontamination Procedures

Station 1: Equipment Drop

Deposit equipment used on-site (tools, sampling devices, clipboards, etc) onto plastic drop cloths. During hot weather a cool down station may be set up within this area.

Station 2: Outer Garment, Boots, and Gloves Wash and Rinse

Scrub outer boots, outer gloves and chemical-resistant splash suit with decontamination solution or detergent water. Rinse off using large amounts of water.

Station 3: Outer Boot and Glove Removal

Remove outer boots and gloves. Deposit in appropriate area.

Station 4: Tank, Canister, or Mask Change

If worker leaves exclusion zone to change air tank, canister, filters, or mask, this is the last step in the decontamination procedure. Worker's air tank, canister, filters, or mask is exchanged, new outer gloves and boots are donned, joints taped, and worker returns to duty.

Station 5: Boot, Gloves, and Outer Garment Removal

Boots, chemical-resistant splash suit, inner gloves removed and deposited in separate containers lined with plastic.

Station 6: SCBA or Face-piece Removal

SCBA backpack and/or facepiece is removed. Avoid touching face with finger. SCBA deposited on plastic sheets.

Station 7: Field Wash

Hands and face are thoroughly washed. Shower if appropriate.

E. Upgrading/Downgrading of PPE Levels

The PPE used and the overall level of protection should be reevaluated periodically as the amount of information on the site increases, and as workers as required to perform different tasks.

Reasons to upgrade the level of PPE may include:

- Known or suspected presence of skin contact hazards.
- Occurance or likely occurance of gas or vapor emission.
- Change in work task that will increase contact or potential contact with hazardous materials.

Appendix C

Section 4.03 Airborne Materials Exposure

A. Introduction

OSHA, in 29 CFR 1910.1000, specifies that an employee's exposure to substances listed in Table Z-1-A, Z-2, or Z-3 shall be limited in accordance with the requirements of the section. OSHA, in 29 CFR 1926.55, specifies that an employee's exposure to those specified in the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs) for Airborne Contaminants for 1970 shall be avoided. Where the requirements of the two standards overlap, the most stringent of the two will be enforced.

B. Administrative and Engineering Controls

To achieve compliance with airborne materials exposure, administrative or engineering controls must first be implemented to achieve compliance.

C. Respirator Use

When effective engineering or administrative controls are not feasible to control airborne exposures, or while they are being instituted, appropriate respirators will be used. Training, selection, issuance, and standard operating procedures are outlined in Section 5.05 of this Health and Safety Manual.

D. Action Specific Hazards

As specified in 29 CFR 1910 Subpart Z, action specific hazards, i.e. lead, asbestos, and formaldehyde, have certain requirements. Any such material will be monitored as directed under specific regulatory requirements.

E. Monitoring

1. Monitoring for IDLH and other dangerous conditions

   During confined space entry and other situations where the quality of the air is unknown, air monitoring will be conducted for combustible or oxygen deficient atmospheres, as well as for volatile organic. Calibration and maintenance procedures for direct-reading equipment are included as Appendix A.

2. General On-site Monitoring

   Site conditions may change during site activities. Air monitoring will be conducted when:

   a. Work begins on a different portion of the site.
   b. A different type of operation is initiated.
   c. Employees are working in obvious contamination.

3. Personal Monitoring

Personal monitoring will be performed on high-risk workers who are closest to the source of contaminant generation. This approach is based upon the rationale that the probability of significant exposure varies directly with distance from the source. If workers who are closest to the source are not significantly exposed, then all other workers are, presumably, also not significantly exposed and probably do not need to be monitored.

However, any employee may request personal monitoring be performed if a potential risk exists.

Personal air monitoring methodology will be determined by the Safety Coordinator using the appropriate National Institute for Occupational Safety and Health (NIOSH) or other appropriate methods.

F. Notification

Employees will be notified of the results of the monitoring performed in accordance with the procedures specified in Section 2.05.

Appendix A

Calibration and Maintenance Procedures

A. Loan of Equipment

1. Sign-out Procedures

The health and safety monitoring equipment can be obtained from the Warehouse Supervisor or the Safety Coordinator. The information that will be required prior to a piece of equipment leaving the warhouse equipment room will be:

- Serial Number of equipment
- Name of Person responsible for equipment
- Job Number and Location
- Expected Return Date

2. Equipment Return

Never use carrying cases as shipping cases.

Should a piece of equipment be damaged or in need of maintenance, it should be tagged with appropriate instructions.

Upon return, the piece of equipment will be checked to see if it is in the same condition as it left in. If it is broken, an assessment will be made to determine whether it was broken by mishandling or by normal wear and tear. It will also be determined whether the repair can be performed in-house or must be sent to the manufacturer. If the equipment was determined to be broken due to mishandling and the equipment must be sent to the manufacturer, the Project Manager in charge will be contacted to determine if the project can absorb the cost of the repair.

B. Photoionization Detectors

1. Calibration Procedures

This is to be performed, at a minimum, on a daily basis or whenever the detector is used.

a. Turn on photoionization detector (PID) and allow to warm up.

b. Zero instrument in "clean" air. (Note: "Clean" air refers to upwind of a waste site).

c. Connect Span Gas cylinder to PID with a piece of clean tubing.

d. Open the valve on the cylinder until a steady reading is obtained.

e. Adjust the SPAN control, if necessary, until reading is the same as the Span Gas concentration.

f. Close the valve on the Span Gas cylinder. Disconnect the cylinder from the PID.

g. Sample again in "clean" air. Adjust the zero, if necessary.

2. Maintenance Procedures

Keeping the PID in top operating shape means charging the battery, cleaning the lamp window, and replacing filters. The exterior of the PID can be wiped clean with a damp cloth and mild detergent, if necessary.

B. Combustible Gas and Oxygen Meters

1. Calibration Procedures

a. Combustible Gas Meter

i. Turn on the instrument and allow to warm up.
ii. Zero % LEL meter in "clean" air.
iii. Connect calibration gas with clean piece of tubing to meter.
iv. Open the valve on the cylinder until a steady reading is obtained.
v. Adjust the combustible gas calibration control, if necessary, until reading is the same as the calibration gas concentration.
vi. Close the valve on the calibration gas cylinder. Disconnect the cylinder from the meter.
vii. Sample again in "clean" air. Adjust the zero, if necessary.

b. Oxygen Meter

i. Turn on the instrument in "clean" air and allow to warm up.
ii. If the % oxygen stabilizes at a value other than 20.8%, adjust the oxygen calibration ccontrol until the reading is 20.8%.

2. Maintenance Procedures

Keeping the meter in top operating shape means charging the battery and replacing worn parts. The exterior of the meter can be wiped clean with a damp cloth and mild detergent, if necessary.

Appendix D

3.05 Confined Spaces

A. Introduction

OSHA has proposed a standard, 29 CFR 1910.146, for permit required confined spaces. The proposed standard includes provisions for testing and entering confined spaces. The employee who enters a confined space may be subject to multiple hazards. The purpose of this section is to outline procedures to reduce these hazards.

B. Definition of Confined Space

OSHA has defined a "permit required confined space" as an enclosed space which:

1. Is large enough and so configured that an employee can bodily enter and perform the assigned work.

2. Has limited or restricted means for entry or exit.

3. Is not designed for continuous employee occupancy.

4. Has one or more of the following characteristics:

   a. Contains or has a known potential to contain a hazardous atmosphere.
   b. Contains a material with the potential for engulfment of an entrant.
   c. Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls, or a floor which slopes downward and tapers to a smaller cross-section, or
   d. Contains any other serious safety or health hazard.

C. Confined Space Entry Program

1. Preparations

   a. Follow lock-out/tag-out procedures as necessary.
   b. Ventilation will be provided if necessary.
   c. Test for oxygen content, explosive mixture, and toxic concentrations from the outside of the confined space.
   d. When a ladder is required to enter the confined space, the ladder must be tied securely and must not be removed while anyone is in the confined space.
   e. Adequate lighting of an approved safety type must be provided.
   f. All necessary safety equipment to be used by the person entering the confined space as well as for the safety watch will be checked.
   g. Emergency procedures will be reviewed.
   h. The confined space entry permit will be filled out by the Project Supervisor or Project Foreman.

i. Signs and barriers will be posted as necessary to prevent unauthorized entry to the confined space and other external hazards.
j. Smoking is prohibited inside of and within twenty feet of the confined space.
k. Spark proof hand tools and explosion proof equipment will be used.
l. If welding is to be performed in the confined space that previously or now contain combustibles, all residues, including dry scale or sediment must be removed. If it is not possible to remove all combustible materials, they must be covered with a non-combustible blanket.
m. At least one 20 lb. ABC multi-purpose fire extinguisher must be available for instant use in a confined space containing flammable gases or vapors.
n. Each person involved shall be trained on the hazards, how to recognize the hazards, and how to protect themselves from the hazards. Additionally, the attendants will be training on the use of rescue equipment and other duties outlined below.

2. Attendants

a. Initial entry will be accomplished with an attendant stationed outside for the purpose of immediate assistance.
b. The designated attendant will never enter into the permit space for the purpose of an attempt to rescue the entrants.
c. Attendants will use any rescue equipment provided for their use and perform other rescue and emergency duties, without entering the permit space.
d. The attendant will be responsible for maintaining an accurate count of all persons in the space.
e. Communication between attendants and entrants will be maintained continuously during entry.
f. Attendants will order authorized entrants to evacuate a space immediately when:

    i. The attendant observes a condition which is not allowed in the entry permit.
    ii. The attendant detects behavioral effects hazard exposure.
    iii. The attendant detects a situation outside the space which could endanger entrants.
    iv. The attendant detects an uncontrolled situation within the permit space.
    v. The attendant is monitoring entry in more than one permit space and must focus attention on the rescue of entrants from one of those spaces,
    vi. The attendant must leave the work station.

g. Attendants will summon rescue and other emergency services as soon as the attendant determines that the authorized entrants need to escape from the confined space hazards.
h. Attendants will warn unauthorized persons away from the space, request that unauthorized persons exit immediately if they have entered the space, and inform authorized entrants if unauthorized persons have entered the space.

3. Supervisor/Foreman

Employees of OBG Tech authorizing or in charge of entry will:

a. Determine that the entry permit is properly filled out.
b. Determine that the entrants and attendants are properly trained.
c. Determine that necessary procedures, practices and equipment for safe entry are in place.
d. Periodically monitor to determine that confined space operations remain consistent with the terms of the entry permit and that acceptable entry conditions are present.
e. Cancel authorization and terminate entry whenever entry conditions are not present.
f. Take the necessary measures for concluding an entry operation, such as closing off a permit space and cancelling the permit, once the authorized work has been completed.
g. The supervisor/foreman in charge of authorizing the confined space entry may also be an entrant or an attendant.

4. Rescue team

Arrangements must be made prior to entry under which a rescue team will respond to a request for rescue activities. The outside rescue team will be informed of the hazards they may confront when called to the rescue.

D. Contractor Responsibilities

A permit space which is under the control of another employer will provide all available information on the permit space in which the contractor needs to be aware.

E. Records

Permits will be filed with other pertinent project health and safety information.

OBG TECHNICAL SERVICES, INC.

CONFINED SPACE ENTRY PERMIT

Job Location:	Contract Number:
Location of Confined Space:	Period Covered by Permit:
Purpose of Entry:	
Authorized Person	
Attendant(s)	
Entrant(s)	
Monitoring Equipment	
Rescue Procedures	
Communication Procedures	

SPECIAL REQUIREMENTS	YES	NO		YES	NO
Lock-out - De-energize			Escape Harness		
Lines Broken - Capped or Blanked			Tripod emergency escape unit		
Purge - Vent and Flush			Lifelines		
Ventilation			Fire Extinguishers		
Secure Area			Lighting		
Breathing Apparatus			Protective Clothing		
Resuscitator - Inhalator			Respirator		

TESTS TO BE TAKEN	PEL	YES	NO	RESULTS
% Oxygen	19.5% to 22%			
% LEL	10%			
Carbon Monoxide	35 ppm			
Aromatic Hydrocarbons	5 ppm			
Hydrogen Sulfide	10 ppm			
Sulfur Dioxide	5 ppm			
Ammonia	25 ppm			

Notes:

Appendix E

5.06 Respiratory Protection

A. Introduction

OSHA, in 29 CFR 1910.134, specifies that "when effective engineering controls are not feasible, or while they are being instituted, appropriate respirators will be used." OSHA references exposure to air contaminated with harmful dusts, fogs, fumes, mists, gases, smokes, sprays, or vapors.

Due to the nature of the business conducted by the company, respiratory protection may be necessary for specific activities performed by our employees. This section will serve as the respiratory protection program and is adopted by the company in an effort to assist ensuring a safer working environment for our employees during work activities requiring respiratory protection as dictated in the site-specific Health and Safety Plan. In order to comply with regulatory requirements, this program is developed pursuant to 29 CFR 1910.134 and 29 CFR 1926.103. This program and use of respirators are instituted according to the site-specific Health and Safety Plan and only after exhausting all feasible engineering controls.

B. Employer and Employee Responsibility

1. Employer Responsibilities

The Safety Coordinator will see that approved respirators, cartridges, and spare parts will be provided by the company. The Safety Coordinator will also be responsible for the establishment and maintenance of this respiratory protection program and the upkeep of records for fit testing, medical surveillance, and training.

2. Employee Responsibilities

It is the responsibility of the employee to use the respiratory protection in accordance with instructions and training received. The employee will maintain the respirator to insure that cartridges and parts are replaced when necessary. The employee will report any problems with his respirator to his supervisor or the Safety Coordinator.

C. Training of Employees

All employees required to wear respirators on the job will be trained prior to the use of respirators. That training will cover the topics required by 29 CFR 1910.120 (Hazardous waste operations and emergency response) and 29 CFR 1910.134 (Respiratory Protection), and include the following:

- basics of respiration
- basics of respiratory hazards
- capabilities and limitations of respirators
- inspection of respirators
- how a respirator should be worn
- cleaning and disinfecting respirators
- storage of respirators
- respirator-specific training
- fit-checking procedures

All employees will be given the opportunity to wear their respirator in an uncontaminated atmosphere and a test atmosphere for a period of time to become familiar with the use of respirators.

All training is documented and is filed in the Syracuse office.

D. Physician's Approval

All employees required to wear a respirator will have a physician's written approval to wear a respirator prior to being required to wear one. The respirator user's medical status will be reviewed annually.

The local physician will determine which health and physical conditions are pertinent. A description of the respiratory hazards, specifics of employee's job functions while wearing a respiratory and copies of all applicable regulations will be provided to the physicians to further aid the decision process.

The physical will be provided at no cost to the employee. A copy of the written report will be made to the employee upon request.

All medical examinations are recorded and are filed in the Syracuse office.

E. Selection of Respirators

Respirators will be selected on the basis of the following:

- chemical and physical hazards
- characteristics of the hazardous operation of process
- face piece to face fit
- comfort
- utilization of NIOSH recommendations
- utilization of manufacturer's recommendations
- the guidance of American National Standard Practices for Protection Z88.2-1969.

All respirators selected will be NIOSH/MSHA approved for the hazards encountered.

The Safety Coordinator will be adequately instructed to insure that the correct respirator is selected and that the appropriate personal modifications are made such as corrective lens for full-face masks.

F. Issuance of Respirators

The Warehouse Supervisor will be responsible for the issuance of a properly selected respirator to each employee. Each employee will be given his own respirator and will be responsible for bringing it to the jobsite. Employees should mark his respirator so that it will not be confused with others.

G. Fit-Testing of Respirators

To insure a proper fit of negative pressure respirators, respirator fit-testing will be performed. Where fit-testing is not required by specific hazard regulation, as it is with lead or asbestos, the qualitative irritant vapor or smoke protocol of the asbestos standard will be adopted (29 CFR 1910.1001, Appendix C). Fit-testing will be performed to select respirators and be performed at the discretion of the Safety Coordinator thereafter unless required by law to be performed more often or unless there is sufficient need to do so (i.e., denture replacement, scarring of face, weight change).

Fit-test failure will result in selection of a different size respirator. Continued test failure will result in selection of a different manufacturer's respirator.

All fit-testing information such as the employee, the date, and the type of respirator is recorded and filed in the Syracuse office.

H. Inspection of Respirators

Respirators will be inspected for damage before and after each use. Each employee, after training, will responsible for inspection. The following areas will be inspected:

- tightness of connections
- face piece
- headbands
- inhalation valve
- exhalation valve
- cartridge or filter fittings
- pliability of rubber or elastomer parts
- signs of deterioration

Any malformation, distortion, missing parts, cracks, etc. will be sufficient to issue replacement parts or if necessary, a new respirator.

I. Standard Operating Procedures

Before entering any potentially contaminated environment, each employee will:

1. Carefully inspect the respirator following the procedures specified in Section 8.

2. Duct tape should be removed from cartridges (if applicable).

3. The respirator should be donned and checked for a proper fit using the following tests:

   a. Positive Pressure Test - close off the exhalation valve with your hand. Breathe into the mask. The face-to-facepiece seal is satisfactory if some pressure can be built up inside the mask and sustained.

b. Negative Pressure Test - close off the inlet openings of the cartridge with the palm of your hand. Inhale gently so that a vacuum occurs inside the mask. Hold your breath for 10 seconds. If the vacuum is sustained, and no inward leakage is detected, the respirator fits properly.

4. Inside the contaminated environment, respirators will not be removed except in a medical emergency such as a suspected heart attack.

5. Respirators will be worn with straps inside the disposable garment allowing a worker to maintain respiratory protection while removing contaminated garments.

J. Cleaning and Disinfecting of Respirators

Respirators will be cleaned after each use. Manufacturers may have specific recommendations for cleaning and those should be followed. In absence of manufacturers recommendations, the following procedures should be used:

1. Remove the cartridges and headbands

2. Disassemble all respirator parts

3. Wash all respirator parts (except cartridges and headbands) in a cleaner - disinfectant solution or use soap and hot water

4. Rinse completely in clean, warm water

5. Air dry in a clean area

6. Re-assemble the respirator

No alcohol will be used to clean the respirator. If a disinfecting solution is not used, a disinfecting spray will be used at least weekly, but preferably after each use.
Respirator wipes will be provided to employees in order to clean respirators during work shifts between uses. The employee will be allowed to leave work area and remove respirator to wash face in order to prevent rashes and discomfort. The respirators will be wiped out at each of these times.

K. Storage of Respirators

Respirators will be stored in clean plastic bags and protected against dust, sunlight, heat, extreme cold, excessive moisture, or damaging chemicals. Respirator cartridges will have the inhalation holes covered with duct tape (or acceptable substitute tape) immediately after leaving a contaminated area. The tape will be left on until the respirator is donned for the nest entry into a contaminated area. This tape will prevent any contaminants from being dislodged from the cartridge.

Respirators should be packed or stored so that the facepiece and exhalation valve will rest in a normal position and function will not be impaired by the elastomer setting in an abnormal position.

L. Periodic Surveillance

Work areas will be monitored as required by specific hazard regulations or on a periodic timetable as set by the site-specific Health and Safety Officer and the site-specific Health and Safety Plan. This surveillance is required to ensure that the proper level of protection is provided to employees. Whenever new hazards are encountered or a substantial change in magnitude of the existing hazard occurs, then additional monitoring will take place.

M. Evaluation of Respiratory Protection Program

In order to maintain an effective program, the respiratory protection program will be re-evaluated on at least an annual basis. This evaluation will address:

- employee acceptance of program and respirators
- methods of surveillance of hazards and results
- regulatory compliance
- changing job functions
- changes in hazards

Employees are encouraged to express any concerns about respirator protection, such input is critical for evaluating the program.

Each employee will be made aware of this written program and any annual changes.

Frequent random inspections will be conducted by the Safety Coordinator to assure that respirators are properly selected, used, cleaned, and maintained.

N. Hazard Specific Respiratory Protection

As specified in 29 CFR Parts 1910, action specific hazards, i.e. lead, asbestos, and formaldehyde, require specific respiratory protection. Any such material will be monitored as directed under specific regulatory requirements, and respiratory protection will issued pursuant to specific regulatory requirement.

Appendix F

10.06 Excavations

A. Introduction

This section applies to all open excavations made in the earth's surface. Excavations are defined to include trenches.

B. General Requirements

1. All surface encumbrances that are located so as to create a hazard to employees will be removed or supported, as necessary, to safeguard employees.
2. Underground installations.
   a. The estimated location of utility installations, such as sewer, telephone, fuel, electric, water lines, or any other underground installations that reasonably may be expected to be encountered during excavation work, will be determined prior to opening an excavation.
   b. Utility companies or owners will be contacted within established or customary local response times, advised of the proposed work, and asked to establish the location of the utility underground installations prior to the start of actual excavation. When utility companies or owners cannot respond to a request to locate underground utility installations within 24 hours (unless a longer period is required by state or local law), or cannot establish the exact location of these installations, the work may proceed, provided caution is taken, and provided detection equipment or other acceptable means to locate utility installations are used.
   c. When excavation operations approach the estimated location of underground installations, the exact location of the installations will be determined by safe and acceptable means.
   d. While the excavation is open, underground installations will be protected, supported or removed as necessary to safeguard employees.

C. Access and egress

1. Structural ramps.
   a. Structural ramps that are used solely by employees as a means of access or egress from excavations will be designed by a competent person. Structural ramps used for access or egress of equipment will be designed by a competent person qualified in structural design, and will be constructed in accordance with the design.
   b. Ramps and runways constructed of two or more structural members will have the structural members connected together to prevent displacement.
   c. Structural members used for ramps and runways will be of uniform thickness.
   d. Cleats or other appropriate means used to connect runway structural members will be attached to the bottom of the runway or will be attached in a manner to prevent tripping.
   e. Structural ramps used in lieu of steps will be provided with cleats or other surface treatments on the top surface to prevent slipping.

2. Means of egress from trench excavations. A stairway, ladder, ramp or other safe means of egress will be located in trench excavations that are 4 feet (1.22 m) or more in depth so as to require no more than 25 feet (7.62 m) of lateral travel for employees.

D. Exposure to vehicular traffic

Employees exposed to public vehicular traffic will be provided with, and will wear, warning vests or other suitable garments marked with or made of reflectorized or high-visibility material.

E. Exposure to falling loads

No employee will be permitted underneath loads handled by lifting or digging equipment. Employees will be required to stand away from any vehicle being loaded or unloaded to avoid being stuck by any spillage or falling materials. Operators may remain in the cabs of vehicles being loaded or unloaded when the vehicles are equipped to provide adequate protection for the operator during loading and unloading operations.

F. Warning system for mobile equipment

When mobile equipment is operated adjacent to an excavation, or when such equipment is required to approach the edge of an excavation, and the operator does not have a clear and direct view of the edge of the excavation, a warning system will be utilized such as barricades, hand or mechanical signals, or stop logs. If possible, the grade should be away from the excavation.

G. Hazardous atmospheres

1. Testing and controls

In addition to the procedures set forth in Sections 3 and 4 of this Health and Safety Manual to prevent exposure to harmful levels of atmospheric contaminants and to assure acceptable atmospheric conditions, the following requirements will apply:

a. Where oxygen deficiency (atmospheres containing less than 19.5 percent oxygen) or a hazardous atmosphere exists or could reasonably be expected to exist, such as in excavations in areas where hazardous substances are stored nearby, the atmospheres in the excavation will be tested before employees enter excavations greater than 4 feet (1.22 m) in depth.
b. Adequate precautions will be taken to prevent employee exposure to atmospheres containing less than 19.5 percent oxygen and other hazardous atmospheres. These precautions include providing proper respiratory protection or ventilation in accordance with subparts D and E of this part respectively.
c. Adequate precaution will be taken such as providing ventilation, to prevent employee exposure to an atmosphere containing a concentration of a flammable gas in excess of 20 percent of the lower flammable limit of the gas.
d. When controls are used that are intended to reduce the level of atmospheric contaminants to acceptable levels, the testing will be conducted as often as necessary to ensure that the atmosphere remains safe.

2. Emergency rescue equipment

a. Emergency rescue equipment, such as breathing apparatus, a safety harness and line, or a basket stretcher, will be readily available where hazardous atmospheric conditions exist or may reasonably be expected to develop during work in an excavation. This equipment will be attended when in use.

b. Employees entering bell-bottom pier holes, or other similar deep and confined footing excavations, will wear a harness with a life-line securely attached to it. The lifeline will be separate from any line used to handle materials, and will be individually attended at all times while the employee wearing the lifeline is in the excavation.

H. Protection from hazards associated with water accumulation

1. Employees will not work in excavations in which there is accumulated water, or in excavations in which water is accumulating, unless adequate precautions have been taken to protect employees against the hazards posed by water accumulation. The precautions necessary to protect employees adequately vary with each situation, but could include special support or shield systems to protect from cave-ins, water removal to control the level of accumulating water, or use of a safety harness and lifeline.
2. If water is controlled or prevented from accumulating by the use of water removal equipment, the water removal equipment and operations will be monitored by a competent person to ensure proper operation.
3. If excavation work interrupts the natural drainage of surface water (such as streams), diversion ditches, dikes, or other suitable means will be used to prevent surface water from entering the excavation and to provide adequate drainage of the area adjacent to the excavation. Excavations subject to runoff from heavy rains will require an inspection by a competent person.

I. Stability of adjacent structures

1. Where the stability of adjoining buildings, walls, or other structures is endangered by excavation operation, support systems such as shoring, bracing, or underpinning will be provided to ensure the stability of such structures for the protection of employees.
2. Excavation below the level of the base or footing of any foundation or retaining wall that could be reasonably expected to pose a hazard to employees will not be permitted except when:
   a. A support system, such as underpinning, is provided to ensure the safety of employees and the stability of the structure; or
   b. The excavation is in stable rock; or
   c. A registered professional engineer has approved the determination that such excavation work will not pose a hazard to employees.
   d. Sidewalks, pavements, and appurtenant structure will not be undermined unless a support system or another method of protection is provided to protect employees from the possible collapse of such structures.

J. Protection of employees from loose rock or soil

1. Adequate protection will be provided to protect employees from loose rock or soil that could pose a hazard by falling or rolling from an excavation face. Such protection will consist of scaling to remove loose material; installation of protective barricades at intervals as necessary on the face to stop and contain falling material; or other means that provide equivalent protection.
2. Employees will be protected from excavated or other materials of equipment that could pose a hazard by falling or rolling into excavations. Protection will be provided by placing and keeping such materials or equipment at least 2 feet (.61 m) from the edge of excavations, or by the use of retaining devices that are sufficient to prevent materials or equipment from falling or rolling into excavations, or by a combination of both if necessary.

K. Inspections

1. Daily inspections of excavations, the adjacent areas, and protective systems will be made by a competent person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection will be conducted by conducted by the competent person prior to the start of work and as needed throughout the shift. Inspections will also be made after every rainstorm or other hazard increasing occurrence. These inspections are only required when employee exposure can be reasonably anticipated.
2. Where the competent person finds evidence of a situation that could result in a possible cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions, exposed employees will be removed from the hazardous area until the necessary precautions have been taken to ensure their safety.

L. Fall protection

1. Where employees or equipment are required or permitted to cross over excavations, walkways or bridges with standard guardrails will be provided.
2. Adequate barrier physical protection will be provided at all remotely located excavations. All wells, pits, shafts, etc., will be barricaded or covered. Upon completion of exploration and similar operations, temporary wells, pits, shafts, etc., will be backfilled.

M. Requirements for protective systems

1. Protection of employees in excavations.
   a. Each employee in an excavation will be protected from cave-ins by an adequate protective system designed in accordance with paragraph 2 or 3 of this section except when:
      1. Excavations are made entirely in stable rock; or
      2. Excavations are less than 5 feet (1.52 m) in depth and examination of the ground by a competent person provides no indication of a potential cave-in.
   b. Protective systems will have the capacity to resist without failure all loads that are intended or could reasonably be expected to be applied or transmitted to the system.

2. Design of sloping and benching systems. The slopes and configurations of sloping and benching systems will be in accordance with the requirements of option 1; or, in the alternative, option 2; or, in the alternative, option 3, or, in the alternative, option 4, as follows:

Option (1) - Allowable configurations and slopes

1. Excavations will be sloped at an angle not steeper than one and one-half horizontal to one vertical (34 degrees measured from the horizontal), unless one of the other options listed below is used.

2. Slopes specified in paragraph 1 of this section, will be excavated to form configurations that are in accordance with the slopes shown for Type C soil in Appendix B to this subpart.

Option (2) - Determination of slopes and configurations using 29 CFR 1926 Subpart P Appendices A and B

Maximum allowable slopes, and allowable configurations for sloping and benching systems, will be determined in accordance with the conditions and requirements set forth in appendices A and B to this subpart.

Option (3) - Designs using other tabulated data

1. Designs of sloping or benching systems will be selected from and be in accordance with tabulated data, such as tables and charts.
2. The tabulated data will be in written form and will include all of the following:
   A. Identification of the parameters that affect the selection of a sloping or benching system drawn from such data;
   B. Identification of the limits of use of the data, to include the magnitude and configuration of slopes determined to be safe;
   C. Explanatory information as may be necessary to aid the user in making a correct selection of a protective system from the data.
3. At least one copy of the tabulated data which identifies the registered professional engineer who approved the data, will be maintained at the jobsite during construction of the protective system. After that time the data may be stored off the jobsite, but a copy of the data will be made available to the Secretary upon request.

Option (4) - Design by a registered professional engineer

1. Sloping and benching systems not utilizing Option (1) or Option (2) or Option (3) under paragraph 2 of this section will be approved by a registered professional engineer.
2. Designs will be in written form and will include at least the following:
   A. The magnitude of the slopes that were determined to be safe for the particular project;
   B. The configurations that were determined to be safe for the particular project; and
   C. The identity of the registered professional engineer approving the design.
3. At lease one copy of the design will be maintained at the jobsite while the slope is being constructed. After that time the design need not be at the jobsite, but a copy will be made available to OSHA upon request.

3. Design of support systems, shield systems, and other protective systems. Designs of support systems shield systems, and other protective systems will be in accordance with the requirements of opption 1; or, in the alternative, option 2; or, in the alternative, option 3; or, in the alternative, option 4 as follows:

Option (1) - Designs using appendices A, C, and D Designs for timber shoring in trenches will be determined in accordance with the conditions and requirements set forth in appendices A and C to this subpart. Designs for aluminum hydraulic shoring will be in accordance with paragraph (c)(2) of this section, but if manufacturer's tabulated data cannot be utilized, designs will be in accordance with Appendix D.

Option (2) - Designs Using Manufacturer's Tabulated Data

a. Design of support systems, shield systems, or other protective systems that are drawn from manufacturer's tabulated data will be in accordance with all specifications, recommendations, and limitations issued or made by the manufacturer.

b. Deviation from the specifications, recommendations, and limitations issued or made by the manufacturer will only be allowed after the manufacturer issues specific written approval.

c. Manufacturer's specifications, recommendations, and limitations, and manufacturer's approval to deviate from the specifications, recommendations, and limitations will be in written form at the jobsite during construction of the protective system. After that time this data may be stored off the jobsite, but a copy will be made available to OSHA upon request.

Option (3) - Designs using other tabulated data

a. Designs of support systems, shield systems, or other protective systems will be selected from and be in accordance with tabulated data, such as tables and charts.

b. The tabulated data will be in written form and include all of the following:

1. Identification of the parameters that affect the selection of a protective system drawn from such data;
2. Identification of the limits of use of the data;
3. Explanatory information as may be necessary to aid the user in making a correct selection of a protective system from the data.

c. At least one copy of the tabulated data, which identifies the registered professional engineer who approved the data, will be maintained at the jobsite during construction of the protective system. After that time the data may be stored off the jobsite, but a copy of the data will be made available to the Secretary upon request.

Option (4) - Design by a registered professional engineer

a. Support systems, shield systems, and other protective systems not utilizing Option 1, Option 2, or Option 3, above, will be approved by a registered professional engineer.

b. Designs will be in written form and will include the following:

1. A plan indicating the sizes, types, and configurations of the materials to be used in the protective system; and
2. The identity of the registered professional engineer approving the design.

c. At least one copy of the design will be maintained at the jobsite during construction of the protective system. After that time, the design may be stored off the jobsite, but a copy of the design will be made available to OSHA upon request.

4. Materials and equipment.

a. Materials and equipment used for protective systems will be free from damage or defects that might impair their proper function.
b. Manufactured materials and equipment used and maintained in a manner that is consistent with the recommendations of the manufacturer, and in a manner that will prevent employee exposure to hazards.
c. When material or equipment that is used for protective systems is damaged, a competent person will examine the material or equipment and evaluate its suitability for continued use. If the competent person cannot assure the material or equipment is able to support the intended loads or is otherwise suitable for safe use, then such material or equipment will be removed from service, and will be evaluated and approved by a registered professional engineer before being returned to service.

5. Installation and removal of support

a. General.
   1. Members of support systems will be securely connected together to prevent sliding, falling, kickouts, or other predictable failure.
   2. Support systems will be installed and removed in a manner that protects employees from cave-ins, structural collapses, or from being struck by members of the support system.
   3. Individual members of support systems will not be subjected to loads exceeding those which those members were designed to withstand.
   4. Before temporary removal of individual members begins, additional precautions will be taken to ensure the safety of employees, such as installing other structural members to carry the loads imposed on the support system.
   5. Removal will begin at, and progress from, the bottom of the excavation. Members will be released slowly so as to note any indication of possible failure of the remaining members of the structure or possible cave-in of the sides of the excavation.
   6. Backfilling will progress together with the removal of support systems from excavations.
b. Additional requirements for support systems for trench excavations.
   1. Excavation of material to a level no greater than 2 feet (.61 m) below the bottom of the members of a support system will be permitted, but only if the system is designed to resist the forces calculated for the full depth of the trench, and there are no indications while the trench is open of a possible loss of soil from behind or below the bottom of the support system.

2. Installation of a support system will be closely coordinated with the excavation of trenches.

N. Sloping and benching systems

Employees will not be permitted to work on the faces of sloped or benched excavations at levels above other employees except when employees at the lower levels are adequately protected from the hazard of falling, rolling, or sliding material or equipment.

O. Shield systems

1. General
   a. Shield systems will not be subjected to loads exceeding those which the system was designed to withstand.
   b. Shield will be installed in a manner to restrict lateral or other hazardous movement of the shield in the event of the application of sudden lateral loads.
   c. Employees will be protected from the hazard of cave-ins when entering or exiting the areas protected by shields.
   d. Employees will not be allowed in shield when shields are being installed, removed, or moved vertically.
2. Additional requirement for shield systems used in trench excavations. Excavations of earth material to a level not greater than 2 feet (.61 m) below the bottom of a shield will be permitted, but only if the shield is designed to resist the forces calculated for the full depth of the trench, and there are no indications while the trench is open of a possible loss of soil from behind or below the bottom of the shield.

Appendix G

This Certifies That

David Schramm

272-44-3108

has satisfactorily completed the

Health and Safety at Hazardous Waste Operations

8 Hour Supervisors Course

given July 18, 1990

developed persuant to 29 CFR 1910.120
Hazardous Waste Operations & Emergency Response

by
O'Brien & Gere Engineers, Inc.
Syracuse, New York

July 26, 1990

Saunders E. Wilson, Jr., C.I.H.
Chief Instructor

Edwin C. Tifft, Jr., Ph.D.
Senior Vice President

TECHNICAL ENVIRONMENTAL SERVICE TRAINING INSTITUTE

certifies that

DAVID M. SCHRAMM

has successfully met the 29 CFR 1910.120 certificate requirements for the course entitled

8 HOUR HEALTH & SAFETY TRAINING - ANNUAL REFRESHER (E-8) -

and in evidence thereof is awarded this

CERTIFICATE OF COMPLETION

on the 13 TH day of AUGUST , 1992

AUGUST 13, 1992

Passed Exam

HSR-00494

Certificate Number

Anthony L. Egitto, Director

TEST institute

1110 Navaho Dr. • Suite 602 • Raleigh, North Carolina 27609 • 919 876 8440

Thomas B. Wehrle

Has attended the course:

Health and Safety at Hazardous Waste Operations:
Annual Refresher for HAZWOPER,

a course developed pursuant to the regulations of 29 CFR 1910.120.

This course was conducted by

O'Brien & Gere Engineers, Inc.

P.O. Box 4873, Syracuse, New York 13221; telephone (315)437-6100.

This course is required by the Occupational Safety and Health Administration.

Certificate number: 591-153-44-8276

Date of course: May 29, 1992

Expiration date: May 29, 1993

Vice President

Trainer

Thomas B. Wehrle

Has attended the course:

Health and Safety at Hazardous Waste Operations:

Refresher for the 40-hour Course

a course developed pursuant to the requirements of 29 CFR 1910.120.

This course was conducted by

O'Brien & Gere Engineers, Inc.

P.O. Box 4873, Syracuse, New York, 13221; telephone (315)437-6100

This course is required by the Occupational Safety and Health Administration.

Certificate number: 591-153-44-8276

*Date of course:*04/05/91

*Expiration date:*04/04/92

Vice President

Ken Walley

Instructor

No. 8HMR-0351

con-test®

WATER AND AIR ENGINEERING

39 Spruce Street
East Longmeadow, MA 01028

CAROLINE MILLER

In recognition of having successfully completed the prescribed course of study for Hazardous Waste Site Activities - 8 Hour Health and Safety Annual Refresher Training on August 21, 1992.

COURSE INSTRUCTORS

Thomas E. Veratti

Thomas E. Veratti, Vice President
Certified Chemical Engineer
Industrial Hygienist

Gary P. Alicandro

Expires August 21, 1993

No. 8HMR-0351

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WATER AND AIR ENGINEERING

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COURSE INSTRUCTORS

Thomas E. Veratti, Vice President
Certified Chemical Engineer
Industrial Hygienist

Expires August 21, 1993

Caroline W. Miller

Has attended the course:

Health and Safety at Hazardous Waste Operations: Supervisor,

a course developed pursuant to the regulations of 29 CFR 1910.120.

This course was conducted by

O'Brien & Gere Engineers, Inc.

P.O. Box 4873, Syracuse, New York 13221; telephone (315)437-6100.

This course is required by the Occupational Safety and Health Administration.

Certificate number: 691-099-42-0338

Date of course: January 23, 1992

Expiration date: January 23, 1993

Vice President

Trainer

APPENDIX F
SIGN-OFF SHEETS

Project Name ______________________________

This is to certify that I have read, fully understand and agree to comply fully with the attached Health and Safety Plan furnished to me by OBG TECHNICAL SERVICES Inc. for the above project.

NAME	SIGNATURE	COMPANY	DATE

Attachment 1

PROJECT TASKS

The past photographic waste management practices utilized in Building 731, Naval Ordnance Station, Indian Head, Maryland has resulted in elevated silver concentrations within the two drainage ditches leading from the building. The purpose of this project is to remediate the contaminated soil on-site and incorporate the treated material within an on-site explosion berm. This will be accomplished by excavating the soils/sediments in the two drainage ditches exhibiting silver concentrations greater than 10 mg/kg and treating the material on-site utilizing solidification/stabilization technology. The treated material will then be incorporated in the base of an on-site explosion berm.

Access Roads/Routes:

The primary site access road is the existing dirt road, as shown in Figure 1. Access routes along one side of both drainage ditches will be constructed to allow excavation and haul equipment access from the dirt road. These routes shall consist of cleared paths, approximately fifteen feet wide, that are immediately adjacent to the twelve foot wide section of the stream bed that is to be excavated. Since the excavation zone for the ditches is approximately twelve feet wide, the portions of both ditches that are to be excavated will lie approximately in the center of the 40 foot wide cleared area, twenty feet on each side from the center of the ditch. The routes shall be properly graded to prevent stormwater from ponding within the routes, and to prevent other conditions that may impede the access of vehicles or the progress of work. Silt fence will be installed along the perimeter of the 40 foot wide cleared areas.

Decontamination Facility:

A personnel decontamination facility will be provided for use by OBG Tech's personnel and others visiting the site. The facility will include a changing room, lockers, and showers. Two concrete decontamination pads (Figure 2) for vehicles and equipment leaving the exclusion zone will be constructed along the existing dirt road.

Exclusion Zone:

Exclusion zones will be established within the security fence. The zones include the excavation areas and the stockpile/treatment area. Entrance to the exclusion zones will only be through the personnel and vehicle decontamination zones.

Contaminated Soils/Sediments Staging Area:

A staging area for contaminated soils/sediments will be constructed to contain stockpiled soil prior to stabilization. The area will be constructed to prevent migration of contamination from dewatering of excavated soils or from storm water runoff. This area will be located as shown in Figure 1 and will be constructed with clean fill that will be used later as soil cover.

Treatability Testing:

A testing program, developed from representive samples collected from the drainage swales, will be implemented to ensure the successful stabilization of the soil/sediments. Bench-scale testing is used to evaluate the physical, chemical, and geotechnical properties of the untreated and treated materials.

The representative soil samples collected from the drainage swales will be analyzed in our laboratory. The following tests will be performed to evaluate the physical characteristics of various additive mix designs:

Test	Method
Moisture Content	ASTM D2216
Compaction	ASTM D1557
Unconfined Compressive Strength	ASTM D2166

The in-place soil/sediment is on the wet side of optimum dry density. Various mix designs will be used in the laboratory to achieve the desired engineered structural fill characteristics, that can be expected for the treated emplaced material at optimum moisture-density. A minimum of two different additive systems will be explored at various ratios in the laboratory to achieve the desired results. Results of these mix designs will be presented to the Government Representative for review and selection of the optimum mix design. The selected mix design will be analyzed for TCLP Silver (Method 1311, EPA SW-846). Results of this analytical test will be forwarded to the Government Representative prior to any on-site treatment.

Waste Excavation and Handling:

Silver-contaminated soil/sediments will be excavated from the drainage swales with a track excavator. The track excavator will be situated on the access route adjacent to the swale and will load directly into the haul trucks. Confirmatory sampling will be conducted by the Government Representative to ensure attainment of target cleanup levels. As necessary, the Government Representative may direct additional soils/sediments excavation to attain the target cleanup level. All excavated materials shall be handled in such fashion as to prevent the release of the contaminated soil to the environment, and to minimize impacts to the adjacent forest, forest floor, or vegetation. Contaminated soils/sediments shall be loaded directly into leak-proof vehicle and promptly moved to the stockpile/treatment area. Any subsequent handling of the soils/sediments, such as consolidation or dewatering, will occur in this area. Off-site disposal is not anticipated for any of the soils/sediments. Tree stumps excavated from the stream bed will have the soil removed for treatment and the stump will be decotaminated for off-site disposal.

Remediation Sampling Program:

Target Level Sampling During Excavation: Subsequent to excavation of the specified dimensions and volumes of the stream bed sediments, confirmatory samples of the unexcavated soil will be acquired by the Government Representive, to ensure that remaining soils and sediments have silver concentrations of 10 mg/kg or less. Silver concentration analytical results shall be made available to OBG Tech on a rush turnaround basis. This data will be used by the Government Representive to direct any additional excavation.

Treatment-Related Sampling: Treated soils and sediments will be sampled prior to their placement in the area of the proposed explosion berm. Acceptance testing preformed on each sample will ensure that: (1) treated materials meet physical geotechnical requirements of the design mix selected by the Government Representative; and (2) silver in the treated material is not leachable, and will therefore remain immobile within the berm structure.

Samples of the treated soil will be obtained after every 100 cubic yards of production. The samples will be analyzed for TCLP Silver (Method 1311, EPA SW-846) and a Modified Proctor (ASTM D1557). The results of the Compaction test will be used in conjunction with the testing of the emplaced treated soil with the nuclear density meter to assure conformance with the specifications for placement of the treated soils. Results of this testing will immediately be made available to the Government Representative.

Wastewater-Related Sampling: Sampling of all wastewater that is: (1) used during decontamination procedures; of (2) extracted from the excavation or untreated material shall be collected and analyzed. Silver concentrations must be 1 milligram per liter (mg/l) or less to discharge into the Facility's sewage system. Wastewater to be discharged into the Facility's sewage system may not have biochemical oxygen demand (BOD) levels of greater than 200 mg/l, or total suspended solids (TSS) levels above 30 mg/l. Wastewater not meeting these requirements shall be pretreated to achieve the specified standards. Analytical results will be provided to the Government Representive. Approval shall be obtained prior to discharge to the Facility's sewer system.

Solidification/Stabilization:

Treatment of the excavated material will be preformed using a contained treatment system. The mixing process utilizes equipment in which the contaminated soils/sediments and stabilization additive are loaded and mixed. The mixing process is achieved by mixing blades blending the additive/soil mixture into the proper percentage of additive and moisture. Treatment will be initiated employing the design mix accepted by the Government Representative which demonstrates the ability to meet explosion berm construction material/performance requirements including load-bearing and compactability characteristics as well as exhibiting acceptable TCLP leachability characteristics (levels of silver in leachate below detection limits). Treatment shall be conducted in a manner which minimizes the potential for release of contaminated material to the environment.

Placement/Compaction/Capping of Treated Material:

Subsequent to treatment and acceptable analytical results, the stabilized soil/sediment will be placed and compacted in an area within the foot print of the proposed explosion berm. Prior to placement, all site preparation activities associated with construction of the explosion berm (e.g., subgrade preparation) will be completed for the area where the stabilized soil will be placed. The stabilized soil will be placed and compacted in 6 inch lifts on suitable subgrade. the stabilized soil will be compacted not less than 92 percent of maximum as determined by Modified Proctor. The final layer of solidified material will be uniformly graded to provide an appropriate base for the 1 foot thick soil cap. The soil cap will be placed and compacted over the treated soil.

Restoration/Demobilization:

Removal of Material Storage/Staging and Decontamination Areas: At the completion of the project, the construction support area shall be removed. All waste materials shall be disposed in an appropriate manner and areas restored to the pre-existing contours and conditions.

Restoration of the Drainage Ditch Network: The excavation area shall be backfilled and graded to contours consistent with those specified in the design drawings. The material used to backfill the swale area will be the same as the soil that has been approved for used in the construction of the explosion berms.. The backfill material will be placed in one foot lifts and compacted not less than 90 percent of maximum as determined by Modified Proctor. Jute matting will be utilized to prevent erosion within the restored drainage ditches.

Revegetation: Areas disturbed by the remedial action shall be restored after the completion of the backfilling, compaction, and grading.

Removal of Equipment, Field Office, and Silt Fencing: All equipment, support facilities, and silt fencing installed to execute the remedial action will be removed from the facility. The treatment system will not be removed until all contaminated soils/sediments from the ditches have been treated and incorporated into the explosion berm.

SPILL/DISCHARGE CONTROL PLAN

OBG Technical Services, Inc. (OBG Tech) has developed a spill control plan to implement, maintain, and oversee spill and discharge control. This plan shall provide contingency measures for on-site spills, off-site spills or discharges from handling, staging, or transport of potentially hazardous materials.

1. If a spill of any size occurs, OBG Tech will immediately notify the Government Representative and the Facility's Air and Hazardous Waste Management Branch at (301) 743-6745 or (301) 743-5746 and implement the spill/discharge control plan. A Spill Report shall be provided to the Government Representative identifying the cause and extent of the spill, any resulting contamination danger, and corrective actions taken.

2. OBG Tech will provide methods, means, and facilities required to prevent contamination of soil, water, atmosphere, uncontaminated structure equipment, or material by the discharge of wastes from spills due to OBG Tech's operation.

3. OBG Tech will provide equipment and personnel to perform emergency measures required to contain any spills that OBG Tech has caused and remove spilled materials and soil or liquids that become contaminated due to spillage. This collected spill material shall be properly disposed of at OBG Tech's expense.

4. OBG Tech will provide for any unexpected spills or discharges with the following equipment to be kept on-site at all times during site activities:

    - Noncombustible absorbent
    - Front-end loader

- Drums (55-gallon USDOT 17-E or 17-H)
- Shovels

5. OBG Tech will take immediate measure to control and contain the spill within the site boundaries. This shall include the following actions:

   - Isolate and contain hazardous spill areas
   - Deny entry to unauthorized personnel
   - Do not allow anyone to touch spilled material
   - Stay upwind; keep out of low areas
   - Keep combustibles away from the spill material
   - Use water spray to reduce vapors and dust, as needed
   - Take samples for analysis to determine that clean-up is adequate
   - Other actions, as needed.

6. OBG Tech will absorb all liquid spills with noncombustible absorbent material, and dispose of the absorbent/spill mixture in the manner specified above.

7. If a discharge of any material stored in drums occurs, OBG Tech will take the following actions to reduce potential migration to adjacent properties:

   - Contain and eliminate the discharge, if possible
   - Remove or retrieve any discharged liquids, if possible
   - Isolate the hazardous area and deny entry to unauthorized personnel
   - Do not allow anyone to touch the discharge materials
   - Other actions as needed

8. For liquid discharged to the soil, OBG Tech will immediately identify the point of discharge, and take measure to eliminate further spills. The discharged material shall be absorbed with a noncombustible absorbent material, specifically designed for the absorption of potentially hazardous wet wastes and the absorbent/discharge mixture shall be placed into dry containers.

9. Decontamination procedures may be required after clean-up to eliminate traces of the substances spilled or reduce it to an acceptable level as determined by the Government Representative. Complete clean-up may require removal of contaminated soils. Personnel decontamination shall include showers and cleansing if necessary and or disposal of clothing and equipment. All contaminated materials including cloth, soil and wood that cannot be decontaminated must be properly containerized, labeled, and disposed of as soon as possible.

DUST CONTROL PLAN

OBG Technical Services, Inc. (OBG Tech) will provide full shift air monitoring during remedial activities. The on-site certified industrial hygienist will monitor potential exposure and migration of blowing dust (especially contaminated or potentially contaminated dust). The following procedures will be implemented for dust control.

1. Assign one individual, supervised by the certified industrial hygienist, whose responsibility it is to prevent migration and blowing of contaminated or potentially contaminated dust.

2. Water will be applied as needed by methods approved by the Government Representative with equipment including a tank, pressure pump, and a nozzle equipped spray bar.

3. Water will be applied in a manner which will not cause runoff, ponding, muddy conditions, or result in soil erosion.

4. Excavated and stockpiled soil will be covered or kept wet as needed to avoid dust.

5. Engineering controls necessary to prevent dusting will be implemented during OBG Tech's construction activities.

RUNOFF CONTROL PLAN

The Runoff Control Plan requires the use of controls and measures to prevent and manage storm or decon water runoff. The following requirements are:

1. Prevent runoff from contaminating other soils and prevent off-site runoff from entering open excavations.

2. Assign one individual whose responsibility is to prevent runoff from decontamination pad during decontamination activities.

3. Obtain Government Representative approval for implementing alternate runoff control measure.

Implementation of the Runoff Control Plan during construction activities shall be performed by the following tasks:

1. The swale areas to be excavated will be protected from water runoff with soil berms around the perimeter of the 40 foot cleared areas. In addition, silt fence will be installed at the perimeter of the 40 foot cleared areas to control runoff from the berms.

2. The stockpile area for the contaminated soil will have a two foot soil berm constructed around the perimeter of the area to prevent the migration of runoff water from the stockpiled soil and to prevent runoff water from entering the stockpile area.

3. OBG Tech will collect rainwater and decontamination washwater from the decontamination pad. The Government Representative will perform required testing analyses on the collected water, with a maximum 24 hour turnaround time. No more than 1,000 gallons of contained wastewater may be stored at the Facility at any one time with a maximum storage time of 48 hours.

4. All collected wastewater from the decontamination pad that yields samples with a silver concentration of 1 mg/l or less, BOD of 200 mg/l or less, and TSS of 30 mg/l or less, may be discharged into the Facility's sewage system. OBG Tech will furnish the equipment necessary for proper discharge of wastewater.

5. If the analytical results indicate that silver, BOD, and/or TSS levels in the contained water are greater than the levels specified above, OBG Tech shall: a) pretreat to the specified standards for discharge to the Facility's sewage system; or b) dispose of the wastewater off-site in an acceptable manner.

REMEDIATION-RELATED WASTEWATER CONTROL

Implementation of the Remediation-Related Wastewater Control Plan during construction activities shall be performed by the following tasks:

1. OBG Tech shall collect rainwater and decontamination washwater from the decontamination pad. The Government Representative will perform required testing analyses on the collected water, with a maximum 24-hour turnaround time. No more than 1,000-gallons of contained wastewater may be stored at the Facility at any one time with a maximum storage time of 48 hours.

2. All collected wastewater from the decontamination pad that yields samples with a silver concentration of 1 mg/l or less, BOD of 200 mg/l or less, and TSS of 30 mg/l or less, may be discharged into the Facility's sewage system. OBG Tech will furnish the equipment necessary for proper discharge of wastewater.

3. If the analytical results indicate that silver, BOD, and/or TSS levels in the contained water are greater than the levels specified above, OBG Tech shall: a) pretreat to the specified standards for discharge to the Facility's sewage system; or b) dispose of the wastewater off-site in an acceptable manner.

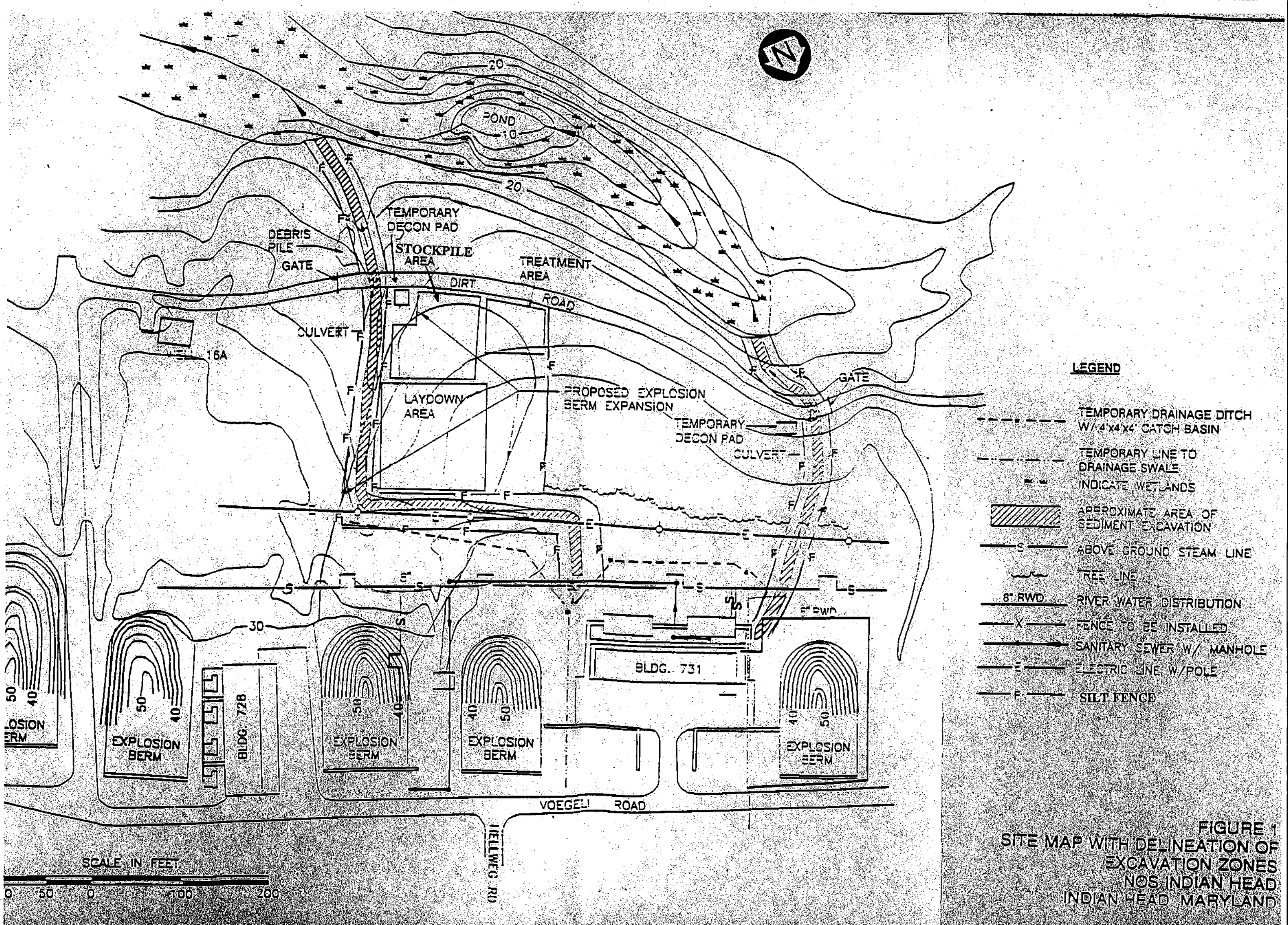
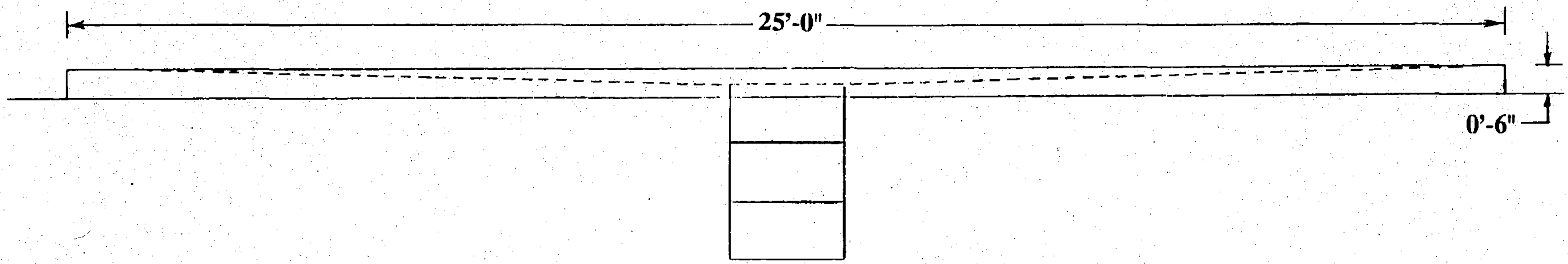


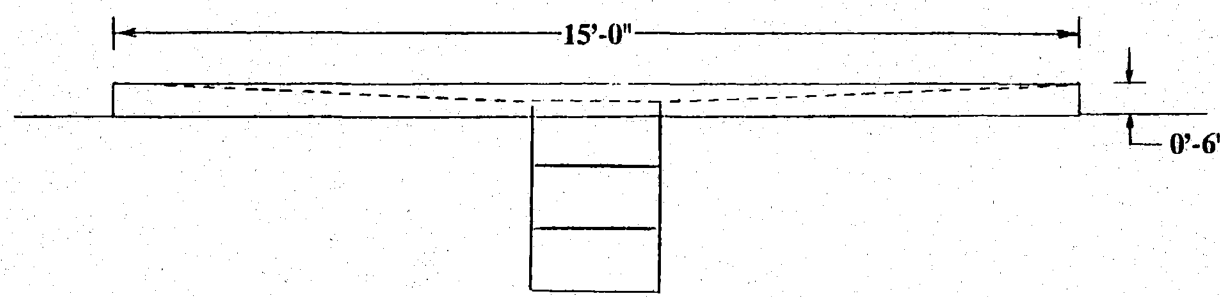
FIGURE 1
SITE MAP WITH DELINEATION OF EXCAVATION ZONES
NOS INDIAN HEAD
INDIAN HEAD, MARYLAND

DECONTAMINATION PAD



SECTION (A)

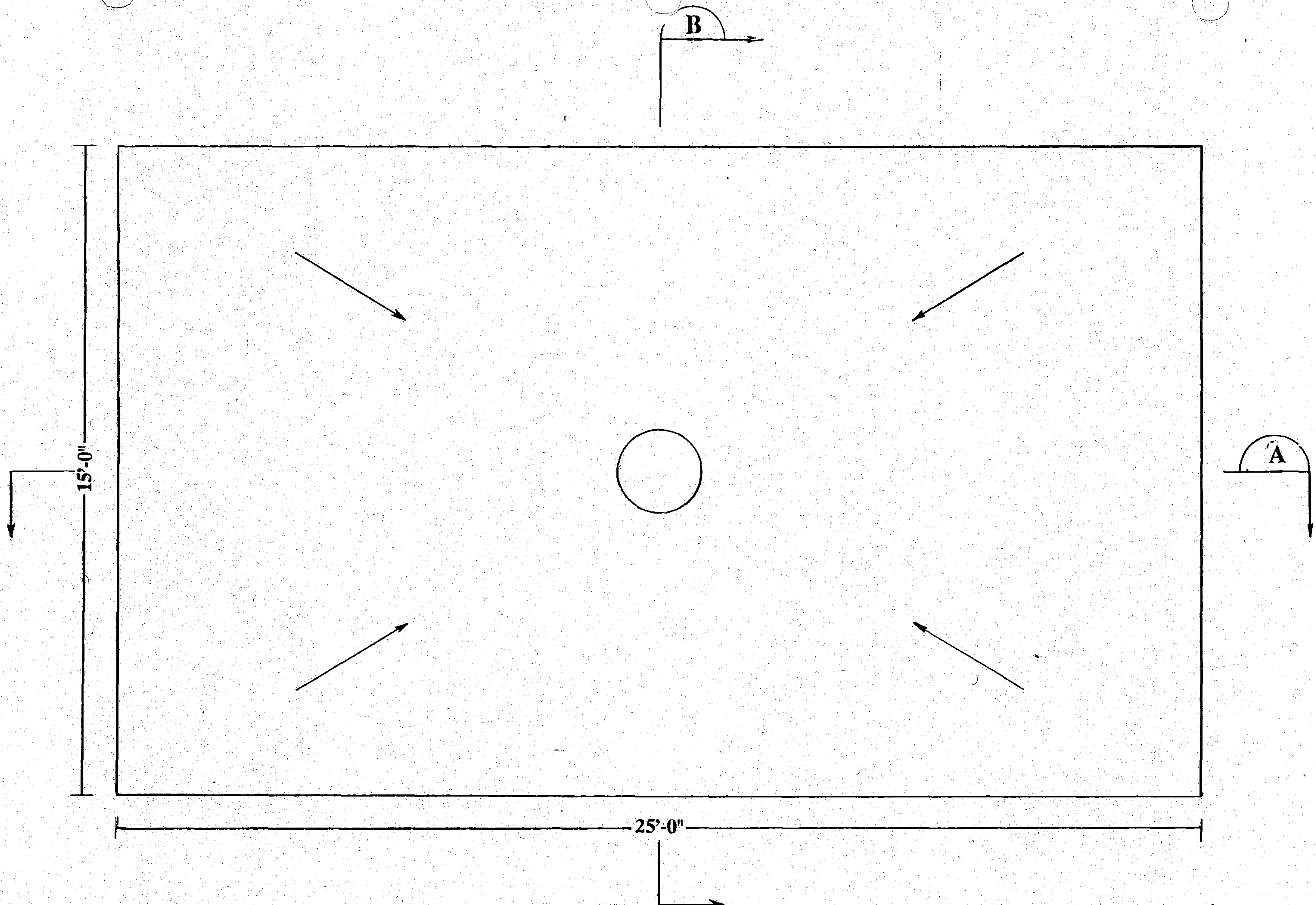
SCALE: 1" = 3'- 0"



SECTION (B)

SCALE: 1" = 3'- 0"

DECONTAMINATION PAD



SCALE: 1" = 3'- 0"

Appendix C: Addendum to the Remedial Work Plan

AMERICAN ENVIRONMENTAL NETWORK, INCORPORATED

LABORATORY

QUALITY ASSURANCE MANUAL

JULY 1, 1992

American Environmental Network, Incorporated
9151 Rumsey Rd Suite 150
Columbia, MD 21045
410-730-8525 Fax 410-997-2586

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AMERICAN ENVIRONMENTAL NETWORK ANALYTICAL LABORATORY
QUALITY ASSURANCE PROGRAM MANUAL

1.0 PURPOSE

American Environmental Network, Inc. Analytical Laboratory provides a wide range of analytical services, covering soil, air and water pollution, environmental impact assessment, industrial process control, effluent and emission pollution control, and research and development for hazardous waste management. Each of these activities requires laboratory data for decision making. To be valuable these data must accurately describe the characteristics and concentrations of constituents in the sample submitted for analysis. At American Environmental Network, Inc. Analytical Laboratory, high standards for precision and accuracy of data are maintained by a Quality Assurance/Quality Control (QA/QC) Program that insures documented quality control measures at all levels.

Specifically, the objectives of the American Environmental Network, Inc. QA/QC Program are to:

- o Estimate the reliability (accuracy) and reproducibility (precision) of each analytical system in a cost effective manner.

- o Allow the early recognition and correction of problems which might affect the reliability and reproducibility of data.

- o Achieve a level of data quality that meets CLIENT requirements for completeness, precision, accuracy, representativeness, comparability and dependability.

The purpose of this manual is to explain management policy and to define the operating procedures to be used to accomplish each of the quality assurance elements necessary to fulfill American Environmental Network's responsibility to meet and/or exceed client or regulatory specifications. This manual also provides a means for creating mutual understanding regarding our quality assurance program and quality control techniques with our customers.

This document outlines the organization of the Quality Assurance function, describes and depicts the lines of authority, and lists the duties and responsibilities within the organization. It provides guidance for the preparation of Procedures Manuals which are to provide the detailed methods of operation and analyses to accomplish the goal of quality data in terms of precision, accuracy, and reproducibility.

2.0 QUALITY ASSURANCE ORGANIZATION

2.1 Organizational Structure

The Organizational Structure functional responsibilities and communication line for management direction and execution are shown in Figure 1. The delineation of authority and responsibilities of persons performing QA/QC activities are described below.

2.2 Responsibility and Authority

2.2.1 The General Manager has overall responsibility for the quality of work produced by American Environmental Network, Inc. The General Manager uses the independent function of the Quality Assurance Manager (QAM) to define and execute the Quality Assurance Program.

2.2.2 The Quality Assurance Manager (QAM) has responsibility for the establishment and execution of the Quality Assurance Program and for defining and measuring the overall program effectiveness.

The QAM reports directly to the General Manager, providing the required authority and organizational freedom to independently implement an effective program.

The QAM is responsible for reviewing and revising the Quality Assurance Program on a continuing basis to assure compliance with the latest revisions of applicable regulations. A formal review of the program is performed annually.

The QAM monitors the adequacy of the Quality Assurance Program and recommends improvements, additions or deletions to the Program. Should conditions adverse to quality be observed, the QAM advises the Laboratory Managers and the President of the condition. The Laboratory Managers shall investigate the cause and determine the action necessary to correct the condition and to prevent recurrence.

Additional functions performed by the QA Manager:

- o maintain complete and up-to-date files on all quality aspects of the laboratory
- o preparing written documents defining QA/QC procedures
- o reviewing and approving Standard Operating Procedures
- o maintaining copies of all current SOPs
- o scheduling and performance of in-house quality audits
- o training employees in QA/QC techniques
- o overseeing inter-laboratory testing programs
- o maintaining current knowledge of approved methods

2.2.3 The responsibility for compliance to the general workmanship and standard practices, shall be vested in the Laboratory Managers.

The Laboratory Managers have responsibility for directing the laboratory operational groups to adhere to the QA/QC program. This responsibility is met through the following steps:

- o recruiting, hiring, and training suitably qualified personnel
- o allocating sufficient staff, time, materials, and equipment to accomplish required tasks
- o integrating QC measures into the job descriptions of the laboratory personnel so that each employee is responsible for the quality of the work he/she produces
- o efficiently responding to corrective action requirements identified by QAM

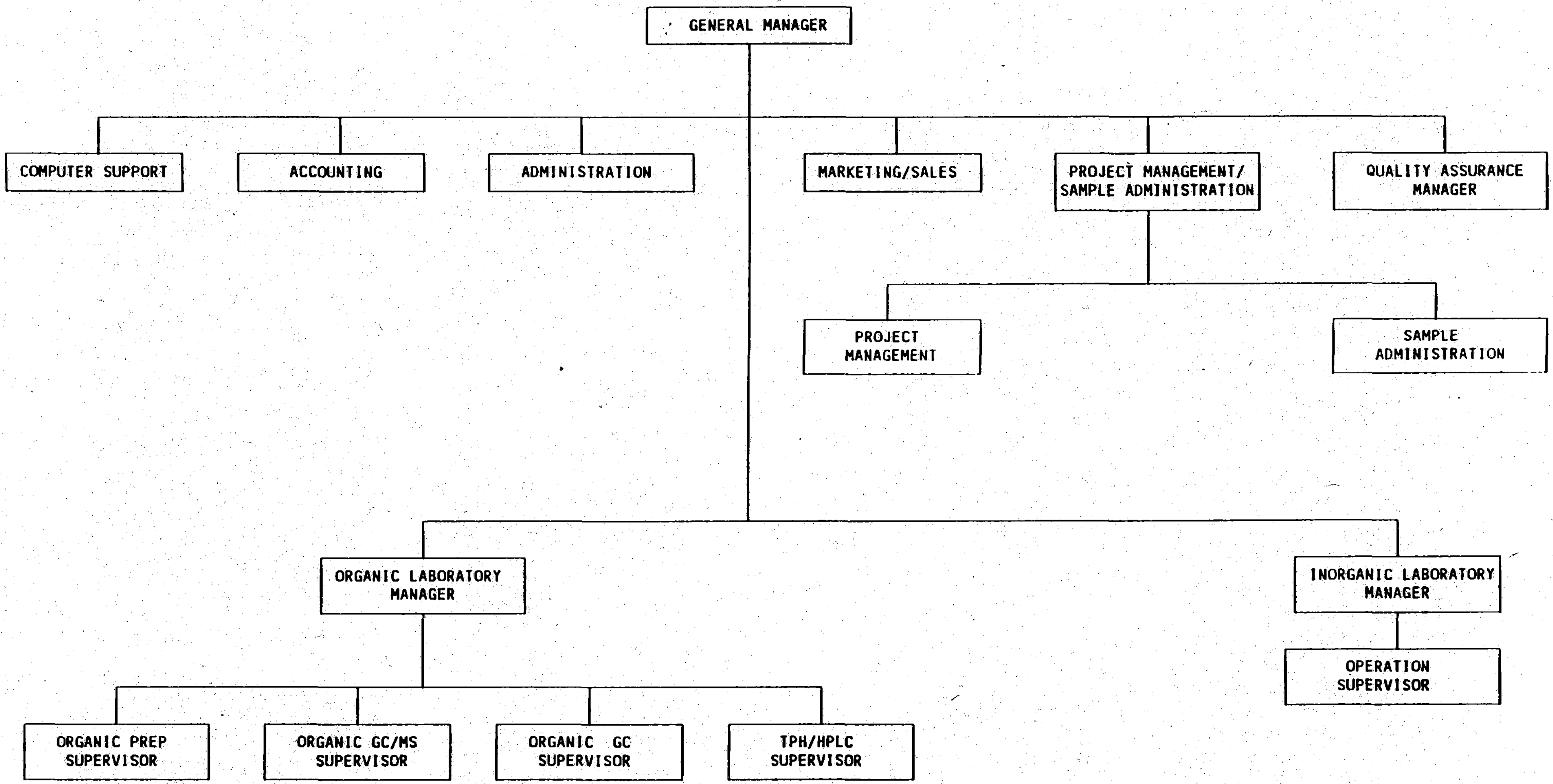
- assignment of SOP writing to the appropriate laboratory personnel
- review and approval of SOPs

2.2.4 The laboratory supervisor plays a key roll in the implementation of the Quality Assurance/Quality Control Program. The supervisor is responsible for the quality of data generated by his/her group. All operations performed in his/her section must comply with internal Standard Operating Procedures and individual contract requirements. The supervisors must train analytical personnel, prepare or update SOPs for each operation, and instruct analysts to perform QC checks. The supervisors assure that all QC criteria for each data set have been met before releasing results for reporting. Additionally, the supervisor documents nonconformance events and corrective actions taken.

2.2.5 The analyst is responsible for following the appropriate methods, documenting his/her activities and results concisely, and implementing the QC checks which are defined in the SOP's. The analyst is expected to produce data of measurable quality and, therefore, must evaluate the outcome of QC samples as part of the analysis. As the first line of control, the analyst can identify quality problems and initiate a Corrective Action Report that addresses the problem to the laboratory supervisor.

FI[illegible] 1
ORGANIZA[illegible] CHART

AMERICAN ENVIRONMENTAL NETWORK, INCORPORATED



3.0 PERSONNEL AND TRAINING/TESTING

3.1 Qualifications

Persons within American Environmental Network, Inc. who perform activities that will affect quality will have training and job evaluation conducted on an individual basis to assure that proficiency is reached and maintained. Persons performing technical functions shall have required technical knowledge and documented related experience. The following are the basic minimum requirements for the general technical functions in the laboratory:

1. The GC Operator shall have at least one year experience in the operation of a GC for environmental samples or shall have worked closely under the guidance of an operator with at least two years experience.

2. The GC/MS Operator shall have at least one year experience in the operation of GC/MS Data System on environmental samples.

3. The Sample Extraction or Preparation Supervisor shall have at least six months experience in the preparation of extracts of environmental samples.

4. The Atomic Absorption Spectrophotometer Operator shall have at least three (3) months experience in the operation of atomic absorption equipment on environmental samples by flame and/or flameless techniques.

5. The Inductively Coupled Plasma operator shall have trained for nine (9) months with direct supervision in the operation of ICP equipment or have completed a formal training course in the operation of ICP equipment.

6. The Inorganic Sample Preparation Specialist shall have trained at least three (3) months under direct supervision in the preparation of samples for ICP and AA analyses.

7. The Organic Extraction Preparation Specialist shall have trained at least three (3) months under direct supervision in the extraction of samples for GC, HPLC or GC/MS analyses.

8. The Wet Chemist/Cyanide Analyst shall have indicated proficiency in wet chemistry procedure as described in Section 3.2 of manual and shall have performed with proficiency within one (1) month of cyanide analysis.

9. Ion Chromatograph Operator shall have at least six (6) months experience in the operation of the IC on environmental samples.

10. High Pressure Liquid Chromatograph Operator shall have at least six (6) months experience in the operation of the HPLC on environmental samples.

11. Sample Administration personnel shall have trained for three (3) months under direct supervision, to perform accurately the procedures in receiving coolers, logging in samples, and checking discrepancies in paperwork for samples received. They also perform data input in the Sample Management System.

3.2 Training/Testing

The Laboratory Supervisor shall be responsible for initial evaluation of capabilities and qualifications of assigned personnel and shall assign those personnel to perform functions based on their qualifications and abilities.

The Supervisor shall be responsible for periodic job evaluation of assigned personnel. Documentation of evaluation shall be retained in personnel files.

Appropriate training shall be the responsibility of the Laboratory Supervisor with support from other American Environmental Network, Inc. management. Training periods will vary according to each job's requirements and previous experience of the employee.

New employees will receive detailed information concerning Safety Practices, Security Policies, and general Corporate Policies. A current copy of the American Environmental Network, Inc. Safety Manual will be made available to employees who must familiarize themselves with this document.

In-house training programs complement basic education and experience levels by supplying additional information about technical subjects, safety, corporate policy, quality awareness, and supervisory and managerial techniques. Tuition reimbursement is provided for those individuals who would like to take relevant undergraduate or graduate courses either in or outside a degree program.

The confidence in any analytical method is limited if the analyst has not demonstrated skill in performing the analysis. Analysts will, therefore, not only be trained in quality assurance techniques, but also be required to qualify to run analyses.

Analysts will demonstrate their proficiency in conducting chemical analyses by analyzing spiked standards or EPA control samples using approved analytical methods. Proficiency must be demonstrated for each analyte to be analyzed by the laboratory prior to conducting analyses of natural samples. Proficiency may be proven during a routine analytical run only under the supervision of an analyst already qualified for that particular analysis.

Milestone achievements or unique training will be noted by the Supervisor on a training document form (Figure 2.0) and maintained in the personnel certification file (presently in QA file). Available certificates of training, education, or award shall also be maintained in the individual's personnel certification file.

Training will also include documentation of the analysts review of the SOP he or she is qualifying to perform. This information is also included in the certification files.
Supervisors shall monitor individual work habits for any needed supportive training. Additional training requirements will be developed by the individual's supervisor.

Supervisors and managers also attend training sessions to improve their supervisory and managerial skills. Topics included in these sessions include the essentials of communications, motivating subordinates, giving orders and instructions, coaching, assessing employee performance and goal setting, project management, and budgeting.

FIGURE 2
TRAINING DOCUMENTATION FORM
AMERICAN ENVIRONMENTAL NETWORK, INC

ANALYST NAME __________ SECTION ____________

DATE OF HIRE __________ JOB TITLE ____________

PARAMETER FOR CERTIFICATION	ANALYTICAL METHOD	DATE QUALIFIED	CERTIFIED BY INITIALS/DATE	QA REVIEW INITIALS/DATE	AENI SOP REVIEW INITIALS/DATE	DATE TO REQUALIFY

.0 WORK AUTHORIZATION POLICY

All work performed by American Environmental Network, Inc. on customer samples shall be authorized by the customer through the Project Manager and utilize a computer generated, project-specific, log-in and analysis form Figure 5 p.38. This form shall specify all information necessary to assure compliance with contractual obligations. It includes at a minimum the analyses requested, the quality control requirements, and the data reporting requirements.

The Project Manager is responsible for notifying the Laboratory Managers and Supervisors of all contract requirements and obligations through the log-in form. This may be done by reference to other documents (SOP #, customer contract, etc.) that contain the contract requirements.

0 CONTROL OF WORK PROCESS BY USING STANDARD OPERATING PROCEDURES

Control over the technical work performed by American Environmental Network, Inc. is based on adherence to written and approved procedures for analytical and operating processes. Applicable procedures are available to the technicians/analysts and a copy of the appropriate procedures are maintained in each laboratory department.

American Environmental Network, Inc. utilizes standard operating procedures (SOPs) to define the exact routines to be followed in each department. There are SOPs covering all facets of the organization, from sample receipt and analytical methods through data archiving. A copy of the SOP index is provided as an Appendix to this manual. The entire SOP manual is available for client review at American Environmental Network, Inc.

Each SOP document is approved separately and identified by means of effective date and approval signatures. An SOP may be initiated by any staff member. As laboratory procedures are developed to meet American Environmental Network, Inc. clients needs, it is necessary to create new SOPs and to update old ones. The new document is submitted to the QA Manager, who, in turn, circulates a copy of the draft document to the laboratory management for comment. The draft SOP and management comments are returned to the SOP initiator for final revision. The revised SOP is then circulated by the QA Manager for approval. Each SOP must by signed by the initiator and manager of the operation. Additionally, the QA Manager reviews and approves SOPs.

Each laboratory and office area has a copy of the SOP's applicable to operations performed in that area. The SOP manual in the QA office area contains a complete set of all SOPs.

All Laboratory employees are responsible for reading, understanding, and following the SOPs. To document this, each employee is required to sign an SOP Review Sheet, which attests to the fact that they have read the SOPs applicable to their job function. This documentation is filed in the employee's certification file.

SOPs will be reviewed on an annual basis.In January of each year, a listing of all current SOP's will be make and dates assigned for their review (and any required revisions) throughout the year. SOP review will be spread over the twelve month period to avoid over-burdening the laboratory. All supervisory personnel will be apprised of the schedule and the QA Officer will follow-up on all scheduled due dates.. Approved revised procedures will be distributed by the Quality Assurance Manager.

Original signed Standard Operation Procedures are kept by the QA Manager. An historical file is maintained. When an SOP is revised, the old version is marked "OBSOLETE" and dated. Each SOP is marked with an effective date. The QA unit maintains a distribution list for the SOPs. Updates are distributed to the appropriate manual by the QAM. Obsolete SOPs are removed from each manual at that time.

In order to ensure usage of the most current SOP, an index will be inserted in the front of each SOP Manual. This index will include the SOP title, revision number,and Effective Date. The analyst need only verify the date of the most current revision against the issue date on the SOP to determine that the SOP in use is actually the most current.

.0 INSTRUMENTATION CONTROL

All equipment whose operation and function directly affects the quality of service will be carefully calibrated and maintained, with records of each calibration and/or maintenance action kept in appropriate log books or files.

6.1 Calibration

Certified standards will be used for all primary calibrations. NIST, NIST-traceable, or EPA standards will be used, when available, for the primary calibrations or verification of primary calibrations. All dilutions of solution standards will be recorded in a readily accessible log book. Identity of dilutions will be such that a secondary standard or dilution can be traced, though subsequent actions, back to the initial certification.

Quality Control Check Standards will be used to record instrument sensitivity and linearity, and to verify proper response. Calibration entries into the instrument logbooks will be dated, initialed and documented by the analyst.

Preparation of standard solution is documented in bound notebooks. Each stock material (either neat or concentrated) is assigned a number which is referenced in the preparation log. Prepared solution numbers are recorded on the analysis run sheet. The standard solution preparation log contains entries regarding the source material which includes:

- o Compound name.
- o Purity.
- o Manufacturer and lot number (for neat or stock).
- o Concentration, if in solution form.

- Solvent, when appropriate.

Calibration protocols are specified in EPA Approved Methods, in American Environmental Network, Inc. Standard Operating Procedures, or according to manufacturers operating instructions. Table I and Figure 3 outline calibration procedures, frequency, and acceptance criteria for standard curves, blanks, ICV's, CCV's, surrogates, and laboratory control samples.

TABLE 1
QUALITY ASSURANCE CRITERIA
Metals/Inorganics

Activity	Frequency	Acceptance Criteria	Corrective Action*
Graphite Furnace AAS			
A. Standard Curve 1. Calibration Blank 2. 4 points through linear range or response	Each run	1. Standards must bracket the samples being analyzed. 2. One standard must be at or near the detection limit. 3. Correlation coefficient (r) must be $\geq$0.995.	3. If standards are not linear, remake standards, recalibrate instrument and verify new curve with ICV. Standard curve is acceptable if ICV is $\pm$ 10% of true value.
B. Initial Calibration Verification (ICV)	Each run, after curve	1. Made of different stock than standard curve. 2. Not processed through the analysis. 3. Must be within $\pm$10% of true value.	3. a. Recalibrate instrument. b. Rerun ICV: must be within $\pm$10% of true value. c. If still unacceptable remake standards and ICV.
C. Continuing Calibration Verification (CCV)	1 per 10 samples (or more frequent)	1. May be prepared from same solution as standard curve. 2. Must be at mid-range on standard curve. 3. Must be within $\pm$10% of true value.	3. a. Rerun CCV; must be $\pm$10% of true value. b. If still unacceptable, recalibrate instrument and rerun all samples since last acceptable calibration check.
D. Method Blank	1 per batch or per 20 samples, whichever is less	1. Must be < CRDL. 2. If the blank is $\geq$ CRDL, but the sample is >10X the blank reading, the blank is considered acceptable.	2. a. If blank is out of control, repeat blank and sample digestion. b. If there is no more sample, note the event in the Project Discrepancy Report.
E. Sample duplicate	1 per 20 samples or per batch	1. Must agree to within $\pm$20 RPD for water and soil. 2. Samples outside of control limit are noted in case narrative.	

* Number or corrective action corresponds to respective acceptance criterion.

TABLE 1
QUALITY ASSURANCE CRITERIA
Metals/Inorganics

Activity	Frequency	Acceptance Criteria	Corrective Action[a]
F. Matrix spike	1 per 20 samples, per batch, or per matrix type, whichever is least[b]	1. Recovery must be within $\pm$25% of true value. 2. Spike recoveries are calculated versus the original sample (do not use the average of duplicate samples).	Flag outliers on Form I or other appropriate reporting form.
G. Laboratory control sample (LCS)	1 per batch or per 20 digested samples, whichever is greater[b].	1. Recovery must be within $\pm$20% of true value.	1. a. Rerun LCS. b. If still out of control, samples digested with that LCS must be redigested and rerun. If there is no more sample, note the event in a Project Discrepancy Report.
H. Analytical Spike	Contract Specific	see Figure 3 for corrective action flow chart	See Figure 3 for corrective action flow chart.
ICP procedures are the same as those for Graphite Furnace AAs, except for the standard curve.			
A. Standard Curve 1. Calibration blank. 2. 3-4 points linear range.	Each run	Not applicable.	Not applicable.
B. Initial Calibration Verification (ICV)	Each run, after curve	1. Made of different stock than standard curve 2. Mid-range on curve 3. Not processed through the digestion 4. Must be within $\pm$10% of true value	4. a. Recalibrate instrument. b. Rerun ICV: must be within $\pm$10% of true value. c. If still unacceptable remake standards and ICV.
C. Continuing Calibration Verification (CCV)	1 per 10 samples (or more frequent)	1. May be operated from some solution as standard curve. 2. Usually at mid-range on standard curve. 3. Must be within $\pm$10% of true value.	3. a. Rerun CCV; must be $\pm$10% of true value. Can be run 3 times. b. If still unacceptable, recalibrate instrument and rerun all samples since last acceptable calibration check.

[a] Number of corrective action corresponds to respective acceptance criterion.

TABLE 1
QUALITY ASSURANCE CRITERIA
Metals/Inorganics

Activity	Frequency	Acceptance Criteria	Corrective Action*
D. Method Blank	1 per batch or per 20 samples, whichever is less	1. Must be < detection limit. 2. If the blank is $\geq$ detection limit, but the sample is >10X the blank reading, the blank is considered acceptable.	2. a. If blank is out of control, repeat blank and sample digestion. b. If there is no more sample, note the event in the Non-conformance Report.
E. Sample duplicate	1 per 20 samples or per batch	1. Must agree to $\pm$20 RPD for Water. 2. Must agree to $\pm$50 RPD for Soil.	1-2 If soils or waste samples are out of control, flag results in report.
F. Matrix spike	1 per 20 samples per batch, or per matrix type, whichever is least	1. Recovery must be within $\pm$25% of true value. 2. Spike recoveries are calculated versus the original sample (do not use the average of duplicate samples).	1-2 If soils or waste samples are out of control, flag results in report.
G. Laboratory control sample (LCS)	1 per batch or per 20 digested samples, whichever is greater	1. Recovery must be within $\pm$20% of true value.	1. a. Rerun LCS. b. If still out of control, samples digested with that LCS must be redigested and rerun. If there is no more sample, note the event in a Non-conformance Report.
Cold Vapor AAS: Mercury			
A. Standard Curve 1. Calibration blank. 2. 6 points through linear range of response.	Each run	1. Each standard should be based on two readings. 2. Standards must bracket the range of the samples beimnlyzed. 3. One standard should be at or near the detection limit. 4. Correlation coefficient (r) must be $\geq$0.995.	4. If standard curve correlation is <0.995 standard curve should be rerun.
B. Initial Calibration Verification (ICV)	Immediately following calibration curve	1. Made of different stock than standard curve. 2. Must be a different concentration than points on standard curve. 3. Must be within $\pm$20% of true value.	3. If ICV is not within $\pm$20% of true value, redigest samples.
C. Continuing Calibration Verification (CCV)	1 per 10 samples (or more frequently)	1. May be made for ICV stock or standard curve stock. 2. May be same concentration as a point on the standard curve; must be within the range of the standard curve. 3. Recovery must be within $\pm$20% of the true value.	3 a. If CCV is not within $\pm$20% of true value, rerun CCV.

TABLE 1
QUALITY ASSURANCE CRITERIA
Metals/Inorganics

Activity	Frequency	Acceptance Criteria	Corrective Action*
D. Sample Duplicate	1 per 20 samples or batch	1. Must agree to $\pm$20 RPD for water. 2. Must agree to $\pm$50 RPD for soil.	1-2 If soils or waste samples are out of control, note the results in report.
E. Matrix Spike	1 per 20 samples, per batch, or per matrix type, whichever is least	Recovery must be $\pm$25% of true value.	1-2 If soils or waste samples are out of control, note the results in report.
F. Digested Blank	1 per digestion batch	Must be < DL	If blank result is $\geq$ DL, then all associated samples must be redigested.
G. LCS	1 per digestion batch.	Recovery must be $\pm$25 %.	If LCS is out of control, redigest all associated samples.

TABLE 1
QUALITY ASSURANCE CRITERIA
Organics Parameters

Activity	Frequency	Acceptance Criteria	Corrective Action*
Organic Parameters			
SW 8010 SW 8015 SW 8020			
Method Blank	One run with each set	No analytes above the target detection limits.	
Calibration	Full calibration with each analytical run		
MS/MSD (QC level III-IV)	With QC levels III-IV		Out of control MS/MSD results are reported in case narrative.
LCS (spiked blank)	Once per week when samples are run		
Method 8240 Calibration			
Initial	As necessary	1. RF calculated for each compound. 2. SPCC's RF >0.300 (0.250 for Bromoform). 3. CCC % RSD < 30%.	2 & 3. Recalibrate if SPCC's or CCC are out of control.
Tuning Check and System Performance Checks	Once per day	Per CLP requirements.	Rerun until acceptable tune has been achieved.
Daily Calibration	Immediately following the tune	1. SPCC's RF >0.300. 2. CCC % RSD <25%.	If out of control, the calibration rerun.
Calibration Blank	Once per day	No target compounds present over the target detection limit.	No samples run until acceptable calibration blank has been achieved.
Surrogates	With each sample	(See attached).	Sample is rerun

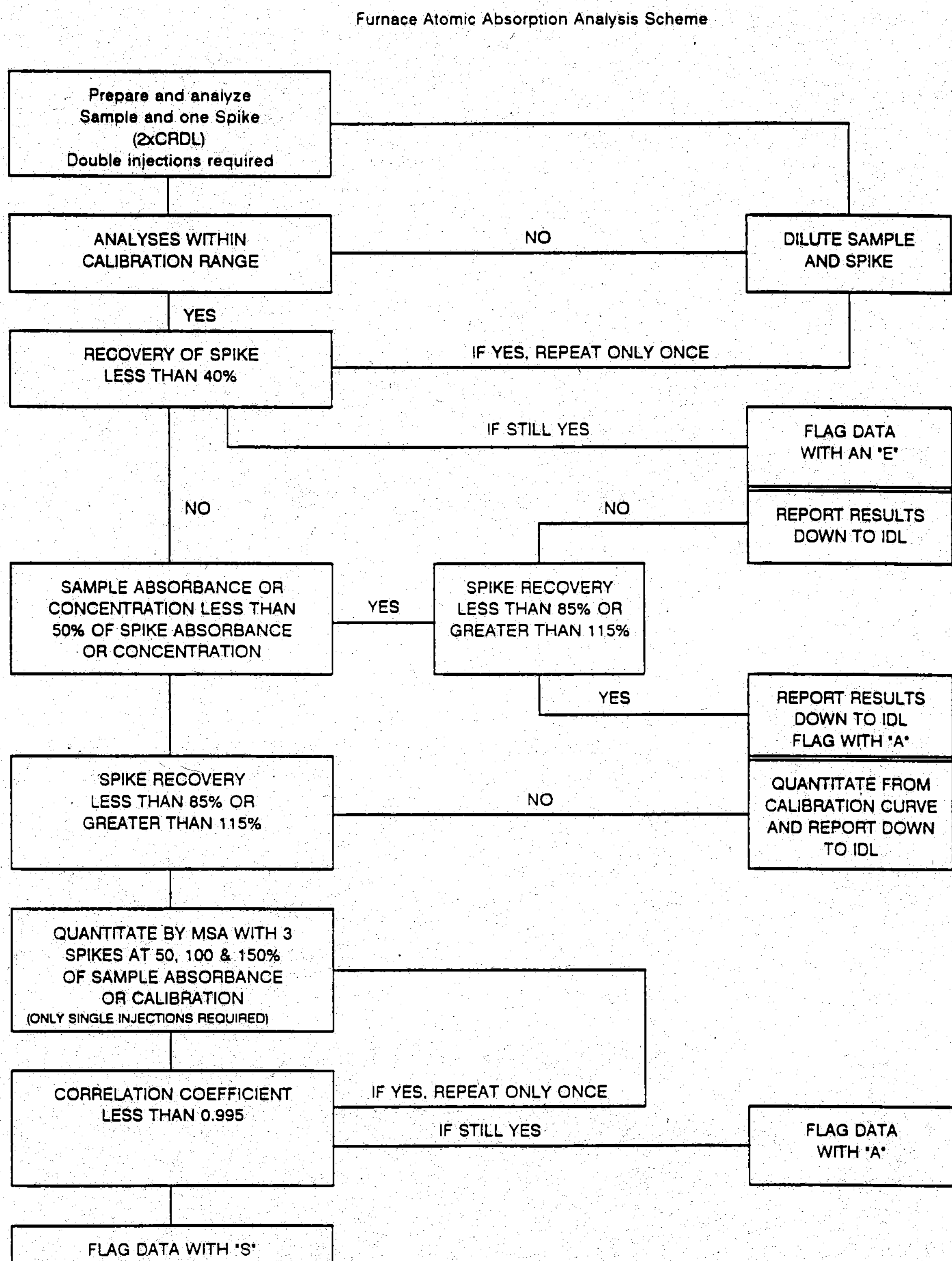
TABLE 1
QUALITY ASSURANCE CRITERIA
Organics Parameters

Activity	Frequency	Acceptance Criteria	Corrective Action*
MS/MSD	One per 20 samples for QC levels III and IV	(See attached).	Data flagged and discussed in case narrative.
Method 8270			
Calibration			
Initial	As necessary	1. RF's calculated for each compound. 2. SPCC's RF $\geq$0.05. 3. CCC % RSD < 30%.	2 & 3. Recalibrate it SPCC's or CCC's are out-of-control.
Tuning check and system performance check	Once per day	Per CLP requirements	Rerun until an acceptable tune has been achieved.
Daily Calibration	Immediately following the tune	1. SPCC's RF $\geq$ 0.05. 2. CCC %D <25%.	If out-of-control the calibration is rerun.
Calibration Blank	Once per day	No target compounds present over the target detection limit.	No samples run until acceptable calibration blank has been achieved.
Method Blank	Per extraction blanks	No target compounds present over the target detection limit.	Blank is rerun. If still out of control, then the extraction batch is reextracted and rerun.
Surrogates	With every sample	One surrogate may be out in each fraction (must have recovery $\geq$10%)	If surrogates are out-of-control, sample is rerun.
		(See attached)	If recoveries are <10% or two in a fraction are out-of-control, the sample is re-extracted.
MS/MSD	One per 20 samples	(See attached)	Data flagged and discussed in the case narrative.

Table 1
QUALITY ASSURANCE CRITERIA
Organics

Activity	Frequency	Acceptance Criteria	Corrective Action
SW8080			
Method Blank	One run with each extraction	No analytes above target detection limits	Report discrepancies in set narrative flag data "B"
Calibration	1-3 point curve	Project Specific	Project Specific
MS/MSD	1 per 20 samples	Project Specific	Results in project file
LCS (spiked blank)	verification of newly prepared standard curve	Per EPA Spaces.	Prepare new curve
SW8150			
Method Blank	One run with each extraction set	No analytes above target detection limits	Report discrepancies in narrative; flag data "B"
Calibration	5 point curve	Project Specific	Project Specific
MS/MSD	One per 20 samples	Project Specific	Results in project file
LCS	Verification of newly prepared standard curve	Per EPA specs; compound specific	Prepare new curve

FIGURE 3
FURNACE QC FLOW CHART



6.2 Instrument Maintenance

Written records are maintained to document all inspection, maintenance, testing, calibration, and/or standardization procedures. The records include date, description of activity and actual findings, the name of the person performing the operation, and a statement as to what the actual maintenance operations were. This information is kept in a logbook specific for each instrument. Logbooks are stored in close proximity to each instrument.

The persons responsible for performing calibration, maintenance, and cleaning are those operations persons using the equipment. American Environmental Network, Inc. also uses manufacturers' service contracts for preventive maintenance and repair of selected equipment.

In the event of equipment failure or malfunction, analyses in process are stopped or transferred to another instrument. Trouble-shooting activities recommended in the operation manual for that instrument are performed, and if necessary, repairs made by the manufacturer's service department. The equipment is clearly identified as out of service and is not used until required repairs have been made.

Nonroutine repairs performed as a result of equipment malfunction are documented in the logbook to show the nature of the defect, how and when the defect was discovered, and any remedial action taken in response to the defect.

Quality Assurance monitors the equipment maintenance and calibration program through inspections of instruments and logbooks every month. Deviations from established maintenance schedules are communicated to the Laboratory Managers who are responsible for taking required corrective action. The reports are filed in the QA office with a copy given to the President.

6.3 Equipment and Instrumentation

A listing of the principle equipment in American Environmental Network, Inc.'s analytical laboratories appears below. It includes four gas chromatograph/mass spectrometers, eight gas chromatographs, three high pressure liquid chromatographs, two GFAA and one CVAA spectrophotometers and two inductively-coupled plasma emission spectrometers. This apparent redundancy of instrumentation is essential for handling large volumes of samples and fast turn-around requirements.

Laboratory Instrumentation

GAS CHROMATOGRAPHS

- o 8 units, Hewlett Packard 5890
- o fully automated with 7673 and 7673A autosamplers
- o multiple general and specific detectors:
  - Hall Detectors
  - Electron Capture
  - Flame Ionization
  - Nitrogen/Phosphorus
  - Photoionization
- o All units are microprocessor or computer (IBM PC-At/Dionex software) controlled
- o Capillary and packed column capabilities
- o Purge and trap concentrator systems with autosamplers:
  - 1 Tekmar LSC-2/ALS for volatile analysis by GC
  - 1 OI system

GAS CHROMATOGRAPHS/MASS SPECTROMETERS:

- o 4 units, Hewlett-Packard 5985 (1), 5995 (1), and 5970 (2)

- o Hewlett-Packard RTE-A Data System with 1 disk drive, 1 HP2932A printer, 2
  laser jet printers, Think Jet printer and 4 HP terminals
- o 9-track tape units and floppy-disk deliverables capability
- o NBS Weily Library
- o CI/EI dual source, 10-1000 amu on HP 5985
- o Purge and trap concentrator systems with autosamplers :
  2 Tekmar LCS-2/ALS and LCS400/ALS
- o automated heated purge and trap capability

HIGH PRESSURE LIQUID CHROMATOGRAPHS (HPLC)

- o Waters pumps
- o 1 pump and solvent conditioner for up to quaternary gradient
- o autosamplers: Waters WISP
- o column-switching capabilities
- o column ovens
- o computer-automated and controlled (Maxima chromatography data system and NEC Powermate SX Plus)

INDUCTIVELY COUPLED ARGON PLASMA EMISSION SPECTROMETER (ICP)

Perkin Elmer 6500 and Plasma II
- o computer controlled
- o high resolution optics

ATOMIC ABSORPTION SPECTROPHOTOMETERS (AAS)

Perkin Elmer 5000 and 3030
- o 2 graphite furnaces
- o fully automated, computer or microprocessor controlled

Perkin Elmer 3100 Mercury Analyzer
- o fully automated

ION CHROMATOGRAPH

Dionex 4000 I
- o fully automated
- o microprocessor controlled

INFRARED SPECTROPHOTOMETER

Perkin Elmer

- o ratio recording

UV/VIS SPECTROPHOTOMETER

Varian 6000

MISCELLANEOUS

- o Electronic Analytical Balance
- o Ph Meters/Ion Specific Electrodes
- o Centrifuges
- o Incubators
- o Ultrasonic Disrupters
- o Rotary Evaporators
- o Shakers
- o TCLP Extractors
- o ZHE TCLP Extractors
- o Furnaces and Ovens

COMPUTER EQUIPMENT

American Environmental Network, Inc. maintains an extensive inventory of microcomputer equipment. Refer to the following table for a complete listing of this equipment.

TABLE

AMERICAN ENVIRONMENTAL NETWORK, INC.
COMPUTER EQUIPMENT LIST

Date: July 1, 1992

Manufacturer	Model No	Processor Type (286,386)	Video Type (Ega, Vga)	Hard Drive Capacity	Ram (KB or MB)	Disk Drive Size, Capacity	Math Coprocessor Type (80287,80387)
ARC	X Turbo	8088	Mono		640 Kb	5.25" 360 K	NA
ARC	X Turbo	8088	Mono	NA	640 Kb	5.25" 360 K	NA
ARC	X Turbo	8088	Mono	NA	640 Kb	5.25" 360 K	NA
ARC	X Turbo	8088	Mono	NA	640 Kb	5.25" 360 K	8087
ARC	X Turbo	80286	Mono	40	1 Mb	5.25" 1.2M/5.25" 360K	80287
Everex	Sys 1800	80286	Mono	80	2 Mb	5.25" 1.2M/3.5" 1.44M	80287
Everex	Sys 1800	80286	Mono	20	1 Mb	5.25" 1.2M/5.25" 360K	80287
Everex	Sys 1800	80286	CGA	20	1 Mb	5.25" 1.2M/5.25" 360K	80287
Everex	Sys 1800	80286	Mono	40	2 MB	5.25" 1.2M/5.25" 360K	NA
Generic		80286	EGA	40	2 Mb	5.25" 1.2Mb	80287
Compaq	Deskpro 286	80286	CVGA	20	640 Kb	5.25" 1.2 Mb	80287
Compaq	Deskpro 286	80286	Mono VGA	40	1.5 Mb	5.25" 1.2 Mb	80287
Dell	200	80286	CVGA	40	640 Kb	5.25" 1.2 Mb	NA
Dell	200	80286	CVGA	40	2 Mb	5.25" 1.2 Mb	NA
NEC	386SX - 16	80386	CVGA	30	2 Mb	5.25" 1.2 Mb	80387

tTABLE con)

Manufacturer	Model No	Processor Type (286,386)	Video Type (Ega, Vga)	Hard Drive Capacity	Ram (KB or MB)	Disk Drive Size, Capacity	Math Coprocessor Type (80287,80387)
Epson	Equity 386-20	80386	CVGA	170	4 Mb	5.25" 1.2 Mb	80387
Epson	Equity 386-20	80386	CVGA	160	4 Mb	5.25" 1.2 Mb	80387
Epson	Equity 386-20	80386	CVGA	80	4 Mb	5.25" 1.2 Mb	80387
Comtech	386-25	80386	CVGA	150	4Mb	3.5" 1.44M	80387
Comtech	386-25	80386	CVGA	40	4Mb	5.25" 1.2M	NA
Comtex	386-33	80386	Mono VGA	465	8Mb	5.25" 1.2M	80387
Compaq	Deskpro 386s	80386	CVGA	110	2 Mb	5.25" 1.2M/3.5" 1.44M	NA

7.0 DATA REDUCTION CONTROL

7.1 Quality Assurance Project Plan

Certain selected projects received into the laboratory require the development of a Quality Assurance Project Plan (QAPP) which must be strictly followed. The USEPA document entitled "Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans", QAMS 005/80, is issued as general instructions for writing the QAPP. Specific requirements of the sponsoring agency are incorporated.

QA Project Plans should provide for the review of all activities which could directly or indirectly influence data quality and the determination of those operations which must be covered by SOP's. QA Project Plans should be prepared in document control format, with provisions for revision, as needed, and with a record of the official distribution.

7.2 Sample Chain of Custody

From the moment a sample is taken until the data analysis is complete, custody of the sample must be controlled. Custody is routinely maintained on all samples received at American Environmental Network, Inc. A sample is in custody if one of the following conditions exists:

- It is in the actual possession of the analyst.
- It is in view of the laboratory analyst.
- It was placed in a secure location, after being in one's possession.
- The sample is kept in a secured area which is restricted to authorized personnel only.

A designated sample custodian is responsible for samples received at American Environmental Network, Inc. and this individual is fully aware of all custody requirements. In addition to receiving samples, receiving department is also responsible for documentation of sample receipt, storage before and after sample analysis, and eventually the proper disposal of samples.

The protection of those personnel involved in the shipping to and receiving of samples at laboratories, as well as the maintenance of the integrity of the samples themselves, is an important aspect of sample control. When sent by common carrier, the packaging, labeling, and shipping of hazardous wastes and substances is regulated by the U.S. Department of Transportation (DOT), Code of Federal Regulations, Part 49.

Samples obtained from sites are classified as either environmental samples or hazardous samples. Environmental samples are those which contain low levels of contaminants and require implementation of limited precautionary procedures. Hazardous samples are those which could possibly contain dangerous levels of contaminants. Hazardous samples must be packaged and labeled according to procedures specified by the U.S. DOT, or the state DOT, whichever is more stringent. If any doubt exists as to the extent of contamination, samples should be treated as hazardous.

Samples not designated as environmental samples or which are known to contain hazardous materials must be considered hazardous. DOT has established a priority system of transportation categories which depends on the degree of hazard inherent in the material. The relevant portion of this listing is shown in Table 3.

Hazardous or environmental samples may be transported by American Environmental Network, Inc. personnel in private vehicles.

All samples are inspected at the time they are delivered to the laboratory. Any breakage or other damage is documented and brought to the attention of the project manager. All custody documentation relating to the samples is completed, signed and dated by the sample custodian. The sample custodian is also responsible for noting the presence of custody seals on the shipping container or sample containers and documenting the condition of the seals at receipt in the remarks section of the field chain-of-custody form. In addition, field chain-of-custody forms sent with all samples will be signed by the sample custodian and a copy provided to the project manager.

Information is logged into the laboratory sample management system and includes the following:

1) laboratory number
2) field sample number (client ID)
3) sample matrix
4) parameter(s) of interest (analyses)
5) sample receipt date
6) sample storage location in laboratory
7) sample custodian initials (hard copy only)
8) sampling site or organization
9) Quality Control level requested comments.

This information is also logged into a hardbound logbook as a backup to the automated system. Samples are then placed in designated locked storage areas prior to analysis. An example of a chain-of-custody form is shown as Figure 4.

After the samples have been logged into the computer system, a "Non-Reported Samples" analyte sheet is generated. There is a sheet for the organics section, the metals section, and wet chemistry section. See Figure 5 for an example. The following information is included on this sheet.

- project, project information
- client
- client ID vs. American Environmental Network's number
- date sampled
- date received
- date due
- analytes requested
- sample location
- QC level required
- holding time, days until holding time is expired.

This form is checked by the project manager who checks for completeness and adds any other pertinent information. Copies of this request sheet are distributed to the lab supervisors and the project manager retains a copy in the project file.

After the samples have been logged in, the sample custodian places the samples in the correct locked holding area. Volatile samples are kept separate from the other laboratory samples. When a sample is removed from its storage location, the analyst signs and dates a logbook. Upon returning a sample, the analyst signs the sample back into the storage location.

Table 3

DOT HAZARDOUS MATERIAL CLASSIFICATION

1. Radioactive Material
2. Poison 'A'
3. Flammable Gas
4. Non-Flammable Gas
5. Flammable Liquid
6. Oxidizer
7. Flammable Solid
8. Corrosive Material (liquid)
9. Poison 'B'
10. Corrosive Material (solid)

Figure 4

HITTMAN EBASCO

HITTMAN EBASCO ASSOCIATES INC.
A Subsidiary of EBASCO SERVICES INCORPORATED
9151 Rumsey Road, Columbia, MD 21045
(301) 730-8525

CHAIN OF CUSTODY RECORD

PROJECT				NO. CONTAINERS	ANALYSIS REQUIRED										REMARKS OR SAMPLE LOCATION	PRESERVATION	
SAMPLERS: (Signature)																ICED	SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN
SAMPLE NUMBER	DATE	TIME	MATRIX														

Relinquished by: (Signature) 1	Date / Time	Received by: (Signature)	Relinquished by: (Signature) 4	Date / Time	Shipped via:
Relinquished by: (Signature) 2	Date / Time	Received by: (Signature)	Received for Laboratory by: (Signature)	Date / Time	Shipping Ticket No.
Relinquished by: (Signature) 3	Date / Time	Received by: (Signature)	Remarks:		

Figure

01/07/92
PAGE 1

RIBUTION: BETSY
Y, LEE, NOBLE, BUCK, KEVIN
RKS:

NON - REPORTED SAMPLES
ORGANIC - SPECIFIC CONTRACT REPORT

PROJECT: NIOSH PATS
COMPANY: NIOSH
PROJECT MGR: MARSHA mb 1/8/92

IENT ID	CLIENT	CON NUM	TAS NUM	DATE REC	DATE DUE	DATE SAMPLED	MATRIX	pH	TYPE	ACD	BN	PST (OCL)	PST (OP)	VOA	PCB	HRB	EXP	TPH IR	TPH GC	PHEN	O&G	GAS	OTH	VOA GC	OTHER	COMMENTS	LOC	HOLD DATE	DAYS LEFT	QA LEVEL
3-1	EPAS	9009	066	01/07/92	01/31/92	/ /	AIR		TCL															A		PCE, TCE	BF	01/31/92	24	2
8-2	EPAS	9008	066	01/07/92	01/31/92	/ /	AIR		TCL															A		PCE, TCE	BF	01/31/92	24	2
8-3	EPAS	9028	066	01/07/92	01/31/92	/ /	AIR		TCL															A		PCE, TCE	BF	01/31/92	24	2
9-4	EPAS	9008	066	01/07/92	01/31/92	/ /	AIR		TCL															A		PCE, TCE	BF	01/31/92	24	2
3-5	EPAS	9008	066	01/07/92	01/31/92	/ /	AIR		TCL															A		PCE, TCE	BF	01/31/92	24	2

& 1,1,1 Trichloroethane

5 ORGANIC RECORDS

L = LEACH E = EXTRACT A = ANALYZE C = CHECK DATA Q = DO QA

7.3 Sample Management

American Environmental Network, Inc. uses several techniques as part of its sample management program; these include a sample management system (SMS) and dBase printouts of assignment and status, centralized project and report files, posted work assignments, and a project manager assigned to each job.

The printed dBase forms identify pertinent information on incoming samples. After sample receiving has logged in the sample, the paperwork is verified against client requests by the project manager. Verified paperwork is then sent to the appropriate lab supervisor and project manager. Each supervisor is responsible for assigning analytical batches for processing and insuring that all customer requirements are met.

All data are filed in the central report file or the data location is referenced in that file. As each test is completed, the SMS is updated to close out the test. Each day a printout is obtained from the SMS which lists the status of all samples. These reports are used by supervisors and project managers to coordinate work assignments.

Reports of analytical results are placed in the central project file. All correspondence, verbal or written, is documented in the central project file, which is kept by the project manager. The project manager monitors the progress of each project and reviews the final report. All reports are issued by the individual section managers and are sent to the project manager who prepares the final report. A copy is placed in the central report file. A weekly Project Status Report Update tracks dates for reporting and invoicing.

7.4 Data Processing

7.4.1 Collection

In order to maintain the quality of laboratory data, great attention is paid to the accuracy and completeness of data records. The procedure for Laboratory Notebook Documentation is defined in SOP No. 1401. Ink is used for all notebook entries. Corrections in notebooks and raw data are made with a single line drawn through the error, dated, and initialed by the analyst. Erasures and white out are expressly forbidden in any raw data.

Auxiliary data produced for internal records and not reported to clients unless requested as part of the analytical data, includes the following: laboratory worksheets, laboratory notebooks, sample tracking system forms, instrument logs, instrument outputs, standards records, maintenance records, calibration records, and associated quality control. The sources are available for inspection during audits and to determine the validity of data.

The analytical data is generated from the GC/MS computer software, GC integrator software, AA, and associated laboratory instrumentation. The outputs may include identifications of compounds, concentrations, retention times, and comparisons to standards. Outputs are in graphic form (chromatogram), bar graph (spectra) and printed tabular form. The outputs are in standard format specified for each analysis and are monitored for consistency. If incomplete or incorrect output is received, corrective actions are taken according to procedures established for each type of analysis and consistent with the manufacturers' recommendation.

Data for inorganic (nonmetal) compound analyses are recorded in bound notebooks assigned for each test. The required information for each analysis includes but is not limited to: the analytical procedure; any procedure changes required; American Environmental Network, Inc. internal sample number; raw analytical data; standard solutions used; preparation of reagents when appropriate; signature and date.

For metal analysis, a digestion log is maintained in a separate notebook. The digestion is documented by record of American Environmental Network, Inc. internal sample number, sample volume, elements, method, spike true value, date and initials. Digital printouts of results are obtained for graphite furnace and ICP analyses.

Final calculation of results for ICP, GFAA, and CVAA are recorded directly on their respective printouts. This includes instrument identification, American Environmental Network, Inc. internal sample number, initial result, dilution or concentration performed, final results, true value of QC or spiked samples, percent recovery obtained, and comments. Each data set is paginated and filed in the metals data notebook.

Data for organic compound extraction techniques are recorded on custom designed, preprinted Sample Workup Sheets. All details regarding the extraction are recorded on this form. The data includes the following entries: extraction method; sample matrix; extraction date; surrogate spiking solution number and concentration; matrix spiking solution numbers and American Environmental Network, Inc. sample identification number; sample amount; quantity of surrogate and matrix spike added; final extract volume; extract storage location and initials of chemist. One copy of the Sample Workup Sheet is kept in an extraction log book. A second copy of the sheet travels with the extracts to the analysis laboratory. Hard copy printouts of GC chromatograms, GC/MS mass spectra, IR printouts, and HPLC printouts are generated. All instrument printouts and compound identifications are checked manually and the instrument printouts are filed with the Sample Workup Sheets in the central file.

7.4.2 Data Review and Reporting

Prior to reporting, data are evaluated using strict control levels. Table I outlines Quality Control measures, frequency acceptance criteria and corrective action each analysis requires. All analysts are thoroughly familiar with these practices and no data will be reported unless they pass the QC checks.

The data and report for each environmental chemistry project receive a minimum of three levels of review and validation as discussed below.

First Level Review

All data receive a 100% review by either the supervisor or a second analyst of equal or higher experience and responsibility than the analyst performing the original work.. This review validates that the quality control requirements have been appropriately met.

This review covers the following points:

- o Transcriptions are checked for accuracy and use of appropriate units.
- o QC data are reviewed to assure that internal specifications and contract requirements have been met.
- o Project Discrepancy Reports, if any, are reviewed for completion, corrective action, and impact upon results. Information contained in the Project Discrepancy Report may need to be included in the narrative report to the client.

- Results make sense compared to historical information about the site and results for other parameters tested at the same time.

<u>Second Level Review</u>

After the supervisor or designee reviews and approves the report, it is submitted to the Laboratory Manager for final technical approval and issuance to the Project Manager. A copy of the signed report is retained in the project file for archiving.

Data are centralized into a project file. Data for the analyses provide a complete audit trail. Data notebooks and data sheets correctly reference the analytical method, the standard solution used, American Environmental Network, Inc. internal sample numbers, original data values, sample results in correct units, calculation formula for all conversions, signature of the analyst, and the date. Instrument printouts must identify the person responsible for the data generation and the date of the run.

<u>Third Level Review</u>

The Project Manager then reviews the document against the specification on the contract directive. If all client specifications are met, the Project Manager releases the report.

8.0 REAGENT QUALITY CONTROL

This section deals with the general requirements for all reagent, solvents, and chemicals to be used in the analytical laboratory, in terms of both acquisitions and preparation. The goal of the procedures specified here is to insure the proper purchase, preparation and control of reagents in a cost effective manner.

8.1 Reagent Classifications

Distinction will be made between reagents purchased from vendors and those that involve preparation within the Laboratory. Purchased reagents can be of various grades, including analytical, spectral, and "nanopure". The recipes for reagents and the analytical procedures should specify the grade of reagents, and the difference between reagents that are specific for a given analytical procedure, and general or shelf reagents. The latter will typically be less precisely prepared. In no case, is divergence permitted from the instructions in the recipes for analytical procedures. These will specify the required conditions for preparation including the required precision, glassware, and the accuracy and precision required in weighing. A reagent whose preparation is specific for a given procedure and whose preparation is particularly involved will be reserved for that procedure and will not be used as general shelf reagent.

8.2 Batch Control

Both purchased and prepared reagents will be controlled on a batch basis. For purchase reagents such as solvents, this means the purchase of quantities appropriate to the needs of the laboratory and the stability or shelf life of the material. All reagents will be evaluated for the presence of interference or significant background problems by the running reagent blanks. Similar batch control will be employed with reagents that involve preparation in the Laboratory. In both cases, appropriate blanks will be run with each group of analyses. It is a requirement of the work plan to specify the nature and composition of these blanks. It is also expressly forbidden to switch from one batch to a second during the course of work on a group of analyses. The work plan must anticipate the reagent needs; adequate reagents must be available before work is initiated. If the unacceptable situation does occur in which reagent supplies are exhausted in the midst of a given effort, all control and standards must be taken that would to permit intercomparison of data taken with different sets of reagents.

8.3 Storage and Maintenance

The analytical procedures and reagent recipes recorded in the appropriate SOP will specify the required storage conditions. The concerns involved may include:

a. Need for storage away from light.
b. Refrigeration requirements.
c. Container requirements; e.g., glass versus plastic.
d. Appropriate dating to insure discarding at the expiration the shelf life of the reagents.

All reagent stock bottles must be handled with proper technique to prevent their contamination or destruction. For example, pipetting from and returning unused reagents to stock bottles are not permitted.

All reagents, solvents and standards shall be dated (mm-dd-yy), and initialled upon receipt at the laboratory and stored under conditions that will maintain their initial high quality. They will be used on a first in - first out basis from storage.

8.4 Labeling

All laboratory-prepared reagents must, at a minimum, be labeled with the following information: reagent name, date prepared, concentration, solvent, discard/expiration dates and the initials of the preparer. If the reagent is toxic, hazardous, or flammable, it is mandatory that an appropriate caution label be placed on the container. Additional information that may be required in specific cases includes: name of analytical procedure (if this reagent is specific for a particular method), procedure designation (such as Method 103-Phosphate-Reagent A) if analytical information, shelf life information and discard date.

9.0 ROUTINE INTERNAL QUALITY CONTROL CHECKS

9.1 Quality Control Samples

The routine quality control checks employed by American Environmental Network, Inc. consists of those specified in Table 1 and Table 4. In general, these checks consist of method blank analyses, replicate analyses and spike sample analyses.

Method Blanks

Method blank analyses are used to estimate the level of contamination due to laboratory reagents, labware and apparatus. Control limits are established based upon client requirements. If no client specifications are available, the blank contamination is evaluated by the laboratory supervisors and managers to determine how the results affect customer sample results.

Replicate Analyses

Replicate analyses will be used to estimate the precision of each analytical test procedure for a known matrix. Data control limits will be established to satisfy the requirements of specific measurement projects, and defined in the contract directive.

Spiked Samples

Spike control sample analyses will be used to estimate analyte recovery (accuracy) for each test procedure for a known matrix. Data control limits will be established to satisfy customer requirements and will be defined in the contract directive.

Intralaboratory Analyses

The Quality Assurance Manager will submit a monthly blind sample to the laboratory. These blind samples will provide an independent verification of the analytical processes. Results of these blind samples will be summarized and reported to the Laboratory Managers and President. The QAM reviews the submitted QC data and makes recommendations, suggests changes, and/or requires corrective action(s) based on results and observations. The QAM reports the findings directly to the President.

Interlaboratory Analyses

In addition to the internal QC Program, the laboratory will participate in collaborative testing comparison programs. As a minimum, the laboratory will actively participate in the US EPA Interlaboratory Quality Assurance Program and the NIOSH Proficiency Analytical Testing Program. The QAM reviews the submitted QC data and makes recommendations, suggests changes, and/or requires corrective action(s) based on results and observations. The QAM reports the findings directly to the President.

Table 4
SURROGATE SPIKE RECOVERY LIMITS

Fraction	Surrogate Compound	Water	Low/Medium Soil
VOA	Toluene-d8	88-110	81-117
VOA	4-Bromofluorobenzene	86-115	74-121
VOA	1,2-Dichloroethane-d4	76-114	70-121

MATRIX SPIKE RECOVERY LIMITS

Fraction	Matrix Spike Compound	Water	RPD W	Soil	RPD S
VOA	1,1-Dichloroethene	61-145	≤14	59-172	≤22
VOA	Trichlorethene	71-120	≤14	62-137	≤24
VOA	Chlorobenzene	75-130	≤13	60-133	≤21
VOA	Toluene	76-125	≤11	66-142	≤21

Table 4
SURROGATE SPIKE RECOVERY LIMITS

Fraction	Matrix Spike Compound	Water	Low/Medium Soil
BN	Nitrobenzene-d8	35-114	23-120
BN	2-Fluorobiphhenyl	43-116	30-115
BN	p-Terphenly-d14	33-141	18-137
Acid	Phenol-d5	10-94	24-113
Acid	2-Fluorophenol	21-100	25-121
Acid	2,4,6-Tribromophenol	10-123	19-122

MATRIX SPIKE RECOVERY LIMITS

Fraction	Matrix Spike Compound	Water	RPD W	Soil	RPD S
BN	1,2,4-Trichlorobenzene	39-98	$\leq$28	38-107	$\leq$23
BN	Acenaphthene	46-118	$\leq$31	31-137	$\leq$19
BN	2,4-Dinitrotoluene	24-96	$\leq$38	28-89	$\leq$47
BN	Pyrene	26-127	$\leq$31	35-142	$\leq$36
BN	N-Nitroso-Di-n-Propylamine	41-116	$\leq$38	41-125	$\leq$38
BN	1,4-Dichlorobenzene	36-97	$\leq$28	28-104	$\leq$27
Acid	Pentachlorophenol	9-103	$\leq$50	17-109	$\leq$47
Acid	Phenol	12-89	$\leq$42	26-90	$\leq$35
Acid	2-Chlorophenol	27-123	$\leq$40	25-102	$\leq$50
Acid	4-Chloro-3-Methylphenol	23-97	$\leq$42	26-103	$\leq$33
Acid	4-Nitrophenol	10-80	$\leq$50	11-114	$\leq$50

9.2 Determination of Detection and Quantitation Limits

An Instrument Detection Limit (IDL) is the smallest signal which is reliably detected above the background noise. Instrument Detection Limits are measured primarily for metals analyzed by atomic absorption spectrophotometry (AAS) and inductively coupled plasma (ICP). The IDL should be determined when new equipment is acquired, after major instrument repairs, and when required by specific contracts. For example, CLP contracts require quarterly determination of detection limits. The IDL is obtained by the following procedures:

o A standard is prepared at 3-5 times the level of the estimated detection limit.

o On 3 non-consecutive days, 7 consecutive measurements of the standard are obtained. The standard is treated as a sample, with rinses or blanks run between each replicate.

o The average of the daily standard deviation is multiplied by three to obtain the IDL.

A Method Detection Limit (MDL) is the minimum concentration that can be measured with 99% confidence that the analyte is greater than zero. MDL's are determined from the analysis of spiked blank waters and soils.

Method Detection Limits should be measured for all new tests. Both water and soil matrices should be tested. The procedure is defined in 40CFR Part 136, Appendix B (Federal Register, October 26, 1984). The procedure is outlined below:

o An estimate of the detection limit is made.

o A minimum of seven replicates of blank water or soil are spiked at a level 1-5 times the estimated detection limit. When appropriate, spike compounds are added.

o The spiked samples are processed through every step of the analytical method.

o The standard deviation for the seven samples is multiplied by 3.143 (students t-score at 99 confidence at n-1 degrees of freedom) to obtain the MDL.

The Practical Quantitation Limit (PQL) is the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operation conditions. EPA's SW846 provides PQL's for typical matrices-groundwater, soils, and wastes. Quantitation Limits are based on the knowledge of an instrument's response and day-to-day precision. The quantitation limit must exceed the laboratory MDL. The MDL study verifies the capability of the laboratory to detect the compounds at the quantitation limit. Usually, one of the calibration standards in each run is performed at the quantitation limit.

9.3 Quality Assessment

o Accuracy
o Representativenes
o Precision
o Comparability
o Completeness

All measurements generated for this program will be completed in a manner which insures that they are representative of matrix and conditions being measured. In order to achieve these objectives, high standards for data quality will be used to guarantee the reliability of the data being generated.

Accuracy: The agreement between the amount of an average measurement by a specific test method with the true (or accepted) value. American Environmental Network, Inc. uses the following checks for accuracy assessment: the laboratory control sample (LCS or blank spike), matrix spikes, NIST or EPA traceable primary standards, continuing calibration standards, and method blanks.

Accuracy is calculated by:

$$Percent\ Recovery = \frac{concentration\ measured}{known\ (true\ value)} X\ 100\%$$

NOTE: For matrix spikes, sample background concentration must be corrected for prior to determining % recovery.

<u>Precision</u>: The degree of mutual agreement among individual measurements, relative to a single test procedure, and under set testing conditions. American Environmental Network, Inc. uses the following checks for precision assessments: duplicate samples (digested and undigested), matrix spike duplicates, and blank spike duplicates

American Environmental Network, Inc. uses the following checks for precision assessment: duplicate samples (digested and undigested), matrix spike duplicates, or blank spike duplicates.

Precision is calculated by:

$$RPD = \frac{|sample - duplicate|}{(sample + duplicate)\ /\ 2} X\ 100\%$$

<u>Completeness</u>: The measurement of the amount of <u>valid</u> data obtained from a system compared to the amount of data anticipated under normal operating conditions. In order to achieve the desired level of completeness, it is necessary to have a sufficient quantity of sample provided to the lab for repeat analysis in

case the original analysis fails to meet the acceptance criteria. The desired level of completeness is 100%, however, a level of 90% should be considered acceptable.

$$Completeness = \frac{number\ of\ successful\ measurements}{number\ of\ requested\ analyses}\ X\ 100\%$$

<u>Representativeness</u>: The expression of the degree to which data accurately and precisely represents an environmental or process condition. Field sampling operations have a major impact on data representativeness. Factors including site selection, sample homogenization, sampling tools, equipment cleaning procedures, sample preservation, and others must be considered. Similarly, laboratory operations could impact upon representativeness if there were day-to-day fluctuations in methodology. Except when analysis for volatile compounds is required, samples are mixed well prior to taking subsamples. Liquid samples are shaken vigorously prior to aliquoting and soils are stirred well with a spatula.

<u>Comparability</u>: Expresses the confidence with which one data set can be compared with another. This quality indicator is enhanced by the following controls used at American Environmental Network, Inc.:

- o Standardized EPA approved methodology for sample preservation, holding times, analysis.
- o Consistent reporting units for each parameter in similar matrices.
- o EPA- or NIST-traceable standards when available.
- o Frequent analysis of outside source QC samples.
- o Participation in interlaboratory performance evaluation studies.

o Frequent performance and system audits.

Quality Control Charts

To date, control charts have been kept on a per client basis or per contract basis. It is American Environmental Network Inc.'s intent to incorporate all quality control data into control charts as soon as sufficient data points are generated.

Control charts are prepared in order to plot values for lab control samples, surrogate spike, and matrix spike recoveries. Results from each matrix must be charted separately. Control limits are statistically calculated from a minimum of 5 initial data points and every 20 data points thereafter.

Control limits for accuracy are defined as follows:

$$\textit{warning limits} = \textit{mean}\ (\bar{x})\ \pm 1.96(\textit{standard deviation})\ (1.96\sigma)$$

$$\textit{control limits} = \textit{mean}\ (\bar{x})\ \pm 3.06(\textit{standard deviation})\ (3.06\sigma)$$

Results which exceed the warning limits but not the control limits alert the analyst to potential problems. Sample results are accepted, but the procedures and standards are checked. If the lab control sample exceeds the control limit, the analyst, supervisor, and QA Manager investigate potential causes of the problem. After the cause is determined and corrected, samples from the original set are rerun along with duplicate spiked samples and a lab control sample. Control limits are recalculated periodically. The frequency of this is dependent on the number of data points accumulated.

QC sample results are to be plotted on a daily basis so that findings may be promptly evaluated. The charts are used to detect trends before an out-of-control situation develops. Examples of situations to monitor closely include:

- o Values outside of control limits.
- o Four (4) or more consecutive points on one side of the midpoint range of the chart.
- o Gradually increasing or decreasing response.
- o Cyclical patterns.
- o Broadened range of response.

In analyses where multi-analyte results are determined the following control situations arise:

- o If the points for at least two-thirds of the analytes are not classified as out-of-control, based on the conditions described above, the Method is in control and environmental sample data may be reported. The conditions which may have caused fewer than two-thirds of the analytes to fail the control criteria should be documented. The data points indicating possible error will be annotated with a reference to the investigation and to the fact that the method met control criteria.

- o If data points for fewer than two-thirds of the analytes are classified as in control (more than one-third meet one of the out-of-control conditions), the Method is considered to be out-of-control and all work on that method (including sample preparation) must cease immediately. No data for environmental samples in that lot may be reported. Efforts must be initiated to determine the cause of the problem. If the problem is instrumental or specific only to preparation of that lot, samples prepared after the out-of-control situation occurred may be processed after the instrumental system is repaired and recalibrated, providing holding times are not exceeded. If no specific cause can be assigned, the instrument should be recalibrated and all samples prepared subsequent to the last in-control lot should be reprepared.

In any case, the out-of-control lot must be reanalyzed. The out-of-control situation and corrective actions taken must be fully documented. No data points from an out-of-control lot will be used to update control charts. Each point should be annotated with a reference to the investigation and to the disposition of samples and results.

TCLP HOLDING TIMES

	FROM SAMPLING DATE TO TCLP EXTRACT	FROM TCLP EXTRACT TO PREP EXTRACT	FROM PREP TO ANALYSIS
VOLATILES	14	NA	14
SEMI-VOLATILES	14	7	40
MERCURY	28	NA	28
METALS (except Mercury)	180	NA	180

HOLDING TIMES FOR ORGANICS

TCL - FROM DATE OF RECEIPT

	WATER	SOIL
VOA	10 days	10 days
BNA	5 days to extract	10 days to extract
Pest/PCB	5 days to extract	10 days to extract
Herb	5 days to extract	10 days to extract

PP - FROM DATE OF SAMPLING

	WATER	SOIL
VOA	14 days	14 days
BNA	7 days to extract	14 days to extract
Pest/PCB	7 days to extract	14 days to extract
Herb	7 days to extract	14 days to extract

Appendix B
ESTIMATED QUANTITATION LIMITS

METHOD SW8240

TARGET DETECTION LIMITS[a]

Volatiles	Target Detection Limits Ground water µg/L	Low Soil/Sediment µg/Kg
Acetone	100	100
Acetonitrile	100	100
Allyl chloride	5	5
Benzene	5	5
Benzyl chloride	100	100
Bromodichloromethane	5	5
Bromoform	5	5
Bromomethane	10	10
2-Butanone	100	100
Carbon disulfide	100	100
Carbon tetrachloride	5	5
Chlorobenzene	5	5
Chlorodibromomethane	5	5
Chloroethane	10	10
2-Chloroethyl vinyl ether	10	10
Chloroform	5	5
Chloromethane	10	10
Chloroprene	5	5
1,2-Dibromo-3-chloropropane	100	100
1,2-Dibromoethane	5	5
Dibromomethane	5	5
1,4-Dichloro-2-butene	100	100
Dichlorodifluoromethane	5	5
1,1-Dichloroethene	5	5
1,2-Dichloroethane	5	5
1,1-Dichloroethane	5	5
trans-1,2-Dichloropropene	5	5
1,2-Dichloropropane	5	5
cis-1,3-Dichloropropene	5	5
trans-1,3-Dichloropropene	5	5
Ethylbenzene	5	5
Ethyl methacrylate	5	5
2-Hexanone	50	50
Isobutyl alcohol	100	100
Methacrylonitrile	100	100
Methylene chloride	5	5
Methyl iodine	5	5
Methyl methacrylate	5	5
4-Methyl-2-pentanone	50	50

Method SW8240
Target Detection Limits[a] (continued)

olatiles	Ground water µg/L	Low Soil/Sediment µg/Kg
Pentachloroethane	10	10
Propionitrile	100	100
Styrene	5	5
1,1,1,2-Tetrachloroethane	5	5
1,1,2,2-Tetrachloroethane	5	5
Tetrachloroethene	5	5
Toluene	5	5
1,1,1-Trichloroethane	5	5
1,1,2-Trichloroethane	5	5
Trichloroethene	5	5
1,2,3-Trichloropropane	5	5
Vinyl acetate	50	50
Vinyl chloride	10	10
Xylene (Total)	5	5

[a] Sample TDLs are highly matrix dependent. The TDLs listed herein are provided for guidance and may not always be achievable. See the following information for further guidance on matrix dependent TDLs.

TDLs listed for low soil/sediment are based on wet weight. Normally data is reported on a dry weight basis; therefore, TDLs will be higher, based on the percent dry weight of each sample.

ESTIMATED QUANTITATION LIMITS[b]

Other Matrices	Factor
Water miscible liquid waste	50
High-concentration soil and sludge	125
Non-water miscible waste	500

EQL =[TDL for low soil sediment] X [Factor]. For non-aqueous samples, the factor is on a wet weight basis.

Method SW8080
Pesticides and PCB's
Target Detection Limits[a]

Analyte	Target Detection limit ($\mu g/L$)
Aldrin	0.004
α-BHC	0.003
β-BHC	0.006
δ-BHC	0.009
γ -BHC (Lindane)	0.004
Chlordane (technical)	0.014
4,4'-DDD	0.011
4,4'-DDE	0.004
4,4'-DDT	0.012
Dieldrin	0.002
Endosulfan I	0.014
Endosulfan II	0.004
Endosulfan sulfate	0.066
Endrin	0.006
Endrin aldehyde	0.023
Heptachlor	0.003
Heptachlor epoxide	0.083
Methoxychlor	0.176
Toxaphene	0.24
PCB-1016	nd
PCB-1221	nd
PCB-1232	nd
PCB-1242	0.065
PCB-1248	nd
PCB-1254	nd
PCB-1260	nd

nd=not determined

DETERMINATION OF ESTIMATED QUANTITATION LIMITS (TDLs) FOR VARIOUS MATRICES[b]

Matrix	Factor
Ground water	10
Low-concentration soil by sonication with GPC cleanup	670
High-concentration soil and sludges by sonication	10,000
Non-water miscible waste	100,000

ample TDLs are highly matrix-dependent. The TDLs listed herein are provided for guidence and may not always be achievable.
EQL = [Method detection limit] X [Factor]. For non-aqueous samples, the factor is on a wet-weight basis.

Method SW8010 Halogentaed Volatile Organics
Target Detection Limits

Compound	Target detection limit[a] µg/L)
Benzyl Chlorideb	-
Bromobenzene	-
Bromodichloromethane	0.1
Bromoform	0.2
Bromomethane	0.3
Carbon tetrachloride	0.12
Chlorobenzene	0.25
Chloroethane	0.52
2-Chloroethyl vinyl ether	0.13
Chlorofor	0.05
Chloromethane	0.08
Dibromochloromethane	0.09
Dibromomethane	-
1,2-Dichlorobenzene	0.15
1,3-Dichlorobenzene	0.32
1,4-Dichlorobenzene	0.24
Dichlorodifluoromethane[c]	-
1,1-Dichloroethane	0.07
1,2-Dichloroethane	0.03
1,1-Dichloroethene	0.13
trans-1,2-Dichloroethene	0.10
Dichloromethane	(b)
1,2-Dichloropropane	0.04
cis-1,3-Dichloropropene	-
trans-1,3-Dichloropropane	0.34
1,1,2,2-Tetrachloroethane	0.03
1,1,1,2-Tetrachloroethane	-
Tetrachloroethene	0.03
1,1,1-Trichloroethane	0.03
1,1,2-Trichloroethane	0.02
Trichloroethene	0.12
Trichlorofluoromethane	-
1,2,3-Trichloropropane	-
Vinyl Chloride	0.18

DETERMINATION OF ESTIMATED QUANTITATION LIMITS (EQL) FOR VARIOUS MATRICES[b]

Matrix	Factor
Ground water	10
Low-concentration soil	10
Water miscible liquid waste	500
High-concentration soil and sludges	1250
Non-water miscible waste	1250

[a] Sample TDLs are highly matrix-dependent. The TDLs listed herein are provided for guidence and may not always be achievable.
[b] EQL = [Target detection limit] X [Factor]. For non-aqueous samples, the factor is on a wet-weight basis.

Metals and Inorganics
Target Detection Limits

Parameter	Method W=water S=soil	Detection water $\mu g/L$	Limit soil $\mu g/Kg$
Common Anions:			
Cl			
SO_4			
Cyanide	SW9010	10	2
Phenols	SW9067		
Mercury	W=SW7470 S=SW7471	.2	
Furnace Metals			
Ag		10	2
As		10	2
Cr		10	2
Pb		5	1
Sb		60	12
Se		5	1
Tl		10	2
ICP Metals			
Al		200	40
Ba		200	40
Be		5	1
Ca		5000	1000
Cd		5	1
Co		50	10
Cu		25	5
Fe		100	20
K		5000	1000
Mg		5000	1000
Mn		15	3
Na		5000	1000
Ni		40	8
V		50	10
Zn		20	4
TCLP As		500	
TCLP Ba		100	
TCLP Cd		40	
TCLP Cr		100	
TCLP Pb		100	
TCLP Se		500	
TCLP Ag		1.0	500
TCLP Hg			

Method SW8020 Aromatic Volatile Organics
Target Detection Limits

Compound	Target detection limit[a] μg/L)
Benzene	0.2
Chlorobenzene	0.2
1,4-Dichlorobenzene	0.3
1,3-Dichlorobenzene	0.4
1,2-Dichlorobenzene	0.4
Ethyl Benzene	0.2
Toluene	0.2
Xylenes	

DETERMINATION OF ESTIMATED QUANTITATION (EQL) FOR VARIOUS MATRICES[b]

Matrix	Factor
Ground water	10
Low-concentration soil	10
Water miscible liquid waste	500
High-concentration soil and sludges	1250
Non-water miscible waste	1250

[a] Sample TDLs are highly matrix-dependent. The TDLs listed herein are provided for guidence and may not always be achievable.

[b] EQL = [Target detection limit] X [Factor]. For non-aqueous samples, the factor is on a wet-weight basis.

APPENDIX C
SOP INDEX

HEAI LABORATORY
STANDARD OPERATING PROCEDURES
INDEX

SOP NO.	TITLE	REVISION	DATE
1001	POLICY ON LABORATORY OPERATING PROCEDURE	2	12/26/91
1002	PROCEDURES FOR CHANGES	1	1/3/92
1003	REQUISITION AND PURCHASE OF MATERIALS AND SERVICES	1	2/10/92
1101	HEAI LABORATORY ORGANIZATION [in revision]		
1202	NOTICE OF NON-COMPLIANCE AND CORRECTIVE ACTION	2	2/2/92
1203	DISCUSSION OF QC LEVELS	0	?
1210	THERMOMETER CALIBRATION [in revision]		
1250	SOLVENT PURITY [in preparation]		
1251	ALUMINA CHECK [in preparation]		
1301	PRESERVATION AND HOLDING TIMES FOR INORGANIC AND ORGANIC COMPOUNDS: WATER	0	5/17/84
1301.1	PRESERVATION AND HOLDING TIMES FOR INORGANIC AND ORGANIC COMPOUNDS: DRINKING WATER SAMPLES	1	4/24/92
1302	PRESERVATION AND HOLDING TIMES FOR INORGANIC AND ORGANIC COMPOUNDS: SOIL	0	3/28/85

DEPARTMENT OF THE ARMY
MISSOURI RIVER DIVISION, CORPS OF ENGINEERS
P.O. BOX 103, DOWNTOWN STATION
OMAHA, NEBRASKA 68101-0103

REPLY TO
ATTENTION OF

August 19, 1992

Environmental, Hazardous, Toxic
and Radioactive Waste Division

American Environmental Network, Incorporated
9151 Rumsey Road, Suite 150
Columbia, Maryland 21045

Gentlemen:

This correspondence addresses the recent evaluation of American Environmental Network, Inc., Laboratory (formerly Hittman Ebasco), in Columbia, Maryland by the U.S. Army Corps of Engineers (USACE) for hazardous and toxic waste analysis.

The laboratory has now successfully analyzed audit samples as listed below:

METHOD	PARAMETERS	MATRIX
524.2	Volatile Organics	water
8240	Volatile Organics	water
8010	Halogenated Volatile Organics	water
8020	Aromatic Volatile Organics	water
8270	Semivolatile Organics	water
8270	Semivolatile Organics	sediment
8080	Organochlorine Pesticides	water
8080	Polychlorinated Biphenyls	water
8080	Polychlorinated Biphenyls	sediment
8150	Chlorinated Herbicides	water
SW-846	CLP TAL Metals1	water
SW-846	CLP TAL Metals1	sediment
9010/9012	Total and Amenable Cyanide	water
418.1	TRPH	water
418.1	TRPH	sediment
6010	Cation	water
8330	Explosives	water
8330	Explosives	sediment
TPH	Total Petroleum Hydrocarbons	water
TPH	Total Petroleum Hydrocarbons	sediment

Remarks: 1. CLP TAL Metals: 23 EPA Contract Laboratory Program, Target Analyte List (TAL) metals (aluminum, anitmony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium and zinc.)

Based on the successful analysis of the audit samples indicated in the table in Paragraph 2 and the results of the laboratory inspection, your laboratory is validated for multimedia sample analysis by the above methods. The period of validation is eighteen (18) months for all parameters, including Explosives (8330) and TPH (8015M). The validation expiration date is February 26, 1993. During the 18-month period, USACE reserves the right to conduct additional laboratory auditing or to suspend validation status for any or all of the listed parameters if deemed necessary. It should be noted that your laboratory may not subcontract USACE analytical work to any other laboratory location without the approval of this office. This lab validation does not guarantee the award of any contracts from a USACE Contracting Officer. If you have any questions or comments, please contact Paulette Lewis at (402) 221-7494.

Sincerely,

Marcia C. Davies

Marcia C. Davies
Chief, Environmental, HTRW Division
HTRW and Engineering Directorate

Enclosure

TABLE 1
STATE CERTIFICATIONS

State	Certification Number	Organization Authorizing Certification	Parameters Certified
Maryland	142	Maryland DHMH	Drinking Water Metals Herbicides/Pesticides Wet Chemistry (Limited)
Virginia	00177	Virginia DGS	Drinking Water Inorganics Organics VOCs (Conditional)
New Jersey	60423	New Jersey DEP	Drinking Water Wet Chemistry (Limited) Metals Organics Water Pollution Wet Chemistry (Limited) Metals Organics
California	196	California DHS	Hazardous Waste Organics (Partial) Inorganics Physical Properties

TABLE 1 (Cont'd)
STATE CERTIFICATIONS

	Certification Number	Organization Authorizing Certification	Parameters Certified
York	10605	New York SDH	Environmental Analysis Air and Emissions Including:
			<u>Drinking Water</u>
			Metals
			Non-Metals
			Microextractables
			Trihalomethanes
			<u>Non-Potable Water</u>
			Demand Waste Water Metals I
			Benzidines
			Nitroaromatics and Isophorones
			Polychlorinated Biphenyls
			Residue
			Waste Water II
			Chlorinated Hydrocarbons
			Nitrosoamines
			Polynuclear Aromatics
			Mineral
			Acrolein and Acrylonitrile
			Haloethers
			Phthalate Esters
			Priority Pollutant Phenols
			Purgeable Aromatics
			Chlorophenoxy Acid Pesticides
			Purgeable Halocarbons
			Waste Water Misc. Analytes
			Chlorinated Hydrocarbon Pesticides

The native soil, in the footprint of the explosion berm where the treated soil will be placed, will be disced or scarified so as to loosen the entire surface to a depth of four inches prior to placement of the first lift.

It is the responsibility of Jowett, Inc. to provide the clean fill used to backfill the excavation areas and as the soil cover. The proctor test results are attached.

The treatability study was performed on a weight basis. the results of the treatability study will be discussed in a separate Appendix.

It is anticipated that there will be two deliveries of additive per day and approximately six to eight loads of fill delivered each day, therefor there is not a need for a traffic plan for trucks.

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SOP NO.	TITLE	REVISION	DATE
1303	SAMPLE STORAGE AND MAINTENANCE	1	5/16/84
1304	SAMPLE RECEIPT AND LOGGING	1	1/9/92
1304.1	SAMPLE RECEIPT AND LOGGING OF DRINKING WATER SAMPLES	0	4/24/92
1304.2	RESIDUAL CHLORINE TEST FOR DRINKING WATER SAMPLES	0	4/24/92
1305	SAMPLE STATUS AND SCHEDULE FOR ANALYSIS	0	8/8/84
1306	LABORATORY SAMPLE CONTAINERS AND HANDLING PROCEDURES	0	10/1/85
1307	BOTTLE PREPARATION AND TRACKING OF BOTTLE LOTS: HAZWRAP	0	8/22/89
1402	CHAIN-OF-CUSTODY	0	5/16/84
1403	LOGBOOK OF ANALYTICAL STANDARDS AND REFERENCE MATERIALS	0	5/21/84
1405	DOCUMENT MAINTENANCE	[in revision-suspended]	
1406	PREPARATION AND LOGGING OF ANALYTICAL STANDARDS FOR GC AND GC/MS	0	2/6/86
1407	TRACEABILITY OF INORGANIC STANDARDS	0	3/20/92

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SOP NO.	TITLE	REVISION	DATE
1501	PROCEDURES FOR THE DETERMINATION OF THE METHOD DETECTION LIMIT	3	2/12/92
1502	BLIND SPIKE AND DUPLICATE	[in revision]	
1503	DATA REPORTING	0	5/7/84
1505	DATA PROCESSING	0	5/7/84
1507	INSTRUMENT DETECTION LIMITS -EPA CLP- INORGANICS	1	2/7/92
1601	LABORATORY SAFETY	1	10/1/85
1602	REFRIGERATION EQUIPMENT	1	2/11/92
1603	GLASSWARE	1	10/1/85
1604	REAGENTS, SOLVENTS, AND GASES	2	5/16/84
1606	GUIDELINES FOR DISPOSAL OF ACID WASTE, SOLVENT WASTE, AND PYRIDINE WASTE	2	1/2/92
1607	HEALTH AND SAFETY PROCEDURES FOR HAZARDOUS SAMPLE PREPARATION AND ANALYSIS	1	8/1/85
1608	GLASSWARE WASHING	1	2/5/88

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SOP NO.	TITLE	REVISION	DATE
1609	LAB SECURITY	1	2/3/88
1610	GUIDELINES FOR SAMPLE DISPOSAL	1	2/6/92
2002	INSTRUMENT AND EQUIPMENT LOGBOOKS	[in revision]	
2006	MANUAL MICROPIPETTING SYSTEM USAGE	0	11/2/87
2201	GAS CHROMATOGRAPH: HEWLITT PACKARD 5890A	0	4/28-85
2301	ULTRAVIOLET-VISIBLE SPECTROPHOTOMETER		
2303	ATOMIC ABSORPTION PERKIN-ELMER 5000	1	4/28/85
2401	BALANCES ANALYTICAL AND TOPLOADER	1	5/10/87
2502	DISSOLVED OXYGEN METER	0	8/29/87
2901	INTEGRATOR-HEWLETT PACKARD 33904	4	8/1/84
2903	HYDRO-SERVICE DE-I SYSTEM	1	5/23/84
3002	POLYCHLORINATED BIPHENYLS IN WATER AND SOIL	1	5/7/84
3003	ACID AND BASE-NEUTRAL ORGANIC ANALYSIS: SOIL AND WATER	1	8/1/84

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SOP NO.	TITLE	REVISION	DATE
3004	PURGEABLES	1	5/23/84
3005	EXTRACTION PROCEDURE FOR TOXICITY	0	5/2/84
3007	TOTAL CYANIDE: SOIL AND WATER	1	5/21/84
3008	POLYNUCLEAR AROMATIC HYDROCARBONS	1	2/2/85
1009	PURGEABLE AROMATICS	1	2/2/85
3010	CYANIDE, AMENABLE TO CHLORINATION	0	6/12/84
3011	TRACEABILITY OF ORGANIC STNADARDS ION SELECTIVE ELECTRODE	0	11/9/87
3012	NITRATE-NITRATE IN WATER AND SLUDGE	1	5/21/85
3013	SILICA IN SOLID SAMPLES	1	4/42/85
3014	SULFATE IN WATER AND SLUDGE: TURBIDIMETRIC	1	7/6/84
3015	GREASE AND OIL IN WATER: FREON EXTRACTION	1	10/1/89
3015.1	OIL AND GREASE IN WATERS, SOILS, SLUDGES	[in preparation]	
3016	TOTAL KJELDAHL NITROGEN IN WATER AND SLUDGE	0	6/12/84

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SOP NO.	TITLE	REVISION	DATE
3018	CYANIDE IN WASTE OR LEACHATE	1	7/3/84
3019	MOISTURE: SOIL	1	7/6/84
3020	AMMONIA IN WATER AND SLUDGE: MANUAL DISTILLATION	1	7/3/84
3021	VOLATILE ACIDS: SLUDGE	1	7/3/84
3023	PHOSPHATE: SOIL AND SLUDGE1	1	7/3/84
3024	PERCENT (%) SOLIDS	1	11/3/87
3025	WATER DIGESTION: FURNACE AA AND ICP - WATER	1	10/5/84
3025.1	WATER DIGESTION: FURNACE AA AND ICP FOR DRINKING WATER SAMPLES	1	4/23/92
3026	ACID DIGESTION OF SEDIMENTS, SLUDGES AND SOILS	0	5/5/84
3027	METHOD OF STANDARD ADDITION	1	4/23/92
3028	SOXHLET EXTRACTION METHOD	0	12/12/84
3029	CALIBRATION CURVE INTERPRETATION	0	10/10/87
3030	ORGANIC SAMPLE PREPARATION	0	4/28/89

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SOP NO.	TITLE	REVISION	DATE
3033	STANDARD TEST METHODS FOR FLASH POINT BY PENSKY - MARTENS CLOSED TESTER	1	5/21/85
3034	NITROGEN, AMMONIA: COLORIMETRIC	0	2/8/85
3035	SILICA, DISSOLVED: COLORIMETRIC	0	2/85
3036	ICP INSTRUMENT, PERKIN - ELMER 6500	0	9/1/87
3037	ACIDITY, ALKALINITY, AND PH MEASUREMENT	0	2/7/85
3038	TOTAL PHOSPHORUS: COLORIMETRIC	0	2/8/85
3040	ANION DETERMINATIONS (CHLORINE, NITRATE, AND SULFATE) USING ION CHROMATOGRAPHY	0	2/85
3040.1	ION CHROMATOGRAPHY: DRINKING WATER SAMPLES	0	4/23/92
3041	FLUORIDE: ION SELECTIVE ELECTRODE	1	2/85
3043	FREE IRON OXIDES IN SOIL	0	3/28/85
3047	DETERMINATION OF ORGANOCHLORINE PESTICIDES AND POLYCHLORINATED BIPHENYLS (PCBS) BY GC	1	5/16/85
3048	PETROLEUM HYDROCARBONS ANALYSIS: TISSUE, WATER, SOIL AND SEDIMENT	1	5/24/85

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SOP NO.	TITLE	REVISION	DATE
3050	PH IN SOIL	1	2/13/87
3053	CATION EXCHANGE CAPACITY IN SOILS	0	3/28/85
3058	SULFIDES IN SOIL AND SOLID WASTES (EPA 9030)	1	5/21/85
3059	NITRATE: BRUCINE METHOD (352.1)	1	5/31/85
3065	DETERMINATION OF NITROAROMATICS BY GAS CHROMATOGRAPHY	0	12/5/85
3066	TOTAL PETROLEUM HYDROCARBONS: IR		
3067	TOTAL PETROLEUM HYDROCARBONS: GAS CHROMATOGRAPHY		
3120.1	SPECIFIC CONDUCTANCE	1	7/14/86
3150.1	PH IN WATER	0	10/1/89
3160.1	TOTAL DISSOLVED SOLIDS	0	10/1/89
3160.2	TOTAL SUSPENDED SOLIDS	0	10/1/89
3200.0	METALS ANALYSIS: GENERAL ATOMIC ABSORPTION TECHNIQUES	0	10/4/85
3200.1	DRINKING WATER METALS, GFAA QUALITY ASSURANCE CRITERIA AND PROCEDURES	1	5/11/92

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SOP NO.	TITLE	REVISION	DATE
3200.2	MERCURY IN DRINKING WATER, QUALITY ASSURANCE CRITERIA AND PROCEDURES	1	5/12/92
3200.7	INDUCTIVELY COUPLED PLASMA - ATOMIC EMISSION SPECTROMETRIC METHOD FOR TRACE ELEMENT ANALYSIS OF WATER AND WASTES	0	9/11/85
3200.8	DRINKING WATER METALS, ICP QUALITY ASSURANCE CRITERIA AND PRECEDURES	1	5/11/92
3335.2	TOTAL CYANIDE: WATER (335.2)	1	10/4/85
3335.5	TOTOAL CYANIDE: SOIL AND SEDIMENTS	1	10/4/85
3351.0	SEPARATORY FUNNEL AND LIQUID-LIQUID EXTRACTION: SW846 3510	0	8/7/86
3355.0	SONICATION EXTRACTION: SW846 3550	0	7/22/86
3420.1	TOTAL PHENOL: 4-AAP	1	5/9/84
3503.0	PURGE AND TRAP METHOD	0	11/19/86
3508.0	ORGANOCHLORINE PESTICIDES - EPA METHOD 508	[in preparation]	
3509A	ORGANOCHLORINE PESTICIDES - STANDARD METHODS PROCEDURE 3509A	0	7/22/86

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SOP NO.	TITLE	REVISION	DATE
3509B	CHLORINATED PHENOXY ACID HERBICIDES: STANDARD METHODS PROCEDURE	0	7/25/85
3515.0	HERBICIDES - EPA METHOD 515	[in preparation]	
3608	ORGANOCHLORINE PESTICIDES AND PCBS - METHOD 608	0	7/21/86
3624	PURGEABLE - EPA METHOD 624	0	7/21/86
3625	BASE/NEUTRALS AND ACIDS EPA METHOD 625	0	7/24/86
3700.0	PHENOLS BY HPLC	[in revision]	
3801.0	HALOGENATED VOLATILE ORGANICS	0	11/17/86
3808.0	ORGANOCHLORINE PESTICIDES AND PCBS - EPA METHOD 8080	0	7/23/86
3814.0	ORGANOPHOSPHORUS PESTICIDES - EPA METHOD 8140 (SOLIDS)	0	7/22/86
3815.0	CHLORINATED HERBICIDES - EPA METHOD 8150	0	7/23/86
3824.0	GC/MS METHOD FOR VOLATILE ORGANICS - EPA METHOD 8240	0	7/23/86

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SOP NO.	TITLE	REVISION	DATE
3827.0	GC/MS METHOD FOR SEMIVOLATILE ORGANICS: CAPILLARY COLUMN TECHNIQUE - EPA METHOD 8270 (SOLIDS)	0	7/22/86
4102	SEMIQUANTITATIVE DETERMINATION FOR SELECTED SEMIVOLATILES IN SOIL	1	10/2/85
4104	DETERMINATION OF SPECIFIC ORGANOCHLORIDE PESTICIDES BY GAS CHROMATOGRAPHY	1	6/20/86
4105	METHOD FOR DETERMINATION OF PURGEABLE (VOLATILE) HALOCARBONS IN WATER, SOIL AND AIR	1	6/19/86
4106	METHOD FOR DETERMINATION OF PURGEABLE (VOLATILE) AROMATICS IN WATER, SOIL AND AIR	1	6/20/86
4107	DETERMINATION OF SPECIFIC ORGANO-SULFUR PESTICIDES BY GAS CHROMATOGRAPHY	0	6/20/86
4108	DETERMINATION OF SPECIFIC NITROGEN/PHOSPHORUS	0	6/20/86
4109	SOIL GAS VOC'S IN CHARCOAL MEDIUM		
4152	INORGANIC REPORTING PROCEDURE - EPA CLP	1	4/1/90
4153	ORGANIC REPORTING PROCEDURE - EPA CLP	0	8/29/89

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SOP NO.	TITLE	REVISION	DATE
154	QUALITY CONTROL FOR GC/MS METHODS	0	8/25/89
155	ICP SCREENING AT BROS		
156	HPLC PHENOLS ORBO-17	1	6/28/90
157	PCB PERSONNEL MONITOR		
158	PCB'S IN PUF's	0	1/8/90
159	PCB PERSONNEL MONITOR-NIOSH		
160	PCB'S		
161	SOW 2/88 SCREENING FOR PCS's		
162	TOTAL SUSPENDED PARTICLES: GRAVIMETRIC ANALYSIS OF FILTERS FOR BROS PROJECT	0	10/3/90
163	ICP METALS ANALYSIS OF PM10 FILTERS FOR BROS PROJECT		
164	GFAA METALS ANALYSIS OF PM10 FILTERS FOR BROS PROJECT	1	5/16/85
165	VOC's-CHARCOAL TUBES		
167	VOC's IN AMBIENT AIR	0	6/91

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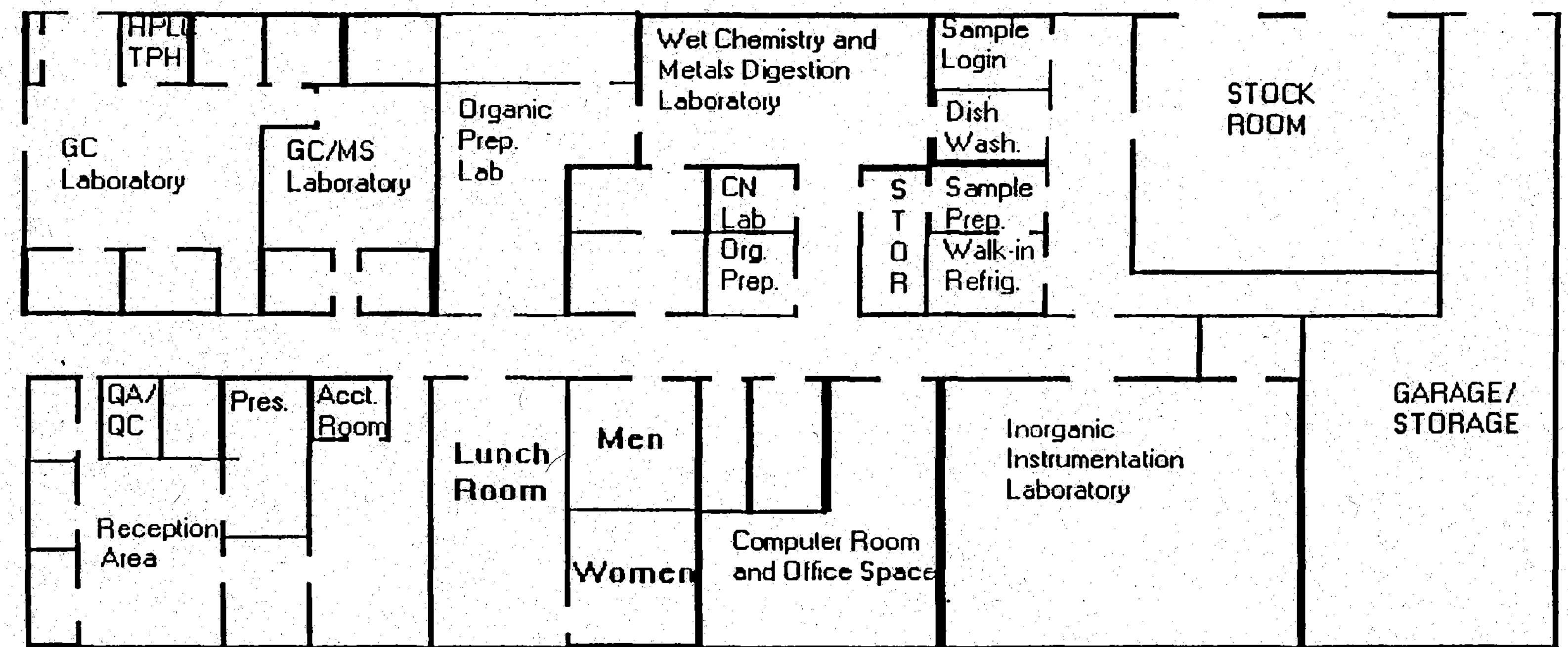
SOP NO.	TITLE	REVISION	DATE
4520	ICP METALS: EPA SOW 1990	1	3/20/92
4525	FURNACE METHAL: EPA SOW 1990	0	2/18/92
453O	MERCURY IN WATER: EPA SOW 1990	1	3/20/92
4531	MERCURY IN SEDIMENT AND SOIL: EPA SOW 1990	1	3/20/92
4540	CYANIDE IN WATER AND SOIL: EPA SOW 1990	1	3/24/92

APPENDIX D
FACILITIES AND FLOOR PLAN

FACILITY DESCRIPTION

The laboratory facility is located in Columbia, Maryland at 9151 Rumsey Road. It comprises about 18,000 square feet of a 48,000 square foot building, The lab is divided into twelve individual operation laboratories and eighteen offices. In addition, there are two large areas designated for computer and general office space, walk-in refrigerator and ample supply and garage storage space. Attached is a floor plan of the American Environmental Network, Inc. facility.



FLOOR PLAN

AMERICAN ENVIRONMENTAL NETWORK, INC.

Appendix D: Treatability Study Results

OBG Laboratories, Inc.

TABLE 1 NOS SEDIMENTS PLUS CEMENTITIOUS BINDER

Sample ID	Mix Code	Delay of Compaction (days)	Additional Cure (days)	Moisture, % as produced	Dry Density, pcf (condition)	UCS, psi (condition)
SP-1	AHG	0	7	20.5	106 (V.Moist)	207 (Good)
	AHG	3	7	19.5	89 (Dry)	52 (Dry)
	AHG	5	7	18.8	90 (Dry)	40 (Dry)
SP-6	AHG	0	7	19.8	108 (V.Moist)	291 (Good)
	AHG	3	7	18.0	95 (Sl Dry)	96 (Dry)
	AHG	5	7	16.9	91 (Dry)	41 (Dry)
	ATG	5	7	22.0	100 (Moist)	119 (Good)
SP-8	AHG	0	7	20.1	109 (Moist)	342 (Good)
	AHG	3	7	18.9	92 (Dry)	39 (Poor)*
	AHG	5	7	17.3	91 (Dry)	39 (Poor)*

AHG = 20% Portland by wet wgt of waste
ATG = 10% Portland by wet wgt of waste (preliminary design mix)

* = Specimen was friable and over-dry.

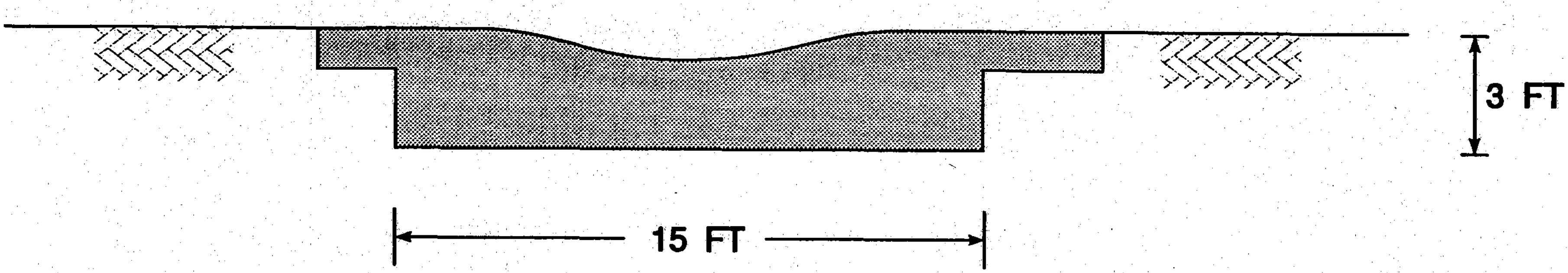
TABLE 2 NOS SEDIMENTS PLUS POZZOLANIC BINDER

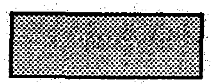
Sample ID	Mix Code	Delay of Compaction (days)	Additional Cure (days)	Moisture, % as produced	Dry Density, pcf (condition)	UCS, psi (condition)
SP-1	BEG	0	7	18.6	109 (Moist)	323 (Good)
	BEG	3	7	19.0	97 (Sl Dry)	96 (Dry)
	BEG	5	7	19.0	92 (Dry)	96 (Dry)
SP-6	BEG	0	7	17.5	113 (Moist)	215 (Good)
	BEG	3	7	16.9	106 (Sl Moist)	159 (Dry)
	BEG	5	7	16.8	99 (Sl Dry)	120 (Dry)
SP-8	BEG	0	7	21.4	106 (Moist)	374 (Good)
	BEG	3	7	16.8	95 (Sl Dry)	143 (Dry)
	BEG	5	7	16.0	94 (Dry)	<10 (Poor)*
	CHG	3	7	20.7	103 (Moist)	88 (Good)

BEG = 30% K-10 by total wet wgt of waste
CHG = 20% ICC CKD by wet wgt of waste
* = Too friable to test; cylinder crumbled before load applied.

APPENDIX E: EXCAVATED SOIL VOLUME ESTIMATES

EXAMPLE TRANSECT CROSS-SECTION (TRANSECT 1)



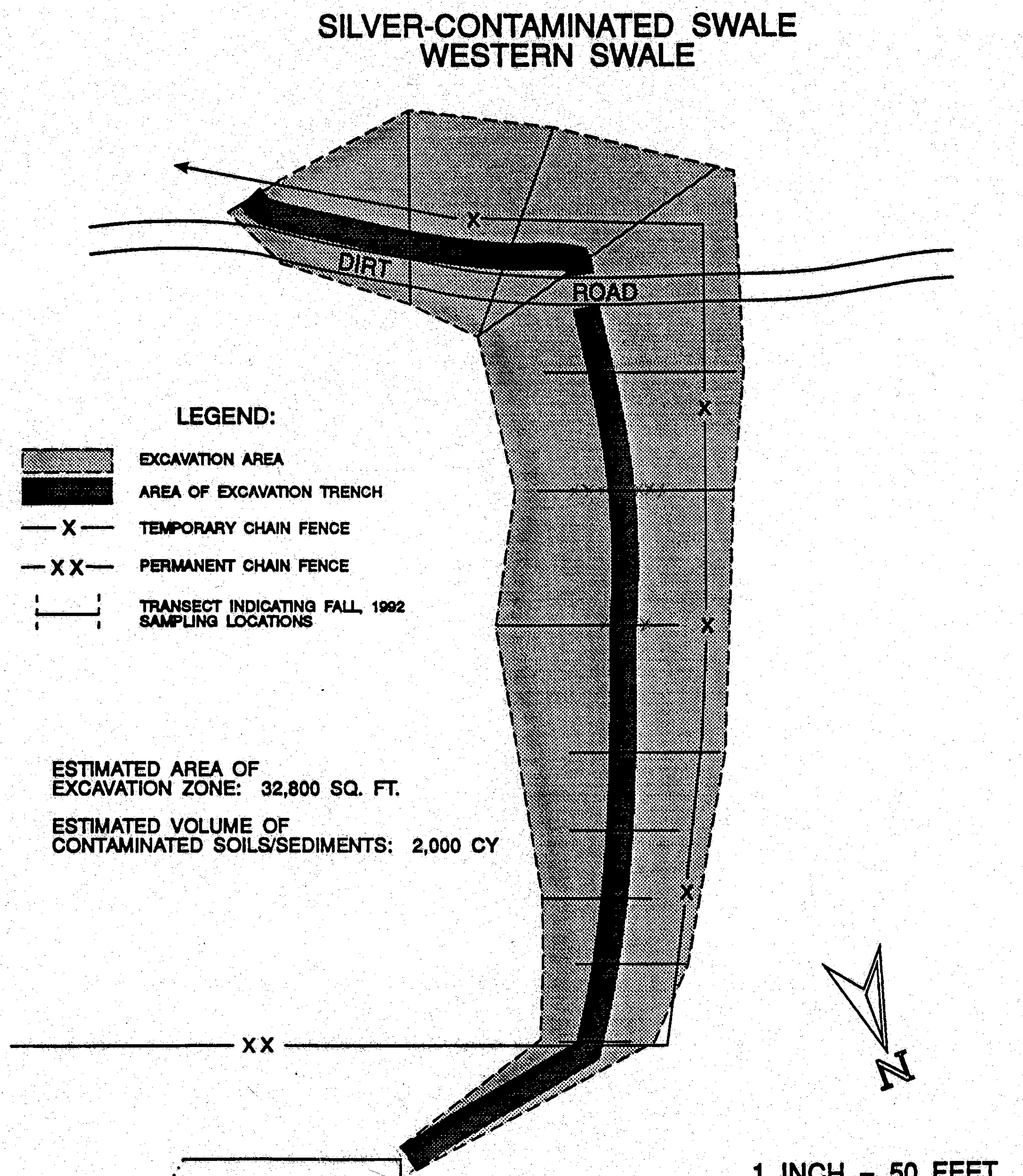

CONTAMINATED SOILS (EXCAVATION ZONE)


CLEAN SURROUNDING SOILS

APPROXIMATE CROSS-SECTIONAL AREA
OF EXCAVATION AT THIS TRANSECT:
44 SQ. FT.

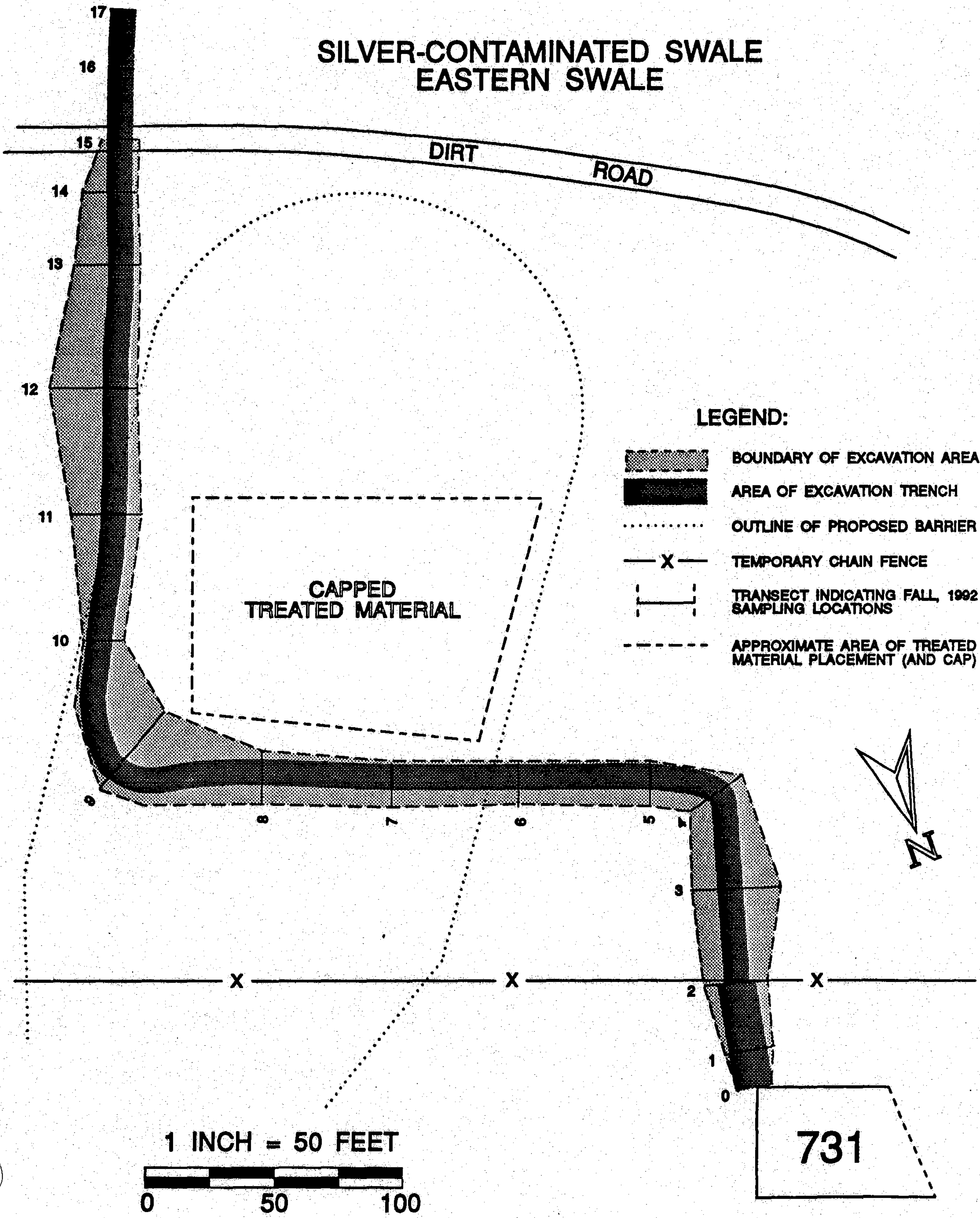
**Ag-Contaminated Soil:
Excavation Dimensions and Volume Estimates**

Transect No.	Area of Transect Cross-section (ft^2)	Distance from Previous Transect (ft)	Approximate Excavated Soil Volume between Transect and Previous Transect (Average of two areas times distance between them) (ft^3)
0	42	--	--
1	44	16	688
2	45	28	1,260
3	48	38	1,786
4	39	38	1,672
5	24	27	864
6	25	50	1,250
7	27	50	1,300
8	34	50	1,550
9	68	52	2,652
10	38	50	2,650
11	55	50	2,350
12	66	50	3,050
13	72	50	3,450
14	44	40	2,320
15	40	50	2,100
16	16	25	700
17	12	25	350
Total in Cubic Feet →			29,992
Total in Cubic Yards →			1,111



SILVER-CONTAMINATED SWALE
WESTERN SWALE
DIRT
ROAD
LEGEND:
EXCAVATION AREA
AREA OF EXCAVATION TRENCH
TEMPORARY CHAIN FENCE
PERMANENT CHAIN FENCE
TRANSECT INDICATING FALL, 1992 SAMPLING LOCATIONS
ESTIMATED AREA OF EXCAVATION ZONE: 32,800 SQ. FT.
ESTIMATED VOLUME OF CONTAMINATED SOILS/SEDIMENTS: 2,000 CY
N
1 INCH = 50 FEET
0
50
100

731



SILVER-CONTAMINATED SWALE
EASTERN SWALE
DIRT ROAD
CAPPED TREATED MATERIAL
LEGEND:
BOUNDARY OF EXCAVATION AREA
AREA OF EXCAVATION TRENCH
OUTLINE OF PROPOSED BARRIER
TEMPORARY CHAIN FENCE
TRANSECT INDICATING FALL, 1992 SAMPLING LOCATIONS
APPROXIMATE AREA OF TREATED MATERIAL PLACEMENT (AND CAP)
N
1 INCH = 50 FEET
0
50
100
731

APPENDIX F: ANALYTICAL DATA PACKAGES

Explanation of ISIS Codes for Field-Analyzed Samples

A 14-character code (ISIS Code) was assigned to every environmental sample acquired for field analysis. The code indicates general location, type of sample, depth below ground surface, and more precise location parameters. An example code is shown below:

01SSXX0125XRXF

The first two characters of the code (in this case *01*) denote from which of the two swales the sample was collected. The eastern swale was assigned *01* and the western swale was assigned *02*. The next two characters (*SS*) describe the media; *SS* denotes soil/sediment, and *SW* denotes surface water. The depth below ground surface is described by the next three characters (*XX0*, in the case above). In ISIS codes, *X*'s always stand for place holders; therefore, *XX0* means at ground surface, *XX5* would mean five feet below ground surface, and so on. The next three characters (*125*) tell how far downstream from the Building 731 outfall the sample was acquired. A sample taken at the point of the outfall would be *XX0*; a sample taken from a point 125 feet downstream would be coded as *125*. The next two characters describe where within the streambed the samples were collected. The example sample above was taken from the right side of the streambed (if facing downstream) because the according characters are *XR*. A sample taken from the left side would be *XL*, and a sample taken from the midpoint of the swale would be *XM*. A slightly different procedure was adopted for samples acquired for confirmation during excavation. During this phase of the field sampling program, three samples per transect were always taken: one from the left-most edge of the excavation (assigned *XA*); one from the midpoint of the swale (*XB*); and one from the right-most edge of the excavation (*XC*). The next single character (*X*, above) describes how far laterally from the center of the swale the sample was collected (assuming it was not collected from the swale's midpoint — if it was collected from the midpoint, this character is meaningless). The example above was acquired five feet from the center, because it was assigned *X*. A sample taken 10 feet from the center is assigned *Y*. A *Z* would mean 15 feet from the center. An *F* in this space denotes that the sample was acquired from a point adjacent to the fence along the western stream. Finally, the last character, *F* for the example above and for every sample acquired, means that the sample was analyzed in the field.

Table of Characterization Study Data

ISIS CODE	Date Collected	Date Analyzed	Collected By	Analyzed By	Concentration of Ag	Remarks
01SSXX0X25XLXF	11/12/92	11/16/92	DVB	SLD	<10	
01SSXX2X25XLXF	11/12/92	11/16/92	DVB	SLD	14	
01SSXX0X25XRXF	11/12/92	11/16/92	DVB	SLD	24	
01SSXX2X25XRXF	11/12/92	11/16/92	DVB	SLD	30	
01SSXX0X57XLXF	11/12/92	11/16/92	DVB	SLD	52	
01SSXX2X57XRXF	11/12/92	11/16/92	DVB	SLD	<10	
01SSXX0X57XLXF	11/12/92	11/16/92	DVB	SLD	56	
01SSXX2X57XRXF	11/12/92	11/16/92	DVB	SLD	<10	
01SSXX0X75XLXF	11/12/92	11/16/92	DVB	SLD	22	
01SSXX2X75XRXF	11/12/92	11/16/92	DVB	SLD	<10	
01SSXX0X75XLXF	11/12/92	11/16/92	DVB	SLD	46	
01SSXX2X75XRXF	11/12/92	11/16/92	DVB	SLD	<10	
01SSXX0100XLXF	11/12/92	11/16/92	DVB	SLD	12	
01SSXX0100XRXF	11/12/92	11/16/92	DVB	SLD	<10	
01SSXX0150XLXF	11/12/92	11/16/92	DVB	SLD	54	
01SSXX0150XRXF	11/12/92	11/16/92	DVB	SLD	<10	
01SSXX0200XLXF	11/12/92	11/16/92	DVB	SLD	16	
01SSXX0200XRXF	11/12/92	11/16/92	DVB	SLD	80	
01SSXX0250XLXF	11/12/92	11/16/92	DVB	SLD	56	
01SSXX0250XRXF	11/12/92	11/16/92	DVB	SLD	<10	R<10
01SSXX0300XLXF	11/12/92	11/16/92	DVB	SLD	<10	
01SSXX0300XRXF	11/12/92	11/16/92	DVB	SLD	<10	
01SSXX0350XLXF	11/12/92	11/16/92	DVB	SLD	<10	
01SSXX0350XRXF	11/12/92	11/16/92	DVB	SLD	10	
01SSXX0400XLXF	11/12/92	11/16/92	DVB	SLD	24	
01SSXX0400XRXF	11/12/92	11/16/92	DVB	SLD	16	

(Characterization Study Data – Continued)

ISIS CODE	Date Collected	Date Analyzed	Collected By	Analyzed By	Concentration of Ag	Remarks
01SSXX0450XLXF	11/12/92	11/16/92	DVB	SLD	64	
01SSXX0450XRXF	11/12/92	11/16/92	DVB	SLD	32	
01SSXX0500XLXF	11/12/92	11/16/92	DVB	SLD	28	
01SSXX0500XRXF	11/12/92	11/16/92	DVB	SLD	<10	
01SSXX0579XLXF	11/12/92	11/16/92	DVB	SLD	<10	
01SSXX0540XRXF	11/12/92	11/16/92	DVB	SLD	<10	
01SSXX0679XLXF	11/12/92	11/16/92	DVB	SLD	<10	
01SSXX0629XRXF	11/12/92	11/16/92	DVB	SLD	<10	
01SSXX0779XLXF	11/12/92	11/16/92	DVB	SLD	<10	
01SSXX0729XRXF	11/12/92	11/16/92	DVB	SLD	<10	
02SSXX0X25XLXF	11/12/92	11/16/92	DVB	SLD	72	
02SSXX2X25XLXF	11/12/92	11/16/92	DVB	SLD	<10	
02SSXX0X25XRXF	11/12/92	11/16/92	DVB	SLD	40	
02SSXX2X25XRXF	11/12/92	11/16/92	DVB	SLD	10	R=10
02SSXX0X50XLXF	11/12/92	11/16/92	DVB	SLD	32	
02SSXX2X50XLXF	11/12/92	11/16/92	DVB	SLD	<10	
02SSXX0X50XRXF	11/12/92	11/16/92	DVB	SLD	78	
02SSXX2X50XRXF	11/12/92	11/16/92	DVB	SLD	<10	
02SSXX0X75XLXF	11/12/92	11/16/92	DVB	SLD	54	
02SSXX2X75XLXF	11/12/92	11/16/92	DVB	SLD	<10	
02SSXX0X75XRXF	11/12/92	11/16/92	DVB	SLD	44	
02SSXX2X75XRXF	11/12/92	11/16/92	DVB	SLD	<10	
02SSXX0100XLXF	11/12/92	11/16/92	DVB	SLD	70	
02SSXX0100XRXF	11/12/92	11/16/92	DVB	SLD	<10	
02SSXX0125XLXF	11/12/92	11/16/92	DVB	SLD	62	
02SSXX0125XRXF	11/12/92	11/16/92	DVB	SLD	70	
02SSXX0175XLXF	11/12/92	11/16/92	DVB	SLD	56	

(Characterization Study Data – Continued)

ISIS CODE	Date Collected	Date Analyzed	Collected By	Analyzed By	Concentration of Ag	Remarks
02SSXX0175XRXF	11/12/92	11/16/92	DVB	SLD	16	
02SSXX0225XLXF	11/12/92	11/16/92	DVB	SLD	40	
02SSXX0225XRXF	11/12/92	11/16/92	DVB	SLD	60	
02SSXX0275XLXF	11/12/92	11/16/92	DVB	SLD	24	
02SSXX0275XRXF	11/12/92	11/16/92	DVB	SLD	82	
02SSXX0375XLXF	11/12/92	11/16/92	DVB	SLD	36	
02SSXX0375XRXF	11/12/92	11/16/92	DVB	SLD	14	R=14
02SSXX0435XLXF	11/12/92	11/16/92	DVB	SLD	<10	
02SSXX0435XRXF	11/12/92	11/16/92	DVB	SLD	<10	
01SSXX0X25XLYF	11/18/92	11/19/92	DVB	SLD	10	
01SSXX2X25XLYF	11/18/92	11/19/92	DVB	SLD	6.0	
01SSXX0X25XRYF	11/18/92	11/19/92	DVB	SLD	50	
01SSXX2X25XRYF	11/18/92	11/19/92	DVB	SLD	4.0	
01SSXX0X57XLYF	11/18/92	11/19/92	DVB	SLD	18	
01SSXX0X57XRYF	11/18/92	11/19/92	DVB	SLD	92	
01SSXX0X75XLYF	11/18/92	11/19/92	DVB	SLD	14	
01SSXX0X75XRYF	11/18/92	11/19/92	DVB	SLD	26	
01SSXX0100XLYF	11/18/92	11/19/92	DVB	SLD	18	
01SSXX0150XLYF	11/18/92	11/19/92	DVB	SLD	36	R=22
01SSXX0200XLYF	11/18/92	11/19/92	DVB	SLD	6.0	
01SSXX0200XRYF	11/18/92	11/19/92	DVB	SLD	4.0	
01SSXX0250XLYF	11/18/92	11/19/92	DVB	SLD	10	
01SSXX0300XRYF	11/18/92	11/19/92	DVB	SLD	58	
01SSXX0400XLYF	11/18/92	11/19/92	DVB	SLD	12	
01SSXX0400XRYF	11/18/92	11/19/92	DVB	SLD	4.0	
01SSXX0450XLYF	11/18/92	11/19/92	DVB	SLD	32	
01SSXX0450XRYF	11/18/92	11/19/92	DVB	SLD	4.0	

(Characterization Study Data – Continued)

ISIS CODE	Date Collected	Date Analyzed	Collected By	Analyzed By	Concentration of Ag	Remarks
01SSXX0500XLYF	11/18/92	11/19/92	DVB	SLD	2.0	
02SSXX0X25XLYF	11/18/92	11/19/92	DVB	SLD	58	R=10
02SSXX0X25XRYF	11/18/92	11/19/92	DVB	SLD	16	
02SSXX0X50XLYF	11/18/92	11/19/92	DVB	SLD	10	
02SSXX0X50XRYF	11/18/92	11/19/92	DVB	SLD	50	
02SSXX0X75XRYF	11/18/92	11/19/92	DVB	SLD	130	
02SSXX0X75XLYF	11/18/92	11/19/92	DVB	SLD	100	
02SSXX0100XLYF	11/18/92	11/19/92	DVB	SLD	36	
02SSXX0125XLYF	11/18/92	11/19/92	DVB	SLD	16	
02SSXX0125XRYF	11/18/92	11/19/92	DVB	SLD	100	
02SSXX0175XLYF	11/18/92	11/19/92	DVB	SLD	80	
02SSXX0175XRYF	11/18/92	11/19/92	DVB	SLD	64	R=52
02SSXX0225XLYF	11/18/92	11/19/92	DVB	SLD	56	
02SSXX0225XRYF	11/18/92	11/19/92	DVB	SLD	22	
02SSXX0275XLYF	11/18/92	11/19/92	DVB	SLD	62	
02SSXX0275XRYF	11/18/92	11/19/92	DVB	SLD	56	
02SSXX0375XLYF	11/18/92	11/19/92	DVB	SLD	90	
02SSXX0375XRYF	11/18/92	11/19/92	DVB	SLD	52	
022SXX0300XRYF	11/17/92	11/19/92	DVB	SLD	20	
02SSXX0300XLYF	11/17/92	11/19/92	DVB	SLD	98	
02SSXX2125XRYF	11/20/92	11/23/92	DVB	SLD	120	
02SSXX0125XRZF	11/20/92	11/23/92	DVB	SLD	68	R=72
02SSXX2X75XLYF	11/20/92	11/23/92	DVB	SLD	2.0	
02SSXX0X75XRZF	11/20/92	11/23/92	DVB	SLD	36	
02SSXX0175XLZF	11/20/92	11/23/92	DVB	SLD	22	
01SSXX0X50XRZF	11/20/92	11/23/92	DVB	SLD	10	
02SSXX0275XRZF	11/20/92	11/23/92	DVB	SLD	94	

(Characterization Study Data – Continued)

ISIS CODE	Date Collected	Date Analyzed	Collected By	Analyzed By	Concentration of Ag	Remarks
01SSXX2200XRXF	11/20/92	11/23/92	DVB	SLD	2.0	
01SSXX0300XRZF	11/20/92	11/23/92	DVB	SLD	28	
02SSXX0125XRFF	11/24/92	11/24/92	DVB	SLD	120	
02SSXX2125XRZF	11/24/92	11/24/92	DVB	SLD	22	
02SSXX0275XLZF	11/24/92	11/24/92	DVB	SLD	78	
02SSXX0275XRFF	11/24/92	11/24/92	DVB	SLD	92	
02SSXX2275XRYF	11/24/92	11/24/92	DVB	SLD	2.0	R=2.0
02SSXX0375XRZF	11/24/92	11/24/92	DVB	SLD	8.0	
02SWXX0X35XMXF	11/24/92	11/24/92	DVB	SLD	2.0	
02SWXX0275XMXF	11/24/92	11/24/92	DVB	SLD	6.0	
~~01SWXX0X25XMXF~~	~~11/24/92~~	~~11/24/92~~	~~DVB~~	~~SLD~~	~~2.0~~	
01SWXX0600XMXF	11/24/92	11/24/92	DVB	SLD	2.0	R=2.0
01SSXX0X10XLYF	11/30/92	12/1/92	DVB	SLD	8.0	
~~01SSXX0X10XRYF~~	~~11/30/92~~	~~12/1/92~~	~~DVB~~	~~SLD~~	~~14~~	
02SSXX0X25XLZF	11/30/92	12/1/92	DVB	SLD	14	
02SSXX0X50XRFF	11/30/92	12/1/92	DVB	SLD	40	
02SSXX0125R2FF	11/30/92	12/1/92	DVB	SLD	8.0	
02SSXX0275L2ZF	11/30/92	12/1/92	DVB	SLD	2.0	
02SSXX0275R2FF	11/30/92	12/1/92	DVB	SLD	18	R=18
02SSXX0200XRZF	12/3/92	12/4/92	DVB	SLD	78	R=62
02SSXX0200XRFF	12/3/92	12/4/92	DVB	SLD	76	
02SSXX0300XRFF	12/3/92	12/4/92	DVB	SLD	88	
02SSXX0325XRYF	12/3/92	12/4/92	DVB	SLD	82	
02SSXX0325XRFF	12/3/92	12/4/92	DVB	SLD	66	
02SSXX0300XRZF	12/9/92	12/10/92	SLD	SLD	8.0	
02SSXX0325XRZF	12/9/92	12/10/92	SLD	SLD	54	
02SSXX0375XRZF	12/9/92	12/10/92	SLD	SLD	18	

Client: ABB Environmental Services – Indian Head, Work Order: WA51011

ANALYSIS AND QUALITY CONTROL
DOCUMENTATION

Prepared By:

COAST-TO-COAST ANALYTICAL SERVICES, INC.
NORTHEASTERN DIVISION

21-Dec-92

Reviewed and Approved by: Caroline [signature]
Laboratory Quality Assurance

Coast-To-Coast Analytical Services, Inc.
Northeastern Division
Quality Control Report

LEVEL III REPORT

Level III documentation consists of the following components for specific types of analyses:

Section	Type of Documentation
INORGANIC ANALYSES FOR METALS	
o	METHODS AND CHRONOLOGY OF ANALYSIS
o	METHOD BLANK AND LABORATORY CONTROL SAMPLE RESULTS
o	DUPLICATE AND MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS
o	SUMMARY REPORT
o	RAW DATA
INORGANIC ANALYSES FOR NON-METALS	
o	METHODS AND CHRONOLOGY OF ANALYSIS
o	METHOD BLANK AND LABORATORY CONTROL SAMPLE RESULTS
o	DUPLICATE AND MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS
o	SUMMARY REPORT
o	RAW DATA
CHAIN OF CUSTODY	
o	CONFIRMATION
o	CHAIN OF CUSTODY RECORDS
o	CORRESPONDENCE

Client: ABB Environmental Services – Indian Head, Work Order: WA51006

ANALYSIS AND QUALITY CONTROL
DOCUMENTATION

Prepared By:

COAST–TO–COAST ANALYTICAL SERVICES, INC.
NORTHEASTERN DIVISION

21–Dec–92

Reviewed and Approved by: Caroline [illegible]
Laboratory Quality Assurance

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Client: ABB Environmental Services - Indian Head

21-Dec-92

Coast-To-Coast Analytical Services, Inc.
Northeastern Division
Quality Control Report

LEVEL III REPORT

Level III documentation consists of the following components for specific types of analyses:

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	o	CONFIRMATION
	o	CHAIN OF CUSTODY RECORDS
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Cl. ,nt: ABB Environmental Services - Souza

20-Dec-92

Coast-To-Coast Analytical Services, Inc.
Northeastern Division
Quality Control Report

LEVEL III REPORT

Level III documentation consists of the following components for specific types of analyses:

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	o	SUMMARY REPORT
	o	RAW DATA
CHAIN OF CUSTODY		
	o	CONFIRMATION
	o	CHAIN OF CUSTODY RECORDS
	o	CORRESPONDENCE

Client: ABB Environmental Services - Indian Head 20-Dec-92

Coast-To-Coast Analytical Services, Inc.
Northeastern Division
Quality Control Report

Methods and Chronology of Analysis

METHODS OF ANALYSIS			*CHRONOLOGY OF ANALYSES*				
Parameter	Method No.	Description	CCAS Sample Nos.	Date Sample Received	Date of Sample Chemical Preparation	Date of Instrument Analysis	Dilution Factor *
Silver	6010	Atomic Emission, Inductively Coupled Plasma	WA51011-1	15-Dec-92	15-Dec-92	16-Dec-92	1.0
			WA51011-2	15-Dec-92	15-Dec-92	16-Dec-92	1.0
			WA51011-3	15-Dec-92	15-Dec-92	16-Dec-92	1.0
			WA51011-4	15-Dec-92	15-Dec-92	16-Dec-92	1.0
			WA51011-5	15-Dec-92	15-Dec-92	16-Dec-92	1.0
			WA51011-6	15-Dec-92	15-Dec-92	16-Dec-92	1.0
			WA51011-7	15-Dec-92	15-Dec-92	16-Dec-92	1.0
			WA51011-8	15-Dec-92	15-Dec-92	16-Dec-92	1.0
			WA51011-9	15-Dec-92	15-Dec-92	16-Dec-92	1.0
			WA51011-10	15-Dec-92	15-Dec-92	16-Dec-92	1.0

Notes:
Unless otherwise indicated, analytical methods are from (1) "Methods of Chemical Analysis of Water and Wastes," EPA-600/4-79-020, Revised March, 1983, or (2) "Test Methods for Evaluating Solid Wastes," EPA SW-846, Revised November, 1986.

*The Dilution Factor (DF) indicates whether a sample, prepared in accordance with the analytical method protocol, was diluted prior to analysis. The Dilution Factor could also indicate that a smaller aliquot than specified in the method was utilized for sample preparation and analysis. For example, a dilution factor of 5 means that the sample was effectively diluted by a factor of 5 prior to analysis, i.e., the sample was analyzed at 20% its reported concentration.

Client: AEB Environmental Services - Indian Head

20-Dec-92

Coast-To-Coast Analytical Services, Inc.
Northeastern Division
Quality Control Report

Method Blank and Laboratory Control Sample Results

	METHOD BLANK RESULTS						LABORATORY CONTROL SAMPLE RESULTS					
Parameter	Date of Prep	Date of Analysis	Units	Concentration Measured in Blank	Acceptance Range	Practical Quantitation Level*	Units	True Value	Measured Value	Percent Recovered	Acceptance Range (%)	Acceptance Range (mg/kg)
Silver	15-Dec-92	16-Dec-92	mg/L	< 0.015	< 0.015	0.015	mg/kg	109	61.0	56.0 &		94.5-123 @
	15-Dec-92	17-Dec-92					mg/L	1.25	1.19	95.2	80-120	

* Practical quantitation level is the lowest concentration measurable for samples with normal chemical and physical composition during routine laboratory operations.

DATA QUALITY COMMENTS:
Results of all quality control measurements are within the laboratory and method specified acceptance range except as noted.

$ Laboratory control sample (LCS) measurement for this parameter is outside the quality control acceptance range. This may imply a potential bias of reported results for samples analyzed concurrently with this LCS.

@ The laboratory uses the statistical mean and 99% confidence range, respectively, as the true value and acceptance range for this commercially available solid reference material (trace metals in soil). Reference values are not available for boron or mercury.

Client: ABB Environmental Services - Indian Head

20-Dec-92

Coast-To-Coast Analytical Services, Inc.
Northeastern Division
Quality Control Report

Duplicate and Matrix Spike/Matrix Spike Duplicate Results

		DUPLICATE RESULTS						*MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS*									
			Sample Measurement					Concentration or Quantity					Matrix Spike Recovery (%)				
Parameter	CCAS Sample No.	Units	Rep 1	Rep 2	Mean Conc	RPD (%)	Acceptance Range for RPD (%)	Units	Sample Only	Spike Added	Sample +Spike Dup 1	Sample +Spike Dup 2	Sample +Spike Dup 1	Sample +Spike Dup 2	Acceptance Range (%)	RPD (%)	Acceptance Range (%)
Silver	WA51011-1							ug	14.7	10.0	50.7	NA	*360	NA	70-130	NA	0-30
								ug	14.7	10.0	NA	44.6	NA	*299	70-130	19	0-30

RPD = Relative percent difference, which is the absolute value of the difference between two duplicate results divided by the mean concentration then multiplied by 100%.

NA = Not applicable.

NC = Relative percent difference cannot be calculated for sample results less than the PQL.

Because of the large uncertainty (i.e., 33% or greater) associated with measurements made near the detection level, the acceptance range for relative percent difference for duplicate measurements at such low concentrations is 0-100%.

DATA QUALITY COMMENTS:
Results of all quality control measurements are within the laboratory or contract specified acceptance range except as noted.

* Matrix spike recovery is outside the laboratory's specified acceptance range indicating potential sample matrix interference and potential bias of reported value for this parameter.

Client: ABB Environmental Services - Indian Head

Coast-To-Coast Analytical Services, Inc.
Northeastern Division
Quality Control Report

Summary Report

Inorganic Laboratory Summary Report

All sample analyses for elements referenced by this Quality Control Report were routine and were conducted in accordance with appropriate analytical protocols and laboratory standard operating procedures except as noted.

CCAS Sample No. Laboratory Control Sample (Solid Matrix), digested 15-Dec-92
Parameter: Silver
Description of Problem/Summary of Laboratory Actions: The silver recovery for this solid LCS is outside the laboratory's quality control acceptance range. This may imply a potential bias of the reported silver results for samples digested and analyzed concurrently with this LCS. The silver recovery for the aqueous LCS digested and analyzed concurrently is within the laboratory's quality control acceptance range.

CCAS Sample No. WA51011-1
Parameter: Silver
Description of Problem/Summary of Laboratory Actions: The silver recoveries for both matrix spikes of this sample are outside the laboratory's quality control acceptance range. This may indicate the presence of a sample matrix interference and a potential bias of the reported value for this parameter. Alternatively, the high spike recoveries may be artifacts of poor sample homogeneity.

Notebook No. ________

PROJECT BL15 - L/S

Continued From Page ________

SAMPLE NUMBER	Dig Type	Init Vol (mL) or Wt (g)	Final Vol (mL)	Client
PBW	HCl	100	100	000007
LCSW				[redacted]
WA50026-1 ~~TOT~~				12/15/92
-2				
-3				
-4				
-5				
-6				
-7		50	50	
-8		100	100	
-9 TOT				
-8 DUP				
-8 SPK				
WA50028-1 TOT				
~~-2 TOT~~				
-3				
~~DUP~~				
~~SPK~~ MV 12/15/92				
PBS				
LCSS		0.3001		
WA50019-1		0.53		[redacted]
WA50023-1		2.18g		[redacted]
WA49006-6		2.06g		[redacted]
~~-6 DUP~~		~~2.16g~~		
~~-6 SPK~~ MV 12/15/92		~~2.06g~~		
-7		2.15g		
-8		2.06g		
-9		2.02g		
-10		2.16g		
~~WA50026-1 DIG~~				
~~WA50015-5~~ MV 12/15/92		100	100	[redacted]
-6			74	
-7				

Continued on Page

Read and Understood By

Michael D. Vick 12/15/92 — D. Nadeau 12/16/92

Signed | Date | Signed | Date

ALIS-215 Notebook No. 25

Continued From Page

Sample		Dig Type	Tot Vol (mL) or Wt (g)	Final Vol (mL)	Client #
[illegible]		HNO_3	100	100	[illegible]
[illegible]026-1	TOT				[redacted] MV 12/15/92
-2					
-3					
-4					
-5					
-6					
~~-7~~			~~MV NOT NEEDED 12-15-92~~		
-8					
-1	DUP				
-1	SPK				
LBS			0.2 g		
LCSS			0.2964		
WA49006-6			2.01 g		[redacted]
~~-6~~	~~DUP~~		~~2.1 g~~		
~~-6~~	~~SPK~~		MV 12/15/92		
-7			2.1		
-8			2.13 g		
-9			2.15 g		
-0			2.26 g		
WA50028-1	TOT	HNO_3	100 mL	100 mL	[redacted]
-2					
-3					
WA50026-1	DIS				
-2					
-7					

Continued on Page

Read and Understood By

Michael D V[illegible] 12/15/92 D. Nadeau 12/18/92

Signed Date Signed Date

Notebook No. ________

PROJECT ALIS - L/S

Continued From Page ________

SAMPLE NUMBER	DIG TYPE	Init Wt (g)	Final Vol (mL)	Client
WA51011-1	HCl	1.01	100	CHE3 DIV
1MS		1.01		
1MSD		1.02		000009
2		1.05		
3		1.04		
4		1.02		
5		1.00		
6		1.00		
7		1.05		
8		1.02		
9		1.05		
10		1.09		
WA51007-1	HCl	2.07	100	[redacted]
WA51007-1	HNO_3	1.95		

Witnessed spiking of WA51011-1 MS, MSD:
Added 0.2 mL CLPP-SPK-1 to each
G. Lewis 12/15/92

Reagents: HCL F06822
HNO_3 F26076
H_2O_2 F11045

SPIKES:	CLPP-CKV-1	112-S	EP-8	S-75
	CLPP-CICV-2	109-S	WP-11	97-S
	CLPP-CICV-3	114-S	CLPP-PSPK-1	123-S
	CLPP-SPK-1	82-S		
	CLPP-SPK-2	104-S		
	CLPP-SPK-3	110-S		
	ICV-3	115-S		
	CLP10	111-S		

Continued on Page

Read and Understood By

Michael D. Vol 12/18/92 D. Naldecai 12/18/92

Signed Date Signed Date

DM 12/16/92

L

L10-S		PBS	Zn, Cd, Ni, Fe, Cr, Al
L08-L		PBW, LCSW	Co
L10-S		LCSS	Zn, Cd, Cr, Ni, Ag, Fe, Al
L08-S	[redacted]	WA50002-1-4	Zn, Cd, Ni, Cr
L10-S	[redacted]	WA50007-1	Cd, Ni, Zn, Fe, Ca, Mg
L15-S		PBS, LCSS	Cd, Cr, Ag, Ba
↓	ABB-DC	WA51011-1, MS, MSD-10	Ag
	[redacted]	WA51007-1	Ag, Ba, Cd, Cr

000010

CWP 12-17-92

```
12/16/92 10:34
wcal std        rep  1  Zn213.8   em     7976.9 conc  5.0000
                rep  1  Cd214.4   em    12527.2 conc  5.0000
                rep  1  Co228.6   em     7021.4 conc  5.0000
                rep  1  Ni231.6   em     4809.8 conc  5.0000
                rep  1  Fe238.2   em    26667.5 conc 10.0000  window edge
                rep  1  Cr267.7   em    12783.4 conc  2.0000
                rep  1  Ag328.1   em    11987.5 conc  2.5000
                rep  1  Al396.2   em        7.7 conc 20.0000
                rep  1  Ba455.4   em    72847.8 conc 20.0000
                rep  1  Mg279.6   em    80194.2 conc 50.0000
                rep  1  Ca393.4   em   128120.3 conc 50.0000
                rep  2  Zn213.8   em     8438.0 conc  5.0000
                rep  2  Cd214.4   em    13205.5 conc  5.0000
                rep  2  Co228.6   em     7082.6 conc  5.0000
                rep  2  Ni231.6   em     5020.5 conc  5.0000
                rep  2  Fe238.2   em    28092.6 conc 10.0000
                rep  2  Cr267.7   em    12744.8 conc  2.0000
                rep  2  Ag328.1   em    11317.3 conc  2.5000
                rep  2  Al396.2   em    22867.8 conc 20.0000
                rep  2  Ba455.4   em    71292.4 conc 20.0000
                rep  2  Mg279.6   em    79612.5 conc 50.0000
                rep  2  Ca393.4   em   134895.8 conc 50.0000
                rep  3  Zn213.8   em     8057.9 conc  5.0000
                rep  3  Cd214.4   em    12834.3 conc  5.0000
                rep  3  Co228.6   em     6562.8 conc  5.0000
                rep  3  Ni231.6   em     4535.9 conc  5.0000
                rep  3  Fe238.2   em    25513.8 conc 10.0000
                rep  3  Cr267.7   em    12736.7 conc  2.0000
                rep  3  Ag328.1   em    11222.6 conc  2.5000
                rep  3  Al396.2   em    23296.8 conc 20.0000
                rep  3  Ba455.4   em    70699.1 conc 20.0000
                rep  3  Mg279.6   em    79295.6 conc 50.0000
                rep  3  Ca393.4   em   135633.5 conc 50.0000
wcal std 6
12/16/92 10:37
   Zn213.8   av   8157.58     sd   246.223 %cv   3.02 conc  5.0000
   Cd214.4   av  12855.67     sd   339.642 %cv   2.64 conc  5.0000
   Co228.6   av   6888.93     sd   284.128 %cv   4.12 conc  5.0000
   Ni231.6   av   4788.73     sd   242.994 %cv   5.07 conc  5.0000
   Fe238.2   av  26757.97     sd  1291.791 %cv   4.83 conc 10.0000
   Cr267.7   av  12754.96     sd    24.953 %cv   0.20 conc  2.0000
   Ag328.1   av  11509.12     sd   417.002 %cv   3.62 conc  2.5000
   Al396.2   av  15390.77     sd 13323.853 %cv  86.57 conc 20.0000
```

```
    Ba455.4    av  71615.11          sd   1109.026 %cv   1.55 conc 20.0000
    Mg279.6    av  79867.42          sd    297.393 %cv   0.37 conc 50.0000
    Ca393.4    av 132883.16          sd   4141.239 %cv   3.12 conc 50.0000

12/16/92 10:40
blank           rep   1  Zn213.8    em       65.1
                rep   1  Cd214.4    em       29.2
                rep   1  Co228.6    em       34.9
                rep   1  Ni231.6    em       36.6
                rep   1  Fe238.2    em       70.0
                rep   1  Cr267.7    em       47.7
                rep   1  Ag328.1    em       61.4
                rep   1  Al396.2    em       57.2
                rep   1  Ba455.4    em       86.5
                rep   1  Mg279.6    em       85.6
                rep   1  Ca393.4    em      132.2
                rep   2  Zn213.8    em       29.2
                rep   2  Cd214.4    em       20.2
                rep   2  Co228.6    em       41.0
                rep   2  Ni231.6    em       11.2
                rep   2  Fe238.2    em       16.3
                rep   2  Cr267.7    em       40.7
                rep   2  Ag328.1    em       42.9
                rep   2  Al396.2    em      -31.8              window edge
                rep   2  Ba455.4    em       54.6
                rep   2  Mg279.6    em       50.7
                rep   2  Ca393.4    em       83.1
                rep   3  Zn213.8    em       33.3
                rep   3  Cd214.4    em       26.0
                rep   3  Co228.6    em       38.8
                rep   3  Ni231.6    em       28.6
                rep   3  Fe238.2    em       55.1
                rep   3  Cr267.7    em        1.5              window edge
                rep   3  Ag328.1    em       80.2
                rep   3  Al396.2    em      -14.7              window edge
                rep   3  Ba455.4    em       15.6
                rep   3  Mg279.6    em       15.3
                rep   3  Ca393.4    em       33.0
blank
12/16/92 10:43
    Zn213.8    av    42.50           sd     19.657 %cv  46.25
    Cd214.4    av    25.16           sd      4.564 %cv  18.14
    Co228.6    av    38.23           sd      3.113 %cv   8.14
    Ni231.6    av    25.49           sd     13.012 %cv  51.05
    Fe238.2    av    47.11           sd     27.711 %cv  58.82
    Cr267.7    av    29.95           sd     24.866 %cv  83.03
    Ag328.1    av    61.48           sd     18.653 %cv  30.34
    Al396.2    av     3.54           sd     47.240 %cv 1336.0
    Ba455.4    av    52.27           sd     35.504 %cv  67.93
    Mg279.6    av    50.52           sd     35.165 %cv  69.60
    Ca393.4    av    82.76           sd     49.566 %cv  59.89

12/16/92 10:46
blank           rep   1  Zn213.8    em       26.4
                rep   1  Cd214.4    em       31.8
                rep   1  Co228.6    em       21.3
                rep   1  Ni231.6    em       -7.6              window edge
                rep   1  Fe238.2    em       28.0
                rep   1  Cr267.7    em       58.9
                rep   1  Ag328.1    em       64.0
                rep   1  Al396.2    em       38.5
                rep   1  Ba455.4    em        6.5
                rep   1  Mg279.6    em        3.2
                rep   1  Ca393.4    em       13.7
                rep   2  Zn213.8    em       25.1
                rep   2  Cd214.4    em       [illegible]
```

000011

rep	2	Co228.6	em	18.2	window edge
rep	2	Ni231.6	em	50.4	
rep	2	Fe238.2	em	56.1	window enge
rep	2	Cr267.7	em	61.7	
rep	2	Ag328.1	em	56.2	
rep	2	Al396.2	em	17.0	
rep	2	Ba455.4	em	5.8	
rep	2	Mg279.6	em	3.0	
rep	2	Ca393.4	em	12.7	
rep	3	Zn213.8	em	20.4	
rep	3	Cd214.4	em	21.7	
rep	3	Co228.6	em	48.4	
rep	3	Ni231.6	em	62.4	
rep	3	Fe238.2	em	33.6	
rep	3	Cr267.7	em	-1.8	
rep	3	Ag328.1	em	49.9	window edge
rep	3	Al396.2	em	83.3	
rep	3	Ba455.4	em	4.5	
rep	3	Mg279.6	em	3.1	
rep	3	Ca393.4	em	11.9	

000012

blank
12/16/92 10:49

Zn213.8	av	23.99	sd	3.131	%cv	13.05
Cd214.4	av	14.65	sd	9.514	%cv	64.93
Co228.6	av	29.32	sd	16.583	%cv	56.56
Ni231.6	av	35.07	sd	37.427	%cv	106.74
Fe238.2	av	39.22	sd	14.864	%cv	37.89
Cr267.7	av	39.62	sd	35.899	%cv	90.62
Ag328.1	av	56.68	sd	7.072	%cv	12.48
Al396.2	av	46.26	sd	33.830	%cv	73.14
Ba455.4	av	5.60	sd	0.993	%cv	17.75
Mg279.6	av	3.10	sd	0.137	%cv	4.43
Ca393.4	av	12.78	sd	0.914	%cv	7.15

12/16/92 10:51

std	rep	1	Zn213.8	em	8241.4	conc	5.0000
	rep	1	Cd214.4	em	12905.0	conc	5.0000
	rep	1	Co228.6	em	6979.4	conc	5.0000
	rep	1	Ni231.6	em	4815.1	conc	5.0000
	rep	1	Fe238.2	em	29406.5	conc	10.0000
	rep	1	Cr267.7	em	12897.4	conc	2.0000
	rep	1	Ag328.1	em	11873.9	conc	2.5000
	rep	1	Al396.2	em	23039.4	conc	20.0000
	rep	1	Ba455.4	em	74005.9	conc	20.0000
	rep	1	Mg279.6	em	83583.3	conc	50.0000
	rep	1	Ca393.4	em	130497.6	conc	50.0000
	rep	2	Zn213.8	em	8381.1	conc	5.0000
	rep	2	Cd214.4	em	13518.2	conc	5.0000
	rep	2	Co228.6	em	6690.1	conc	5.0000
	rep	2	Ni231.6	em	4788.0	conc	5.0000
	rep	2	Fe238.2	em	25673.1	conc	10.0000
	rep	2	Cr267.7	em	12998.7	conc	2.0000
	rep	2	Ag328.1	em	11742.5	conc	2.5000
	rep	2	Al396.2	em	22862.7	conc	20.0000
	rep	2	Ba455.4	em	74880.3	conc	20.0000
	rep	2	Mg279.6	em	84101.1	conc	50.0000
	rep	2	Ca393.4	em	132467.4	conc	50.0000
	rep	3	Zn213.8	em	8569.1	conc	5.0000
	rep	3	Cd214.4	em	13836.4	conc	5.0000
	rep	3	Co228.6	em	7187.1	conc	5.0000
	rep	3	Ni231.6	em	4837.3	conc	5.0000
	rep	3	Fe238.2	em	27293.9	conc	10.0000
	rep	3	Cr267.7	em	12743.6	conc	2.0000
	rep	3	Ag328.1	em	11960.0	conc	2.5000
	rep	3	Al396.2	em	24695.3	conc	20.0000
	rep	3	Ba455.4	em	74753.4	conc	20.0000

rep	3	Mg279.6	em	84955.0 conc	50.0000
rep	3	Ca393.4	em	143949.0 conc	50.0000

std
12/16/92 10:54

Zn213.8	av	8397.2061	sd	164.46109	%cv	1.96	conc	5.0000
Cd214.4	av	13419.863	sd	473.40701	%cv	3.53	conc	5.0000
Co228.6	av	6935.5317	sd	226.70935	%cv	3.27	conc	5.0000
Ni231.6	av	4813.4487	sd	24.67713	%cv	0.51	conc	5.0000
Fe238.2	av	27791.167	sd	1432.9068	%cv	5.16	conc	10.0000
Cr267.7	av	12879.895	sd	128.45401	%cv	1.00	conc	2.0000
Ag328.1	av	11858.602	sd	109.56098	%cv	0.92	conc	2.5000
Al396.2	av	23532.482	sd	1010.8616	%cv	4.30	conc	20.0000
Ba455.4	av	73546.609	sd	1613.1529	%cv	2.19	conc	20.0000
Mg279.6	av	84215.604	sd	696.92657	%cv	0.83	conc	50.0000
Ca393.4	av	135637.95	sd	7264.5810	%cv	5.36	conc	50.0000

000013

12/16/92 10:56

ICV	rep	1	Zn213.8	conc	2.6908	mg/L
	rep	1	Cd214.4	conc	2.5704	mg/L
	rep	1	Co228.6	conc	2.6761	mg/L
	rep	1	Ni231.6	conc	2.6737	mg/L
	rep	1	Fe238.2	conc	4.8561	mg/L
	rep	1	Cr267.7	conc	1.0301	mg/L
	rep	1	Ag328.1	conc	1.2643	mg/L
	rep	1	Al396.2	conc	9.8409	mg/L
	rep	1	Ba455.4	conc	10.2621	mg/L
	rep	1	Mg279.6	conc	26.5784	mg/L
	rep	1	Ca393.4	conc	25.7232	mg/L
	rep	2	Zn213.8	conc	2.6380	mg/L
	rep	2	Cd214.4	conc	2.5574	mg/L
	rep	2	Co228.6	conc	2.6799	mg/L
	rep	2	Ni231.6	conc	2.6915	mg/L
	rep	2	Fe238.2	conc	5.2731	mg/L
	rep	2	Cr267.7	conc	1.0807	mg/L
	rep	2	Ag328.1	conc	1.2975	mg/L
	rep	2	Al396.2	conc	10.1310	mg/L
	rep	2	Ba455.4	conc	10.2503	mg/L
	rep	2	Mg279.6	conc	28.7198	mg/L
	rep	2	Ca393.4	conc	26.8983	mg/L
	rep	3	Zn213.8	conc	2.9633	mg/L
	rep	3	Cd214.4	conc	2.7247	mg/L
	rep	3	Co228.6	conc	2.8886	mg/L
	rep	3	Ni231.6	conc	2.6968	mg/L
	rep	3	Fe238.2	conc	5.3333	mg/L
	rep	3	Cr267.7	conc	1.0394	mg/L
	rep	3	Ag328.1	conc	1.2951	mg/L
	rep	3	Al396.2	conc	10.2459	mg/L
	rep	3	Ba455.4	conc	10.1840	mg/L
	rep	3	Mg279.6	conc	26.7082	mg/L
	rep	3	Ca393.4	conc	26.2418	mg/L

ICV
12/16/92 10:59

Zn213.8	av	2.7641	mg/L	sd	0.17459	%cv	6.32
Cd214.4	av	2.6175	mg/L	sd	0.09309	%cv	3.56
Co228.6	av	2.7482	mg/L	sd	0.12158	%cv	4.42
Ni231.6	av	2.6873	mg/L	sd	0.01208	%cv	0.45
Fe238.2	av	5.1542	mg/L	sd	0.25988	%cv	5.04
Cr267.7	av	1.0500	mg/L	sd	0.02691	%cv	2.56
Ag328.1	av	1.2857	mg/L	sd	0.01851	%cv	1.44
Al396.2	av	10.0726	mg/L	sd	0.20870	%cv	2.07
Ba455.4	av	10.2321	mg/L	sd	0.04209	%cv	0.41
Mg279.6	av	27.3355	mg/L	sd	1.20062	%cv	4.39
Ca393.4	av	26.2878	mg/L	sd	0.58890	%cv	2.24

NA
Restandardize

12/16/92 11:02

/

rep	1	Cd214.4	conc	0.0045	mg/L
rep	1	Co228.6	conc	-0.0024	mg/L
rep	1	Ni231.6	conc	0.0012	mg/L
rep	1	Fe238.2	conc	0.0028	mg/L
rep	1	Cr267.7	conc	-0.0004	mg/L
rep	1	Ag328.1	conc	-0.0057	mg/L
rep	1	Al396.2	conc	-0.0042	mg/L
rep	1	Ba455.4	conc	0.0091	mg/L
rep	1	Mg279.6	conc	0.0256	mg/L
rep	1	Ca393.4	conc	0.0232	mg/L
rep	2	Zn213.8	conc	0.0034	mg/L
rep	2	Cd214.4	conc	-0.0038	mg/L
rep	2	Co228.6	conc	0.0021	mg/L
rep	2	Ni231.6	conc	0.0165	mg/L
rep	2	Fe238.2	conc	0.0060	mg/L
rep	2	Cr267.7	conc	0.0035	mg/L
rep	2	Ag328.1	conc	-0.0024	mg/L
rep	2	Al396.2	conc	0.0086	mg/L
rep	2	Ba455.4	conc	0.0065	mg/L
rep	2	Mg279.6	conc	0.0178	mg/L
rep	2	Ca393.4	conc	0.0155	mg/L
rep	3	Zn213.8	conc	-0.0011	mg/L
rep	3	Cd214.4	conc	0.0012	mg/L
rep	3	Co228.6	conc	0.0128	mg/L
rep	3	Ni231.6	conc	-0.0036	mg/L
rep	3	Fe238.2	conc	0.0117	mg/L
rep	3	Cr267.7	conc	0.0028	mg/L
rep	3	Ag328.1	conc	0.0080	mg/L
rep	3	Al396.2	conc	0.0290	mg/L
rep	3	Ba455.4	conc	0.0022	mg/L
rep	3	Mg279.6	conc	0.0055	mg/L
rep	3	Ca393.4	conc	0.0056	mg/L

window edge

000014

ICB
12/16/92 11:04

Zn213.8	av	-0.0023 mg/L	sd	0.00642	%cv	273.24	NA
Cd214.4	av	0.0006 mg/L	sd	0.00417	%cv	658.06	
Co228.6	av	0.0042 mg/L	sd	0.00780	%cv	187.31	
Ni231.6	av	0.0047 mg/L	sd	0.01045	%cv	221.63	
Fe238.2	av	0.0068 mg/L	sd	0.00450	%cv	66.05	
Cr267.7	av	0.0020 mg/L	sd	0.00209	%cv	105.67	
Ag328.1	av	-0.0000 mg/L	sd	0.00714	%cv	21401.	
Al396.2	av	0.0111 mg/L	sd	0.01675	%cv	150.26	
Ba455.4	av	0.0059 mg/L	sd	0.00344	%cv	58.12	
Mg279.6	av	0.0163 mg/L	sd	0.01014	%cv	62.22	
Ca393.4	av	0.0148 mg/L	sd	0.00881	%cv	59.69	

12/16/92 11:08
std

rep	1	Zn213.8	em	8177.9	conc	5.0000
rep	1	Cd214.4	em	12935.4	conc	5.0000
rep	1	Co228.6	em	6707.6	conc	5.0000
rep	1	Ni231.6	em	5107.6	conc	5.0000
rep	1	Fe238.2	em	127958.5	conc	10.0000
rep	1	Cr267.7	em	13468.8	conc	2.0000
rep	1	Ag328.1	em	11670.3	conc	2.5000
rep	1	Al396.2	em	23100.5	conc	20.0000
rep	1	Ba455.4	em	71121.6	conc	20.0000
rep	1	Mg279.6	em	85682.0	conc	50.0000
rep	1	Ca393.4	em	197292.8	conc	50.0000
rep	2	Zn213.8	em	8527.7	conc	5.0000
rep	2	Cd214.4	em	13546.1	conc	5.0000
rep	2	Co228.6	em	7138.5	conc	5.0000
rep	2	Ni231.6	em	4889.7	conc	5.0000
rep	2	Fe238.2	em	129298.6	conc	10.0000
rep	2	Cr267.7	em	12943.7	conc	2.0000
rep	2	Ag328.1	em	11848.8	conc	2.5000

000015

rep	2	Mg279.6	em	88407.7	conc	50.0000
rep	2	Ca393.4	em	132366.1	conc	50.0000
rep	3	Zn213.8	em	8297.5	conc	5.0000
rep	3	Cd214.4	em	13820.8	conc	5.0000
rep	3	Co228.6	em	7038.1	conc	5.0000
rep	3	Ni231.6	em	4965.6	conc	5.0000
rep	3	Fe238.2	em	26981.8	conc	10.0000
rep	3	Cr267.7	em	12943.8	conc	2.0000
rep	3	Ag328.1	em	11724.1	conc	2.5000
rep	3	Al396.2	em	23025.3	conc	20.0000
rep	3	Ba455.4	em	72138.9	conc	20.0000
rep	3	Mg279.6	em	86320.1	conc	50.0000
rep	3	Ca393.4	em	133441.9	conc	50.0000

std
12/16/92 11:11

Zn213.8	av	8334.3643	sd	177.81062	%cv	2.13	conc	5.0000
Cd214.4	av	13434.078	sd	453.19217	%cv	3.37	conc	5.0000
Co228.6	av	6961.3970	sd	225.44183	%cv	3.24	conc	5.0000
Ni231.6	av	4970.9482	sd	134.00414	%cv	2.70	conc	5.0000
Fe238.2	av	28079.632	sd	1163.1169	%cv	4.14	conc	10.0000
Cr267.7	av	13118.785	sd	303.16299	%cv	2.31	conc	2.0000
Ag328.1	av	11747.582	sd	91.30134	%cv	0.78	conc	2.5000
Al396.2	av	22893.273	sd	296.19910	%cv	1.29	conc	20.0000
Ba455.4	av	71874.757	sd	661.83844	%cv	0.92	conc	20.0000
Mg279.6	av	86803.289	sd	1425.6342	%cv	1.64	conc	50.0000
Ca393.4	av	134366.92	sd	2590.3452	%cv	1.93	conc	50.0000

12/16/92 11:13

ICV	rep	1	Zn213.8	conc	2.5772	mg/L
	rep	1	Cd214.4	conc	2.6053	mg/L
	rep	1	Co228.6	conc	2.7442	mg/L
	rep	1	Ni231.6	conc	2.4345	mg/L
	rep	1	Fe238.2	conc	4.9906	mg/L
	rep	1	Cr267.7	conc	1.0429	mg/L
	rep	1	Ag328.1	conc	1.2967	mg/L
	rep	1	Al396.2	conc	10.8093	mg/L
	rep	1	Ba455.4	conc	10.7931	mg/L
	rep	1	Mg279.6	conc	24.5825	mg/L
	rep	1	Ca393.4	conc	24.8684	mg/L
	rep	2	Zn213.8	conc	2.5944	mg/L
	rep	2	Cd214.4	conc	2.5401	mg/L
	rep	2	Co228.6	conc	2.6784	mg/L
	rep	2	Ni231.6	conc	2.4770	mg/L
	rep	2	Fe238.2	conc	4.9598	mg/L
	rep	2	Cr267.7	conc	1.0363	mg/L
	rep	2	Ag328.1	conc	1.2713	mg/L
	rep	2	Al396.2	conc	9.8933	mg/L
	rep	2	Ba455.4	conc	10.8711	mg/L
	rep	2	Mg279.6	conc	26.1910	mg/L
	rep	2	Ca393.4	conc	26.4029	mg/L
	rep	3	Zn213.8	conc	2.5761	mg/L
	rep	3	Cd214.4	conc	2.5776	mg/L
	rep	3	Co228.6	conc	2.5947	mg/L
	rep	3	Ni231.6	conc	2.5630	mg/L
	rep	3	Fe238.2	conc	5.2958	mg/L
	rep	3	Cr267.7	conc	1.0420	mg/L
	rep	3	Ag328.1	conc	1.2636	mg/L
	rep	3	Al396.2	conc	10.1016	mg/L
	rep	3	Ba455.4	conc	10.6282	mg/L
	rep	3	Mg279.6	conc	26.4550	mg/L
	rep	3	Ca393.4	conc	26.1380	mg/L

ICV
12/16/92 11:16

Zn213.8	av	2.5826	mg/L	sd	0.01024	%cv	0.40 103
Cd214.4	av	2.5744	mg/L	sd	0.03271	%cv	1.27 103

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Ni231.6   av   2.4915 mg/L      sd  0.06545 %cv  2.63 100
Fe238.2   av   5.0221 mg/L      sd  0.18574 %cv  3.65 102
Cr267.7   av   1.0404 mg/L      sd  0.00360 %cv  0.35 104
Ag328.1   av   1.2772 mg/L      sd  0.01734 %cv  1.36 102
Al396.2   av  10.2681 mg/L      sd  0.48012 %cv  4.68 103
Ba455.4   av  10.7642 mg/L      sd  0.12404 %cv  1.15 108
Mg279.6   av  25.7428 mg/L      sd  1.01352 %cv  3.94 103
Ca393.4   av  25.8031 mg/L      sd  0.82022 %cv  3.18 103
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000016

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12/16/92 11:16
ICB          rep  1  Zn213.8   conc   0.0042 mg/L
             rep  1  Cd214.4   conc  -0.0071 mg/L
             rep  1  Co228.6   conc  -0.0007 mg/L
             rep  1  Ni231.6   conc   0.0222 mg/L
             rep  1  Fe238.2   conc  -0.0027 mg/L
             rep  1  Cr267.7   conc   0.0026 mg/L
             rep  1  Ag328.1   conc   0.0006 mg/L
             rep  1  Al396.2   conc   0.0363 mg/L
             rep  1  Ba455.4   conc   0.0090 mg/L
             rep  1  Mg279.6   conc   0.0248 mg/L
             rep  1  Ca393.4   conc   0.0219 mg/L
             rep  2  Zn213.8   conc  -0.0002 mg/L
             rep  2  Cd214.4   conc  -0.0009 mg/L
             rep  2  Co228.6   conc   0.0068 mg/L
             rep  2  Ni231.6   conc   0.0037 mg/L
             rep  2  Fe238.2   conc  -0.0004 mg/L
             rep  2  Cr267.7   conc   0.0006 mg/L
             rep  2  Ag328.1   conc  -0.0070 mg/L        window edge
             rep  2  Al396.2   conc   0.0370 mg/L
             rep  2  Ba455.4   conc   0.0075 mg/L
             rep  2  Mg279.6   conc   0.0182 mg/L
             rep  2  Ca393.4   conc   0.0156 mg/L
             rep  3  Zn213.8   conc  -0.0020 mg/L        window edge
             rep  3  Cd214.4   conc  -0.0036 mg/L
             rep  3  Co228.6   conc  -0.0129 mg/L
             rep  3  Ni231.6   conc   0.0290 mg/L
             rep  3  Fe238.2   conc   0.0074 mg/L
             rep  3  Cr267.7   conc   0.0038 mg/L
             rep  3  Ag328.1   conc  -0.0041 mg/L
             rep  3  Al396.2   conc   0.0243 mg/L
             rep  3  Ba455.4   conc   0.0032 mg/L
             rep  3  Mg279.6   conc   0.0079 mg/L
             rep  3  Ca393.4   conc   0.0059 mg/L
ICB
12/16/92 11:21
   Zn213.8   av   0.0007 mg/L      sd  0.00319 %cv 454.51
   Cd214.4   av  -0.0039 mg/L      sd  0.00311 %cv  79.98
   Co228.6   av  -0.0023 mg/L      sd  0.00997 %cv 437.40
   Ni231.6   av   0.0183 mg/L      sd  0.01311 %cv  71.68
   Fe238.2   av   0.0015 mg/L      sd  0.00530 %cv 360.93
   Cr267.7   av   0.0024 mg/L      sd  0.00161 %cv  68.11
   Ag328.1   av  -0.0035 mg/L      sd  0.00385 %cv 110.29
   Al396.2   av   0.0326 mg/L      sd  0.00712 %cv  21.87
   Ba455.4   av   0.0065 mg/L      sd  0.00302 %cv  46.18 Rerun-carryover
   Mg279.6   av   0.0169 mg/L      sd  0.00848 %cv  50.02
   Ca393.4   av   0.0145 mg/L      sd  0.00803 %cv  55.51

12/16/92 11:27
ICB          rep  1  Ba455.4   conc   0.0008 mg/L
             rep  2  Ba455.4   conc   0.0020 mg/L
             rep  3  Ba455.4   conc   0.0005 mg/L
ICB
12/16/92 11:27
   Ba455.4   av   0.0011 mg/L      sd  0.00080 %cv  72.46
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000017

ICSA rep 1 Zn213.8 conc -0.0035 mg/L
rep 1 Cd214.4 conc 0.0055 mg/L
rep 1 Co228.6 conc -0.0071 mg/L
rep 1 Ni231.6 conc -0.0143 mg/L
rep 1 Cr267.7 conc 0.0049 mg/L window edge
rep 1 Ag328.1 conc -0.0165 mg/L window edge
rep 1 Ba455.4 conc 0.0019 mg/L
rep 2 Zn213.8 conc 0.0096 mg/L
rep 2 Cd214.4 conc 0.0089 mg/L window edge
rep 2 Co228.6 conc 0.0051 mg/L
rep 2 Ni231.6 conc 0.0015 mg/L
rep 2 Cr267.7 conc 0.0054 mg/L
rep 2 Ag328.1 conc -0.0096 mg/L window edge
rep 2 Ba455.4 conc 0.0001 mg/L
rep 3 Zn213.8 conc 0.0113 mg/L
rep 3 Cd214.4 conc 0.0129 mg/L
rep 3 Co228.6 conc -0.0003 mg/L
rep 3 Ni231.6 conc -0.0292 mg/L window edge
rep 3 Cr267.7 conc 0.0027 mg/L
rep 3 Ag328.1 conc 0.0016 mg/L
rep 3 Ba455.4 conc 0.0004 mg/L

ICSA
12/16/92 11:31

Zn213.8	av	0.0058 mg/L	sd	0.00809	%cv	139.70
Cd214.4	av	0.0091 mg/L	sd	0.00371	%cv	40.66
Co228.6	av	-0.0008 mg/L	sd	0.00614	%cv	781.10
Ni231.6	av	-0.0140 mg/L	sd	0.01538	%cv	109.80
Cr267.7	av	0.0043 mg/L	sd	0.00140	%cv	32.51
Ag328.1	av	-0.0082 mg/L	sd	0.00913	%cv	111.38
Ba455.4	av	0.0008 mg/L	sd	0.00100	%cv	126.36

12/16/92 11:33
ICSAB rep 1 Zn213.8 conc 1.0207 mg/L
rep 1 Cd214.4 conc 0.9603 mg/L
rep 1 Co228.6 conc 0.4685 mg/L
rep 1 Ni231.6 conc 0.8462 mg/L
rep 1 Cr267.7 conc 0.4544 mg/L
rep 1 Ag328.1 conc 1.0264 mg/L
rep 1 Ba455.4 conc 0.4910 mg/L
rep 2 Zn213.8 conc 1.0197 mg/L
rep 2 Cd214.4 conc 0.9440 mg/L
rep 2 Co228.6 conc 0.4667 mg/L
rep 2 Ni231.6 conc 0.8791 mg/L
rep 2 Cr267.7 conc 0.4543 mg/L
rep 2 Ag328.1 conc 0.9844 mg/L
rep 2 Ba455.4 conc 0.5016 mg/L
rep 3 Zn213.8 conc 1.0328 mg/L
rep 3 Cd214.4 conc 0.9509 mg/L
rep 3 Co228.6 conc 0.4712 mg/L
rep 3 Ni231.6 conc 0.8708 mg/L
rep 3 Cr267.7 conc 0.4423 mg/L
rep 3 Ag328.1 conc 0.9747 mg/L
rep 3 Ba455.4 conc 0.4895 mg/L

ICSAB
12/16/92 11:35

Zn213.8	av	1.0244 mg/L	sd	0.00729	%cv	0.71	102
Cd214.4	av	0.9517 mg/L	sd	0.00819	%cv	0.86	95
Co228.6	av	0.4688 mg/L	sd	0.00230	%cv	0.49	94
Ni231.6	av	0.8654 mg/L	sd	0.01709	%cv	1.97	87
Cr267.7	av	0.4503 mg/L	sd	0.00699	%cv	1.55	90
Ag328.1	av	0.9951 mg/L	sd	0.02749	%cv	2.76	100
Ba455.4	av	0.4940 mg/L	sd	0.00660	%cv	1.34	99

12/16/92 11:37
throw away rep 1 Zn213.8 conc 0.0025 mg/L

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               rep   1   Co228.6     conc     0.0077 mg/L
               rep   1   Ni231.6     conc    -0.0115 mg/L
               rep   1   Fe238.2     conc     0.1520 mg/L
               rep   1   Cr267.7     conc     0.0074 mg/L
               rep   1   Ag328.1     conc    -0.0003 mg/L
               rep   1   Al396.2     conc     0.3550 mg/L
               rep   1   Ba455.4     conc    -0.0006 mg/L
               rep   1   Mg279.6     conc     0.4117 mg/L
               rep   1   Ca393.4     conc     0.3715 mg/L
               rep   2   Zn213.8     conc    -0.0076 mg/L
               rep   2   Cd214.4     conc    -0.0007 mg/L
               rep   2   Co228.6     conc     0.0088 mg/L
               rep   2   Ni231.6     conc     0.0149 mg/L
               rep   2   Fe238.2     conc     0.1108 mg/L
               rep   2   Cr267.7     conc     0.0111 mg/L
               rep   2   Ag328.1     conc     0.0007 mg/L
               rep   2   Al396.2     conc     0.2516 mg/L
               rep   2   Ba455.4     conc    -0.0021 mg/L          window edge
               rep   2   Mg279.6     conc     0.2649 mg/L
               rep   2   Ca393.4     conc     0.2301 mg/L
               rep   3   Zn213.8     conc     0.0011 mg/L
               rep   3   Cd214.4     conc     0.0046 mg/L
               rep   3   Co228.6     conc     0.0035 mg/L
               rep   3   Ni231.6     conc    -0.0294 mg/L          window edge
               rep   3   Fe238.2     conc     0.0373 mg/L
               rep   3   Cr267.7     conc    -0.0022 mg/L          window edge
               rep   3   Ag328.1     conc    -0.0099 mg/L          window edge
               rep   3   Al396.2     conc     0.0696 mg/L
               rep   3   Ba455.4     conc     0.0009 mg/L
               rep   3   Mg279.6     conc     0.1242 mg/L
               rep   3   Ca393.4     conc     0.1008 mg/L
throw away
12/16/92 11:40
     Zn213.8    av   -0.0014 mg/L          sd   0.00538 %cv 382.50
     Cd214.4    av    0.0010 mg/L          sd   0.00309 %cv 301.70
     Co228.6    av    0.0067 mg/L          sd   0.00279 %cv  41.70
     Ni231.6    av   -0.0087 mg/L          sd   0.02229 %cv 257.61
     Fe238.2    av    0.1000 mg/L          sd   0.05812 %cv  58.11
     Cr267.7    av    0.0055 mg/L          sd   0.00684 %cv 125.54
     Ag328.1    av   -0.0032 mg/L          sd   0.00584 %cv 185.27
     Al396.2    av    0.2254 mg/L          sd   0.14453 %cv  64.12
     Ba455.4    av   -0.0006 mg/L          sd   0.00146 %cv 238.73
     Mg279.6    av    0.2669 mg/L          sd   0.14378 %cv  53.86
     Ca393.4    av    0.2341 mg/L          sd   0.13540 %cv  57.83

12/16/92 11:42
CRI            rep   1   Zn213.8     conc     0.0326 mg/L
               rep   1   Cd214.4     conc     0.0076 mg/L
               rep   1   Co228.6     conc     0.1189 mg/L
               rep   1   Ni231.6     conc     0.0968 mg/L
               rep   1   Cr267.7     conc     0.0175 mg/L
               rep   1   Ag328.1     conc     0.0078 mg/L
               rep   2   Zn213.8     conc     0.0461 mg/L
               rep   2   Cd214.4     conc     0.0119 mg/L
               rep   2   Co228.6     conc     0.1042 mg/L
               rep   2   Ni231.6     conc     0.0509 mg/L
               rep   2   Cr267.7     conc     0.0221 mg/L
               rep   2   Ag328.1     conc     0.0160 mg/L
               rep   3   Zn213.8     conc     0.0403 mg/L
               rep   3   Cd214.4     conc     0.0078 mg/L
               rep   3   Co228.6     conc     0.1011 mg/L
               rep   3   Ni231.6     conc     0.0709 mg/L
               rep   3   Cr267.7     conc     0.0151 mg/L
               rep   3   Ag328.1     conc     0.0284 mg/L
CRI
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    Zn213.8     av    0.0397 mg/L          sd   0.00679 %cv  17.12 99
    Cd214.4     av    0.0091 mg/L          sd   0.00247 %cv  27.11 91
    Co228.6     av    0.1081 mg/L          sd   0.00949 %cv   8.79 108
    Ni231.6     av    0.0729 mg/L          sd   0.02300 %cv  31.56 91
    Cr267.7     av    0.0182 mg/L          sd   0.00357 %cv  19.57 91
    Ag328.1     av    0.0174 mg/L          sd   0.01038 %cv  59.61 87

12/16/92 11:46
L10 PBS         rep   1  Zn213.8    conc    0.0169 mg/L                      000019
                rep   1  Cd214.4    conc   -0.0079 mg/L        window edge
                rep   1  Ni231.6    conc   -0.0151 mg/L
                rep   1  Fe238.2    conc    0.0197 mg/L
                rep   1  Cr267.7    conc    0.0013 mg/L
                rep   1  Al396.2    conc    0.0151 mg/L
                rep   2  Zn213.8    conc    0.0098 mg/L
                rep   2  Cd214.4    conc   -0.0001 mg/L
                rep   2  Ni231.6    conc    0.0106 mg/L
                rep   2  Fe238.2    conc    0.0254 mg/L
                rep   2  Cr267.7    conc    0.0018 mg/L
                rep   2  Al396.2    conc   -0.1069 mg/L        window edge
                rep   3  Zn213.8    conc    0.0125 mg/L
                rep   3  Cd214.4    conc    0.0024 mg/L
                rep   3  Ni231.6    conc   -0.0004 mg/L
                rep   3  Fe238.2    conc    0.0251 mg/L
                rep   3  Cr267.7    conc    0.0017 mg/L
                rep   3  Al396.2    conc    0.0124 mg/L
L10 PBS
12/16/92 11:48
    Zn213.8     av    0.0131 mg/L          sd   0.00356 %cv  27.30 <
    Cd214.4     av   -0.0019 mg/L          sd   0.00535 %cv 284.89 <
    Ni231.6     av   -0.0016 mg/L          sd   0.01287 %cv 796.59 <
    Fe238.2     av    0.0234 mg/L          sd   0.00318 %cv  13.57 <
    Cr267.7     av    0.0016 mg/L          sd   0.00026 %cv  15.72 <
    Al396.2     av   -0.0264 mg/L          sd   0.06967 %cv 263.48 <

12/16/92 11:50
L08 PBW         rep   1  Co228.6    conc    0.0047 mg/L
                rep   2  Co228.6    conc   -0.0050 mg/L
                rep   3  Co228.6    conc   -0.0008 mg/L
L08 PBW
12/16/92 11:50
    Co228.6     av   -0.0004 mg/L          sd   0.00486 %cv 1258.1 <

12/16/92 11:51
L08 LCSW        rep   1  Co228.6    conc    2.6250 mg/L
                rep   2  Co228.6    conc    2.6699 mg/L
                rep   3  Co228.6    conc    2.6312 mg/L
L08 LCSW
12/16/92 11:52
    Co228.6     av    2.6420 mg/L          sd   0.02434 %cv   0.92

12/16/92 11:53
L10 LCSS        rep   1  Zn213.8    conc    1.7873 mg/L
                rep   1  Cd214.4    conc    0.5087 mg/L
                rep   1  Ni231.6    conc    0.5359 mg/L
                rep   1  Cr267.7    conc    0.5309 mg/L
                rep   1  Ag328.1    conc    0.0233 mg/L
                rep   2  Zn213.8    conc    1.6766 mg/L
                rep   2  Cd214.4    conc    0.5100 mg/L
                rep   2  Ni231.6    conc    0.5127 mg/L
                rep   2  Cr267.7    conc    0.5304 mg/L
                rep   2  Ag328.1    conc    0.0201 mg/L
                rep   3  Zn213.8    conc    1.7257 mg/L
                rep   3  Cd214.4    conc    0.5035 mg/L
                rep   3  Ni231.6    conc    0.5614 mg/L
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rep 3 Ag328.1 conc 0.0111 mg/L

000020

L10 LCSS
12/16/92 11:54
Zn213.8 av 1.7299 mg/L sd 0.05546 %cv 3.21
Cd214.4 av 0.5074 mg/L sd 0.00342 %cv 0.67
Ni231.6 av 0.5367 mg/L sd 0.02436 %cv 4.54
Cr267.7 av 0.5359 mg/L sd 0.00911 %cv 1.70
Ag328.1 av 0.0182 mg/L sd 0.00636 %cv 35.05

12/16/92 11:56
L10 LCSS/10 rep 1 Fe238.2 conc 5.6406 mg/L
rep 1 Al396.2 conc 4.6890 mg/L
rep 2 Fe238.2 conc 5.9333 mg/L
rep 2 Al396.2 conc 4.6529 mg/L
rep 3 Fe238.2 conc 5.7653 mg/L
rep 3 Al396.2 conc 4.7220 mg/L
L10 LCSS/10
12/16/92 11:57
Fe238.2 av 5.7797 mg/L sd 0.14692 %cv 2.54 x10 = 57.8
Al396.2 av 4.6880 mg/L sd 0.03457 %cv 0.74 x10 = 46.9

12/16/92 11:59
WA50002-1 rep 1 Zn213.8 conc 0.3087 mg/L
rep 1 Cd214.4 conc 0.0038 mg/L
rep 1 Ni231.6 conc 0.0638 mg/L
rep 1 Cr267.7 conc 0.0904 mg/L
rep 2 Zn213.8 conc 0.3408 mg/L
rep 2 Cd214.4 conc 0.0151 mg/L
rep 2 Ni231.6 conc 0.0413 mg/L
rep 2 Cr267.7 conc 0.1008 mg/L
rep 3 Zn213.8 conc 0.3173 mg/L
rep 3 Cd214.4 conc 0.0035 mg/L
rep 3 Ni231.6 conc 0.0569 mg/L
rep 3 Cr267.7 conc 0.1038 mg/L
WA50002-1
12/16/92 11:59
Zn213.8 av 0.3223 mg/L sd 0.01659 %cv 5.15
Cd214.4 av 0.0074 mg/L sd 0.00661 %cv 88.89
Ni231.6 av 0.0540 mg/L sd 0.01151 %cv 21.31
Cr267.7 av 0.0983 mg/L sd 0.00703 %cv 7.15

12/16/92 12:01
CCV rep 1 Zn213.8 conc 2.6281 mg/L
rep 1 Cd214.4 conc 2.5636 mg/L
rep 1 Co228.6 conc 2.5781 mg/L
rep 1 Ni231.6 conc 2.5695 mg/L
rep 1 Fe238.2 conc 5.2450 mg/L
rep 1 Cr267.7 conc 1.0410 mg/L
rep 1 Ag328.1 conc 1.2403 mg/L
rep 1 Al396.2 conc 10.4203 mg/L
rep 1 Ba455.4 conc 9.7627 mg/L
rep 1 Mg279.6 conc 23.5459 mg/L
rep 1 Ca393.4 conc 25.8061 mg/L
rep 2 Zn213.8 conc 2.5992 mg/L
rep 2 Cd214.4 conc 2.5924 mg/L
rep 2 Co228.6 conc 2.6169 mg/L
rep 2 Ni231.6 conc 2.3926 mg/L
rep 2 Fe238.2 conc 4.9792 mg/L
rep 2 Cr267.7 conc 1.0428 mg/L
rep 2 Ag328.1 conc 1.2860 mg/L
rep 2 Al396.2 conc 10.0993 mg/L
rep 2 Ba455.4 conc 10.0564 mg/L
rep 2 Mg279.6 conc 23.2896 mg/L
rep 2 Ca393.4 conc 26.4791 mg/L
rep 3 Zn213.8 conc 2.5753 mg/L

000021

rep	3	Ni231.6	conc	2.3109 mg/L	
rep	3	Fe238.2	conc	5.1095 mg/L	
rep	3	Cr267.7	conc	1.0193 mg/L	
rep	3	Ag328.1	conc	1.2236 mg/L	
rep	3	Al396.2	conc	10.7069 mg/L	
rep	3	Ba455.4	conc	10.4752 mg/L	
rep	3	Mg279.6	conc	24.9082 mg/L	
rep	3	Ca393.4	conc	25.6466 mg/L	

CCV
12/16/92 12:04

Zn213.8	av	2.6009 mg/L	sd	0.02645	%cv	1.02	104
Cd214.4	av	2.5761 mg/L	sd	0.01478	%cv	0.57	103
Co228.6	av	2.6092 mg/L	sd	0.02801	%cv	1.07	104
Ni231.6	av	2.4243 mg/L	sd	0.13219	%cv	5.45	97
Fe238.2	av	5.1112 mg/L	sd	0.13291	%cv	2.60	102
Cr267.7	av	1.0344 mg/L	sd	0.01306	%cv	1.26	103
Ag328.1	av	1.2480 mg/L	sd	0.02896	%cv	2.32	100
Al396.2	av	10.4089 mg/L	sd	0.30388	%cv	2.92	104
Ba455.4	av	10.0981 mg/L	sd	0.35806	%cv	3.55	101
Mg279.6	av	25.2479 mg/L	sd	0.32085	%cv	1.27	101
Ca393.4	av	25.8106 mg/L	sd	0.60347	%cv	2.34	103

12/16/92 12:07

CCB	rep	1	Zn213.8	conc	0.0023 mg/L	
	rep	1	Cd214.4	conc	0.0047 mg/L	
	rep	1	Co228.6	conc	-0.0159 mg/L	window edge
	rep	1	Ni231.6	conc	-0.0152 mg/L	
	rep	1	Fe238.2	conc	0.0092 mg/L	
	rep	1	Cr267.7	conc	0.0017 mg/L	
	rep	1	Ag328.1	conc	-0.0112 mg/L	window edge
	rep	1	Al396.2	conc	0.0235 mg/L	
	rep	1	Ba455.4	conc	0.0072 mg/L	
	rep	1	Mg279.6	conc	0.0188 mg/L	
	rep	1	Ca393.4	conc	0.0195 mg/L	
	rep	2	Zn213.8	conc	-0.0029 mg/L	
	rep	2	Cd214.4	conc	0.0017 mg/L	
	rep	2	Co228.6	conc	-0.0179 mg/L	window edge
	rep	2	Ni231.6	conc	-0.0152 mg/L	
	rep	2	Fe238.2	conc	-0.0053 mg/L	
	rep	2	Cr267.7	conc	-0.0034 mg/L	
	rep	2	Ag328.1	conc	0.0008 mg/L	
	rep	2	Al396.2	conc	0.0178 mg/L	
	rep	2	Ba455.4	conc	0.0061 mg/L	
	rep	2	Mg279.6	conc	0.0148 mg/L	
	rep	2	Ca393.4	conc	0.0141 mg/L	
	rep	3	Zn213.8	conc	-0.0025 mg/L	
	rep	3	Cd214.4	conc	-0.0068 mg/L	
	rep	3	Co228.6	conc	0.0051 mg/L	
	rep	3	Ni231.6	conc	0.0001 mg/L	
	rep	3	Fe238.2	conc	-0.0100 mg/L	
	rep	3	Cr267.7	conc	0.0042 mg/L	
	rep	3	Ag328.1	conc	-0.0045 mg/L	
	rep	3	Al396.2	conc	-0.0094 mg/L	
	rep	3	Ba455.4	conc	0.0022 mg/L	
	rep	3	Mg279.6	conc	0.0057 mg/L	
	rep	3	Ca393.4	conc	0.0047 mg/L	

CCB
12/16/92 12:09

Zn213.8	av	-0.0010 mg/L	sd	0.00291	%cv	279.87	<
Cd214.4	av	-0.0001 mg/L	sd	0.00597	%cv	4572.2	<
Co228.6	av	-0.0096 mg/L	sd	0.01276	%cv	133.32	<
Ni231.6	av	-0.0101 mg/L	sd	0.00881	%cv	[illegible]	<
Fe238.2	av	0.0046 mg/L	sd	0.00864	%cv	186.90	<
Cr267.7	av	0.0008 mg/L	sd	0.00386	%cv	475.75	<

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    Al396.2     av    0.0108 mg/L         sd   0.01753 %cv 165.65<
    Ba455.4     av    0.0051 mg/L         sd   0.00262 %cv  51.04 Rerun-carryover
    Mg279.6     av    0.0131 mg/L         sd   0.00673 %cv  51.32<
    Ca393.4     av    0.0128 mg/L         sd   0.00747 %cv  58.51<

12/16/92 12:13
CCB              rep   1  Ba455.4    conc    0.0005 mg/L
                 rep   2  Ba455.4    conc    0.0010 mg/L          window edge
                 rep   3  Ba455.4    conc    0.0003 mg/L
CCB
12/16/92 12:13
    Ba455.4     av    0.0006 mg/L         sd   0.00038 %cv  62.74<

12/16/92 12:15
WA50002-2        rep   1  Zn213.8    conc    0.6117 mg/L
                 rep   1  Cd214.4    conc    0.0105 mg/L
                 rep   1  Ni231.6    conc   -0.0155 mg/L
                 rep   1  Cr267.7    conc    0.1093 mg/L
                 rep   2  Zn213.8    conc    0.6048 mg/L
                 rep   2  Cd214.4    conc    0.0081 mg/L
                 rep   2  Ni231.6    conc    0.0480 mg/L
                 rep   2  Cr267.7    conc    0.1014 mg/L
                 rep   3  Zn213.8    conc    0.6397 mg/L
                 rep   3  Cd214.4    conc    0.0054 mg/L
                 rep   3  Ni231.6    conc    0.0174 mg/L
                 rep   3  Cr267.7    conc    0.1027 mg/L
WA50002-2
12/16/92 12:16
    Zn213.8     av    0.6187 mg/L         sd   0.01845 %cv   2.98
    Cd214.4     av    0.0080 mg/L         sd   0.00255 %cv  31.78<
    Ni231.6     av    0.0167 mg/L         sd   0.03175 %cv 190.65<
    Cr267.7     av    0.1045 mg/L         sd   0.00422 %cv   4.04

12/16/92 12:18
WA50002-3        rep   1  Zn213.8    conc    0.2201 mg/L
                 rep   1  Cd214.4    conc    0.0065 mg/L
                 rep   1  Ni231.6    conc    0.0604 mg/L
                 rep   1  Cr267.7    conc    0.0975 mg/L
                 rep   2  Zn213.8    conc    0.2294 mg/L
                 rep   2  Cd214.4    conc    0.0051 mg/L
                 rep   2  Ni231.6    conc   -0.0185 mg/L
                 rep   2  Cr267.7    conc    0.1015 mg/L
                 rep   3  Zn213.8    conc    0.2229 mg/L
                 rep   3  Cd214.4    conc    0.0036 mg/L
                 rep   3  Ni231.6    conc   -0.0083 mg/L
                 rep   3  Cr267.7    conc    0.1132 mg/L
WA50002-3
12/16/92 12:19
    Zn213.8     av    0.2241 mg/L         sd   0.00476 %cv   2.12
    Cd214.4     av    0.0051 mg/L         sd   0.00146 %cv  28.75<
    Ni231.6     av    0.0112 mg/L         sd   0.04292 %cv 384.19<
    Cr267.7     av    0.1041 mg/L         sd   0.00818 %cv   7.86

12/16/92 12:21
WA50002-4        rep   1  Zn213.8    conc    0.2919 mg/L
                 rep   1  Cd214.4    conc    0.0026 mg/L
                 rep   1  Ni231.6    conc    0.0122 mg/L
                 rep   1  Cr267.7    conc    0.0481 mg/L
                 rep   2  Zn213.8    conc    0.3069 mg/L
                 rep   2  Cd214.4    conc    0.0096 mg/L
                 rep   2  Ni231.6    conc   -0.0092 mg/L
                 rep   2  Cr267.7    conc    0.0434 mg/L
                 rep   3  Zn213.8    conc    0.3231 mg/L
                 rep   3  Cd214.4    conc    0.0024 mg/L
                 rep   3  Ni231.6    conc   -0.0056 mg/L
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000022

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WA50002-4
12/16/92 12:22
  Zn213.8      av     0.3073 mg/L          sd    0.01559 %cv    5.07
  Cd214.4      av     0.0049 mg/L          sd    0.00412 %cv   84.42<
  Ni231.6      av    -0.0009 mg/L          sd    0.01148 %cv 1303.9<
  Cr267.7      av     0.0453 mg/L          sd    0.00252 %cv    5.56

12/16/92 12:24
WA50007-1      rep   1  Cd214.4    conc    0.1528 mg/L
               rep   1  Ni231.6    conc    0.3784 mg/L
               rep   2  Cd214.4    conc    0.1373 mg/L
               rep   2  Ni231.6    conc    0.3336 mg/L
               rep   3  Cd214.4    conc    0.1347 mg/L
               rep   3  Ni231.6    conc    0.3494 mg/L
WA50007-1
12/16/92 12:24
  Cd214.4      av     0.1416 mg/L          sd    0.00978 %cv    6.91
  Ni231.6      av     0.3638 mg/L          sd    0.01446 %cv    3.98

12/16/92 12:26
WA50007-1/5    rep   1  Zn213.8    conc    3.2082 mg/L
               rep   2  Zn213.8    conc    3.3186 mg/L
               rep   3  Zn213.8    conc    3.3408 mg/L
WA50007-1/5
12/16/92 12:26
  Zn213.8      av     3.2892 mg/L          sd    0.07101 %cv    2.16 x5 - 164

12/16/92 12:28
WA50007-1/20   rep   1  Fe238.2    conc    8.6923 mg/L
               rep   1  Mg279.6    conc   13.5274 mg/L
               rep   1  Ca393.4    conc  121.6422 mg/L
               rep   2  Fe238.2    conc    8.3595 mg/L
               rep   2  Mg279.6    conc   13.7530 mg/L
               rep   2  Ca393.4    conc  121.0401 mg/L
               rep   3  Fe238.2    conc    8.6920 mg/L
               rep   3  Mg279.6    conc   13.9619 mg/L
               rep   3  Ca393.4    conc  119.7859 mg/L
WA50007-1/20
12/16/92 12:29
  Fe238.2      av     8.5813 mg/L          sd    0.19204 %cv    2.24 x20 - 172
  Mg279.6      av    13.7474 mg/L          sd    0.21729 %cv    1.58 x20 - 275
  Ca393.4      av   120.8227 mg/L          sd    0.94706 %cv    0.78 Rerun

12/16/92 12:31
L15 PBS        rep   1  Cd214.4    conc    0.0030 mg/L
               rep   1  Cr267.7    conc    0.0042 mg/L
               rep   1  Ag328.1    conc    0.0006 mg/L
               rep   1  Ba455.4    conc    0.0027 mg/L
               rep   2  Cd214.4    conc   -0.0043 mg/L          window edge
               rep   2  Cr267.7    conc    0.0067 mg/L
               rep   2  Ag328.1    conc   -0.0018 mg/L
               rep   2  Ba455.4    conc    0.0016 mg/L
               rep   3  Cd214.4    conc    0.0011 mg/L
               rep   3  Cr267.7    conc   -0.0038 mg/L          window edge
               rep   3  Ag328.1    conc    0.0027 mg/L
               rep   3  Ba455.4    conc    0.0006 mg/L          window edge
L15 PBS
12/16/92 12:32
  Cd214.4      av    -0.0001 mg/L          sd    0.00376 %cv 4747.9<
  Cr267.7      av     0.0024 mg/L          sd    0.00547 %cv  232.54<
  Ag328.1      av     0.0005 mg/L          sd    0.00226 %cv  445.51<
  Ba455.4      av     0.0016 mg/L          sd    0.00104 %cv   64.00<

12/16/92 12:34
L15 LCSS       rep   1  Cd214.4    conc    0.5321 mg/L
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000023

	rep	1	Ag328.1	conc	0.1815	mg/L
	rep	1	Ba455.4	conc	1.5543	mg/L
	rep	2	Cd214.4	conc	0.5153	mg/L
	rep	2	Cr267.7	conc	0.5325	mg/L
	rep	2	Ag328.1	conc	0.1871	mg/L
	rep	2	Ba455.4	conc	1.6249	mg/L
	rep	3	Cd214.4	conc	0.5222	mg/L
	rep	3	Cr267.7	conc	0.5215	mg/L
	rep	3	Ag328.1	conc	0.1808	mg/L
	rep	3	Ba455.4	conc	1.6362	mg/L

000024

L15 LCSS
12/16/92 12:35

Cd214.4	av	0.5232 mg/L	sd	0.00849	%cv	1.62
Cr267.7	av	0.5283 mg/L	sd	0.00595	%cv	1.13
Ag328.1	av	0.1831 mg/L	sd	0.00348	%cv	1.90
Ba455.4	av	1.6051 mg/L	sd	0.04438	%cv	2.77

12/16/92 12:38

WA51011-1	rep	1	Ag328.1	conc	0.1463	mg/L
	rep	2	Ag328.1	conc	0.1512	mg/L
	rep	3	Ag328.1	conc	0.1428	mg/L

WA51011-1
12/16/92 12:38

Ag328.1	av	0.1468 mg/L	sd	0.00425	%cv	2.90

12/16/92 12:40

WA51011-1MS	rep	1	Ag328.1	conc	0.5116	mg/L
	rep	2	Ag328.1	conc	0.5150	mg/L
	rep	3	Ag328.1	conc	0.4951	mg/L

WA51011-1MS
12/16/92 12:40

Ag328.1	av	0.5072 mg/L	sd	0.01065	%cv	2.10

12/16/92 12:43

CCV	rep	1	Zn213.8	conc	2.6619	mg/L
	rep	1	Cd214.4	conc	2.8428	mg/L
	rep	1	Co228.6	conc	2.7597	mg/L
	rep	1	Ni231.6	conc	2.5687	mg/L
	rep	1	Fe238.2	conc	5.2276	mg/L
	rep	1	Cr267.7	conc	1.0668	mg/L
	rep	1	Ag328.1	conc	1.2742	mg/L
	rep	1	Al396.2	conc	10.7073	mg/L
	rep	1	Ba455.4	conc	10.8838	mg/L
	rep	1	Mg279.6	conc	26.8558	mg/L
	rep	1	Ca393.4	conc	26.2410	mg/L
	rep	2	Zn213.8	conc	2.6663	mg/L
	rep	2	Cd214.4	conc	2.6725	mg/L
	rep	2	Co228.6	conc	2.7190	mg/L
	rep	2	Ni231.6	conc	2.5702	mg/L
	rep	2	Fe238.2	conc	5.7010	mg/L
	rep	2	Cr267.7	conc	1.1024	mg/L
	rep	2	Ag328.1	conc	1.2985	mg/L
	rep	2	Al396.2	conc	10.4057	mg/L
	rep	2	Ba455.4	conc	10.7182	mg/L
	rep	2	Mg279.6	conc	26.2140	mg/L
	rep	2	Ca393.4	conc	26.0530	mg/L
	rep	3	Zn213.8	conc	2.6298	mg/L
	rep	3	Cd214.4	conc	2.6950	mg/L
	rep	3	Co228.6	conc	2.6817	mg/L
	rep	3	Ni231.6	conc	2.6265	mg/L
	rep	3	Fe238.2	conc	5.2102	mg/L
	rep	3	Cr267.7	conc	1.0906	mg/L
	rep	3	Ag328.1	conc	1.2989	mg/L
	rep	3	Al396.2	conc	10.7015	mg/L
	rep	3	Ba455.4	conc	10.7725	mg/L

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                 rep   3  Ca393.4     conc    25.9043 mg/L
CCV
12/16/92 12:46
     Zn213.8     av    2.6527 mg/L         sd    0.01991 %cv    0.75 106
     Cd214.4     av    2.7368 mg/L         sd    0.09257 %cv    3.38 109
     Co228.6     av    2.7202 mg/L         sd    0.03902 %cv    1.43 109
     Ni231.6     av    2.5885 mg/L         sd    0.03295 %cv    1.27 104
     Fe238.2     av    5.3796 mg/L         sd    0.27846 %cv    5.18 108
     Cr267.7     av    1.0866 mg/L         sd    0.01812 %cv    1.67 109
     Ag328.1     av    1.2905 mg/L         sd    0.01418 %cv    1.10 103
     Al396.2     av   10.6048 mg/L         sd    0.17245 %cv    1.63 106
     Ba455.4     av   10.7915 mg/L         sd    0.08442 %cv    0.78 108
     Mg279.6     av   26.5740 mg/L         sd    0.32800 %cv    1.23 106
     Ca393.4     av   26.0661 mg/L         sd    0.16873 %cv    0.65 104

12/16/92 12:50
CCB              rep   1  Zn213.8     conc     0.0067 mg/L
                 rep   1  Cd214.4     conc    -0.0063 mg/L
                 rep   1  Co228.6     conc     0.0072 mg/L
                 rep   1  Ni231.6     conc    -0.0004 mg/L
                 rep   1  Fe238.2     conc     0.0016 mg/L
                 rep   1  Cr267.7     conc     0.0007 mg/L
                 rep   1  Ag328.1     conc     0.0034 mg/L
                 rep   1  Al396.2     conc     0.0153 mg/L
                 rep   1  Ba455.4     conc     0.0070 mg/L
                 rep   1  Mg279.6     conc     0.0180 mg/L
                 rep   1  Ca393.4     conc     0.0219 mg/L
                 rep   2  Zn213.8     conc     0.0005 mg/L           window edge
                 rep   2  Cd214.4     conc     0.0031 mg/L
                 rep   2  Co228.6     conc    -0.0000 mg/L
                 rep   2  Ni231.6     conc     0.0072 mg/L
                 rep   2  Fe238.2     conc     0.0270 mg/L
                 rep   2  Cr267.7     conc    -0.0008 mg/L
                 rep   2  Ag328.1     conc    -0.0010 mg/L
                 rep   2  Al396.2     conc     0.0499 mg/L
                 rep   2  Ba455.4     conc     0.0037 mg/L
                 rep   2  Mg279.6     conc     0.0121 mg/L
                 rep   2  Ca393.4     conc     0.0173 mg/L
                 rep   3  Zn213.8     conc    -0.0067 mg/L
                 rep   3  Cd214.4     conc     0.0016 mg/L
                 rep   3  Co228.6     conc     0.0046 mg/L
                 rep   3  Ni231.6     conc     0.0070 mg/L
                 rep   3  Fe238.2     conc     0.0020 mg/L
                 rep   3  Cr267.7     conc    -0.0061 mg/L
                 rep   3  Ag328.1     conc    -0.0044 mg/L
                 rep   3  Al396.2     conc     0.0591 mg/L
                 rep   3  Ba455.4     conc     0.0016 mg/L
                 rep   3  Mg279.6     conc     0.0057 mg/L
                 rep   3  Ca393.4     conc     0.0131 mg/L
CCB
12/16/92 12:52
     Zn213.8     av    0.0002 mg/L         sd    0.00674 %cv 3763.6 <
     Cd214.4     av   -0.0005 mg/L         sd    0.00503 %cv  973.65 <
     Co228.6     av    0.0039 mg/L         sd    0.00367 %cv   93.59 <
     Ni231.6     av    0.0046 mg/L         sd    0.00434 %cv   94.19 <
     Fe238.2     av    0.0102 mg/L         sd    0.01452 %cv  142.25 <
     Cr267.7     av   -0.0021 mg/L         sd    0.00354 %cv  172.56 <
     Ag328.1     av   -0.0007 mg/L         sd    0.00388 %cv  570.23 <
     Al396.2     av    0.0414 mg/L         sd    0.02310 %cv   55.80 <
     Ba455.4     av    0.0041 mg/L         sd    0.00269 %cv   65.51 <
     Mg279.6     av    0.0119 mg/L         sd    0.00613 %cv   51.28 <
     Ca393.4     av    0.0174 mg/L         sd    0.00442 %cv   25.82 <

12/16/92 12:55
WA51011-1MSD     rep   1  Ag328.1     conc     0.4415 mg/L
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000025

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                 rep   2  Ag328.1    conc     [illegible] mg/L
                 rep   3  Ag328.1    conc     0.4502 mg/L
WA51011-1MSD
12/16/92 12:55
  Ag328.1        av     0.4457 mg/L         sd    0.00439 %cv    0.98

12/16/92 12:57
WA51011-2        rep   1  Ag328.1    conc     0.0244 mg/L
                 rep   2  Ag328.1    conc     0.0224 mg/L
                 rep   3  Ag328.1    conc     0.0259 mg/L                      000026
WA51011-2
12/16/92 12:57
  Ag328.1        av     0.0242 mg/L         sd    0.00174 %cv    7.18

12/16/92 12:59
WA51011-3        rep   1  Ag328.1    conc     0.0442 mg/L
                 rep   2  Ag328.1    conc     0.0484 mg/L
                 rep   3  Ag328.1    conc     0.0524 mg/L
WA51011-3
12/16/92 13:00
  Ag328.1        av     0.0483 mg/L         sd    0.00408 %cv    8.44

12/16/92 13:01
WA51011-4        rep   1  Ag328.1    conc    -0.0105 mg/L         window edge
                 rep   2  Ag328.1    conc     0.0067 mg/L         window edge
                 rep   3  Ag328.1    conc     0.0005 mg/L
WA51011-4
12/16/92 13:02
  Ag328.1        av    -0.0011 mg/L         sd    0.00870 %cv  802.16

12/16/92 13:04
WA51011-5        rep   1  Ag328.1    conc     0.0015 mg/L
                 rep   2  Ag328.1    conc     0.0044 mg/L
                 rep   3  Ag328.1    conc    -0.0019 mg/L
WA51011-5
12/16/92 13:04
  Ag328.1        av     0.0013 mg/L         sd    0.00314 %cv  234.53

12/16/92 13:06
WA51011-6        rep   1  Ag328.1    conc     0.0183 mg/L
                 rep   2  Ag328.1    conc     0.0163 mg/L
                 rep   3  Ag328.1    conc     0.0181 mg/L
WA51011-6
12/16/92 13:06
  Ag328.1        av     0.0176 mg/L         sd    0.00110 %cv    6.25

12/16/92 13:08
WA51011-7        rep   1  Ag328.1    conc     0.2581 mg/L
                 rep   2  Ag328.1    conc     0.2414 mg/L
                 rep   3  Ag328.1    conc     [illegible] mg/L
WA51011-7
12/16/92 13:08
  Ag328.1        av     0.2509 mg/L         sd    0.00859 %cv    3.42

12/16/92 13:10
WA51011-8        rep   1  Ag328.1    conc     0.0326 mg/L
                 rep   2  Ag328.1    conc     0.0342 mg/L
                 rep   3  Ag328.1    conc     0.0201 mg/L
WA51011-8
12/16/92 13:11
  Ag328.1        av     0.0290 mg/L         sd    0.00768 %cv   26.51

12/16/92 13:12
WA51011-9        rep   1  Ag328.1    conc     0.0279 mg/L
                 rep   2  Ag328.1    conc     0.0240 mg/L
                 rep   3  Ag328.1    conc     0.0850 mg/L
```

WA51011-9
12/16/92 13:13

Ag328.1	av	0.0456 mg/L	sd	0.03416	%cv	74.84

12/16/92 13:15

WA51011-10	rep 1	Ag328.1	conc	0.3279 mg/L	
	rep 2	Ag328.1	conc	0.3337 mg/L	
	rep 3	Ag328.1	conc	0.3194 mg/L	

WA51011-10
12/16/92 13:15

000027

Ag328.1	av	0.3270 mg/L	sd	0.00717	%cv	2.19

12/16/92 13:21

CCV	rep 1	Zn213.8	conc	2.6627 mg/L
	rep 1	Cd214.4	conc	2.8598 mg/L
	rep 1	Co228.6	conc	2.6512 mg/L
	rep 1	Ni231.6	conc	2.6122 mg/L
	rep 1	Fe238.2	conc	5.2991 mg/L
	rep 1	Cr267.7	conc	1.0383 mg/L
	rep 1	Ag328.1	conc	1.2892 mg/L
	rep 1	Al396.2	conc	10.6529 mg/L
	rep 1	Ba455.4	conc	10.6017 mg/L
	rep 1	Mg279.6	conc	25.1657 mg/L
	rep 1	Ca393.4	conc	27.7286 mg/L
	rep 2	Zn213.8	conc	2.6363 mg/L
	rep 2	Cd214.4	conc	2.6194 mg/L
	rep 2	Co228.6	conc	2.6168 mg/L
	rep 2	Ni231.6	conc	2.5691 mg/L
	rep 2	Fe238.2	conc	5.1490 mg/L
	rep 2	Cr267.7	conc	1.0346 mg/L
	rep 2	Ag328.1	conc	1.2818 mg/L
	rep 2	Al396.2	conc	10.5834 mg/L
	rep 2	Ba455.4	conc	10.9945 mg/L
	rep 2	Mg279.6	conc	27.1843 mg/L
	rep 2	Ca393.4	conc	27.2452 mg/L
	rep 3	Zn213.8	conc	2.6662 mg/L
	rep 3	Cd214.4	conc	2.7563 mg/L
	rep 3	Co228.6	conc	2.5494 mg/L
	rep 3	Ni231.6	conc	2.6302 mg/L
	rep 3	Fe238.2	conc	5.1762 mg/L
	rep 3	Cr267.7	conc	1.0760 mg/L
	rep 3	Ag328.1	conc	1.2699 mg/L
	rep 3	Al396.2	conc	10.4211 mg/L
	rep 3	Ba455.4	conc	10.5665 mg/L
	rep 3	Mg279.6	conc	25.8464 mg/L
	rep 3	Ca393.4	conc	26.6619 mg/L

CCV
12/16/92 13:23

Zn213.8	av	2.6551 mg/L	sd	0.01637	%cv	0.62	106
Cd214.4	av	2.7452 mg/L	sd	0.12057	%cv	4.39	110
Co228.6	av	2.6058 mg/L	sd	0.05180	%cv	[illegible]	104
Ni231.6	av	2.6038 mg/L	sd	0.03142	%cv	1.21	104
Fe238.2	av	5.2081 mg/L	sd	0.07995	%cv	1.54	104
Cr267.7	av	1.0497 mg/L	sd	0.02293	%cv	2.18	105
Ag328.1	av	1.2803 mg/L	sd	0.00975	%cv	0.76	102
Al396.2	av	10.5525 mg/L	sd	0.11896	%cv	1.13	106
Ba455.4	av	10.7209 mg/L	sd	0.23761	%cv	2.22	107
Mg279.6	av	26.0655 mg/L	sd	1.02700	%cv	3.94	104
Ca393.4	av	27.2119 mg/L	sd	0.53414	%cv	1.96	109

12/16/92 13:26

CCB	rep 1	Zn213.8	conc	0.0031 mg/L
	rep 1	Cd214.4	conc	0.0028 mg/L
	rep 1	Co228.6	conc	-0.0353 mg/L
	rep 1	Ni231.6	conc	-0.0070 mg/L
	rep 1	Fe238.2	conc	0.0281 mg/L

window edge

000028

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rep  1  Ag328.1   conc  -0.0038 mg/L
rep  1  Al396.2   conc   0.0006 mg/L
rep  1  Ba455.4   conc   0.0071 mg/L
rep  1  Mg279.6   conc   0.0159 mg/L
rep  1  Ca393.4   conc   0.0210 mg/L
rep  2  Zn213.8   conc  -0.0058 mg/L
rep  2  Cd214.4   conc  -0.0005 mg/L
rep  2  Co228.6   conc   0.0019 mg/L
rep  2  Ni231.6   conc  -0.0015 mg/L
rep  2  Fe238.2   conc  -0.0037 mg/L
rep  2  Cr267.7   conc   0.0002 mg/L
rep  2  Ag328.1   conc   0.0030 mg/L
rep  2  Al396.2   conc   0.0114 mg/L
rep  2  Ba455.4   conc   0.0055 mg/L
rep  2  Mg279.6   conc   0.0145 mg/L
rep  2  Ca393.4   conc   0.0167 mg/L
rep  3  Zn213.8   conc  -0.0064 mg/L
rep  3  Cd214.4   conc   0.0010 mg/L
rep  3  Co228.6   conc  -0.0163 mg/L        window edge
rep  3  Ni231.6   conc  -0.0359 mg/L        window edge
rep  3  Fe238.2   conc   0.0022 mg/L
rep  3  Cr267.7   conc   0.0090 mg/L
rep  3  Ag328.1   conc   0.0063 mg/L
rep  3  Al396.2   conc   0.0343 mg/L
rep  3  Ba455.4   conc   0.0031 mg/L
rep  3  Mg279.6   conc   0.0100 mg/L
rep  3  Ca393.4   conc   0.0101 mg/L
CCB
12/16/92 13:29
  Zn213.8  av  -0.0030 mg/L   sd  0.00533 %cv 175.65<
  Cd214.4  av   0.0011 mg/L   sd  0.00163 %cv 148.15<
  Co228.6  av  -0.0166 mg/L   sd  0.01860 %cv 112.34<
  Ni231.6  av  -0.0148 mg/L   sd  0.01853 %cv 125.27<
  Fe238.2  av   0.0062 mg/L   sd  0.01239 %cv 199.16<
  Cr267.7  av   0.0053 mg/L   sd  0.00456 %cv  86.05<
  Ag328.1  av   0.0018 mg/L   sd  0.00512 %cv 278.88<
  Al396.2  av   0.0155 mg/L   sd  0.01724 %cv 111.60<
  Ba455.4  av   0.0053 mg/L   sd  0.00202 %cv  38.30 Rerun-carryover
  Mg279.6  av   0.0135 mg/L   sd  0.00309 %cv  22.90<
  Ca393.4  av   0.0159 mg/L   sd  0.00548 %cv  34.45<

12/16/92 13:31
WAA51007-1   rep  1  Cd214.4   conc   0.0708 mg/L
             rep  1  Cr267.7   conc   0.5496 mg/L
             rep  1  Ag328.1   conc   0.0016 mg/L
             rep  1  Ba455.4   conc   2.1205 mg/L
             rep  2  Cd214.4   conc   0.0799 mg/L    NA
             rep  2  Cr267.7   conc   0.5613 mg/L
12/16/92 13:32
WAA51007-1   rep  2  Ag328.1   conc  -0.0037 mg/L
12/16/92 13:37
CCB          rep  1  Zn213.8   conc  -0.0055 mg/L
             rep  1  Cd214.4   conc   0.0023 mg/L
             rep  1  Co228.6   conc   0.0011 mg/L
             rep  1  Ni231.6   conc  -0.0036 mg/L
             rep  1  Fe238.2   conc   0.0867 mg/L
             rep  1  Cr267.7   conc   0.0082 mg/L
             rep  1  Ag328.1   conc  -0.0121 mg/L        window edge
             rep  1  Al396.2   conc   0.0268 mg/L
             rep  1  Ba455.4   conc   0.0004 mg/L
             rep  1  Mg279.6   conc   0.0118 mg/L
             rep  1  Ca393.4   conc   0.0105 mg/L
             rep  2  Zn213.8   conc  -0.0058 mg/L
             rep  2  Cd214.4   conc  -0.0031 mg/L
             rep  2  Co228.6   conc  -0.0018 mg/L
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                   rep   2  Ni231.6     conc    -0.0266 mg/L
                   rep   2  Fe238.2     conc     0.0425 mg/L
                   rep   2  Cr267.7     conc    -0.0014 mg/L
                   rep   2  Ag328.1     conc     0.0046 mg/L
                   rep   2  Al396.2     conc     0.0749 mg/L
                   rep   2  Ba455.4     conc     0.0003 mg/L
                   rep   2  Mg279.6     conc     0.0075 mg/L
                   rep   2  Ca393.4     conc     0.0080 mg/L
                   rep   3  Zn213.8     conc    -0.0276 mg/L          window edge
                   rep   3  Cd214.4     conc    -0.0008 mg/L
                   rep   3  Co228.6     conc    -0.0160 mg/L          window edge
                   rep   3  Ni231.6     conc     0.0111 mg/L
                   rep   3  Fe238.2     conc     0.0273 mg/L
                   rep   3  Cr267.7     conc     0.0053 mg/L
                   rep   3  Ag328.1     conc     0.0014 mg/L
                   rep   3  Al396.2     conc     0.0097 mg/L
                   rep   3  Ba455.4     conc    -0.0003 mg/L          window edge
                   rep   3  Mg279.6     conc     0.0039 mg/L
                   rep   3  Ca393.4     conc     0.0055 mg/L
CCB
12/16/92 13:39
    Zn213.8      av    -0.0130 mg/L        sd   0.01264 %cv  97.61<
    Cd214.4      av    -0.0005 mg/L        sd   0.00271 %cv 522.22<
    Co228.6      av    -0.0056 mg/L        sd   0.00915 %cv 164.51<
    Ni231.6      av    -0.0040 mg/L        sd   0.02007 %cv 497.39<
    Fe238.2      av     0.0521 mg/L        sd   0.03086 %cv  59.18 Rerun - carry over
    Cr267.7      av     0.0041 mg/L        sd   0.00492 %cv 121.50<
    Ag328.1      av    -0.0020 mg/L        sd   0.00888 %cv 436.59<
    Al396.2      av     0.0371 mg/L        sd   0.03381 %cv  91.06<
    Ba455.4      av     0.0002 mg/L        sd   0.00037 %cv 224.07<
    Mg279.6      av     0.0077 mg/L        sd   0.00397 %cv  51.61<
    Ca393.4      av     0.0080 mg/L        sd   0.00249 %cv  31.06<

12/16/92 13:45
CCB                rep   1  Fe238.2     conc     0.0140 mg/L
                   rep   2  Fe238.2     conc     0.0170 mg/L
                   rep   3  Fe238.2     conc     0.0057 mg/L
CCB
12/16/92 13:45
    Fe238.2      av     0.0122 mg/L        sd   0.00587 %cv  47.99<

12/16/92 13:47
WAA51007-1         rep   1  Cd214.4     conc     0.0656 mg/L
                   rep   1  Cr267.7     conc     0.5626 mg/L
                   rep   1  Ag328.1     conc    -0.0014 mg/L
                   rep   1  Ba455.4     conc     2.1573 mg/L
                   rep   2  Cd214.4     conc     0.0703 mg/L
                   rep   2  Cr267.7     conc     0.5476 mg/L
                   rep   2  Ag328.1     conc     0.0004 mg/L
                   rep   2  Ba455.4     conc     2.1129 mg/L
                   rep   3  Cd214.4     conc     0.0676 mg/L
                   rep   3  Cr267.7     conc     0.5637 mg/L
                   rep   3  Ag328.1     conc     0.0109 mg/L
                   rep   3  Ba455.4     conc     2.0781 mg/L
WAA51007-1
12/16/92 13:49
    Cd214.4      av     0.0678 mg/L        sd   0.00240 %cv   3.53
    Cr267.7      av     0.5580 mg/L        sd   0.00899 %cv   1.61
    Ag328.1      av     0.0033 mg/L        sd   0.00662 %cv 202.22<
    Ba455.4      av     2.1161 mg/L        sd   0.03972 %cv   1.88

12/16/92 13:52
WA50007-1/100      rep   1  Ca393.4     conc    26.3706 mg/L
                   rep   2  Ca393.4     conc    26.3381 mg/L
                   rep   3  Ca393.4     conc    25.6019 mg/L
WA50007-1/100
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\Ca393.4      av    26.1032 mg/L          sd    0.43530 %cv    1.67 x100= 2610

12/16/92 13:54
throw away      rep   1  Cd214.4   conc   -0.0037 mg/L        window edge
                rep   1  Cr267.7   conc    0.0001 mg/L
                rep   1  Ag328.1   conc   -0.0017 mg/L
                rep   1  Ba455.4   conc   -0.0024 mg/L        window edge
                rep   2  Cd214.4   conc   -0.0046 mg/L        window edge
                rep   2  Cr267.7   conc    0.0012 mg/L
                rep   2  Ag328.1   conc   -0.0112 mg/L                      000030
                rep   2  Ba455.4   conc    0.0007 mg/L
                rep   3  Cd214.4   conc    0.0004 mg/L
                rep   3  Cr267.7   conc    0.0061 mg/L
                rep   3  Ag328.1   conc   -0.0132 mg/L        window edge
                rep   3  Ba455.4   conc    0.0007 mg/L
throw away
12/16/92 13:55
    Cd214.4     av    -0.0026 mg/L          sd    0.00268 %cv  102.18
    Cr267.7     av     0.0025 mg/L          sd    0.00322 %cv  130.77  NA
    Ag328.1     av    -0.0087 mg/L          sd    0.00614 %cv   70.60
    Ba455.4     av    -0.0004 mg/L          sd    0.00177 %cv  499.52

12/16/92 14:02
CCV             rep   1  Cd214.4   conc    2.6149 mg/L
                rep   1  Cr267.7   conc    1.0647 mg/L
                rep   1  Ag328.1   conc    1.2847 mg/L
                rep   1  Ba455.4   conc   10.4470 mg/L
                rep   2  Cd214.4   conc    2.6057 mg/L
                rep   2  Cr267.7   conc    1.0179 mg/L
                rep   2  Ag328.1   conc    1.2839 mg/L
                rep   2  Ba455.4   conc   10.2593 mg/L
                rep   3  Cd214.4   conc    2.6273 mg/L
                rep   3  Cr267.7   conc    1.0716 mg/L
                rep   3  Ag328.1   conc    1.3547 mg/L
                rep   3  Ba455.4   conc   10.2783 mg/L
CCV
12/16/92 14:03
    Cd214.4     av     2.6160 mg/L          sd    0.01081 %cv    0.41 105
    Cr267.7     av     1.0514 mg/L          sd    0.02921 %cv    2.78 105
    Ag328.1     av     1.3078 mg/L          sd    0.04062 %cv    3.11 105
    Ba455.4     av    10.3282 mg/L          sd    0.10329 %cv    1.00 103

12/16/92 14:05
CCB             rep   1  Cd214.4   conc    0.0014 mg/L
                rep   1  Cr267.7   conc   -0.0049 mg/L
                rep   1  Ag328.1   conc   -0.0017 mg/L
                rep   1  Ba455.4   conc    0.0058 mg/L
                rep   2  Cd214.4   conc    0.0024 mg/L
                rep   2  Cr267.7   conc    0.0059 mg/L
                rep   2  Ag328.1   conc   -0.0003 mg/L
                rep   2  Ba455.4   conc    0.0044 mg/L
                rep   3  Cd214.4   conc    0.0048 mg/L
                rep   3  Cr267.7   conc   -0.0025 mg/L
                rep   3  Ag328.1   conc   -0.0004 mg/L
                rep   3  Ba455.4   conc    0.0052 mg/L
CCB
12/16/92 14:06
    Cd214.4     av     0.0029 mg/L          sd    0.00178 %cv   62.06
    Cr267.7     av    -0.0005 mg/L          sd    0.00564 %cv 1106.84
    Ag328.1     av    -0.0008 mg/L          sd    0.00080 %cv   99.09
    Ba455.4     av     0.0051 mg/L          sd    0.00070 %cv   13.59 Rerun-carry over

12/16/92 14:09
CCB             rep   1  Ba455.4   conc    0.0002 mg/L
                rep   2  Ba455.4   conc    0.0003 mg/L
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        rep   3  Ba455.4     conc     0.0002 mg/L
CCB
12/16/92 14:10
    Ba455.4     av    -0.0000 mg/L          sd    0.00030 %cv  1343.2<

12/16/92 14:11
CCV             rep    1  Ca393.4     conc    26.9561 mg/L
                rep    2  Ca393.4     conc    26.6540 mg/L
                rep    3  Ca393.4     conc    26.3403 mg/L
CCV
12/16/92 14:11
    Ca393.4     av    26.6501 mg/L          sd    0.30792 %cv    1.16 106 107          000031

12/16/92 14:15
CCB             rep    1  Ca393.4     conc     0.0058 mg/L
                rep    2  Ca393.4     conc     0.0067 mg/L
                rep    3  Ca393.4     conc     0.0066 mg/L
CCB
12/16/92 14:16
    Ca393.4     av     0.0064 mg/L          sd    0.00049 %cv    7.73<

12/16/92 14:18
ICSA            rep    1  Zn213.8     conc    -0.0153 mg/L
                rep    1  Cd214.4     conc     0.0072 mg/L          window edge
                rep    1  Co228.6     conc     0.0008 mg/L
                rep    1  Ni231.6     conc    -0.0207 mg/L          window edge
                rep    1  Cr267.7     conc     0.0020 mg/L
                rep    1  Ag328.1     conc     0.0013 mg/L
                rep    1  Ba455.4     conc     0.0008 mg/L
                rep    2  Zn213.8     conc     0.0067 mg/L
                rep    2  Cd214.4     conc     0.0104 mg/L
                rep    2  Co228.6     conc     0.0083 mg/L
                rep    2  Ni231.6     conc    -0.0260 mg/L          window edge
                rep    2  Cr267.7     conc     0.0021 mg/L
                rep    2  Ag328.1     conc    -0.0026 mg/L
                rep    2  Ba455.4     conc     0.0004 mg/L
                rep    3  Zn213.8     conc     0.0184 mg/L
                rep    3  Cd214.4     conc     0.0097 mg/L
                rep    3  Co228.6     conc     0.0217 mg/L
                rep    3  Ni231.6     conc    -0.0165 mg/L
                rep    3  Cr267.7     conc     0.0043 mg/L
                rep    3  Ag328.1     conc     0.0026 mg/L
                rep    3  Ba455.4     conc     0.0001 mg/L
ICSA
12/16/92 14:19
    Zn213.8     av     0.0033 mg/L          sd    0.01710 %cv  523.94
    Cd214.4     av     0.0091 mg/L          sd    0.00167 %cv   18.31
    Co228.6     av     0.0103 mg/L          sd    0.01061 %cv  103.33
    Ni231.6     av    -0.0210 mg/L          sd    0.00480 %cv   22.81
    Cr267.7     av     0.0028 mg/L          sd    0.00129 %cv  [illegible]
    Ag328.1     av     0.0004 mg/L          sd    0.00271 %cv  630.00
    Ba455.4     av     0.0005 mg/L          sd    0.00037 %cv   81.20

12/16/92 14:21
ICSAB           rep    1  Zn213.8     conc     1.0273 mg/L
                rep    1  Cd214.4     conc     0.9525 mg/L
                rep    1  Co228.6     conc     0.4500 mg/L
                rep    1  Ni231.6     conc     0.8947 mg/L
                rep    1  Cr267.7     conc     0.4608 mg/L
                rep    1  Ag328.1     conc     1.0029 mg/L
                rep    1  Ba455.4     conc     0.5208 mg/L
                rep    2  Zn213.8     conc     1.0143 mg/L
                rep    2  Cd214.4     conc     0.9730 mg/L
                rep    2  Co228.6     conc     0.4843 mg/L
                rep    2  Ni231.6     conc     0.9055 mg/L
                rep    2  Cr267.7     conc     0.4695 mg/L
```

rep	2	Ag328.1	conc	0.9980	mg/L
rep	2	Ba455.4	conc	0.5103	mg/L
rep	3	Zn213.8	conc	1.0313	mg/L
rep	3	Cd214.4	conc	0.9299	mg/L
rep	3	Co228.6	conc	0.4761	mg/L
rep	3	Ni231.6	conc	0.9091	mg/L
rep	3	Cr267.7	conc	0.4684	mg/L
rep	3	Ag328.1	conc	1.0205	mg/L
rep	3	Ba455.4	conc	0.5272	mg/L

000032

ICSAB
12/16/92 14:23

Zn213.8	av	1.0243 mg/L	sd	0.00888	%cv	0.87	102
Cd214.4	av	0.9518 mg/L	sd	0.02154	%cv	2.26	95
Co228.6	av	0.4701 mg/L	sd	0.01795	%cv	3.82	94
Ni231.6	av	0.9031 mg/L	sd	0.00750	%cv	0.83	90
Cr267.7	av	0.4662 mg/L	sd	0.00471	%cv	1.01	93
Ag328.1	av	1.0071 mg/L	sd	0.01184	%cv	1.18	101
Ba455.4	av	0.5194 mg/L	sd	0.00851	%cv	1.64	104

12/16/92 14:25

throw away	rep	1	Zn213.8	conc	-0.0003	mg/L
	rep	1	Cd214.4	conc	0.0006	mg/L
	rep	1	Co228.6	conc	-0.0078	mg/L
	rep	1	Ni231.6	conc	-0.0052	mg/L
	rep	1	Fe238.2	conc	0.1454	mg/L
	rep	1	Cr267.7	conc	0.0046	mg/L
	rep	1	Ag328.1	conc	0.0031	mg/L
	rep	1	Al396.2	conc	0.4557	mg/L
	rep	1	Ba455.4	conc	0.0006	mg/L
	rep	1	Mg279.6	conc	0.4746	mg/L
	rep	1	Ca393.4	conc	0.5084	mg/L
	rep	2	Zn213.8	conc	0.0138	mg/L
	rep	2	Cd214.4	conc	0.0018	mg/L
	rep	2	Co228.6	conc	0.0013	mg/L
	rep	2	Ni231.6	conc	-0.0140	mg/L
	rep	2	Fe238.2	conc	0.1183	mg/L
	rep	2	Cr267.7	conc	0.0027	mg/L
	rep	2	Ag328.1	conc	-0.0022	mg/L
	rep	2	Al396.2	conc	0.2791	mg/L
	rep	2	Ba455.4	conc	-0.0006	mg/L
	rep	2	Mg279.6	conc	0.2334	mg/L
	rep	2	Ca393.4	conc	0.2132	mg/L
	rep	3	Zn213.8	conc	0.0097	mg/L
	rep	3	Cd214.4	conc	-0.0001	mg/L window edge
	rep	3	Co228.6	conc	-0.0064	mg/L
	rep	3	Ni231.6	conc	-0.0334	mg/L window edge
	rep	3	Fe238.2	conc	0.0401	mg/L
	rep	3	Cr267.7	conc	0.0044	mg/L
	rep	3	Ag328.1	conc	-0.0072	mg/L
	rep	3	Al396.2	conc	0.0517	mg/L
	rep	3	Ba455.4	conc	-0.0011	mg/L window edge
	rep	3	Mg279.6	conc	0.1085	mg/L
	rep	3	Ca393.4	conc	0.1019	mg/L

throw away
12/16/92 14:28

Zn213.8	av	0.0077 mg/L	sd	0.00728	%cv	94.17
Cd214.4	av	0.0007 mg/L	sd	0.00094	%cv	127.75
Co228.6	av	-0.0043 mg/L	sd	0.00490	%cv	[illegible]
Ni231.6	av	-0.0175 mg/L	sd	0.01447	%cv	82.55
Fe238.2	av	0.1013 mg/L	sd	0.05469	%cv	54.00
Cr267.7	av	0.0039 mg/L	sd	0.00105	%cv	26.98
Ag328.1	av	-0.0021 mg/L	sd	0.00511	%cv	243.23
Al396.2	av	0.2622 mg/L	sd	0.20235	%cv	77.25
Ba455.4	av	-0.0003 mg/L	sd	0.00086	%cv	249.07
Mg279.6	av	0.2722 mg/L	sd	[illegible]	%cv	[illegible]
Ca393.4	av	0.2745 mg/L	sd	0.21006	%cv	76.53

12/16/92 14:31

CRI

rep	1	Zn213.8	conc	0.0470	mg/L
rep	1	Cd214.4	conc	0.0145	mg/L
rep	1	Co228.6	conc	0.1589	mg/L
rep	1	Ni231.6	conc	0.1009	mg/L
rep	1	Cr267.7	conc	0.0360	mg/L
rep	1	Ag328.1	conc	0.0273	mg/L
rep	2	Zn213.8	conc	0.0539	mg/L
rep	2	Cd214.4	conc	0.0125	mg/L
rep	2	Co228.6	conc	0.1529	mg/L
rep	2	Ni231.6	conc	0.1024	mg/L
rep	2	Cr267.7	conc	0.0185	mg/L
rep	2	Ag328.1	conc	0.0182	mg/L
rep	3	Zn213.8	conc	0.0504	mg/L
rep	3	Cd214.4	conc	0.0047	mg/L
rep	3	Co228.6	conc	0.1382	mg/L
rep	3	Ni231.6	conc	0.0678	mg/L
rep	3	Cr267.7	conc	0.0290	mg/L
rep	3	Ag328.1	conc	0.0161	mg/L

000033

CRI

12/16/92 14:32

Zn213.8	av	0.0521 mg/L	sd	0.00614	%cv	11.79	130
Cd214.4	av	0.0106 mg/L	sd	0.00519	%cv	49.13	106
Co228.6	av	0.1500 mg/L	sd	0.01067	%cv	7.11	150
Ni231.6	av	0.0904 mg/L	sd	0.01959	%cv	21.68	113
Cr267.7	av	0.0278 mg/L	sd	0.00881	%cv	31.66	139
Ag328.1	av	0.0205 mg/L	sd	0.00594	%cv	28.96	103

Client: ABB Environmental Services - Indian Head

20-Dec-92

Coast-To-Coast Analytical Services, Inc.
Northeastern Division
Quality Control Report

Methods and Chronology of Analysis

Parameter	Method No.	Description	CCAS Sample Nos.	Date Sample Received	Date of Sample Chemical Preparation	Date of Instrument Analysis	Dilution Factor *
	METHODS OF ANALYSIS		*CHRONOLOGY OF ANALYSES*				
TS -Total Residue	CLP-CIP	Gravimetric, 103-105C	WA51011-1	15-Dec-92	15-Dec-92	16-Dec-92	1.0
			WA51011-2	15-Dec-92	15-Dec-92	16-Dec-92	1.0
			WA51011-3	15-Dec-92	15-Dec-92	16-Dec-92	1.0
			WA51011-4	15-Dec-92	15-Dec-92	16-Dec-92	1.0
			WA51011-5	15-Dec-92	15-Dec-92	16-Dec-92	1.0
			WA51011-6	15-Dec-92	15-Dec-92	16-Dec-92	1.0
			WA51011-7	15-Dec-92	15-Dec-92	16-Dec-92	1.0
			WA51011-8	15-Dec-92	15-Dec-92	16-Dec-92	1.0
			WA51011-9	15-Dec-92	15-Dec-92	16-Dec-92	1.0
			WA51011-10	15-Dec-92	15-Dec-92	16-Dec-92	1.0

Notes:

Unless otherwise indicated, analytical methods are from (1) "Methods of Chemical Analysis of Water and Wastes," EPA 600/4-79-020, Revised March, 1983, or (2) "Test Methods for Evaluating Solid Wastes," EPA SW-846, Revised November, 1986.

CLP-CIP = USEPA Contract Laboratory Program Caucus Inorganic Protocols, SOW 0788.

*The Dilution Factor (DF) indicates whether a sample, prepared in accordance with the analytical method protocol, was diluted prior to analysis. The Dilution Factor could also indicate that a smaller aliquot than specified in the method was utilized for sample preparation and analysis. For example, a dilution factor of 5 means that the sample was effectively diluted by a factor of 5 prior to analysis, i.e., the sample was analyzed at 20% its reported concentration.

Client: ABB Environmental Services - Indian Head

20-Dec-92

Coast-To-Coast Analytical Services, Inc.
Northeastern Division
Quality Control Report

Method Blank and Laboratory Control Sample Results

Parameter	Date of Prep*	Date of Analysis*	*METHOD BLANK RESULTS* Units	Conc. Measured in Blank	Acceptance Range	Practical Quantitation Level**	*LABORATORY CONTROL SAMPLE RESULTS* Units	True Value	Measured Value	Percent Recovered	Acceptance Range (%)	Acceptance Range (mg/kg)	Acceptance Range (%)
TS -Total Residue	15-Dec-92	16-Dec-92	wt %	< 0.10	< 0.10	0.10							

* Date is indicated if sample preparation/analysis was performed on more than one day for a parameter. If no date is given, all samples, method blanks and laboratory control samples were prepared and analyzed as indicated on the Chronology Form.

** Practical quantitation level is the lowest concentration measurable for samples with normal chemical and physical composition during routine laboratory operations.

DATA QUALITY COMMENTS:
Results of all quality control measurements are within the laboratory and method specified acceptance range except as noted.

Client: ABB Environmental Services - Indian Head

20-Dec-92

Coast-To-Coast Analytical Services, Inc.
Northeastern Division
Quality Control Report

Duplicate and Matrix Spike/Matrix Spike Duplicate Results

		DUPLICATE RESULTS						*MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS*									
			Sample Measurements					Concentration or Quantity					Matrix Spike Recovery (%)				
Parameter	CCAS Sample No.	Units	Rep 1	Rep 2	Mean Conc	RPD (%)	Acceptance Range for RPD (%)	Units	Sample Only	Spike Added	Sample +Spike Dup 1	Sample +Spike Dup 2	Sample +Spike Dup 1	Sample +Spike Dup 2	Acceptance Range (%)	RPD (%)	Acceptance Range (%)
TS	WA51011-1	wt%	99.0	100	100	1.0	0-20										
	WA51011-2	wt%	99.0	99.1	99.1	0.1	0-20										
	WA51011-3	wt%	101	99.8	100	1.2	0-20										
	WA51011-4	wt%	99.3	99.4	99.4	0.1	0-20										
	WA51011-5	wt%	99.0	99.2	99.1	0.2	0-20										
	WA51011-6	wt%	98.0	98.2	98.1	0.2	0-20										
	WA51011-7	wt%	99.1	99.1	99.1	0.0	0-20										
	WA51011-8	wt%	98.3	98.4	98.4	0.1	0-20										
	WA51011-9	wt%	98.8	98.9	98.9	0.1	0-20										
	WA51011-10	wt%	99.0	98.8	98.9	0.2	0-20										

RPD = Relative percent difference, which is the absolute value of the difference between two replicate results divided by the mean concentration then multiplied by 100%.

NC = Relative percent difference cannot be calculated for sample results less than the PQL.

NA = Not applicable.

Because of the large uncertainty (i.e., 33% or greater) associated with measurements made near the detection level, the acceptance range for relative percent difference for duplicate measurements at such low concentrations is 0-100%.

DATA QUALITY COMMENTS:
Results of all quality control measurements are within the laboratory or contract specified acceptance range except as noted.

0000036

Client: ABB Environmental Services – Indian Head

20-Dec-92

000037

Coast-To-Coast Analytical Services, Inc.
Northeastern Division
Quality Control Report

Summary Report

Inorganic Laboratory Summary Report

All sample analyses for wet chemistry referenced by this Quality Control Report were routine and were conducted in accordance with appropriate analytical protocols and laboratory standard operating procedures except as noted.

CCAS Sample Nos.: WA51011-1 – 10

_____X_____Check here if all analyses were routine.

Notebook No. ________

PROJECT Total Solids CLP SOW 788 PRL=0.10%

Continued From Page ________

ASTM Class 1 Weights (g)

Weight	Initial (g)	Final (g)
2.000	2.000	2.000
5.000	5.000	5.000
10.000	10.000	9.999

000038

Oven Temp 103°C

Time in: 6:00 PM 12-15-92

Time out: 8:00 AM 12-16-92

Client	Sample ID	Site ID	Dish ID	Dish WT (g)	Dish + Wet WT (g)	Dish + Dry WT (g)
	Blank		1	1.558	1.558	1.558
	LCS#1		2	1.558	5.000	4.548
	LCS#3		3	1.559	5.000	4.992
ABB-DC	WAS1011-1	0255030 XAFF	4	1.602	2.509	2.500
Dupe	WAS1011-1	↓	5	~~1.562~~ 1.555	~~2.521~~ 2.514	2.514
	WAS1011-2	0155XX0X10 XAXF	6	1.572	2.404	2.396
Dupe	WAS1011-2	↓	7	1.542	2.412	2.404
	WAS1011-3	0155XX25 XBXF	8	1.579	2.590	2.600
Dupe	WAS1011-3	↓	9	1.617	2.615	2.613
	WAS1011-4	0155XOX57 XCXF	10	1.543	2.786	2.777
Dupe	WAS1011-4	↓	11	1.539	2.778	2.771
	WAS1011-5	0155XX2X 75XBXF	12	1.562	2.661	2.650
Dupe	WAS1011-5	↓	13	1.557	2.667	2.655
	WAS1011-6	0155XX0X 25XLYF	14	1.648	2.597	2.578
Dupe	WAS1011-6	↓	15	1.531	2.609	2.590
	WAS1011-7	0255XX0275 XLXF	16	1.612	2.695	2.685
Dupe	WAS1011-7	↓	17	1.550	2.710	2.700
	WAS1011-8	0155XX0X57 XRXF	18	1.546	2.604	2.586
Dupe	WAS1011-8	↓	19	1.570	2.597	2.581
	WAS1011-9	0255XX225 XAYF	20	1.665	2.508	2.498
Dupe	WAS1011-9	↓	21	1.556	2.500	2.490
	WAS1011-10	0255X0X50 XEFF	22	1.537	2.230	2.223
Dupe	WAS1011-10	↓	23	1.551	2.237	2.229

Continued on Page

[signature] 12-15-92
Set-up Date

[signature] 12.16.92 Read and Understood By [signature] 12/17/92

Signed Date Signed Date

Notebook No. ______

PROJECT TOTAL SOLIDS CLP SOW 788 PQL = 0.10%

Continued From Page ______

CLIENT	SAMPLE ID	SITE ID	DISH ID	DISH WT (g)	DISH + WET WT (g)	DISH + DRY WT (g)
EDL	WA51003-13	3362-001	24	1.567	5.336	5.240
Dupe	WA51003-13	↓	25	1.588	5.327	5.226
	WA51003-14	3362-002	26	1.600	5.114	5.000
Dupe	WA51003-14	↓	27	1.608	5.090	4.981
	WA51007-1	B-3	28	1.617	5.228	4.954
Dupe	WA51007-1	↓	29	1.559	5.211	4.920

TOTAL RESIDUE, SOILS AND SOLIDS
GRAVIMETRIC

METHOD: CLP-SOW 2/88
PQL = 0.10 %

DATE: DEC. 15, 1992
ANALYST: J.F.

CLIENT	SAMPLE #	DISH WEIGHT (g)	DISH + WET SAMPLE WT (g)	DISH + DRY SAMPLE WT (g)	WET SAMPLE WEIGHT (g)	DRY SAMPLE WEIGHT (g)	TOTAL RESIDUE (%)	TS MEAN (%)	RPD (%)
METHOD	BLANK	1.558	1.558	1.558	0.000	0.000	<0.10		
	LCS#1	1.558	5.000	4.548	3.442	2.990	86.868		
	LCS#3	1.559	5.000	4.992	3.441	3.433	99.768		
ABB-DC	WA51011-1	1.602	2.509	2.500	0.907	0.898	99.008	99.504	1.00
DUPE	WA51011-1	1.558	2.514	2.514	0.956	0.956	100.000		
	WA51011-2	1.572	2.404	2.396	0.832	0.824	99.038	99.059	0.04
DUPE	WA51011-2	1.542	2.412	2.404	0.870	0.862	99.080		
	WA51011-3	1.579	2.590	2.600	1.011	1.021	100.989	100.394	1.18
DUPE	WA51011-3	1.617	2.615	2.613	0.998	0.996	99.800		
	WA51011-4	1.543	2.786	2.777	1.243	1.234	99.276	99.355	0.16
DUPE	WA51011-4	1.539	2.778	2.771	1.239	1.232	99.435		
	WA51011-5	1.562	2.661	2.650	1.099	1.088	98.999	99.094	0.19
DUPE	WA51011-5	1.557	2.667	2.65[illegible]	1.110	1.101	99.189		
	WA51011-6	1.648	2.597	2.578	0.949	0.930	97.998	98.118	0.24
DUPE	WA51011-6	1.531	2.609	2.590	1.078	1.059	98.237		
	WA51011-7	1.612	2.695	2.685	1.083	1.073	99.077	99.107	0.06
DUPE	WA51011-7	1.550	2.710	2.700	1.160	1.150	99.138		
	WA51011-8	1.546	2.604	2.586	1.058	1.040	98.299	98.370	0.15
DUPE	WA51011-8	1.570	2.597	2.581	1.027	1.011	98.442		
	WA41011-9	1.665	2.508	2.498	0.843	0.833	98.814	98.877	0.13
DUPE	WA51011-9	1.556	2.500	2.490	0.944	0.934	98.941		
	WA51011-10	1.537	2.230	2.223	0.693	0.686	98.990	98.912	0.16
DUPE	WA51011-10	1.551	2.237	2.229	0.686	0.678	98.834		
EDL	WA51003-13	1.567	5.336	5.240	3.769	3.673	97.453	97.376	0.16
DUPE	WA51003-13	1.588	5.327	5.226	3.739	3.638	97.299		
	WA51003-14	1.600	5.114	5.000	3.514	3.400	96.756	96.813	0.12
DUPE	WA51003-14	1.608	5.090	4.981	3.482	3.373	96.870		
	WA51007-1	1.617	5.228	4.954	3.611	3.337	92.412	92.222	0.41
	WA51007-1	1.559	5.211	4.920	3.652	3.361	92.032		

$$\% \text{ SOLIDS} = \frac{\text{SAMPLE DRY WEIGHT (g)}}{\text{SAMPLE WET WEIGHT (g)}} * 100$$

J. Fine 12-16-92

Continued on Page

J. Fine 12-15-92
SET UP Date

Read and Understood By

J. Fine 12-16-92 | [illegible] | 12/17/92
Signed | Date | Signed | Date
COMPLETION

Coast-to-Coast Analytical Services, Inc.
Northeastern Division (207) 874-2400
CONFIRMATION

ORDER NO W-A51011

Project Manager: Laura J. O'Meara
ORDER DATE: 12/15/92
PHONE: 202/797-6500
000040 FAX: 202/797-6501
DUE: 17 DEC

REPORT TO: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

INVOICE: ABB Environmental Svcs., Inc.
2590 Executive Center Circle East
Tallahassee, FL 32301

PO: SE207668

PROJECT: 7800-00

SAMPLED BY: D. VON BUSHBERGER DELIVERED BY: FED-EX DISPOSE: AFTER 14 JAN

ITEM	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
1	WA51011-1	02SSXX0300XRFF	03 DEC 1330	15 DEC	SO

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Silver, Total	6010	1	20.00	20.00
Elements Sample Preparation		1	23.00	23.00
Solids-Total Residue (TS)	CLP/CIP SO	1	0.00	0.00
Elements Matrix Spike Sample		1	43.00	43.00
Elements MS Duplicate Sample		1	43.00	43.00
TOTALS		1	129.00	129.00

ITEM	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
2	WA51011-2	01SSXX0X10XAXF	04 DEC 1630	15 DEC	SO
	WA51011-3	01SSXX2X25XBXF	07 DEC 0815		
	WA51011-4	01SSXX0X57XCXF	07 DEC 0830		
	WA51011-5	01SSXX2X75XBXF	07 DEC 0845		
	WA51011-6	01SSXX0X25XLYF	18 NOV 1300		
	WA51011-7	02SSXX0275XLXF	12 NOV 1300		
	WA51011-8	01SSXX0X57XRXF	12 NOV 1330		
	WA51011-9	02SSXX2125XRYF	20 NOV 1300		
	WA51011-10	02SSXX0X50XRFF	30 NOV 1300		

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Silver, Total	6010	9	20.00	180.00
Elements Sample Preparation		9	23.00	207.00
Solids-Total Residue (TS)	CLP/CIP SO	9	0.00	0.00
TOTALS		9	43.00	387.00

ORDER NOTE: QCIII INDIAN HEAD
Prices include RUSH surcharges

INVOICE: With Report

TOTAL ORDER AMOUNT $516.00
This is NOT an Invoice

LJO
12·16

Please contact CCAS promptly if you have any questions.

XJ0121692

COASTAL ANALYTICAL SERVICES

141 Suburban Road • San Luis Obispo, CA 93401 • (805) 543-2553 FAX (805) 543-2685
751 S. Kellogg, Suite A • Goleta, CA 93117 • (805) 964-7838 FAX (805) 967-4386
6006 Egret Ct. • Benicia, CA 94510 • (707) 747-2757 FAX (707) 747-2765
2400 Cumberland Dr. • Valparaiso, Indiana 46383 • (219) 464-2389 FAX (219) 462-2953
4765 Calle Quetzal • Camarillo, CA 93012 • (805) 389-1353 FAX (805) 389-1438
340 County Road No. 5 • Westbrook, ME 04092 • (207) 874-2400 FAX (207) 775-4029

Chain of Custody

• PLEASE PRINT IN PEN

Client ABB ENVIRONMENTAL SVS. INC.	Contact D. von Bushberger	Phone # (202) 797-6530	FAX # (202) 797-6501
Address 1400 16th ST. NW	City WASHINGTON, DC	State	Zip 20036
Project Name/Number NOS INDIAN HEAD SITE 5 7800-00		Project MGR F. GODOY	
Bill (If different than above)	Address		
Sampler (Print and sign) DOUGLAS VON BUSHBERGER	Due Date ASAP Circle for RUSH*	Copies To:	Auth. Init.

Sample Description	Date/Time Coll'd	*Matrix	# of Containers	Pres.	Filt. y/n	* Subject to Availability Analysis	Remarks	Lab ID #
01SSXXOX10XAXF	12/4/92 16:30	S	1	4°C	N	TOTAL Ag ICP	LOWEST CONCENTRATION	
01SSXX2X25XBXF	12/7/92 08:15	S	1	4°C	N			
01SSXX0X57XCXF	12/7/92 08:30	S	1	4°C	N			
01SSXX2X75XBXF	12/7/92 08:45	S	1	4°C	N			
02SSXX0300XRFF	12/3/92 13:30	S	1	4°C	N		HIGHEST CONCENTRATION	
		S	1	4°C	N			
		S	1	4°C	N			
		S	1	4°C	N			

Relinquished By	Date/Time	Received By	Relinquished By	Date/Time	Received By
D. von Bushberger	12/16/92 7:00 PM	Jim Bont	12/15/92 11:00		

FOR LAB USE ONLY

Shipping Method	Shipping #	Received By	Date/Time	Condition (See Remarks) Cold	Sealed	Intact

REMARKS

*Matrix:
DW - Drinking Water
WW - Wastewater
GW - Groundwater
SW - Surface Water
IM - Impinger
FI - Filter
FP - Free Product
A/G - Air/Gas
SL - Sludge/Soil/Solid
OT - Other

ORIGINAL

COAST ANALYTICAL SERVICES

141 Suburban Road • San Luis Obispo, CA 93401 • (805) 543-2553 FAX (805) 543-2685
751 S. Kellogg, Suite A • Goleta, CA 93117 • (805) 964-7838 FAX (805) 967-4386
6006 Egret Ct. • Benicia, CA 94510 • (707) 747-2757 FAX (707) 747-2765
2400 Cumberland Dr. • Valparaiso, Indiana 46383 • (219) 464-2389 FAX (219) 462-2953
4765 Calle Quetzal • Camarillo, CA 93012 • (805) 389-1353 FAX (805) 389-1438
340 County Road No. 5 • Westbrook, ME 04092 • (207) 874-2400 FAX (207) 775-4029

• PLEASE PRINT IN PEN

Client ABB-ES	Contact D. von Bushberger	Phone # ( )	FAX # ( )
Address	City	State	Zip
Project Name/Number SEE PAGE 1/2		Project MGR	
Bill (If different than above)	Address		
Sampler (Print and sign) DOUGLAS VON BUSHBERGER [signature]	Due Date ASAP	Circle for RUSH*	Copies To: Auth. Init.

Sample Description	Date/Time Coll'd	*Matrix	# of Containers	Pres.	Filt. y/n	Analysis *Subject to Availability	Remarks	Lab ID #
01SSXX0X25XLYF	11/18/92 13:00	S	1	4°C	N	TOTAL Ag ICP	LOWEST CONCENTRATION	
02SSXX0275XLXF	11/12/92 13:00	S	1	4°C	N			
01SSXX0X57XRXF	11/12/92 13:30	S	1	4°C	N			
02SSXX2125XRYF	11/20/92 13:00	S	1	4°C	N			
02SSXX0X50XRFF	11/30/92 13:00	S	1	4°C	N		HIGHEST CONCENTRATION	

Relinquished By	Date/Time	Received By	Relinquished By	Date/Time	Received By
D. von Bushberger	12/16/92 10 AM 7:00 PM	Jon Bortt	12-15-92 / 11:00		

FOR LAB USE ONLY

Shipping Method	Shipping #	Received By	Date/Time	Condition (See Remarks) Cold	Sealed	Intact

REMARKS

* Matrix:
DW - Drinking Water
WW - Wastewater
GW - Groundwater
SW - Surface Water
IM - Impinger
FL - Filter
FR - Free Product
A/G - Air/Gas
SL - Sludge/Soil/Solid
OT - Other

ORIGINAL

Client: ABB Environmental Services – Souza, Work Order: WA51011

ANALYSIS AND QUALITY CONTROL DOCUMENTATION

Prepared By:

COAST–TO–COAST ANALYTICAL SERVICES, INC.
NORTHEASTERN DIVISION

20–Dec–92

Reviewed and Approved by: George Brewer
Laboratory Quality Assurance

000001

CHAIN OF CUSTODY RECORD

Page 1 of 1

PROJECT NO. 7800-00

PROJECT NAME NOS INDIAN HEAD Ag REMED.

SAMPLERS (SIGNATURE) N/A

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	SAMPLE TYPE: 8270-SVOA	6010-TMA	9012-CYANIDE	8080-PEST	8330-EXPL.	REMARKS (INDICATE SOIL/WATER/AIR SEDIMENT/SLUDGE)
SOLID-02	12/29	14:00		✓	WITHIN DRUM	4	✓	✓	✓	✓	✓	SOLID MATERIAL

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
[illegible]	12/29/92 17:00				

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED FOR DISPOSAL BY: (SIGNATURE)	DATE/TIME	REMARKS

OH-62

ABB Environmental Services, Inc.

CHAIN OF CUSTODY RECORD

PROJECT NO.

PROJECT NAME

SAMPLERS (SIGNATURE) [illegible]

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CON-TAINERS	SAMPLE TYPE											REMARKS INDICATE SOIL/WATER/AIR SEDIMENT/SLUDGE
							[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]						
[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	11	X											
[illegible] 2	[illegible]	[illegible]		[illegible]		1	X											
[illegible]	[illegible]	[illegible]		[illegible]		1	X											
[illegible]	[illegible]	[illegible]		[illegible]		1	X											
[illegible] 1	[illegible]	[illegible]		[illegible]	[illegible]	1		X	X	X	X	X						[illegible]

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
[illegible]	[illegible]				
RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED FOR DISPOSAL BY: (SIGNATURE)	DATE/TIME	REMARKS

ABB Environmental Services, Inc.

EA Laboratories
A Division of EA Engineering, Science, and Technology, Inc.

EA Laboratories
19 Loveton Circle
Sparks, MD 21152
Telephone: 410-771-4920
800-677-0706
Fax: 410-771-4407

12 January 1993

Mr. Franco Godoy
ABB Environmental Services, Inc.
1400 16th Street NW
Washington, D.C. 20036

Re: NOS Indian Head - Ag Remediation (Direct)

Dear Mr. Godoy:

Enclosed is our report on the analysis of one soil sample, and one water sample collected for ABB Environmental Services on 23 and 29 December 1992. Preliminary data was sent to you via facsimile. The invoice is included.

Please contact me if you have any questions or require further information and refer to report 930030. Unless other arrangements are made, we reserve the right to dispose of your samples thirty (30) days from the date of this letter. We will retain the raw data for seven years from this date.

Sincerely,

B. Landas

Benjamin R. Landas,
Laboratory Project Manager

enclosure

LABORATORY DATA REPORT

Prepared for:

ABB Environmental Services
Indian Head - Ag Remediation

Prepared by:

EA Laboratories
19 Loveton Circle
Sparks, Maryland 21152

January 1993

EA Laboratories
ANALYTICAL NARRATIVE

Client: **ABB Environmental Services**
Site: **Indian Head Ag Remediation**
Project number: **Direct**

Laboratory Project Manager: **Benjamin R. Landas**
EA Laboratories Report: **930030**
Date: **12 January 1993**

This report contains the results of the analysis of one soil sample, and one water sample collected on 23 and 29 December 1992 in support of the referenced project. The samples arrived intact by Federal Express at EA Laboratories on 29 and 30 December 1992. Upon receipt, the samples were inspected, compared with the chain-of-custody records, logged into the laboratory computer system with assigned laboratory accession numbers, and released for analysis. Please refer to Table 1 for the list of approved parameters and methods.

Client Sample Name	EA Lab Number
Near Drum	**11916**
Within Drum	**11951**

Results are reported in Table 2, and in the Form I's which follow.

Quality Control

This section summarizes the general quality control activities performed by the laboratory which relate to laboratory method performance, sample matrix effects, and field quality control samples. Quality control samples specified by the project and in the analytical methods are analyzed and reported as required, and the data are validated by analyst, staff, and supervisor review.

Laboratory method performance: All quality control criteria for method performance must be met for data to be reported. These criteria generally apply to instrument tune, calibration, method blanks, and Laboratory Control Samples (LCS).

EA Laboratories
ANALYTICAL NARRATIVE

Client: **ABB Environmental Services**
Site: **Indian Head Ag Remediation**
Project number: **Direct**

Laboratory Project Manager: **Benjamin R. Landas**
EA Laboratories Report: **930030**
Date: **12 January 1993**

Sample matrix effects: Quality control samples are analyzed to determine any measurement bias due to the sample, and may include matrix spikes (MS), matrix spike duplicates (MSD), and laboratory duplicates (D). If criteria are not met, matrix interferences are confirmed either by reanalysis or by inspection of the LCS results to verify that laboratory method performance is in control. Data are reported with appropriate qualifiers or discussion.

Field quality control samples: Field duplicates, trip blanks, and rinsate blanks are used to evaluate field quality control. Unless specific laboratory performance criteria and corrective actions are identified in the project requirements, results are reported after routine laboratory data validation.

<u>Semivolatiles</u>

Sample Within Drum (EA #11951) had low area counts for the internal standards chrysene-d12 and perylene-d12 which resulted in a high recovery of the surrogate terphenyl-d14 (152%) which is quantitated off of chrysene-d12. This high recovery indicates a positive bias for any compounds quantitated off of the two internal standards. The only compounds detected in this sample that are impacted by this positive bias is pyrene and bis(2-ethylhexyl)phthalate. The extract for this sample was concentrated to a 2 ml final volume instead of 1 ml because of the viscosity of the extract. Also, during the extraction process, this sample was apparently cross-contaminated with matrix spike solution. Every compound in the spike solution was detected in this sample below the quantitation limit (except 4-nitrophenol which is undetectable at the contamination level). These compounds are reported but are not believed to be present in this sample. These compounds are: phenol, 2-chlorophenol, n-nitroso-di-n-propylamine, 1,4-dichlorobenzene, 1,2,4-trichlorobenzene, 4-chloro-3-methylphenol, acenaphthene, pentachlorophenol and pyrene.

Pest/PCB's

The chromatogram for sample Within Drum (EA #11951) was very complex with numerous peak responses throughout the analytical run. Because there were so many peaks, the probability of a false positive is high. Also, because many of the peaks were very large, the possibility of masking low level target compounds is also high. To remove interferences, the extract was cleaned using a florisil cartridge procedure and a desulfuring procedure to remove molecular sulfur. These procedures did not remove the interferences mentioned above.

The surrogate recovery of sample Within Drum (EA #11951) was only 21% while the surrogate recoveries in the method blank and the laboratory control samples (LCS) ranged from 123-129%. Since all laboratory QC recoveries were acceptable, the low surrogate recovery indicates a negative matrix bias which should be considered when evaluating these results.

Certification of Results

The Laboratory certifies that this report meets the project requirements for analytical data as stated in the Analytical Task Order (ATO) and the chain-of-custody. In addition, the Laboratory certifies that the data as reported meet the Data Quality Objectives for precision, accuracy, and completeness specified for this project or as stated in EA Laboratories Quality Assurance

EA Laboratories
ANALYTICAL NARRATIVE

Client: **ABB Environmental Services**
Site: **Indian Head Ag Remediation**
Project number: **Direct**

Laboratory Project Manager: **Benjamin R. Landas**
EA Laboratories Report: **930030**
Date: **12 January 1993**

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program for other than the conditions detailed above. Release of the data contained in this report has been authorized by the appropriate Laboratory Managers as verified by the following signatures.

Walter E Miller — 12 January 1993

Walter E. Miller, Organics Manager

Phyllis A. Christopher — 12 January 1993

Phyllis A. Christopher, Inorganics Manager

TABLE 1. ANALYTICAL METHODS

Parameter	Method	Method Number	Matrix	Reference
SAMPLE PREPARATION				
Metals Digestion	Nitric Acid - Hydrogen Peroxide	3050	SO	(1)
Organics Extraction	Soxhlet Extraction	3540	SO	(1)
ORGANICS				
Acid Extractable Organic Compounds	Gas Chromatography/Mass Spectrometry	8270	W,SO	(1)
Base-Neutral Extractable Organic Compounds	Gas Chromatography/Mass Spectrometry	8270	W,SO	(1)
Explosives	HPLC	8330	W,SO	(1)
Halogenated Hydrocarbon Pesticides	Gas Chromatography - ECD	8080	W,SO	(1)
Polychlorinated Biphenyls	Gas Chromatography - ECD	8080	W,SO	(1)
Volatile Organic Compounds	Gas Chromatography/Mass Spectrometry	8240	W,SO	(1)
METALS				
Aluminum	Atomic Emission - ICP	6010	W,SO	(1)
Antimony	Atomic Emission - ICP	6010	W,SO	(1)
Arsenic	Atomic Absorption - Furnace	7060	W,SO	(1)
Barium	Atomic Emission - ICP	6010	W,SO	(1)
Beryllium	Atomic Emission - ICP	6010	W,SO	(1)
Cadmium	Atomic Emission - ICP	6010	W,SO	(1)
Calcium	Atomic Emission - ICP	6010	W,SO	(1)

TABLE 1. ANALYTICAL METHODS

Parameter	Method	Method Number	Matrix	Reference
Chromium, Total	Atomic Emission - ICP	6010	W,SO	(1)
Cobalt	Atomic Emission - ICP	6010	W,SO	(1)
Copper	Atomic Emission - ICP	6010	W,SO	(1)
Iron	Atomic Emission - ICP	6010	W,SO	(1)
Lead	Atomic Absorption - Furnace	7421	W,SO	(1)
Magnesium	Atomic Emission - ICP	6010	W,SO	(1)
Manganese	Atomic Emission - ICP	6010	W,SO	(1)
Mercury	Atomic Absorption - Cold Vapor	7471	SO	(1)
Nickel	Atomic Emission - ICP	6010	W,SO	(1)
Potassium	Atomic Emission - ICP	6010	W,SO	(1)
Selenium	Atomic Absorption - Furnace	7740	W,SO	(1)
Silver	Atomic Emission - ICP	6010	W,SO	(1)
Sodium	Atomic Emission - ICP	6010	W,SO	(1)
Thallium	Atomic Absorption - Furnace	7841	W,SO	(1)
Vanadium	Atomic Emission - ICP	6010	W,SO	(1)
Zinc	Atomic Emission - ICP	6010	W,SO	(1)
INORGANIC NONMETALS				
Cyanide, Total	Colorimetric - Automated UV	9012	W,SO	(1)

TABLE 1. ANALYTICAL METHODS

Parameter	Method	Method Number	Matrix	Reference

Matrix codes:

A - Air
W - Estuarine water, ground water, leachates, ocean water, surface water, and wastewater
DW - Drinking water
SO - Soils, sludges, sediments, wastes
T - Animal tissue, plant tissue

References:

(1) United States Environmental Protection Agency. 1986. Test Methods for Evaluating Solid Waste. Physical/Chemical Methods. EPA SW-846, 3rd edition. U.S. EPA, Washington, D.C.

TABLE 2.
RESULTS FOR THE DETERMINATION OF TOTAL METALS AND TOTAL CYANIDE IN ONE WATER SAMPLES COLLECTED FOR THE NOS INDIAN HEAD Ag REMEDIATION PROJECT ON 29 DECEMBER 1992

Parameter	Units	WITHIN DRUM
Aluminum, Total	mg/kg (dry)	1530
Antimony, Total	mg/kg (dry)	12.0
Arsenic, Total	mg/kg (dry)	0.41
Barium, Total	mg/kg (dry)	17.8
Beryllium, Total	mg/kg (dry)	<0.19
Cadmium, Total	mg/kg (dry)	3.5
Calcium, Total	mg/kg (dry)	14300
Chromium, Total	mg/kg (dry)	3.1
Cobalt, Total	mg/kg (dry)	6.8
Copper, Total	mg/kg (dry)	<1.6
Iron, Total	mg/kg (dry)	46900
Lead, Total	mg/kg (dry)	3.9
Magnesium, Total	mg/kg (dry)	799
Manganese, Total	mg/kg (dry)	187
Mercury, Total	mg/kg (dry)	<0.17
Nickel, Total	mg/kg (dry)	13.3
Potassium, Total	mg/kg (dry)	1860
Selenium, Total	mg/kg (dry)	0.14
Silver, Total	mg/kg (dry)	7.3
Sodium, Total	mg/kg (dry)	602
Thallium, Total	mg/kg (dry)	<0.14
Vanadium, Total	mg/kg (dry)	1.9
Zinc, Total	mg/kg (dry)	67.2
Cyanide, Total	mg/kg (dry)	<0.21
Accession Number		11951

INDIVIDUAL DATA SHEETS
Volatiles - 8240

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO: LIQUID1-4

Lab Name: EA LABS   Contract: 7800-00

Lab Code: EAENG   Case No: NOS   IHARSAS No.: ______   SDG No: LIQUID 1-4

Matrix: (soil/water) WATER   Lab Sample ID: 11916

Sample wt/vol: 5.0 (g/mL) ML   Lab File ID: AM357

Level: (low/med) LOW   Date Received: 12/29/92

% Moisture: not dec. ______   Date Analyzed: 12/30/92

GC Column: RTX502.2 ID: .53 (mm)   Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)   Soil Aliquot Volume: _____ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	190	
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene(total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	100	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-pentanone	50	U
591-78-6	2-Hexanone	50	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	7	
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylenes(Total)	5	U

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO:

LIQUID1-4

Lab Name: EA LABS Contract: 7800-00

Lab Code: EAENG Case No: NOS IHARSAS No.: ______ SDG No: LIQUID 1-4

Matrix: (soil/water) WATER Lab Sample ID: 11916

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: AM357

Level: (low/med) LOW Date Received: 12/29/92

% Moisture: not dec. ______ Date Analyzed: 12/30/92

GC Column: RTX502.2 ID: .53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Number TICS found: 2

CONCENTRATION UNITS
(ug/L or ug/Kg) ug/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.------------	Unknown	11.44	33	BJ
2.------------	Unknown	13.29	6	BJ

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO:

VBLK1

Lab Name: EA LABS   Contract: 7800-00

Lab Code: EAENG   Case No: NOS IHARSAS No.: ______   SDG No:LIQUID 1-4

Matrix: (soil/water) WATER   Lab Sample ID: 0

Sample wt/vol: 5.0 (g/mL) ML   Lab File ID: AM355

Level: (low/med) LOW   Date Received: / /

% Moisture: not dec. ______   Date Analyzed: 12/30/92

GC Column: RTX502.2 ID: .53 (mm)   Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)   Soil Aliquot Volume:_____ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	100	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene(total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	100	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-pentanone	50	U
591-78-6	2-Hexanone	50	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylenes(Total)	5	U

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO:

VBLK1

Lab Name: EA LABS Contract: 7800-00

Lab Code: EAENG Case No: NOS IHARSAS No.: ______ SDG No:LIQUID 1-4

Matrix: (soil/water) WATER Lab Sample ID: 0

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: AM355

Level: (low/med) LOW Date Received: / /

% Moisture: not dec. ______ Date Analyzed: 12/30/92

GC Column: RTX502.2 ID: .53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume:_____ (uL)

Number TICS found: 2

CONCENTRATION UNITS
(ug/L or ug/Kg) ug/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.------------	Unknown	11.41	36	J
2.------------	Unknown	13.31	5	J

INDIVIDUAL DATA SHEETS
Semivolatiles - 8270

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO:

WITHIN DRUM

Lab Name: EA LABS   Contract: 7800/7285

Lab Code: EAENG   Case No: ABB/NOS SAS No.: ______   SDG No:SOLID-02

Matrix: (soil/water) SOIL   Lab Sample ID: 11951

Sample wt/vol: 30.0 (g/ml) G   Lab File ID: B03689

Level: (low/med) LOW   Date Received: 12/30/92

% Moisture: 48   decanted: (Y/N) N   Date Extracted: 12/30/92

Concentrated Extract Volume: 2000 (uL)   Date Analyzed: 12/31/92

Injection Volume: 1.0 (uL)   Dilution Factor: 1.0

GPC Cleanup: (Y/N)N   pH: ____

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
108-95-2	PHENOL	760	J
111-44-4	BIS(2-CHLOROETHYL) ETHER	1300	U
95-57-8	2-CHLOROPHENOL	550	J
541-73-1	1,3-DICHLOROBENZENE	1300	U
106-46-7	1,4-DICHLOROBENZENE	300	J
100-51-6	BENZYL ALCOHOL	2500	U
95-50-1	1,2-DICHLOROBENZENE	1300	U
95-48-7	2-METHYLPHENOL	1300	U
108-60-1	BIS(2-CHLOROISOPROPYL)ETHER	1300	U
106-44-5	3+4-METHYLPHENOL	200	J
621-64-7	N-NITROSO-DI-N-PROPYLAMINE	280	J
67-72-1	HEXACHLOROETHANE	1300	U
98-95-3	NITROBENZENE	1300	U
78-59-1	ISOPHORONE	1300	U
88-75-5	2-NITROPHENOL	1300	U
105-67-9	2,4-DIMETHYLPHENOL	1300	U
65-85-0	BENZOIC ACID	6200	U
111-91-1	BIS(2-CHLOROETHOXY)METHANE	1300	U
120-83-2	2,4-DICHLOROPHENOL	1300	U
120-82-1	1,2,4-TRICHLOROBENZENE	340	J
91-20-3	NAPHTHALENE	1300	U
106-47-8	4-CHLOROANILINE	2500	U
87-68-3	HEXACHLOROBUTADIENE	1300	U
59-50-7	4-CHLORO-3-METHYLPHENOL	1000	J
91-57-6	2-METHYLNAPHTHALENE	970	J
77-47-4	HEXACHLOROCYCLOPENTADIENE	1300	U
88-06-2	2,4,6-TRICHLOROPHENOL	1300	U
95-95-4	2,4,5-TRICHLOROPHENOL	1300	U
91-58-7	2-CHLORONAPHTHALENE	1300	U
88-74-4	2-NITROANILINE	6200	U
131-11-3	DIMETHYLPHTHALATE	370	BJ
208-96-8	ACENAPHTHYLENE	1300	U
99-09-2	3-NITROANILINE	6200	U
83-32-9	ACENAPHTHENE	1200	J
51-28-5	2,4-DINITROPHENOL	6200	U

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO:

WITHIN DRUM

Lab Name: EA LABS   Contract: 7800/7285

Lab Code: EAENG   Case No: ABB/NOS SAS No.: ______   SDG No:SOLID-02

Matrix: (soil/water) SOIL   Lab Sample ID: 11951

Sample wt/vol: 30.0 (g/ml) G   Lab File ID: B03689

Level: (low/med) LOW   Date Received: 12/30/92

% Moisture: 48   decanted: (Y/N) N   Date Extracted: 12/30/92

Concentrated Extract Volume: 2000 (uL)   Date Analyzed: 12/31/92

Injection Volume: 1.0 (uL)   Dilution Factor: 1.0

GPC Cleanup: (Y/N)N   pH: ____

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)ug/Kg	Q
100-02-7	4-NITROPHENOL	6200	U
132-64-9	DIBENZOFURAN	1300	U
121-14-2	2,4-DINITROTOLUENE	1300	U
606-20-2	2,6-DINITROTOLUENE	1300	U
84-66-2	DIETHYLPHTHALATE	810	BJ
7005-72-3	4-CHLOROPHENYL PHENYLETHER	1300	U
86-73-7	FLUORENE	1300	U
100-01-6	4-NITROANILINE	6200	U
534-52-1	4,6-DINITRO-2-METHYLPHENOL	6200	U
86-30-6	N-NITROSODIPHENYLAMINE	1300	U
101-55-3	4-BROMOPHENYL-PHENYLETHER	1300	U
118-74-1	HEXACHLOROBENZENE	1300	U
87-86-5	PENTACHLOROPHENOL	1100	J
85-01-8	PHENANTHRENE	1300	U
120-12-7	ANTHRACENE	1300	U
84-74-2	DI-N-BUTYLPHTHALATE	860	BJ
206-44-0	FLUORANTHENE	1300	U
129-00-0	PYRENE	890	J
85-68-7	BUTYLBENZYLPHTHALATE	1300	U
91-94-1	3,3'-DICHLOROBENZIDINE	2500	U
56-55-3	BENZO(A)ANTHRACENE	1300	U
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	1400	
218-01-9	CHRYSENE	1300	U
117-84-0	DI-N-OCTYLPHTHALATE	1300	U
205-99-2	BENZO(B)FLUORANTHENE	1300	U
207-08-9	BENZO(K)FLUORANTHENE	1300	U
50-32-8	BENZO(A)PYRENE	1300	U
193-39-5	INDENO(1,2,3-CD)PYRENE	1300	U
53-70-3	DIBENZO(A,H)ANTHRACENE	1300	U
191-24-2	BENZO(G,H,I)PERYLENE	1300	U

1F
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO: WITHIN DRUM

Lab Name: EA LABS Contract: 7800/7285

Lab Code: EAENG Case No: ABB/NOS SAS No.: ______ SDG No: SOLID-02

Matrix: (soil/water) SOIL Lab Sample ID: 11951

Sample wt/vol: 30.0 (g/ml) G Lab File ID: B03689

Level: (low/med) LOW Date Received: 12/30/92

% Moisture: 48 decanted: (Y/N) N Date Extracted: 12/30/92

Concentrated Extract Volume: 2000 (uL) Date Analyzed: 12/31/92

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: ____

Number TICS found: 20

CONCENTRATION UNITS (ug/L or ug/Kg) ug/Kg

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 0-00-0------	UNKNOWN	5.13	800000	BJ
2. 0-00-0------	UNKNOWN C13H20 ISOMER	14.86	3100	J
3. 0-00-0------	UNKNOWN C13H20 ISOMER	15.07	4400	J
4. 0-00-0------	UNKNOWN C11H10 ISOMER	16.87	6900	J
5. 0-00-0------	UNKNOWN	16.88	7100	J
6. 0-00-0------	UNKNOWN	17.20	2900	J
7. 0-00-0------	UNKNOWN	17.35	2900	J
8. 0-00-0------	UNKNOWN	17.40	1700	J
9. 0-00-0------	UNKNOWN	17.42	2600	J
10. 0-00-0------	UNKNOWN C12H12 ISOMER	18.32	2600	J
11. 0-00-0------	UNKNOWN C12H12 ISOMER	18.52	3900	J
12. 0-00-0------	UNKNOWN C12H12 ISOMER	18.80	3600	J
13. 0-00-0------	UNKNOWN HYDROCARBON	18.85	9500	J
14. 0-00-0------	UNKNOWN	19.40	2100	J
15. 0-00-0------	UNKNOWN	20.57	2900	J
16. 0-00-0------	UNKNOWN	20.85	2600	J
17. 0-00-0------	UNKNOWN	20.98	3300	J
18. 0-00-0------	UNKNOWN HYDROCARBON	30.18	8000	J
19. 0-00-0------	UNKNOWN HYDROCARBON	30.97	11000	J
20. 0-00-0------	UNKNOWN HYDROCARBON	31.67	11000	J

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO:

SBLK#1499

Lab Name: EA LABS Contract: 7800/7285

Lab Code: EAENG Case No: ABB/NOS SAS No.: ______ SDG No: SOLID-02

Matrix: (soil/water) SOIL Lab Sample ID: 1499

Sample wt/vol: 30.0 (g/ml) G Lab File ID: B03685

Level: (low/med) LOW Date Received: / /

% Moisture: _____ decanted: (Y/N) N Date Extracted: 12/30/92

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 12/31/92

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N)N pH: ____

CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

CAS NO.	COMPOUND	CONCENTRATION	Q
108-95-2	PHENOL	330	U
111-44-4	BIS(2-CHLOROETHYL) ETHER	330	U
95-57-8	2-CHLOROPHENOL	330	U
541-73-1	1,3-DICHLOROBENZENE	330	U
106-46-7	1,4-DICHLOROBENZENE	330	U
100-51-6	BENZYL ALCOHOL	660	U
95-50-1	1,2-DICHLOROBENZENE	330	U
95-48-7	2-METHYLPHENOL	330	U
108-60-1	BIS(2-CHLOROISOPROPYL)ETHER	330	U
106-44-5	3+4-METHYLPHENOL	330	U
621-64-7	N-NITROSO-DI-N-PROPYLAMINE	330	U
67-72-1	HEXACHLOROETHANE	330	U
98-95-3	NITROBENZENE	330	U
78-59-1	ISOPHORONE	330	U
88-75-5	2-NITROPHENOL	330	U
105-67-9	2,4-DIMETHYLPHENOL	330	U
65-85-0	BENZOIC ACID	1600	U
111-91-1	BIS(2-CHLOROETHOXY)METHANE	330	U
120-83-2	2,4-DICHLOROPHENOL	330	U
120-82-1	1,2,4-TRICHLOROBENZENE	330	U
91-20-3	NAPHTHALENE	330	U
106-47-8	4-CHLOROANILINE	660	U
87-68-3	HEXACHLOROBUTADIENE	330	U
59-50-7	4-CHLORO-3-METHYLPHENOL	660	U
91-57-6	2-METHYLNAPHTHALENE	330	U
77-47-4	HEXACHLOROCYCLOPENTADIENE	330	U
88-06-2	2,4,6-TRICHLOROPHENOL	330	U
95-95-4	2,4,5-TRICHLOROPHENOL	330	U
91-58-7	2-CHLORONAPHTHALENE	330	U
88-74-4	2-NITROANILINE	1600	U
131-11-3	DIMETHYLPHTHALATE	330	U
208-96-8	ACENAPHTHYLENE	330	U
99-09-2	3-NITROANILINE	1600	U
83-32-9	ACENAPHTHENE	330	U
51-28-5	2,4-DINITROPHENOL	1600	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO:

SBLK#1499

Lab Name: EA LABS Contract: 7800/7285

Lab Code: EAENG Case No: ABB/NOS SAS No.: ______ SDG No:SOLID-02

Matrix: (soil/water) SOIL Lab Sample ID: 1499

Sample wt/vol: 30.0 (g/ml) G Lab File ID: B03685

Level: (low/med) LOW Date Received: / /

% Moisture: _____ decanted: (Y/N) N Date Extracted: 12/30/92

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 12/31/92

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N)N pH: ____

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)ug/Kg	Q
100-02-7	4-NITROPHENOL	1600	U
132-64-9	DIBENZOFURAN	330	U
121-14-2	2,4-DINITROTOLUENE	330	U
606-20-2	2,6-DINITROTOLUENE	330	U
84-66-2	DIETHYLPHTHALATE	140	J
7005-72-3	4-CHLOROPHENYL PHENYLETHER	330	U
86-73-7	FLUORENE	330	U
100-01-6	4-NITROANILINE	1600	U
534-52-1	4,6-DINITRO-2-METHYLPHENOL	1600	U
86-30-6	N-NITROSODIPHENYLAMINE	330	U
101-55-3	4-BROMOPHENYL-PHENYLETHER	330	U
118-74-1	HEXACHLOROBENZENE	330	U
87-86-5	PENTACHLOROPHENOL	1600	U
85-01-8	PHENANTHRENE	330	U
120-12-7	ANTHRACENE	330	U
84-74-2	DI-N-BUTYLPHTHALATE	1200	
206-44-0	FLUORANTHENE	330	U
129-00-0	PYRENE	330	U
85-68-7	BUTYLBENZYLPHTHALATE	330	U
91-94-1	3,3'-DICHLOROBENZIDINE	660	U
56-55-3	BENZO(A)ANTHRACENE	330	U
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	330	U
218-01-9	CHRYSENE	330	U
117-84-0	DI-N-OCTYLPHTHALATE	330	U
205-99-2	BENZO(B)FLUORANTHENE	330	U
207-08-9	BENZO(K)FLUORANTHENE	330	U
50-32-8	BENZO(A)PYRENE	330	U
193-39-5	INDENO(1,2,3-CD)PYRENE	330	U
53-70-3	DIBENZO(A,H)ANTHRACENE	330	U
191-24-2	BENZO(G,H,I)PERYLENE	330	U

1F
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO:

SBLK#1499

Lab Name: EA LABS Contract: 7800/7285

Lab Code: EAENG Case No: ABB/NOS SAS No.: ______ SDG No:SOLID-02

Matrix: (soil/water) SOIL Lab Sample ID: 1499

Sample wt/vol: 30.0 (g/ml) G Lab File ID: B03685

Level: (low/med) LOW Date Received: / /

% Moisture: _____ decanted: (Y/N) N Date Extracted: 12/30/92

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 12/31/92

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N)N pH: ____

Number TICS found: 1

CONCENTRATION UNITS
(ug/L or ug/Kg) ug/Kg

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.0-00-0------	UNKNOWN	5.30	430000	J

INDIVIDUAL DATA SHEETS
Pesticides/PCBs

EA Laboratories
Pesticide/PCB Report Sheet

Project/Client:	NOS INDIAN HEAD	EA Number:	11951
Matrix:	SOIL	Units:	ug/Kg or ppb
Date Received:	12/30/92	Dilution Factor:	1
Date Extracted:	12/30/92	Extraction volume:	30g
Date Analyzed:	01/05/93	Final volume:	10mL
Percent Moisture	48 %		

Analyte	WITHIN DRUM		Detection Limit
Pesticides:			
ALDRIN	ND		7.7
alpha BHC	ND		7.7
beta BHC	ND		7.7
delta BHC	ND		7.7
gamma BHC	1.2	J	7.7
CHLORDANE	ND		150
4,4'-DDD	ND		15
4,4'-DDE	ND		15
4,4'-DDT	ND		15
DIELDRIN	ND		15
ENDOSULFAN I	ND		7.7
ENDOSULFAN II	ND		15
ENDOSULFAN SULFATE	ND		15
ENDRIN	19		15
ENDRIN ALDEHYDE	ND		15
HEPTACHLOR	ND		7.7
HEPTACHLOR EPOXIDE	ND		7.7
METHOXYCHLOR	ND		77
TOXAPHENE	ND		150
PCBS:			
AROCLOR 1016	ND		77
AROCLOR 1221	ND		77
AROCLOR 1232	ND		77
AROCLOR 1242	ND		77
AROCLOR 1248	ND		77
AROCLOR 1254	ND		150
AROCLOR 1260	ND		150

ND: Indicates not detected.
J : Indicates an estimated value.
E: Exceeds the linear range of calibration

EA Laboratories
Pesticide/PCB Report Sheet

Project/Client:	NOS INDIAN HEAD	EA Number:	PBLK 1500
Matrix:	SOIL	Units:	ug/Kg or ppb
Date Received:	LAB GENERATED	Dilution Factor:	1
Date Extracted:	12/30/92	Extraction volume:	30g
Date Analyzed:	01/05/93	Final volume:	10mL
Percent Moisture	0 %		

Analyte	METHOD BLANK	Detection Limit
Pesticides:		
ALDRIN	ND	4.0
alpha BHC	ND	4.0
beta BHC	ND	4.0
delta BHC	ND	4.0
gamma BHC	ND	4.0
CHLORDANE	ND	80
4,4'-DDD	ND	8.0
4,4'-DDE	ND	8.0
4,4'-DDT	ND	8.0
DIELDRIN	ND	8.0
ENDOSULFAN I	ND	4.0
ENDOSULFAN II	ND	8.0
ENDOSULFAN SULFATE	ND	8.0
ENDRIN	ND	8.0
ENDRIN ALDEHYDE	ND	8.0
HEPTACHLOR	ND	4.0
HEPTACHLOR EPOXIDE	ND	4.0
METHOXYCHLOR	ND	40
TOXAPHENE	ND	80
PCBS:		
AROCLOR 1016	ND	40
AROCLOR 1221	ND	40
AROCLOR 1232	ND	40
AROCLOR 1242	ND	40
AROCLOR 1248	ND	40
AROCLOR 1254	ND	80
AROCLOR 1260	ND	80

ND: Indicates not detected.
J : Indicates an estimated value.
E: Exceeds the linear range of calibration

INDIVIDUAL DATA SHEETS
Explosives

1

METHOD 8330 EXPLOSIVES ANALYSIS DATA SHEET

EPA SAMPLE NO.

WITHIN DRUM

Lab Name: EA LABORATORIES Contract: ______

Lab Code: EAENG Case #: ______ SAS #: ______ SDG: WITHIN DRUM

Matrix: (soil/water) SOLID Lab Sample ID: 9211951

Sample wt/vol: 2.0 g Lab File ID: 12318321.D05

Level: (low/med) LOW Date Received: 12/30/92

% Moisture: 48% Date Extracted: 12/30/92

Extraction: SONC Date Analyzed: 12/31/92

GPC Cleanup:(Y/N) N pH: ______ Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/g) ug/g	Q
2691-41-0	HMX	0.77	U
121-82-4	RDX	0.77	U
99-35-4	1,3,5-TRINITROBENZENE	0.38	U
99-65-0	1,3-DINITROBENZENE	0.38	U
98-95-3	NITROBENZENE	0.38	U
479-45-8	TETRYL	1.2	U
118-96-7	2,4,6-TRINITROTOLUENE	0.77	U
606-20-2	2,6-DINITROTOLUENE	0.77	U
121-14-2	2,4-DINITROTOLUENE	0.38	U
99-99-0	4-NITROTOLUENE	0.77	U
88-72-2	2-NITROTOLUENE	0.77	U
99-08-1	3-NITROTOLUENE	0.77	U

1

METHOD 8330 EXPLOSIVES ANALYSIS DATA SHEET

EPA SAMPLE NO.

METHOD BLANK

Lab Name: EA LABORATORIES Contract: ______

Lab Code: EAENG Case #: ______ SAS #: ______ SDG: WITHIN DRUM

Matrix: (soil/water) SOLID Lab Sample ID: EBLK1502

Sample wt/vol: 2.0 g Lab File ID: 12318321.D03

Level: (low/med) LOW Date Received: N/A

% Moisture: N/A Date Extracted: 12/30/92

Extraction: SONC Date Analyzed: 12/31/92

GPC Cleanup:(Y/N) N pH: ______ Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/g) ug/g	Q
2691-41-0--	HMX	0.40	U
121-82-4---	RDX	0.40	U
99-35-4----	1,3,5-TRINITROBENZENE	0.20	U
99-65-0----	1,3-DINITROBENZENE	0.20	U
98-95-3----	NITROBENZENE	0.20	U
479-45-8---	TETRYL	0.60	U
118-96-7---	2,4,6-TRINITROTOLUENE	0.40	U
606-20-2---	2,6-DINITROTOLUENE	0.40	U
121-14-2---	2,4-DINITROTOLUENE	0.20	U
99-99-0----	4-NITROTOLUENE	0.40	U
88-72-2----	2-NITROTOLUENE	0.40	U
99-08-1----	3-NITROTOLUENE	0.40	U

Job #: 1414 Locator Code: GCMS

ABB WASH

CHAIN OF CUSTODY RECORD

Page 1 of 1

PROJECT NO. 7800-00

PROJECT NAME NOS INDIAN HEAD Ag REMEDIATION

SAMPLERS (SIGNATURE) N/A MR FRANCO GODOY

ANALYSIS TYPE

DRAFT INVOICE L2431

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CON-TAINERS	8240 - VOA	8270 - SVOA	6010 - TMA	9012 - CYANIDE	8080 - PESTICIDES	8330 - EXPLOSIVES	NOT ENOUGH	SAMPLE	WILL SAMPLE MORE	ON 12/29/92	D. VAN BUSKIRK	REMARKS INDICATE SOIL/WATER/AIR SEDIMENT/SLUDGE
LIQUID01	12/23/92	08:30		✓	NEAR DRUM	1	X	ON HOLD	ON HOLD	ON HOLD	ON HOLD	ON HOLD						LIQUID
LIQUID02	12/23/92	08:30		✓	" "	1	X											"
LIQUID03	12/23/92	08:30		✓	" "	1	X									11916		"
LIQUID04	12/23/92	08:30		✓	" "	1	X											"
SOLID01	12/23/92	08:30		✓	WITHIN DRUM	1		X	X	X	X	X						SOLID MATERIAL, SOME LIQUID

VOA BY 8240
TCL LIST (3/90)
N/S
EA STD REPORT
VTSR IS TODAY
12/29/92. 7 day
VERBALS.
10 DAY HARDCOPY.

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
D. Van Buskirk	12/23/92 19:00				W. Archer 12/29/92 1213
RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED FOR DISPOSAL BY: (SIGNATURE)	DATE/TIME	REMARKS	

OH-62

ABB Environmental Services, Inc.

Job # 479 Locator Code: 010 Temp: 4°

ABB WASH

CHAIN OF CUSTODY RECORD

Page 1 of 1

PROJECT NO.	PROJECT NAME
7800-00	NOS INDIAN HEAD Ag REMED.

SAMPLERS (SIGNATURE) N/A MR. FRANCO GODOY

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	8270-SVOA	6010-TMA	9012-CYANIDE	8080-PEST.	8330-EXPL.			EA#			REMARKS (INDICATE SOIL/WATER/AIR SEDIMENT/SLUDGE)
SOLID-02	12/29	14:00	[redacted]	✓	WITHIN DRUM	4	✓	✓	✓	✓	✓			11951			SOLID MATERIAL
																	L 2435 DRAFT
																	INVOICE.
																	COMMENTS:
																	EA STD REPORT
																	TCL SVOA W/LS 8270
																	TAL METALS (23) 6010
																	CN BY SW9012M
																	EXPL. SW8330
																	TCL P/P SW8080
																	7 DAY VERBALS
																	10 DAY HC.
																	Quote. 931-20217

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
[signature]	12/29/92 19:00				Archer 12/30/92 9:30
RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED FOR DISPOSAL BY: (SIGNATURE)	DATE/TIME	REMARKS

OH-62

ABB Environmental Services, Inc.

COAST - TO - COAST ANALYTICAL SERVICES

Air, Water & Hazardous Waste Sampling, Analysis & Consultation
Certified Hazardous Waste, Chemistry, Bacteriology & Bioassay Laboratories

141 Suburban Road	San Luis Obispo, CA 93401	(805) 543-2553	Fax (805) 543-2685
751 S. Kellogg, Suite A	Goleta, CA 93117	(805) 964-7838	Fax (805) 967-4386
6006 Egret Court	Benicia, CA 94510	(707) 747-2757	Fax (707) 747-2765
4765 Calle Quetzal	Camarillo, CA 93010	(805) 389-1353	Fax (805) 389-1438
4570 Campus Drive	Newport Beach, CA 92660	(714) 252-2143	Fax (714) 253-7733
2400 Cumberland Dr.	Valparaiso, IN 46383	(219) 464-2389	Fax (219) 462-2953
340 County Road, No. 5	Westbrook, ME 04098	(207) 874-2400	Fax (207) 775-4029

December 21, 1992

Mr. Franko Godoy
ABB Environmental Services, Inc.
1400 16th Street, N.W. Suite 720
Washington, DC 20036

Dear Mr. Godoy:

Please find enclosed the Reports of Analysis (ROA) for the samples received by the laboratory on December 15, 1992. This cover letter is an integral part of the ROA.

Sample results are reported on our new Laboratory Information Management System (LIMS) Report of Analysis. Results are presented by sample and by analytical group. The LIMS ROA presents the results for each analytical group on separate pages. PQLs, methods, dilution factors, dates of preparation and analysis as well as any applicable footnotes all appear on the page(s) where the parameter is reported. Analytical data are approved for the reporting by a qualified reviewer by signature on the authorization page.

If you have any questions or comments concerning this Report of Analysis, please do not hesitate to contact me or Geoff Pellechia. We appreciate your continued use of our laboratory for your analytical needs and look forward to working with you in the future.

Sincerely,

Coast-to-Coast Analytical Services, Inc.

D. Elizabeth Harrold

for Laura J. O'Meara, Supervisor
Client Services

LJO/dmt

Enclosure

COAST - TO - COAST ANALYTICAL SERVICES

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(207) 874-2400
Fax (207) 775-4029

Coast-to-Coast Analytical Services, Inc. - Northeast Division (CCAS) has completed analysis of your samples identified by the CCAS order number: WA51006; sample number: 1. This sample was analyzed in accordance with the methods noted on the Report of Analysis. Samples and associated QC samples met CCAS internal quality control except as noted on the Report of Analysis. The attached Report of Analysis, which consists of 1 page, is authorized for release by:

D. Elizabeth Harrold

for Laura J. O'Meara
Client Services Supervisor

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(207) 874-2400
Fax (207) 775-4029

Sample No. : WA-51006-1
Report Date: 12/21/92
PO No. : SE207668

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
TM100-01	Soil	D. VON BUSHBERGE R	12/08/92	12/15/92

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
TCLP*Extraction	****	****	1.0	****	1311	12/16/92	MV	1
TCLP-Silver	<0.50	mg/L	1.0	0.50	6010	12/18/92	DN	2

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 12/15/92 by MV
(2) Sample Preparation on 12/16/92 by MV using 3010

LJO/edh/djn/mv

Coast-to-Coast Analytical Services, Inc.
Northeastern Division (207) 874-2400
CONFIRMATION

ORDER NO W-A51006

Project Manager: Laura J. O'Meara
ORDER DATE: 12/15/92
PHONE: 202/797-6500
FAX: 202/797-6501
DUE: 18 DEC

REPORT TO: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

INVOICE: ABB Environmental Svcs., Inc.
2590 Executive Center Circle East
Tallahassee, FL 32301

PO: SE207668

SAMPLED BY: D. VON BUSHBERGER DELIVERED BY: FED-EX DISPOSE: AFTER 14 JAN

ITEM	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
1	WA51006-1	TM100-01	08 DEC 1200	15 DEC	SO

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
TCLP-Silver	6010	1	450.00	450.00
TCLP*Extraction	1311	1	105.00	105.00
Elements Matrix Spike Sample		1	0.00	0.00
TOTALS		1	555.00	555.00

ORDER NOTE: QCIII INDIAN HEAD

INVOICE: With Report

TOTAL ORDER AMOUNT $555.00
This is NOT an Invoice

BB/LJO
12-16

Please contact CCAS promptly if you have any questions.

yo 121692

COAST - TO - COAST ANALYTICAL SERVICES

141 Suburban Road	San Luis Obispo, CA 93401	(805) 543-2553	FAX (805) 543-2685
751 S. Kellogg, Suite A	Goleta, CA 93117	(805) 964-7838	FAX (805) 967-4386
6006 Egret Ct.	Benicia, CA 94510	(707) 747-2757	FAX (707) 747-2765
2400 Cumberland Dr.	Valparaiso, Indiana 46383	(219) 464-2389	FAX (219) 462-2953
4765 Calle Quetzal	Camarillo, CA 93012	(805) 389-1353	FAX (805) 389-1438
340 County Road No. 5	Westbrook, ME 04092	(207) 874-2400	FAX (207) 775-4029

Chain of Custody

• PLEASE PRINT IN PEN

Client ABB ENVIRONMENTAL SERVICES, INC.
Contact D. VON BUSHBERGER
Phone # (202) 797-6530
FAX # (202) 797-6501
Address 1400 16th ST. NW
City WASHINGTON DC
State
Zip 20036
Project Name/Number NOS INDIAN HEAD SITE 5 / 7800-00
Project MGR F. GODOY
Bill (If different than above)
Address
Sampler (Print and sign) D. VON BUSHBERGER [signature]
Due Date ASAP
Circle for RUSH*
Copies To:
Auth. Init.

* Subject to Availability

Sample Description	Date/Time Coll'd	*Matrix	# of Containers	Pres.	Filt. y/n	Analysis	Remarks	Lab ID #
TM100-01	12/8/92 12:00	S	1	N/A	N	TCLP METALS		

Relinquished By	Date/Time	Received By	Relinquished By	Date/Time	Received By
D. von Bushberger [signature]	12/10/92 7:05 PM	Jon Bartlett [signature]	12-15-92 / 11:00		

FOR LAB USE ONLY

Shipping Method	Shipping #	Received By	Date/Time	Cold	Sealed	Intact

Condition (See Remarks)

REMARKS

* **Matrix:**
DW - Drinking Water
WW - Wastewater
GW - Groundwater
SW - Surface Water
IM - Impinger
FI - Filter
FP - Free Product
A/G - Air/Gas
SL - Sludge/Soil/Solid
OT - Other

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Fax (207) 775-4029

Coast-to-Coast Analytical Services, Inc. - Northeast Division (CCAS) has completed analysis of your samples identified by the CCAS order number: WA51011; sample numbers: 1-10. These samples were analyzed in accordance with the methods noted on the Report of Analysis. Samples and associated QC samples met CCAS internal quality control except as noted on the Report of Analysis. The attached Report of Analysis, which consists of 20 pages, is authorized for release by:

D. Elizabeth Harrold
for Laura J. O'Meara
Client Services Supervisor

COAST - TO - COAST ANALYTICAL SERVICES

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(207) 874-2400
Fax (207) 775-4029

Sample No. : WA-51011-1
Report Date: 12/21/92
PO No. : SE207668
Project : 7800-00

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
02SSXX0300XRFF	Soil	D. VON BUSHBERGE R	12/03/92	12/15/92

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Silver, Total	15	mg/kgdrywt	1.0	1.5	6010	12/16/92	DN	1,2

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 12/15/92 by MV using 3050
(2) Results for the LCS associated with this sample were outside laboratory acceptance range.

LJO/edh/cmd/djn
AL15ICPXSXX2

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(207) 874-2400
Fax (207) 775-4029

Sample No. : WA-51011-1
Report Date: 12/21/92
PO No. : SE207668
Project : 7800-00

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
02SSXX0300XRFF	Soil	D. VON BUSHBERGE R	12/03/92	12/15/92

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Solids-Total Residue (TS)	99	wt %	1.0	0.10	CLP/CIP SOW	12/16/92	JF	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 12/15/92 by JF

LJO/edh/bac/jf
AL15WCXXSXX1

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Fax (207) 775-4029

Sample No. : WA-51011-2
Report Date: 12/21/92
PO No. : SE207668
Project : 7800-00

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
01SSXX0X10XAXF	Soil	D. VON BUSHBERGE R	12/04/92	12/15/92

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Silver, Total	2.3	mg/kgdrywt	1.0	1.5	6010	12/16/92	DN	1,2

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 12/15/92 by MV using 3050
(2) Results for the LCS associated with this sample were outside laboratory acceptance range.

LJO/edh/cmd/djn
AL15ICPXSXX2

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Sample No. : WA-51011-2
Report Date: 12/21/92
PO No. : SE207668
Project : 7800-00

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
01SSXX0X10XAXF	Soil	D. VON BUSHBERGE R	12/04/92	12/15/92

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Solids-Total Residue (TS)	99	wt %	1.0	0.10	CLP/CIP SOW	12/16/92	JF	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 12/15/92 by JF

LJO/edh/bac/jf
AL15WCXXSXX1

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Fax (207) 775-4029

Sample No. : WA-51011-3
Report Date: 12/21/92
PO No. : SE207668
Project : 7800-00

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
01SSXX2X25XBXF	Soil	D. VON BUSHBERGE R	12/07/92	12/15/92

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Silver, Total	4.6	mg/kgdrywt	1.0	1.5	6010	12/16/92	DN	1,2

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 12/15/92 by MV using 3050
(2) Results for the LCS associated with this sample were outside laboratory acceptance range.

LJO/edh/cmd/djn
AL15ICPXSXX2

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Sample No. : WA-51011-3
Report Date: 12/21/92
PO No. : SE207668
Project : 7800-00

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
01SSXX2X25XBXF	Soil	D. VON BUSHBERGE R	12/07/92	12/15/92

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Solids-Total Residue (TS)	100	wt %	1.0	0.10	CLP/CIP SOW	12/16/92	JF	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 12/15/92 by JF

LJO/edh/bac/jf
AL15WCXXSXX1

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Sample No. : WA-51011-4
Report Date: 12/21/92
PO No. : SE207668
Project : 7800-00

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
01SSXXOX57XCXF	Soil	D. VON BUSHBERGE R	12/07/92	12/15/92

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Silver, Total	<1.5	mg/kgdrywt	1.0	1.5	6010	12/16/92	DN	1,2

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 12/15/92 by MV using 3050
(2) Results for the LCS associated with this sample were outside laboratory acceptance range.

LJO/edh/cmd/djn
AL15ICPXSXX2

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(207) 874-2400
Fax (207) 775-4029

Sample No. : WA-51011-4
Report Date: 12/21/92
PO No. : SE207668
Project : 7800-00

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
01SSXXOX57XCXF	Soil	D. VON BUSHBERGE R	12/07/92	12/15/92

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Solids-Total Residue (TS)	99	wt %	1.0	0.10	CLP/CIP SOW	12/16/92	JF	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 12/15/92 by JF

LJO/edh/bac/jf
AL15WCXXSXX1

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(207) 874-2400
Fax (207) 775-4029

Sample No. : WA-51011-5
Report Date: 12/21/92
PO No. : SE207668
Project : 7800-00

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
01SSXX2X75XBXF	Soil	D. VON BUSHBERGE R	12/07/92	12/15/92

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Silver, Total	<1.5	mg/kgdrywt	1.0	1.5	6010	12/16/92	DN	1,2

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 12/15/92 by MV using 3050
(2) Results for the LCS associated with this sample were outside laboratory acceptance range.

LJO/edh/cmd/djn
AL15ICPXSXX2

COAST - TO - COAST ANALYTICAL SERVICES

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Fax (207) 775-4029

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

Sample No. : WA-51011-5
Report Date: 12/21/92
PO No. : SE207668
Project : 7800-00

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
01SSXX2X75XBXF	Soil	D. VON BUSHBERGE R	12/07/92	12/15/92

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Solids-Total Residue (TS)	99	wt %	1.0	0.10	CLP/CIP SOW	12/16/92	JF	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 12/15/92 by JF

LJO/edh/bac/jf
AL15WCXXSXX1

COAST - TO - COAST ANALYTICAL SERVICES

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(207) 874-2400
Fax (207) 775-4029

Sample No. : WA-51011-6
Report Date: 12/21/92
PO No. : SE207668
Project : 7800-00

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
01SSXX0X25XLYF	Soil	D. VON BUSHBERGE R	11/18/92	12/15/92

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Silver, Total	1.8	mg/kgdrywt	1.0	1.5	6010	12/16/92	DN	1,2

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 12/15/92 by MV using 3050
(2) Results for the LCS associated with this sample were outside laboratory acceptance range.

LJO/edh/cmd/djn
AL15ICPXSXX2

COAST - TO - COAST ANALYTICAL SERVICES

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(207) 874-2400
Fax (207) 775-4029

Sample No. : WA-51011-6
Report Date: 12/21/92
PO No. : SE207668
Project : 7800-00

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
01SSXX0X25XLYF	Soil	D. VON BUSHBERGE R	11/18/92	12/15/92

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Solids-Total Residue (TS)	98	wt %	1.0	0.10	CLP/CIP SOW	12/16/92	JF	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 12/15/92 by JF

LJO/edh/bac/jf
AL15WCXXSXX1

COAST - TO - COAST ANALYTICAL SERVICES

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340 County Road, No. 5 • P.O. Box 720 • Westbrook, ME 04098

(207) 874-2400
Fax (207) 775-4029

Sample No. : WA-51011-7
Report Date: 12/21/92
PO No. : SE207668
Project : 7800-00

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
02SSXX0275XLXF	Soil	D. VON BUSHBERGE R	11/12/92	12/15/92

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Silver, Total	24	mg/kgdrywt	1.0	1.5	6010	12/16/92	DN	1,2

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 12/15/92 by MV using 3050
(2) Results for the LCS associated with this sample were outside laboratory acceptance range.

LJO/edh/cmd/djn
AL15ICPXSXX2

COAST - TO - COAST ANALYTICAL SERVICES

Air, Water & Hazardous Waste Sampling, Analysis & Consultation
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Northeastern Division
340 County Road, No. 5 • P.O. Box 720 • Westbrook, ME 04098

(207) 874-2400
Fax (207) 775-4029

Sample No. : WA-51011-7
Report Date: 12/21/92
PO No. : SE207668
Project : 7800-00

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
02SSXX0275XLXF	Soil	D. VON BUSHBERGE R	11/12/92	12/15/92

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Solids-Total Residue (TS)	99	wt %	1.0	0.10	CLP/CIP SOW	12/16/92	JF	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 12/15/92 by JF

LJO/edh/bac/jf
AL15WCXXSXX1

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(207) 874-2400
Fax (207) 775-4029

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

Sample No. : WA-51011-8
Report Date: 12/21/92
PO No. : SE207668
Project : 7800-00

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
01SSXX0X57XRXF	Soil	D. VON BUSHBERGE R	11/12/92	12/15/92

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Silver, Total	2.9	mg/kgdrywt	1.0	1.5	6010	12/16/92	DN	1,2

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 12/15/92 by MV using 3050
(2) Results for the LCS associated with this sample were outside laboratory acceptance range.

LJO/edh/cmd/djn
AL15ICPXSXX2

COAST - TO - COAST ANALYTICAL SERVICES

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Newport Beach, CA • Valparaiso, IN • Westbrook, ME

Northeastern Division
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(207) 874-2400
Fax (207) 775-4029

Sample No. : WA-51011-8
Report Date: 12/21/92
PO No. : SE207668
Project : 7800-00

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
01SSXX0X57XRXF	Soil	D. VON BUSHBERGE R	11/12/92	12/15/92

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Solids-Total Residue (TS)	98	wt %	1.0	0.10	CLP/CIP SOW	12/16/92	JF	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 12/15/92 by JF

LJO/edh/bac/jf
AL15WCXXSXX1

COAST - TO - COAST ANALYTICAL SERVICES

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(207) 874-2400
Fax (207) 775-4029

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

Sample No. : WA-51011-9
Report Date: 12/21/92
PO No. : SE207668
Project : 7800-00

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
02SSXX2125XRYF	Soil	D. VON BUSHBERGE R	11/20/92	12/15/92

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Silver, Total	4.4	mg/kgdrywt	1.0	1.5	6010	12/16/92	DN	1,2

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 12/15/92 by MV using 3050
(2) Results for the LCS associated with this sample were outside laboratory acceptance range.

LJO/edh/cmd/djn
AL15ICPXSXX2

COAST - TO - COAST ANALYTICAL SERVICES

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(207) 874-2400
Fax (207) 775-4029

Sample No. : WA-51011-9
Report Date: 12/21/92
PO No. : SE207668
Project : 7800-00

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
02SSXX2125XRYF	Soil	D. VON BUSHBERGE R	11/20/92	12/15/92

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Solids-Total Residue (TS)	99	wt %	1.0	0.10	CLP/CIP SOW	12/16/92	JF	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 12/15/92 by JF

LJO/edh/bac/jf
AL15WCXXSXX1

COAST - TO - COAST ANALYTICAL SERVICES

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(207) 874-2400
Fax (207) 775-4029

Sample No. : WA-51011-10
Report Date: 12/21/92
PO No. : SE207668
Project : 7800-00

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
02SSXX0X50XRFF	Soil	D. VON BUSHBERGE R	11/30/92	12/15/92

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Silver, Total	30	mg/kgdrywt	1.0	1.5	6010	12/16/92	DN	1,2

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 12/15/92 by MV using 3050
(2) Results for the LCS associated with this sample were outside laboratory acceptance range.

LJO/edh/cmd/djn
AL15ICPXSXX2

COAST - TO - COAST ANALYTICAL SERVICES

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Northeastern Division
340 County Road, No. 5 • P.O. Box 720 • Westbrook, ME 04098

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Fax (207) 775-4029

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

Sample No. : WA-51011-10
Report Date: 12/21/92
PO No. : SE207668
Project : 7800-00

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
02SSXX0X50XRFF	Soil	D. VON BUSHBERGE R	11/30/92	12/15/92

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Solids-Total Residue (TS)	99	wt %	1.0	0.10	CLP/CIP SOW	12/16/92	JF	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 12/15/92 by JF

LJO/edh/bac/jf
AL15WCXXSXX1

Coast-to-Coast Analytical Services, Inc.
Northeastern Division (207) 874-2400
CONFIRMATION

ORDER NO W-A51011

Project Manager: Laura J. O'Meara
ORDER DATE: 12/15/92
PHONE: 202/797-6500
FAX: 202/797-6501
DUE: 17 DEC

REPORT TO: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

INVOICE: ABB Environmental Svcs., Inc.
2590 Executive Center Circle East
Tallahassee, FL 32301

PO: SE207668

PROJECT: 7800-00

SAMPLED BY: D. VON BUSHBERGER   DELIVERED BY: FED-EX   DISPOSE: AFTER 14 JAN

ITEM	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
1	WA51011-1	02SSXX0300XRFF	03 DEC 1330	15 DEC	SO

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Silver, Total	6010	1	20.00	20.00
Elements Sample Preparation		1	23.00	23.00
Solids-Total Residue (TS)	CLP/CIP SO	1	0.00	0.00
Elements Matrix Spike Sample		1	43.00	43.00
Elements MS Duplicate Sample		1	43.00	43.00
TOTALS		1	129.00	129.00

ITEM	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
2	WA51011-2	01SSXX0X10XAXF	04 DEC 1630	15 DEC	SO
	WA51011-3	01SSXX2X25XBXF	07 DEC 0815		
	WA51011-4	01SSXXOX57XCXF	07 DEC 0830		
	WA51011-5	01SSXX2X75XBXF	07 DEC 0845		
	WA51011-6	01SSXX0X25XLYF	18 NOV 1300		
	WA51011-7	02SSXX0275XLXF	12 NOV 1300		
	WA51011-8	01SSXX0X57XRXF	12 NOV 1330		
	WA51011-9	02SSXX2125XRYF	20 NOV 1300		
	WA51011-10	02SSXX0X50XRFF	30 NOV 1300		

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Silver, Total	6010	9	20.00	180.00
Elements Sample Preparation		9	23.00	207.00
Solids-Total Residue (TS)	CLP/CIP SO	9	0.00	0.00
TOTALS		9	43.00	387.00

ORDER NOTE: QCIII INDIAN HEAD
Prices include RUSH surcharges

INVOICE: With Report   TOTAL ORDER AMOUNT $516.00
This is NOT an Invoice

LJO
12-16   Please contact CCAS promptly if you have any questions.

Xp121692

COAST - TO - COAST ANALYTICAL SERVICES

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6006 Egret Ct. • Benicia, CA 94510 • (707) 747-2757 FAX (707) 747-2765
2400 Cumberland Dr. • Valparaiso, Indiana 46383 • (219) 464-2389 FAX (219) 462-2953
4765 Calle Quetzal • Camarillo, CA 93012 • (805) 389-1353 FAX (805) 389-1438
340 County Road No. 5 • Westbrook, ME 04092 • (207) 874-2400 FAX (207) 775-4029

Chain of Custody

• PLEASE PRINT IN PEN

Client: ABB ENVIRONMENTAL SVS. INC. Contact: D. von BUSHBERGER Phone #: (202) 797-6530 FAX #: (202) 797-6501

Address: 1400 16th ST. NW City: WASHINGTON, DC State: Zip: 20036

Project Name/Number: NOS INDIAN HEAD SITE 5 7800-00 Project MGR: F. GODOY

Bill (If different than above) Address

Sampler (Print and sign): DOUGLAS von BUSHBERGER [signature] Due Date: ASAP Circle for RUSH* Copies To: Auth. Init.

* Subject to Availability

Sample Description	Date/Time Coll'd	*Matrix	# of Containers	Pres.	Filt. y/n	Analysis	Remarks	Lab ID #
01SSXX0X10XAXF	12/4/92 16:30	S	1	4°C	N	TOTAL Ag ICP	LOWEST CONCENTRATION	
01SSXX2X25XBXF	12/7/92 08:15	S	1	4°C	N			
01SSXX0X57XCXF	12/7/92 08:30	S	1	4°C	N			
01SSXX2X75XBXF	12/7/92 08:45	S	1	4°C	N			
02SSXX0300XRFF	12/3/92 13:30	S	1	4°C	N		HIGHEST CONCENTRATION	
		S	1	4°C	N			
		S	1	4°C	N			
		S	1	4°C	N			

Relinquished By	Date/Time	Received By	Relinquished By	Date/Time	Received By
D. von BUSHBERGER	12/16/92 7:00 PM (10:30)	[signature]	12/15/92 / 11:00		

FOR LAB USE ONLY

Shipping Method	Shipping #	Received By	Date/Time	Condition (See Remarks) Cold	Sealed	Intact

REMARKS

* Matrix:
DW - Drinking Water
WW - Wastewater
GW - Groundwater
SW - Surface Water
IM - Impinger
FI - Filter
FP - Free Product
A/G - Air/Gas
SL - Sludge/Soil/Solid
OT - Other

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340 County Road No. 5 • Westbrook, ME 04092 • (207) 874-2400 FAX (207) 775-4029

Chain of Custody

• PLEASE PRINT IN PEN

Client ABB-ES	Contact D. VON BUSHBERGER	Phone # ( )	FAX # ( )
Address	City	State	Zip
Project Name/Number SEE PAGE 1/2		Project MGR	
Bill (If different than above)	Address		
Sampler (Print and sign) DOUGLAS VON BUSHBERGER [signature]	Due Date ASAP Circle for RUSH*	Copies To:	Auth. Init.

Sample Description	Date/Time Coll'd	*Matrix	# of Containers	Pres.	Filt. y/n	* Subject to Availability Analysis	Remarks	Lab ID #
01SSXX0X25XLYF	11/18/92 13:00	S	1	4°C	N	TOTAL Ag ICP	LOWEST CONCENTRATION	
02SSXX0275XLXF	11/12/92 13:00	S	1	4°C	N			
01SSXX0X57XRXF	11/12/92 13:30	S	1	4°C	N			
02SSXX2125XRYF	11/20/92 13:00	S	1	4°C	N			
02SSXX0X50XRFF	11/30/92 13:00	S	1	4°C	N		HIGHEST CONCENTRATION	

Relinquished By	Date/Time	Received By	Relinquished By	Date/Time	Received By
D. von Bushberger	12/14/92 10 AM 7:00 PM	Jon Bout	12-15-92 / 11:00		

FOR LAB USE ONLY

Shipping Method	Shipping #	Received By	Date/Time	Condition (See Remarks) Cold	Sealed	Intact

REMARKS

*Matrix:
DW - Drinking Water
WW - Wastewater
GW - Groundwater
SW - Surface Water
IM - Impinger
FI - Filter
FP - Free Product
A/G - Air/Gas
SL - Sludge/Soil/Solid
OT - Other

Client: ABB Environmental Services – Souza, Work Order: WA51006

ANALYSIS AND QUALITY CONTROL DOCUMENTATION

Prepared By:

COAST–TO–COAST ANALYTICAL SERVICES, INC.
NORTHEASTERN DIVISION

20–Dec–92

Reviewed and Approved by: George Brewer
Laboratory Quality Assurance

Coast-To-Coast Analytical Services, Inc.
Northeastern Division
Quality Control Report

LEVEL III REPORT

Level III documentation consists of the following components for specific types of analyses:

Section		Type of Documentation
INORGANIC ANALYSES FOR METALS		
	o	METHODS AND CHRONOLOGY OF ANALYSIS
	o	METHOD BLANK AND LABORATORY CONTROL SAMPLE RESULTS
	o	SUMMARY REPORT
	o	RAW DATA
CHAIN OF CUSTODY		
	o	CONFIRMATION
	o	CHAIN OF CUSTODY RECORDS
	o	CORRESPONDENCE

Coast-To-Coast Analytical Services, Inc.
Northeastern Division
Quality Control Report

Methods and Chronology of Analysis

METHODS OF ANALYSIS			CHRONOLOGY OF ANALYSES				
Parameter	Method No.	Description	CCAS Sample Nos.	Date Sample Received	Date of Sample Chemical Preparation	Date of Instrument Analysis	Dilution Factor *
TCLP Extraction	1311	Toxicity Characteristic Leaching Procedure	WA51006-1	15-Dec-92	#15-Dec-92		
Silver, TCLP	6010	Atomic Emission, Inductively Coupled Plasma	WA51006-1	15-Dec-92	16-Dec-92	18-Dec-92	1.0

Notes:
Unless otherwise indicated, analytical methods are from (1) "Methods of Chemical Analysis of Water and Wastes," EPA-600/4-79-020, Revised March, 1983, or (2) "Test Methods for Evaluating Solid Wastes," EPA SW-846, Revised November, 1986.

*The Dilution Factor (DF) indicates whether a sample, prepared in accordance with the analytical method protocol, was diluted prior to analysis. The Dilution Factor could also indicate that a smaller aliquot than specified in the method was utilized for sample preparation and analysis. For example, a dilution factor of 5 means that the sample was effectively diluted by a factor of 5 prior to analysis, i.e., the sample was analyzed at 20% its reported concentration.

For TCLP Extraction, "Date of Sample Chemical Preparation" is the date on which the TCLP extraction was begun. For other parameters, "Date of Sample Chemical Preparation" is the date on which the TCLP extract was subjected to acid digestion.

Client: ABB Environmental Services - Indian Head

20-Dec-92

Coast-To-Coast Analytical Services, Inc.
Northeastern Division
Quality Control Report

Method Blank and Laboratory Control Sample Results

Parameter	Date of Prep	Date of Analysis	*METHOD BLANK RESULTS* Units	Concentration Measured in Blank	Acceptance Range	Practical Quantitation Level*	*LABORATORY CONTROL SAMPLE RESULTS* Units	True Value	Measured Value	Percent Recovered	Acceptance Range (%)	Acceptance Range (mg/kg)
Silver	16-Dec-92	18-Dec-92	mg/L	< 0.015	< 0.015	0.015	mg/L	1.25	1.24	99.2	80-120	
&	16-Dec-92	18-Dec-92	mg/L	< 0.015	< 0.015	0.015						

* Practical quantitation level is the lowest concentration measurable for samples with normal chemical and physical composition during routine laboratory operations.

DATA QUALITY COMMENTS:
Results of all quality control measurements are within the laboratory and method specified acceptance range except as noted.

& Indicates the TCLP Extraction Blank extracted concurrently with CCAS Sample No. WA51006-1.

Client: ABB Environmental Services - Indian Head

000005

Coast-To-Coast Analytical Services, Inc.
Northeastern Division
Quality Control Report

Summary Report

Inorganic Laboratory Summary Report

All sample analyses for elements referenced by this Quality Control Report were routine and were conducted in accordance with appropriate analytical protocols and laboratory standard operating procedures except as noted.

CCAS Sample Nos. WA51006-1

__X__ Check here if all analyses were routine.

ALIG-L[illegible] my 12/16/92

Sample Number	Dig Type	Init Vol (ml)	Final Vol (ml)	Client
PBLD	HCl	100	100	
LCSD				[illegible]
[illegible]0001-1				[redacted]
-1 TCLP SPK				
[illegible]0008-1				[redacted]
-1 TCLP SPK				
-2				
-2 TCLP SPK				
TCLP BLANK-FL#1(				
TCLP BLANK-FL#2(				
TCLP BLANK-FL# (12/15/92)				
WA51006-1				ABB-OC
-1 TCLP SPK				
WA50016-1		100	100	[redacted]
-2				
-3				
-4				
-5				
-6				
-7				
-8				
-9		50	50	
WA50015-3 DUP my 12/16/92		100	100	
WA50015-3 SPK				
WA50017-1		50	50	
-2				
-3				
-4				
WB50015-1 DIS		100	100	[redacted]
-2				
-3				
-4				
-5				

Continued on Page 28

Read and Understood By

Signed	Date	Signed	Date
Michael D Vah[illegible]	12/16/92	D. Nadeau	12/21/92

PROJECT ALK-L~~B~~ MV 12/16/92

Notebook No. 1

Continued From Page 27

000007

SAMPLE NUMBER	Dig Types	Init Vol (mL)	Final Vol (mL)	Client
PBW	HNO_3	100	100	
LCSW				
WA50001-1				[redacted]
-1 TCLP SPIKE				
WA50008-1				[redacted]
-1 TCLP SPIKE				
-2				
-2 TCLP SPIKE				
TCLP BLANK-FL#1 (				
TCLP BLANK-FL#2 (				
WA50016-1				[redacted]
-2				
-3				
-4				
-5				
-6				
-7				
-8				
MV 12/16/92 WA50015-~~8~~1 DUP				
WA50015-~~8~~1 SPK				
WA50015-1 DIS				[redacted]
-2				
-3				
-4				
-5				
-6 TOT				
WA50015-6 TOT	HCl	100	100	
-6 TOT DUP				
-6 TOT SPK				
15-4 TOT				
15-5 TOT				

See Page 26 for Spikes & Reagents

Continued on Page

Spiking Witnessed AB 12/16/92

Michael D. Vol 12/16/92 — Signed / Date

Read and Understood By

D. Nadeau 12/21/92 — Signed / Date

COAST–TO–COAST ANALYTICAL SERVICES, INC. – ELEMENTS SECTION

TCLP EXTRACTION LOG

ABB SAMPLE NUMBER	WA51006-1	Blank (Fluid #2)		
CLIENT NAME	ABB-DC	NA		000008
MATRIX	Clay	↓		
TOTAL SOLIDS DETERMINATION (ALL WEIGHTS IN GRAMS)				
A) Weight of Empty Filtrate Vessel	NA – 100% Solids	NA		
B) Weight of Weigh Boat				
C) Weight of Weigh Boat + Waste				
D) Weight of Weigh Boat + Residue				
E) Total Weight of Waste (C–D)				
F) Weight of Filtrate Vessel + Filtrate				
G) Weight of Liquid Phase (F–A)				
H) Weight of Solid Phase (E–G)				
I) Percent Solid (H/E x 100)				
J) Weight of Solid Phase Removed for pH Determination				
K) Remaining Solid Phase (H–J)		↓		
pH DETERMINATION AND PARTICLE SIZE EVALUATION				
L) Initial pH	11.0	—		
M) pH After Addition of 3.5 mL 1 N HCl	6.5	NA		
N) Particle Size Reduction Required (Yes/No)?	No	↓		
EXTRACTION CONDITIONS				
O) Weight of Solid Extracted (If Different from "K" Above)	100.00	NA		
P) Extraction Fluid Used (#1/#2)	#2	#2		
Q) Volume of Extraction Fluid Used (mL)	2000. mL	2000. mL		
R) Extraction Started (Date and Time)	12/15/92 16:10	→		
S) Extraction Completed (Date and Time)	12/16/92 9:50	→		
T) Elapsed Extraction Time (Hours:Minutes)	17:40	→		
U) pH of Extract After Extraction	6.0	2.9		
V) Extract Filtered and Preserved (Date)	12/16/92	→		
W) S/N of Associated Spiked Sample	WA51006-1	NA		

Analyst: G. Brewer Date: 12/15/92 Reviewer: D Nadeau Date: 12/21/92

TEMPLATE: FORMS\DATA\TCLPLOG.WK1

Dn 12/18/92
L

L16L PBW, LCSW Zn, Cd, Ni, Fe, Mn, Cr, V, Be, Cu, Ag, Mg, Na

TCLP BL1 12/14 Cd, Cr, V, Ag, Ba

TCLP BL2 12/15 Ag

ABB-DC WA51006-1TCLP&spk Ag

000009

[redacted] WA50001-1 TCLP&spk Cd, Cr, Ag

[redacted] WA50008-1-2TCLP&spks Cd, Cr, Ag, V

L10-L [redacted] WA50011-1-3 Zn, Ni, Cr, Be, Cu, Ag

[redacted] WA50012-1-3 Zn, Ni, Mn, Cr, Cu

L16-L [redacted] WA50016-1-4, 6-8 Fe, Mn, Ca, Mg, Na

[redacted] WA50015-1dis-3dis-5dis Zn, Ni, Fe, Mn, Cr, Be, Cu, Ag, Mg, Ca

WA50015-6dis tot

WA50015-4-5tot Ca, Mg

CWD 12-21-92

12/18/92 10:59

wcal std	rep	1	Zn213.8	em	9953.4	conc	5.0000	
	rep	1	Cd214.4	em	15647.3	conc	5.0000	
	rep	1	Ni231.6	em	5797.4	conc	5.0000	
	rep	1	Fe238.2	em	34744.2	conc	10.0000	window edge
	rep	1	Mn257.6	em	128088.9	conc	5.0000	
	rep	1	Cr267.7	em	15865.7	conc	2.0000	
	rep	1	V292.4	em	30863.2	conc	5.0000	
	rep	1	Be313.0	em	161809.3	conc	0.5000	
	rep	1	Cu324.8	em	16272.3	conc	2.5000	
	rep	1	Ag328.1	em	14472.1	conc	2.5000	
	rep	1	Ba455.4	em	106283.8	conc	20.0000	
	rep	1	Mg279.6	em	111991.2	conc	50.0000	
	rep	1	Ca393.4	em	195562.3	conc	50.0000	
	rep	1	Na589.6	em	26946.5	conc	50.0000	
	rep	2	Zn213.8	em	10499.4	conc	5.0000	
	rep	2	Cd214.4	em	15776.3	conc	5.0000	
	rep	2	Ni231.6	em	5979.5	conc	5.0000	
	rep	2	Fe238.2	em	35738.0	conc	10.0000	
	rep	2	Mn257.6	em	128075.8	conc	5.0000	
	rep	2	Cr267.7	em	16143.5	conc	2.0000	
	rep	2	V292.4	em	31271.7	conc	5.0000	
	rep	2	Be313.0	em	159292.4	conc	0.5000	
	rep	2	Cu324.8	em	16121.[illegible]	conc	2.5000	
	rep	2	Ag328.1	em	14931.8	conc	2.5000	
	rep	2	Ba455.4	em	107[illegible].6	conc	20.0000	
	rep	2	Mg279.6	em	[illegible]	conc	50.0000	
	rep	2	Ca393.4	em	19[illegible].8	conc	50.0000	
	rep	2	Na589.6	em	27[illegible].8	conc	50.0000	
	rep	3	Zn213.8	em	10869.0	conc	5.0000	
	rep	3	Cd214.4	em	16531.6	conc	5.0000	
	rep	3	Ni231.6	em	[illegible]	conc	5.0000	
	rep	3	Fe238.2	em	3[illegible].6	conc	10.0000	
	rep	3	Mn257.6	em	13[illegible].7	conc	5.0000	
	rep	3	Cr267.7	em	16678.5	conc	2.0000	
	rep	3	V292.4	em	31820.2	conc	5.0000	
	rep	3	Be313.0	em	170832.1	conc	0.5000	
	rep	3	Cu324.8	em	16429.0	conc	2.5000	
	rep	3	Ag328.1	em	[illegible].2	conc	2.5000	
	rep	3	Ba455.4	em	110[illegible]	conc	20.0000	
	rep	3	Mg279.6	em	[illegible].9	conc	50.0000	
	rep	3	Ca393.4	em	[illegible].5	conc	50.0000	

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                    rep   3  Na589.6     em       27370.7 conc 50.0000
wcal std
12/18/92 11:03
    Zn213.8     av  10373.92                 sd   373.899 %cv   3.60 conc   5.0000
    Cd214.4     av  16018.40                 sd   534.907 %cv   3.34 conc   5.0000
    Ni231.6     av   6047.31                 sd   289.830 %cv   4.79 conc   5.0000
    Fe238.2     av  35489.25                 sd   656.999 %cv   1.85 conc  10.0000
    Mn257.6     av 129589.47                 sd  2610.448 %cv   2.01 conc   5.0000
    Cr267.7     av  16229.25                 sd   413.124 %cv   2.55 conc   2.0000
    V292.4      av  31318.36                 sd   480.234 %cv   1.53 conc   5.0000
    Be313.0     av 163977.94                 sd  6067.847 %cv   3.70 conc   0.5000
    Cu324.8     av  16274.33                 sd   153.686 %cv   0.94 conc   2.5000
    Ag328.1     av  14820.66                 sd   308.455 %cv   2.08 conc   2.5000
    Ba455.4     av 108281.20                 sd  2349.065 %cv   2.17 conc  20.0000
    Mg279.6     av 115544.41                 sd  3143.022 %cv   2.72 conc  50.0000
    Ca393.4     av 195956.50                 sd  1821.145 %cv   0.93 conc  50.0000
    Na589.6     av  27318.48                 sd   348.821 %cv   1.28 conc  50.0000

12/18/92 11:06
blank               rep   1  Zn213.8     em        45.2
                    rep   1  Cd214.4     em        39.3
                    rep   1  Ni231.6     em        36.7
                    rep   1  Fe238.2     em       106.8
                    rep   1  Mn257.6     em       212.7
                    rep   1  Cr267.7     em        54.2
                    rep   1  V292.4      em        99.5
                    rep   1  Be313.0     em       315.7
                    rep   1  Cu324.8     em        69.0
                    rep   1  Ag328.1     em        55.0
                    rep   1  Ba455.4     em       155.2
                    rep   1  Mg279.6     em       165.3
                    rep   1  Ca393.4     em       276.8
                    rep   1  Na589.6     em        27.4              window edge
                    rep   2  Zn213.8     em        39.6
                    rep   2  Cd214.4     em        26.7
                    rep   2  Ni231.6     em        45.6
                    rep   2  Fe238.2     em        69.0
                    rep   2  Mn257.6     em       113.5
                    rep   2  Cr267.7     em        58.6
                    rep   2  V292.4      em        67.7
                    rep   2  Be313.0     em       205.8
                    rep   2  Cu324.8     em        71.2
                    rep   2  Ag328.1     em        88.6
                    rep   2  Ba455.4     em        79.7
                    rep   2  Mg279.6     em        89.9
                    rep   2  Ca393.4     em       155.3
                    rep   2  Na589.6     em        60.4
                    rep   3  Zn213.8     em        26.8
                    rep   3  Cd214.4     em        [illegible]              window edge
                    rep   3  Ni231.6     em        21.9              window edge
                    rep   3  Fe238.2     em        [illegible]
                    rep   3  Mn257.6     em        52.7
                    rep   3  Cr267.7     em        24.4
                    rep   3  V292.4      em        48.1
                    rep   3  Be313.0     em       218.0
                    rep   3  Cu324.8     em        60.0
                    rep   3  Ag328.1     em        45.3
                    rep   3  Ba455.4     em        29.1
                    rep   3  Mg279.6     em        30.9
                    rep   3  Ca393.4     em        57.4
                    rep   3  Na589.6     em        28.8
blank
12/18/92 11:09
    Zn213.8     av     37.20                 sd     9.437 %cv  25.37
    Cd214.4     av     24.77                 sd    15.550 %cv  62.77
    Ni231.6     av     34.74                 sd    11.967 %cv  34.45
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000010

000011

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Fe238.2    av     72.40     sd    32.811 %cv  45.32
Mn257.6    av    126.32     sd    80.764 %cv  63.95
Cr267.7    av     45.73     sd    18.622 %cv  40.72
V292.4     av     71.73     sd    25.935 %cv  36.16
Be313.0    av    246.50     sd    60.277 %cv  24.45
Cu324.8    av     66.74     sd     5.893 %cv   8.83
Ag328.1    av     62.96     sd    22.711 %cv  36.07
Ba455.4    av     88.01     sd    63.471 %cv  72.12
Mg279.6    av     95.38     sd    67.406 %cv  70.67
Ca393.4    av    163.17     sd   109.920 %cv  67.36
Na589.6    av     38.87     sd    18.629 %cv  47.92

12/18/92 11:13
blank          rep  1  Zn213.8   em     15.1
               rep  1  Cd214.4   em     20.2         window edge
               rep  1  Ni231.6   em     28.4
               rep  1  Fe238.2   em     40.0
               rep  1  Mn257.6   em      9.0
               rep  1  Cr267.7   em     58.0
               rep  1  V292.4    em     75.5
               rep  1  Be313.0   em    144.8
               rep  1  Cu324.8   em     41.8         window edge
               rep  1  Ag328.1   em     16.9
               rep  1  Ba455.4   em      5.1         window edge
               rep  1  Mg279.6   em      6.9
               rep  1  Ca393.4   em     24.0
               rep  1  Na589.6   em     36.0
               rep  2  Zn213.8   em     19.8
               rep  2  Cd214.4   em     12.2
               rep  2  Ni231.6   em     23.7
               rep  2  Fe238.2   em     33.2
               rep  2  Mn257.6   em     62.1
               rep  2  Cr267.7   em     57.4
               rep  2  V292.4    em     79.8
               rep  2  Be313.0   em    136.0
               rep  2  Cu324.8   em     62.2
               rep  2  Ag328.1   em     61.5
               rep  2  Ba455.4   em      3.4
               rep  2  Mg279.6   em      4.0
               rep  2  Ca393.4   em     20.1
               rep  2  Na589.6   em    -36.5         window edge
               rep  3  Zn213.8   em     23.4
               rep  3  Cd214.4   em     21.4
               rep  3  Ni231.6   em     25.2
               rep  3  Fe238.2   em     38.1
               rep  3  Mn257.6   em     26.6
               rep  3  Cr267.7   em     31.3         window edge
               rep  3  V292.4    em     58.3
               rep  3  Be313.0   em    11[illegible].6
               rep  3  Cu324.8   em     74.3
               rep  3  Ag328.1   em     59.9
               rep  3  Ba455.4   em      3.3
               rep  3  Mg279.6   em      3.6
               rep  3  Ca393.4   em     18.1
               rep  3  Na589.6   em     41.8
blank
12/18/92 11:46
Zn213.8    av     19.82     sd     4.159 %cv  21.42
Cd214.4    av     17.96     sd     4.991 %cv  27.79
Ni231.6    av     25.74     sd     2.409 %cv   9.36
Fe238.2    av     37.12     sd     3.473 %cv   9.36
Mn257.6    av     32.57     sd    27.048 %cv  83.04
Cr267.7    av     48.92     sd    15.251 %cv  31.18
V292.4     av     71.21     sd    11.418 %cv  16.03
Be313.0    av    130.82     sd    17.180 %cv  13.14
Cu324.8    av     [illegible]     sd    [illegible] %cv  27.63
```

Ag328.1	av	46.09	sd	25.327 %cv	54.95
Ba455.4	av	3.93	sd	0.988 %cv	25.16
Mg279.6	av	4.83	sd	1.777 %cv	36.81
Ca393.4	av	20.77	sd	2.996 %cv	14.43
Na589.6	av	13.78	sd	43.619 %cv	316.55

12/18/92 11:19

000012

std	rep	1	Zn213.8	em	10343.4	conc	5.0000
	rep	1	Cd214.4	em	16144.5	conc	5.0000
	rep	1	Ni231.6	em	5994.7	conc	5.0000
	rep	1	Fe238.2	em	35611.9	conc	10.0000
	rep	1	Mn257.6	em	129621.0	conc	5.0000
	rep	1	Cr267.7	em	16455.7	conc	2.0000
	rep	1	V292.4	em	31449.2	conc	5.0000
	rep	1	Be313.0	em	168586.5	conc	0.5000
	rep	1	Cu324.8	em	16657.0	conc	2.5000
	rep	1	Ag328.1	em	14954.8	conc	2.5000
	rep	1	Ba455.4	em	111221.2	conc	20.0000
	rep	1	Mg279.6	em	115573.3	conc	50.0000
	rep	1	Ca393.4	em	198571.6	conc	50.0000
	rep	1	Na589.6	em	27769.5	conc	50.0000
	rep	2	Zn213.8	em	10973.1	conc	5.0000
	rep	2	Cd214.4	em	16324.5	conc	5.0000
	rep	2	Ni231.6	em	6220.0	conc	5.0000
	rep	2	Fe238.2	em	34987.4	conc	10.0000
	rep	2	Mn257.6	em	135075.1	conc	5.0000
	rep	2	Cr267.7	em	16602.5	conc	2.0000
	rep	2	V292.4	em	32106.3	conc	5.0000
	rep	2	Be313.0	em	166969.4	conc	0.5000
	rep	2	Cu324.8	em	16350.5	conc	2.5000
	rep	2	Ag328.1	em	15076.0	conc	2.5000
	rep	2	Ba455.4	em	108832.2	conc	20.0000
	rep	2	Mg279.6	em	115811.7	conc	50.0000
	rep	2	Ca393.4	em	196063.0	conc	50.0000
	rep	2	Na589.6	em	27958.9	conc	50.0000
	rep	3	Zn213.8	em	10947.7	conc	5.0000
	rep	3	Cd214.4	em	16445.4	conc	5.0000
	rep	3	Ni231.6	em	6220.4	conc	5.0000
	rep	3	Fe238.2	em	36904.6	conc	10.0000
	rep	3	Mn257.6	em	134339.7	conc	5.0000
	rep	3	Cr267.7	em	16677.1	conc	2.0000
	rep	3	V292.4	em	32392.9	conc	5.0000
	rep	3	Be313.0	em	171795.1	conc	0.5000
	rep	3	Cu324.8	em	17012.3	conc	2.5000
	rep	3	Ag328.1	em	15125.3	conc	2.5000
	rep	3	Ba455.4	em	112910.9	conc	20.0000
	rep	3	Mg279.6	em	115433.9	conc	50.0000
	rep	3	Ca393.4	em	193085.6	conc	50.0000
	rep	3	Na589.6	em	27741.8	conc	50.0000

std
12/18/92 11:23

Zn213.8	av	10921.[illegible]	sd	468.7589[illegible]	%cv	[illegible]	conc	5.0000
Cd214.4	av	16304.830	sd	151.39905	%cv	0.93	conc	5.0000
Ni231.6	av	6145.0[illegible]	sd	130.21352	%cv	2.12	conc	5.0000
Fe238.2	av	35834.625	sd	977.80542	%cv	2.73	conc	10.0000
Mn257.6	av	133011.93	sd	2959.6091	%cv	2.23	conc	5.0000
Cr267.7	av	16578.445	sd	112.62469	%cv	0.68	conc	2.0000
V292.4	av	31962.767	sd	459.00970	%cv	1.44	conc	5.0000
Be313.0	av	169117.10	sd	2456.1411	%cv	1.45	conc	0.5000
Cu324.8	av	16673.257	sd	331.21854	%cv	1.99	conc	2.5000
Ag328.1	av	15052.[illegible]	sd	87.75640	%cv	0.58	conc	2.5000
Ba455.4	av	110988.09	sd	2049.3330	%cv	1.85	conc	20.0000
Mg279.6	av	115606.31	sd	191.02075	%cv	0.17	conc	50.0000
Ca393.4	av	195906.71	sd	2746.3515	%cv	1.40	conc	50.0000
Na589.6	av	27823.392	sd	118.14777	%cv	0.42	conc	50.0000

12/18/92 11:20

000013

ICV	rep	1	Zn213.8	conc	2.5457	mg/L
	rep	1	Cd214.4	conc	2.6545	mg/L
	rep	1	Ni231.6	conc	2.6383	mg/L
	rep	1	Fe238.2	conc	5.1914	mg/L
	rep	1	Mn257.6	conc	2.5418	mg/L
	rep	1	Cr267.7	conc	1.0535	mg/L
	rep	1	V292.4	conc	2.5124	mg/L
	rep	1	Be313.0	conc	0.2517	mg/L
	rep	1	Cu324.8	conc	1.2710	mg/L
	rep	1	Ag328.1	conc	1.2665	mg/L
	rep	1	Ba455.4	conc	10.1601	mg/L
	rep	1	Mg279.6	conc	27.5119	mg/L
	rep	1	Ca393.4	conc	26.2676	mg/L
	rep	1	Na589.6	conc	26.0278	mg/L
	rep	2	Zn213.8	conc	2.4566	mg/L
	rep	2	Cd214.4	conc	2.6407	mg/L
	rep	2	Ni231.6	conc	2.5921	mg/L
	rep	2	Fe238.2	conc	5.1155	mg/L
	rep	2	Mn257.6	conc	2.6718	mg/L
	rep	2	Cr267.7	conc	1.0710	mg/L
	rep	2	V292.4	conc	2.5804	mg/L
	rep	2	Be313.0	conc	0.2521	mg/L
	rep	2	Cu324.8	conc	1.2592	mg/L
	rep	2	Ag328.1	conc	1.2738	mg/L
	rep	2	Ba455.4	conc	10.3482	mg/L
	rep	2	Mg279.6	conc	26.4499	mg/L
	rep	2	Ca393.4	conc	26.9748	mg/L
	rep	2	Na589.6	conc	25.5345	mg/L
	rep	3	Zn213.8	conc	2.4948	mg/L
	rep	3	Cd214.4	conc	2.5783	mg/L
	rep	3	Ni231.6	conc	2.6071	mg/L
	rep	3	Fe238.2	conc	5.0245	mg/L
	rep	3	Mn257.6	conc	2.5827	mg/L
	rep	3	Cr267.7	conc	1.0491	mg/L
	rep	3	V292.4	conc	2.5484	mg/L
	rep	3	Be313.0	conc	0.2431	mg/L
	rep	3	Cu324.8	conc	1.2835	mg/L
	rep	3	Ag328.1	conc	1.2761	mg/L
	rep	3	Ba455.4	conc	10.2888	mg/L
	rep	3	Mg279.6	conc	26.9380	mg/L
	rep	3	Ca393.4	conc	26.6656	mg/L
	rep	3	Na589.6	conc	25.6512	mg/L

ICV
12/18/92 11:29

Zn213.8	av	2.4990 mg/L	sd	0.04471	%cv	1.79	100
Cd214.4	av	2.6245 mg/L	sd	0.04056	%cv	1.55	105
Ni231.6	av	2.6125 mg/L	sd	0.02360	%cv	0.90	105
Fe238.2	av	5.1105 mg/L	sd	0.08358	%cv	1.64	102
Mn257.6	av	2.5988 mg/L	sd	0.06649	%cv	2.56	104
Cr267.7	av	1.0579 mg/L	sd	0.01157	%cv	1.09	106
V292.4	av	2.5471 mg/L	sd	0.03401	%cv	1.34	102
Be313.0	av	0.2490 mg/L	sd	0.00507	%cv	2.04	100
Cu324.8	av	1.2712 mg/L	sd	0.01213	%cv	0.95	102
Ag328.1	av	1.2724 mg/L	sd	0.00498	%cv	0.39	102
Ba455.4	av	10.2657 mg/L	sd	0.09618	%cv	0.94	103
Mg279.6	av	26.9556 mg/L	sd	0.53155	%cv	1.97	108
Ca393.4	av	26.6360 mg/L	sd	0.35458	%cv	1.33	107
Na589.6	av	25.7379 mg/L	sd	0.25781	%cv	1.00	103

12/18/92 11:32

ICB	rep	1	Zn213.8	conc	0.0068	mg/L
	rep	1	Cd214.4	conc	0.0043	mg/L
	rep	1	Ni231.6	conc	0.0154	mg/L
	rep	1	Fe238.2	conc	0.0053	mg/L
	rep	1	Mn257.6	conc	0.0047	mg/L

Window edge

rep	1	Cr267.7	conc	-0.0011 mg/L	
rep	1	V292.4	conc	-0.0092 mg/L	
rep	1	Be313.0	conc	0.0003 mg/L	
rep	1	Cu324.8	conc	0.0031 mg/L	
rep	1	Ag328.1	conc	0.0042 mg/L	
rep	1	Ba455.4	conc	0.0144 mg/L	
rep	1	Mg279.6	conc	0.0337 mg/L	
rep	1	Ca393.4	conc	0.0336 mg/L	
rep	1	Na589.6	conc	0.0280 mg/L	
rep	2	Zn213.8	conc	-0.0034 mg/L	
rep	2	Cd214.4	conc	0.0009 mg/L	
rep	2	Ni231.6	conc	-0.0070 mg/L	window edge
rep	2	Fe238.2	conc	0.0095 mg/L	
rep	2	Mn257.6	conc	0.0008 mg/L	
rep	2	Cr267.7	conc	0.0011 mg/L	
rep	2	V292.4	conc	-0.0041 mg/L	window edge
rep	2	Be313.0	conc	0.0000 mg/L	
rep	2	Cu324.8	conc	-0.0010 mg/L	
rep	2	Ag328.1	conc	-0.0048 mg/L	
rep	2	Ba455.4	conc	0.0068 mg/L	
rep	2	Mg279.6	conc	0.0146 mg/L	
rep	2	Ca393.4	conc	0.0136 mg/L	
rep	2	Na589.6	conc	-0.0090 mg/L	window edge
rep	3	Zn213.8	conc	-0.0003 mg/L	window edge
rep	3	Cd214.4	conc	-0.0020 mg/L	
rep	3	Ni231.6	conc	0.0022 mg/L	
rep	3	Fe238.2	conc	-0.0101 mg/L	window edge
rep	3	Mn257.6	conc	0.0014 mg/L	
rep	3	Cr267.7	conc	0.0011 mg/L	
rep	3	V292.4	conc	-0.0047 mg/L	
rep	3	Be313.0	conc	0.0002 mg/L	
rep	3	Cu324.8	conc	0.0022 mg/L	
rep	3	Ag328.1	conc	-0.0013 mg/L	
rep	3	Ba455.4	conc	0.0023 mg/L	
rep	3	Mg279.6	conc	0.0058 mg/L	
rep	3	Ca393.4	conc	0.0040 mg/L	
rep	3	Na589.6	conc	0.0536 mg/L	

000014

ICB
12/18/92 11:35

Zn213.8	av	0.0010 mg/L	sd	0.00525	%cV	508.77
Cd214.4	av	0.0011 mg/L	sd	0.00316	%cV	292.61
Ni231.6	av	-0.0067 mg/L	sd	0.00881	%cV	131.06
Fe238.2	av	0.0016 mg/L	sd	0.01033	%cV	663.05
Mn257.6	av	0.0023 mg/L	sd	0.00213	%cV	92.85
Cr267.7	av	0.0004 mg/L	sd	0.00130	%cV	368.49
V292.4	av	-0.0060 mg/L	sd	0.00277	%cV	46.31
Be313.0	av	0.0002 mg/L	sd	0.00014	%cV	84.61
Cu324.8	av	0.0014 mg/L	sd	0.00214	%cV	151.42
Ag328.1	av	-0.0006 mg/L	sd	0.00452	%cV	742.[illegible]
Ba455.4	av	0.0078 mg/L	sd	0.00614	%cV	78.46
Mg279.6	av	0.0180 mg/L	sd	0.01424	%cV	79.02
Ca393.4	av	0.0171 mg/L	sd	0.01508	%cV	88.44
Na589.6	av	0.0242 mg/L	sd	0.03148	%cV	129.99

[illegible] below [illegible]

12/18/92 11:38

ICSA	rep	1	Zn213.8	conc	0.0179 mg/L	
	rep	1	Cd214.4	conc	0.0088 mg/L	window edge
	rep	1	Ni231.6	conc	-0.0042 mg/L	
	rep	1	Mn257.6	conc	0.0082 mg/L	
	rep	1	Cr267.7	conc	-0.0029 mg/L	
	rep	1	V292.4	conc	-0.0398 mg/L	
	rep	1	Be313.0	conc	0.0001 mg/L	
	rep	1	Cu324.8	conc	-0.0017 mg/L	window edge
	rep	1	Ag328.1	conc	-0.0017 mg/L	window edge
	rep	1	Ba455.4	conc	0.0012 mg/L	
	rep	2	Zn213.8	conc	0.0136 mg/L	

rep	2	Cd214.4	conc	0.0157 mg/L	
rep	2	Ni231.6	conc	0.0169 mg/L	
rep	2	Mn257.6	conc	0.0093 mg/L	
rep	2	Cr267.7	conc	0.0125 mg/L	
rep	2	V292.4	conc	0.0362 mg/L	
rep	2	Be313.0	conc	0.0001 mg/L	
rep	2	Cu324.8	conc	-0.0082 mg/L	window edge
rep	2	Ag328.1	conc	-0.0027 mg/L	
rep	2	Ba455.4	conc	0.0009 mg/L	window edge
rep	3	Zn213.8	conc	0.0140 mg/L	
rep	3	Cd214.4	conc	0.0174 mg/L	
rep	3	Ni231.6	conc	0.0075 mg/L	
rep	3	Mn257.6	conc	0.0095 mg/L	
rep	3	Cr267.7	conc	0.0032 mg/L	
rep	3	V292.4	conc	0.0214 mg/L	
rep	3	Be313.0	conc	0.0002 mg/L	
rep	3	Cu324.8	conc	0.0028 mg/L	window edge
rep	3	Ag328.1	conc	-0.0011 mg/L	
rep	3	Ba455.4	conc	-0.0002 mg/L	window edge

000015

ICSA
12/18/92 11:40

Zn213.8	av	0.0152 mg/L	sd	0.00236	%cv	15.52
Cd214.4	av	0.0140 mg/L	sd	0.00456	%cv	32.62
Ni231.6	av	0.0067 mg/L	sd	0.01060	%cv	157.10
Mn257.6	av	0.0090 mg/L	sd	0.00070	%cv	7.77
Cr267.7	av	0.0062 mg/L	sd	0.00544	%cv	87.95
V292.4	av	0.0325 mg/L	sd	0.00971	%cv	29.92
Be313.0	av	0.0001 mg/L	sd	0.00004	%cv	32.43
Cu324.8	av	-0.0024 mg/L	sd	0.00555	%cv	234.75
Ag328.1	av	-0.0016 mg/L	sd	0.00089	%cv	54.24
Ba455.4	av	0.0006 mg/L	sd	0.00073	%cv	115.79

12/18/92 11:43

ICSAB	rep	1	Zn213.8	conc	0.9904 mg/L
	rep	1	Cd214.4	conc	0.9555 mg/L
	rep	1	Ni231.6	conc	0.9305 mg/L
	rep	1	Mn257.6	conc	0.4901 mg/L
	rep	1	Cr267.7	conc	0.4781 mg/L
	rep	1	V292.4	conc	0.4690 mg/L
	rep	1	Be313.0	conc	0.4986 mg/L
	rep	1	Cu324.8	conc	0.5039 mg/L
	rep	1	Ag328.1	conc	0.9894 mg/L
	rep	1	Ba455.4	conc	0.4957 mg/L
	rep	2	Zn213.8	conc	0.9928 mg/L
	rep	2	Cd214.4	conc	0.9581 mg/L
	rep	2	Ni231.6	conc	0.9507 mg/L
	rep	2	Mn257.6	conc	0.4775 mg/L
	rep	2	Cr267.7	conc	0.4990 mg/L
	rep	2	V292.4	conc	0.4769 mg/L
	rep	2	Be313.0	conc	0.5033 mg/L
	rep	2	Cu324.8	conc	0.4911 mg/L
	rep	2	Ag328.1	conc	1.0083 mg/L
	rep	2	Ba455.4	conc	0.4952 mg/L
	rep	3	Zn213.8	conc	0.9674 mg/L
	rep	3	Cd214.4	conc	0.9423 mg/L
	rep	3	Ni231.6	conc	0.9516 mg/L
	rep	3	Mn257.6	conc	0.4884 mg/L
	rep	3	Cr267.7	conc	0.4826 mg/L
	rep	3	V292.4	conc	0.4841 mg/L
	rep	3	Be313.0	conc	0.4932 mg/L
	rep	3	Cu324.8	conc	0.4982 mg/L
	rep	3	Ag328.1	conc	1.0126 mg/L
	rep	3	Ba455.4	conc	0.4917 mg/L

ICSAB
12/18/92 11:45

98

Cd214.4	av	0.9520 mg/L	sd	0.00843	%cv	0.89	95
Ni231.6	av	0.9443 mg/L	sd	0.01195	%cv	1.27	94
Mn257.6	av	0.4853 mg/L	sd	0.00685	%cv	1.41	97
Cr267.7	av	0.4866 mg/L	sd	0.01100	%cv	2.26	97
V292.4	av	0.4767 mg/L	sd	0.00758	%cv	1.59	95
Be313.0	av	0.4984 mg/L	sd	0.00506	%cv	1.02	100
Cu324.8	av	0.4911 mg/L	sd	0.01752	%cv	3.57	98
Ag328.1	av	1.0034 mg/L	sd	0.01230	%cv	1.23	100
Ba455.4	av	0.4942 mg/L	sd	0.00221	%cv	0.45	99

000016

12/18/92 11:48

throw away	rep	1	Zn213.8	conc	0.0018 mg/L	
	rep	1	Cd214.4	conc	-0.0011 mg/L	
	rep	1	Ni231.6	conc	0.0050 mg/L	
	rep	1	Fe238.2	conc	0.3573 mg/L	
	rep	1	Mn257.6	conc	0.0010 mg/L	
	rep	1	Cr267.7	conc	-0.0049 mg/L	
	rep	1	V292.4	conc	-0.0048 mg/L	
	rep	1	Be313.0	conc	0.0006 mg/L	
	rep	1	Cu324.8	conc	-0.0043 mg/L	
	rep	1	Ag328.1	conc	-0.0016 mg/L	window edge
	rep	1	Ba455.4	conc	0.0006 mg/L	
	rep	1	Mg279.6	conc	0.7290 mg/L	
	rep	1	Ca393.4	conc	0.6333 mg/L	
	rep	1	Na589.6	conc	0.0749 mg/L	
	rep	2	Zn213.8	conc	-0.0001 mg/L	
	rep	2	Cd214.4	conc	-0.0008 mg/L	
	rep	2	Ni231.6	conc	-0.0019 mg/L	window edge
	rep	2	Fe238.2	conc	0.1309 mg/L	
	rep	2	Mn257.6	conc	0.0000 mg/L	
	rep	2	Cr267.7	conc	-0.0048 mg/L	
	rep	2	V292.4	conc	0.0077 mg/L	
	rep	2	Be313.0	conc	0.0002 mg/L	
	rep	2	Cu324.8	conc	0.0081 mg/L	
	rep	2	Ag328.1	conc	0.0031 mg/L	
	rep	2	Ba455.4	conc	0.0004 mg/L	
	rep	2	Mg279.6	conc	0.2670 mg/L	
	rep	2	Ca393.4	conc	0.2354 mg/L	
	rep	2	Na589.6	conc	0.0716 mg/L	
	rep	3	Zn213.8	conc	0.0106 mg/L	
	rep	3	Cd214.4	conc	-0.0042 mg/L	window edge
	rep	3	Ni231.6	conc	0.0027 mg/L	
	rep	3	Fe238.2	conc	0.0415 mg/L	
	rep	3	Mn257.6	conc	0.0020 mg/L	
	rep	3	Cr267.7	conc	0.0007 mg/L	
	rep	3	V292.4	conc	-0.0045 mg/L	
	rep	3	Be313.0	conc	0.0000 mg/L	
	rep	3	Cu324.8	conc	0.0103 mg/L	
	rep	3	Ag328.1	conc	0.0041 mg/L	
	rep	3	Ba455.4	conc	0.0001 mg/L	
	rep	3	Mg279.6	conc	0.1060 mg/L	
	rep	3	Ca393.4	conc	0.0888 mg/L	
	rep	3	Na589.6	conc	0.0397 mg/L	

throw away
12/18/92 11:51

Zn213.8	av	0.0041 mg/L	sd	0.00571	%cv	139.00
Cd214.4	av	-0.0021 mg/L	sd	0.00190	%cv	91.76
Ni231.6	av	0.0020 mg/L	sd	0.00355	%cv	181.65
Fe238.2	av	0.1766 mg/L	sd	0.16274	%cv	92.17
Mn257.6	av	0.0010 mg/L	sd	0.00101	%cv	98.52
Cr267.7	av	-0.0030 mg/L	sd	0.00319	%cv	106.26
V292.4	av	-0.0005 mg/L	sd	0.00714	%cv	1436.9
Be313.0	av	0.0003 mg/L	sd	0.00031	%cv	102.59
Cu324.8	av	0.0047 mg/L	sd	0.00784	%cv	166.60
Ag328.1	av	0.0019 mg/L	sd	0.00307	%cv	164.24
Ba455.4	av	0.0004 mg/L	sd	0.00023	%cv	58.51

Mg279.6	av	0.3674 mg/L	sd	0.32338	%cv	88.03	
Ca393.4	av	0.3192 mg/L	sd	0.28177	%cv	88.28	
Na589.6	av	0.0621 mg/L	sd	0.01944	%cv	31.33	

000017

12/18/92 11:54

CRI	rep	1	Zn213.8	conc	0.0318 mg/L
	rep	1	Cd214.4	conc	0.0090 mg/L
	rep	1	Ni231.6	conc	0.0751 mg/L
	rep	1	Mn257.6	conc	0.0318 mg/L
	rep	1	Cr267.7	conc	0.0157 mg/L
	rep	1	V292.4	conc	0.0925 mg/L
	rep	1	Be313.0	conc	0.0089 mg/L
	rep	1	Cu324.8	conc	0.0449 mg/L
	rep	1	Ag328.1	conc	0.0147 mg/L
	rep	2	Zn213.8	conc	0.0359 mg/L
	rep	2	Cd214.4	conc	0.0092 mg/L
	rep	2	Ni231.6	conc	0.0850 mg/L
	rep	2	Mn257.6	conc	0.0306 mg/L
	rep	2	Cr267.7	conc	0.0119 mg/L
	rep	2	V292.4	conc	0.0907 mg/L
	rep	2	Be313.0	conc	0.0089 mg/L
	rep	2	Cu324.8	conc	0.0387 mg/L
	rep	2	Ag328.1	conc	0.0168 mg/L
	rep	3	Zn213.8	conc	0.0401 mg/L
	rep	3	Cd214.4	conc	0.0084 mg/L
	rep	3	Ni231.6	conc	0.0523 mg/L
	rep	3	Mn257.6	conc	0.0311 mg/L
	rep	3	Cr267.7	conc	0.0159 mg/L
	rep	3	V292.4	conc	0.0907 mg/L
	rep	3	Be313.0	conc	0.0093 mg/L
	rep	3	Cu324.8	conc	0.0559 mg/L
	rep	3	Ag328.1	conc	0.0159 mg/L

CRI
12/18/92 11:56

Zn213.8	av	0.0359 mg/L	sd	0.00415	%cv	11.56	90
Cd214.4	av	0.0089 mg/L	sd	0.00038	%cv	4.23	89
Ni231.6	av	0.0708 mg/L	sd	0.01678	%cv	23.70	89
Mn257.6	av	0.0312 mg/L	sd	0.00061	%cv	1.95	104
Cr267.7	av	0.0145 mg/L	sd	0.00226	%cv	15.58	73
V292.4	av	0.0913 mg/L	sd	0.00106	%cv	1.16	91
Be313.0	av	0.0090 mg/L	sd	0.00026	%cv	2.84	90
Cu324.8	av	0.0465 mg/L	sd	0.00869	%cv	18.68	93
Ag328.1	av	0.0158 mg/L	sd	0.00107	%cv	6.75	79

Rerun Ba below
Next ICB out

12/18/92 12:00

ICB	rep	1	Ba455.4	conc	0.0006 mg/L
	rep	2	Ba455.4	conc	-0.0001 mg/L
	rep	3	Ba455.4	conc	-0.0007 mg/L

window edge

ICB
12/18/92 12:00

Ba455.4	av	-0.0001 mg/L	sd	0.00063	%cv	919.79	2

12/18/92 12:02

L16 PBW	rep	1	Zn213.8	conc	0.0094 mg/L
	rep	1	Cd214.4	conc	-0.0009 mg/L
	rep	1	Ni231.6	conc	-0.0044 mg/L
	rep	1	Fe238.2	conc	0.0114 mg/L
	rep	1	Mn257.6	conc	-0.0000 mg/L
	rep	1	Cr267.7	conc	-0.0027 mg/L
	rep	1	V292.4	conc	-0.0030 mg/L
	rep	1	Be313.0	conc	0.0001 mg/L
	rep	1	Cu324.8	conc	-0.0031 mg/L
	rep	1	Ag328.1	conc	-0.0011 mg/L
	rep	1	Ba455.4	conc	0.0010 mg/L
	rep	1	Mg279.6	conc	0.0042 mg/L
	rep	1	Ca393.4	conc	[illegible] mg/L

rep	1	Na589.6	conc	0.0443	mg/L	window edge
rep	2	Zn213.8	conc	0.0118	mg/L	
rep	2	Cd214.4	conc	-0.0030	mg/L	window edge
rep	2	Ni231.6	conc	0.0157	mg/L	
rep	2	Fe238.2	conc	0.0017	mg/L	
rep	2	Mn257.6	conc	-0.0007	mg/L	window edge
rep	2	Cr267.7	conc	0.0010	mg/L	
rep	2	V292.4	conc	-0.0005	mg/L	
rep	2	Be313.0	conc	0.0001	mg/L	
rep	2	Cu324.8	conc	-0.0003	mg/L	
rep	2	Ag328.1	conc	0.0032	mg/L	
rep	2	Ba455.4	conc	-0.0013	mg/L	window edge
rep	2	Mg279.6	conc	0.0034	mg/L	
rep	2	Ca393.4	conc	0.0064	mg/L	
rep	2	Na589.6	conc	0.0819	mg/L	
rep	3	Zn213.8	conc	0.0218	mg/L	
rep	3	Cd214.4	conc	-0.0004	mg/L	
rep	3	Ni231.6	conc	0.0146	mg/L	
rep	3	Fe238.2	conc	-0.0086	mg/L	window edge
rep	3	Mn257.6	conc	0.0010	mg/L	
rep	3	Cr267.7	conc	-0.0019	mg/L	
rep	3	V292.4	conc	-0.0033	mg/L	window edge
rep	3	Be313.0	conc	0.0000	mg/L	
rep	3	Cu324.8	conc	-0.0009	mg/L	
rep	3	Ag328.1	conc	0.0009	mg/L	
rep	3	Ba455.4	conc	0.0003	mg/L	window edge
rep	3	Mg279.6	conc	0.0025	mg/L	
rep	3	Ca393.4	conc	0.0057	mg/L	
rep	3	Na589.6	conc	0.0478	mg/L	window edge

000018

L16 PBW
12/18/92 12:05

Zn213.8	av	0.0143	mg/L	sd	0.00663	%cv	46.52	
Cd214.4	av	-0.0014	mg/L	sd	0.00134	%cv	94.07	
Ni231.6	av	0.0116	mg/L	sd	0.00621	%cv	53.70	
Fe238.2	av	0.0014	mg/L	sd	0.00984	%cv	691.32	
Mn257.6	av	0.0001	mg/L	sd	0.00084	%cv	805.25	
Cr267.7	av	-0.0012	mg/L	sd	0.00197	%cv	162.64	
V292.4	av	-0.0023	mg/L	sd	0.00149	%cv	66.03	
Be313.0	av	0.0001	mg/L	sd	0.00002	%cv	31.82	
Cu324.8	av	0.0006	mg/L	sd	0.00217	%cv	353.94	
Ag328.1	av	0.0010	mg/L	sd	0.00213	%cv	209.27	
Ba455.4	av	-0.0000	mg/L	sd	0.00119	%cv	13000	Rerun
Mg279.6	av	0.0034	mg/L	sd	0.00087	%cv	25.80	
Ca393.4	av	0.0065	mg/L	sd	0.00091	%cv	14.04	Rerun
Na589.6	av	0.0580	mg/L	sd	0.02080	%cv	35.88	

12/18/92 12:08
L16 LCSW

rep	1	Zn213.8	conc	2.3541	mg/L
rep	1	Cd214.4	conc	2.5406	mg/L
rep	1	Ni231.6	conc	2.5621	mg/L
rep	1	Fe238.2	conc	[illegible]	mg/L
rep	1	Mn257.6	conc	2.6241	mg/L
rep	1	Cr267.7	conc	[illegible]	mg/L
rep	1	V292.4	conc	2.5139	mg/L
rep	1	Be313.0	conc	0.2424	mg/L
rep	1	Cu324.8	conc	[illegible]	mg/L
rep	1	Ag328.1	conc	[illegible]	mg/L
rep	1	Ba455.4	conc	[illegible]	mg/L
rep	1	Mg279.6	conc	25.6380	mg/L
rep	1	Ca393.4	conc	25.5994	mg/L
rep	1	Na589.6	conc	24.5140	mg/L
rep	2	Zn213.8	conc	[illegible]	mg/L
rep	2	Cd214.4	conc	2.5944	mg/L
rep	2	Ni231.6	conc	2.5806	mg/L
rep	2	Fe238.2	conc	[illegible]	mg/L
rep	2	Mn257.6	[illegible]	[illegible]	[illegible]

000019

rep	2	Cr267.7	conc	1.0349	mg/L
rep	2	V292.4	conc	2.4977	mg/L
rep	2	Be313.0	conc	0.2413	mg/L
rep	2	Cu324.8	conc	1.2676	mg/L
rep	2	Ag328.1	conc	1.2251	mg/L
rep	2	Ba455.4	conc	9.8290	mg/L
rep	2	Mg279.6	conc	26.1370	mg/L
rep	2	Ca393.4	conc	25.5319	mg/L
rep	2	Na589.6	conc	25.3544	mg/L
rep	3	Zn213.8	conc	2.4653	mg/L
rep	3	Cd214.4	conc	2.5572	mg/L
rep	3	Ni231.6	conc	2.5211	mg/L
rep	3	Fe238.2	conc	4.9837	mg/L
rep	3	Mn257.6	conc	2.5766	mg/L
rep	3	Cr267.7	conc	1.0295	mg/L
rep	3	V292.4	conc	2.4156	mg/L
rep	3	Be313.0	conc	0.2340	mg/L
rep	3	Cu324.8	conc	1.2458	mg/L
rep	3	Ag328.1	conc	1.2506	mg/L
rep	3	Ba455.4	conc	9.5959	mg/L
rep	3	Mg279.6	conc	25.6451	mg/L
rep	3	Ca393.4	conc	25.7874	mg/L
rep	3	Na589.6	conc	25.4820	mg/L

L16 LCSW
12/18/92 12:11

Zn213.8	av	2.4633	mg/L	sd	0.06833	%cv	2.77	
Cd214.4	av	2.5641	mg/L	sd	0.02758	%cv	1.08	
Ni231.6	av	2.5546	mg/L	sd	0.03050	%cv	1.19	
Fe238.2	av	5.0703	mg/L	sd	0.10186	%cv	2.01	
Mn257.6	av	2.5835	mg/L	sd	0.03761	%cv	1.46	
Cr267.7	av	1.0233	mg/L	sd	0.01556	%cv	1.52	
V292.4	av	2.4757	mg/L	sd	0.05271	%cv	2.13	
Be313.0	av	0.2393	mg/L	sd	0.00455	%cv	1.90	
Cu324.8	av	1.2514	mg/L	sd	0.01420	%cv	1.13	
Ag328.1	av	1.2358	mg/L	sd	0.01319	%cv	1.07	
Ba455.4	av	9.6620	mg/L	sd	0.14564	%cv	1.51	Rerun
Mg279.6	av	25.8133	mg/L	sd	0.28034	%cv	1.09	
Ca393.4	av	25.6396	mg/L	sd	0.13240	%cv	0.52	Rerun
Na589.6	av	25.1171	mg/L	sd	0.52539	%cv	2.09	

12/18/92 12:15

L16 TCLP BL1	rep	1	Cd214.4	conc	0.0083	mg/L
12/H	rep	1	Cr267.7	conc	-0.0010	mg/L
	rep	1	V292.4	conc	-0.0070	mg/L
	rep	1	Ag328.1	conc	0.0012	mg/L
	rep	1	Ba455.4	conc	0.0434	mg/L
	rep	2	Cd214.4	conc	0.0022	mg/L
	rep	2	Cr267.7	conc	-0.0024	mg/L
	rep	2	V292.4	conc	-0.0075	mg/L
	rep	2	Ag328.1	conc	0.0017	mg/L
	rep	2	Ba455.4	conc	0.0377	mg/L
	rep	3	Cd214.4	conc	0.0056	mg/L
	rep	3	Cr267.7	conc	0.0020	mg/L
	rep	3	V292.4	conc	-0.0030	mg/L
	rep	3	Ag328.1	conc	0.0050	mg/L
	rep	3	Ba455.4	conc	0.0365	mg/L

L16 TCLP BL1
12/18/92 12:16

Cd214.4	av	0.0054	mg/L	sd	0.00303	%cv	56.44	<
Cr267.7	av	-0.0005	mg/L	sd	0.00223	%cv	477.97	<
V292.4	av	-0.0058	mg/L	sd	0.00244	%cv	41.70	<
Ag328.1	av	0.0026	mg/L	sd	0.00204	%cv	77.19	<
Ba455.4	av	0.0392	mg/L	sd	0.00366	%cv	9.34	Rerun

12/18/92 12:18
WA510DA-STD&0 rep 1 Ag328.1 conc [illegible] mg/L

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                    rep   2  Ag328.1    conc   -0.0040 mg/L          window edge
                    rep   3  Ag328.1    conc    0.0050 mg/L
WA51006-1T/5+0
12/18/92 12:18
     Ag328.1        av    0.0008 mg/L         sd   0.00451 %cv 590.67<0.015

12/18/92 12:20
WA51006-1T/5+1  rep   1  Ag328.1    conc    0.9698 mg/L
                    rep   2  Ag328.1    conc    0.9613 mg/L
                    rep   3  Ag328.1    conc    0.9748 mg/L
WA51006-1T/5+1
12/18/92 12:20
     Ag328.1        av    0.9686 mg/L         sd   0.00683 %cv   0.7097

12/18/92 12:22
WA51006-1TS/5   rep   1  Ag328.1    conc    0.5376 mg/L
                    rep   2  Ag328.1    conc    0.5362 mg/L
                    rep   3  Ag328.1    conc    0.5392 mg/L
WA51006-1TS/5
12/18/92 12:22
     Ag328.1        av    0.5377 mg/L         sd   0.00149 %cv   0.28x5 = 2.69

12/18/92 12:24
CCV                 rep   1  Zn213.8    conc    2.5010 mg/L
                    rep   1  Cd214.4    conc    2.6633 mg/L
                    rep   1  Ni231.6    conc    2.5087 mg/L
                    rep   1  Fe238.2    conc    5.1163 mg/L
                    rep   1  Mn257.6    conc    2.4550 mg/L
                    rep   1  Cr267.7    conc    1.0268 mg/L
                    rep   1  V292.4     conc    2.3792 mg/L
                    rep   1  Be313.0    conc    0.2272 mg/L
                    rep   1  Cu324.8    conc    1.1709 mg/L
                    rep   1  Ag328.1    conc    1.1736 mg/L
                    rep   1  Ba455.4    conc    8.8371 mg/L
                    rep   1  Mg279.6    conc   24.4136 mg/L
                    rep   1  Ca393.4    conc   25.4524 mg/L
                    rep   1  Na589.6    conc   24.3684 mg/L
                    rep   2  Zn213.8    conc    2.3918 mg/L
                    rep   2  Cd214.4    conc    2.5787 mg/L
                    rep   2  Ni231.6    conc    2.4379 mg/L
                    rep   2  Fe238.2    conc    5.0016 mg/L
                    rep   2  Mn257.6    conc    2.4457 mg/L
                    rep   2  Cr267.7    conc    1.0432 mg/L
                    rep   2  V292.4     conc    2.4549 mg/L
                    rep   2  Be313.0    conc    0.2354 mg/L
                    rep   2  Cu324.8    conc    1.2103 mg/L
                    rep   2  Ag328.1    conc    1.1972 mg/L
                    rep   2  Ba455.4    conc    9.5890 mg/L
                    rep   2  Mg279.6    conc   25.8092 mg/L
                    rep   2  Ca393.4    conc   25.6755 mg/L
                    rep   2  Na589.6    conc   24.4652 mg/L
                    rep   3  Zn213.8    conc    2.5004 mg/L
                    rep   3  Cd214.4    conc    2.6505 mg/L
                    rep   3  Ni231.6    conc    2.6609 mg/L
                    rep   3  Fe238.2    conc    5.2400 mg/L
                    rep   3  Mn257.6    conc    2.6048 mg/L
                    rep   3  Cr267.7    conc    1.0352 mg/L
                    rep   3  V292.4     conc    2.5601 mg/L
                    rep   3  Be313.0    conc    0.2322 mg/L
                    rep   3  Cu324.8    conc    1.2019 mg/L
                    rep   3  Ag328.1    conc    1.2312 mg/L
                    rep   3  Ba455.4    conc    9.6440 mg/L
                    rep   3  Mg279.6    conc   26.0401 mg/L
                    rep   3  Ca393.4    conc   25.4037 mg/L
                    rep   3  Na589.6    conc   24.7616 mg/L
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CWD 12-18-92

000220

12/18/92 12:27

Zn213.8	av	2.4644	mg/L	sd	0.06288	%cv	2.55	99
Cd214.4	av	2.6308	mg/L	sd	0.04532	%cv	1.73	105
Ni231.6	av	2.5358	mg/L	sd	0.11392	%cv	4.49	101
Fe238.2	av	5.1193	mg/L	sd	0.11924	%cv	2.33	102
Mn257.6	av	2.5018	mg/L	sd	0.08927	%cv	3.57	100
Cr267.7	av	1.0350	mg/L	sd	0.00819	%cv	0.79	104
V292.4	av	2.4647	mg/L	sd	0.09087	%cv	3.69	99
Be313.0	av	0.2316	mg/L	sd	0.00415	%cv	1.79	93
Cu324.8	av	1.1944	mg/L	sd	0.02073	%cv	1.74	96
Ag328.1	av	1.2006	mg/L	sd	0.02897	%cv	2.41	96
Ba455.4	av	9.3567	mg/L	sd	0.45081	%cv	4.82	94
Mg279.6	av	25.4210	mg/L	sd	0.87999	%cv	3.46	102
Ca393.4	av	25.5105	mg/L	sd	0.14494	%cv	0.57	102
Na589.6	av	24.5317	mg/L	sd	0.20489	%cv	0.84	98

000021

12/18/92 12:30

CCB	rep	1	Zn213.8	conc	0.0107	mg/L	
	rep	1	Cd214.4	conc	0.0025	mg/L	
	rep	1	Ni231.6	conc	0.0105	mg/L	
	rep	1	Fe238.2	conc	0.0023	mg/L	
	rep	1	Mn257.6	conc	0.0057	mg/L	
	rep	1	Cr267.7	conc	-0.0003	mg/L	
	rep	1	V292.4	conc	-0.0037	mg/L	
	rep	1	Be313.0	conc	0.0001	mg/L	
	rep	1	Cu324.8	conc	0.0066	mg/L	
	rep	1	Ag328.1	conc	-0.0023	mg/L	
	rep	1	Ba455.4	conc	0.0111	mg/L	
	rep	1	Mg279.6	conc	0.0319	mg/L	
	rep	1	Ca393.4	conc	0.0752	mg/L	
	rep	1	Na589.6	conc	0.1420	mg/L	— carry over
	rep	2	Zn213.8	conc	0.0045	mg/L	
	rep	2	Cd214.4	conc	0.0072	mg/L	
	rep	2	Ni231.6	conc	-0.0171	mg/L	window edge
	rep	2	Fe238.2	conc	-0.0038	mg/L	
	rep	2	Mn257.6	conc	0.0029	mg/L	
	rep	2	Cr267.7	conc	0.0015	mg/L	
	rep	2	V292.4	conc	0.0049	mg/L	
	rep	2	Be313.0	conc	-0.0000	mg/L	
	rep	2	Cu324.8	conc	0.0005	mg/L	
	rep	2	Ag328.1	conc	-0.0009	mg/L	
	rep	2	Ba455.4	conc	0.0071	mg/L	
	rep	2	Mg279.6	conc	0.0220	mg/L	
	rep	2	Ca393.4	conc	0.0451	mg/L	
	rep	2	Na589.6	conc	0.0413	mg/L<	window edge
	rep	3	Zn213.8	conc	-0.0021	mg/L	
	rep	3	Cd214.4	conc	0.0055	mg/L	
	rep	3	Ni231.6	conc	0.0011	mg/L	
	rep	3	Fe238.2	conc	[illegible]	mg/L	
	rep	3	Mn257.6	conc	0.0020	mg/L	
	rep	3	Cr267.7	conc	-0.0017	mg/L	
	rep	3	V292.4	conc	-0.0017	mg/L	window edge
	rep	3	Be313.0	conc	0.0001	mg/L	
	rep	3	Cu324.8	conc	0.0004	mg/L	
	rep	3	Ag328.1	conc	-0.0021	mg/L	
	rep	3	Ba455.4	conc	0.0050	mg/L	
	rep	3	Mg279.6	conc	0.0113	mg/L	
	rep	3	Ca393.4	conc	0.0265	mg/L	
	rep	3	Na589.6	conc	0.0287	mg/L<	

CCB
12/18/92 12:3[illegible]

Zn213.8	av	0.0044	mg/L	sd	0.00638	%cv	145.42<	
Cd214.4	av	0.0051	mg/L	sd	0.00236	%cv	46.30<	
Ni231.6	av	-0.0018	mg/L	sd	0.01409	%cv	[illegible]55<	
Fe238.2	av	0.0017	mg/L	sd	0.00525	%cv	309.86<	

Cr267.7	av	-0.0001 mg/L	sd	0.00156	%cv	1102.9<	
V292.4	av	-0.0002 mg/L	sd	0.00451	%cv	2935.4<	
Be313.0	av	0.0001 mg/L	sd	0.00009	%cv	132.14<	
Cu324.8	av	0.0024 mg/L	sd	0.00372	%cv	158.03<	
Ag328.1	av	-0.0004 mg/L	sd	0.00222	%cv	595.42<	
Ba455.4	av	0.0077 mg/L	sd	0.00306	%cv	39.50	OUT - Rerun Ba above + below
Mg279.6	av	0.0217 mg/L	sd	0.01029	%cv	47.33<	
Ca393.4	av	0.0489 mg/L	sd	0.02455	%cv	50.18	OUT - Rerun above + below
Na589.6	av	0.0707 mg/L	sd	0.06208	%cv	87.84	See above

000022

12/18/92 12:37

12/15

L16 TCLP BL2	rep	1	Cd214.4	conc	-0.0002 mg/L
	rep	1	Cr267.7	conc	-0.0026 mg/L
	rep	1	V292.4	conc	0.0012 mg/L
	rep	1	Ag328.1	conc	-0.0035 mg/L
	rep	1	Ba455.4	conc	0.0255 mg/L
	rep	2	Cd214.4	conc	0.0006 mg/L
	rep	2	Cr267.7	conc	0.0002 mg/L
	rep	2	V292.4	conc	-0.0071 mg/L
	rep	2	Ag328.1	conc	0.0024 mg/L
	rep	2	Ba455.4	conc	0.0253 mg/L
	rep	3	Cd214.4	conc	-0.0003 mg/L
	rep	3	Cr267.7	conc	0.0022 mg/L
	rep	3	V292.4	conc	-0.0033 mg/L
	rep	3	Ag328.1	conc	0.0003 mg/L
	rep	3	Ba455.4	conc	0.0251 mg/L

L16 TCLP BL2
12/18/92 12:38

Cd214.4	av	0.0000 mg/L	sd	0.00051	%cv	2416.2<	NA
Cr267.7	av	-0.0001 mg/L	sd	0.00242	%cv	4136.5<	
V292.4	av	-0.0031 mg/L	sd	0.00416	%cv	135.90<	
Ag328.1	av	-0.0003 mg/L	sd	0.00298	%cv	1138.9<	
Ba455.4	av	0.0253 mg/L	sd	0.00017	%cv	0.67	Rerun NA

12/18/92 12:40

WA50001-1T/5+0	rep	1	Cd214.4	conc	0.0036 mg/L
	rep	1	Cr267.7	conc	0.0002 mg/L
	rep	1	Ag328.1	conc	0.0104 mg/L
	rep	1	Ba455.4	conc	0.0373 mg/L
	rep	2	Cd214.4	conc	-0.0016 mg/L
	rep	2	Cr267.7	conc	0.0013 mg/L
	rep	2	Ag328.1	conc	-0.0062 mg/L
	rep	2	Ba455.4	conc	0.0364 mg/L
	rep	3	Cd214.4	conc	-0.0050 mg/L
	rep	3	Cr267.7	conc	-0.0009 mg/L
	rep	3	Ag328.1	conc	0.0060 mg/L
	rep	3	Ba455.4	conc	0.0359 mg/L

window edge

WA50001-1T/5+0
12/18/92 12:42

Cd214.4	av	-0.0010 mg/L	sd	0.00432	%cv	429.91	< 0.005
Cr267.7	av	0.0002 mg/L	sd	0.00109	%cv	550.83	< 0.005
Ag328.1	av	0.0034 mg/L	sd	0.00859	%cv	252.89	< 0.005
Ba455.4	av	0.0365 mg/L	sd	0.0007[illegible]	%cv	1.93	Result

12/18/92 12:44

WA50001-1T/5+1	rep	1	Cd214.4	conc	1.0865 mg/L
	rep	1	Cr267.7	conc	0.9056 mg/L
	rep	1	Ag328.1	conc	0.0383 mg/L
	rep	1	Ba455.4	conc	0.9535 mg/L
	rep	2	Cd214.4	conc	1.0858 mg/L
	rep	2	Cr267.7	conc	1.0153 mg/L
	rep	2	Ag328.1	conc	0.0570 mg/L
	rep	2	Ba455.4	conc	0.9528 mg/L
	rep	3	Cd214.4	conc	[illegible] mg/L
	rep	3	Cr267.7	conc	0.9984 mg/L

rep 3 Ba455.4 conc 0.9226 mg/L

WA50001-1T/5+1
12/18/92 12:45

Cd214.4 av 1.0951 mg/L sd 0.00828 %cv 0.76 110
Cr267.7 av 1.0034 mg/L sd 0.01034 %cv 1.03 100
Ag328.1 av 0.9388 mg/L sd 0.01794 %cv 1.91 94
Ba455.4 av 0.9363 mg/L sd 0.01574 %cv 1.68 Rerun

000023

12/18/92 12:47
WA50001-1TS/5 rep 1 Cd214.4 conc 0.2194 mg/L
rep 1 Cr267.7 conc 0.9220 mg/L
rep 1 Ag328.1 conc 0.4570 mg/L
rep 1 Ba455.4 conc 16.2559 mg/L
rep 2 Cd214.4 conc 0.2202 mg/L
rep 2 Cr267.7 conc 0.9068 mg/L
rep 2 Ag328.1 conc 0.4271 mg/L
rep 2 Ba455.4 conc 16.3040 mg/L
rep 3 Cd214.4 conc 0.2072 mg/L
rep 3 Cr267.7 conc 0.9282 mg/L
rep 3 Ag328.1 conc 0.4496 mg/L
rep 3 Ba455.4 conc 16.2229 mg/L

WA50001-1TS/5
12/18/92 12:49

Cd214.4 av 0.2156 mg/L sd 0.00730 %cv 3.39 x5 = 1.08
Cr267.7 av 0.9190 mg/L sd 0.01102 %cv 1.20 x5 = 4.60
Ag328.1 av 0.4446 mg/L sd 0.01556 %cv 3.50 x5 = 2.22
Ba455.4 av 16.2609 mg/L sd 0.04078 %cv 0.25 Rerun

12/18/92 12:51
WA50008-1T/5+0 rep 1 Cd214.4 conc -0.0019 mg/L
rep 1 Cr267.7 conc 0.0088 mg/L
rep 1 V292.4 conc -0.0027 mg/L window edge
rep 1 Ag328.1 conc -0.0037 mg/L
rep 1 Ba455.4 conc 0.2174 mg/L
rep 2 Cd214.4 conc -0.0001 mg/L window edge
rep 2 Cr267.7 conc 0.0108 mg/L
rep 2 V292.4 conc -0.0001 mg/L
rep 2 Ag328.1 conc 0.0009 mg/L
rep 2 Ba455.4 conc 0.2002 mg/L
rep 3 Cd214.4 conc 0.0013 mg/L
rep 3 Cr267.7 conc 0.0079 mg/L
rep 3 V292.4 conc 0.0000 mg/L
rep 3 Ag328.1 conc 0.0000 mg/L
rep 3 Ba455.4 conc 0.2037 mg/L

WA50008-1T/5+0
12/18/92 12:52

Cd214.4 av -0.0002 mg/L sd 0.00160 %cv 845.95 <0.050
Cr267.7 av 0.0092 mg/L sd 0.00152 %cv 16.60 <0.075
V292.4 av -0.0009 mg/L sd 0.00135 %cv 165.82 <0.125
Ag328.1 av -0.0009 mg/L sd 0.00241 %cv 258.29 <0.075
Ba455.4 av 0.2071 mg/L sd 0.00908 %cv [illegible] Rerun

12/18/92 12:54
WA50008-1T/5+1 rep 1 Cd214.4 conc 0.9849 mg/L
rep 1 Cr267.7 conc 0.8218 mg/L
rep 1 V292.4 conc 0.8557 mg/L
rep 1 Ag328.1 conc 0.8849 mg/L
rep 1 Ba455.4 conc 1.0677 mg/L
rep 2 Cd214.4 conc 1.0409 mg/L
rep 2 Cr267.7 conc [illegible] mg/L
rep 2 V292.4 conc [illegible] mg/L
rep 2 Ag328.1 conc 0.8216 mg/L
rep 2 Ba455.4 conc 1.0149 mg/L
rep 3 Cd214.4 conc 1.0871 mg/L
rep 3 Cr267.7 conc 0.8526 mg/L
[illegible]

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                 rep   3   Ag328.1     conc      0.8669 mg/L
                 rep   3   Ba455.4     conc      1.0563 mg/L
WA50008-1T/5+1
12/18/92 12:56
   Cd214.4       av    1.0174 mg/L          sd   0.02885 %cv   2.84 102
   Cr267.7       av    0.9392 mg/L          sd   0.01574 %cv   1.68 94
   V292.4        av    0.8855 mg/L          sd   0.02941 %cv   3.32 89
   Ag328.1       av    0.8809 mg/L          sd   0.00805 %cv   0.91 88
   Ba455.4       av    1.0463 mg/L          sd   0.02779 %cv   2.66 Rerun
                                                                              000024
12/18/92 12:58
WA50008-1TS/5    rep   1   Cd214.4     conc      0.1993 mg/L
                 rep   1   Cr267.7     conc      0.8906 mg/L
                 rep   1   V292.4      conc     -0.0063 mg/L          window edge
                 rep   1   Ag328.1     conc      0.5033 mg/L
                 rep   1   Ba455.4     conc      1.4650 mg/L
                 rep   2   Cd214.4     conc      0.2017 mg/L
                 rep   2   Cr267.7     conc      0.8906 mg/L
                 rep   2   V292.4      conc     -0.0090 mg/L          window edge
                 rep   2   Ag328.1     conc      0.5017 mg/L
                 rep   2   Ba455.4     conc      1.4569 mg/L
                 rep   3   Cd214.4     conc      0.1911 mg/L
                 rep   3   Cr267.7     conc      0.8937 mg/L
                 rep   3   V292.4      conc     -0.0171 mg/L          window edge
                 rep   3   Ag328.1     conc      0.5142 mg/L
                 rep   3   Ba455.4     conc      1.4370 mg/L
WA50008-1TS/5
12/18/92 13:00
   Cd214.4       av    0.1974 mg/L          sd   0.00555 %cv   2.81 x5 = 0.987
   Cr267.7       av    0.8917 mg/L          sd   0.00179 %cv   0.20 x5 = 4.46
   V292.4        av   -0.0108 mg/L          sd   0.00561 %cv  52.05 NA
   Ag328.1       av    0.5064 mg/L          sd   0.00683 %cv   1.35 x5 = 2.53
   Ba455.4       av    1.4530 mg/L          sd   0.01442 %cv   0.99 Rerun

12/18/92 13:02
WA50008-2T/5+0   rep   1   Cd214.4     conc     -0.0015 mg/L
                 rep   1   Cr267.7     conc      0.0075 mg/L
                 rep   1   V292.4      conc      0.0013 mg/L
                 rep   1   Ag328.1     conc     -0.0021 mg/L
                 rep   1   Ba455.4     conc      0.2882 mg/L
                 rep   2   Cd214.4     conc      0.0012 mg/L
                 rep   2   Cr267.7     conc      0.0057 mg/L
                 rep   2   V292.4      conc      0.0001 mg/L
                 rep   2   Ag328.1     conc      0.0083 mg/L
                 rep   2   Ba455.4     conc      0.2857 mg/L
                 rep   3   Cd214.4     conc      0.0015 mg/L
                 rep   3   Cr267.7     conc      0.0028 mg/L
                 rep   3   V292.4      conc      0.0046 mg/L
                 rep   3   Ag328.1     conc      0.0026 mg/L
                 rep   3   Ba455.4     conc      0.2804 mg/L
WA50008-2T/5+0
12/18/92 13:03
   Cd214.4       av   -0.0006 mg/L          sd   0.00157 %cv 267.93 <0.050
   Cr267.7       av    0.0054 mg/L          sd   0.00288 %cv  44.39 <0.075
   V292.4        av    0.0020 mg/L          sd   0.00234 %cv 116.48 <0.125
   Ag328.1       av    0.0029 mg/L          sd   0.00521 %cv 178.36 <0.075
   Ba455.4       av    0.2848 mg/L          sd   0.00398 %cv   1.40 Rerun

12/18/92 13:06
WA50008-2T/5+1   rep   1   Cd214.4     conc      1.0643 mg/L
                 rep   1   Cr267.7     conc      0.9382 mg/L
                 rep   1   V292.4      conc      0.9339 mg/L
                 rep   1   Ag328.1     conc      0.8678 mg/L
                 rep   1   Ba455.4     conc      1.1280 mg/L
                 rep   2   Cd214.4     conc      1.0626 mg/L
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                 rep   2   V292.4     conc    0.9221 mg/L
                 rep   2   Ag328.1    conc    0.8649 mg/L
                 rep   2   Ba455.4    conc    1.0702 mg/L
                 rep   3   Cd214.4    conc    1.0772 mg/L
                 rep   3   Cr267.7    conc    0.9301 mg/L
                 rep   3   V292.4     conc    0.9358 mg/L
                 rep   3   Ag328.1    conc    0.8864 mg/L
                 rep   3   Ba455.4    conc    1.0866 mg/L
WA50008-2T/5+1
12/18/92 13:07
   Cd214.4   av   1.0681 mg/L      sd   0.00799 %cv   0.75 107
   Cr267.7   av   0.9368 mg/L      sd   0.00587 %cv   0.63 94
   V292.4    av   0.9306 mg/L      sd   0.00742 %cv   0.80 93
   Ag328.1   av   0.8730 mg/L      sd   0.01170 %cv   1.34 87
   Ba455.4   av   1.0950 mg/L      sd   0.02980 %cv   2.72 Rerun

12/18/92 13:09
WA50008-2TS/5    rep   1   Cd214.4    conc    0.1905 mg/L
                 rep   1   Cr267.7    conc    0.9048 mg/L
                 rep   1   V292.4     conc   -0.0024 mg/L
                 rep   1   Ag328.1    conc    0.4810 mg/L
                 rep   1   Ba455.4    conc   15.3194 mg/L
                 rep   2   Cd214.4    conc    0.1998 mg/L
                 rep   2   Cr267.7    conc    0.8845 mg/L
                 rep   2   V292.4     conc    0.0012 mg/L
                 rep   2   Ag328.1    conc    0.4779 mg/L
                 rep   2   Ba455.4    conc   15.9079 mg/L
                 rep   3   Cd214.4    conc    0.1998 mg/L
                 rep   3   Cr267.7    conc    0.8595 mg/L
                 rep   3   V292.4     conc   -0.0038 mg/L
                 rep   3   Ag328.1    conc    0.4652 mg/L
                 rep   3   Ba455.4    conc   15.7294 mg/L
WA50008-2TS/5
12/18/92 13:11
   Cd214.4   av   0.1967 mg/L      sd   0.00536 %cv   2.73 x5 = .984
   Cr267.7   av   0.8829 mg/L      sd   0.02266 %cv   2.57 x5 = 4.41
   V292.4    av  -0.0017 mg/L      sd   0.00260 %cv 157.25 NA
   Ag328.1   av   0.4747 mg/L      sd   0.00836 %cv   1.76 x5 = 2.37
   Ba455.4   av  15.6522 mg/L      sd   0.30175 %cv   1.93 Rerun

12/18/92 13:13
CCV              rep   1   Zn213.8    conc    2.4429 mg/L
                 rep   1   Cd214.4    conc    2.6245 mg/L
                 rep   1   Ni231.6    conc    2.5697 mg/L
                 rep   1   Fe238.2    conc    4.7514 mg/L
                 rep   1   Mn257.6    conc    2.3063 mg/L
                 rep   1   Cr267.7    conc    0.9788 mg/L
                 rep   1   V292.4     conc    2.3396 mg/L
                 rep   1   Be313.0    conc    0.2283 mg/L
                 rep   1   Cu324.8    conc    1.1425 mg/L
                 rep   1   Ag328.1    conc    1.1376 mg/L
                 rep   1   Ba455.4    conc    8.5296 mg/L
                 rep   1   Mg279.6    conc   23.1438 mg/L
                 rep   1   Ca393.4    conc   22.4758 mg/L
                 rep   1   Na589.6    conc   22.4551 mg/L
                 rep   2   Zn213.8    conc    2.6636 mg/L
                 rep   2   Cd214.4    conc    2.7186 mg/L
                 rep   2   Ni231.6    conc    2.4374 mg/L
                 rep   2   Fe238.2    conc    4.9348 mg/L
                 rep   2   Mn257.6    conc    2.4382 mg/L
                 rep   2   Cr267.7    conc    0.9849 mg/L
                 rep   2   V292.4     conc    2.3721 mg/L
                 rep   2   Be313.0    conc    0.2256 mg/L
                 rep   2   Cu324.8    conc    1.1190 mg/L
                 rep   2   Ag328.1    conc    1.1882 mg/L
                 rep   2   Ba455.4    conc    8.6547 mg/L
```

000025

C00026

rep	2	Mg279.6	conc	23.9236	mg/L
rep	2	Ca393.4	conc	22.1957	mg/L
rep	2	Na589.6	conc	22.5560	mg/L
rep	3	Zn213.8	conc	2.4340	mg/L
rep	3	Cd214.4	conc	2.6824	mg/L
rep	3	Ni231.6	conc	2.6224	mg/L
rep	3	Fe238.2	conc	4.8406	mg/L
rep	3	Mn257.6	conc	2.4215	mg/L
rep	3	Cr267.7	conc	1.0003	mg/L
rep	3	V292.4	conc	2.2699	mg/L
rep	3	Be313.0	conc	0.2239	mg/L
rep	3	Cu324.8	conc	1.0871	mg/L
rep	3	Ag328.1	conc	1.1351	mg/L
rep	3	Ba455.4	conc	8.6355	mg/L
rep	3	Mg279.6	conc	23.8158	mg/L
rep	3	Ca393.4	conc	22.7315	mg/L
rep	3	Na589.6	conc	22.5045	mg/L

CCV
12/18/92 13:16

Zn213.8	av	2.4135	mg/L	sd	0.04347	%cv	1.80	97
Cd214.4	av	2.6752	mg/L	sd	0.04746	%cv	1.77	107
Ni231.6	av	2.5412	mg/L	sd	0.09862	%cv	3.88	102
Fe238.2	av	4.8423	mg/L	sd	0.09174	%cv	1.89	97
Mn257.6	av	2.3887	mg/L	sd	0.07183	%cv	3.01	96
Cr267.7	av	0.9880	mg/L	sd	0.01107	%cv	1.12	99
V292.4	av	2.3249	mg/L	sd	0.05117	%cv	2.20	93
Be313.0	av	0.2243	mg/L	sd	0.00120	%cv	0.54	90
Cu324.8	av	1.1062	mg/L	sd	0.01686	%cv	1.52	out
Ag328.1	av	1.1303	mg/L	sd	0.01109	%cv	0.98	90
Ba455.4	av	8.6733	mg/L	sd	0.16582	%cv	1.91	out
Mg279.6	av	23.6277	mg/L	sd	0.42258	%cv	1.79	95
Ca393.4	av	22.4677	mg/L	sd	0.26800	%cv	1.19	90
Na589.6	av	22.5052	mg/L	sd	0.05044	%cv	0.22	90

Renin Ba above + below

12/18/92 13:19

CCB	rep	1	Zn213.8	conc	0.0030	mg/L	
	rep	1	Cd214.4	conc	0.0005	mg/L	
	rep	1	Ni231.6	conc	-0.0111	mg/L	
	rep	1	Fe238.2	conc	0.0020	mg/L	
	rep	1	Mn257.6	conc	0.0030	mg/L	
	rep	1	Cr267.7	conc	-0.0011	mg/L	
	rep	1	V292.4	conc	0.0077	mg/L	
	rep	1	Be313.0	conc	0.0002	mg/L	
	rep	1	Cu324.8	conc	0.0110	mg/L	
	rep	1	Ag328.1	conc	0.0059	mg/L	
	rep	1	Ba455.4	conc	0.0113	mg/L	
	rep	1	Mg279.6	conc	0.0216	mg/L	
	rep	1	Ca393.4	conc	0.0326	mg/L	
	rep	1	Na589.6	conc	0.0977	mg/L	
	rep	2	Zn213.8	conc	0.0075	mg/L	
	rep	2	Cd214.4	conc	-0.0072	mg/L	window edge
	rep	2	Ni231.6	conc	-0.0095	mg/L	
	rep	2	Fe238.2	conc	-0.0015	mg/L	
	rep	2	Mn257.6	conc	0.0023	mg/L	
	rep	2	Cr267.7	conc	-0.0026	mg/L	
	rep	2	V292.4	conc	-0.0066	mg/L	
	rep	2	Be313.0	conc	0.0000	mg/L	
	rep	2	Cu324.8	conc	-0.0087	mg/L	window edge
	rep	2	Ag328.1	conc	-0.0016	mg/L	window edge
	rep	2	Ba455.4	conc	0.0063	mg/L	
	rep	2	Mg279.6	conc	0.0123	mg/L	
	rep	2	Ca393.4	conc	0.0336	mg/L	
	rep	2	Na589.6	conc	0.0700	mg/L	
	rep	3	Zn213.8	conc	0.0060	mg/L	
	rep	3	Cd214.4	conc	-0.0019	mg/L	

rep 3 Fe238.2 conc -0.0001 mg/L
rep 3 Mn257.6 conc 0.0011 mg/L
rep 3 Cr267.7 conc 0.0051 mg/L
rep 3 V292.4 conc -0.0014 mg/L
rep 3 Be313.0 conc 0.0001 mg/L
rep 3 Cu324.8 conc -0.0009 mg/L
rep 3 Ag328.1 conc 0.0032 mg/L
rep 3 Ba455.4 conc 0.0041 mg/L
rep 3 Mg279.6 conc 0.0076 mg/L
rep 3 Ca393.4 conc 0.0215 mg/L
rep 3 Na589.6 conc 0.1249 mg/L

CCB
12/18/92 13:23

Zn213.8	av	0.0012 mg/L	sd	0.00733	%cv	609.76
Cd214.4	av	-0.0029 mg/L	sd	0.00393	%cv	136.53
Ni231.6	av	0.0040 mg/L	sd	0.01319	%cv	333.80
Fe238.2	av	0.0011 mg/L	sd	0.00111	%cv	101.19
Mn257.6	av	0.0021 mg/L	sd	0.00094	%cv	43.89
Cr267.7	av	0.0005 mg/L	sd	0.00407	%cv	875.04
V292.4	av	-0.0001 mg/L	sd	0.00728	%cv	6586.2
Be313.0	av	0.0001 mg/L	sd	0.00010	%cv	98.16
Cu324.8	av	0.0005 mg/L	sd	0.00991	%cv	2168.3
Ag328.1	av	0.0025 mg/L	sd	0.00382	%cv	154.41
Ba455.4	av	0.0072 mg/L	sd	0.00371	%cv	51.32 Rerun-carryover
Mg279.6	av	0.0138 mg/L	sd	0.00713	%cv	51.61
Ca393.4	av	0.0359 mg/L	sd	0.01569	%cv	43.71 Rerun - carryover
Na589.6	av	0.0975 mg/L	sd	0.02746	%cv	28.15 Rerun - carryover

12/18/92 13:26
WA50011-1 rep 1 Zn213.8 conc 0.0769 mg/L

Rerun Cd below
Next CCV out.

12/18/92 13:32
CCB rep 1 Ba455.4 conc 0.0009 mg/L window edge
rep 1 Ca393.4 conc 0.0076 mg/L
rep 1 Na589.6 conc 0.0588 mg/L
rep 2 Ba455.4 conc 0.0005 mg/L
rep 2 Ca393.4 conc 0.0076 mg/L
rep 2 Na589.6 conc -0.0213 mg/L
rep 3 Ba455.4 conc 0.0008 mg/L
rep 3 Ca393.4 conc 0.0068 mg/L
rep 3 Na589.6 conc 0.0715 mg/L

CCB
12/18/92 13:33

Ba455.4	av	0.0007 mg/L	sd	0.00021	%cv	28.79
Ca393.4	av	0.0073 mg/L	sd	0.00046	%cv	6.31
Na589.6	av	0.0363 mg/L	sd	0.05032	%cv	138.61

12/18/92 13:35
CCV rep 1 Cu324.8 conc 1.1161 mg/L
rep 1 Ba455.4 conc 8.9352 mg/L
rep 2 Cu324.8 conc 1.1303 mg/L
rep 2 Ba455.4 conc 8.8610 mg/L
rep 3 Cu324.8 conc 1.1548 mg/L
rep 3 Ba455.4 conc 8.8754 mg/L

CCV
12/18/92 13:35

Cu324.8	av	1.1337 mg/L	sd	0.01957	%cv	1.73 91
Ba455.4	av	8.8905 mg/L	sd	0.03938	%cv	0.44 out

Cu OK now

12/18/92 13:37
CCB rep 1 Cu324.8 conc 0.0101 mg/L
rep 2 Cu324.8 conc 0.0047 mg/L
rep 3 Cu324.8 conc 0.0115 mg/L

CCB
12/18/92 13:37

Cu324.8	av	0.0088 mg/L	sd	0.00361	%cv	41.16

12/18/92 13:40

WA50011-1	rep	1	Zn213.8	conc	0.0711	mg/L
	rep	1	Cd214.4	conc	0.0049	mg/L
	rep	1	Ni231.6	conc	0.0116	mg/L
	rep	1	Cr267.7	conc	0.0113	mg/L
	rep	1	Be313.0	conc	0.0009	mg/L
	rep	1	Cu324.8	conc	0.0055	mg/L
	rep	1	Ag328.1	conc	0.0083	mg/L
	rep	2	Zn213.8	conc	0.0743	mg/L
	rep	2	Cd214.4	conc	0.0002	mg/L
	rep	2	Ni231.6	conc	0.0374	mg/L
	rep	2	Cr267.7	conc	0.0071	mg/L
	rep	2	Be313.0	conc	0.0008	mg/L
	rep	2	Cu324.8	conc	0.0201	mg/L
	rep	2	Ag328.1	conc	0.0073	mg/L
	rep	3	Zn213.8	conc	0.0697	mg/L
	rep	3	Cd214.4	conc	0.0034	mg/L
	rep	3	Ni231.6	conc	0.0155	mg/L
	rep	3	Cr267.7	conc	0.0055	mg/L
	rep	3	Be313.0	conc	0.0008	mg/L
	rep	3	Cu324.8	conc	0.0161	mg/L
	rep	3	Ag328.1	conc	-0.0051	mg/L window edge

000028

WA50011-1
12/18/92 13:41

Zn213.8	av	0.0717	mg/L	sd	0.00232	%cv	3.23	
Cd214.4	av	0.0028	mg/L	sd	0.00237	%cv	83.63	Rerun
Ni231.6	av	0.0215	mg/L	sd	0.01393	%cv	64.72	<
Cr267.7	av	0.0079	mg/L	sd	0.00299	%cv	37.64	<
Be313.0	av	0.0009	mg/L	sd	0.00006	%cv	6.85	<
Cu324.8	av	0.0139	mg/L	sd	0.00757	%cv	54.45	<
Ag328.1	av	0.0035	mg/L	sd	0.00748	%cv	213.75	<

12/18/92 13:43

WA50011-2	rep	1	Zn213.8	conc	0.0245	mg/L
	rep	1	Cd214.4	conc	-0.0003	mg/L
	rep	1	Ni231.6	conc	0.0032	mg/L
	rep	1	Cr267.7	conc	0.0072	mg/L
	rep	1	Be313.0	conc	0.0000	mg/L
	rep	1	Cu324.8	conc	0.0000	mg/L
	rep	1	Ag328.1	conc	0.0004	mg/L
	rep	2	Zn213.8	conc	0.0234	mg/L
	rep	2	Cd214.4	conc	-0.0012	mg/L
	rep	2	Ni231.6	conc	-0.0018	mg/L
	rep	2	Cr267.7	conc	0.0114	mg/L
	rep	2	Be313.0	conc	0.0004	mg/L
	rep	2	Cu324.8	conc	0.0011	mg/L
	rep	2	Ag328.1	conc	0.0008	mg/L
	rep	3	Zn213.8	conc	0.0309	mg/L
	rep	3	Cd214.4	conc	0.0036	mg/L
	rep	3	Ni231.6	conc	-0.0100	mg/L window edge
	rep	3	Cr267.7	conc	0.0119	mg/L
	rep	3	Be313.0	conc	0.0001	mg/L
	rep	3	Cu324.8	conc	0.0010	mg/L
	rep	3	Ag328.1	conc	0.0037	mg/L

WA50011-2
12/18/92 13:45

Zn213.8	av	0.0263	mg/L	sd	0.00407	%cv	15.48	
Cd214.4	av	0.0007	mg/L	sd	0.00253	%cv	358.47	Rerun
Ni231.6	av	-0.0028	mg/L	sd	0.00665	%cv	283.38	<
Cr267.7	av	0.0102	mg/L	sd	0.00257	%cv	25.27	<
Be313.0	av	0.0002	mg/L	sd	0.00018	%cv	102.96	<
Cu324.8	av	0.0007	mg/L	sd	0.00060	%cv	80.96	<
Ag328.1	av	0.0616	mg/L	sd	0.00176	%cv	107.59	<

12/18/92 13:47

WA50011-3	rep	1	Zn213.8	conc	0.0956	mg/L

000029

rep	1	Cd214.4	conc	0.0064	mg/L
rep	1	Ni231.6	conc	0.0399	mg/L
rep	1	Cr267.7	conc	0.0112	mg/L
rep	1	Be313.0	conc	0.0005	mg/L
rep	1	Cu324.8	conc	0.0143	mg/L
rep	1	Ag328.1	conc	-0.0080	mg/L
rep	2	Zn213.8	conc	0.0973	mg/L
rep	2	Cd214.4	conc	-0.0007	mg/L
rep	2	Ni231.6	conc	0.0279	mg/L
rep	2	Cr267.7	conc	0.0135	mg/L
rep	2	Be313.0	conc	0.0007	mg/L
rep	2	Cu324.8	conc	0.0151	mg/L
rep	2	Ag328.1	conc	0.0077	mg/L
rep	3	Zn213.8	conc	0.0946	mg/L
rep	3	Cd214.4	conc	0.0042	mg/L
rep	3	Ni231.6	conc	0.0048	mg/L
rep	3	Cr267.7	conc	0.0159	mg/L
rep	3	Be313.0	conc	0.0005	mg/L
rep	3	Cu324.8	conc	0.0237	mg/L
rep	3	Ag328.1	conc	0.0004	mg/L

WA50011-3
12/18/92 13:49

Zn213.8	av	0.0958 mg/L	sd	0.00133	%cv	1.39	
Cd214.4	av	0.0033 mg/L	sd	0.00366	%cv	110.25	Rerun
Ni231.6	av	0.0242 mg/L	sd	0.01782	%cv	73.67	<
Cr267.7	av	0.0135 mg/L	sd	0.00237	%cv	17.53	<
Be313.0	av	0.0006 mg/L	sd	0.00008	%cv	13.93	<
Cu324.8	av	0.0177 mg/L	sd	0.00522	%cv	29.45	<
Ag328.1	av	0.0000 mg/L	sd	0.00789	%cv	21846	<

12/18/92 13:51

WA50012-1	rep	1	Zn213.8	conc	0.0310	mg/L	
	rep	1	Ni231.6	conc	-0.0063	mg/L	
	rep	1	Mn257.6	conc	0.0079	mg/L	
	rep	1	Cr267.7	conc	-0.0018	mg/L	
	rep	1	Cu324.8	conc	0.0014	mg/L	
	rep	2	Zn213.8	conc	0.0351	mg/L	
	rep	2	Ni231.6	conc	0.0201	mg/L	
	rep	2	Mn257.6	conc	0.0086	mg/L	
	rep	2	Cr267.7	conc	0.0041	mg/L	
	rep	2	Cu324.8	conc	0.0025	mg/L	
	rep	3	Zn213.8	conc	0.0372	mg/L	
	rep	3	Ni231.6	conc	-0.0094	mg/L	window edge
	rep	3	Mn257.6	conc	0.0074	mg/L	
	rep	3	Cr267.7	conc	-0.0038	mg/L	window edge
	rep	3	Cu324.8	conc	0.0049	mg/L	

WA50012-1
12/18/92 13:52

Zn213.8	av	0.0344 mg/L	sd	0.00313	%cv	9.10	
Ni231.6	av	0.0015 mg/L	sd	0.01622	%cv	1082.18	<
Mn257.6	av	0.0080 mg/L	sd	0.00058	%cv	7.33	<
Cr267.7	av	-0.0005 mg/L	sd	0.00412	%cv	827.84	<
Cu324.8	av	0.0029 mg/L	sd	0.00175	%cv	59.43	<

12/18/92 13:54

WA50012-2	rep	1	Zn213.8	conc	0.0447	mg/L
	rep	1	Ni231.6	conc	0.0004	mg/L
	rep	1	Mn257.6	conc	0.0255	mg/L
	rep	1	Cr267.7	conc	0.0061	mg/L
	rep	1	Cu324.8	conc	0.0011	mg/L
	rep	2	Zn213.8	conc	0.0288	mg/L
	rep	2	Ni231.6	conc	0.0135	mg/L
	rep	2	Mn257.6	conc	0.0255	mg/L
	rep	2	Cr267.7	conc	0.0086	mg/L
	rep	2	Cu324.8	conc	0.0053	mg/L
	rep	3	Zn213.8	conc	[illegible]	mg/L

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                 rep   3  Ni231.6    conc    -0.0094 mg/L          window edge
                 rep   3  Mn257.6    conc     0.0251 mg/L
                 rep   3  Cr267.7    conc     0.0002 mg/L
                 rep   3  Cu324.8    conc     0.0067 mg/L
WA50012-2
12/18/92 13:55
    Zn213.8      av     0.0408 mg/L        sd   0.01064 %cv   26.08
    Ni231.6      av     0.0012 mg/L        sd   0.01157 %cv  933.09<
    Mn257.6      av     0.0254 mg/L        sd   0.00026 %cv    1.02
    Cr267.7      av     0.0050 mg/L        sd   0.00434 %cv   87.18<
    Cu324.8      av     0.0044 mg/L        sd   0.00292 %cv   67.11<
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000030

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12/18/92 13:58
WA50012-3        rep   1  Zn213.8    conc     0.0796 mg/L
                 rep   1  Ni231.6    conc    -0.0203 mg/L          window edge
                 rep   1  Mn257.6    conc     0.2500 mg/L
                 rep   1  Cr267.7    conc     0.0071 mg/L
                 rep   1  Cu324.8    conc     0.0136 mg/L
                 rep   2  Zn213.8    conc     0.0909 mg/L
                 rep   2  Ni231.6    conc     0.0037 mg/L
                 rep   2  Mn257.6    conc     0.2493 mg/L
                 rep   2  Cr267.7    conc     0.0048 mg/L
                 rep   2  Cu324.8    conc     0.0103 mg/L
                 rep   3  Zn213.8    conc     0.0886 mg/L
                 rep   3  Ni231.6    conc     0.0141 mg/L
                 rep   3  Mn257.6    conc     0.2454 mg/L
                 rep   3  Cr267.7    conc     0.0076 mg/L
                 rep   3  Cu324.8    conc     0.0118 mg/L
WA50012-3
12/18/92 13:59
    Zn213.8      av     0.0864 mg/L        sd   0.00599 %cv    6.93
    Ni231.6      av    -0.0008 mg/L        sd   0.01767 %cv 2175.3<
    Mn257.6      av     0.2482 mg/L        sd   0.00248 %cv    1.00
    Cr267.7      av     0.0065 mg/L        sd   0.00151 %cv   23.02<
    Cu324.8      av     0.0119 mg/L        sd   0.00168 %cv   14.08<

12/18/92 14:01
WA50016-1        rep   1  Fe238.2    conc     0.0146 mg/L
                 rep   1  Mn257.6    conc     0.0413 mg/L
                 rep   1  Mg279.6    conc    14.4211 mg/L
                 rep   1  Ca393.4    conc    51.3463 mg/L
                 rep   1  Na589.6    conc    10.0772 mg/L
                 rep   2  Fe238.2    conc     0.0081 mg/L
                 rep   2  Mn257.6    conc     0.0416 mg/L
                 rep   2  Mg279.6    conc    14.1098 mg/L
                 rep   2  Ca393.4    conc    52.3849 mg/L
                 rep   2  Na589.6    conc     9.8931 mg/L
                 rep   3  Fe238.2    conc     0.0026 mg/L
                 rep   3  Mn257.6    conc     0.0443 mg/L
                 rep   3  Mg279.6    conc    13.7902 mg/L
                 rep   3  Ca393.4    conc    52.1822 mg/L
                 rep   3  Na589.6    conc    10.0199 mg/L
WA50016-1
12/18/92 14:02
    Fe238.2      av     0.0085 mg/L        sd   0.00602 %cv   71.02<
    Mn257.6      av     0.0424 mg/L        sd   0.00164 %cv    3.86
    Mg279.6      av    14.1070 mg/L        sd   0.31546 %cv    2.24
    Ca393.4      av    51.9712 mg/L        sd   0.55052 %cv    1.06
    Na589.6      av     9.9967 mg/L        sd   0.09423 %cv    0.94

12/18/92 14:05
WA50016-2        rep   1  Fe238.2    conc     0.0140 mg/L
                 rep   1  Mn257.6    conc     0.0387 mg/L
                 rep   1  Mg279.6    conc     9.6529 mg/L
                 rep   1  Ca393.4    conc    42.1140 mg/L
                 [illegible]
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	rep	2	Fe238.2	conc	0.0163 mg/L
	rep	2	Mn257.6	conc	0.0396 mg/L
	rep	2	Mg279.6	conc	9.3328 mg/L
	rep	2	Ca393.4	conc	42.6842 mg/L
	rep	2	Na589.6	conc	7.6811 mg/L
	rep	3	Fe238.2	conc	0.0118 mg/L
	rep	3	Mn257.6	conc	0.0396 mg/L
	rep	3	Mg279.6	conc	9.4942 mg/L
	rep	3	Ca393.4	conc	41.6850 mg/L
	rep	3	Na589.6	conc	7.6904 mg/L

000031

WA50016-2
12/18/92 14:06

Fe238.2	av	0.0140 mg/L	sd	0.00227	%cv	16.18 <
Mn257.6	av	0.0393 mg/L	sd	0.00054	%cv	1.38
Mg279.6	av	9.4933 mg/L	sd	0.16004	%cv	1.69
Ca393.4	av	42.1611 mg/L	sd	0.50127	%cv	1.19
Na589.6	av	7.7376 mg/L	sd	0.08989	%cv	1.16

12/18/92 14:08

WA50016-3	rep	1	Fe238.2	conc	0.0307 mg/L
	rep	1	Mn257.6	conc	0.0140 mg/L
	rep	1	Mg279.6	conc	8.4013 mg/L
	rep	1	Ca393.4	conc	32.7119 mg/L
	rep	1	Na589.6	conc	8.7641 mg/L
	rep	2	Fe238.2	conc	0.0378 mg/L
	rep	2	Mn257.6	conc	0.0134 mg/L
	rep	2	Mg279.6	conc	8.6252 mg/L
	rep	2	Ca393.4	conc	32.6654 mg/L
	rep	2	Na589.6	conc	8.4695 mg/L
	rep	3	Fe238.2	conc	0.0316 mg/L
	rep	3	Mn257.6	conc	0.0161 mg/L
	rep	3	Mg279.6	conc	8.4111 mg/L
	rep	3	Ca393.4	conc	32.1193 mg/L
	rep	3	Na589.6	conc	8.5294 mg/L

WA50016-3
12/18/92 14:10

Fe238.2	av	0.0334 mg/L	sd	0.00389	%cv	11.66
Mn257.6	av	0.0145 mg/L	sd	0.00142	%cv	9.80
Mg279.6	av	8.4792 mg/L	sd	0.12653	%cv	1.49
Ca393.4	av	32.4988 mg/L	sd	0.32954	%cv	1.01
Na589.6	av	8.5877 mg/L	sd	0.15573	%cv	1.81

12/18/92 14:12

WA50016-4	rep	1	Fe238.2	conc	0.0635 mg/L
	rep	1	Mn257.6	conc	0.0061 mg/L
	rep	1	Mg279.6	conc	3.2390 mg/L
	rep	1	Ca393.4	conc	12.2936 mg/L
	rep	1	Na589.6	conc	42.0907 mg/L
	rep	2	Fe238.2	conc	0.0505 mg/L
	rep	2	Mn257.6	conc	0.0065 mg/L
	rep	2	Mg279.6	conc	3.4822 mg/L
	rep	2	Ca393.4	conc	12.3548 mg/L
	rep	2	Na589.6	conc	42.5830 mg/L
	rep	3	Fe238.2	conc	0.0565 mg/L
	rep	3	Mn257.6	conc	0.0042 mg/L
	rep	3	Mg279.6	conc	3.4690 mg/L
	rep	3	Ca393.4	conc	11.9760 mg/L
	rep	3	Na589.6	conc	42.1674 mg/L

WA50016-4
12/18/92 14:13

Fe238.2	av	0.0569 mg/L	sd	0.00649	%cv	11.42
Mn257.6	av	0.0056 mg/L	sd	0.00124	%cv	22.09 <
Mg279.6	av	3.3967 mg/L	sd	0.04949	%cv	1.46
Ca393.4	av	12.2081 mg/L	sd	0.20335	%cv	1.67
Na589.6	av	42.2804 mg/L	sd	0.26484	%cv	0.63

12/18/92 14:16

CCV	rep	1	Zn213.8	conc	2.5074	mg/L
	rep	1	Cd214.4	conc	2.7880	mg/L
	rep	1	Ni231.6	conc	2.6537	mg/L
	rep	1	Fe238.2	conc	5.1451	mg/L
	rep	1	Mn257.6	conc	2.5968	mg/L
	rep	1	Cr267.7	conc	1.0370	mg/L
	rep	1	V292.4	conc	2.4646	mg/L
	rep	1	Be313.0	conc	0.2285	mg/L
	rep	1	Cu324.8	conc	1.1732	mg/L
	rep	1	Ag328.1	conc	1.1845	mg/L
	rep	1	Ba455.4	conc	9.1828	mg/L
	rep	1	Mg279.6	conc	24.8371	mg/L
	rep	1	Ca393.4	conc	24.4641	mg/L
	rep	1	Na589.6	conc	23.7450	mg/L
	rep	2	Zn213.8	conc	2.6261	mg/L
	rep	2	Cd214.4	conc	2.7886	mg/L
	rep	2	Ni231.6	conc	2.7334	mg/L
	rep	2	Fe238.2	conc	5.1852	mg/L
	rep	2	Mn257.6	conc	2.5446	mg/L
	rep	2	Cr267.7	conc	1.0648	mg/L
	rep	2	V292.4	conc	2.4095	mg/L
	rep	2	Be313.0	conc	0.2411	mg/L
	rep	2	Cu324.8	conc	1.1766	mg/L
	rep	2	Ag328.1	conc	1.1823	mg/L
	rep	2	Ba455.4	conc	9.3588	mg/L
	rep	2	Mg279.6	conc	25.2100	mg/L
	rep	2	Ca393.4	conc	24.3346	mg/L
	rep	2	Na589.6	conc	24.5749	mg/L
	rep	3	Zn213.8	conc	2.5080	mg/L
	rep	3	Cd214.4	conc	2.7983	mg/L
	rep	3	Ni231.6	conc	2.5433	mg/L
	rep	3	Fe238.2	conc	5.3064	mg/L
	rep	3	Mn257.6	conc	2.5615	mg/L
	rep	3	Cr267.7	conc	1.0557	mg/L
	rep	3	V292.4	conc	2.4951	mg/L
	rep	3	Be313.0	conc	0.2376	mg/L
	rep	3	Cu324.8	conc	1.1899	mg/L
	rep	3	Ag328.1	conc	1.1986	mg/L
	rep	3	Ba455.4	conc	9.3233	mg/L
	rep	3	Mg279.6	conc	24.6715	mg/L
	rep	3	Ca393.4	conc	24.0141	mg/L
	rep	3	Na589.6	conc	24.0038	mg/L

000032

CCV
12/18/92 14:19

Zn213.8	av	2.5472	mg/L	sd	0.06836	%cv	2.68	102
Cd214.4	av	2.7916	mg/L	sd	0.00580	%cv	0.21	104
Ni231.6	av	2.6435	mg/L	sd	0.09546	%cv	[illegible]	106
Fe238.2	av	5.2123	mg/L	sd	0.08395	%cv	[illegible]	104
Mn257.6	av	2.5677	mg/L	sd	0.02664	%cv	[illegible]	103
Cr267.7	av	1.0525	mg/L	sd	[illegible]	%cv	[illegible]	105
V292.4	av	2.4564	mg/L	sd	0.04338	%cv	[illegible]	98
Be313.0	av	0.2357	mg/L	sd	0.00653	%cv	2.77	94
Cu324.8	av	1.1799	mg/L	sd	0.00880	%cv	[illegible]	94
Ag328.1	av	1.1885	mg/L	sd	0.00882	%cv	[illegible]	95
Ba455.4	av	9.2883	mg/L	sd	0.09307	%cv	1.00	93
Mg279.6	av	24.9062	mg/L	sd	0.27582	%cv	[illegible]	100
Ca393.4	av	24.2709	mg/L	sd	0.23166	%cv	0.95	97
Na589.6	av	24.1079	mg/L	sd	0.42463	%cv	1.76	96

Rerun CCB above / below

12/18/92 14:22

CCB	rep	1	Zn213.8	conc	0.0071	mg/L
	rep	1	Cd214.4	conc	0.0052	mg/L
	rep	1	Ni231.6	conc	0.0009	mg/L
	rep	1	Fe238.2	conc	0.0042	mg/L
	rep	1	[illegible]	conc	[illegible]	mg/L

rep	1	Cr267.7	conc	0.0046	mg/L
rep	1	V292.4	conc	0.0051	mg/L
rep	1	Be313.0	conc	0.0001	mg/L
rep	1	Cu324.8	conc	-0.0073	mg/L
rep	1	Ag328.1	conc	0.0023	mg/L
rep	1	Ba455.4	conc	0.0057	mg/L
rep	1	Mg279.6	conc	0.0123	mg/L
rep	1	Ca393.4	conc	0.0119	mg/L
rep	1	Na589.6	conc	0.0770	mg/L -carry over
rep	2	Zn213.8	conc	0.0047	mg/L
rep	2	Cd214.4	conc	-0.0054	mg/L window edge
rep	2	Ni231.6	conc	0.0040	mg/L
rep	2	Fe238.2	conc	-0.0134	mg/L
rep	2	Mn257.6	conc	0.0006	mg/L
rep	2	Cr267.7	conc	-0.0025	mg/L
rep	2	V292.4	conc	-0.0019	mg/L
rep	2	Be313.0	conc	-0.0003	mg/L window edge
rep	2	Cu324.8	conc	0.0062	mg/L
rep	2	Ag328.1	conc	0.0017	mg/L
rep	2	Ba455.4	conc	0.0013	mg/L
rep	2	Mg279.6	conc	0.0022	mg/L
rep	2	Ca393.4	conc	0.0022	mg/L
rep	2	Na589.6	conc	0.0890	mg/L -carry over
rep	3	Zn213.8	conc	-0.0026	mg/L
rep	3	Cd214.4	conc	-0.0001	mg/L
rep	3	Ni231.6	conc	0.0077	mg/L
rep	3	Fe238.2	conc	0.0050	mg/L
rep	3	Mn257.6	conc	0.0005	mg/L
rep	3	Cr267.7	conc	0.0022	mg/L
rep	3	V292.4	conc	-0.0040	mg/L
rep	3	Be313.0	conc	0.0003	mg/L
rep	3	Cu324.8	conc	0.0017	mg/L
rep	3	Ag328.1	conc	0.0003	mg/L
rep	3	Ba455.4	conc	0.0009	mg/L
rep	3	Mg279.6	conc	0.0008	mg/L
rep	3	Ca393.4	conc	0.0008	mg/L
rep	3	Na589.6	conc	0.0397	mg/L < OL. window edge

000033

CCB
12/18/92 14:26

Zn213.8	av	0.0031 mg/L	sd	0.00504	%cv	162.72	<
Cd214.4	av	-0.0036 mg/L	sd	0.00303	%cv	84.05	<
Ni231.6	av	0.0042 mg/L	sd	0.00338	%cv	80.69	<
Fe238.2	av	-0.0014 mg/L	sd	0.01038	%cv	755.23	<
Mn257.6	av	0.0011 mg/L	sd	0.00097	%cv	85.31	<
Cr267.7	av	0.0015 mg/L	sd	0.00372	%cv	245.73	<
V292.4	av	-0.0003 mg/L	sd	0.00474	%cv	1716.5	<
Be313.0	av	0.0000 mg/L	sd	0.00030	%cv	964.54	<
Cu324.8	av	0.0002 mg/L	sd	0.00685	%cv	3629.4	<
Ag328.1	av	0.0014 mg/L	sd	0.00099	%cv	69.52	<
Ba455.4	av	0.0026 mg/L	sd	0.00263	%cv	99.07	<
Mg279.6	av	0.0051 mg/L	sd	0.00630	%cv	123.47	<
Ca393.4	av	0.0050 mg/L	sd	0.00605	%cv	121.91	<
Na589.6	av	0.0686 mg/L	sd	0.02571	%cv	37.49	see above

Rerun Cd below

12/18/92 14:29

WA50016-6	rep	1	Fe238.2	conc	0.0148	mg/L
	rep	1	Mn257.6	conc	0.2488	mg/L
	rep	1	Mg279.6	conc	2.2606	mg/L
	rep	1	Ca393.4	conc	12.4655	mg/L
	rep	1	Na589.6	conc	11.1655	mg/L
	rep	2	Fe238.2	conc	0.0149	mg/L
	rep	2	Mn257.6	conc	0.2582	mg/L
	rep	2	Mg279.6	conc	2.3[illegible]	mg/L
	rep	2	Ca393.4	conc	12.5870	mg/L
	rep	2	Na589.6	conc	11.[illegible]490	mg/L
	rep	3	Fe238.2	conc	0.0068	mg/L

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                rep   3  Mn257.6    conc      0.2576 mg/L
                rep   3  Mg279.6    conc      2.3381 mg/L
                rep   3  Ca393.4    conc     12.6035 mg/L
                rep   3  Na589.6    conc     11.1917 mg/L
WA50016-6
12/18/92 14:30
    Fe238.2     av    0.0112 mg/L         sd   0.00407 %cv  36.44<
    Mn257.6     av    0.2550 mg/L         sd   0.00533 %cv   2.09
    Mg279.6     av    2.3196 mg/L         sd   0.05221 %cv   2.25
    Ca393.4     av   12.5520 mg/L         sd   0.07536 %cv   0.60
    Na589.6     av   11.2687 mg/L         sd   0.15673 %cv   1.39

12/18/92 14:33
WA50016-7       rep   1  Fe238.2    conc      0.5451 mg/L
                rep   1  Mn257.6    conc      0.0301 mg/L
                rep   1  Mg279.6    conc      0.6445 mg/L
                rep   1  Ca393.4    conc      1.6865 mg/L
                rep   1  Na589.6    conc     17.4432 mg/L
                rep   2  Fe238.2    conc      0.5631 mg/L
                rep   2  Mn257.6    conc      0.0296 mg/L
                rep   2  Mg279.6    conc      0.6488 mg/L
                rep   2  Ca393.4    conc      1.6624 mg/L
                rep   2  Na589.6    conc     17.9704 mg/L
                rep   3  Fe238.2    conc      0.5426 mg/L
                rep   3  Mn257.6    conc      0.0308 mg/L
                rep   3  Mg279.6    conc      0.6403 mg/L
                rep   3  Ca393.4    conc      1.6585 mg/L
                rep   3  Na589.6    conc     18.0900 mg/L
WA50016-7
12/18/92 14:34
    Fe238.2     av    0.5503 mg/L         sd   0.01121 %cv   2.04
    Mn257.6     av    0.0302 mg/L         sd   0.00062 %cv   2.06
    Mg279.6     av    0.6445 mg/L         sd   0.00429 %cv   0.67
    Ca393.4     av    1.6692 mg/L         sd   0.01515 %cv   0.91
    Na589.6     av   17.8346 mg/L         sd   0.34412 %cv   1.93

12/18/92 14:36
WA50016-8       rep   1  Fe238.2    conc      0.0313 mg/L
                rep   1  Mn257.6    conc      0.2408 mg/L
                rep   1  Mg279.6    conc      1.8009 mg/L
                rep   1  Ca393.4    conc     15.7592 mg/L
                rep   1  Na589.6    conc     73.5612 mg/L
                rep   2  Fe238.2    conc      0.0309 mg/L
                rep   2  Mn257.6    conc      0.2454 mg/L
                rep   2  Mg279.6    conc      1.7678 mg/L
                rep   2  Ca393.4    conc     15.5016 mg/L
                rep   2  Na589.6    conc     72.4979 mg/L
                rep   3  Fe238.2    conc      0.0321 mg/L
                rep   3  Mn257.6    conc      0.2431 mg/L
                rep   3  Mg279.6    conc      1.8510 mg/L
                rep   3  Ca393.4    conc     15.7688 mg/L
                rep   3  Na589.6    conc     73.8301 mg/L
WA50016-8
12/18/92 14:38
    Fe238.2     av    0.0314 mg/L         sd   0.00062 %cv   1.98
    Mn257.6     av    0.2431 mg/L         sd   0.00226 %cv   0.93
    Mg279.6     av    1.8065 mg/L         sd   0.04189 %cv   2.32
    Ca393.4     av   15.6763 mg/L         sd   0.15143 %cv   0.97
    Na589.6     av   73.2964 mg/L         sd   0.70848 %cv   0.96

12/18/92 14:40
WA50015-1Dis    rep   1  Zn213.8    conc      0.0182 mg/L
                rep   1  Cd214.4    conc     -0.0012 mg/L
                rep   1  Ni231.6    conc      0.0287 mg/L
                rep   1  Fe238.2    conc     -0.0018 mg/L      window edge
                rep   1  Mn257.6    conc     [illegible] mg/L
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000034

rep 1 Cr267.7 conc -0.0010 mg/L
rep 1 Be313.0 conc -0.0001 mg/L
rep 1 Cu324.8 conc -0.0008 mg/L
rep 1 Ag328.1 conc -0.0050 mg/L
rep 1 Mg279.6 conc 2.0932 mg/L
rep 1 Ca393.4 conc 3.1317 mg/L
rep 2 Zn213.8 conc 0.0257 mg/L
rep 2 Cd214.4 conc -0.0031 mg/L
rep 2 Ni231.6 conc 0.0082 mg/L 000035
rep 2 Fe238.2 conc 0.0074 mg/L
rep 2 Mn257.6 conc 0.0222 mg/L
rep 2 Cr267.7 conc 0.0002 mg/L
rep 2 Be313.0 conc -0.0001 mg/L
rep 2 Cu324.8 conc 0.0006 mg/L
rep 2 Ag328.1 conc -0.0038 mg/L window edge
rep 2 Mg279.6 conc 2.1296 mg/L
rep 2 Ca393.4 conc 3.1621 mg/L
rep 3 Zn213.8 conc 0.0140 mg/L
rep 3 Cd214.4 conc 0.0015 mg/L
rep 3 Ni231.6 conc 0.0066 mg/L
rep 3 Fe238.2 conc 0.0036 mg/L
rep 3 Mn257.6 conc 0.0212 mg/L
rep 3 Cr267.7 conc -0.0019 mg/L
rep 3 Be313.0 conc -0.0001 mg/L
rep 3 Cu324.8 conc 0.0082 mg/L
rep 3 Ag328.1 conc -0.0074 mg/L window edge
rep 3 Mg279.6 conc 2.1060 mg/L
rep 3 Ca393.4 conc 3.0650 mg/L

WA50015-1Dis
12/18/92 14:42

Zn213.8	av	0.0193 mg/L	sd	0.00591	%cv	30.65	<
Cd214.4	av	-0.0010 mg/L	sd	0.00230	%cv	237.64	Rerun
Ni231.6	av	0.0145 mg/L	sd	0.01234	%cv	85.24	<
Fe238.2	av	0.0031 mg/L	sd	0.00466	%cv	152.28	<
Mn257.6	av	0.0224 mg/L	sd	0.00123	%cv	5.51	
Cr267.7	av	-0.0009 mg/L	sd	0.00109	%cv	122.30	<
Be313.0	av	-0.0001 mg/L	sd	0.00002	%cv	22.54	<
Cu324.8	av	0.0027 mg/L	sd	0.00486	%cv	180.22	<
Ag328.1	av	-0.0054 mg/L	sd	0.00186	%cv	34.44	<
Mg279.6	av	2.1096 mg/L	sd	0.01843	%cv	0.87	
Ca393.4	av	3.1196 mg/L	sd	0.04967	%cv	1.59	

12/18/92 14:45
WA50015-2Dis rep 1 Zn213.8 conc 0.0117 mg/L
rep 1 Cd214.4 conc -0.0030 mg/L
rep 1 Ni231.6 conc 0.0047 mg/L
rep 1 Fe238.2 conc 0.0018 mg/L
rep 1 Mn257.6 conc 7.8460 mg/L
rep 1 Cr267.7 conc 0.0069 mg/L
rep 1 Be313.0 conc 0.0002 mg/L
rep 1 Cu324.8 conc 0.0046 mg/L
rep 1 Ag328.1 conc -0.0017 mg/L
rep 1 Mg279.6 conc 1.6268 mg/L
rep 1 Ca393.4 conc 5.5940 mg/L
rep 2 Zn213.8 conc 0.0386 mg/L
rep 2 Cd214.4 conc -0.0008 mg/L
rep 2 Ni231.6 conc 0.0056 mg/L
rep 2 Fe238.2 conc 0.0104 mg/L
rep 2 Mn257.6 conc 7.8066 mg/L
rep 2 Cr267.7 conc 0.0045 mg/L
rep 2 Be313.0 conc 0.0002 mg/L
rep 2 Cu324.8 conc 0.0099 mg/L
rep 2 Ag328.1 conc 0.0014 mg/L
rep 2 Mg279.6 conc 1.6182 mg/L
rep 2 Ca393.4 conc 5.7603 mg/L
rep 3 [illegible] conc 0.0225 [illegible]

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                     rep   3  Cd214.4   conc    0.0004 mg/L
                     rep   3  Ni231.6   conc   -0.0076 mg/L         window edge
                     rep   3  Fe238.2   conc    0.0031 mg/L
                     rep   3  Mn257.6   conc    7.8366 mg/L
                     rep   3  Cr267.7   conc    0.0063 mg/L
                     rep   3  Be313.0   conc    0.0001 mg/L
                     rep   3  Cu324.8   conc    0.0053 mg/L
                     rep   3  Ag328.1   conc    0.0001 mg/L
                     rep   3  Mg279.6   conc    1.6320 mg/L
                     rep   3  Ca393.4   conc    5.7410 mg/L
WA50015-2Dis
12/18/92 14:47
    Zn213.8     av     0.0243 mg/L        sd   0.01354 %cv   55.75<
    Cd214.4     av    -0.0011 mg/L        sd   0.00172 %cv  154.11 Rerun
    Ni231.6     av     0.0009 mg/L        sd   0.00737 %cv  808.22<
    Fe238.2     av     0.0051 mg/L        sd   0.00465 %cv   90.85<
    Mn257.6     av     7.8298 mg/L        sd   0.02057 %cv    0.26
    Cr267.7     av     0.0059 mg/L        sd   0.00128 %cv   21.69<
    Be313.0     av     0.0002 mg/L        sd   0.00007 %cv   40.85<
    Cu324.8     av     0.0066 mg/L        sd   0.00288 %cv   43.60<
    Ag328.1     av    -0.0001 mg/L        sd   0.00155 %cv 2165.5<
    Mg279.6     av     1.6256 mg/L        sd   0.00697 %cv    0.43
    Ca393.4     av     5.6984 mg/L        sd   0.09098 %cv    1.60

12/18/92 14:50
WA50015-3Dis         rep   1  Zn213.8   conc    0.0221 mg/L
                     rep   1  Cd214.4   conc   -0.0055 mg/L         window edge
                     rep   1  Ni231.6   conc   -0.0171 mg/L         window edge
                     rep   1  Fe238.2   conc    0.0068 mg/L
                     rep   1  Mn257.6   conc    0.0278 mg/L
                     rep   1  Cr267.7   conc    0.0033 mg/L
                     rep   1  Be313.0   conc    0.0001 mg/L
                     rep   1  Cu324.8   conc   -0.0086 mg/L         window edge
                     rep   1  Ag328.1   conc   -0.0024 mg/L
                     rep   1  Mg279.6   conc    2.1702 mg/L
                     rep   1  Ca393.4   conc    3.1875 mg/L
                     rep   2  Zn213.8   conc    0.0145 mg/L
                     rep   2  Cd214.4   conc    0.0024 mg/L
                     rep   2  Ni231.6   conc    0.0148 mg/L
                     rep   2  Fe238.2   conc    0.0062 mg/L
                     rep   2  Mn257.6   conc    0.0276 mg/L
                     rep   2  Cr267.7   conc   -0.0046 mg/L         window edge
                     rep   2  Be313.0   conc    0.0000 mg/L
                     rep   2  Cu324.8   conc    0.0050 mg/L
                     rep   2  Ag328.1   conc   -0.0043 mg/L         window edge
                     rep   2  Mg279.6   conc    2.1164 mg/L
                     rep   2  Ca393.4   conc    3.0829 mg/L
                     rep   3  Zn213.8   conc    0.0204 mg/L
                     rep   3  Cd214.4   conc   -0.0006 mg/L
                     rep   3  Ni231.6   conc    0.0068 mg/L
                     rep   3  Fe238.2   conc    0.0039 mg/L
                     rep   3  Mn257.6   conc    0.0257 mg/L
                     rep   3  Cr267.7   conc    0.0015 mg/L
                     rep   3  Be313.0   conc    0.0001 mg/L
                     rep   3  Cu324.8   conc   -0.0037 mg/L         window edge
                     rep   3  Ag328.1   conc   -0.0063 mg/L         window edge
                     rep   3  Mg279.6   conc    2.1842 mg/L
                     rep   3  Ca393.4   conc    3.2682 mg/L
WA50015-3Dis
12/18/92 14:52
    Zn213.8     av     0.0190 mg/L        sd   0.00400 %cv   21.10<
    Cd214.4     av    -0.0012 mg/L        sd   0.00400 %cv  326.58 Rerun
    Ni231.6     av     0.0015 mg/L        sd   0.0166  %cv  [illegible]
    Fe238.2     av     0.0057 mg/L        sd   0.00152 %cv   26.81<
    Mn257.6     av     0.0270 mg/L        sd   0.00118 %cv    4.35
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000036

Be313.0	av	0.0001 mg/L	sd	0.00004	%cv	[illegible]	–
Cu324.8	av	-0.0024 mg/L	sd	0.00689	%cv	283.70	<
Ag328.1	av	-0.0043 mg/L	sd	0.00196	%cv	45.36	<
Mg279.6	av	2.1569 mg/L	sd	0.03577	%cv	1.66	
Ca393.4	av	3.1795 mg/L	sd	0.09289	%cv	2.92	

12/18/92 14:55

000037

WA50015-3DDis	rep	1	Zn213.8	conc	0.0086 mg/L	
	rep	1	Cd214.4	conc	-0.0016 mg/L	
	rep	1	Ni231.6	conc	-0.0071 mg/L	window edge
	rep	1	Fe238.2	conc	0.0027 mg/L	
	rep	1	Mn257.6	conc	0.0240 mg/L	
	rep	1	Cr267.7	conc	0.0043 mg/L	
	rep	1	Be313.0	conc	0.0003 mg/L	
	rep	1	Cu324.8	conc	0.0029 mg/L	
	rep	1	Ag328.1	conc	-0.0022 mg/L	
	rep	1	Mg279.6	conc	2.2248 mg/L	
	rep	1	Ca393.4	conc	3.2359 mg/L	
	rep	2	Zn213.8	conc	0.0086 mg/L	
	rep	2	Cd214.4	conc	0.0005 mg/L	
	rep	2	Ni231.6	conc	0.0024 mg/L	window edge
	rep	2	Fe238.2	conc	0.0013 mg/L	
	rep	2	Mn257.6	conc	0.0241 mg/L	
	rep	2	Cr267.7	conc	0.0044 mg/L	
	rep	2	Be313.0	conc	0.0002 mg/L	
	rep	2	Cu324.8	conc	0.0057 mg/L	
	rep	2	Ag328.1	conc	0.0091 mg/L	
	rep	2	Mg279.6	conc	2.1980 mg/L	
	rep	2	Ca393.4	conc	3.2753 mg/L	
	rep	3	Zn213.8	conc	0.0180 mg/L	
	rep	3	Cd214.4	conc	-0.0044 mg/L	window edge
	rep	3	Ni231.6	conc	0.0076 mg/L	
	rep	3	Fe238.2	conc	0.0055 mg/L	
	rep	3	Mn257.6	conc	0.0266 mg/L	
	rep	3	Cr267.7	conc	0.0002 mg/L	
	rep	3	Be313.0	conc	0.0000 mg/L	
	rep	3	Cu324.8	conc	0.0079 mg/L	window edge
	rep	3	Ag328.1	conc	0.0065 mg/L	
	rep	3	Mg279.6	conc	2.2043 mg/L	
	rep	3	Ca393.4	conc	3.1757 mg/L	

WA50015-3DDis
12/18/92 14:57

Zn213.8	av	0.0117 mg/L	sd	0.00545	%cv	46.40	<
Cd214.4	av	-0.0018 mg/L	sd	0.00245	%cv	132.82	Rerun
Ni231.6	av	0.0009 mg/L	sd	0.00744	%cv	790.16	<
Fe238.2	av	0.0031 mg/L	sd	0.00212	%cv	67.43	<
Mn257.6	av	0.0249 mg/L	sd	0.00148	%cv	5.95	
Cr267.7	av	0.0030 mg/L	sd	0.00238	%cv	79.89	<
Be313.0	av	0.0002 mg/L	sd	0.00014	%cv	76.88	<
Cu324.8	av	0.0055 mg/L	sd	0.00254	%cv	46.17	<
Ag328.1	av	0.0045 mg/L	sd	0.00591	%cv	132.22	<
Mg279.6	av	2.2090 mg/L	sd	0.01402	%cv	0.63	
Ca393.4	av	3.2289 mg/L	sd	0.05015	%cv	1.55	

12/18/92 15:00

WA50015-3SDis	rep	1	Zn213.8	conc	0.5725 mg/L
	rep	1	Cd214.4	conc	0.0549 mg/L
	rep	1	Ni231.6	conc	0.5336 mg/L
	rep	1	Fe238.2	conc	1.0923 mg/L
	rep	1	Mn257.6	conc	0.5596 mg/L
	rep	1	Cr267.7	conc	0.2068 mg/L
	rep	1	Be313.0	conc	0.0482 mg/L
	rep	1	Cu324.8	conc	0.2268 mg/L
	rep	1	Ag328.1	conc	0.0494 mg/L
	rep	1	Mg279.6	conc	12.4306 mg/L
	rep	1	Ca393.4	conc	13.9026 mg/L

000038

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         rep  2  Zn213.8   conc    0.5397 mg/L
         rep  2  Cd214.4   conc    0.0520 mg/L
         rep  2  Ni231.6   conc    0.5305 mg/L
         rep  2  Fe238.2   conc    1.1222 mg/L
         rep  2  Mn257.6   conc    0.5540 mg/L
         rep  2  Cr267.7   conc    0.2154 mg/L
         rep  2  Be313.0   conc    0.0466 mg/L
         rep  2  Cu324.8   conc    0.2450 mg/L
         rep  2  Ag328.1   conc    0.0404 mg/L
         rep  2  Mg279.6   conc   13.0654 mg/L
         rep  2  Ca393.4   conc   13.4638 mg/L
         rep  3  Zn213.8   conc    0.5344 mg/L
         rep  3  Cd214.4   conc    0.0558 mg/L
         rep  3  Ni231.6   conc    0.5432 mg/L
         rep  3  Fe238.2   conc    1.0946 mg/L
         rep  3  Mn257.6   conc    0.5364 mg/L
         rep  3  Cr267.7   conc    0.2085 mg/L
         rep  3  Be313.0   conc    0.0479 mg/L
         rep  3  Cu324.8   conc    0.2383 mg/L
         rep  3  Ag328.1   conc    0.0394 mg/L
         rep  3  Mg279.6   conc   12.8507 mg/L
         rep  3  Ca393.4   conc   13.1971 mg/L
WA50015-3SDis
12/18/92 15:02
   Zn213.8   av   0.5489 mg/L    sd  0.02062 %cv   3.76
   Cd214.4   av   0.0542 mg/L    sd  0.00200 %cv   3.68 Rerun
   Ni231.6   av   0.5358 mg/L    sd  0.00665 %cv   1.24
   Fe238.2   av   1.1030 mg/L    sd  0.01664 %cv   1.51
   Mn257.6   av   0.5500 mg/L    sd  0.01212 %cv   2.20
   Cr267.7   av   0.2102 mg/L    sd  0.00459 %cv   2.18
   Be313.0   av   0.0476 mg/L    sd  0.00081 %cv   1.71
   Cu324.8   av   0.2360 mg/L    sd  0.00831 %cv   3.52
   Ag328.1   av   0.0431 mg/L    sd  0.00549 %cv  12.75
   Mg279.6   av  12.7822 mg/L    sd  0.32290 %cv   2.53
   Ca393.4   av  13.2412 mg/L    sd  0.20422 %cv   1.54

12/18/92 15:05
WA50015-4Dis  rep  1  Zn213.8   conc    0.0159 mg/L
         rep  1  Cd214.4   conc   -0.0017 mg/L
         rep  1  Ni231.6   conc    0.0005 mg/L
         rep  1  Fe238.2   conc    0.0083 mg/L
         rep  1  Mn257.6   conc   -0.0001 mg/L
         rep  1  Cr267.7   conc    0.0019 mg/L
         rep  1  Be313.0   conc    0.0002 mg/L
         rep  1  Cu324.8   conc    0.0031 mg/L
         rep  1  Ag328.1   conc    0.0078 mg/L
         rep  1  Mg279.6   conc    0.0137 mg/L
         rep  1  Ca393.4   conc    0.0380 mg/L
         rep  2  Zn213.8   conc    0.0184 mg/L
         rep  2  Cd214.4   conc   -0.0025 mg/L
         rep  2  Ni231.6   conc   -0.0201 mg/L        window edge
         rep  2  Fe238.2   conc    0.0008 mg/L
         rep  2  Mn257.6   conc    0.0017 mg/L
         rep  2  Cr267.7   conc   -0.0004 mg/L
         rep  2  Be313.0   conc    0.0000 mg/L
         rep  2  Cu324.8   conc    0.0029 mg/L
         rep  2  Ag328.1   conc    0.0019 mg/L
         rep  2  Mg279.6   conc    0.0096 mg/L
         rep  2  Ca393.4   conc    0.0328 mg/L
         rep  3  Zn213.8   conc    0.0085 mg/L
         rep  3  Cd214.4   conc    0.0033 mg/L        window edge
         rep  3  Ni231.6   conc    0.0170 mg/L
         rep  3  Fe238.2   conc    0.0016 mg/L
         rep  3  Mn257.6   conc    0.0001 mg/L
         rep  3  Cr267.7   conc    0.0055 mg/L
         rep  3  Be313.0   conc    0.0000 mg/L
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rep	3	Cu324.8	conc	0.0007 mg/L	
rep	3	Ag328.1	conc	-0.0057 mg/L	
rep	3	Mg279.6	conc	0.0067 mg/L	
rep	3	Ca393.4	conc	0.0322 mg/L	

WA50015-4Dis
12/18/92 15:07

Zn213.8	av	0.0143 mg/L	sd	0.00517	%cv	36.23<	
Cd214.4	av	-0.0025 mg/L	sd	0.00080	%cv	32.37	Rerun
Ni231.6	av	-0.0009 mg/L	sd	0.01361	%cv	2160.5<	
Fe238.2	av	0.0036 mg/L	sd	0.00415	%cv	116.02<	
Mn257.6	av	0.0006 mg/L	sd	0.00098	%cv	176.19<	
Cr267.7	av	0.0023 mg/L	sd	0.00298	%cv	128.96<	
Be313.0	av	0.0001 mg/L	sd	0.00012	%cv	147.12<	
Cu324.8	av	0.0021 mg/L	sd	0.00121	%cv	59.11<	
Ag328.1	av	0.0011 mg/L	sd	0.00680	%cv	606.98<	
Mg279.6	av	0.0100 mg/L	sd	0.00352	%cv	35.18<	
Ca393.4	av	0.0343 mg/L	sd	0.00317	%cv	9.24	

000039

12/18/92 15:10

WA50015-5Dis	rep	1	Zn213.8	conc	0.0643 mg/L	
	rep	1	Cd214.4	conc	-0.0042 mg/L	window edge
	rep	1	Ni231.6	conc	-0.0017 mg/L	
	rep	1	Fe238.2	conc	0.0297 mg/L	
	rep	1	Mn257.6	conc	0.2862 mg/L	
	rep	1	Cr267.7	conc	-0.0015 mg/L	
	rep	1	Be313.0	conc	0.0006 mg/L	
	rep	1	Cu324.8	conc	-0.0036 mg/L	
	rep	1	Ag328.1	conc	0.0040 mg/L	
	rep	1	Mg279.6	conc	1.8832 mg/L	
	rep	1	Ca393.4	conc	6.4378 mg/L	
	rep	2	Zn213.8	conc	0.0561 mg/L	
	rep	2	Cd214.4	conc	0.0011 mg/L	
	rep	2	Ni231.6	conc	-0.0046 mg/L	
	rep	2	Fe238.2	conc	0.0300 mg/L	
	rep	2	Mn257.6	conc	0.2773 mg/L	
	rep	2	Cr267.7	conc	0.0032 mg/L	
	rep	2	Be313.0	conc	0.0006 mg/L	
	rep	2	Cu324.8	conc	-0.0004 mg/L	
	rep	2	Ag328.1	conc	0.0022 mg/L	
	rep	2	Mg279.6	conc	1.8143 mg/L	
	rep	2	Ca393.4	conc	6.4586 mg/L	
	rep	3	Zn213.8	conc	0.0478 mg/L	
	rep	3	Cd214.4	conc	0.0026 mg/L	
	rep	3	Ni231.6	conc	-0.0053 mg/L	window edge
	rep	3	Fe238.2	conc	0.0298 mg/L	
	rep	3	Mn257.6	conc	0.2843 mg/L	
	rep	3	Cr267.7	conc	0.0001 mg/L	
	rep	3	Be313.0	conc	0.0004 mg/L	
	rep	3	Cu324.8	conc	0.0186 mg/L	
	rep	3	Ag328.1	conc	0.0024 mg/L	
	rep	3	Mg279.6	conc	1.8698 mg/L	
	rep	3	Ca393.4	conc	6.3046 mg/L	

WA50015-5Dis
12/18/92 15:12

Zn213.8	av	0.0561 mg/L	sd	0.00821	%cv	14.65	
Cd214.4	av	-0.0002 mg/L	sd	0.00360	%cv	2273.7	Rerun
Ni231.6	av	-0.0038 mg/L	sd	0.00191	%cv	49.78<	
Fe238.2	av	0.0298 mg/L	sd	0.00014	%cv	0.47	
Mn257.6	av	0.2826 mg/L	sd	0.00471	%cv	1.67	
Cr267.7	av	0.0006 mg/L	sd	0.00239	%cv	390.88<	
Be313.0	av	0.0005 mg/L	sd	0.00012	%cv	22.68<	
Cu324.8	av	0.0022 mg/L	sd	0.00747	%cv	337.23<	
Ag328.1	av	0.0013 mg/L	sd	0.00329	%cv	260.28<	
Mg279.6	av	1.8558 mg/L	sd	0.03653	%cv	1.97	
Ca393.4	av	6.4003 mg/L	sd	0.08359	%cv	1.31	

12/18/92 15:19

000040

CCV	rep	1	Zn213.8	conc	2.5365	mg/L
	rep	1	Cd214.4	conc	2.8683	mg/L
	rep	1	Ni231.6	conc	2.8769	mg/L
	rep	1	Fe238.2	conc	5.1391	mg/L
	rep	1	Mn257.6	conc	2.6662	mg/L
	rep	1	Cr267.7	conc	1.0739	mg/L
	rep	1	V292.4	conc	2.4700	mg/L
	rep	1	Be313.0	conc	0.2365	mg/L
	rep	1	Cu324.8	conc	1.1760	mg/L
	rep	1	Ag328.1	conc	1.1940	mg/L
	rep	1	Ba455.4	conc	9.2544	mg/L
	rep	1	Mg279.6	conc	25.1829	mg/L
	rep	1	Ca393.4	conc	23.9886	mg/L
	rep	1	Na589.6	conc	23.6842	mg/L
	rep	2	Zn213.8	conc	2.5759	mg/L
	rep	2	Cd214.4	conc	2.8124	mg/L
	rep	2	Ni231.6	conc	2.6153	mg/L
	rep	2	Fe238.2	conc	5.1644	mg/L
	rep	2	Mn257.6	conc	2.5246	mg/L
	rep	2	Cr267.7	conc	1.0492	mg/L
	rep	2	V292.4	conc	2.4840	mg/L
	rep	2	Be313.0	conc	0.2269	mg/L
	rep	2	Cu324.8	conc	1.1458	mg/L
	rep	2	Ag328.1	conc	1.1955	mg/L
	rep	2	Ba455.4	conc	9.3009	mg/L
	rep	2	Mg279.6	conc	25.7608	mg/L
	rep	2	Ca393.4	conc	24.4723	mg/L
	rep	2	Na589.6	conc	23.9324	mg/L
	rep	3	Zn213.8	conc	2.6016	mg/L
	rep	3	Cd214.4	conc	2.8439	mg/L
	rep	3	Ni231.6	conc	2.6362	mg/L
	rep	3	Fe238.2	conc	5.2792	mg/L
	rep	3	Mn257.6	conc	2.5815	mg/L
	rep	3	Cr267.7	conc	1.0585	mg/L
	rep	3	V292.4	conc	2.5006	mg/L
	rep	3	Be313.0	conc	0.2366	mg/L
	rep	3	Cu324.8	conc	1.1830	mg/L
	rep	3	Ag328.1	conc	1.2038	mg/L
	rep	3	Ba455.4	conc	9.1006	mg/L
	rep	3	Mg279.6	conc	24.9862	mg/L
	rep	3	Ca393.4	conc	24.2780	mg/L
	rep	3	Na589.6	conc	24.0087	mg/L

CCV
12/18/92 15:22

Zn213.8	av	2.5880	mg/L	sd	0.01289	%cv	0.50	104
Cd214.4	av	2.8415	mg/L	sd	0.02801	%cv	0.99	out
Ni231.6	av	2.7101	mg/L	sd	0.14656	%cv	5.41	108
Fe238.2	av	5.1942	mg/L	sd	0.07463	%cv	1.44	104
Mn257.6	av	2.5907	mg/L	sd	0.07124	%cv	2.75	104
Cr267.7	av	1.0605	mg/L	sd	0.01245	%cv	1.17	106
V292.4	av	2.4849	mg/L	sd	0.01529	%cv	0.62	99
Be313.0	av	0.2333	mg/L	sd	0.00557	%cv	2.39	93
Cu324.8	av	1.1683	mg/L	sd	0.01976	%cv	1.69	93
Ag328.1	av	1.1978	mg/L	sd	0.00526	%cv	0.44	96
Ba455.4	av	9.2186	mg/L	sd	0.10482	%cv	1.14	92
Mg279.6	av	25.3100	mg/L	sd	0.40266	%cv	1.59	101
Ca393.4	av	24.2463	mg/L	sd	0.24338	%cv	1.00	97
Na589.6	av	23.8751	mg/L	sd	0.16968	%cv	0.71	96

12/18/92 15:25

CCB	rep	1	Zn213.8	conc	0.0007	mg/L
	rep	1	Cd214.4	conc	-0.0025	mg/L
	rep	1	Ni231.6	conc	0.0068	mg/L
	rep	1	Fe238.2	conc	-0.0026	mg/L
	rep	1	Mn257.6	conc	0.0031	mg/L

window edge

000041

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rep   1  Cr267.7   conc    0.0026 mg/L
rep   1  V292.4    conc   -0.0007 mg/L
rep   1  Be313.0   conc    0.0001 mg/L
rep   1  Cu324.8   conc    0.0075 mg/L
rep   1  Ag328.1   conc   -0.0005 mg/L
rep   1  Ba455.4   conc    0.0061 mg/L
rep   1  Mg279.6   conc    0.0137 mg/L
rep   1  Ca393.4   conc    0.0130 mg/L
rep   1  Na589.6   conc    0.0923 mg/L
rep   2  Zn213.8   conc   -0.0027 mg/L
rep   2  Cd214.4   conc   -0.0015 mg/L
rep   2  Ni231.6   conc    0.0228 mg/L
rep   2  Fe238.2   conc    0.0035 mg/L
rep   2  Mn257.6   conc    0.0018 mg/L
rep   2  Cr267.7   conc    0.0023 mg/L
rep   2  V292.4    conc   -0.0034 mg/L
rep   2  Be313.0   conc    0.0000 mg/L
rep   2  Cu324.8   conc   -0.0078 mg/L
rep   2  Ag328.1   conc   -0.0001 mg/L
rep   2  Ba455.4   conc    0.0019 mg/L
rep   2  Mg279.6   conc    0.0029 mg/L
rep   2  Ca393.4   conc    0.0027 mg/L
rep   2  Na589.6   conc    0.0215 mg/L          window edge
rep   3  Zn213.8   conc    0.0065 mg/L
rep   3  Cd214.4   conc   -0.0028 mg/L
rep   3  Ni231.6   conc   -0.0056 mg/L
rep   3  Fe238.2   conc   -0.0027 mg/L
rep   3  Mn257.6   conc    0.0004 mg/L
rep   3  Cr267.7   conc    0.0027 mg/L
rep   3  V292.4    conc   -0.0007 mg/L
rep   3  Be313.0   conc    0.0002 mg/L
rep   3  Cu324.8   conc    0.0100 mg/L
rep   3  Ag328.1   conc    0.0027 mg/L
rep   3  Ba455.4   conc    0.0012 mg/L
rep   3  Mg279.6   conc    0.0002 mg/L
rep   3  Ca393.4   conc    0.0000 mg/L
rep   3  Na589.6   conc    0.0731 mg/L          window edge
CCB
12/18/92 15:29
   Zn213.8   av   0.0015 mg/L     sd  0.00467 %cV 310.42 <
   Cd214.4   av  -0.0022 mg/L     sd  0.00070 %cV  31.12 <
   Ni231.6   av   0.0080 mg/L     sd  0.01423 %cV 178.41 <
   Fe238.2   av  -0.0006 mg/L     sd  0.00357 %cV-613.21 <
   Mn257.6   av   0.0018 mg/L     sd  0.00134 %cV  76.06 <
   Cr267.7   av   0.0025 mg/L     sd  0.00017 %cV   6.79 <
 < V292.4    av   0.0016 mg/L     sd  0.00160 %cV 100.41 <
   Be313.0   av   0.0001 mg/L     sd  0.00009 %cV  77.98 <
   Cu324.8   av   0.0032 mg/L     sd  0.00966 %cV 298.22 <
   Ag328.1   av   0.0007 mg/L     sd  0.00175 %cV 255.69
   Ba455.4   av   0.0031 mg/L     sd  0.00263 %cV  85.36 <
   Mg279.6   av   0.0056 mg/L     sd  0.00715 %cV 128.38 <
   Ca393.4   av   0.0053 mg/L     sd  0.00689 %cV 131.15 <
   Na589.6   av   0.0628 mg/L     sd  0.03665 %cV  58.82 Rerun

12/18/92 15:33
CCB           rep  1  Na589.6   conc    0.0713 mg/L
              rep  2  Na589.6   conc    0.1053 mg/L
              rep  3  Na589.6   conc    0.0918 mg/L
CCB
12/18/92 15:34
   Na589.6   av   0.0895 mg/L     sd  0.01714 %cV [illegible] rerun

12/18/92 15:35
CCB           rep  1  Na589.6   conc    0.0267 mg/L
              rep  2  Na589.6   conc    0.0038 mg/L
              rep  3  Na589.6   conc   -0.0159 mg/L          window edge
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ccb
12/18/92 15:35
Na589.6 av -0.0148 mg/L sd 0.05335 %cv 359.52< - use fresh DI

Rerun Cd below

12/18/92 15:37

000042

WA50015-6Tot	rep	1	Zn213.8	conc	0.0756	mg/L
	rep	1	Cd214.4	conc	0.0047	mg/L
	rep	1	Ni231.6	conc	0.0125	mg/L
	rep	1	Fe238.2	conc	18.5357	mg/L
	rep	1	Mn257.6	conc	2.6579	mg/L
	rep	1	Cr267.7	conc	0.0167	mg/L
	rep	1	Be313.0	conc	0.0007	mg/L
	rep	1	Cu324.8	conc	0.0182	mg/L
	rep	1	Ag328.1	conc	0.0048	mg/L
	rep	1	Mg279.6	conc	6.6044	mg/L
	rep	1	Ca393.4	conc	5.7059	mg/L
	rep	2	Zn213.8	conc	0.0757	mg/L
	rep	2	Cd214.4	conc	-0.0026	mg/L
	rep	2	Ni231.6	conc	0.0012	mg/L
	rep	2	Fe238.2	conc	18.4605	mg/L
	rep	2	Mn257.6	conc	2.6973	mg/L
	rep	2	Cr267.7	conc	0.0118	mg/L
	rep	2	Be313.0	conc	0.0009	mg/L
	rep	2	Cu324.8	conc	0.0135	mg/L
	rep	2	Ag328.1	conc	0.0004	mg/L
	rep	2	Mg279.6	conc	6.7167	mg/L
	rep	2	Ca393.4	conc	5.9462	mg/L
	rep	3	Zn213.8	conc	0.0878	mg/L
	rep	3	Cd214.4	conc	-0.0036	mg/L
	rep	3	Ni231.6	conc	-0.0040	mg/L
	rep	3	Fe238.2	conc	18.5485	mg/L
	rep	3	Mn257.6	conc	2.6963	mg/L
	rep	3	Cr267.7	conc	0.0132	mg/L
	rep	3	Be313.0	conc	0.0007	mg/L
	rep	3	Cu324.8	conc	0.0143	mg/L
	rep	3	Ag328.1	conc	0.0019	mg/L
	rep	3	Mg279.6	conc	6.4014	mg/L
	rep	3	Ca393.4	conc	5.5860	mg/L

window edge

WA50015-6Tot
12/18/92 15:40

Zn213.8	av	0.0797	mg/L	sd	0.00702	%cv	8.81
Cd214.4	av	-0.0005	mg/L	sd	0.00454	%cv	866.34 Rerun
Ni231.6	av	0.0032	mg/L	sd	0.00845	%cv	261.40<
Fe238.2	av	18.5149	mg/L	sd	0.04752	%cv	0.26
Mn257.6	av	2.6838	mg/L	sd	0.02248	%cv	0.84
Cr267.7	av	0.0139	mg/L	sd	0.00250	%cv	17.98<
Be313.0	av	0.0008	mg/L	sd	0.00013	%cv	16.65<
Cu324.8	av	0.0153	mg/L	sd	0.00249	%cv	16.26<
Ag328.1	av	0.0024	mg/L	sd	0.00223	%cv	93.92<
Mg279.6	av	6.5741	mg/L	sd	0.15983	%cv	2.43
Ca393.4	av	5.7461	mg/L	sd	0.18340	%cv	3.19

12/18/92 15:42

WA50015-6DTot	rep	1	Zn213.8	conc	0.0921	mg/L
	rep	1	Cd214.4	conc	0.0014	mg/L
	rep	1	Ni231.6	conc	-0.0016	mg/L
	rep	1	Fe238.2	conc	18.7679	mg/L
	rep	1	Mn257.6	conc	2.6786	mg/L
	rep	1	Cr267.7	conc	0.0136	mg/L
	rep	1	Be313.0	conc	0.0007	mg/L
	rep	1	Cu324.8	conc	0.0209	mg/L
	rep	1	Ag328.1	conc	0.0078	mg/L
	rep	1	Mg279.6	conc	6.8490	mg/L
	rep	1	Ca393.4	conc	5.9471	mg/L
	rep	2	Zn213.8	conc	0.0818	mg/L
	rep	2	Cd214.4	conc	0.0017	mg/L

rep	2	Ni231.6	conc	0.0055	mg/L
rep	2	Fe238.2	conc	19.4560	mg/L
rep	2	Mn257.6	conc	2.6645	mg/L
rep	2	Cr267.7	conc	0.0141	mg/L
rep	2	Be313.0	conc	0.0011	mg/L
rep	2	Cu324.8	conc	0.0116	mg/L
rep	2	Ag328.1	conc	0.0019	mg/L
rep	2	Mg279.6	conc	6.8199	mg/L
rep	2	Ca393.4	conc	6.0296	mg/L
rep	3	Zn213.8	conc	0.0902	mg/L
rep	3	Cd214.4	conc	0.0016	mg/L
rep	3	Ni231.6	conc	0.0045	mg/L
rep	3	Fe238.2	conc	18.8190	mg/L
rep	3	Mn257.6	conc	2.5851	mg/L
rep	3	Cr267.7	conc	0.0085	mg/L
rep	3	Be313.0	conc	0.0011	mg/L
rep	3	Cu324.8	conc	0.0186	mg/L
rep	3	Ag328.1	conc	0.0037	mg/L
rep	3	Mg279.6	conc	6.8635	mg/L
rep	3	Ca393.4	conc	5.9583	mg/L

WA50015-6DTot
12/18/92 15:45

Zn213.8	av	0.0880	mg/L	sd	0.00545	%cv	6.19	
Cd214.4	av	0.0015	mg/L	sd	0.00016	%cv	10.16	Rerun
Ni231.6	av	0.0021	mg/L	sd	0.00325	%cv	153.41	<
Fe238.2	av	19.0143	mg/L	sd	0.38334	%cv	2.02	
Mn257.6	av	2.6427	mg/L	sd	0.05040	%cv	1.91	
Cr267.7	av	0.0120	mg/L	sd	0.00310	%cv	25.70	<
Be313.0	av	0.0010	mg/L	sd	0.00019	%cv	19.87	<
Cu324.8	av	0.0170	mg/L	sd	0.00484	%cv	28.44	<
Ag328.1	av	0.0045	mg/L	sd	0.00303	%cv	68.03	<
Mg279.6	av	6.8441	mg/L	sd	0.02220	%cv	0.32	
Ca393.4	av	5.9783	mg/L	sd	0.04478	%cv	0.75	

12/18/92 15:47

WA50015-6STot	rep	1	Zn213.8	conc	0.5946	mg/L
	rep	1	Cd214.4	conc	0.0536	mg/L
	rep	1	Ni231.6	conc	0.5485	mg/L
	rep	1	Fe238.2	conc	21.0637	mg/L
	rep	1	Mn257.6	conc	3.2256	mg/L
	rep	1	Cr267.7	conc	0.2266	mg/L
	rep	1	Be313.0	conc	0.0486	mg/L
	rep	1	Cu324.8	conc	0.2476	mg/L
	rep	1	Ag328.1	conc	0.0288	mg/L
	rep	1	Mg279.6	conc	17.3941	mg/L
	rep	1	Ca393.4	conc	15.7076	mg/L
	rep	2	Zn213.8	conc	0.5873	mg/L
	rep	2	Cd214.4	conc	0.0515	mg/L
	rep	2	Ni231.6	conc	0.5245	mg/L
	rep	2	Fe238.2	conc	19.9957	mg/L
	rep	2	Mn257.6	conc	3.1610	mg/L
	rep	2	Cr267.7	conc	0.2179	mg/L
	rep	2	Be313.0	conc	0.0458	mg/L
	rep	2	Cu324.8	conc	0.2486	mg/L
	rep	2	Ag328.1	conc	0.0402	mg/L
	rep	2	Mg279.6	conc	17.7277	mg/L
	rep	2	Ca393.4	conc	15.5279	mg/L
	rep	3	Zn213.8	conc	0.6157	mg/L
	rep	3	Cd214.4	conc	0.0538	mg/L
	rep	3	Ni231.6	conc	0.5672	mg/L
	rep	3	Fe238.2	conc	19.9259	mg/L
	rep	3	Mn257.6	conc	3.1011	mg/L
	rep	3	Cr267.7	conc	0.2291	mg/L
	rep	3	Be313.0	conc	0.0466	mg/L
	rep	3	Cu324.8	conc	0.2669	mg/L
	rep	3	Ag328.1	conc	0.0479	mg/L

rep 3 Mg279.6 conc 15.8075 mg/L
rep 3 Ca393.4 conc 15.3949 mg/L

WA50015-6STot
12/18/92 15:50

Zn213.8	av	0.5992 mg/L	sd	0.01476	%cv	2.46	
Cd214.4	av	0.0530 mg/L	sd	0.00129	%cv	2.44	Rerun
Ni231.6	av	0.5467 mg/L	sd	0.02138	%cv	3.91	
Fe238.2	av	20.3284 mg/L	sd	0.63771	%cv	3.14	
Mn257.6	av	3.1592 mg/L	sd	0.06267	%cv	1.98	
Cr267.7	av	0.2245 mg/L	sd	0.00589	%cv	2.62	
Be313.0	av	0.0470 mg/L	sd	0.00144	%cv	3.06	
Cu324.8	av	0.2544 mg/L	sd	0.01089	%cv	4.28	
Ag328.1	av	0.0390 mg/L	sd	0.00959	%cv	24.61	
Mg279.6	av	17.3088 mg/L	sd	0.46561	%cv	2.69	
Ca393.4	av	15.5435 mg/L	sd	0.15694	%cv	1.01	

000044

12/18/92 15:54
WA50015-4Tot rep 1 Mg279.6 conc 0.0142 mg/L
rep 1 Ca393.4 conc 0.0509 mg/L
rep 2 Mg279.6 conc 0.0137 mg/L
rep 2 Ca393.4 conc 0.0459 mg/L
rep 3 Mg279.6 conc 0.0121 mg/L
rep 3 Ca393.4 conc 0.0459 mg/L

WA50015-4Tot
12/18/92 15:54

Mg279.6	av	0.0133 mg/L	sd	0.00113	%cv	8.45
Ca393.4	av	0.0476 mg/L	sd	0.00289	%cv	6.08

12/18/92 15:56
WA50015-5Tot rep 1 Mg279.6 conc 22.8084 mg/L
rep 1 Ca393.4 conc 10.2424 mg/L
rep 2 Mg279.6 conc 23.1307 mg/L
rep 2 Ca393.4 conc 10.3555 mg/L
rep 3 Mg279.6 conc 22.8888 mg/L
rep 3 Ca393.4 conc 10.3492 mg/L

WA50015-5Tot
12/18/92 15:56

Mg279.6	av	22.9427 mg/L	sd	0.16774	%cv	0.73
Ca393.4	av	10.3157 mg/L	sd	0.06357	%cv	0.62

12/18/92 15:58
CCV rep 1 Zn213.8 conc 2.6226 mg/L
rep 1 Cd214.4 conc 2.8752 mg/L
rep 1 Ni231.6 conc 2.7506 mg/L
rep 1 Fe238.2 conc 5.2357 mg/L
rep 1 Mn257.6 conc 2.5172 mg/L
rep 1 Cr267.7 conc 1.0496 mg/L
rep 1 V292.4 conc 2.3980 mg/L
rep 1 Be313.0 conc 0.2279 mg/L
rep 1 Cu324.8 conc 1.1762 mg/L
rep 1 Ag328.1 conc 1.1940 mg/L
rep 1 Ba455.4 conc 8.9622 mg/L
rep 1 Mg279.6 conc 24.7406 mg/L
rep 1 Ca393.4 conc 24.6167 mg/L
rep 1 Na589.6 conc 23.9095 mg/L
rep 2 Zn213.8 conc 2.5330 mg/L
rep 2 Cd214.4 conc 2.8289 mg/L
rep 2 Ni231.6 conc 2.6237 mg/L
rep 2 Fe238.2 conc 5.1990 mg/L
rep 2 Mn257.6 conc 2.5951 mg/L
rep 2 Cr267.7 conc 1.0396 mg/L
rep 2 V292.4 conc 2.4118 mg/L
rep 2 Be313.0 conc 0.2269 mg/L
rep 2 Cu324.8 conc 1.1287 mg/L
rep 2 Ag328.1 conc 1.1772 mg/L
rep 2 Ba455.4 conc [illegible] mg/L

rep	2	Mg279.6	conc	25.3274	mg/L
rep	2	Ca393.4	conc	24.2133	mg/L
rep	2	Na589.6	conc	23.7367	mg/L
rep	3	Zn213.8	conc	2.5661	mg/L
rep	3	Cd214.4	conc	2.6130	mg/L
rep	3	Ni231.6	conc	2.6446	mg/L
rep	3	Fe238.2	conc	5.1911	mg/L
rep	3	Mn257.6	conc	2.5805	mg/L
rep	3	Cr267.7	conc	1.0665	mg/L
rep	3	V292.4	conc	2.4797	mg/L
rep	3	Be313.0	conc	0.2293	mg/L
rep	3	Cu324.8	conc	1.1543	mg/L
rep	3	Ag328.1	conc	1.1920	mg/L
rep	3	Ba455.4	conc	9.1292	mg/L
rep	3	Mg279.6	conc	25.1666	mg/L
rep	3	Ca393.4	conc	23.8045	mg/L
rep	3	Na589.6	conc	23.8991	mg/L

CCV
12/18/92 16:01

Zn213.8	av	2.5739 mg/L	sd	0.04530	%cv	1.76	103
Cd214.4	av	2.6390 mg/L	sd	0.03235	%cv	1.14	104
Ni231.6	av	2.6730 mg/L	sd	0.06805	%cv	2.55	107
Fe238.2	av	5.2086 mg/L	sd	0.02381	%cv	0.46	104
Mn257.6	av	2.5643 mg/L	sd	0.04141	%cv	1.61	103
Cr267.7	av	1.0519 mg/L	sd	0.01357	%cv	1.29	105
V292.4	av	2.4298 mg/L	sd	0.04377	%cv	1.80	97
Be313.0	av	0.2281 mg/L	sd	0.00118	%cv	0.52	91
Cu324.8	av	1.1531 mg/L	sd	0.02373	%cv	2.06	92
Ag328.1	av	1.1877 mg/L	sd	0.00918	%cv	0.77	95
Ba455.4	av	9.0935 mg/L	sd	0.11755	%cv	1.29	91
Mg279.6	av	25.0782 mg/L	sd	0.30320	%cv	1.21	100
Ca393.4	av	24.2115 mg/L	sd	0.40611	%cv	1.68	97
Na589.6	av	23.8484 mg/L	sd	0.09690	%cv	0.41	95

12/18/92 16:04

CCB	rep	1	Zn213.8	conc	-0.0024	mg/L	
	rep	1	Cd214.4	conc	-0.0021	mg/L	
	rep	1	Ni231.6	conc	0.0031	mg/L	
	rep	1	Fe238.2	conc	0.0088	mg/L	
	rep	1	Mn257.6	conc	0.0015	mg/L	
	rep	1	Cr267.7	conc	-0.0056	mg/L	window edge
	rep	1	V292.4	conc	0.0018	mg/L	
	rep	1	Be313.0	conc	-0.0003	mg/L	
	rep	1	Cu324.8	conc	-0.0021	mg/L	
	rep	1	Ag328.1	conc	0.0036	mg/L	
	rep	1	Ba455.4	conc	0.0058	mg/L	
	rep	1	Mg279.6	conc	0.0119	mg/L	
	rep	1	Ca393.4	conc	0.0115	mg/L	
	rep	1	Na589.6	conc	0.0441	mg/L	
	rep	2	Zn213.8	conc	0.0063	mg/L	
	rep	2	Cd214.4	conc	-0.0009	mg/L	
	rep	2	Ni231.6	conc	0.0246	mg/L	
	rep	2	Fe238.2	conc	-0.0003	mg/L	
	rep	2	Mn257.6	conc	0.0003	mg/L	window edge
	rep	2	Cr267.7	conc	-0.0006	mg/L	
	rep	2	V292.4	conc	0.0039	mg/L	
	rep	2	Be313.0	conc	0.0001	mg/L	
	rep	2	Cu324.8	conc	0.0069	mg/L	
	rep	2	Ag328.1	conc	-0.0019	mg/L	
	rep	2	Ba455.4	conc	0.0025	mg/L	
	rep	2	Mg279.6	conc	0.0037	mg/L	
	rep	2	Ca393.4	conc	0.0035	mg/L	
	rep	2	Na589.6	conc	0.0671	mg/L	
	rep	3	Zn213.8	conc	0.0006	mg/L	
	rep	3	Cd214.4	conc	0.0006	mg/L	
	rep	3	Ni231.6	conc	[illegible]	mg/L	

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                rep   3  Fe238.2   conc   -0.0047 mg/L
                rep   3  Mn257.6   conc    0.0007 mg/L
                rep   3  Cr267.7   conc   -0.0046 mg/L
                rep   3  V292.4    conc   -0.0050 mg/L         window edge
                rep   3  Be313.0   conc   -0.0000 mg/L
                rep   3  Cu324.8   conc   -0.0065 mg/L         window edge
                rep   3  Ag328.1   conc    0.0029 mg/L
                rep   3  Ba455.4   conc    0.0005 mg/L
                rep   3  Mg279.6   conc    0.0003 mg/L
                rep   3  Ca393.4   conc    0.0001 mg/L
                rep   3  Na589.6   conc   -0.0133 mg/L
CCB
12/18/92 16:08
     Zn213.8    av    0.0031 mg/L        sd   0.00295 %cv   95.21
     Cd214.4    av   -0.0002 mg/L        sd   0.00166 %cv  769.51
     Ni231.6    av    0.0060 mg/L        sd   0.01736 %cv  288.44
     Fe238.2    av    0.0013 mg/L        sd   0.00687 %cv  529.27
     Mn257.6    av    0.0008 mg/L        sd   0.00057 %cv   69.64
     Cr267.7    av   -0.0036 mg/L        sd   0.00264 %cv   72.65
     V292.4     av    0.0002 mg/L        sd   0.00469 %cv  2062.1
     Be313.0    av    0.0001 mg/L        sd   0.00016 %cv  124.90
     Cu324.8    av   -0.0008 mg/L        sd   0.00651 %cv  856.21
     Ag328.1    av    0.0015 mg/L        sd   0.00298 %cv  193.46
     Ba455.4    av    0.0029 mg/L        sd   0.00268 %cv   91.56
     Mg279.6    av    0.0053 mg/L        sd   0.00596 %cv  112.68
     Ca393.4    av    0.0050 mg/L        sd   0.00590 %cv  117.47
     Na589.6    av    0.0326 mg/L        sd   0.04138 %cv  126.80

12/18/92 16:11
ICSA            rep   1  Zn213.8   conc    0.0100 mg/L
                rep   1  Cd214.4   conc    0.0143 mg/L
                rep   1  Ni231.6   conc    0.0038 mg/L
                rep   1  Mn257.6   conc    0.0087 mg/L
                rep   1  Cr267.7   conc   -0.0058 mg/L         window edge
                rep   1  V292.4    conc    0.0356 mg/L
                rep   1  Be313.0   conc    0.0001 mg/L
                rep   1  Cu324.8   conc   -0.0034 mg/L         window edge
                rep   1  Ag328.1   conc   -0.0122 mg/L
                rep   1  Ba455.4   conc    0.0006 mg/L
                rep   2  Zn213.8   conc    0.0095 mg/L
                rep   2  Cd214.4   conc    0.0134 mg/L
                rep   2  Ni231.6   conc    0.0088 mg/L
                rep   2  Mn257.6   conc    0.0079 mg/L
                rep   2  Cr267.7   conc    0.0029 mg/L
                rep   2  V292.4    conc    0.0442 mg/L
                rep   2  Be313.0   conc    0.0004 mg/L
                rep   2  Cu324.8   conc    0.0017 mg/L
                rep   2  Ag328.1   conc   -0.0084 mg/L         window edge
                rep   2  Ba455.4   conc   -0.0011 mg/L         window edge
                rep   3  Zn213.8   conc    0.0004 mg/L
                rep   3  Cd214.4   conc    0.0130 mg/L
                rep   3  Ni231.6   conc    0.0236 mg/L
                rep   3  Mn257.6   conc    0.0106 mg/L
                rep   3  Cr267.7   conc    0.0052 mg/L
                rep   3  V292.4    conc    0.0418 mg/L
                rep   3  Be313.0   conc    0.0003 mg/L
                rep   3  Cu324.8   conc    0.0152 mg/L         window edge
                rep   3  Ag328.1   conc   -0.0014 mg/L
                rep   3  Ba455.4   conc    0.0007 mg/L         window edge
ICSA
12/18/92 16:19
     Zn213.8    av    0.0066 mg/L        sd   0.00541 %cv   81.95
     Cd214.4    av    0.0136 mg/L        sd   0.00069 %cv    5.05
     Ni231.6    av    0.0121 mg/L        sd   0.01032 %cv   85.31
     Mn257.6    av    0.0091 mg/L        sd   0.00139 %cv   15.32
     Cr267.7    av    0.0008 mg/L        sd   0.00579 %cv  741.86
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V292.4 av 0.0405 mg/L sd 0.00443 %cv 10.93
Be313.0 av 0.0003 mg/L sd 0.00014 %cv 53.87
Cu324.8 av 0.0045 mg/L sd 0.00958 %cv 212.34
Ag328.1 av -0.0073 mg/L sd 0.00552 %cv 75.12
Ba455.4 av 0.0001 mg/L sd 0.00104 %cv 1501.4

12/18/92 16:15

ICSAB rep 1 Zn213.8 conc 0.9836 mg/L
rep 1 Cd214.4 conc 0.9907 mg/L
rep 1 Ni231.6 conc 0.9007 mg/L
rep 1 Mn257.6 conc 0.4889 mg/L
rep 1 Cr267.7 conc 0.4820 mg/L
rep 1 V292.4 conc 0.4503 mg/L
rep 1 Be313.0 conc 0.4535 mg/L
rep 1 Cu324.8 conc 0.4415 mg/L
rep 1 Ag328.1 conc 0.9283 mg/L
rep 1 Ba455.4 conc 0.4487 mg/L
rep 2 Zn213.8 conc 0.9818 mg/L
rep 2 Cd214.4 conc 0.9809 mg/L
rep 2 Ni231.6 conc 0.9547 mg/L
rep 2 Mn257.6 conc 0.4948 mg/L
rep 2 Cr267.7 conc 0.5031 mg/L
rep 2 V292.4 conc 0.4480 mg/L
rep 2 Be313.0 conc 0.4548 mg/L
rep 2 Cu324.8 conc 0.4388 mg/L
rep 2 Ag328.1 conc 0.9175 mg/L
rep 2 Ba455.4 conc 0.4384 mg/L
rep 3 Zn213.8 conc 0.9819 mg/L
rep 3 Cd214.4 conc 1.0116 mg/L
rep 3 Ni231.6 conc 0.9689 mg/L
rep 3 Mn257.6 conc 0.4942 mg/L
rep 3 Cr267.7 conc 0.4984 mg/L
rep 3 V292.4 conc 0.4722 mg/L
rep 3 Be313.0 conc 0.4640 mg/L
rep 3 Cu324.8 conc 0.4561 mg/L
rep 3 Ag328.1 conc 0.9148 mg/L
rep 3 Ba455.4 conc 0.4466 mg/L

ICSAB
12/18/92 16:18
Zn213.8 av 0.9824 mg/L sd 0.00104 %cv 0.10 98
Cd214.4 av 0.9944 mg/L sd 0.01566 %cv 1.57 99
Ni231.6 av 0.9414 mg/L sd 0.03597 %cv 3.82 94
Mn257.6 av 0.4926 mg/L sd 0.00325 %cv 0.66 99
Cr267.7 av 0.4945 mg/L sd 0.01111 %cv 2.25 99
V292.4 av 0.4568 mg/L sd 0.01332 %cv 2.92 91
Be313.0 av 0.4574 mg/L sd 0.00574 %cv 1.26 91
Cu324.8 av 0.4455 mg/L sd 0.00931 %cv 2.09 89
Ag328.1 av 0.9202 mg/L sd 0.00716 %cv 0.78 92
Ba455.4 av 0.4446 mg/L sd 0.00543 %cv 1.22 89

12/18/92 16:20
throw away rep 1 Zn213.8 conc 0.0035 mg/L
rep 1 Cd214.4 conc -0.0004 mg/L
rep 1 Ni231.6 conc 0.0047 mg/L
rep 1 Fe238.2 conc 0.1284 mg/L
rep 1 Mn257.6 conc 0.0004 mg/L
rep 1 Cr267.7 conc -0.0080 mg/L
rep 1 V292.4 conc -0.0023 mg/L
rep 1 Be313.0 conc 0.0001 mg/L
rep 1 Cu324.8 conc 0.0018 mg/L
rep 1 Ag328.1 conc 0.0010 mg/L
rep 1 Ba455.4 conc -0.0000 mg/L
rep 1 Mg279.6 conc 0.2959 mg/L
rep 1 Ca393.4 conc 0.2316 mg/L
rep 1 Na589.6 conc 0.0787 mg/L
rep 2 Zn213.8 conc -0.0021 mg/L window edge

000048

rep	2	Cd214.4	conc	0.0031 mg/L	
rep	2	Ni231.6	conc	0.0152 mg/L	
rep	2	Fe238.2	conc	0.0479 mg/L	
rep	2	Mn257.6	conc	0.0007 mg/L	
rep	2	Cr267.7	conc	-0.0018 mg/L	window edge
rep	2	V292.4	conc	-0.0021 mg/L	
rep	2	Be313.0	conc	0.0002 mg/L	
rep	2	Cu324.8	conc	0.0049 mg/L	
rep	2	Ag328.1	conc	0.0099 mg/L	
rep	2	Ba455.4	conc	0.0000 mg/L	window edge
rep	2	Mg279.6	conc	0.0870 mg/L	
rep	2	Ca393.4	conc	0.0743 mg/L	
rep	2	Na589.6	conc	-0.0253 mg/L	
rep	3	Zn213.8	conc	0.0091 mg/L	
rep	3	Cd214.4	conc	-0.0036 mg/L	window edge
rep	3	Ni231.6	conc	0.0033 mg/L	
rep	3	Fe238.2	conc	-0.0040 mg/L	
rep	3	Mn257.6	conc	-0.0004 mg/L	
rep	3	Cr267.7	conc	0.0050 mg/L	
rep	3	V292.4	conc	-0.0039 mg/L	
rep	3	Be313.0	conc	0.0002 mg/L	
rep	3	Cu324.8	conc	-0.0008 mg/L	
rep	3	Ag328.1	conc	-0.0067 mg/L	window edge
rep	3	Ba455.4	conc	0.0007 mg/L	
rep	3	Mg279.6	conc	0.0246 mg/L	
rep	3	Ca393.4	conc	0.0188 mg/L	
rep	3	Na589.6	conc	0.0449 mg/L	window edge

throw away
12/18/92 16:23

Zn213.8	av	0.0032 mg/L	sd	0.00614	%cv	193.73
Cd214.4	av	-0.0003 mg/L	sd	0.00336	%cv	1170.2
Ni231.6	av	0.0077 mg/L	sd	0.00650	%cv	84.47
Fe238.2	av	0.0574 mg/L	sd	0.06675	%cv	116.21
Mn257.6	av	0.0003 mg/L	sd	0.00058	%cv	230.42
Cr267.7	av	0.0001 mg/L	sd	0.00433	%cv	4586.3
V292.4	av	-0.0027 mg/L	sd	0.00101	%cv	36.70
Be313.0	av	0.0002 mg/L	sd	0.00006	%cv	34.14
Cu324.8	av	0.0019 mg/L	sd	0.00286	%cv	151.26
Ag328.1	av	0.0014 mg/L	sd	0.00831	%cv	590.39
Ba455.4	av	0.0002 mg/L	sd	0.00040	%cv	167.64
Mg279.6	av	0.1358 mg/L	sd	0.14208	%cv	104.60
Ca393.4	av	0.1082 mg/L	sd	0.11037	%cv	102.00
Na589.6	av	0.0328 mg/L	sd	0.05306	%cv	161.96

12/18/92 16:27

CRI	rep	1	Zn213.8	conc	0.0427 mg/L
	rep	1	Cd214.4	conc	0.0108 mg/L
	rep	1	Ni231.6	conc	0.0540 mg/L
	rep	1	Mn257.6	conc	0.0346 mg/L
	rep	1	Cr267.7	conc	0.0159 mg/L
	rep	1	V292.4	conc	0.0892 mg/L
	rep	1	Be313.0	conc	0.0088 mg/L
	rep	1	Cu324.8	conc	0.0538 mg/L
	rep	1	Ag328.1	conc	0.0183 mg/L
	rep	2	Zn213.8	conc	0.0424 mg/L
	rep	2	Cd214.4	conc	0.0057 mg/L
	rep	2	Ni231.6	conc	0.0534 mg/L
	rep	2	Mn257.6	conc	0.0313 mg/L
	rep	2	Cr267.7	conc	0.0117 mg/L
	rep	2	V292.4	conc	0.0861 mg/L
	rep	2	Be313.0	conc	0.0087 mg/L
	rep	2	Cu324.8	conc	0.0512 mg/L
	rep	2	Ag328.1	conc	0.0202 mg/L
	rep	3	Zn213.8	conc	0.0449 mg/L
	rep	3	Cd214.4	conc	0.0044 mg/L
	rep	3	[illegible]	conc	0.0660 mg/L

rep	3	Mn257.6	conc	0.0334 mg/L
rep	3	Cr267.7	conc	0.0110 mg/L
rep	3	V292.4	conc	0.1015 mg/L
rep	3	Be313.0	conc	0.0089 mg/L
rep	3	Cu324.8	conc	0.0441 mg/L
rep	3	Ag328.1	conc	0.0106 mg/L

CRI
12/18/92 16:28

Zn213.8	av	0.0433 mg/L	sd	0.00139	%cv	3.20	108
Cd214.4	av	0.0069 mg/L	sd	0.00338	%cv	43.69	69
Ni231.6	av	0.0578 mg/L	sd	0.00708	%cv	12.24	72
Mn257.6	av	0.0331 mg/L	sd	0.00164	%cv	4.96	110
Cr267.7	av	0.0129 mg/L	sd	0.00263	%cv	20.44	65
V292.4	av	0.0923 mg/L	sd	0.00317	%cv	6.85	92
Be313.0	av	0.0088 mg/L	sd	0.00012	%cv	1.38	88
Cu324.8	av	0.0497 mg/L	sd	0.00499	%cv	10.05	99
Ag328.1	av	0.0164 mg/L	sd	0.00506	%cv	30.90	82

000049

Coast-to-Coast Analytical Services, Inc.
Northeastern Division (207) 874-2400
CONFIRMATION

ORDER NO W-A51006

Project Manager: Laura J. O'Meara
ORDER DATE: 12/15/92
PHONE: 202/797-6500
FAX: 202/797-6501
DUE: 18 DEC

000050

REPORT TO: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

INVOICE: ABB Environmental Svcs., Inc.
2590 Executive Center Circle East
Tallahassee, FL 32301

PO: SE207668

SAMPLED BY: D. VON BUSHBERGER DELIVERED BY: FED-EX DISPOSE: AFTER 14 JAN

ITEM	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
1	WA51006-1	TM100-01	08 DEC 1200	15 DEC	SO

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
TCLP-Silver	6010	1	450.00	450.00
TCLP*Extraction	1311	1	105.00	105.00
Elements Matrix Spike Sample		1	0.00	0.00
TOTALS		1	555.00	555.00

ORDER NOTE: QCIII INDIAN HEAD

INVOICE: With Report

TOTAL ORDER AMOUNT $555.00
This is NOT an Invoice

JBB/LJO
12-16

Please contact CCAS promptly if you have any questions.

JG 121692

CO AN TICAL SERVICES

141 Suburban Road • San Luis Obispo, CA 93401 • (805) 543-2553 FAX (805) 543-2685
751 S. Kellogg, Suite A • Goleta, CA 93117 • (805) 964-7838 FAX (805) 967-4386
6006 Egret Ct. • Benicia, CA 94510 • (707) 747-2757 FAX (707) 747-2765
2400 Cumberland Dr. • Valparaiso, Indiana 46383 • (219) 464-2389 FAX (219) 462-2953
4765 Calle Quetzal • Camarillo, CA 93012 • (805) 389-1353 FAX (805) 389-1438
340 County Road No. 5 • Westbrook, ME 04092 • (207) 874-2400 FAX (207) 775-4029

• PLEASE PRINT IN PEN

Client: ABB ENVIRONMENTAL SERVICES, INC.
Contact: D. VON BUSHBERGER
Phone #: (202) 797-6530
FAX #: (202) 797-6501
Address: 1400 16th ST. NW
City: WASHINGTON DC
State:
Zip: 20036
Project Name/Number: NOS INDIAN HEAD SITE 5 / 7800-00
Project MGR: F. GODOY
Bill (If different than above):
Address:
Sampler (Print and sign): D. VON BUSHBERGER
Due Date: ASAP
Circle for RUSH*
Copies To:
Auth. Init.

Sample Description	Date/Time Coll'd	*Matrix	# of Containers	Pres.	Filt. y/n	* Subject to Availability Analysis	Remarks	Lab ID #
TM100-01	12/8/92 12:00	S	1	N/A	N	TCLP METALS		

Relinquished By	Date/Time	Received By	Relinquished By	Date/Time	Received By
D von Bushberger	12/10/92 7:05 PM	Jon Bartlett	12-15-92 / 1130		

FOR LAB USE ONLY

Shipping Method	Shipping #	Received By	Date/Time	Condition (See Remarks) Cold	Sealed	Intact

REMARKS

*Matrix:
DW - Drinking Water
WW - Wastewater
GW - Groundwater
SW - Surface Water
IM - Impinger
FI - Filter
FP - Free Product
A/G - Air/Gas
SL - Sludge/Soil/Solid
OT - Other

ORIGINAL

COAST - TO - COAST ANALYTICAL SERVICES

Air, Water & Hazardous Waste Sampling, Analysis & Consultation
Certified Hazardous Waste, Chemistry, Bacteriology & Bioassay Laboratories

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751 S. Kellogg, Suite A	Goleta, CA 93117	(805) 964-7838	Fax (805) 967-4386
6006 Egret Court	Benicia, CA 94510	(707) 747-2757	Fax (707) 747-2765
4765 Calle Quetzal	Camarillo, CA 93010	(805) 389-1353	Fax (805) 389-1438
4570 Campus Drive	Newport Beach, CA 92660	(714) 252-2143	Fax (714) 253-7733
2400 Cumberland Dr.	Valparaiso, IN 46383	(219) 464-2389	Fax (219) 462-2953
340 County Road, No. 5	Westbrook, ME 04098	(207) 874-2400	Fax (207) 775-4029

January 29, 1993

Mr. Franko Godoy
ABB Environmental Services, Inc.
1400 16th Street, N.W., Suite 720
Washingotn, DC 20036

Dear Mr. Godoy:

Please find enclosed the Report of Analysis (ROA) for the samples received by the laboratory on January 25, 1993. This cover letter is an integral part of the ROA.

Sample results are reported on our new Laboratory Information Management System (LIMS) Report of Analysis. Results are presented by sample and by analytical group. The LIMS ROA presents the results for each analytical group on separate pages. PQLs, methods, dilution factors, dates of preparation and analysis as well as any applicable footnotes all appear on the page(s) where the parameter is reported. Analytical data are approved for the reporting by a qualified reviewer by signature on the authorization page.

If you have any questions or comments concerning this Report of Analysis, please do not hesitate to contact me or Geoff Pellechia. We appreciate your continued use of our laboratory for your analytical needs and look forward to working with you in the future.

Sincerely,

Coast-to-Coast Analytical Services, Inc.

D. Elizabeth Harrold

for Laura J. O'Meara, Supervisor
Client Services

LJO/dmt

Enclosure

COAST - TO - COAST ANALYTICAL SERVICES

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(207) 874-2400
Fax (207) 775-4029

Coast-to-Coast Analytical Services, Inc. - Northeast Division (CCAS) has completed analysis of your samples identified by the CCAS order number: WJ0073; sample numbers: 1-13. These samples were analyzed in accordance with the methods noted on the Report of Analysis. Samples and associated QC samples met CCAS internal quality control except as noted on the Report of Analysis. The attached Report of Analysis, which consists of 25 pages, is authorized for release by:

D. Elizabeth Harrold

for Laura J. O'Meara
Client Services Supervisor

COAST - TO - COAST ANALYTICAL SERVICES

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(207) 874-2400
Fax (207) 775-4029

Sample No. : WJ-0073-1
Report Date: 01/29/93
PO No. : SE207668
Project : 7800-00

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
TM100-02	Soil	CLIENT	01/07/93	01/25/93

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
TCLP*Extraction	****	****	1.0	****	1311	01/26/93	MV	1
TCLP-Silver	<0.50	mg/L	1.0	0.50	6010	01/27/93	DN	2

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 01/25/93 by MV using 1311
(2) Sample Preparation on 01/26/93 by JHC using 3010

LJO/edh/ajc/djn

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(207) 874-2400
Fax (207) 775-4029

Sample No. : WJ-0073-2
Report Date: 01/29/93
PO No. : SE207668
Project : 7800-00

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
02SSXX0300XRFF	Soil	CLIENT	12/22/92	01/25/93

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Silver, Total	110	mg/kgdrywt	1.0	1.5	6010	01/27/93	DN	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 01/26/93 by JHC using 3050

LJO/edh/ajc/djn
JA26ICPXSXX2

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(207) 874-2400
Fax (207) 775-4029

Sample No. : WJ-0073-2
Report Date: 01/29/93
PO No. : SE207668
Project : 7800-00

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
02SSXX0300XRFF	Soil	CLIENT	12/22/92	01/25/93

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Solids-Total Residue (TS)	99	wt %	1.0	0.10	CLP/CIP SOW	01/26/93	JF	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 01/25/93 by JF

LJO/edh/ajc/jf
JA25WCXXSXX1

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(207) 874-2400
Fax (207) 775-4029

Sample No. : WJ-0073-3
Report Date: 01/29/93
PO No. : SE207668
Project : 7800-00

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
02SSXX0125XRFF	Soil	CLIENT	12/22/92	01/25/93

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Silver, Total	79	mg/kgdrywt	1.0	1.5	6010	01/27/93	DN	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 01/26/93 by JHC using 3050

LJO/edh/ajc/djn
JA26ICPXSXX2

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(207) 874-2400
Fax (207) 775-4029

Sample No. : WJ-0073-3
Report Date: 01/29/93
PO No. : SE207668
Project : 7800-00

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
02SSXX0125XRFF	Soil	CLIENT	12/22/92	01/25/93

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Solids-Total Residue (TS)	99	wt %	1.0	0.10	CLP/CIP SOW	01/26/93	JF	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 01/25/93 by JF

LJO/edh/ajc/jf
JA25WCXXSXX1

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CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

Sample No. : WJ-0073-4
Report Date: 01/29/93
PO No. : SE207668
Project : 7800-00

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
02SSXX2125XRYF	Soil	CLIENT	12/22/92	01/25/93

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Silver, Total	70	mg/kgdrywt	1.0	1.5	6010	01/27/93	DN	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 01/26/93 by JHC using 3050

LJO/edh/ajc/djn
JA26ICPXSXX2

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Fax (207) 775-4029

Sample No. : WJ-0073-4
Report Date: 01/29/93
PO No. : SE207668
Project : 7800-00

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
02SSXX2125XRYF	Soil	CLIENT	12/22/92	01/25/93

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Solids-Total Residue (TS)	98	wt %	1.0	0.10	CLP/CIP SOW	01/26/93	JF	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 01/25/93 by JF

LJO/edh/ajc/jf
JA25WCXXSXX1

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Fax (207) 775-4029

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

Sample No. : WJ-0073-5
Report Date: 01/29/93
PO No. : SE207668
Project : 7800-00

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
01SSXX0350XAXF	Soil	CLIENT	12/09/92	01/25/93

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Silver, Total	3.7	mg/kgdrywt	1.0	1.5	6010	01/27/93	DN	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 01/26/93 by JHC using 3050

LJO/edh/ajc/djn
JA26ICPXSXX2

COAST - TO - COAST ANALYTICAL SERVICES

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CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

Sample No. : WJ-0073-5
Report Date: 01/29/93
PO No. : SE207668
Project : 7800-00

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
01SSXX0350XAXF	Soil	CLIENT	12/09/92	01/25/93

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Solids-Total Residue (TS)	98	wt %	1.0	0.10	CLP/CIP SOW	01/26/93	JF	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 01/25/93 by JF

LJO/edh/ajc/jf
JA25WCXXSXX1

COAST - TO - COAST ANALYTICAL SERVICES

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Fax (207) 775-4029

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

Sample No. : WJ-0073-6
Report Date: 01/29/93
PO No. : SE207668
Project : 7800-00

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
01SSXX0629XMXF	Soil	CLIENT	01/07/93	01/25/93

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Silver, Total	9.5	mg/kgdrywt	1.0	1.5	6010	01/27/93	DN	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 01/26/93 by JHC using 3050

LJO/edh/ajc/djn
JA26ICPXSXX2

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(207) 874-2400
Fax (207) 775-4029

Sample No. : WJ-0073-6
Report Date: 01/29/93
PO No. : SE207668
Project : 7800-00

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
01SSXX0629XMXF	Soil	CLIENT	01/07/93	01/25/93

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Solids-Total Residue (TS)	100	wt %	1.0	0.10	CLP/CIP SOW	01/26/93	JF	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 01/25/93 by JF

LJO/edh/ajc/jf
JA25WCXXSXX1

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(207) 874-2400
Fax (207) 775-4029

Sample No. : WJ-0073-7
Report Date: 01/29/93
PO No. : SE207668
Project : 7800-00

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
01SSXX0400XAXF	Soil	CLIENT	12/22/92	01/25/93

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Silver, Total	5.6	mg/kgdrywt	1.0	1.5	6010	01/27/93	DN	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 01/26/93 by JHC using 3050

LJO/edh/ajc/djn
JA26ICPXSXX2

COAST - TO - COAST ANALYTICAL SERVICES

Air, Water & Hazardous Waste Sampling, Analysis & Consultation
Certified Hazardous Waste, Chemistry, Bacteriology & Bioassay Laboratories

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CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

Sample No. : WJ-0073-7
Report Date: 01/29/93
PO No. : SE207668
Project : 7800-00

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
01SSXX0400XAXF	Soil	CLIENT	12/22/92	01/25/93

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Solids-Total Residue (TS)	99	wt %	1.0	0.10	CLP/CIP SOW	01/26/93	JF	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 01/25/93 by JF

LJO/edh/ajc/jf
JA25WCXXSXX1

COAST - TO - COAST ANALYTICAL SERVICES

Air, Water & Hazardous Waste Sampling, Analysis & Consultation
Certified Hazardous Waste, Chemistry, Bacteriology & Bioassay Laboratories

San Luis Obispo, CA • Goleta, CA • Benicia, CA • Camarillo, CA
Newport Beach, CA • Valparaiso, IN • Westbrook, ME

Northeastern Division
340 County Road, No. 5 • P.O. Box 720 • Westbrook, ME 04098

(207) 874-2400
Fax (207) 775-4029

Sample No. : WJ-0073-8
Report Date: 01/29/93
PO No. : SE207668
Project : 7800-00

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
02SSXX0X75XRYF	Soil	CLIENT	12/22/92	01/25/93

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Silver, Total	78	mg/kgdrywt	1.0	1.5	6010	01/27/93	DN	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 01/26/93 by JHC using 3050

LJO/edh/ajc/djn
JA26ICPXSXX2

COAST - TO - COAST ANALYTICAL SERVICES

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(207) 874-2400
Fax (207) 775-4029

Sample No. : WJ-0073-8
Report Date: 01/29/93
PO No. : SE207668
Project : 7800-00

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
02SSXX0X75XRYF	Soil	CLIENT	12/22/92	01/25/93

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Solids-Total Residue (TS)	98	wt %	1.0	0.10	CLP/CIP SOW	01/26/93	JF	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 01/25/93 by JF

LJO/edh/ajc/jf
JA25WCXXSXX1

COAST - TO - COAST ANALYTICAL SERVICES

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(207) 874-2400
Fax (207) 775-4029

Sample No. : WJ-0073-9
Report Date: 01/29/93
PO No. : SE207668
Project : 7800-00

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
02SSXX0X75XLYF	Soil	CLIENT	12/22/92	01/25/93

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Silver, Total	110	mg/kgdrywt	1.0	1.5	6010	01/27/93	DN	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 01/26/93 by JHC using 3050

LJO/edh/ajc/djn
JA26ICPXSXX2

COAST - TO - COAST ANALYTICAL SERVICES

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(207) 874-2400
Fax (207) 775-4029

Sample No. : WJ-0073-9
Report Date: 01/29/93
PO No. : SE207668
Project : 7800-00

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
02SSXX0X75XLYF	Soil	CLIENT	12/22/92	01/25/93

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Solids-Total Residue (TS)	99	wt %	1.0	0.10	CLP/CIP SOW	01/26/93	JF	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 01/25/93 by JF

LJO/edh/ajc/jf
JA25WCXXSXX1

COAST - TO - COAST ANALYTICAL SERVICES

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(207) 874-2400
Fax (207) 775-4029

Sample No. : WJ-0073-10
Report Date: 01/29/93
PO No. : SE207668
Project : 7800-00

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
01SSXX1629XBXF	Soil	CLIENT	01/11/93	01/25/93

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Silver, Total	<1.5	mg/kgdrywt	1.0	1.5	6010	01/27/93	DN	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 01/26/93 by JHC using 3050

LJO/edh/ajc/djn
JA26ICPXSXX2

COAST - TO - COAST ANALYTICAL SERVICES

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(207) 874-2400
Fax (207) 775-4029

Sample No. : WJ-0073-10
Report Date: 01/29/93
PO No. : SE207668
Project : 7800-00

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
01SSXX1629XBXF	Soil	CLIENT	01/11/93	01/25/93

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Solids-Total Residue (TS)	99	wt %	1.0	0.10	CLP/CIP SOW	01/26/93	JF	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 01/25/93 by JF

LJO/edh/ajc/jf
JA25WCXXSXX1

COAST - TO - COAST ANALYTICAL SERVICES

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(207) 874-2400
Fax (207) 775-4029

Sample No. : WJ-0073-11
Report Date: 01/29/93
PO No. : SE207668
Project : 7800-00

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
01SSXX1450XBXF	Soil	CLIENT	01/11/93	01/25/93

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Silver, Total	34	mg/kgdrywt	1.0	1.5	6010	01/27/93	DN	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 01/26/93 by JHC using 3050

LJO/edh/ajc/djn
JA26ICPXSXX2

COAST - TO - COAST ANALYTICAL SERVICES

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Northeastern Division
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Fax (207) 775-4029

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

Sample No. : WJ-0073-11
Report Date: 01/29/93
PO No. : SE207668
Project : 7800-00

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
01SSXX1450XBXF	Soil	CLIENT	01/11/93	01/25/93

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Solids-Total Residue (TS)	99	wt %	1.0	0.10	CLP/CIP SOW	01/26/93	JF	1

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(1) Sample Preparation on 01/25/93 by JF

LJO/edh/ajc/jf
JA25WCXXSXX1

COAST - TO - COAST ANALYTICAL SERVICES

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Fax (207) 775-4029

Sample No. : WJ-0073-12
Report Date: 01/29/93
PO No. : SE207668
Project : 7800-00

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
01SSXX0450XCXF	Soil	CLIENT	01/11/93	01/25/93

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Silver, Total	5.4	mg/kgdrywt	1.0	1.5	6010	01/27/93	DN	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 01/26/93 by JHC using 3050

LJO/edh/ajc
JA26ICPXSXX2

COAST - TO - COAST ANALYTICAL SERVICES

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(207) 874-2400
Fax (207) 775-4029

Sample No. : WJ-0073-12
Report Date: 01/29/93
PO No. : SE207668
Project : 7800-00

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
01SSXX0450XCXF	Soil	CLIENT	01/11/93	01/25/93

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Solids-Total Residue (TS)	99	wt %	1.0	0.10	CLP/CIP SOW	01/26/93	JF	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 01/25/93 by JF

LJO/edh/ajc/jf
JA25WCXXSXX1

COAST - TO - COAST ANALYTICAL SERVICES

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Northeastern Division
340 County Road, No. 5 • P.O. Box 720 • Westbrook, ME 04098

(207) 874-2400
Fax (207) 775-4029

Sample No. : WJ-0073-13
Report Date: 01/29/93
PO No. : SE207668
Project : 7800-00

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
01SSXX0679XMXF	Soil	CLIENT	01/07/93	01/25/93

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Silver, Total	<1.5	mg/kgdrywt	1.0	1.5	6010	01/27/93	DN	1

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(1) Sample Preparation on 01/26/93 by JHC using 3050

LJO/edh/ajc/djn
JA26ICPXSXX2

COAST - TO - COAST ANALYTICAL SERVICES

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(207) 874-2400
Fax (207) 775-4029

Sample No. : WJ-0073-13
Report Date: 01/29/93
PO No. : SE207668
Project : 7800-00

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
01SSXX0679XMXF	Soil	CLIENT	01/07/93	01/25/93

PARAMETER	RESULT	UNITS	DF	PQL*	METHOD	ANALYZED	BY	NOTES
Solids-Total Residue (TS)	99	wt %	1.0	0.10	CLP/CIP SOW	01/26/93	JF	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

(1) Sample Preparation on 01/25/93 by JF

LJO/edh/ajc/jf
JA25WCXXSXX1

Coast-to-Coast Analytical Services, Inc.
Northeastern Division (207) 874-2400
CONFIRMATION

ORDER NO WJ-0073

Project Manager: Laura J. O'Meara
ORDER DATE: 01/25/93
PHONE: 202/797-6500
FAX: 202/797-6501
DUE: 14 FEB

REPORT TO: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

INVOICE: ABB Environmental Svcs., Inc.
2590 Executive Center Circle East
Tallahassee, FL 32301

PO: SE207668

PROJECT: 7800-00

SAMPLED BY: CLIENT   DELIVERED BY: FED-EX   DISPOSE: AFTER 24 FEB

ITEM	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
1	WJ0073-1	TM100-02	07 JAN 1045	25 JAN	SO

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
TCLP*Extraction	1311	1	105.00	105.00
Elements Matrix Spike Sample		1	0.00	0.00
TCLP-Silver	6010	1	450.00	450.00
TOTALS		1	555.00	555.00

	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
2	WJ0073-2	02SSXX0300XRFF	22 DEC	25 JAN	SO

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Silver, Total	6010	1	20.00	20.00
Elements Sample Preparation		1	23.00	23.00
Solids-Total Residue (TS)	CLP/CIP SO	1	0.00	0.00
Elements Matrix Spike Sample		1	43.00	43.00
Elements MS Duplicate Sample		1	43.00	43.00
TOTALS		1	129.00	129.00

LABORATORY ORDER CONTINUED ON PAGE 2

SJC 012793

Coast-to-Coast Analytical Services, Inc.
Northeastern Division (207) 874-2400
CONFIRMATION

ORDER NO WJ-0073

Project Manager: Laura J. O'Meara
ORDER DATE: 01/25/93
PHONE: 202/797-6500
FAX: 202/797-6501
DUE: 14 FEB

REPORT TO: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

INVOICE: ABB Environmental Svcs., Inc.
2590 Executive Center Circle East
Tallahassee, FL 32301

PO: SE207668

PROJECT: 7800-00

SAMPLED BY: CLIENT DELIVERED BY: FED-EX DISPOSE: AFTER 24 FEB

	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
3	WJ0073-3	02SSXX0125XRFF	22 DEC	25 JAN	SO
	WJ0073-4	02SSXX2125XRYF	22 DEC		
	WJ0073-5	01SSXX0350XAXF	09 DEC		
	WJ0073-6	01SSXX0629XMXF	07 JAN		
	WJ0073-7	01SSXX0400XAXF	22 DEC		
	WJ0073-8	02SSXX0X75XRYF	22 DEC		
	WJ0073-9	02SSXX0X75XLYF	22 DEC		
	WJ0073-10	01SSXX1629XBXF	11 JAN		
	WJ0073-11	01SSXX1450XBXF	11 JAN		
	WJ0073-12	01SSXX0450XCXF	11 JAN		
	WJ0073-13	01SSXX0679XMXF	07 JAN		

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Silver, Total	6010	11	20.00	220.00
Elements Sample Preparation		11	23.00	253.00
Solids-Total Residue (TS)	CLP/CIP SO	11	0.00	0.00
TOTALS		11	43.00	473.00

ORDER NOTE: QC-III/INDIAN HEAD/$

INVOICE: With Report

TOTAL ORDER AMOUNT $1,157.00
This is NOT an Invoice

JBL/LJO
01-28

Please contact CCAS promptly if you have any questions.

Log-in Summary

ABB-ES Site Name: NOS Indian Head   ABB-ES Contract Number: PROJ. 7800-00 SE207668

Date Samples Received: 1-25-93   Number of Coolers: 1

Air Bill Number: 5732976384

Condition of Containers: Good

Custody Seals (circle): YES / NO   Custody Seals Broken (circle): YES / NO

Temperature of Cooler: ICE MELTED °C

(Temperature taken from the 125 ml vial provided by ABB-ES)
(ABB-ES shall be notified if the temperature exceeds 4°C)

pH of all non VOC samples N/A pH units.

All Bottles Labelled (circle): YES / NO

COMMENTS:

NO MS/MSD SAMPLE SPECIFIED

All Bottles agree with ARF and COC (circle): YES / NO

COMMENTS:

OVERALL COMMENTS:

CHAIN OF CUSTODY RECORD

PROJECT NO. 7800-00

PROJECT NAME NOS/I.H. Ag CONTAMINATION

SAMPLERS (SIGNATURE) [signature]

	STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	ICP-Ag (TOTAL)	TCLP-Ag	REMARKS INDICATE SOIL/WATER/AIR SEDIMENT/SLUDGE
2		12/22/92	N/A		✓	02SSXX0300XRFF	1	✓		TOTAL SILVER
3		12/22/92	N/A		✓	02SSXX0125XRFF	1	✓		"
4		12/22/92	N/A		✓	02SSXX2125XRYF	1	✓		"
5		12/9/92	N/A		✓	01SSXX0350XAXF	1	✓		"
6		1/7/93	N/A		✓	01SSXX0629XMXF	1	✓		"
7		12/22/92	N/A		✓	01SSXX0400XAXF	1	✓		"
8		12/22/92	N/A		✓	02SSXX0X75XRYF	1	✓		"
9		12/22/92	N/A		✓	02SSXX0X75XLYF	1	✓		"
10		1/11/93	N/A		✓	01SSXX1629XBXF	1	✓		"
11		1/11/93	N/A		✓	01SSXX1450XBXF	1	✓		"
12		1/11/93	N/A		✓	01SSXX0450XCXF	1	✓		"
13		1/7/93	N/A		✓	01SSXX0679XMXF	1	✓		"
1		1/7/93	10:45		✓	TM100-02	1		✓	TCLP SILVER

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
[signature]	1/21/93 19:00	[signature]	1/25/93 9:30		

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED FOR DISPOSAL BY: (SIGNATURE)	DATE/TIME	REMARKS

OH-62

ABB Environmental Services, Inc.

Client: ABB Environmental Services - Indian Head, Work Order: WJ0073

ANALYSIS AND QUALITY CONTROL DOCUMENTATION

Prepared By:

COAST-TO-COAST ANALYTICAL SERVICES, INC.
NORTHEASTERN DIVISION

29-Jan-93

Reviewed and Approved by: Andrea Colby
Laboratory Quality Assurance

000001

Coast-To-Coast Analytical Services, Inc.
Northeastern Division
Quality Control Report

LEVEL III REPORT

Level III documentation consists of the following components for specific types of analyses:

Section		Type of Documentation
INORGANIC ANALYSES FOR METALS		
	o	METHODS AND CHRONOLOGY OF ANALYSIS
	o	METHOD BLANK AND LABORATORY CONTROL SAMPLE RESULTS
	o	DUPLICATE AND MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS
	o	SUMMARY REPORT
	o	RAW DATA
INORGANIC ANALYSES FOR NON-METALS		
	o	METHODS AND CHRONOLOGY OF ANALYSIS
	o	METHOD BLANK AND LABORATORY CONTROL SAMPLE RESULTS
	o	DUPLICATE AND MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS
	o	SUMMARY REPORT
	o	RAW DATA
CHAIN OF CUSTODY		
	o	CONFIRMATION
	o	CHAIN OF CUSTODY RECORDS
	o	CORRESPONDENCE

Coast-To-Coast Analytical Services, Inc.
Northeastern Division
Quality Control Report

Methods and Chronology of Analysis

METHODS OF ANALYSIS			*CHRONOLOGY OF ANALYSES*				
Parameter	Method No.	Description	CCAS Sample Nos.	Date Sample Received	Date of Sample Chemical Preparation	Date of Instrument Analysis	Dilution Factor *
Silver	6010	Atomic Emission, Inductively Coupled Plasma	WJ0073-2	25-Jan-93	26-Jan-93	27-Jan-93	1.0
			WJ0073-3	25-Jan-93	26-Jan-93	27-Jan-93	1.0
			WJ0073-4	25-Jan-93	26-Jan-93	27-Jan-93	1.0
			WJ0073-5	25-Jan-93	26-Jan-93	27-Jan-93	1.0
			WJ0073-6	25-Jan-93	26-Jan-93	27-Jan-93	1.0
			WJ0073-7	25-Jan-93	26-Jan-93	27-Jan-93	1.0
			WJ0073-8	25-Jan-93	26-Jan-93	27-Jan-93	1.0
			WJ0073-9	25-Jan-93	26-Jan-93	27-Jan-93	1.0
			WJ0073-10	25-Jan-93	26-Jan-93	27-Jan-93	1.0
			WJ0073-11	25-Jan-93	26-Jan-93	27-Jan-93	1.0
			WJ0073-12	25-Jan-93	26-Jan-93	27-Jan-93	1.0
			WJ0073-13	25-Jan-93	26-Jan-93	27-Jan-93	1.0
TCLP Extraction	1311	Toxicity Characteristic Leaching Procedure	WJ0073-1	25-Jan-93	#25-Jan-93		
Silver, TCLP	6010	Atomic Emission, Inductively Coupled Plasma	WJ0073-1	25-Jan-93	26-Jan-93	27-Jan-93	1.0

Notes:
Unless otherwise indicated, analytical methods are from (1) "Methods of Chemical Analysis of Water and Wastes," EPA-600/4-79-020, Revised March, 1983, or (2) "Test Methods for Evaluating Solid Wastes," EPA SW-846, Revised November, 1986.

*The Dilution Factor (DF) indicates whether a sample, prepared in accordance with the analytical method protocol, was diluted prior to analysis. The Dilution Factor could also indicate that a smaller aliquot than specified in the method was utilized for sample preparation and analysis. For example, a dilution factor of 5 means that the sample was effectively diluted by a factor of 5 prior to analysis, i.e., the sample was analyzed at 20% its reported concentration.

For TCLP Extraction, "Date of Sample Chemical Preparation" is the date on which the TCLP extraction was begun. For other parameters, "Date of Sample Chemical Preparation" is the date on which the TCLP extract was subjected to acid digestion.

Coast-To-Coast Analytical Services, Inc.
Northeastern Division
Quality Control Report

Method Blank and Laboratory Control Sample Results

	METHOD BLANK RESULTS						LABORATORY CONTROL SAMPLE RESULTS						
Parameter	Date of Prep	Date of Analysis	Units	Concentration Measured in Blank	Acceptance Range	Practical Quantitation Level*	Units	True Value	Measured Value	Percent Recovered	Acceptance Range (%)	Acceptance Range (mg/kg)	
Silver	26-Jan-93	27-Jan-93	mg/L	< 0.015	< 0.015	0.015	mg/kg	109	104	95.4		94.5-123	@
	26-Jan-93	27-Jan-93	mg/L	< 0.015	< 0.015	0.015	mg/L	1.25	1.29	103	80-120		
&	26-Jan-93	27-Jan-93	mg/L	< 0.015	< 0.015	0.015							

* Practical quantitation level is the lowest concentration measurable for samples with normal chemical and physical composition during routine laboratory operations.

DATA QUALITY COMMENTS:
Results of all quality control measurements are within the laboratory and method specified acceptance range except as noted.

@ The laboratory uses the statistical mean and 99% confidence range, respectively, as the true value and acceptance range for this commercially available solid reference material (trace metals in soil). Reference values are not available for boron or mercury.

& Indicates the TCLP extraction blank extracted concurrently with Sample No. WJ0073-1.

Coast-To-Coast Analytical Services, Inc.
Northeastern Division
Quality Control Report

Duplicate and Matrix Spike/Matrix Spike Duplicate Results

Parameter	CCAS Sample No.	*DUPLICATE RESULTS* Units	Sample Measurement Rep 1	Sample Measurement Rep 2	Mean Conc	RPD (%)	Acceptance Range for RPD (%)	*MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS* Concentration or Quantity: Units	Sample Only	Spike Added	Sample +Spike Dup 1	Sample +Spike Dup 2	Matrix Spike Recovery (%): Sample +Spike Dup 1	Sample +Spike Dup 2	Acceptance Range (%)	RPD (%)	Acceptance Range (%)
Silver	WJ0073-2							ug	127	10.0	124	NA	~0.0	NA	70-130	NA	0-30
	WJ0073-2							ug	115	10.0	NA	156	NA	~411	70-130	200 &	0-30
	WJ0073-1	mg/L	<0.075	<0.075	<0.075	NC	0-30	mg/L	<0.075	0.050	0.044	NA	88.0	NA	80-120	NA	0-30
	WJ0073-1							mg/L	<0.075	5.00	2.93	NA	58.6	NA	$	NA	0-30

RPD = Relative percent difference, which is the absolute value of the difference between two duplicate results divided by the mean concentration then multiplied by 100%.

NA = Not applicable.

NC = Relative percent difference cannot be calculated for sample results less than the PQL.

Because of the large uncertainty (i.e., 33% or greater) associated with measurements made near the detection level, the acceptance range for relative percent difference for duplicate measurements at such low concentrations is 0-100%.

DATA QUALITY COMMENTS:
Results of all quality control measurements are within the laboratory or contract specified acceptance range except as noted.

~ Matrix spike recovery is outside the laboratory specified acceptance range. The spike concentration for this parameter is significantly below the sample concentration and cannot be distinguished from the sample's analytical signal.

& Precision of replicate analysis as measured by RPD is outside the laboratory's acceptance range for this parameter. Sample homogeneity may be a factor.

$ Indicates a TCLP matrix spike, performed in accordance with Method 1311. The purpose of this spike is to monitor the performance of the analytical methods used, and to determine whether matrix interferences exist. The EPA has not established acceptance criteria for TCLP matrix spike recoveries.

Client: ABB Environmental Services - Indian Head, Work Order: WJ0073 26-Jan-93

000006

Coast-To-Coast Analytical Services, Inc.
Northeastern Division
Quality Control Report

Summary Report

Inorganic Laboratory Summary Report

All sample analyses for elements referenced by this Quality Control Report were routine and were conducted in accordance with appropriate analytical protocols and laboratory standard operating procedures except as noted.

CCAS Sample No.: WJ0073-2

Parameter: Silver

Description of Problem/Summary of Laboratory Actions: Recoveries for both silver matrix spikes of this sample are outside the laboratory's quality control acceptance criteria. In each case, the amount of silver contributed by the sample itself is significantly greater than the spike quantity, and the spike's analytical signal cannot accurately be distinguished from that of the sample.

COAST-TO-COAST ANALYTICAL SERVICES, INC. - ELEMENTS SECTION
TCLP EXTRACTION LOG

ABB SAMPLE NUMBER	WJ0073-1	TCLP BLANK		000001
CLIENT NAME	ABB-DC	NA		
MATRIX	Soil	NA		

TOTAL SOLIDS DETERMINATION (ALL WEIGHTS IN GRAMS)

A) Weight of Empty Filtrate Vessel	NA	NA		
B) Weight of Weigh Boat				
C) Weight of Weigh Boat + Waste				
D) Weight of Weigh Boat + Residue				
E) Total Weight of Waste (C-D)				
F) Weight of Filtrate Vessel + Filtrate				
G) Weight of Liquid Phase (F-A)				
H) Weight of Solid Phase (E-G)				
I) Percent Solid (H/E x 100)				
J) Weight of Solid Phase Removed for pH Determination				
K) Remaining Solid Phase (H-J)				

pH DETERMINATION AND PARTICLE SIZE EVALUATION

L) Initial pH	~~9.2~~ 1-25-93 7.	NA		
M) pH After Addition of 3.5 mL 1 N HCl	7			
N) Particle Size Reduction Required (Yes/No)?	NO			

EXTRACTION CONDITIONS

O) Weight of Solid Extracted (If Different from "K" Above)	100.00g	NA		
P) Extraction Fluid Used (#1/#2)	#2	#2		
Q) Volume of Extraction Fluid Used (mL)	2,000 mL	2000 ml		
R) Extraction Started (Date and Time)	01-25-93 1430h	01-25-93 1430h		
S) Extraction Completed (Date and Time)	01-26-93 0830h	1-26-93 0830H		
T) Elapsed Extraction Time (Hours:Minutes)	18:00	18:00		
U) pH of Extract After Extraction	7.0	~~4~~ MU 1-26-93 2.9		
V) Extract Filtered and Preserved (Date)	1-26-93	1-26-93		
W) S/N of Associated Spiked Sample	WJ0073-1	~~NA~~ 01-26-93 NA		

Analyst: [signature] Date: 012593 Reviewer: ______ Date: ______

TEMPLATE: FORMS\DATA\TCLPLOG.WK1

PROJECT JA 26 - L/S

Notebook No. 14

Continued From Page

~~# Sample~~	Dig Type	Init Vol. or Wet Wt (g)	Final Vol	Client
PBSH	HCl	~~.2~~	100	QC
LCSS H		~~0.25~~ 0.2750g		QC
WJ0073 -2		1.04		[redacted]
-3		1.02		
-4		1-26-93 ~~1.15~~ 1.28		
-5		1.21		
-6		1.03		
-7		1.07		
-8		1.03		
-9		1.01		
-10		1.01		
-11		1.00		
-12		1.09		
-13		1.06		
-2 MS		1.14		
-2 MSD		~~1.11~~ 1.03		
WJ00~~44~~ 53 -1		1.09		[redacted]
PBW		100 mL		QC
LCSW				QC
WJ0073 -1 (1/25/93)				[redacted]
~~QC012693 1+3~~				
-1 SPK				
-1 DupSPK				
-1 TCLP SPK		100 ~~g~~ mL		
		0.3148g		
PBSN	HNO_3	.2 "		QC
LCSS N		~~.20~~ .3148		QC
WJ0053 -1		1.16		[redacted]
-1 Dup		1.00		
-1 SPK		1.03		

LCSS of HNO3 cut 25mL HCl by accident MV 1-26-93

Continued on Page 57

Signed	Date	Read and Understood By Signed	Date
[signature]	1-26-93	[signature]	1/27/93

PROJECT JA26 - L/S

Continued From Page 56

000009

wt of boat + LCS = 2.6750
wt of empty boat = 2.4000
wt of LCS = 0.2750

CLPP-CICV-1	112-S	1.0 mL
CLPP-SPK-1	82-S	0.2 mL
CLPF-PSPK-1	128-S	0.2 mL

HCl	F26050
H_2O_2	F30829
HNO_3	F41046

MDV 1-26-93

Continued on Page —

Read and Understood By

Michael D. V[illegible] 1-26-93 [illegible] 1/27/93

Signed Date Signed Date

Rn 1-27-93

A26-L PBW, LCSW, TCLP BL 2
↓ A8B-DC WJCC73-1 TCLP dys, TCLP sx
A26-S PBS, LCSS
↓ A8B-DC WJCC73-2, MS, MSD, 3-13

Ag 000010

[illegible] 1-27-93

[illegible] 27 93 [illegible]
[illegible] rep 1 Ag328.1 em 20[illegible] conc 2.5000
rep 2 Ag328.1 em 2[illegible]07[illegible] conc 2.5000
rep 3 Ag328.1 em 20[illegible]97 [illegible] conc 2.5000
[illegible]
[illegible]/27/93 [illegible]
Ag328.1 av 20834.[illegible] sd 251 05 %cv [illegible] conc 2.5000

01/27/93 09:10
Blank rep 1 Ag328.1 em 53.7
rep 2 Ag328.1 em 5[illegible].7
rep 3 Ag328.1 em -7.8 window edge
blank
01/27/93 09:10
Ag328.1 av 33.85 sd 35.035 %cv 100.0

01/27/93 09:11
Blank rep 1 Ag328.1 em 9.3 window edge
rep 2 Ag328.1 em 60.6
rep 3 Ag328.1 em 56.4
blank
01/27/93 09:12
Ag328.1 av 42.17 sd 36.115 %cv 85.64

01/27/93 09:13
std rep 1 Ag328.1 em 21027.4 conc 2.5000
rep 2 Ag328.1 em 21033.2 conc 2.5000
rep 3 Ag328.1 em 21383.1 conc 2.5000
std
01/27/93 09:13
Ag328.1 av 21147.916 sd 203.69484 %cv 0.96 conc 2.5000

01/27/93 09:15
ICV rep 1 Ag328.1 conc 1.2593 mg/L
rep 2 Ag328.1 conc 1.2729 mg/L
rep 3 Ag328.1 conc 1.2837 mg/L
ICV
01/27/93 09:15
Ag328.1 av 1.2753 mg/L sd 0.00731 %cv 0.59 102

01/27/93 09:16
ICB rep 1 Ag328.1 conc 0.0038 mg/L
rep 2 Ag328.1 conc 0.0045 mg/L
rep 3 Ag328.1 conc -0.0014 mg/L
ICB
[illegible] 27 93 [illegible]

000011

[illegible]

Ag328 [illegible] 0.9814 mg/L [illegible] 98%

01/27/93 09:[illegible]
[illegible] rep 1 Ag328 conc [illegible] mg/L
rep 2 Ag328 1 conc 0.0085 mg/L
rep 3 Ag328 1 conc 0.0071 mg/L
[illegible]
01/27/93 09:22
Ag328 av 0.0057 mg/L sd 0.00554 %cv 97.[illegible]

01/27/93 09:23
CS1 rep 1 Ag328 conc 0.0248 mg/L
rep 2 Ag328 1 conc 0.0105 mg/L
rep 3 Ag328 1 conc 0.0195 mg/L
CS1
01/27/93 09:24
Ag328 1 av 0.0181 mg/L sd 0.00676 %cv 37.40 91%

01/27/93 09:25
A20 PBW rep 1 Ag328 1 conc 0.0035 mg/L
rep 2 Ag328 1 conc 0.0013 mg/L
rep 3 Ag328 1 conc 0.0124 mg/L
A20 PBW
01/27/93 09:25
Ag328 1 av 0.0057 mg/L sd 0.00588 %cv 102.45 <

01/27/93 09:27
A20 LCSW rep 1 Ag328 1 conc 1.2835 mg/L
rep 2 Ag328 1 conc 1.2901 mg/L
rep 3 Ag328 1 conc 1.2875 mg/L
A20 LCSW
01/27/93 09:27
Ag328 1 av 1.2871 mg/L sd 0.00334 %cv 0.26

01/27/93 09:29
A20 TCLP BL rep 1 Ag328 1 conc 0.0027 mg/L
rep 2 Ag328 1 conc -0.0009 mg/L window edge
rep 3 Ag328 1 conc -0.0008 mg/L
A20 TCLP BL
01/27/93 09:29
Ag328 1 av 0.0003 mg/L sd 0.00205 %cv 511.23 <

01/27/93 09:30
[illegible]073-1T/5 rep 1 Ag328 1 conc 0.0058 mg/L
rep 2 Ag328 1 conc -0.0023 mg/L
rep 3 Ag328 1 conc 0.0018 mg/L
[illegible]073-1T/5
01/27/93 09:3[illegible]
Ag328 1 av 0.0018 mg/L sd 0.00410 %cv 232.51 <0.075

[illegible]

<0.075

000012

[illegible]

CCV
01/27/93 09:33
Ag328.1 av [illegible] mg/L sd 0.00698 %cv 0.36 100%

01/27/93 09:35
CCB rep 1 Ag328.1 conc 0.0046 mg/L
rep 2 Ag328.1 conc 0.0034 mg/L
rep 3 Ag328.1 conc 0.0045 mg/L
CCB
01/27/93 09:36
Ag328.1 av 0.0049 mg/L sd 0.00043 %cv 8.74

01/27/93 09:39
WJ0073-1TS/5 rep 1 Ag328.1 conc 0.5846 mg/L
rep 2 Ag328.1 conc 0.5909 mg/L
rep 3 Ag328.1 conc 0.5815 mg/L
WJ0073-1TS/5
01/27/93 09:40
Ag328.1 av 0.5857 mg/L sd 0.00474 %cv 0.81 x5 = 2.93

01/27/93 09:41
A26 PBS rep 1 Ag328.1 conc 0.0059 mg/L
rep 2 Ag328.1 conc 0.0029 mg/L
rep 3 Ag328.1 conc 0.0022 mg/L
A26 PBS
01/27/93 09:42
Ag328.1 av 0.0037 mg/L sd 0.00199 %cv 54.04

01/27/93 09:43
A26 LCSS rep 1 Ag328.1 conc 0.2842 mg/L
rep 2 Ag328.1 conc 0.2845 mg/L
rep 3 Ag328.1 conc 0.2864 mg/L
A26 LCSS
01/27/93 09:44
Ag328.1 av 0.2850 mg/L sd 0.00121 %cv 0.43

01/27/93 09:45
WJ0073-2 rep 1 Ag328.1 conc 1.1634 mg/L
rep 2 Ag328.1 conc 1.1646 mg/L
rep 3 Ag328.1 conc 1.1655 mg/L
WJ0073-2
01/27/93 09:46
Ag328.1 av 1.1645 mg/L sd 0.00100 [illegible]

01/27/93 09:47
[illegible]

```
                    rep   2  Ag328 1    conc    1.2594 mg/L
                    rep   3  Ag328 1    conc    1.2545 mg/L

   Ag328 1    av    1.2715 mg/L       sd    0.01748 %cv    1.57 102%

   27 93 10:01
             rep   1  Ag328 1    conc    0.0013 mg/L
             rep   2  Ag328 1    conc    0.0018 mg/L
             rep   3  Ag328 1    conc    0.0061 mg/L

   27 93 10:01
   Ag328 1    av    0.0030 mg/L       sd    0.00271 %cv   89.57 <

   27 93 10:03
             rep   1  Ag328        conc    0.0528 mg/L
             rep   2  Ag328 1    conc    0.0530 mg/L
             rep   3  Ag328        conc    0.0523 mg/L
```

```
01/27/93 10:09
WJ0073-10      rep  1  Ag328        conc   0.0064 mg/L
               rep  2  Ag328.1      conc  -0.0005 mg/L
               rep  3  Ag328.1      conc   0.0046 mg/L
WJ0073-10
01/27/93 10:09
    Ag328.1    av    0.0035 mg/L         sd   0.0034[illegible] %cv  [illegible]
01/27/93 10:11
WJ0073-11      rep  1  Ag328.1      conc   0.3286 mg/L
               rep  2  Ag328.1      conc   0.3562 mg/L
               rep  3  Ag328.1      conc   0.3367 mg/L
WJ0073-11
01/27/93 10:11
    Ag328.1    av    0.3405 mg/L         sd   0.01454 %cv   4.27

01/27/93 10:13
WJ0073-12      rep  1  Ag328.1      conc   0.0559 mg/L
               rep  2  Ag328.1      conc   0.0556 mg/L
               rep  3  Ag328.1      conc   0.0608 mg/L
WJ0073-12
01/27/93 10:13
    Ag328.1    av    0.0575 mg/L         sd   0.00264 %cv   4.56

01/27/93 10:15
WJ0073-13      rep  1  Ag328.1      conc   0.0151 mg/L
               rep  2  Ag328.1      conc   0.0115 mg/L
               rep  3  Ag328.1      conc   0.0157 mg/L
WJ0073-13
01/27/93 10:15
    Ag328.1    av    0.0141 mg/L         sd   0.00225 %cv  15.98

01/27/93 10:17
CCV            rep  1  Ag328.1      conc   1.2582 mg/L
               rep  2  Ag328.1      conc   1.2895 mg/L
               rep  3  Ag328.1      conc   1.2847 mg/L
CCV
01/27/93 10:17
    Ag328.1    av    1.2775 mg/L         sd   0.01687 %cv   1.32  102%

01/27/93 10:19
CCB            rep  1  Ag328.1      conc   0.0020 mg/L
               rep  2  Ag328.1      conc   0.0036 mg/L
               rep  3  Ag328        conc   0.0012 mg/L
CCB
```

000015

99%

01/27/98 10:34
Drill away	rep	1	Ag328.1	conc	[illegible] mg/L	window edge
rep	2	Ag328.1	conc	0.0[illegible] mg/L
rep	3	Ag328.1	conc	0.0[illegible] mg/L

Drill away
01/27/98 10:34
Ag328 | av | 0.00[illegible] mg/L | sd | 0.00[illegible] [illegible]

01/27/98 10:35
CB1	rep	1	Ag328.1	conc	0.0[illegible] mg/L
rep	2	Ag328.1	conc	0.0[illegible] mg/L
rep	3	Ag328.1	conc	0.0[illegible] mg/L

CB1
01/27/98 10:35
Ag328 | av | 0.0[illegible] mg/L | sd | 0.00[illegible] [illegible] 98%

Coast-To-Coast Analytical Services, Inc.
Northeastern Division
Quality Control Report

Methods and Chronology of Analysis

METHODS OF ANALYSIS			*CHRONOLOGY OF ANALYSES*				
Parameter	Method No.	Description	CCAS Sample Nos.	Date Sample Received	Date of Sample Chemical Preparation	Date of Instrument Analysis	Dilution Factor *
TS -Total Residue	CLP-CIP	Gravimetric, 103-105C	WJ0073-2	25-Jan-93	25-Jan-93	26-Jan-93	1.0
			WJ0073-3	25-Jan-93	25-Jan-93	26-Jan-93	1.0
			WJ0073-4	25-Jan-93	25-Jan-93	26-Jan-93	1.0
			WJ0073-5	25-Jan-93	25-Jan-93	26-Jan-93	1.0
			WJ0073-6	25-Jan-93	25-Jan-93	26-Jan-93	1.0
			WJ0073-7	25-Jan-93	25-Jan-93	26-Jan-93	1.0
			WJ0073-8	25-Jan-93	25-Jan-93	26-Jan-93	1.0
			WJ0073-9	25-Jan-93	25-Jan-93	26-Jan-93	1.0
			WJ0073-10	25-Jan-93	25-Jan-93	26-Jan-93	1.0
			WJ0073-11	25-Jan-93	25-Jan-93	26-Jan-93	1.0
			WJ0073-12	25-Jan-93	25-Jan-93	26-Jan-93	1.0
			WJ0073-13	25-Jan-93	25-Jan-93	26-Jan-93	1.0

Notes:
Unless otherwise indicated, analytical methods are from (1) "Methods of Chemical Analysis of Water and Wastes," EPA 600/4-79-020, Revised March, 1983, or (2) "Test Methods for Evaluating Solid Wastes," EPA SW-846, Revised November, 1986.

CLP-CIP = USEPA Contract Laboratory Program Caucus Inorganic Protocols, SOW 0788.

*The Dilution Factor (DF) indicates whether a sample, prepared in accordance with the analytical method protocol, was diluted prior to analysis. The Dilution Factor could also indicate that a smaller aliquot than specified in the method was utilized for sample preparation and analysis. For example, a dilution factor of 5 means that the sample was effectively diluted by a factor of 5 prior to analysis, i.e., the sample was analyzed at 20% its reported concentration.

Coast-To-Coast Analytical Services, Inc.
Northeastern Division
Quality Control Report

Method Blank and Laboratory Control Sample Results

			METHOD BLANK RESULTS				LABORATORY CONTROL SAMPLE RESULTS						
Parameter	Date of Prep*	Date of Analysis*	Units	Conc. Measured in Blank	Acceptance Range	Practical Quantitation Level**	Units	True Value	Measured Value	Percent Recovered	Acceptance Range (%)	Acceptance Range (mg/kg)	Acceptance Range (%)
TS -Total Residue	25-Jan-93	26-Jan-93	wt %	< 0.10	< 0.10	0.10							

* Date is indicated if sample preparation/analysis was performed on more than one day for a parameter. If no date is given, all samples, method blanks and laboratory control samples were prepared and analyzed as indicated on the Chronology Form.

** Practical quantitation level is the lowest concentration measurable for samples with normal chemical and physical composition during routine laboratory operations.

DATA QUALITY COMMENTS:
Results of all quality control measurements are within the laboratory and method specified acceptance range except as noted.

Coast-To-Coast Analytical Services, Inc.
Northeastern Division
Quality Control Report

Duplicate and Matrix Spike/Matrix Spike Duplicate Results

		DUPLICATE RESULTS						*MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS*								
			Sample Measurements					Concentration or Quantity					Matrix Spike Recovery (%)			
Parameter	CCAS Sample No.	Units	Rep 1	Rep 2	Mean Conc	RPD (%)	Acceptance Range for RPD (%)	Units	Sample Only	Spike Added	Sample +Spike Dup 1	Sample +Spike Dup 2	Sample +Spike Dup 1	Sample +Spike Dup 2	Acceptance Range (%)	RPD (%)	Acceptance Range (%)
TS	WJ0073-2	wt%	98.9	98.7	98.8	0.2	0-20										
	WJ0073-3	wt%	98.8	99.6	99.2	0.8	0-20										
	WJ0073-4	wt%	98.4	98.5	98.5	0.1	0-20										
	WJ0073-5	wt%	98.2	98.5	98.4	0.3	0-20										
	WJ0073-6	wt%	99.6	99.3	99.5	0.3	0-20										
	WJ0073-7	wt%	98.9	99.1	99.0	0.2	0-20										
	WJ0073-8	wt%	98.2	98.2	98.2	0.0	0-20										
	WJ0073-9	wt%	98.9	98.3	98.6	0.6	0-20										
	WJ0073-10	wt%	98.9	98.6	98.8	0.3	0-20										
	WJ0073-11	wt%	98.9	98.3	98.6	0.6	0-20										
	WJ0073-12	wt%	98.9	98.5	98.7	0.4	0-20										
	WJ0073-13	wt%	99.1	98.3	98.7	0.8	0-20										

RPD = Relative percent difference, which is the absolute value of the difference between two replicate results divided by the mean concentration then multiplied by 100%.

NC = Relative percent difference cannot be calculated for sample results less than the PQL.

NA = Not applicable.

Because of the large uncertainty (i.e., 33% or greater) associated with measurements made near the detection level, the acceptance range for relative percent difference for duplicate measurements at such low concentrations is 0-100%.

DATA QUALITY COMMENTS:
Results of all quality control measurements are within the laboratory or contract specified acceptance range except as noted.

Client: ABB Environmental Services - Indian Head, Work Order: WJ0073 26-Jan-93

000019

Coast-To-Coast Analytical Services, Inc.
Northeastern Division
Quality Control Report

Summary Report

Inorganic Laboratory Summary Report

All sample analyses for wet chemistry referenced by this Quality Control Report were routine and were conducted in accordance with appropriate analytical protocols and laboratory standard operating procedures except as noted.

CCAS Sample Nos.: WJ0073-2 - 13

_____X_____Check here if all analyses were routine.

Notebook No. 10

PROJECT Total Solids CLP SOW 788 PQL=0-10% Continued From Page 3

000020

ASTM Class 1 Weights	Initial (g)	Final (g)
2.000 g	2.000	2.000
5.000 g	5.001	5.001
10.000 g	10.001	10.000

Oven Temp Time in: 5:30 PM 1-25-93
103°C Time out: 8:00 AM 1-26-93

Client	Sample ID	Site ID	Dish ID	Dish wt (g)	Dish + Wet wt (g)	Dish + Dry wt (g)
	Blank		A	1.645	1.645	1.645
	LCS #1		B	1.556	5.001	4.654
	LCS #3		C	1.576	5.002	4.978
ABB-OC	WJ0073-1	TM100-02	D	1.554	5.028	4.415
Dupe	WJ0073-1	↓	E	1.567	5.008	4.432
	WJ0073-2	02SSXX0300	F	1.572	2.662	2.650
Dupe	WJ0073-2	↓	G	1.593	2.669	2.655
	WJ0073-3	02SSXX0025	H	1.557	2.701	2.687
Dupe	WJ0073-3	↓	I	1.649	2.704	2.700
	WJ0073-4	02SSXX2125	J	1.639	2.666	~~2.600~~ 2.650 1-26
Dupe	WJ0073-4	↓	K	1.556	2.577	2.562
	WJ0073-5	01SSXX0350	L	1.550	2.597	2.578
Dupe	WJ0073-5	↓	M	1.591	2.623	2.608
	WJ0073-6	01SSXX0625	N	1.614	2.729	2.725
Dupe	WJ0073-6	↓	O	1.606	~~2.601~~ 2.735 1-25-93	2.717
	WJ0073-7	01SSXX0400	P	1.607	2.725	2.713
Dupe	WJ0073-7	↓	Q	1.570	2.732	2.722
	WJ0073-8	02SSXX0X75	R	1.601	2.682	2.662
Dupe	WJ0073-8	↓	S	1.572	2.711	2.691
	WJ0073-9	02SSXX0X75	T	1.580	2.682	2.670
Dupe	WJ0073-9	↓	U	1.637	2.716	2.698
	WJ0073-10	01SSXX1629	V	1.582	2.742	2.729
Dupe	WJ0073-10	↓	W	1.559	2.762	2.745

Continued on Page 4

[signature] Setup — 1-25-93 Date

Read and Understood By

[signature] Signed Completion — 1-26-93 Date — [signature] Signed — 1/27/93 Date

Notebook No. 10

PROJECT TOTAL SOLIDS CLP SOW 288 PQL = 0.10%

Continued From Page 3

CLIENT	Sample ID	Site ID	Dish ID	Dish wt(g)	Dish + weight (g)	Dish + Dry wt(g)
ABB-DC	WJ0073-11	0155xx145	X	1.567	2.641	2.629
Dupe	WJ0073-11	↓	Y	1.578	2.642	2.624
	WJ0073-12	0155xx045	Z	1.565	2.611	2.599
Dupe	WJ0073-12	↓	AA	1.604	2.615	2.600
	WJ0073-13	0155xx067	BB	1.603	2.737	2.727
Dupe	WJ0073-13	↓	CC	1.603	2.748	2.728

000021

TOTAL RESIDUE, SOILS AND SOLIDS GRAVIMETRIC

METHOD: CLP-SOW 2/88
PQL = 0.10 %

DATE: JAN. 25, 1993
ANALYST: J.F.

CLIENT	SAMPLE #	DISH WEIGHT (g)	DISH + WET SAMPLE WT (g)	DISH + DRY SAMPLE WT (g)	WET SAMPLE WEIGHT (g)	DRY SAMPLE WEIGHT (g)	TOTAL RESIDUE (%)	TS MEAN (%)	RPD (%)
METHOD	BLANK	1.645	1.645	1.645	0.000	0.000	ERR		
	LCS#1	1.556	5.001	4.654	3.445	3.098	89.927 ✓ mcan 1/27/93		
	LCS#3	1.576	5.002	4.978	3.426	3.402	99.299 ✓ mcan 1/27/93		
ABB-DC	WJ0073-1	1.554	5.028	4.415	3.474	2.861	82.355	82.808	1.09
DUPE	WJ0073-1	1.567	5.008	4.432	3.441	2.865	83.261		
	WJ0073-2	1.572	2.662	2.650	1.090	1.078	98.899	98.799	0.20
DUPE	WJ0073-2	1.593	2.669	2.655	1.076	1.062	98.699		
	WJ0073-3	1.557	2.701	2.687	1.144	1.130	98.776	99.199	0.85
DUPE	WJ0073-3	1.649	2.704	2.700	1.055	1.051	99.621		
	WJ0073-4	1.639	2.666	2.650	1.027	1.011	98.442	98.486	0.09
DUPE	WJ0073-4	1.556	2.577	2.562	1.021	1.006	98.531		
	WJ0073-5	1.550	2.597	2.578	1.047	1.028	98.185 ✓ mcan 1/27/93	98.366	0.37
DUPE	WJ0073-5	1.591	2.623	2.608	1.032	1.017	98.547		
	WJ0073-6	1.614	2.729	2.725	1.115	1.111	99.641	99.463	0.36
DUPE	WJ0073-6	1.606	2.725	2.717	1.119	1.111	99.285		
	WJ0073-7	1.607	2.725	2.713	1.118	1.106	98.927	99.033	0.21
DUPE	WJ0073-7	1.570	2.732	2.722	1.162	1.152	99.139		
	WJ0073-8	1.601	2.682	2.662	1.081	1.061	98.150 ✓ mcan 1/27/93	98.197	0.10
DUPE	WJ0073-8	1.572	2.711	2.691	1.139	1.119	98.244		
	WJ0073-9	1.580	2.682	2.670	1.102	1.090	98.911	98.621	0.59
DUPE	WJ0073-9	1.637	2.716	2.698	1.079	1.061	98.332		
	WJ0073-10	1.582	2.742	2.729	1.160	1.147	98.879	98.733	0.30
DUPE	WJ0073-10	1.559	2.762	2.745	1.203	1.186	98.587		
	WJ0073-11	1.567	2.641	2.629	1.074	1.062	98.883 ✓ mcan 1/27/93	98.595	0.58
DUPE	WJ0073-11	1.578	2.642	2.624	1.064	1.046	98.308		
	WJ0073-12	1.565	2.611	2.599	1.046	1.034	98.853	98.685	0.34
DUPE	WJ0073-12	1.604	2.615	2.600	1.011	0.996	98.516		
	WJ0073-13	1.603	2.737	2.727	1.134	1.124	99.118	98.686	0.88
DUPE	WJ0073-13	1.603	2.748	2.728	1.145	1.125	98.253		

$$\% \text{ SOLIDS} = \frac{\text{SAMPLE DRY WEIGHT (g)}}{\text{SAMPLE WET WEIGHT (g)}} * 100$$

J.F. 1.26.93

Continued on Page

J. Frie 1-25-93

SERVP
J. Frie 1.26.93

Signed / Date

COMPLETION

Read and Understood By

Andrea Carey 1/27/93

Signed / Date

Coast-to-Coast Analytical Services, Inc.
Northeastern Division (207) 874-2400
CONFIRMATION

ORDER NO WJ-0073

Project Manager: Laura J. O'Meara
ORDER DATE: 01/25/93
PHONE: 202/797-6500
FAX: 202/797-6501
DUE: 14 FEB

000022

REPORT TO: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

INVOICE: ABB Environmental Svcs., Inc.
2590 Executive Center Circle East
Tallahassee, FL 32301

PO: SE207668
PROJECT: 7800-00

SAMPLED BY: CLIENT   DELIVERED BY: FED-EX   DISPOSE: AFTER 24 FEB

ITEM	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
1	WJ0073-1	TM100-02	07 JAN 1045	25 JAN	SO

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
TCLP*Extraction	1311	1	105.00	105.00
Elements Matrix Spike Sample		1	0.00	0.00
TCLP-Silver	6010	1	450.00	450.00
TOTALS		1	555.00	555.00

	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
2	WJ0073-2	02SSXX0300XRFF	22 DEC	25 JAN	SO

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Silver, Total	6010	1	20.00	20.00
Elements Sample Preparation		1	23.00	23.00
Solids-Total Residue (TS)	CLP/CIP SO	1	0.00	0.00
Elements Matrix Spike Sample		1	43.00	43.00
Elements MS Duplicate Sample		1	43.00	43.00
TOTALS		1	129.00	129.00

LABORATORY ORDER CONTINUED ON PAGE 2

SJC 012293

Coast-to-Coast Analytical Services, Inc.
Northeastern Division (207) 874-2400
CONFIRMATION

ORDER NO WJ-0073 | Project Manager: Laura J. O'Meara
ORDER DATE: 01/25/93

REPORT TO: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

PHONE: 202/797-6500
FAX: 202/797-6501
DUE: 14 FEB

INVOICE: ABB Environmental Svcs., Inc.
2590 Executive Center Circle East
Tallahassee, FL 32301

PO: SE207668
PROJECT: 7800-00

SAMPLED BY: CLIENT DELIVERED BY: FED-EX DISPOSE: AFTER 24 FEB

	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
3	WJ0073-3	02SSXX0125XRFF	22 DEC	25 JAN	SO
	WJ0073-4	02SSXX2125XRYF	22 DEC		
	WJ0073-5	01SSXX0350XAXF	09 DEC		
	WJ0073-6	01SSXX0629XMXF	07 JAN		
	WJ0073-7	01SSXX0400XAXF	22 DEC		
	WJ0073-8	02SSXX0X75XRYF	22 DEC		
	WJ0073-9	02SSXX0X75XLYF	22 DEC		
	WJ0073-10	01SSXX1629XBXF	11 JAN		
	WJ0073-11	01SSXX1450XBXF	11 JAN		
	WJ0073-12	01SSXX0450XCXF	11 JAN		
	WJ0073-13	01SSXX0679XMXF	07 JAN		

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Silver, Total	6010	11	20.00	220.00
Elements Sample Preparation		11	23.00	253.00
Solids-Total Residue (TS)	CLP/CIP SO	11	0.00	0.00
TOTALS		11	43.00	473.00

ORDER NOTE: QC-III/INDIAN HEAD/$

INVOICE: With Report TOTAL ORDER AMOUNT $1,157.00
This is NOT an Invoice

JBB/LJO
01-28 Please contact CCAS promptly if you have any questions.

Log-in Summary

ABB-ES Site Name: NOS Indian Head ABB-ES Contract Number: PROJ. 7800-00 SE207668

Date Samples Received: 1-25-93 Number of Coolers: 1

Air Bill Number: 5732976384

Condition of Containers: Good

Custody Seals (circle): YES / NO Custody Seals Broken (circle): YES / NO

Temperature of Cooler: ICE MELTED °C

(Temperature taken from the 125 ml vial provided by ABB-ES)
(ABB-ES shall be notified if the temperature exceeds 4°C)

pH of all non VOC samples N/A pH units.

All Bottles Labelled (circle): YES / NO

COMMENTS:

NO MS/MSD SAMPLE SPECIFIED

All Bottles agree with ARF and COC (circle): YES / NO

COMMENTS:

OVERALL COMMENTS:

CHAIN OF CUSTODY RECORD

PROJECT NO.	PROJECT NAME
7800-00	NOS/I.H. Ag CONTAMINATION

SAMPLERS (SIGNATURE): [signature]

SAMPLE TYPE: ICP-Ag (TOTAL); TCLP-Ag

	STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	ICP-Ag (TOTAL)	TCLP-Ag	REMARKS INDICATE SOIL/WATER/AIR SEDIMENT/SLUDGE
2		12/22/92	N/A		✓	02SSXX0300XRFF	1	✓		TOTAL SILVER
3		12/22/92	N/A		✓	02SSXX0125XRFF	1	✓		"
4		12/22/92	N/A		✓	02SSXX2125XRYF	1	✓		"
5		12/19/92	N/A		✓	01SSXX0350XAXF	1	✓		"
6		1/7/93	N/A		✓	01SSXX0629XMXF	1	✓		"
7		12/22/92	N/A		✓	01SSXX0400XAXF	1	✓		"
8		12/22/92	N/A		✓	02SSXX0X75XRYF	1	✓		"
9		12/22/92	N/A		✓	02SSXX0X75XLYF	1	✓		"
10		1/11/93	N/A		✓	01SSXX1629XBXF	1	✓		"
11		1/11/93	N/A		✓	01SSXX1450XBXF	1	✓		"
12		1/11/93	N/A		✓	01SSXX0450XCXF	1	✓		"
13		1/7/93	N/A		✓	01SSXX0679XMXF	1	✓		"
1		1/7/93	10:45		✓	TM100-02	1		✓	TCLP SILVER

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
[signature]	1/21/93 19:00	[signature]	1/25/93 9:30		
RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED FOR DISPOSAL BY: (SIGNATURE)	DATE/TIME	REMARKS

000025

OH-62

ABB Environmental Services, Inc.

OBG
TECHNICAL SERVICES
P.O. Box 5240 / 5000 Brittonfield Parkway / Syracuse, New York 13220 / (315) 437-6400

Transmittal

To: ABB Environmental Services, Inc.
1400 16th Street, N.W.
Suite 720
Washington, D.C. 20036

Date: February 5, 1993
File: 37300
Re: N.O.S., Indianhead, MD

Gentlemen: We are sending you X herewith ____ under separate cover

____ drawings X descriptive literature ____ letters

Quan.	Date	Description
1	2-5	Complete Analytical Reports/American Environmental Network
1	2-5	Complete Compaction Reports/EMSI Engineering, Inc.
	2-5	Material Delivery Report/CKD Additive

THESE ARE TRANSMITTED as checked below:

- [ ] For approval
- [x] For your use
- [ ] As requested
- [ ] For review and comment
- [ ] FOR BIDS DUE ____ 19____
- [ ] Approved as submitted
- [ ] Approved as noted
- [ ] Returned for corrections
- [ ] ____
- [ ] Resubmit ____ copies for approval
- [ ] Submit ____ copies for distribution
- [ ] Return ____ corrected prints
- [ ] PRINTS RETURNED AFTER LOAN TO US

REMARKS:

If material received is not as listed, please notify us at once.

cc.

Very truly yours,

OBG TECHNICAL SERVICES, INC.

Thomas B Wehle

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
ANALYTICAL REPORT
O'BIREN & GERE
PROJECT: N.O.S. INDIAN HEAD MD
TCLP SILVER & TSS
OBG-~~0133~~ 0202
December 15, 1992

AMERICAN ENVIRONMENTAL NETWORK, INC.

9151 Rumsey Road Suite 150, Columbia, MD 21045-1992
(410) 730-8525 Fax (410) 997-2586

December 15, 1992

Client: O'Brien & Gere

Project: N.O.S. Indian Head MD

Case: OBG-~~0133~~ 0202

Analysis: TCLP Silver & TSS

Client ID	AENM ID	Date Sampled	Date Received	Date Analyzed
STOCK PILE #1	17624	12/08/92	12/08/92	12/10/92
COMPOSITE #1	17625	12/08/92	12/08/92	12/10/92

One soil sample was received and analyzed for TCLP Silver. One water sample was received and analyzed for TCLP Silver and TSS. Results are reported in units of µg/l in the Leachate for TCLP Silver and MG/L for TSS.

All quality control met standard laboratory criteria.

This report consists specifically of tabulated sample results.

If you have any further questions or if more information is needed please feel free to contact Ms. Kristina Yamarik (410)730-8525.

Report Released By [signature]

Joseph Dembowski
Inorganic Laboratory Manager

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
ANALYTICAL REPORT

CLIENT: O'BRIEN & GERE

PROJECT: N.O.S. Indian Head Md

CONTRACT NO:OBG-0133

REPORTING DATE: 15-Dec-92

REPORT PREPARED BY KP

DATA RELEASED BY

MATRIX: WATER

****

CLIENT ID:		COMPOSITE #1
AENM ID:		17625
PARAMETERS	DETECTION LIMIT & UNITS	
TOTAL SUSPENDED SOLIDS	4.0 MG/L	550 MG/L

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
TCLP METALS

QCLEVEL 2
DATE: 15-Dec-92

CLIENT: O'BRIEN & GERE
AENM SAMPLE #: 17624
CLIENT SAMPLE #: STOCK PILE #1

UNITS: ug/L in LEACHATE

ANALYTE	METHOD	REPORT LIMIT	SAMPLE RESULT
SILVER	6010	500	<500

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
TCLP METALS

QCLEVEL 2

CLIENT: O'BRIEN & GERE
DATE: 15-Dec-92

AENM SAMPLE #: 17625

CLIENT SAMPLE #: COMPOSITE #1
UNITS: ug/L in LEACHATE

ANALYTE	METHOD	REPORT LIMIT	SAMPLE RESULT
SILVER	6010	500	<500

PROJECT

NOS - INDIANHEAD, MD

SAMPLERS: (Signature)

Thomas B Wahle

SAMPLE NUMBER	DATE	TIME	MATRIX	NO. CONTAINERS	TCLP SILVER	TOTAL SUSPENDED SOLIDS	TOTAL SILVER	HOLD - ARCHIVE		REMARKS OR SAMPLE LOCATION	ICED	PRESERVATION: SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN
STOCKPILE #1	12-8-92	1:10pm	SOIL	1	✓				11624	RUSH ☆		NA
COMPOSITE #1	12-8-92	1:15pm	WATER	1		✓	✓		11625			NA
TRIP BLANK	12-8-92	1:15pm	WATER	1				✓	11626	HOLD		N/A

Relinquished by: (Signature) ①	Date / Time	Received by: (Signature)	Relinquished by: (Signature) ④	Date / Time	Shipped via:
Thomas B Wahle	12-8-92 1:20	[signature] 12/8/92			
Relinquished by: (Signature) ②	**Date / Time**	**Received by: (Signature)**	**Received for Laboratory by: (Signature)**	**Date / Time**	**Shipping Ticket No.**
		Douglas Wiley			
Relinquished by: (Signature) ③	**Date / Time**	**Received by: (Signature)**	**Remarks:**		

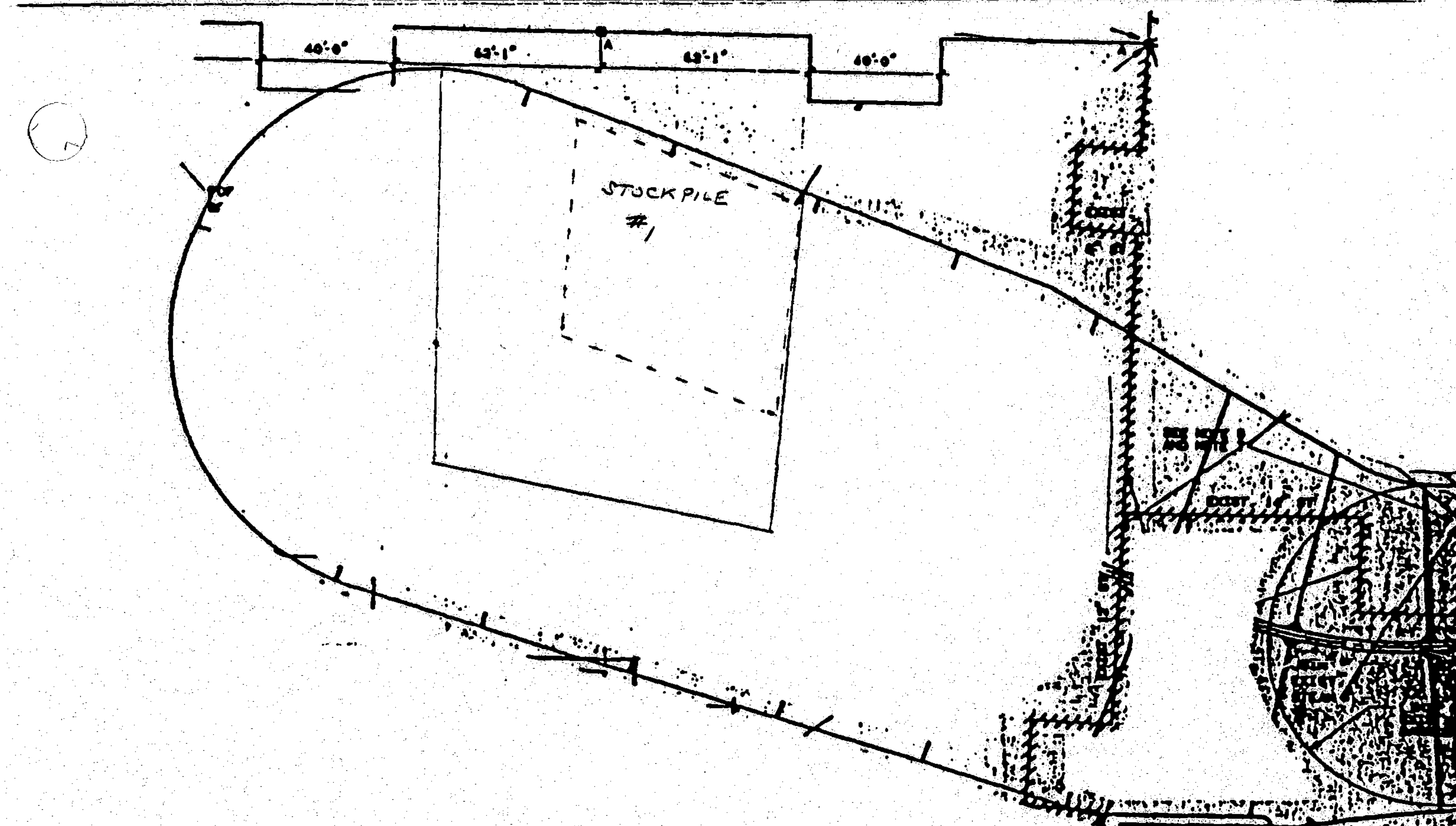
OBG TECHNICAL SERVICES

DAILY SAMPLE AND ANALYSIS REPORT

Date: 12-8-92 Sample Location: Explosion Berm

Sample Number: Stockpile #1 Time: 1:10 pm

Notes: Sampled approximately 100 cy's of treated soil before it was spread. A five part composite sample was collected and sampled for TCLP Silver. The lay down area is shown below.



AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
ANALYTICAL REPORT
O'BRIEN & GERE
PROJECT: OBG TECHNICAL SERVICES
TCLP SILVER
OBG-0203
December 16, 1992

AMERICAN ENVIRONMENTAL NETWORK, INC.

9151 Rumsey Road Suite 150, Columbia, MD 21045-1992
(410) 730-8525 Fax (410) 997-2586

December 16, 1992

Client: O'Brien & Gere

Project: OBG Technical Services

Case: OBG-0203

Analysis: TCLP Silver

Client ID	AENM ID	Date Sampled	Date Received	Date Analyzed
STOCKPILE #2	17749	12/14/92	12/14/92	12/16/92

One soil sample was received and analyzed for TCLP Silver. Results are reported in units of µg/l in the Leachate.

All quality control met standard laboratory criteria.

This report consists specifically of tabulated sample results.

If you have any further questions or if more information is needed please feel free to contact Ms. Kristina Yamarik (410)730-8525.

Report Released By Joseph Dembowski
Inorganic Laboratory Manager

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
TCLP METALS
METHOD BLANK AND %RECOVERY LCS

CLIENT: O'BRIEN & GERE

QCLEVEL: 2
DATE: 16-Dec-92

UNITS: ug/L IN LEACHATE

ANALYTE	METHOD	METHOD BLANK	% RECOVERY LABORATORY CONTROL SAMPLE
SILVER	6010	<500	108

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
TCLP METALS

QCLEVEL 2
DATE: 16-Dec-92

CLIENT: O'BRIEN & GERE
AENM SAMPLE #: 17749
CLIENT SAMPLE #: STOCKPILE #2

UNITS: ug/L in LEACHATE

ANALYTE	METHOD	REPORT LIMIT	SAMPLE RESULT
SILVER	6010	500	<500

PROJECT
N.O.S. INDIAN HEAD, MD

SAMPLERS: (Signature)
Thomas B. Wehle

SAMPLE NUMBER	DATE	TIME	MATRIX	NO. CONTAINERS	ANALYSIS REQUIRED: TCLP SILVER										REMARKS OR SAMPLE LOCATION	PRESERVATION: ICED	PRESERVATION: SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN
STOCKPILE #2	12-14-92	1:15pm	SOIL	1	✓		5749								*RUSH & Early		—

Relinquished by: (Signature) ①	Date / Time	Received by: (Signature)	Relinquished by: (Signature) ④	Date / Time	Shipped via:
	12/14/92 / 1430	*Kristina Yannick			

Relinquished by: (Signature) ②	Date / Time	Received by: (Signature)	Received for Laboratory by: (Signature)	Date / Time	Shipping Ticket No.

Relinquished by: (Signature) ③	Date / Time	Received by: (Signature)	Remarks:

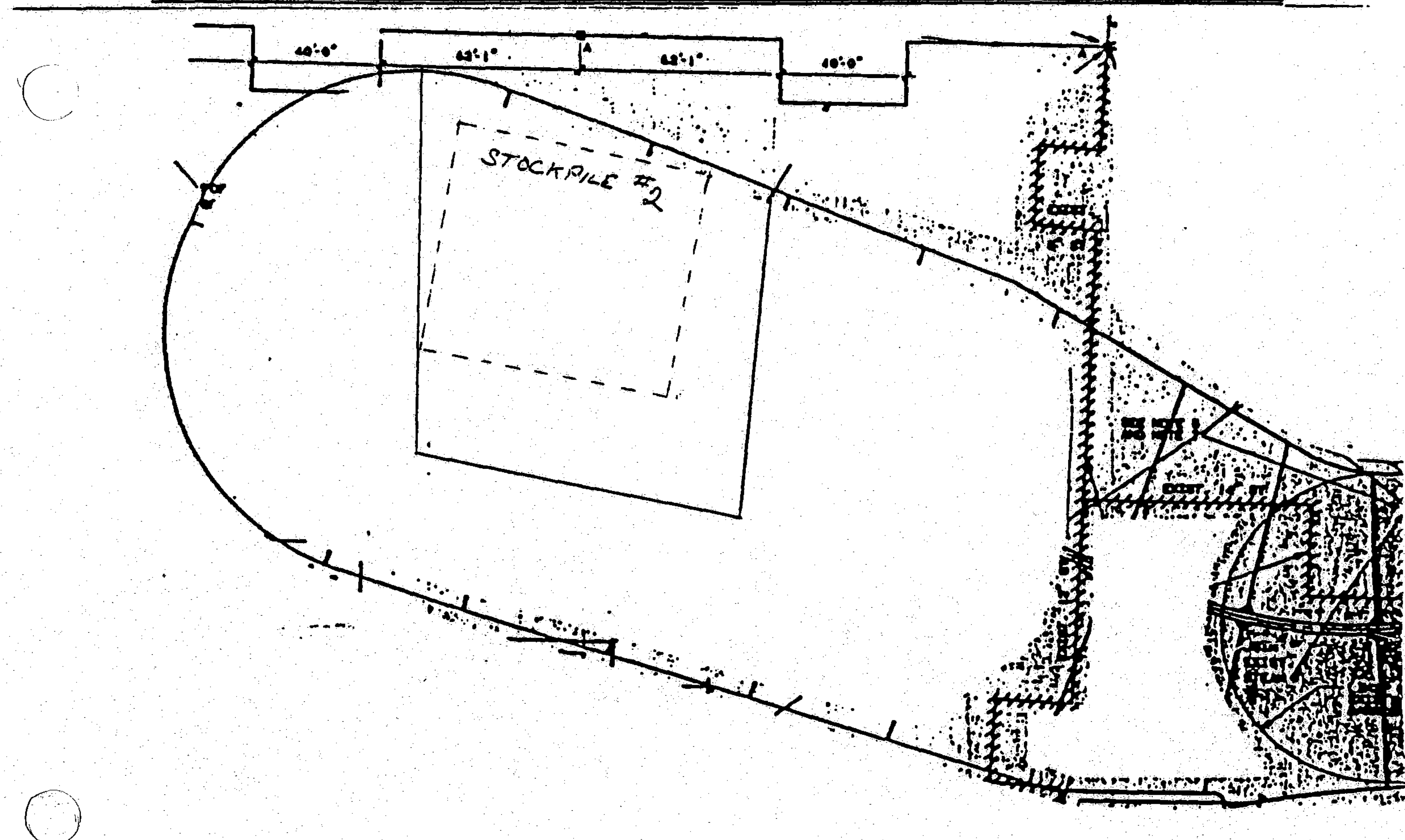
OBG TECHNICAL SERVICES

DAILY SAMPLE AND ANALYSIS REPORT

Date: 12-14-92 Sample Location: Explosion Berm

Sample Number: Stockpile #2 Time: 1:15 pm

Notes: Sampled approximately 100 cy's of treated soil before it was spread. A five point composite sample was collected and sampled for TCLP Silver. The lay down area is shown below.



AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
ANALYTICAL REPORT
O'BRIEN & GERE
PROJECT: NOS INDIAN HEAD MD
TCLP SILVER
OBG--0204
December 18, 1992

AMERICAN ENVIRONMENTAL NETWORK, INC.

9151 Rumsey Road Suite 150, Columbia, MD 21045-1992
(410) 730-8525 Fax (410) 997-2586

December 18, 1992

Client: O'Brien & Gere

Project: NOS Indian Head MD

Case: OBG--0204

Analysis: TCLP Silver

Client ID	AENM ID	Date Sampled	Date Received	Date Analyzed
STOCKPILE #3	17844	12/16/92	12/16/92	12/17/92
STOCKPILE #4	17845	12/16/92	12/16/92	12/17/92

Two soil samples were received and analyzed for TCLP Silver. TCLP Silver results are reported in units of ug/l in the Leachate.

All quality control met standard laboratory criteria.

This report consists specifically of tabulated sample and QC results.

If you have any further questions or if more information is needed please feel free to contact Mrs. Kristina Yamarik (410)730-8525.

Report Released By John Massey for JD

Joseph Dembowski
Inorganic Laboratory Manager

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
TCLP METALS

QCLEVEL 2
DATE: 18-Dec-92

CLIENT: OBG--0204
AENM SAMPLE #: 17844
CLIENT SAMPLE #: STOCKPILE #3

UNITS: ug/L in LEACHATE

ANALYTE	METHOD	REPORT LIMIT	SAMPLE RESULT
SILVER	6010	500	<500

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
TCLP METALS

QCLEVEL 2
DATE: 18-Dec-92

CLIENT: OBG--0204
AENM SAMPLE #: 17845
CLIENT SAMPLE #: STOCKPILE #4

UNITS: ug/L in LEACHATE

ANALYTE	METHOD	REPORT LIMIT	SAMPLE RESULT
SILVER	6010	500	<500

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND

METHOD BLANK AND %RECOVERY LCS

QCLEVEL: 2

CLIENT: OBG--0204

DATE: 18-Dec-92

UNITS: ug/L IN LEACHATE

ANALYTE	METHOD	METHOD BLANK	% RECOVERY LABORATORY CONTROL SAMPLE
SILVER	6010	<500	98

NOS Indian Head, MD

SAMPLERS: (Signature)

Caroline Mills

SAMPLE NUMBER	DATE	TIME	MATRIX	NO. CONTAINERS	REQUIRED: TCLP Silver										REMARKS OR SAMPLE LOCATION	ICED	SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN
Stockpile #3	12-16-92	1:30p	Soil	1	✓		178	44							Rush		—
Stockpile #4	12-16-92	1:30p	Soil	1	✓		178	45							Rush		—

Relinquished by: (Signature) ①	Date / Time	Received by: (Signature)	Relinquished by: (Signature) ④	Date / Time	Shipped via:
Caroline Mills	12-16-92 1800 2:40p	Richard B. Lemanowicz			
Relinquished by: (Signature) ②	**Date / Time**	**Received by: (Signature)**	**Received for Laboratory by: (Signature)**	**Date / Time**	**Shipping Ticket No.**
			[illegible]	12/16/92 4:51	
Relinquished by: (Signature) ③	**Date / Time**	**Received by: (Signature)**	**Remarks:**		

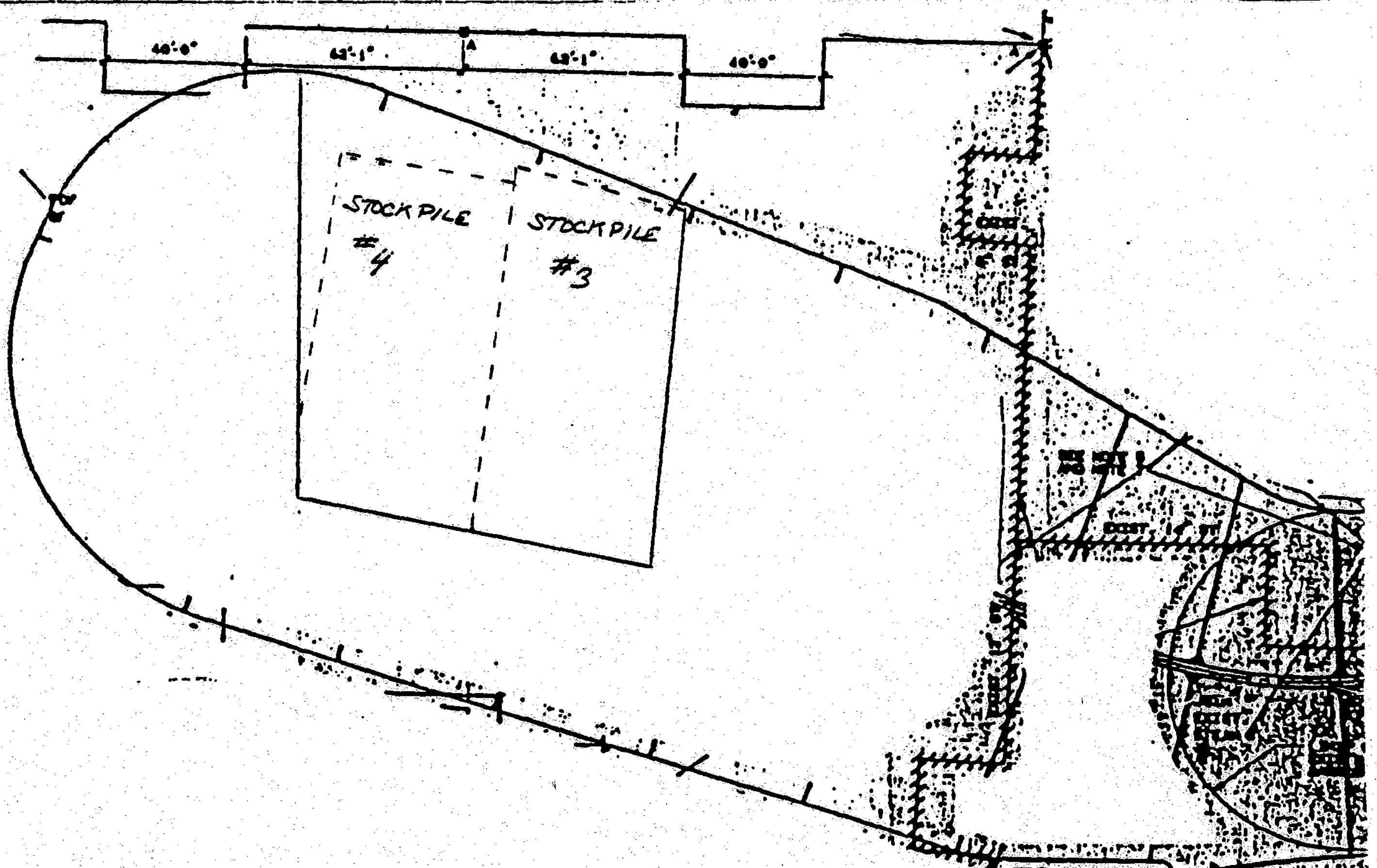
OBG TECHNICAL SERVICES

DAILY SAMPLE AND ANALYSIS REPORT

Date: 12-16-92 Sample Location: Explosion Berm

Sample Number: Stockpile #3 + #4 Time: 1:30 pm

Notes: Sampled approximately 200 cy's of treated soil before being spread. ~~A~~ Two five part composite samples were collected and sampled for TCLP Silver. The lay down area is shown below.



AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
ANALYTICAL REPORT
O'BRIEN & GERE
PROJECT: NOS-INDIAN HEAD MD
TCLP SILVER, TOTAL SILVER, & TSS
OBG-0205
December 29, 1992

AMERICAN ENVIRONMENTAL NETWORK, INC.

9151 Rumsey Road Suite 150, Columbia, MD 21045-1992
(410) 730-8525 Fax (410) 997-2586

December 29, 1992

Client: O'Brien & Gere

Project: NOS-Indian Head MD

Case: OBG-0205

Analysis: TCLP Silver, Total Silver, and TSS

Client ID	AENM ID	Date Sampled	Date Received	Date Analyzed
STOCKPILE #5	18195	12/22/92	12/22/92	12/28-12/29/92
~~STOCKPILE~~ #2 COMPOSITE #2	18196	12/22/92	12/22/92	12/28-12/29/92

One ~~water~~ SOIL sample was received and analyzed for TCLP Silver and one water WATER sample was received and analyzed for Total Silver and TSS (160.2). TCLP results are reported in units of µg/l in the Leachate.

All quality control met standard laboratory criteria.

This report consists specifically of tabulated sample and QC results.

If you have any further questions or if more information is needed please feel free to contact Ms. Kristina Yamarik (410)730-8525.

Report Released By [signature]

Joseph Dembowski
Inorganic Laboratory Manager

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
TCLP METALS
METHOD BLANK AND %RECOVERY LCS

QCLEVEL: 2
CLIENT: O'BRIEN & GERE
DATE: 29-Dec-92

UNITS: ug/L IN LEACHATE

ANALYTE	METHOD	METHOD BLANK	% RECOVERY LABORATORY CONTROL SAMPLE
SILVER	6010	<500	103

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
TCLP METALS

QCLEVEL 2
DATE: 29-Dec-92

CLIENT: O'BRIEN & GERE
AENM SAMPLE #: 18195
CLIENT SAMPLE #: STOCKPILE #5

UNITS: ug/L in LEACHATE

ANALYTE	METHOD	REPORT LIMIT	SAMPLE RESULT
SILVER	6010	500	<500

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
METHOD BLANK AND %RECOVERY LCS

QCLEVEL: 2

CLIENT: O'BRIEN & GERE

DATE: 29-Dec-92

WATER UNITS: ug/L = PPB

ANALYTE	METHOD	METHOD BLANK	% RECOVERY LABORATORY CONTROL SAMPLE
SILVER	6010	<10	104

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
INORGANIC DATA ANALYSIS

QCLEVEL 2

CLIENT: O'BRIEN & GERE

DATE: 29-Dec-92

AENM SAMPLE #: 18196

CLIENT SAMPLE #: COMPOSITE #2

WATER UNITS: ug/L = PPB

ANALYTE	METHOD	REPORT LIMIT	SAMPLE RESULT
SILVER	6010	10	22

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
ANALYTICAL REPORT

CLIENT: O'BRIEN & GERE

PROJECT: NOS-INDIAN HEAD MD

REPORT PREPARED BY

CONTRACT NO:OBG-0205

DATA RELEASED BY

REPORTING DATE: 29-Dec-92

MATRIX: WATER

****

CLIENT ID:		COMPOSITE #2
AENM ID:		18196
PARAMETERS	DETECTION LIMIT & UNITS	
----------	--------	
TOTAL SUSPENDED SOLIDS	4.0 MG/L	1320 MG/L

R. 1? ? /92
D. ?? /92
RC 2
LOC 1

AMERICAN ENVIRONMENTAL NETWORK, INC.

CHAIN OF CUSTODY RECORD

AMERICAN ENVIRONMENTAL NETWORK, INC.
9151 Rumsey Road, Columbia, MD 21045
(410) 730-8525

PROJECT: NOS - Indian Head, MD

SAMPLERS: (Signature) Caroline Miller

SAMPLE NUMBER	DATE	TIME	MATRIX	NO. CONTAINERS	TCLP Silver	Total Suspended Silver	Total Silver	Hold - Archive		← ...					REMARKS OR SAMPLE LOCATION	ICED	PRESERVATION: SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN
Stockpile # 5	12-22-92	7:30a	soil	1	✓				181	95					RUSH		NA
Composite #2	12-22-92	8:00am	water	1		✓	✓		1:1	16							NA
Trip Blank	12-22-92	8:00am	water	1				✓	1:1	77					Hold		NA
											inHold						

Relinquished by: (Signature) ①	Date / Time	Received by: (Signature)	Relinquished by: (Signature) ④	Date / Time	Shipped via:
Thomas ? ?	12/22/92 1305 pm 3:05	Richard B. ?			
Relinquished by: (Signature) ②	**Date / Time**	**Received by: (Signature)**	**Received for Laboratory by: (Signature)**	**Date / Time**	**Shipping Ticket No.**
Relinquished by: (Signature) ③	**Date / Time**	**Received by: (Signature)**	**Remarks:**		

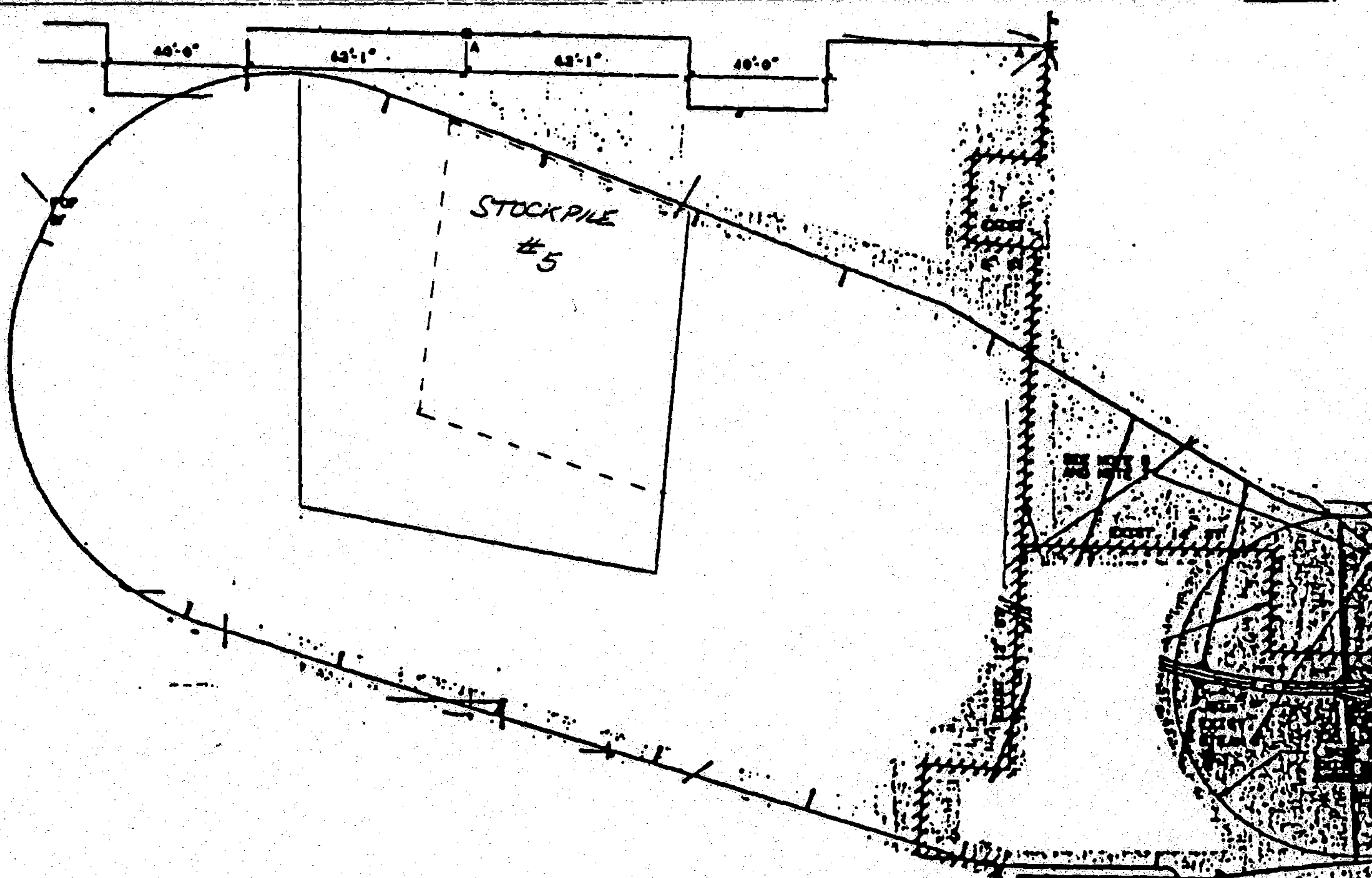
OBG TECHNICAL SERVICES

DAILY SAMPLE AND ANALYSIS REPORT

Date: 12-22-92 Sample Location: Explosion Berm

Sample Number: Stockpile #5 Time: 7:20 am

Notes: Collected a soil sample from approximately 100 cy's of treated soil. A five part composite sample was collected and analyzed for TCLP Silver. The lay down area is shown below.



AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
ANALYTICAL REPORT
O'BRIEN & GERE
PROJECT: NOS INDIAN HEAD MD
TCLP SILVER
OBG-0207
January 12, 1993

AMERICAN ENVIRONMENTAL NETWORK, INC.

9151 Rumsey Road Suite 150, Columbia, MD 21045-1992
(410) 730-8525 Fax (410) 997-2586

January 12, 1993

Client: O'Brien & Gere

Project: NOS-Indian Head MD

Case: OBG-0207

Analysis: TCLP Silver

Client ID	AENM ID	Date Sampled	Date Received	Date Analyzed
STOCKPILE #7	398	01/07/93	01/08/93	01/12/93
STOCKPILE #8	399	01/07/93	01/08/93	01/12/93

Two soil samples were received and analyzed for TCLP Silver. TCLP results are reported in units of $\mu g/l$ in the Leachate.

All quality control met standard laboratory criteria.

This report consists specifically of tabulated sample and QC results.

If you have any further questions or if more information is needed please feel free to contact Ms. Kristina Yamarik (410)730-8525.

Report Released By Joseph Dembowski

Joseph Dembowski
Inorganic Laboratory Manager

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND

METHOD BLANK AND %RECOVERY LCS

QCLEVEL: 2

CLIENT: OBG-0207

DATE: 12-Jan-93

UNITS: ug/L IN LEACHATE

ANALYTE	METHOD	METHOD BLANK	% RECOVERY LABORATORY CONTROL SAMPLE
SILVER	6010	<500	102

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
TCLP METALS

QCLEVEL 2
DATE: 12-Jan-93

CLIENT: OBG-0207
AENM SAMPLE #: 398
CLIENT SAMPLE #: STOCKPILE #7

UNITS: ug/L in LEACHATE

ANALYTE	METHOD	REPORT LIMIT	SAMPLE RESULT
SILVER	6010	500	<500

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
TCLP METALS

QCLEVEL 2
DATE: 12-Jan-93

CLIENT: OBG-0207
AENM SAMPLE #: 399
CLIENT SAMPLE #: STOCKPILE #8

UNITS: ug/L in LEACHATE

ANALYTE	METHOD	REPORT LIMIT	SAMPLE RESULT
SILVER	6010	500	<500

R- 1/8/?
D - 1/12/
QC - 0
Loc - 1

AMERICAN ENVIRONMENTAL NETWORK, INC.

AMERICAN ENVIRONMENTAL NETWORK, INC.
9151 Rumsey Road, Columbia, MD 21045
(410) 730-8525

CHAIN OF CUSTODY RECORD

PROJECT: NOS Indian Head

SAMPLERS: (Signature) Caroline Miller

SAMPLE NUMBER	DATE	TIME	MATRIX	NO. CONTAINERS	ANALYSIS REQUIRED: TCLP Silver	AEN #	REMARKS OR SAMPLE LOCATION	ICED	PRESERVATION: SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN
Stockpile ~~Composite~~ #7	1/7/93	10:45	soil	1	X	396	RUSH		NA
Stockpile #8	1/7/93	3:30	soil	1	X	397			NA

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Shipped via:
① Stuart Williams	1-8-92 9:25 pm	K. Kelly 1/8/92	④		
②			Received for Laboratory by: (Signature) Kristina Humanik	1/8/93 11:20p	Shipping Ticket No.
③			Remarks:		

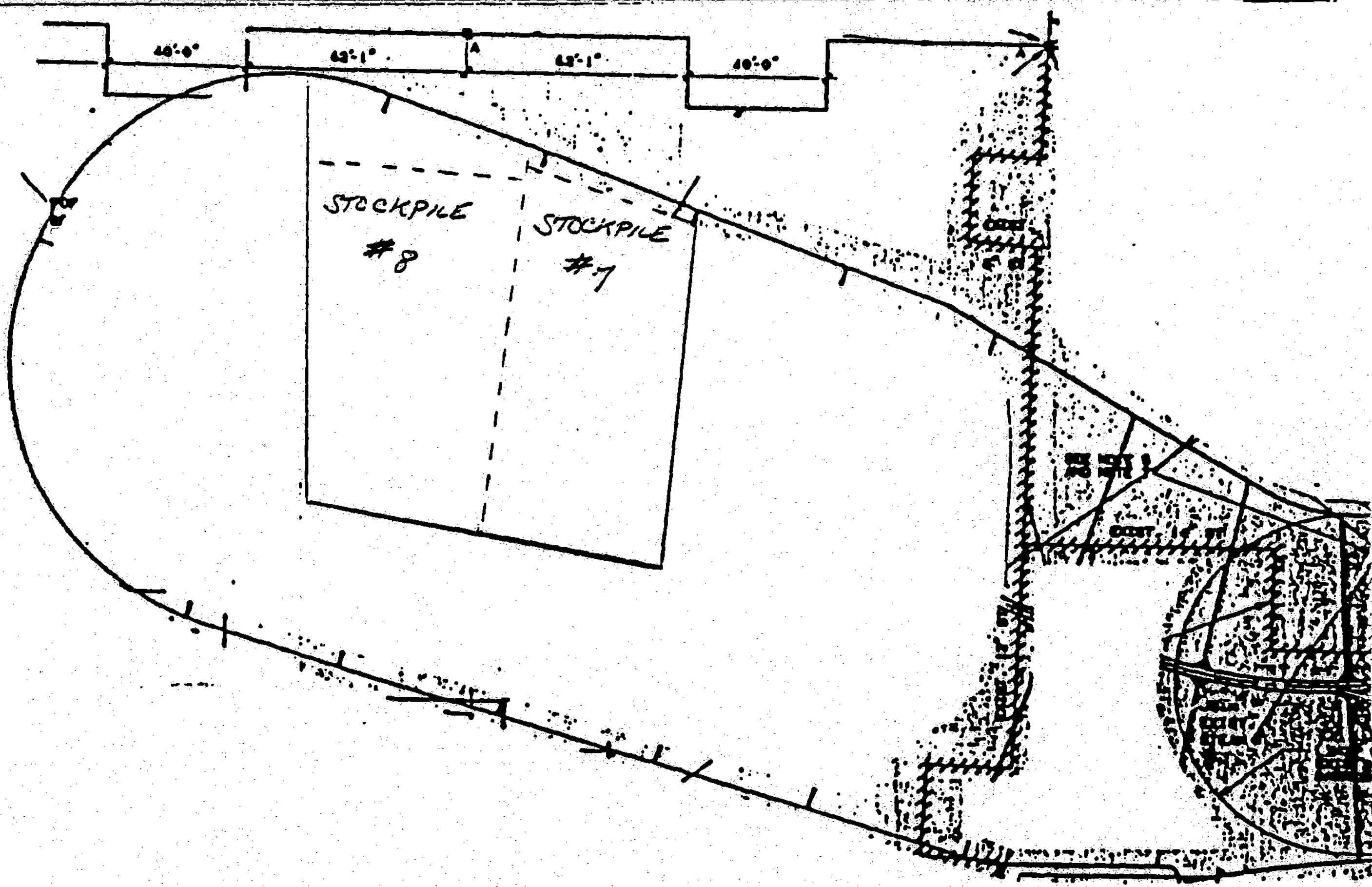
OBG TECHNICAL SERVICES

DAILY SAMPLE AND ANALYSIS REPORT

Date: 1-7-93 Sample Location: Explosion Berm

Sample Number: Stockpile #7 + #8 Time: 10:45 am / 3:30 pm

Notes: Collected two - five part composite samples of the treated soil. These samples were analyzed for TCLP silver. The lay down area is shown below.



AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
ANALYTICAL REPORT
O'BRIEN & GERE
PROJECT: NOS INDIAN HEAD
TCLP SILVER
OBG-0208
January 20, 1993

AMERICAN ENVIRONMENTAL NETWORK, INC.

9151 Rumsey Road Suite 150, Columbia, MD 21045-1992
(410) 730-8525 Fax (410) 997-2586

January 20, 1993

Client: O'Brien & Gere

Project: NOS-Indian Head MD

Case: OBG-0208

Analysis: TCLP Silver

Client ID	AENM ID	Date Sampled	Date Received	Date Analyzed
STOCKPILE #9	739	01/14/93	01/18/93	01/20/93
STOCKPILE #10	740	01/14/93	01/18/93	01/20/93

Two soil samples were received and analyzed for TCLP Silver. TCLP results are reported in units of $\mu g/l$ in the Leachate.

All quality control met standard laboratory criteria.

This report consists specifically of tabulated sample and QC results.

If you have any further questions or if more information is needed please feel free to contact Ms. Kristina Yamarik (410)730-8525.

Report Released By

Joseph Dembowski
Inorganic Laboratory Manager

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
TCLP METALS

QCLEVEL 2
CLIENT: O'BRIEN & GERE
DATE: 20-Jan-93
AENM SAMPLE #: 739
CLIENT SAMPLE #: STOCKPILE #9
UNITS: ug/L in LEACHATE

ANALYTE	METHOD	REPORT LIMIT	SAMPLE RESULT
SILVER	6010	500	<500

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND

TCLP METALS

QCLEVEL 2

CLIENT: O'BRIEN & GERE

DATE: 20-Jan-93

AENM SAMPLE #: 740

CLIENT SAMPLE #: STOCKPILE #10

UNITS: ug/L in LEACHATE

ANALYTE	METHOD	REPORT LIMIT	SAMPLE RESULT
SILVER	6010	500	<500

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
METHOD BLANK AND %RECOVERY LCS

CLIENT: O'BRIEN & GERE

QCLEVEL: 2
DATE: 20-Jan-93

UNITS: ug/L IN LEACHATE

ANALYTE	METHOD	METHOD BLANK	% RECOVERY LABORATORY CONTROL SAMPLE
SILVER	6010	<500	89

[illegible]
R - 1[illegible]93
D - 1/19/93
Loc - 20
QC - 2

AMERICAN ENVIRONMENTAL NETWORK, INC.

AMERICAN ENVIRONMENTAL NETWORK, INC.
9151 Rumsey Road, Columbia, MD 21045
(410) 730-8525

CHAIN OF CUSTODY RECORD

PROJECT: AB JOWCH - Indian Head (OBG Tech)

SAMPLERS: (Signature) Carolyn Miller

SAMPLE NUMBER	DATE	TIME	MATRIX	NO. CONTAINERS	ANALYSIS REQUIRED: TCLP Silver		ACN #								REMARKS OR SAMPLE LOCATION	PRESERVATION: ICED	PRESERVATION: SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN
Stockpile #9	1/14/93	10:20	soil	1	X		739								RUSH		
Stockpile #10	1/14/93	3:00	soil	1	X		740										

Relinquished by: (Signature) ①	Date / Time	Received by: (Signature)	Relinquished by: (Signature) ④	Date / Time	Shipped via:
Thomas Wehle	1-15-93 / 3:40	Dina Minelli			
Relinquished by: (Signature) ②	**Date / Time**	**Received by: (Signature)**	**Received for Laboratory by: (Signature)**	**Date / Time**	**Shipping Ticket No.**
			Whitney Plewnik	1/15/93 / 3:25p	
Relinquished by: (Signature) ③	**Date / Time**	**Received by: (Signature)**	**Remarks:**		

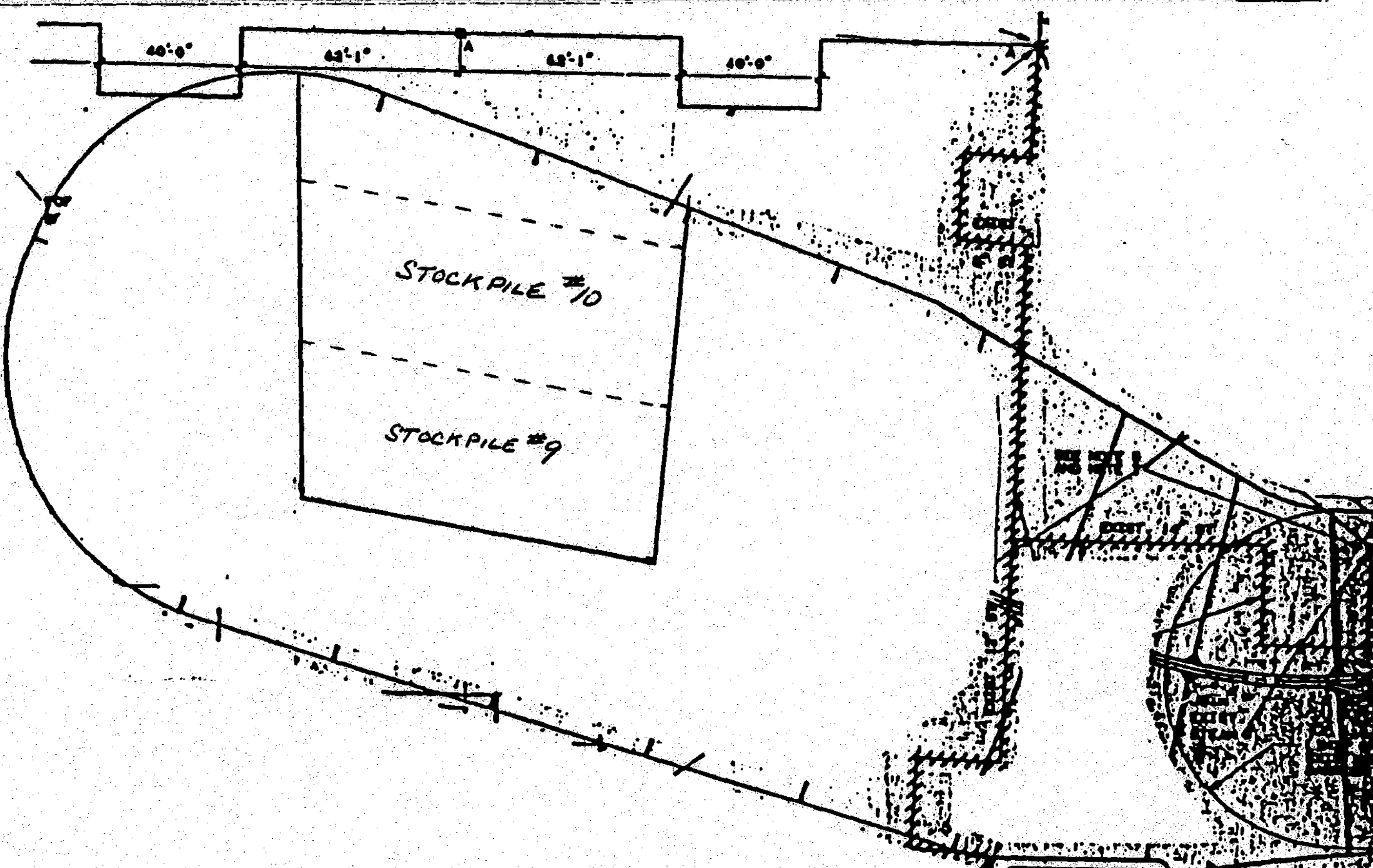
OBG TECHNICAL SERVICES

DAILY SAMPLE AND ANALYSIS REPORT

Date: 1-14-93 Sample Location: explosion berm

Sample Number: STOCKPILE #9 / #10 Time: 10:20 AM / 3:00 pm

Notes: Collected and analized the treated soil for TCLP silver. Stockpile was spread as show below in the laydown area.



AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
ANALYTICAL REPORT
O'BRIEN & GERE
PROJECT: INDIAN HEAD
TCLP SILVER, TOTAL SILVER, AND TSS
OBG--0209
January 22, 1993

AMERICAN ENVIRONMENTAL NETWORK, INC.

9151 Rumsey Road Suite 150, Columbia, MD 21045-1992
(410) 730-8525 Fax (410) 997-2586

January 22, 1993

Client: O'Brien & Gere

Project: Indian Head MD

Case: OBG--0209

Analysis: TCLP Silver, Total Silver, and TSS

Client ID	AENM ID	Date Sampled	Date Received	Date Analyzed
STOCK PILE #11	908	01/15/93	01/20/93	01/21-01/22/93
STOCK PILE #12	909	01/16/93	01/20/93	01/21-01/22/93
STOCK PILE #13	910	01/16/93	01/20/93	01/21-01/22/93
STOCK PILE #14	911	01/16/93	01/20/93	01/21-01/22/93
STOCK PILE #15	912	01/16/93	01/20/93	01/21-01/22/93
STOCK PILE #16	913	01/17/93	01/20/93	01/21-01/22/93
STOCK PILE #17	914	01/18/93	01/20/93	01/21-01/22/93
COMPOSITE #3	915	01/18/93	01/20/93	01/21-01/22/93
TRIP BLANK	916	01/18/93	01/20/93	01/21-01/22/93

Seven soil samples were received and analyzed for TCLP Silver and one water sample was received and analyzed for Total Silver and TSS (160.2). TCLP results are reported in units of $\mu g/l$ in the Leachate.

All quality control met standard laboratory criteria.

This report consists specifically of tabulated sample and QC results.

If you have any further questions or if more information is needed please feel free to contact Ms. Kristina Yamarik (410)730-8525.

Report Released By

Joseph Dembowski
Inorganic Laboratory Manager

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
ANALYTICAL REPORT

CLIENT: O'BRIEN & GERE

PROJECT: INDIAN HEAD

REPORT PREPARED BY ______

CONTRACT NO: OBG--0209

DATA RELEASED BY ______

REPORTING DATE: 22-Jan-93

MATRIX: WATER

****

CLIENT ID	AENM ID	TSS
COMPOSITE #3	915	<4 mg/l
TRIP BLANK	916	HOLD

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
INORGANIC DATA ANALYSIS

QCLEVEL 2
DATE: 22-Jan-93

CLIENT: OBG--0209
AENM SAMPLE #: 915
CLIENT SAMPLE #: COMPOSITE #3

WATER UNITS: ug/L = PPB

ANALYTE	METHOD	REPORT LIMIT	SAMPLE RESULT
SILVER	6010	10	<10

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND

METHOD BLANK AND %RECOVERY LCS

QCLEVEL: 2

CLIENT: OBG--0209

DATE: 22-Jan-93

WATER UNITS: ug/L = PPB

ANALYTE	METHOD	METHOD BLANK	% RECOVERY LABORATORY CONTROL SAMPLE
SILVER	6010	<10	96

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
TCLP METALS

QCLEVEL 2
DATE: 22-Jan-93

CLIENT: OBG--0209
AENM SAMPLE #: 908
CLIENT SAMPLE #: STOCK PILE #11

UNITS: ug/L in LEACHATE

ANALYTE	METHOD	REPORT LIMIT	SAMPLE RESULT
SILVER	6010	500	<500

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
TCLP METALS

QCLEVEL 2
DATE: 22-Jan-93

CLIENT: OBG--0209
AENM SAMPLE #: 909
CLIENT SAMPLE #: STOCK PILE #12

UNITS: ug/L in LEACHATE

ANALYTE	METHOD	REPORT LIMIT	SAMPLE RESULT
SILVER	6010	500	<500

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
TCLP METALS

QCLEVEL 2
CLIENT: OBG--0209
DATE: 22-Jan-93
AENM SAMPLE #: 910
CLIENT SAMPLE #: STOCK PILE #13
UNITS: ug/L in LEACHATE

ANALYTE	METHOD	REPORT LIMIT	SAMPLE RESULT
SILVER	6010	500	<500

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
TCLP METALS

QCLEVEL 2
CLIENT: OBG--0209
DATE: 22-Jan-93
AENM SAMPLE #: 911
CLIENT SAMPLE #: STOCK PILE #14
UNITS: ug/L in LEACHATE

ANALYTE	METHOD	REPORT LIMIT	SAMPLE RESULT
SILVER	6010	500	<500

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
TCLP METALS

QCLEVEL 2
CLIENT: OBG--0209
DATE: 22-Jan-93
AENM SAMPLE #: 912
CLIENT SAMPLE #: STOCK PILE #15
UNITS: ug/L in LEACHATE

ANALYTE	METHOD	REPORT LIMIT	SAMPLE RESULT
SILVER	6010	500	<500

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
TCLP METALS

QCLEVEL 2
CLIENT: OBG--0209
DATE: 22-Jan-93
AENM SAMPLE #: 913
CLIENT SAMPLE #: STOCK PILE #16
UNITS: ug/L in LEACHATE

ANALYTE	METHOD	REPORT LIMIT	SAMPLE RESULT
SILVER	6010	500	<500

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
TCLP METALS

QCLEVEL 2
DATE: 22-Jan-93

CLIENT: OBG--0209
AENM SAMPLE #: 914
CLIENT SAMPLE #: STOCK PILE #17

UNITS: ug/L in LEACHATE

ANALYTE	METHOD	REPORT LIMIT	SAMPLE RESULT
SILVER	6010	500	<500

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
METHOD BLANK AND %RECOVERY LCS

QCLEVEL: 2

CLIENT: OBG--0209

DATE: 22-Jan-93

UNITS: ug/L IN LEACHATE

ANALYTE	METHOD	METHOD BLANK	% RECOVERY LABORATORY CONTROL SAMPLE
SILVER	6010	<500	95

R 1.13
15 143
LOC - 25
GC - 2

AMERICAN ENVIRONMENTAL NETWORK, INC.

CHAIN OF CUSTODY RECORD

AMERICAN ENVIRONMENTAL NETWORK, INC.
9151 Rumsey Road, Columbia, MD 21045
(410) 730-8525

PROJECT Jowett (Indian Head) Obg Tech

SAMPLERS: (Signature) Caroline Miller

SAMPLE NUMBER	DATE	TIME	MATRIX	NO. CONTAINERS	TCLP Silver	TOTAL SILVER	TSS	AEN #	REMARKS OR SAMPLE LOCATION	ICED	SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN
Stockpile #11	1/15/93	400p	Soil	1	X			908	☆ Rush ☆		N/A
Stockpile #12	1/16/93	930a	Soil	1	X			909			
Stockpile #13	1/16/93	1200p	Soil	1	X			910			
Stockpile #14	1/16/93	300p	Soil	1	X			911			
Stockpile #15	1/16/93	400p	Soil	1	X			912			
STOCK PILE #16	1/17/93	2:00p	SOIL	1	X			913			
STOCKPILE #17	1-18-93	1:30p	SOIL	1	X			914			
COMPOSITE #3	1-18-93	5:00p	WATER	2		X	X	915			HNO3
TRIP BLANK	1-18-93	5:00p	WATER	1				916	40cD		

Relinquished by: (Signature) ①	Date / Time	Received by: (Signature)	Relinquished by: (Signature) ④	Date / Time	Shipped via:
X [signature]	1/19/93 1515	[signature]	[signature]		
Relinquished by: (Signature) ②	**Date / Time**	**Received by: (Signature)**	**Received for Laboratory by: (Signature)**	**Date / Time**	**Shipping Ticket No.**
			[signature]	1/20/93 7:20	
Relinquished by: (Signature) ③	**Date / Time**	**Received by: (Signature)**	**Remarks:**		

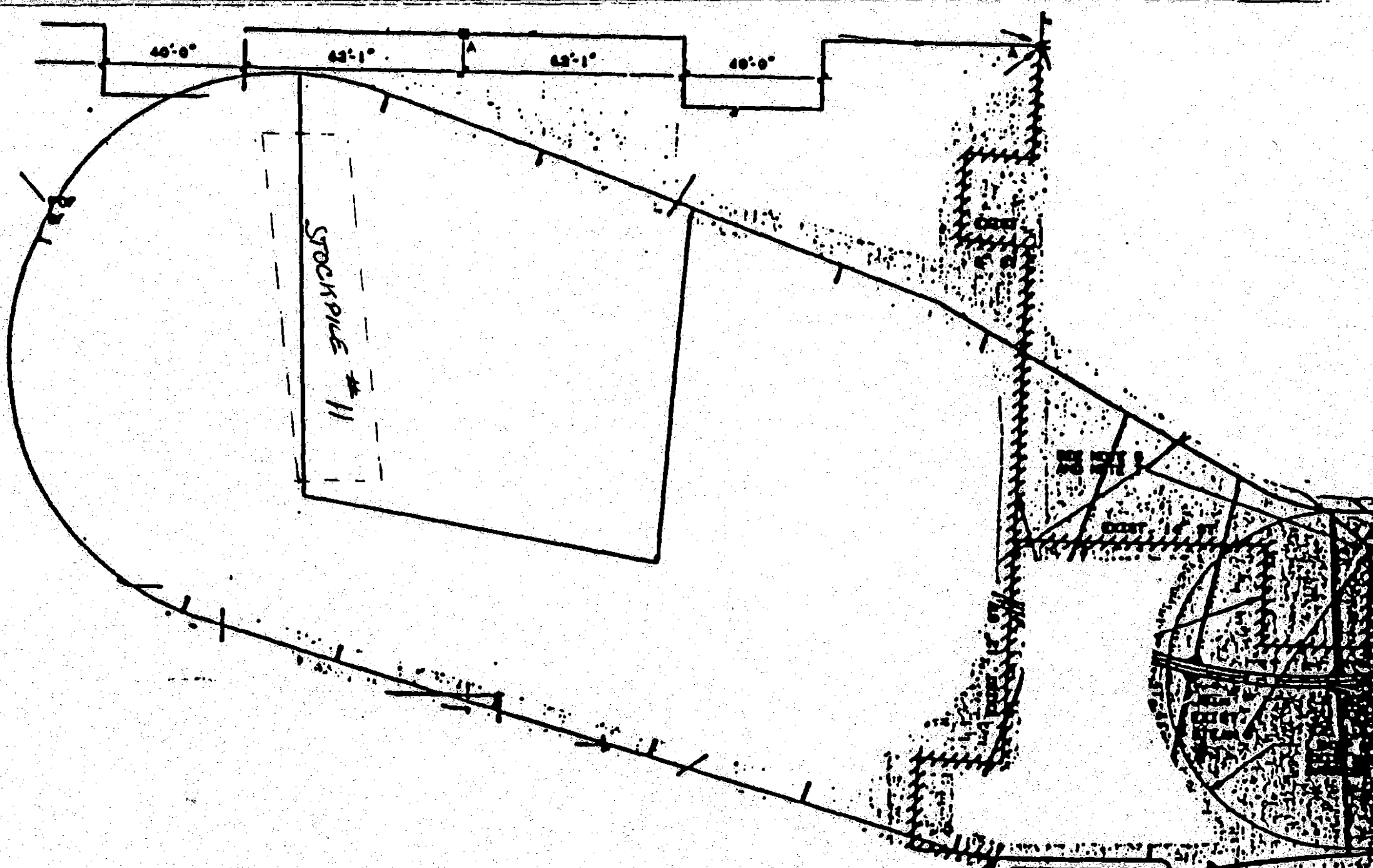
OBG TECHNICAL SERVICES

DAILY SAMPLE AND ANALYSIS REPORT

Date: 1-15-93 Sample Location: Explosion Berm

Sample Number: Stockpile #11 Time: 4:00pm

Notes: Collected one - five part composite sample of the treated soil. This soil sample was analyzed for TCLP silver. Stockpiled soils were spread as shown below.



OBG TECHNICAL SERVICES

DAILY SAMPLE AND ANALYSIS REPORT

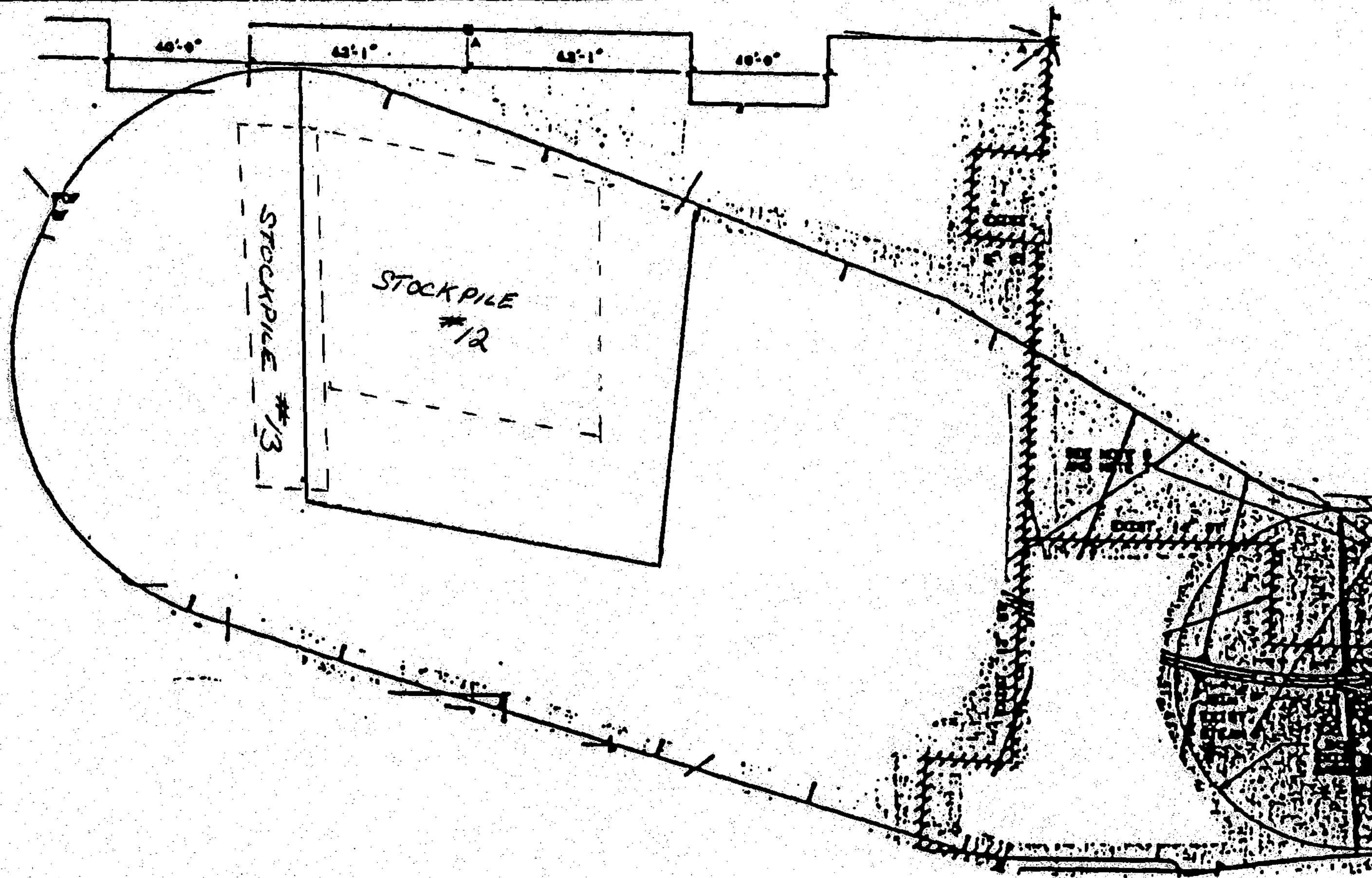
Date: 1-16-93

Sample Location: Explosion Berm

Sample Number: Stockpile #12 + #13

Time: 9:30am / 12:00 noon

Notes: Collected and sampled two - five part composite soil samples. The soil was analyzed for TCLP silver. The treated soil stockpiles were spread as shown below.



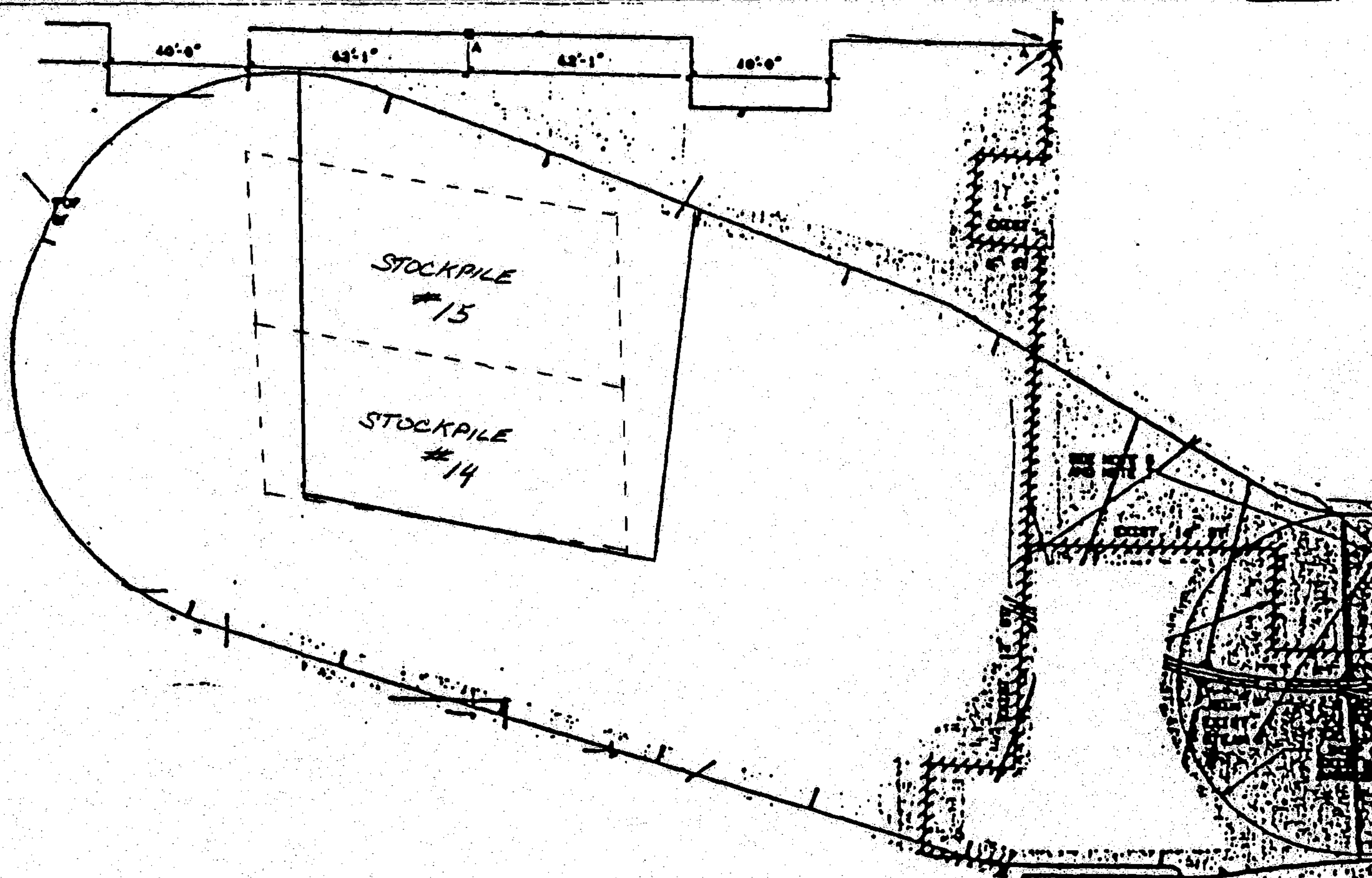
OBG TECHNICAL SERVICES

DAILY SAMPLE AND ANALYSIS REPORT

Date: 1-16-93 Sample Location: Explosion Berm

Sample Number: Stockpile #14-#15 Time: 3:00pm / 4:00pm

Notes: Collected two - five part composite soil sample from the treated soil stockpiles and analyzed the sample for TCLP silver. The stockpiles were spread as shown below.



OBG TECHNICAL SERVICES

DAILY SAMPLE AND ANALYSIS REPORT

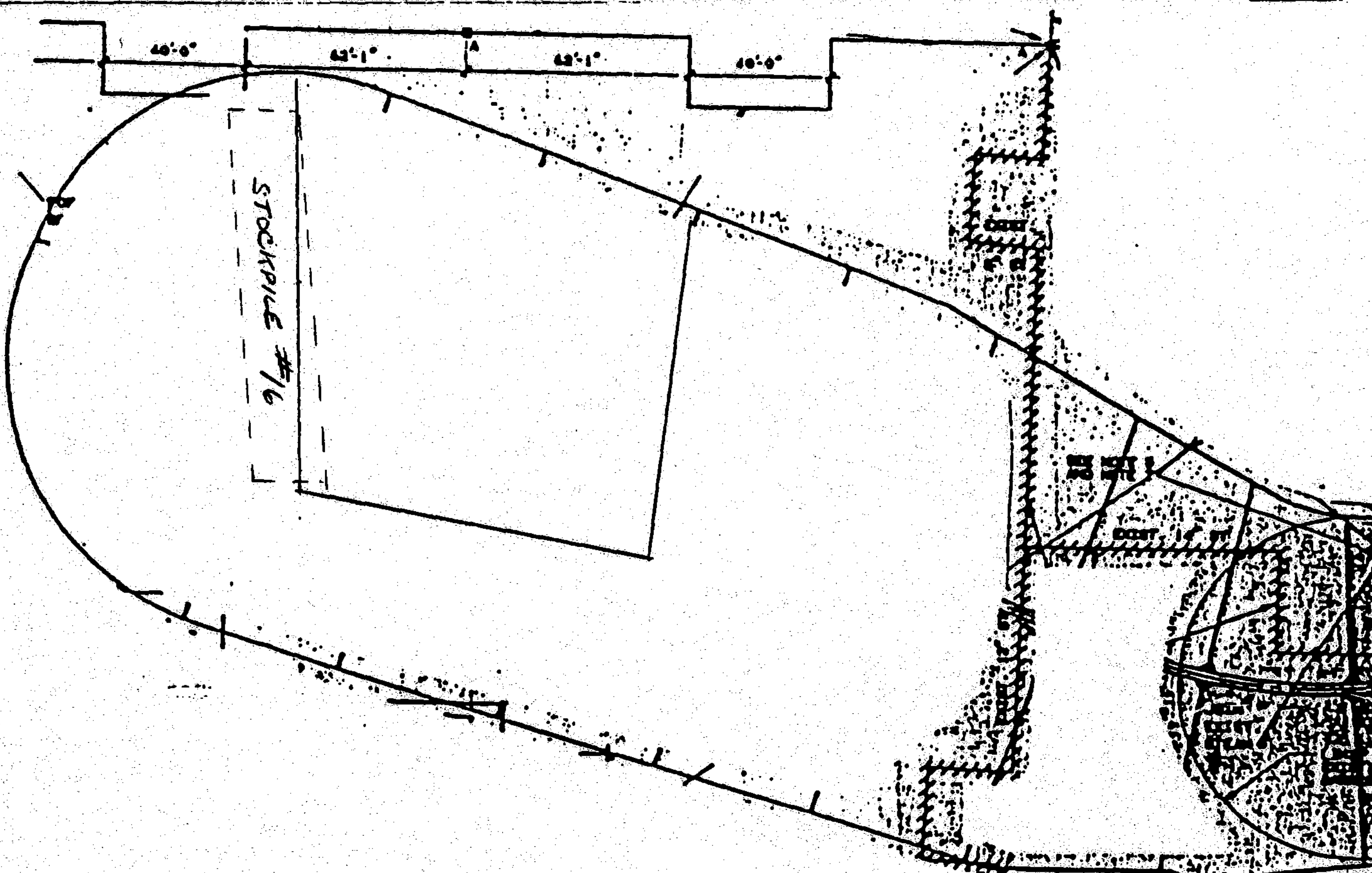
Date: 1-17-93

Sample Location: Explosion Berm

Sample Number: Stockpile #16

Time: 2:00 pm

Notes: Collected one - five part composite sample and analized the sample for TCLP silver. The treated soil was spread as shown below.



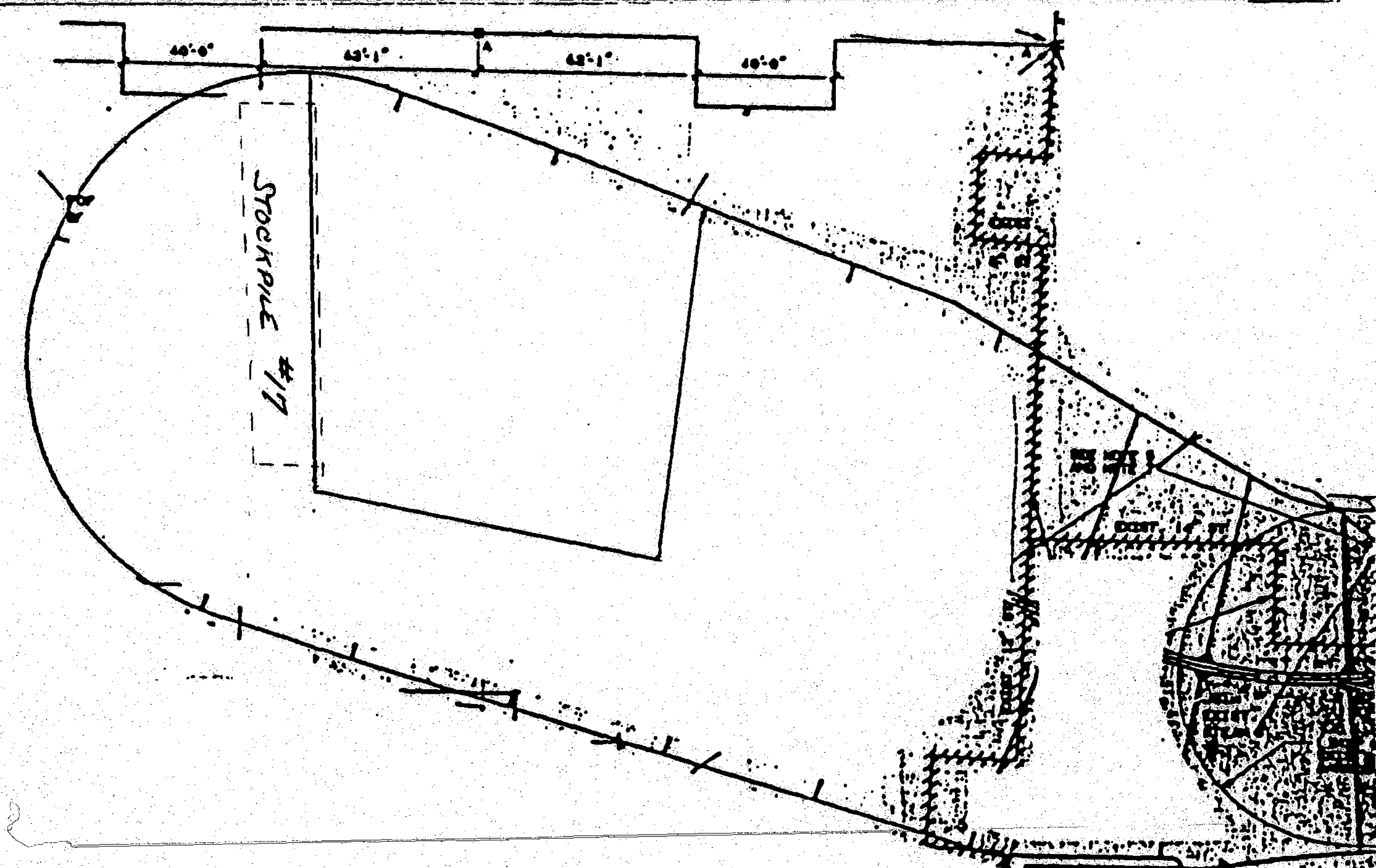
OBG TECHNICAL SERVICES

DAILY SAMPLE AND ANALYSIS REPORT

Date: 1-18-93 Sample Location: Explosion Berm

Sample Number: Stockpile #17 Time: 1:30 pm

Notes: Collected one - five part composite sample and analized the sample for TCLP silver. The treated soil was spread as shown below.



AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
ANALYTICAL REPORT
O'BIREN & GERE
PROJECT: N.O.S. INDIAN HEAD MD
TCLP SILVER & TSS
OBG-~~0133~~ 0202
December 15, 1992

AMERICAN ENVIRONMENTAL NETWORK, INC.

9151 Rumsey Road Suite 150, Columbia, MD 21045-1992
(410) 730-8525 Fax (410) 997-2586

December 15, 1992

Client: O'Brien & Gere

Project: N.O.S. Indian Head MD

Case: OBG-~~0133~~ 0202

Analysis: TCLP Silver & TSS

Client ID	AENM ID	Date Sampled	Date Received	Date Analyzed
STOCK PILE #1	17624	12/08/92	12/08/92	12/10/92
COMPOSITE #1	17625	12/08/92	12/08/92	12/10/92

One soil sample was received and analyzed for TCLP Silver. One water sample was received and analyzed for TCLP Silver and TSS. Results are reported in units of μg/l in the Leachate for TCLP Silver and MG/L for TSS.

All quality control met standard laboratory criteria.

This report consists specifically of tabulated sample results.

If you have any further questions or if more information is needed please feel free to contact Ms. Kristina Yamarik (410)730-8525.

Report Released By [signature]

Joseph Dembowski
Inorganic Laboratory Manager

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
ANALYTICAL REPORT

CLIENT: O'BRIEN & GERE

PROJECT: N.O.S. Indian Head Md

CONTRACT NO:08G-0133

REPORTING DATE: 15-Dec-92

REPORT PREPARED BY KP

DATA RELEASED BY

MATRIX: WATER

****

CLIENT ID:		COMPOSITE #1
AENM ID:		17625
PARAMETERS	DETECTION LIMIT & UNITS	
TOTAL SUSPENDED SOLIDS	4.0 MG/L	550 MG/L

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
TCLP METALS

QCLEVEL 2
DATE: 15-Dec-92

CLIENT: O'BRIEN & GERE
AENM SAMPLE #: 17624
CLIENT SAMPLE #: STOCK PILE #1

UNITS: ug/L in LEACHATE

ANALYTE	METHOD	REPORT LIMIT	SAMPLE RESULT
SILVER	6010	500	<500

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
TCLP METALS

QCLEVEL 2
DATE: 15-Dec-92

CLIENT: O'BRIEN & GERE
AENM SAMPLE #: 17625
CLIENT SAMPLE #: COMPOSITE #1

UNITS: ug/L in LEACHATE

ANALYTE	METHOD	REPORT LIMIT	SAMPLE RESULT
SILVER	6010	500	<500

PROJECT: NOS - INDIANHEAD, MD

SAMPLERS: (Signature) Thomas B Wahle

SAMPLE NUMBER	DATE	TIME	MATRIX	NO. CONTAINERS	TCLP SILVER	TOTAL SUSPENDED SOLIDS	TOTAL SILVER	HOLD - ARCHIVE		REMARKS OR SAMPLE LOCATION	ICED	PRESERVATION: SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN
STOCKPILE #1	12-8-92	1:10pm	SOIL	1	✓				11624	RUSH		NA
COMPOSITE #1	12-8-92	1:15pm	WATER	1		✓	✓		11625			NA
TRIP BLANK	12-8-92	1:15pm	WATER	1				✓	11626	HOLD		N/A

Relinquished by: (Signature) ①	Date / Time	Received by: (Signature)	Relinquished by: (Signature) ④	Date / Time	Shipped via:
Thomas B Wahle	12-8-92 1:20	[signature] 12/8/92			
Relinquished by: (Signature) ②	**Date / Time**	**Received by: (Signature)**	**Received for Laboratory by: (Signature)**	**Date / Time**	**Shipping Ticket No.**
		Douglas [illegible]			
Relinquished by: (Signature) ③	**Date / Time**	**Received by: (Signature)**	**Remarks:**		

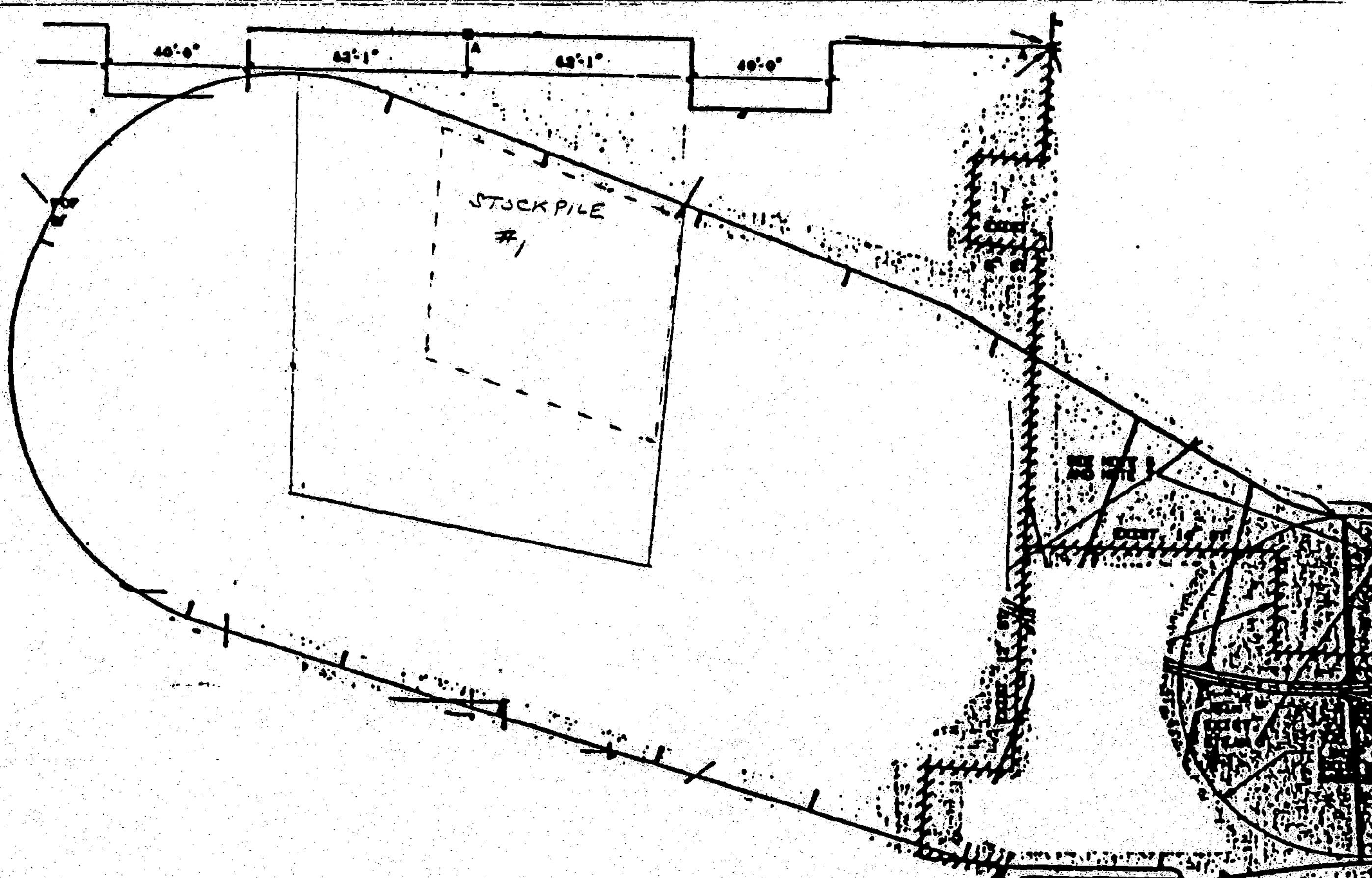
OBG TECHNICAL SERVICES

DAILY SAMPLE AND ANALYSIS REPORT

Date: 12-8-92 Sample Location: Explosion Berm

Sample Number: Stockpile #1 Time: 1:10 pm

Notes: Sampled approximately 100 cy's of treated soil before it was spread. A five part composite sample was collected and sampled for TCLP Silver. The lay down area is shown below.



AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
ANALYTICAL REPORT
O'BRIEN & GERE
PROJECT: NOS INDIAN HEAD MD
TCLP SILVER AND TSS
OBG--0206
January 11, 1993

AMERICAN ENVIRONMENTAL NETWORK, INC.

9151 Rumsey Road Suite 150, Columbia, MD 21045-1992
(410) 730-8525 Fax (410) 997-2586

January 11, 1993

Client: O'Brien & Gere

Project: NOS-Indian Head MD

Case: OBG-0206

Analysis: TCLP Silver and TSS

Client ID	AENM ID	Date Sampled	Date Received	Date Analyzed
STOCKPILE #6	306	01/06/93	01/07/93	01/08-01/11/93

One soil sample was received and analyzed for TCLP Silver and TSS (160.2). TCLP results are reported in units of µg/l in the Leachate.

All quality control met standard laboratory criteria.

This report consists specifically of tabulated sample and QC results.

If you have any further questions or if more information is needed please feel free to contact Ms. Kristina Yamarik (410)730-8525.

Report Released By

Joseph Dembowski
Inorganic Laboratory Manager

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
METHOD BLANK AND %RECOVERY LCS

QCLEVEL: 2
CLIENT: OBG--0206
DATE: 11-Jan-93

UNITS: ug/L IN LEACHATE

ANALYTE	METHOD	METHOD BLANK	% RECOVERY LABORATORY CONTROL SAMPLE
SILVER	6010	<500	113

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
TCLP METALS

QCLEVEL 2
DATE: 11-Jan-93

CLIENT: OBG--0206
AENM SAMPLE #: 306
CLIENT SAMPLE #: STOCKPILE #6

UNITS: ug/L in LEACHATE

ANALYTE	METHOD	REPORT LIMIT	SAMPLE RESULT
SILVER	6010	500	<500

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
ANALYTICAL REPORT

CLIENT: O'BRIEN & GERE

PROJECT: NOS INDIAN HEAD MD

CONTRACT NO:OBG-0206

REPORTING DATE: 11-Jan-93

REPORT PREPARED BY

DATA RELEASED BY

MATRIX: WATER

****

CLIENT ID:		COMPOSITE #2A
AENM ID:		307
PARAMETERS	DETECTION LIMIT & UNITS	
TSS	4.0 MG/L	637

R. 1/7/93
D. 1/11/9
QC. 2
LOC. 1

AMERICAN ENVIRONMENTAL NETWORK, INC.

AMERICAN ENVIRONMENTAL NETWORK, INC.
9151 Rumsey Road, Columbia, MD 21045
(410) 730-8525

CHAIN OF CUSTODY RECORD

PROJECT: NOS Indian Head, MD

SAMPLERS: (Signature) Claudine W. Miller

SAMPLE NUMBER	DATE	TIME	MATRIX	NO. CONTAINERS	TCLP Silver	TSS	← AEN #	REMARKS OR SAMPLE LOCATION	ICED	SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN
Stockpile #6	1/6/93	12:45p	Soil	1	✓		306	RUSH		
Composite #2A	1/6/93	1:00p	Water	1		✓	307			

Relinquished by: (Signature) ①	Date / Time	Received by: (Signature)	Relinquished by: (Signature) ④	Date / Time	Shipped via:
Claudine Miller	1/7/93 9:15am	[signature] 1/7/93			
Relinquished by: (Signature) ②	**Date / Time**	**Received by: (Signature)**	**Received for Laboratory by: (Signature)**	**Date / Time**	**Shipping Ticket No.**
			Douglas C. Goldby	1/7/93 10:55	
Relinquished by: (Signature) ③	**Date / Time**	**Received by: (Signature)**	**Remarks:**		

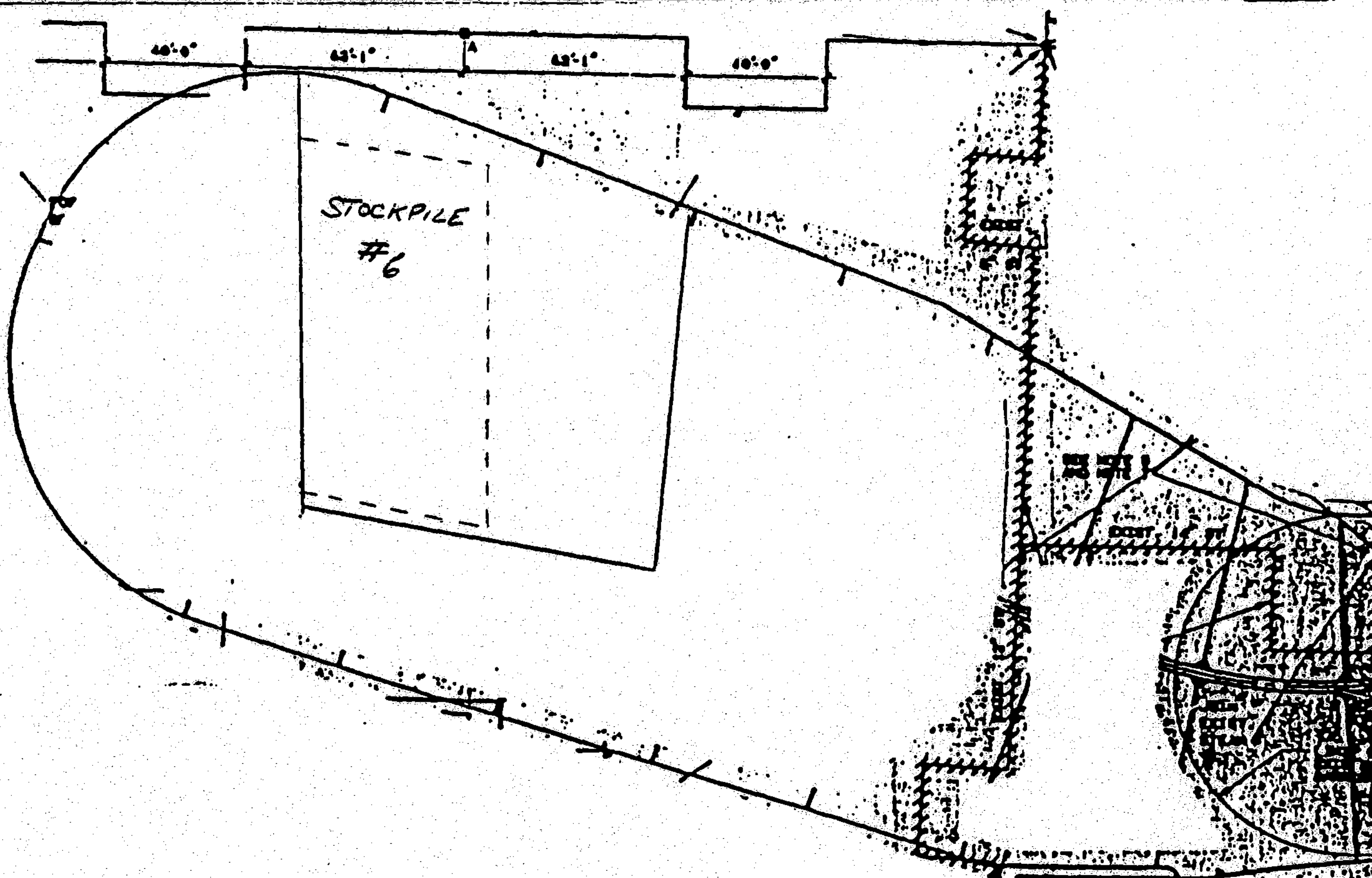
OBG TECHNICAL SERVICES

DAILY SAMPLE AND ANALYSIS REPORT

Date: 1-6-93 Sample Location: Explosive Berm

Sample Number: Stockpile #6 Time: 12:45 pm

Notes: Collected a five part composite sample of the treated soil. This sample was analyzed for TCLP silver. The lay down area is shown below



AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
ANALYTICAL REPORT
O'BRIEN & GERE
PROJECT: OBG TECHNICAL SERVICES
TCLP SILVER
OBG-0203
December 16, 1992

AMERICAN ENVIRONMENTAL NETWORK, INC.

9151 Rumsey Road Suite 150, Columbia, MD 21045-1992
(410) 730-8525 Fax (410) 997-2586

December 16, 1992

Client: O'Brien & Gere

Project: OBG Technical Services

Case: OBG-0203

Analysis: TCLP Silver

Client ID	AENM ID	Date Sampled	Date Received	Date Analyzed
STOCKPILE #2	17749	12/14/92	12/14/92	12/16/92

One soil sample was received and analyzed for TCLP Silver. Results are reported in units of µg/l in the Leachate.

All quality control met standard laboratory criteria.

This report consists specifically of tabulated sample results.

If you have any further questions or if more information is needed please feel free to contact Ms. Kristina Yamarik (410)730-8525.

Report Released By [signature]
Joseph Dembowski
Inorganic Laboratory Manager

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
TCLP METALS
METHOD BLANK AND %RECOVERY LCS

QCLEVEL: 2

CLIENT: O'BRIEN & GERE

DATE: 16-Dec-92

UNITS: ug/L IN LEACHATE

ANALYTE	METHOD	METHOD BLANK	% RECOVERY LABORATORY CONTROL SAMPLE
SILVER	6010	<500	108

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
TCLP METALS

QCLEVEL 2
CLIENT: O'BRIEN & GERE
DATE: 16-Dec-92
AENM SAMPLE #: 17749
CLIENT SAMPLE #: STOCKPILE #2
UNITS: ug/L in LEACHATE

ANALYTE	METHOD	REPORT LIMIT	SAMPLE RESULT
SILVER	6010	500	<500

PROJECT: N.O.S. INDIAN HEAD, MD

SAMPLERS: (Signature) Thomas B. Wehle

SAMPLE NUMBER	DATE	TIME	MATRIX	NO. CONTAINERS	ANALYSIS REQUIRED: TCLP SILVER										REMARKS OR SAMPLE LOCATION	PRESERVATION: ICED	PRESERVATION: SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN
STOCKPILE #2	12-14-92	1:15pm	SOIL	1	✓		1	7L	9						*RUSH E Early		—

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Shipped via:
①	12/14/92 / 1430	*Kristina Yamnik	④		
Relinquished by: (Signature)	**Date / Time**	**Received by: (Signature)**	**Received for Laboratory by: (Signature)**	**Date / Time**	**Shipping Ticket No.**
②					
Relinquished by: (Signature)	**Date / Time**	**Received by: (Signature)**	**Remarks:**		
③					

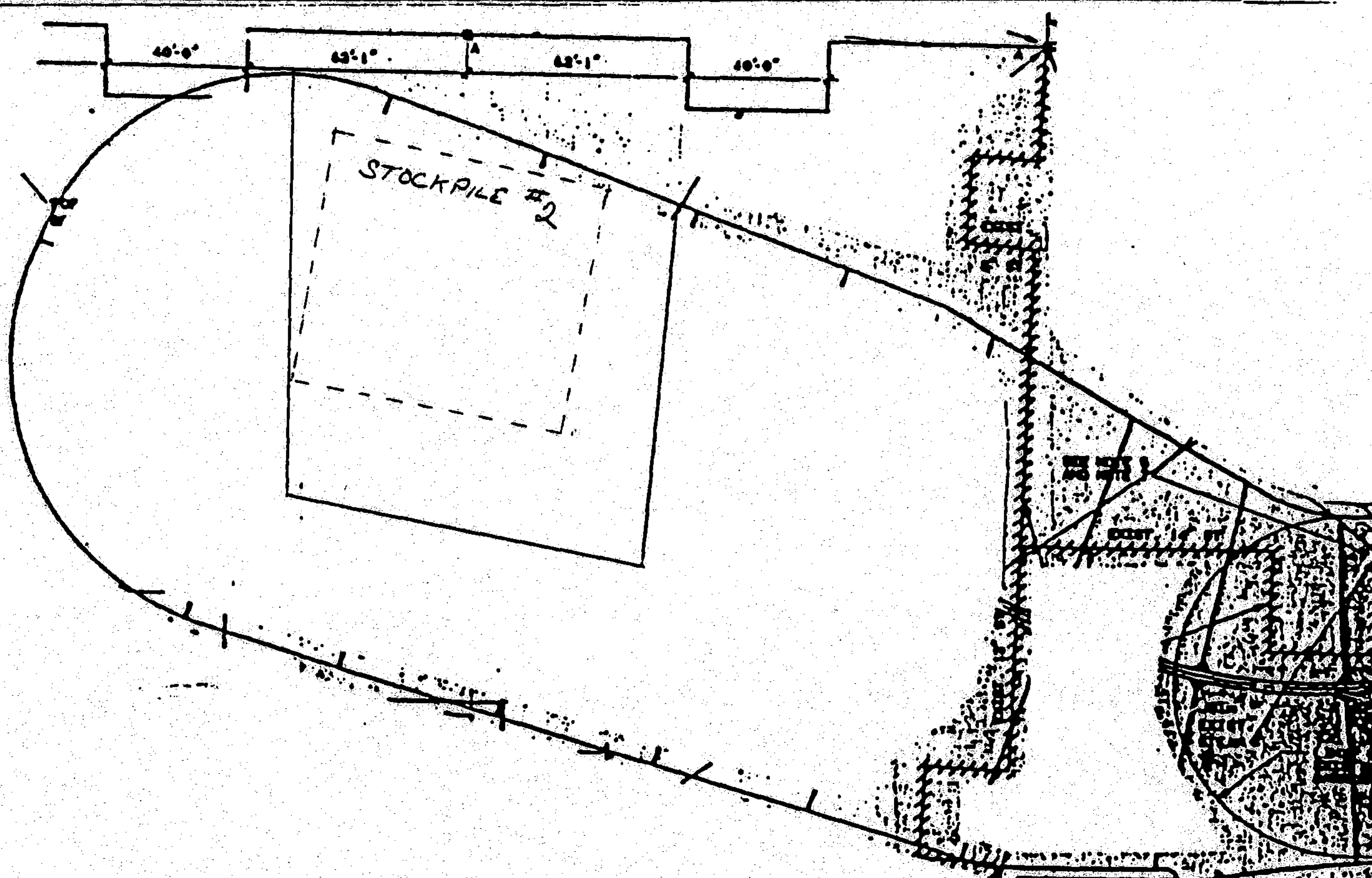
OBG TECHNICAL SERVICES

DAILY SAMPLE AND ANALYSIS REPORT

Date: 12-14-92 Sample Location: Explosion Berm

Sample Number: Stockpile #2 Time: 1:15 pm

Notes: Sampled approximately 100 cy's of treated soil before it was spread. A five part composite sample was collected and sampled for TCLP Silver. The lay down area is shown below.



AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
ANALYTICAL REPORT
O'BRIEN & GERE
PROJECT: NOS INDIAN HEAD MD
TCLP SILVER
OBG--0204
December 18, 1992

AMERICAN ENVIRONMENTAL NETWORK, INC.

9151 Rumsey Road Suite 150, Columbia, MD 21045-1992
(410) 730-8525 Fax (410) 997-2586

December 18, 1992

Client: O'Brien & Gere

Project: NOS Indian Head MD

Case: OBG--0204

Analysis: TCLP Silver

Client ID	AENM ID	Date Sampled	Date Received	Date Analyzed
STOCKPILE #3	17844	12/16/92	12/16/92	12/17/92
STOCKPILE #4	17845	12/16/92	12/16/92	12/17/92

Two soil samples were received and analyzed for TCLP Silver. TCLP Silver results are reported in units of ug/l in the Leachate.

All quality control met standard laboratory criteria.

This report consists specifically of tabulated sample and QC results.

If you have any further questions or if more information is needed please feel free to contact Mrs. Kristina Yamarik (410)730-8525.

Report Released By John Massey for JD
Joseph Dembowski
Inorganic Laboratory Manager

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
TCLP METALS

QCLEVEL 2

CLIENT: OBG--0204
AENM SAMPLE #: 17844
CLIENT SAMPLE #: STOCKPILE #3

DATE: 18-Dec-92

UNITS: ug/L in LEACHATE

ANALYTE	METHOD	REPORT LIMIT	SAMPLE RESULT
SILVER	6010	500	<500

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND

TCLP METALS

QCLEVEL 2

DATE: 18-Dec-92

CLIENT: OBG--0204

AENM SAMPLE #: 17845

CLIENT SAMPLE #: STOCKPILE #4

UNITS: ug/L in LEACHATE

ANALYTE	METHOD	REPORT LIMIT	SAMPLE RESULT
SILVER	6010	500	<500

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
METHOD BLANK AND %RECOVERY LCS

QCLEVEL: 2

CLIENT: OBG--0204

DATE: 18-Dec-92

UNITS: ug/L IN LEACHATE

ANALYTE	METHOD	METHOD BLANK	% RECOVERY LABORATORY CONTROL SAMPLE
SILVER	6010	<500	98

NOS I... ...n Head, MD

SAMPLERS: (Signature) Caroline Miller

SAMPLE NUMBER	DATE	TIME	MATRIX	NO. CONTAINERS	ANALYSIS REQUIRED: TCLP Silver										REMARKS OR SAMPLE LOCATION	ICED	PRESERVATION: SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN
Stockpile #3	12-16-92	1:30p	Soil	1	✓		178	44							Rush		—
Stockpile #4	12-16-92	1:30p	soil	1	✓		178	45							Rush		—

Relinquished by: (Signature) ①	Date / Time	Received by: (Signature)	Relinquished by: (Signature) ④	Date / Time	Shipped via:
Caroline Miller	12-16-92 2:40p 1800	[signature]			

Relinquished by: (Signature) ②	Date / Time	Received by: (Signature)	Received for Laboratory by: (Signature)	Date / Time	Shipping Ticket No.
			[signature]	12/17/92 4:51	

Relinquished by: (Signature) ③	Date / Time	Received by: (Signature)	Remarks:

OBG TECHNICAL SERVICES

DAILY SAMPLE AND ANALYSIS REPORT

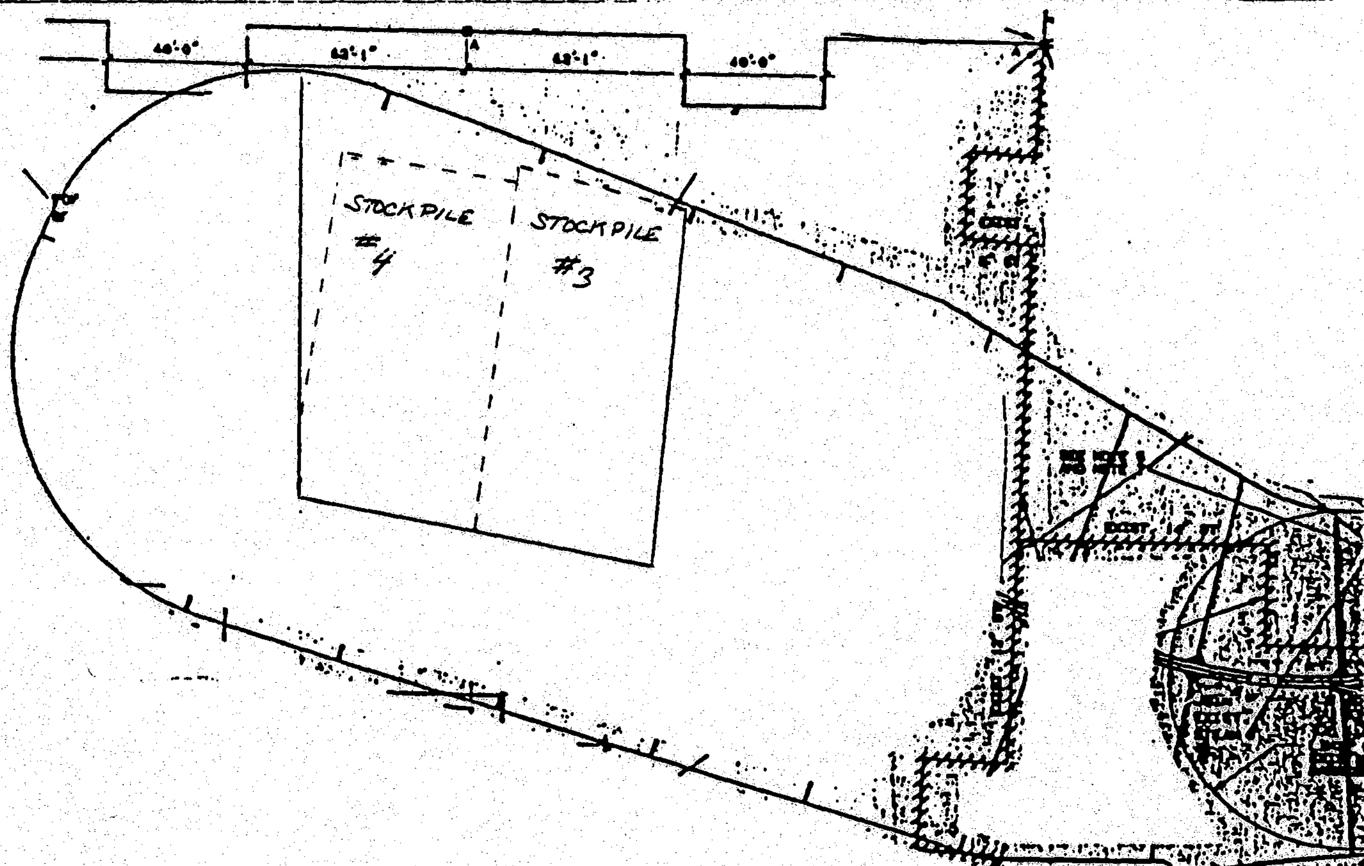
Date: 12-16-92

Sample Location: Explosion Berm

Sample Number: Stockpile #3 + #4

Time: 1:30 pm

Notes: Sampled approximately 200 cy's of treated soil before being spread. Two five part composite samples were collected and sampled for TCLP Silver. The lay down area is shown below.



AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
ANALYTICAL REPORT
O'BRIEN & GERE
PROJECT: NOS-INDIAN HEAD MD
TCLP SILVER, TOTAL SILVER, & TSS
OBG-0205
December 29, 1992

AMERICAN ENVIRONMENTAL NETWORK, INC.

9151 Rumsey Road Suite 150, Columbia, MD 21045-1992
(410) 730-8525 Fax (410) 997-2586

December 29, 1992

Client: O'Brien & Gere

Project: NOS-Indian Head MD

Case: OBG-0205

Analysis: TCLP Silver, Total Silver, and TSS

Client ID	AENM ID	Date Sampled	Date Received	Date Analyzed
STOCKPILE #5	18195	12/22/92	12/22/92	12/28-12/29/92
~~STOCKPILE~~ #2 COMPOSITE #2	18196	12/22/92	12/22/92	12/28-12/29/92

One ~~water~~ Soil sample was received and analyzed for TCLP Silver and one water WATER sample was received and analyzed for Total Silver and TSS (160.2). TCLP results are reported in units of µg/l in the Leachate.

All quality control met standard laboratory criteria.

This report consists specifically of tabulated sample and QC results.

If you have any further questions or if more information is needed please feel free to contact Ms. Kristina Yamarik (410)730-8525.

Report Released By [signature]
Joseph Dembowski
Inorganic Laboratory Manager

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
TCLP METALS
METHOD BLANK AND %RECOVERY LCS

QCLEVEL: 2
CLIENT: O'BRIEN & GERE
DATE: 29-Dec-92

UNITS: ug/L IN LEACHATE

ANALYTE	METHOD	METHOD BLANK	% RECOVERY LABORATORY CONTROL SAMPLE
SILVER	6010	<500	103

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
TCLP METALS

QCLEVEL 2
DATE: 29-Dec-92

CLIENT: O'BRIEN & GERE
AENM SAMPLE #: 18195
CLIENT SAMPLE #: STOCKPILE #5

UNITS: ug/L in LEACHATE

ANALYTE	METHOD	REPORT LIMIT	SAMPLE RESULT
SILVER	6010	500	<500

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
METHOD BLANK AND %RECOVERY LCS

QCLEVEL: 2

CLIENT: O'BRIEN & GERE

DATE: 29-Dec-92

WATER UNITS: ug/L = PPB

ANALYTE	METHOD	METHOD BLANK	% RECOVERY LABORATORY CONTROL SAMPLE
SILVER	6010	<10	104

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
INORGANIC DATA ANALYSIS

QCLEVEL 2
DATE: 29-Dec-92

CLIENT: O'BRIEN & GERE
AENM SAMPLE #: 18196
CLIENT SAMPLE #: COMPOSITE #2

WATER UNITS: ug/L = PPB

ANALYTE	METHOD	REPORT LIMIT	SAMPLE RESULT
SILVER	6010	10	22

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
ANALYTICAL REPORT

CLIENT: O'BRIEN & GERE

PROJECT: NOS-INDIAN HEAD MD

CONTRACT NO:OBG-0205

REPORTING DATE: 29-Dec-92

REPORT PREPARED BY

DATA RELEASED BY

MATRIX: WATER

****

CLIENT ID:		COMPOSITE #2
AENM ID:		18196
PARAMETERS	DETECTION LIMIT & UNITS	
TOTAL SUSPENDED SOLIDS	4.0 MG/L	1320 MG/L

R-2/ 2
D. 1/1 1/92
RC 2
Loc 1

AMERICAN ENVIRONMENTAL NETWORK, INC.

CHAIN OF CUSTODY RECORD

AMERICAN ENVIRONMENTAL NETWORK, INC.
9151 Rumsey Road, Columbia, MD 21045
(410) 730-8525

PROJECT: NOS - Indian Head, MD

SAMPLERS: (Signature) Caroline Mills

SAMPLE NUMBER	DATE	TIME	MATRIX	NO. CONTAINERS	TCLP Silver	Total Suspended Solids	Total Silver	Hold - Archive							REMARKS OR SAMPLE LOCATION	ICED	SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN
Stockpile # 5	12-22-92	7:30a	soil	1	✓				181	95					~~RUSH~~		NA
Composite #2	12-22-92	8:00am	water	1		✓	✓		1 1	16							NA
Trip Blank	12-22-92	8:00am	water	1				✓	1 1	97					Hold		NA
											on Hold						

Relinquished by: (Signature) ①	Date / Time	Received by: (Signature)	Relinquished by: (Signature) ④	Date / Time	Shipped via:
Thomas P. Velch	12/22/92 1305 Pm 3:05	Richard S. Nomeller			
Relinquished by: (Signature) ②	**Date / Time**	**Received by: (Signature)**	**Received for Laboratory by: (Signature)**	**Date / Time**	**Shipping Ticket No.**
			[illegible]		
Relinquished by: (Signature) ③	**Date / Time**	**Received by: (Signature)**	**Remarks:**		

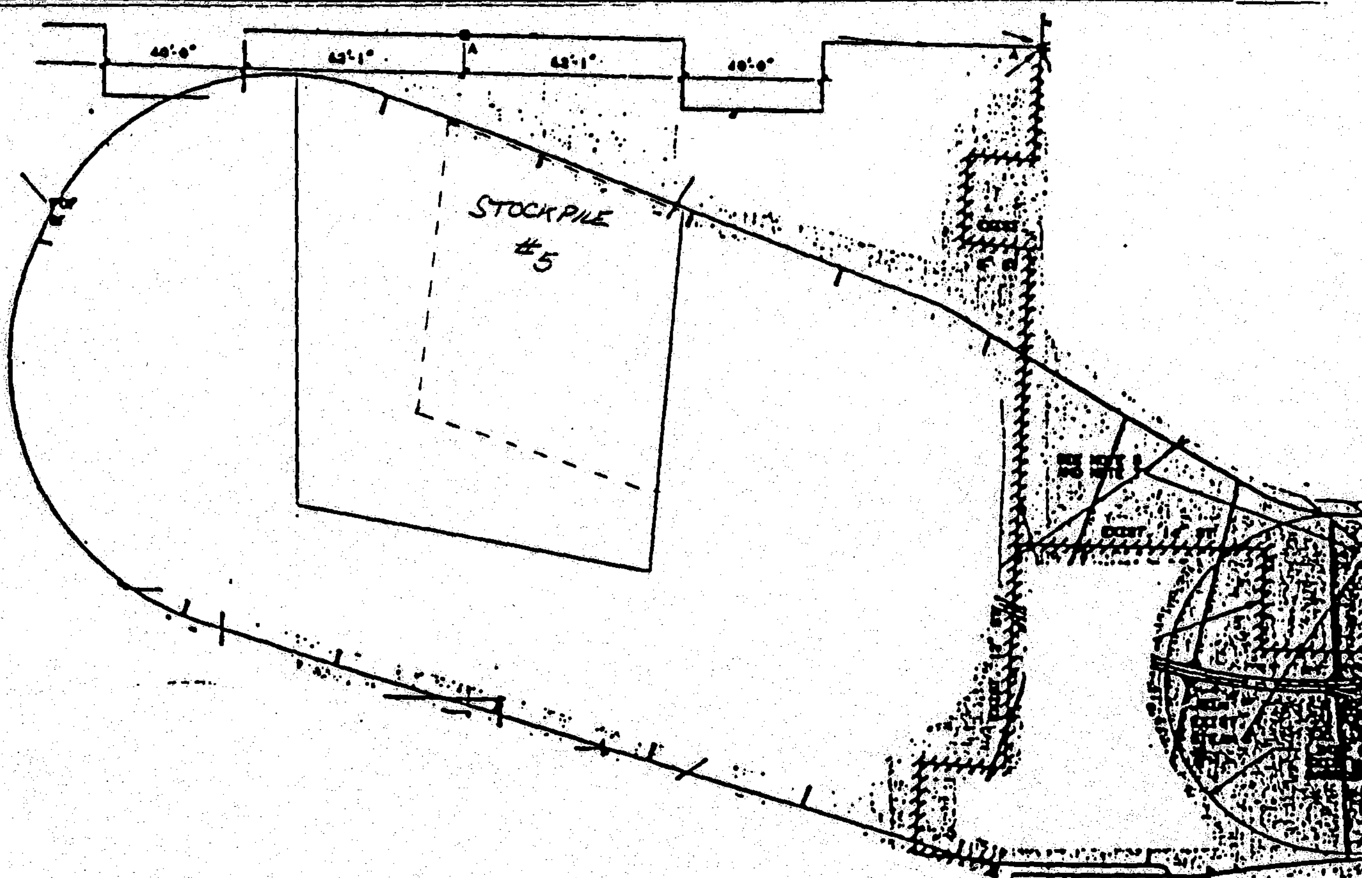
OBG TECHNICAL SERVICES

DAILY SAMPLE AND ANALYSIS REPORT

Date: 12-22-92 Sample Location: Explosion Berm

Sample Number: Stockpile #5 Time: 7:20 am

Notes: Collected a soil sample from approximately 100 cy's of treated soil. A five part composite sample was collected and analyzed for TCLP Silver. The lay down area is shown below.



AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
ANALYTICAL REPORT
O'BRIEN & GERE
PROJECT: NOS INDIAN HEAD MD
TCLP SILVER AND TSS
OBG--0206
January 11, 1993

AMERICAN ENVIRONMENTAL NETWORK, INC.

9151 Rumsey Road Suite 150, Columbia, MD 21045-1992
(410) 730-8525 Fax (410) 997-2586

January 11, 1993

Client: O'Brien & Gere

Project: NOS-Indian Head MD

Case: OBG-0206

Analysis: TCLP Silver and TSS

Client ID	AENM ID	Date Sampled	Date Received	Date Analyzed
STOCKPILE #6	306	01/06/93	01/07/93	01/08-01/11/93

One soil sample was received and analyzed for TCLP Silver and TSS (160.2). TCLP results are reported in units of $\mu g/l$ in the Leachate.

All quality control met standard laboratory criteria.

This report consists specifically of tabulated sample and QC results.

If you have any further questions or if more information is needed please feel free to contact Ms. Kristina Yamarik (410)730-8525.

Report Released By [signature]
Joseph Dembowski
Inorganic Laboratory Manager

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
METHOD BLANK AND %RECOVERY LCS

CLIENT: OBG--0206

QCLEVEL: 2
DATE: 11-Jan-93

UNITS: ug/L IN LEACHATE

ANALYTE	METHOD	METHOD BLANK	% RECOVERY LABORATORY CONTROL SAMPLE
SILVER	6010	<500	113

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
TCLP METALS

QCLEVEL 2

CLIENT: OBG--0206
DATE: 11-Jan-93

AENM SAMPLE #: 306

CLIENT SAMPLE #: STOCKPILE #6
UNITS: ug/L in LEACHATE

ANALYTE	METHOD	REPORT LIMIT	SAMPLE RESULT
SILVER	6010	500	<500

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
ANALYTICAL REPORT

CLIENT: O'BRIEN & GERE

PROJECT: NOS INDIAN HEAD MD

CONTRACT NO:OBG-0206

REPORTING DATE: 11-Jan-93

REPORT PREPARED BY

DATA RELEASED BY

MATRIX: WATER

****

CLIENT ID:		COMPOSITE #2A
AENM ID:		307
PARAMETERS	DETECTION LIMIT & UNITS	
TSS	4.0 MG/L	637

DBG...
R. 1/7/93
D. 1/11/93
QC- 2
LOC- 1

AMERICAN ENVIRONM[...]ITAL NETWORK, INC.

AMERICAN ENVIRONMENTAL NETWORK, INC.
9151 Rumsey Road, Columbia, MD 21045
(410) 730-8525

CHAIN OF CUSTODY RECORD

PROJECT: NOS Indian Head, MD

SAMPLERS: (Signature) Caroline W. Miller

SAMPLE NUMBER	DATE	TIME	MATRIX	NO. CONTAINERS	TCLP Silver	TSS	AEN #							REMARKS OR SAMPLE LOCATION	PRESERVATION ICED	SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN
Stockpile #6	1/6/93	12:45p	Soil	1	✓		306							RUSH		
Composite #2A	1/6/93	1:00p	Water	1		✓	307									

Relinquished by: (Signature) ①	Date / Time	Received by: (Signature)	Relinquished by: (Signature) ④	Date / Time	Shipped via:
Caroline Miller	1/7/93 9:15am	[signature] 1/7/93			
Relinquished by: (Signature) ②	**Date / Time**	**Received by: (Signature)**	**Received for Laboratory by: (Signature)**	**Date / Time**	**Shipping Ticket No.**
			Douglas C. Golby	1/7/93 10:55	
Relinquished by: (Signature) ③	**Date / Time**	**Received by: (Signature)**	**Remarks:**		

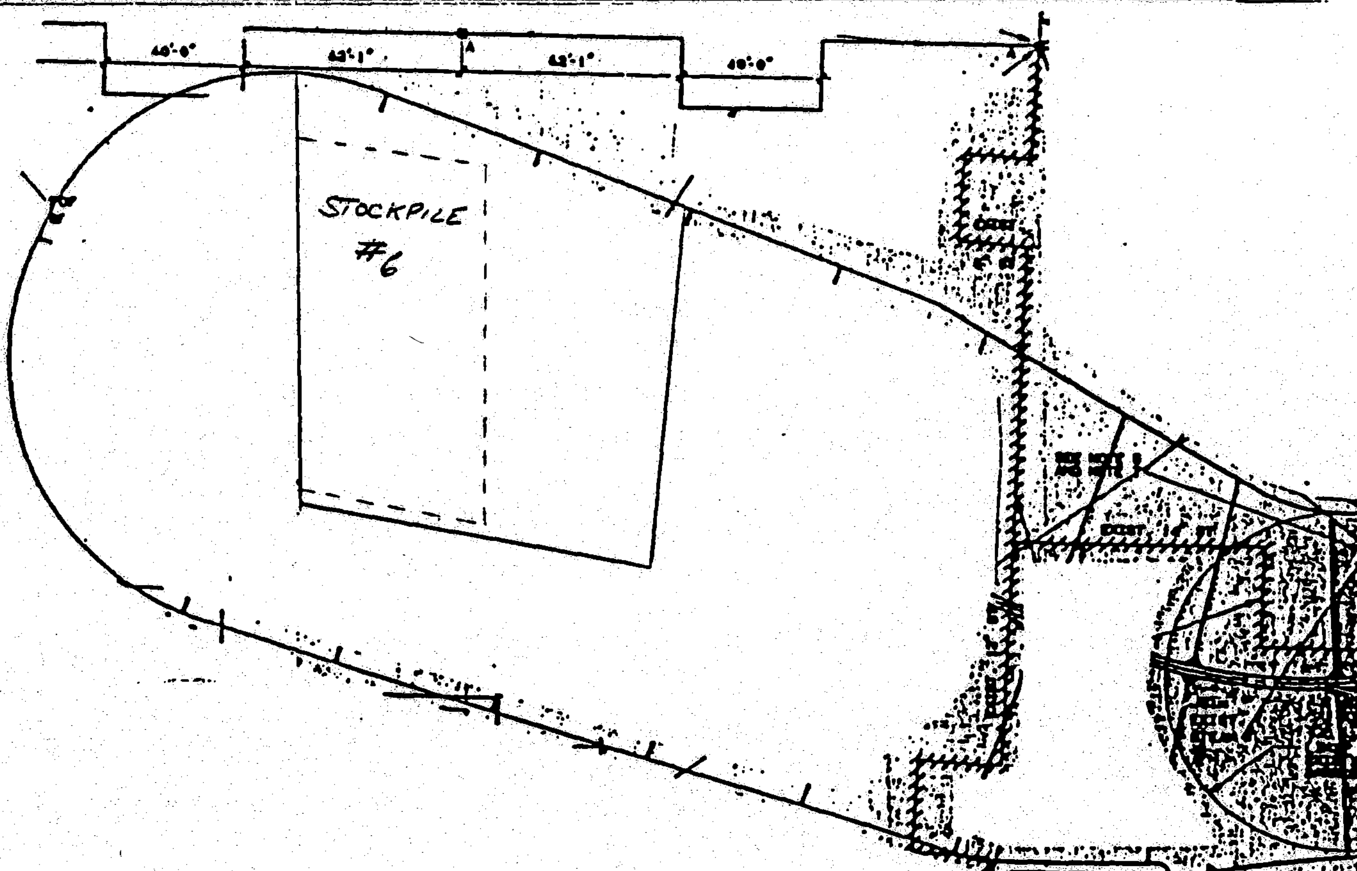
OBG TECHNICAL SERVICES

DAILY SAMPLE AND ANALYSIS REPORT

Date: 1-6-93 Sample Location: Explosive Berm

Sample Number: Stockpile #6 Time: 12:45 pm

Notes: Collected a five part composite sample of the treated soil. This sample was analyzed for TCLP silver. The lay down area is shown below



AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
ANALYTICAL REPORT
O'BRIEN & GERE
PROJECT: NOS INDIAN HEAD MD
TCLP SILVER
OBG-0207
January 12, 1993

AMERICAN ENVIRONMENTAL NETWORK, INC.

9151 Rumsey Road Suite 150, Columbia, MD 21045-1992
(410) 730-8525 Fax (410) 997-2586

January 12, 1993

Client: O'Brien & Gere

Project: NOS-Indian Head MD

Case: OBG-0207

Analysis: TCLP Silver

Client ID	AENM ID	Date Sampled	Date Received	Date Analyzed
STOCKPILE #7	398	01/07/93	01/08/93	01/12/93
STOCKPILE #8	399	01/07/93	01/08/93	01/12/93

Two soil samples were received and analyzed for TCLP Silver. TCLP results are reported in units of $\mu g/l$ in the Leachate.

All quality control met standard laboratory criteria.

This report consists specifically of tabulated sample and QC results.

If you have any further questions or if more information is needed please feel free to contact Ms. Kristina Yamarik (410)730-8525.

Report Released By Joseph Dembowski

Joseph Dembowski
Inorganic Laboratory Manager

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
METHOD BLANK AND %RECOVERY LCS

QCLEVEL: 2

CLIENT: OBG-0207

DATE: 12-Jan-93

UNITS: ug/L IN LEACHATE

ANALYTE	METHOD	METHOD BLANK	% RECOVERY LABORATORY CONTROL SAMPLE
SILVER	6010	<500	102

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
TCLP METALS

CLIENT: OBG-0207
AENM SAMPLE #: 398
CLIENT SAMPLE #: STOCKPILE #7

QCLEVEL 2
DATE: 12-Jan-93

UNITS: ug/L in LEACHATE

ANALYTE	METHOD	REPORT LIMIT	SAMPLE RESULT
SILVER	6010	500	<500

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
TCLP METALS

QCLEVEL 2
DATE: 12-Jan-93

CLIENT: 08G-0207
AENM SAMPLE #: 399
CLIENT SAMPLE #: STOCKPILE #8

UNITS: ug/L in LEACHATE

ANALYTE	METHOD	REPORT LIMIT	SAMPLE RESULT
SILVER	6010	500	<500

R - 1/13
D - 1/12/93
GC - 0
LC - 1

AMERICAN ENVIRONMENTAL NETWORK, INC.

AMERICAN ENVIRONMENTAL NETWORK, INC.
9151 Rumsey Road, Columbia, MD 21045
(410) 730-8525

CHAIN OF CUSTODY RECORD

PROJECT: NOS Indian Head

SAMPLERS: (Signature) Caroline Miller

SAMPLE NUMBER	DATE	TIME	MATRIX	NO. CONTAINERS	ANALYSIS REQUIRED: TCLP Silver		AEN #								REMARKS OR SAMPLE LOCATION	ICED	SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN
Stockpile ~~Composite~~ #7	1/7/93	10:45	soil	1	X		396								RUSH		NA
Stockpile #8	1/7/93	3:30	soil	1	X		39[illegible]										NA

Relinquished by: (Signature) ①	Date / Time	Received by: (Signature)	Relinquished by: (Signature) ④	Date / Time	Shipped via:
Stuart Williams	1-8-92 9:25	[illegible] 1/8/92			
Relinquished by: (Signature) ②	**Date / Time**	**Received by: (Signature)**	**Received for Laboratory by: (Signature)**	**Date / Time**	**Shipping Ticket No.**
			Kristine Yasmanik	1/8/93 11:20p	
Relinquished by: (Signature) ③	**Date / Time**	**Received by: (Signature)**	**Remarks:**		

OBG TECHNICAL SERVICES

DAILY SAMPLE AND ANALYSIS REPORT

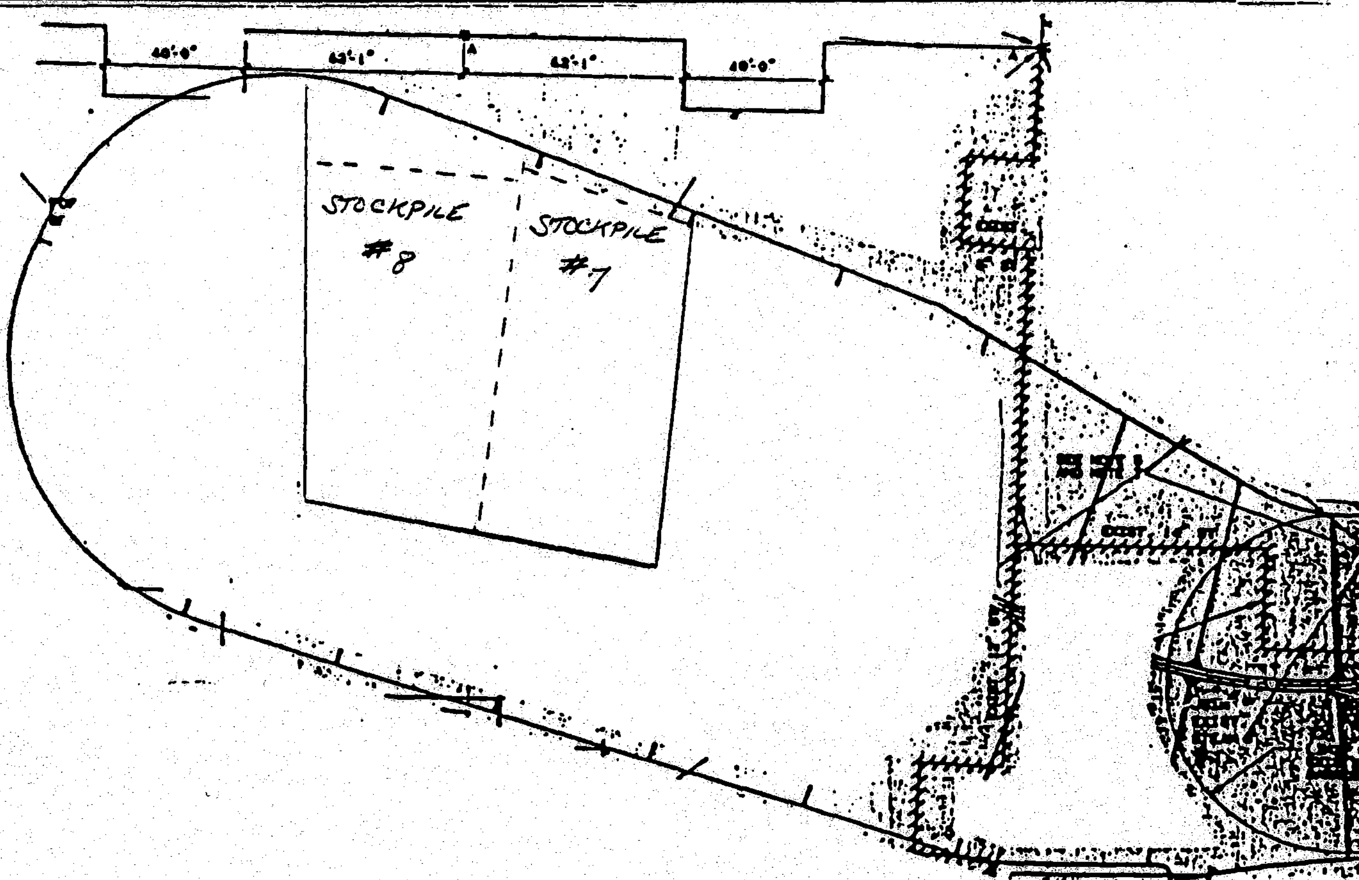
Date: 1-7-93

Sample Location: Explosion Berm

Sample Number: Stockpile #7+#8

Time: 10:45 am / 3:30 pm

Notes: Collected two - five part composite samples of the treated soil. These samples were analyzed for TCLP silver. The lay down area is shown below.



AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
ANALYTICAL REPORT
O'BRIEN & GERE
PROJECT: INDIAN HEAD
TCLP SILVER
OBG-0201
December 1, 1992

AMERICAN ENVIRONM_NTAL NETWORK, INC.

CBG-
~~0135~~0202

CHAIN OF CUSTODY RECORD

AMERICAN ENVIRONMENTAL NETWORK INC.
9151 Rumsey Road, Columbia, MD 2104_
(410) 730-8525

PROJECT: NOS - INDIANHEAD, MD

SAMPLERS: (Signature) Thomas B Wehle

SAMPLE NUMBER	DATE	TIME	MATRIX	NO. CONTAINERS	TCLP SILVER	TOTAL SUSPENDED SOLIDS	TOTAL SILVER	HOLD - ARCHIVE						REMARKS OR SAMPLE LOCATION	ICED	SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN
STOCKPILE #1	12-8-92	1:10pm	SOIL	1	✓				17624					RUSH ☆		NA
COMPOSITE #1	12-8-92	1:15pm	WATER	1		✓	✓		17625							NA
TRIP BLANK	12-8-92	1:15pm	WATER	1				✓	17626					HOLD		N/A

Relinquished by: (Signature) ①	Date / Time	Received by: (Signature)	Relinquished by: (Signature) ④	Date / Time	Shipped via:
Thomas B Wehle	12-8-92 / 1:20	[signature] 12/8/92			
Relinquished by: (Signature) ②	**Date / Time**	**Received by: (Signature)**	**Received for Laboratory by: (Signature)**	**Date / Time**	**Shipping Ticket No.**
		[signature]			
Relinquished by: (Signature) ③	**Date / Time**	**Received by: (Signature)**	**Remarks:**		

AMERICAN ENVIRONMENTAL NETWORK (MARYLAND), INC.
9151 Rumsey Road Suite 150 Columbia, MD 21045-1992
(410) 730-8525 Fax (410) 997-2586

CLIENT: O'Brien & Gere
5221 Militia Hill Road
Plymouth Meeting, PA 19462
Attn: Mr. David Schramm

PROJECT: N.O.S. - Indian Head, MD
AENI PROJECT NUMBER: OBG-0202
DATE SAMPLED: 12/8/92
DATE RECEIVED: 12/8/92
DATE REPORTED: 12/10/92

SAMPLE NUMBER	MATRIX	ANALYSIS	RESULT
17624 Stockpile #1	Soil/Leachate	TCLP Silver	< 0.010 mg/L
17625 Composite #1	Water	Total Silver	0.037 mg/L
17625 Composite #1	Water	TSS	550.0 mg/L

RELEASED BY: Kristina Yasvanik

OBG LABORATORIES, INC.

CHAIN OF CUSTODY RECORD

shelf

SURVEY: NAVAL ORDINANCE STATION

SAMPLED BY: J M DOERNER

LOCATION: INDIAN HEAD, MD

ORGANIZATION: OBG

STATION NUMBER	SAMPLE LOCATION	DATE COLLECTED	TIME COLLECTED	SAMPLE MATRIX	COMP. OR GRAB	NO. OF CONTAINERS	ANALYSIS REQUIRED
	SP-6 MIX ATG	11-7	1120	S	C	1	TCLP 16721
	SP-8 MIX CHG	11-9	—	S	C	1	TCLP 16722

Relinquished By:	DATE	TIME	Received By:	DATE	TIME
[signature]	11-20	1800			
Relinquished By:	DATE	TIME	Received By:	DATE	TIME
Relinquished By:	DATE	TIME	Received by Laboratory:	DATE	TIME
			[signature]	11/21/92	80[illegible]

COMMENTS:

METHOD OF SHIPMENT:

FED-X ON 11-20-92

airbill #3204819634 STAT. DELIVERY TO AMER ENV. NETWO[illegible]

OBG Laboratories, Inc., an O'Brien & Gere Limited Company
5221 Militia Hill Road / Plymouth Meeting, PA 19462 / (215) 825-8877 FAX (215) 825-5623
. . . and 5000 Brittonfield Parkway / PO Box 4942 / Syracuse, NY 13221

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
TCLP METALS

QCLEVEL 2
CLIENT: O'BRIEN & GERE
DATE: 01-Dec-92
AENM SAMPLE #: 16722
CLIENT SAMPLE #: SP-8 MIX CHG
UNITS: ug/L in LEACHATE

ANALYTE	METHOD	REPORT LIMIT	SAMPLE RESULT
SILVER	6010	500	<500

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
TCLP METALS

CLIENT: O'BRIEN & GERE
AENM SAMPLE #: 16721
CLIENT SAMPLE #: SP-6 MIX ATG

QCLEVEL 2
DATE: 01-Dec-92

UNITS: ug/L in LEACHATE

ANALYTE	METHOD	REPORT LIMIT	SAMPLE RESULT
SILVER	6010	500	<500

AMERICAN ENVIRONMENTAL NETWORK, INC.

9151 Rumsey Road Suite 150, Columbia, MD 21045-1992
(410) 730-8525 Fax (410) 997-2586

December 1, 1992

Client: O'Brien & Gere

Project: Indian Head

Case: OBG-0201

Analysis: TCLP Silver

Client ID	AENM ID	Date Sampled	Date Received	Date Analyzed
SP-6 MIX ATG	16721	11/07/92	11/21/92	11/25/92
SP-8 MIX CHG	16722	11/09/92	11/21/92	11/25/92

Two soil samples were received and analyzed for TCLP Silver. Results are reported in units of µg/l in the Leachate.

All quality control met standard laboratory criteria.

This report consists specifically of tabulated sample results.

If you have any further questions or if more information is needed please feel free to contact Ms. Amy Friedlander (410)730-8525.

Report Released By Joseph Dembowski
Joseph Dembowski
Inorganic Laboratory Manager

AMERICAN ENVIRONMENTAL NETWORK (MARYLAND), INC.

9151 Rumsey Road Suite 150. Columbia, MD 21045-1992
(410) 730-8525 Fax (410) 997-2586

December 8, 1992

Mr. David Schramm
O'Brien & Gere
5221 Militia Hill Road
Plymouth Meeting, PA 19462

Dear David:

Enclosed are results of the TCLP Silver analyses performed on the samples received 11/21/92 from the Indian Head site.

The samples were analyzed in accordance with EPA-approved procedures.

Please feel free to call me at (301) 730-8525 if you have any questions concerning this report.

Sincerely,

Amy I. Friedlander

Amy I. Friedlander
Project Manager

obg-0201
Enclosures
aif

EMSI ENGINEERING INC.
6997 Gateway Court
MANASSAS, VIRGINIA 22110

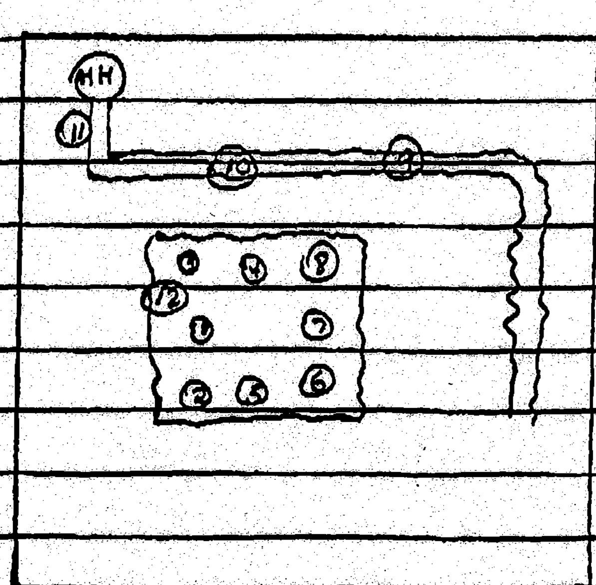
(703) 818-8519

DATE 1-18-93	JOB NO. 93-106
PROJECT Pad & Trench back fill (O.B.G)	
LOCATION Indian Head, MD	
CONTRACTOR O.B.G	OWNER
WEATHER P. cloudy	TEMP. 37 ° at 9:00 / ° at
PRESENT AT SITE Tom Wehrle (O.B.G), Bijan Khomasi (EMSI)	

TO O.B.G Technical Service

THE FOLLOWING WAS NOTED:

- At the request of O.B.G superintendent EMSI Personnel arrived at site at 9:00 Am to test the compaction of back fill made on the "lay down Pad" and East Trench.
(9) density tests were Performed using Nuclear gauge on "lay down" and (3) density tests were Performed on East Trench. Proctor values used for tests were given to us by the contractor.
Lay down area soil was composed of mix of lime and clayey material. For east Trench, soil was composed of silty gravely sand (Borrow material). Test result are ~~—~~ on attachment sheet.



COPIES TO

FIELD REPORT

SIGNED Bijan

EMSI ENG[illegible]ERING INC.

COMPACTION TEST SUMMARY

MADE FOR: OBG Technical Service
LOCATION: Indian Head, MD
PROJECT: Pad Trench backfill

TECHNICIAN:
MAX. DRY DEN. IN ACCORDANCE WITH: ASTM D1557
METHOD OF DENSITY MEASUREMENT: SAND CONE
NUCLEAR GAUGE ✓

TEST NO.	DATE	TEST LOCATION	ELEVATION*	M.C. (%)	DRY DEN. (PCF)	PROCTOR (PCF)	O.M.C. (%)	COMP. (%)	REMARKS
[illegible]	1-18-93	lay down pad	3' backfill	16.6	95.7	102	21.0	93.8	
2		"	"	17.8	96.8	"	"	94.9	
3		"	"	20.3	97.1	"	"	95.21	
4		"	4' backfill	17.0	97.0	"	"	95.1	
5		"	"	20.0	96.7	"	"	94.8	
6		"	5' backfill	17.4	94.9	"	"	93.1	
7		"	"	16.8	96.8	"	"	94.9	
8		"	4' backfill	17.3	96.1	"	"	94.2	
9		East Trench	FG	16.9	110.3	122.4	11.3	90.1	
10		"	"	16.3	110.3	"	"	90.1	
11		"	"	19.3	105.2	"	"	86	
12		lay down pad	2' backfill	17.9	95.9	102	21.0	94.1	

* Approximate elevations, for lift measurements only

SHEET NO.
FILE NO.: CTS.WK1

EMSI ENGINEERING INC.
6997 Gateway Court
MANASSAS, VIRGINIA 22110

(703) 818-8519

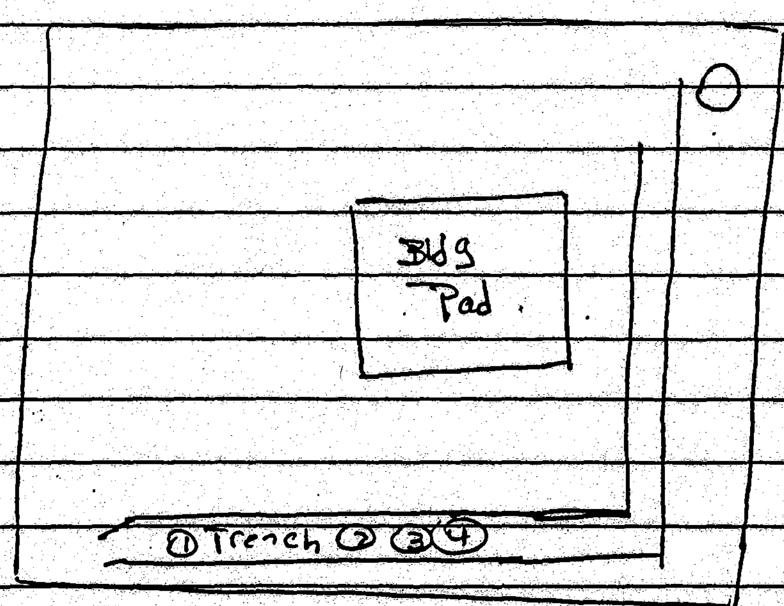
DATE 1-20-93	JOB NO. 93-106
PROJECT OBG Navy	
LOCATION Indian Head : MD	
CONTRACTOR OBG	OWNER Navy
WEATHER P. cloudy	TEMP 385 °at 11:00 AM °at PM
PRESENT AT SITE Tom (OBG), Bijan (EMSI) Frank (Jowett)	

TO

THE FOLLOWING WAS NOTED:

> EMSI arrived on site at 12:00 Am as requested to Test the compaction.
Four density Tests were Performed on The Trench (see attachment sheet for location) The results were as shown on attachment sheet.
Tests results were reported to contractor
Note ① the moisture content of the soil is approximatly 5% higer than requred optimum moisture.
② Average compaction is 89% which is considered acceptable grass area
①②③④ Tests locations. Specs sec: 02221

>



COPIES TO

FIELD REPORT

SIGNED Bijan

EMSI ENGINEERING INC.

COMPACTION TEST SUMMARY

MADE FOR:
LOCATION: Indian Head
PROJECT: O.B.C

TECHNICIAN: Bilan
MAX. DRY DEN. IN ACCORDANCE WITH: ASTM D1557 ✓
METHOD OF DENSITY MEASUREMENT: SAND CONE
NUCLEAR GAUGE ✓

TEST NO.	DATE	TEST LOCATION	ELEVATION*	M.C. (%)	DRY DEN (PCF)	PROCTOR (PCF)	O.M.C. (%)	COMP. (%)	REMARKS
1	1-20-93	Trench west side	FG	8.2	123.6	122.4	11.3	100%	
2	"	" "	"	20.4	103.4	117.80	15.40	87.8%	
3	"	" "	"	20.5	105.2	"	"	89.3%	
4	"	" "	"	20.7	104.7	"	"	88.9%	

* Approximate elevations, for lift measurements only

SHEET NO.
FILE NO.: CTS.WK1

EMSI ENGINEERING INC.
6997 Gateway Court
MANASSAS, VIRGINIA 22110

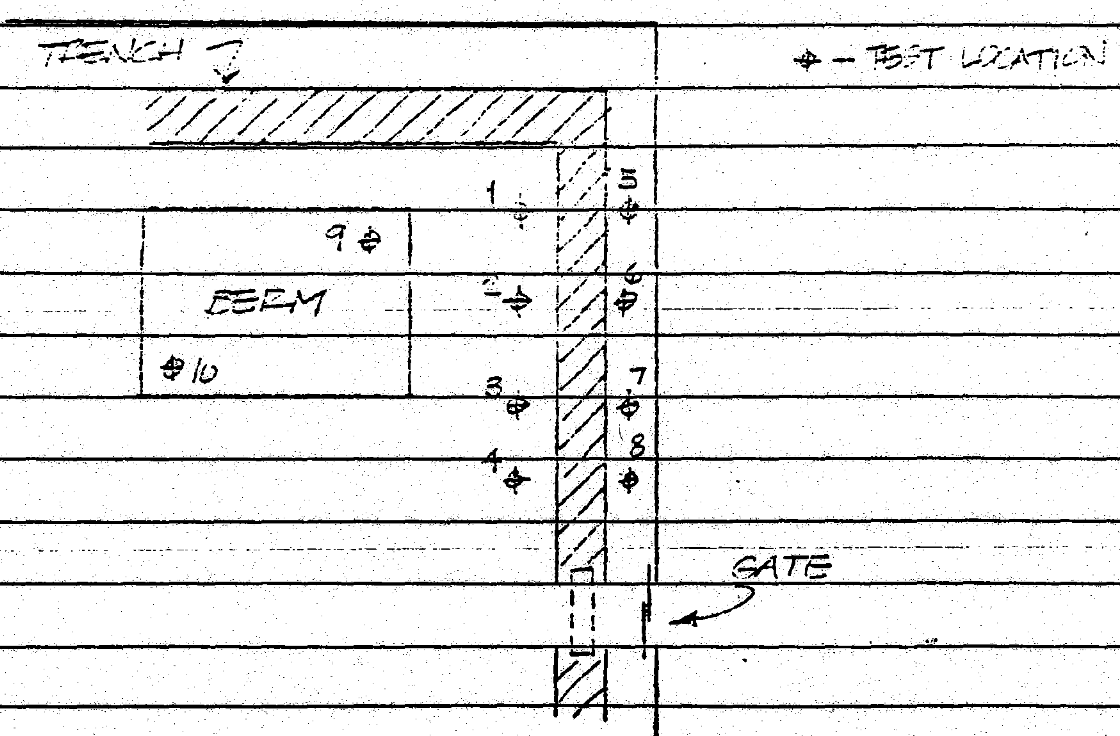
(703) 818-8519

DATE	JOB NO.
01/28/93	
PROJECT	
OBG @ MIX, ASSEMBLE, & CURE	
LOCATION NOS INDIAN HEAD, MD	
CONTRACTOR OBG	OWNER USN
WEATHER CLOUDY	TEMP. 35 °at 1100 AM; °at PM
PRESENT AT SITE	

TO OBG

THE FOLLOWING WAS NOTED:

> EMSI ARRIVED @ SITE AT APPROXIMATELY 10:00 AM TO PERFORM COMPACTION TESTS ON THE FILL PLACED @ THE SITE.
THE ~~[illegible]~~ TEST LOCATIONS ARE SHOWN BELOW. RESULTS ARE TABULATED ON THE ATTACHED SHEET.
WORK WAS COMPLETED @ 11:30 AM.



COPIES TO

FIELD REPORT

SIGNED

EMSI ENGINEERING INC.

* 6997 Gateway Court; Manassas, VA 22110

COMPACTION TEST SUMMARY

Made for: OBG

Location: NOS, INDIAN HEAD MD

Project: MIX, ASSEMBLE, & CURE FACILITY

Project No.:

Technician: ED

Maximum dry density in accordance with: ASTM D-1557

Method of density measurement: ✓ Nuclear Density Gauge

Sand Cone

TEST NO.	DATE	TEST LOCATION	ELEVATION*	MC (%)	DRY DEN (PCF)	PROCTOR (PCF)	OMC (%)	COMP. (%)	REMARKS
1	01-28-93	SEE ATTACHED SKETCH	N/A	20.3	102.0	117.8	15.4	86.6	
2				22.5	100.9			85.7	
3				17.3	109.2			92.7	
4				11.3	112.0			95.1	
5				21.4	104.2			88.4	
6				19.7	105.9			89.9	
7				19.5	105.2			89.3	
8				10.5	115.8			98.3	
9				21.2	103.6			88.0	
10				20.6	104.1			88.3	

* Approximate elevations, for lift measurements only.

Sheet No.: 1 of 1

File No.: CTS.DOC

OBG TECHNICAL SERVICES, INC.

Material Delivery Report

Job Number: 37300

Date	Vendor	Truck Number	Item	Quantity	Ticket Number
12-4-92	MRI	TRACTOR 1-049 TRAILER 9526	CKD	19.81 TONS	133290
12-8-92	MRI	TRAC 1-049 TRAIL 9-519	CKD	20.46 TONS	—
12-9-92	MRI	1-049 9-519	CKD	20.38 TONS	133291
12-14-92	MRI	1-050 9-526	CKD	19.70 T	133306
12-16-92	MRI	1-049 9-586	CKD	21.10 T	133305
12-18-92	MRI	TRAILER 9-526	CKD	18.36	133292
12-21-92	MRI	TRACTOR 2717 TRAIL 9-586	CKD	19.08	133296
12-22-92	MRI	2-686 TRAIL 9-527	CKD	16.68	133294
12-22-92	MRI	2926 TRAILER 9521	CKD	23.30	133293
1-5-93	MRI	1-053 TRAILER 9-526	CKD	17.60	133295
1-6-93	MRI	TRAILER 7586	CKD	22.22	133297
1-6-93	MRI	2256 TRAILER 9045	CKD	17.95	133298
1-7-93	MRI	2686 TRAILER 9586	CKD	20.69	133299
1-13-93	MRI	TRAILER 9526	CKD	16.74	133304
1-14-93	MRI	TRACTOR 2723 TRAILER 9586	CKD	18.92	133301

OBG TECHNICAL SERVICES, INC.

Material Delivery Report

Job Number: 37300

Date	Vendor	Truck Number	Item	Quantity	Ticket Number
1-14-93	MRI	TRAILER 9045	CKD	16.83	133300
1-15-93	MRI	9519	CKD	16.75	133302
1-15-93	MRI	TRACTOR 2692 / TRAILER 9569	CKD	23.54	155991
1-15-93	MRI	1019 / 9568	CKD	14.26	155992
1-16-93	MRI	2717 / 9527	CKD	19.12	155993
1-16-93	MRI	2580 / 9569	CKD	28.45	3363
1-16-93	MRI	2753 / 9526	CKD	17.01	3366
1-18-93	MRI	2717 / 9121	CKD	15.55	3364

EARTHWORK

Transmittal Form Number: [illegible] (Submital Log)

From: [illegible] (Contractor) Date: [illegible]

Title: [illegible]

Subj: Submittal for Contract [illegible] in accordance with Specification Section [illegible] Paragraph(s) 1.4.1

Transmitted Herewith are:

For: ( )Acceptance or Approval ( )clarification (X) [illegible]

I hereby certified that the (equipment)(material)(article) shown and marked in this submittal is that proposed to be incorporated into this contract, is in compliance with the contract drawings and specification, can be installed in the allocated spaces, and is submitted for Government approval.

Contractors Signature and certification: [illegible]

From: ROICC Code ______ Date: [illegible]

To: ______

for review and comments no later than ______.

From: [illegible] Date: [illegible]

To: ROICC Code [illegible]

(X) Approved; ( ) Returned for Corrections; ( ) Disapproved;

( ) Approved, as noted; ( ) ______

Remarks:

[illegible]

From: ROICC Code 09RB10 Date: 9-23-92

To: JOWETT

Submittal is: (X) Approved; ( ) returned for correction;

( ) Approved as noted; ( ) Disapproved;

( ) ______

Remarks:

Approved

No Exceptions taken

ROICC 1 (rev 5/92) ★U.S.GPO:1992-0-623-055/41147

SEC: 02221 - Earthwork For Structures And Pavements _ _ _ _ _ _ #5 -

This is a partial submittal to avoid delay in the work schedule.

1.4.1 - Certified Test Reports

d. Select material for controlled fill

1). "SM" material - 8/31/92

—— Material Classification "SM" conforms with ¶ 2.1.2.3 - General Site Fill and Embankment.

2). "GM-GC" material - 8-14-92

—— Material classification "GM-GC" conforms with ¶ 2.1.2.2 - General Backfill Adjacent to Structures.

Recommendation:

Approved

[signature] 9-18-92
(301) 868-2880

SUBCONTRACTOR'S CERTIFICATION

Date 9-15-92

Company Name RAYE VEST CORPORATION

Address P.O. BOX 669 WHITE PLAINS, MD. 20695

Contact CHRIS HAYDEN

Specification Section 02221 FILL MATERIAL

Shop Drawing # 1

Certification

I hereby certify that this submittal and/or shop drawing:

✓ Meets or exceeds the contract drawings and specifications without exception.

___ Meets the contract drawings and specifications except as hereby noted in our cover letter dated ________________, describing said deviations for approval.

DATE 9-15-92 AUTHORIZED SIGNATURE Chris Hayden

ONE COPY OF THIS CERTIFICATION MUST BE ATTACHED TO EACH COPY OF YOUR SUBMITTAL.

JUWETT INCORPORATED

Item No. 501

Spec. Sect. 02221 Para. 1.4.1

It is hereby certified that the (material) (equipment) shown and marked in this submittal, shop drawings, catalog cut(s), etc., and approved / proposed to be incorporated into Contract Number 90-C-0544, is in compliance with the contract drawings and specifications, and can be installed in the allocated space, and is ✓ approved for use ________ submitted for Government approval

Authorized Reviewer ________ Date ________

Signature CQC Rep. [signature] Date 9-18-92

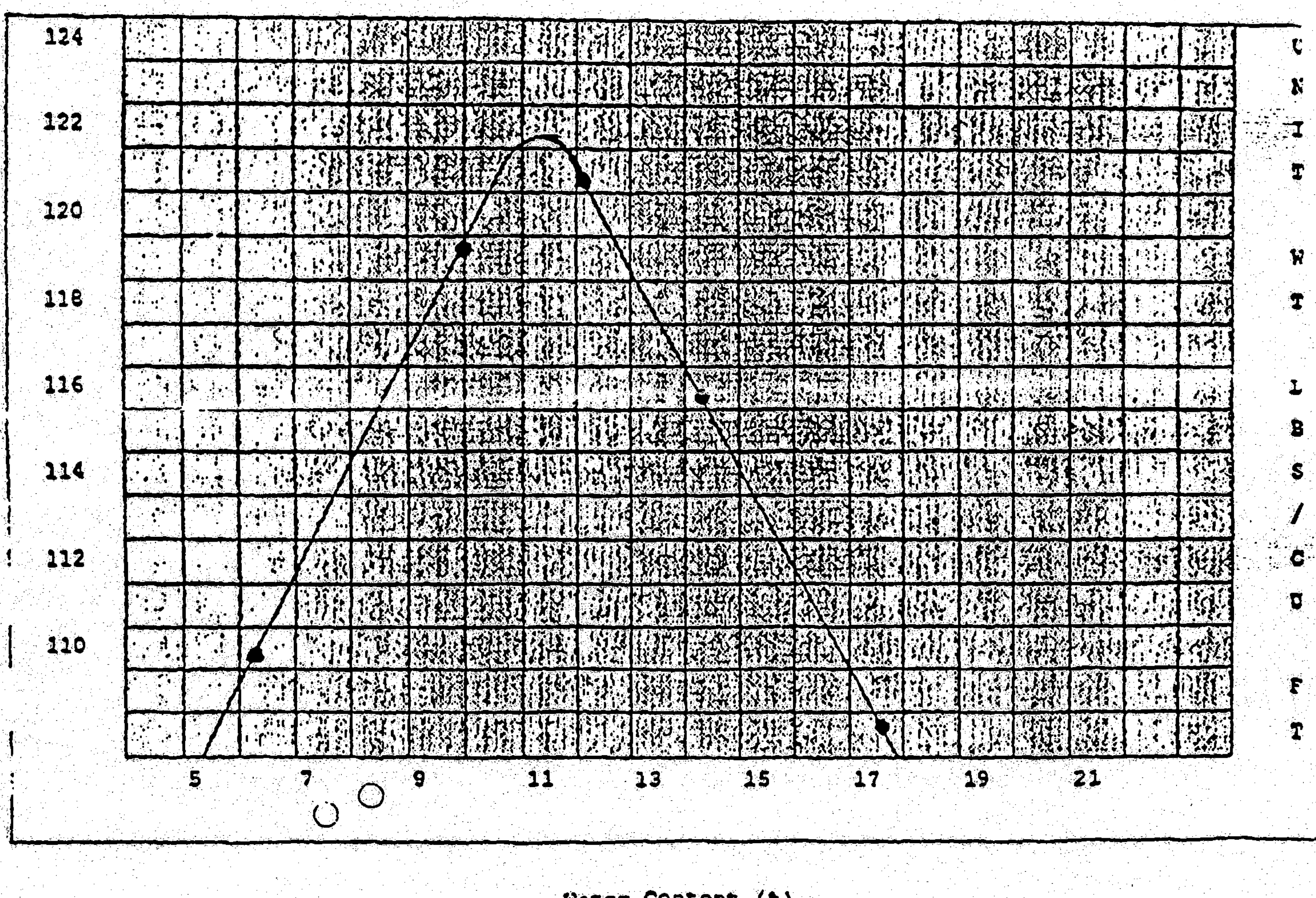
BOB TAYLOR ENGINEERING, INC.
317 Great Mills Lane
LEXINGTON PARK, MARYLAND 20653

COMPACTION TEST
Moisture/Density Relationship

PROJECT VILLAGE LAKE APARTMENTS LAB NO. 92-028

SAMPLE LOCATION REDDISH BROWN CLAYEY SAND DATE 06-11-92

Cylinder No.	1	2	3	4	5
Volume - Cu. Ft.	1/30	1/30	1/30	1/30	1/30
Method of Compaction ASTM	D-1557	D-1557	D-1557	D-1557	D-155
Wt. Cylinder + Soil (lbs.)	13.19	13.67	13.82	13.71	13.55
Wt. Cylinder (lbs.)	9.28	9.28	9.28	9.28	9.28
Wt. Compacted Soil (lbs.)	3.91	4.39	4.54	4.43	4.27
Unit Wt. Wet (lbs./cu. ft.)	117.3	131.7	136.2	132.9	128.1
Water Content (%)	6.4	10.0	12.2	14.3	17.7
Unit Wt. Dry (lbs./cu. ft.)	110.2	119.7	121.4	116.3	108.8



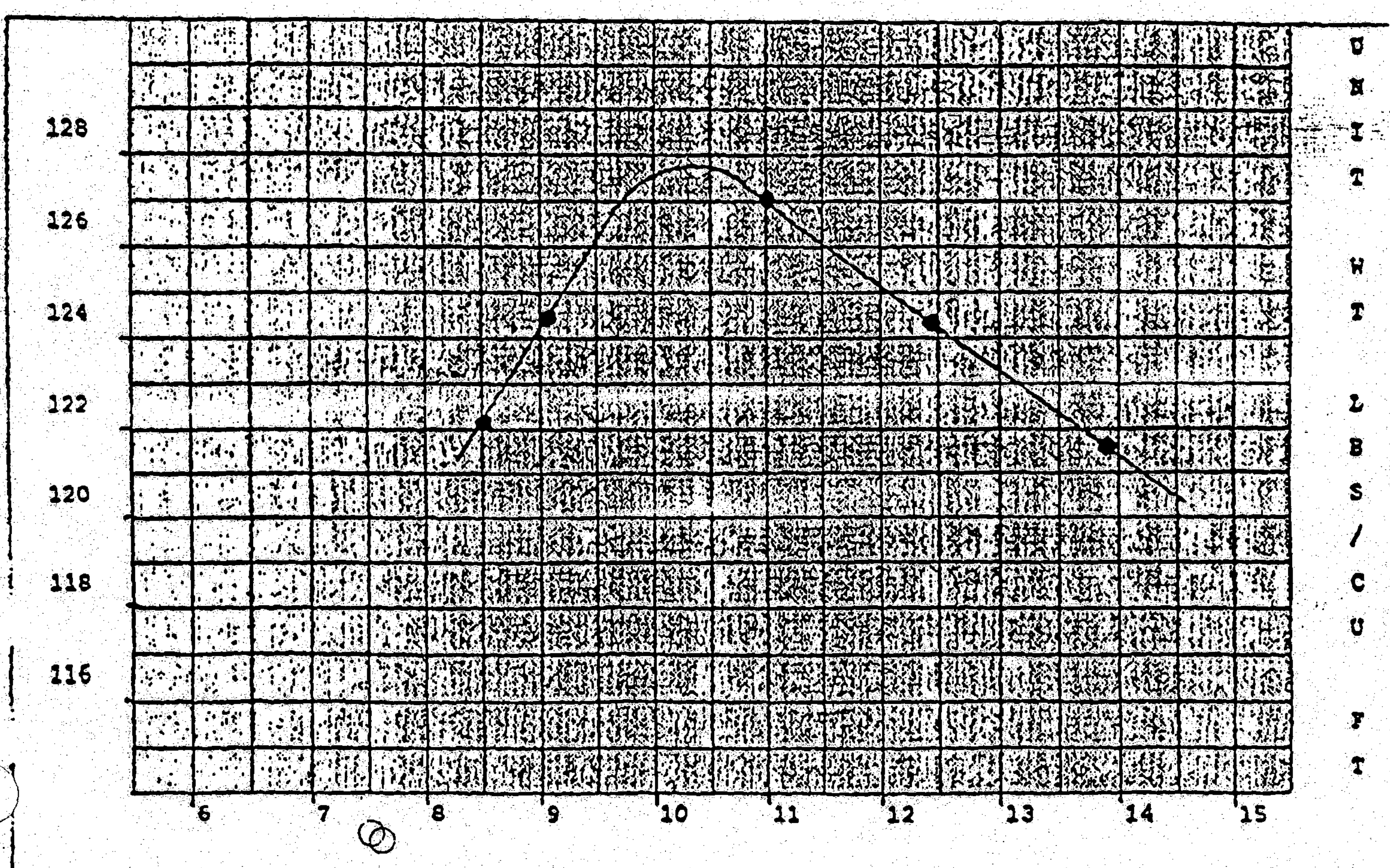
BOB TAYLOR ENGINEERING, INC.
317 Great Mills Lane
LEXINGTON PARK, MARYLAND 20653

COMPACTION TEST
Moisture/Density Relationship

PROJECT VILLAGE LAKE APARTMENTS LAB NO. 92-028

SAMPLE LOCATION SANDY BANK RUN GRAVEL DATE 07-10-92

Cylinder No.	1	2	3	4	5
Volume - Cu. Ft.	1/13.33	1/13.33	1/13.33	1/13.33	1/13.33
Method of Compaction ASTM	D-1557-C	D-1557-C	D-1557-C	D-1557-C	D-1557-C
Wt. Cylinder + Soil (lbs.)	22.42	22.65	33.05	22.95	22.86
Wt. Cylinder (lbs.)	12.47	12.47	12.47	12.47	12.47
Wt. Compacted Soil (lbs.)	9.95	10.18	10.58	10.48	10.39
Unit Wt. Wet (lbs./cu. ft.)	132.6	135.7	141.0	139.7	138.5
Water Content (%)	8.5	9.1	11.0	12.4	13.8
Unit Wt. Dry (lbs./cu. ft.)	122.2	124.4	127.0	124.3	121.7



BOB TAYLOR ENGINEERING, INC.
GEOTECHNICAL SERVICES • MATERIALS TESTING

ROBERT F. TAYLOR, P.E.
PRESIDENT

317 GREAT MILLS LANE
LEXINGTON PARK, MD 20653
(301) 862-4300 • (301) 932-5575

September 9, 1992
Job No. 92-166

Raye Vest Excavating, Inc.
P. O. Box 669
White Plains, Maryland 20695

Ref: Miscellaneous Soil Testing

Gentlemen:

Enclosed with this letter are the following:

- Invoice Number 40992 Dated 09/09/92
- ASTM D-4318 Liquid Limit, Plastic Limit and Plasticity Index of Soil (Two)
- ASTM C-136 Sieve or Screen Analysis of Fine and Coarse Aggregates (Two)
- A copy of the Field Report Dated 08/27/92

Should you have any questions or concerns, please don't hesitate to call.

Sincerely,

Robert F. Taylor, P.E.
President

Enclosures

BTE
BOB TAYLOR ENGINEERING, INC.
GEOTECHNICAL SERVICES • MATERIALS TESTING

ROBERT F. TAYLOR, P.E.
PRESIDENT

317 GREAT MILLS LANE
LEXINGTON PARK, MD 20653
(301) 862-4300 • (301) 932-5575

ASTM C-136
TESTS ON FINE AGGREGATE FOR SIEVE ANALYSIS

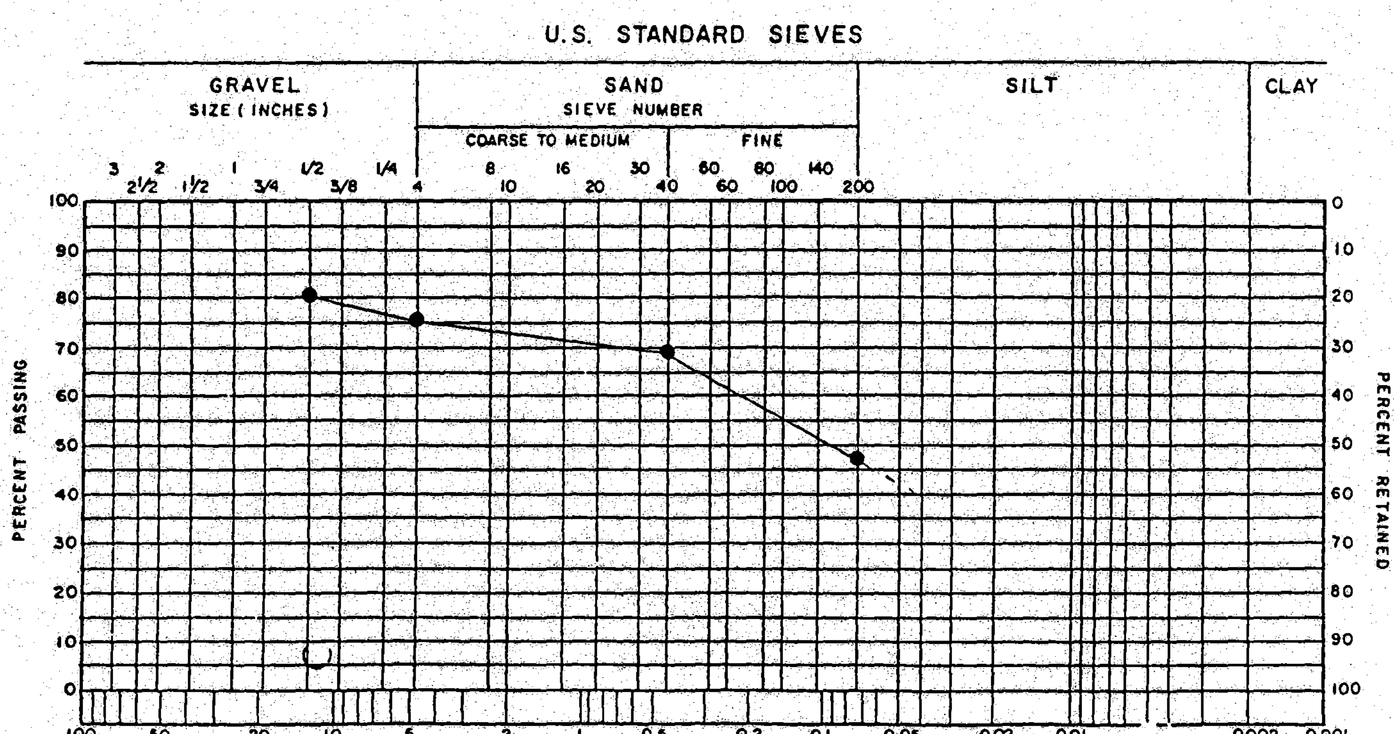
CLIENT: RAYE VEST EXCAVATING, INC. JOB NUMBER: 92-166

PROJECT: MISCELLANEOUS SOIL TESTING SIEVE NUMBER: TWO

DATE OF TESTING: AUGUST 31, 1992 MATERIAL: SM

SAMPLE LOCATION: RAYE VEST GRAVEL PIT

SIEVE	WT. G	%	% PASS	% RET.
1/2"	49.60	18.55	81.45	18.55
	.00	.00	81.45	18.55
No. 4	13.90	5.20	76.25	23.75
	.00	.00	76.25	23.75
No. 40	18.10	6.77	69.48	30.52
	.00	.00	69.48	30.52
No. 200	55.60	20.79	48.69	51.31
Elut.	130.20	48.69	.00	100.00
TOTAL	267.40	100.00		



BOB TAYLOR ENGINEERING, INC.
GEOTECHNICAL SERVICES • MATERIALS TESTING

ROBERT F. TAYLOR, P.E.
PRESIDENT

317 GREAT MILLS LANE
LEXINGTON PARK, MD 20653
(301) 862-4300 • (301) 932-5575

CLIENT: Raye Vest Excavating, Inc. JOB NUMBER: 92-166

PROJECT: Miscellaneous Soil Testing SAMPLE NUMBER: Two

DATE SAMPLE: August 27, 1992 DATE TESTED: 08-31-92

SAMPLE LOCATION: Raye Vest Gravel Pit

RESULTS OF LABORATORY TESTING

Liquid Limits (LL) as per ASTM D-4318-84

LL = 35

Plastic Limits (PL) as per ASTM D-4318-84

PL = 27

Plasticity Index (PI) = LL - PL

PI = 8

Soil Description:

Orange/Brown Fine Sand with some Silt, little Gravel and few Coarse Sand

COMMENTS:

The soil sample labeled Two does meet the specifications entitled Earthwork For Structures and Pavements - Section 2.1.2.3 which states that a soil must be provided which can be classified as GP, GM, GC, SP, SM, SC by ASTM D-2487.

Robert F. Taylor

BOB TAYLOR ENGINEERING, INC.
317 Great Mills Lane
LEXINGTON PARK, MARYLAND 20653

(301) 862-4300
(301) 932-5575

JOB NO.	92-166
DATE	08/27/92
PROJECT	MISCELLANEOUS SOIL TESTING
LOCATION	WALDORF, MARYLAND
PRESENT AT SITE	CARL LEACH
	BTE BILLABLE TIME: 2.5 HOURS

RAYE VEST EXCAVATING, INC.
P. O. BOX 669
WHITE PLAINS, MARYLAND 20695

FIELD REPORT

A soil sample was collected per ASTM D-75 from the orange/brown fine sand material. This sample will be laboratory tested per ASTM C-136 and ASTM D-2847 according to the job specifications.

BT.
REVIEWER'S INITIALS

TECHNICIAN'S SIGNATURE

8-27-92
DATE

EARTHWORK

Transmittal Form Number: [illegible] (Submital Log)

From: [illegible] (Contractor) Date: [illegible]

Title: [illegible]

Subj: Submittal for Contract [illegible] in accordance with Specification Section [illegible] Paragraph(s) [illegible]

Transmitted Herewith are:

For: ( )Acceptance or Approval ( )clarification (X) [illegible]

I hereby certified that the (equipment)(material)(article) shown and marked in this submittal is that proposed to be incorporated into this contract, is in compliance with the contract drawings and specification, can be installed in the allocated spaces, and is submitted for Government approval.

Contractors Signature and certification: [illegible]

From: ROICC Code ______ Date: [illegible]

To: ______

for review and comments no later than ______.

From: [illegible] Date: [illegible]

To: ROICC Code [illegible]

(X) Approved; ( ) Returned for Corrections; ( ) Disapproved;
(X) Approved, as noted; ( ) ______

Remarks:

[illegible]

From: ROICC Code 09RB10 Date: 9-23-92

To: JOWETT

Submittal is: (X) Approved; ( ) returned for correction;
( ) Approved as noted; ( ) Disapproved;
( ) ______

Remarks:

Approved

No Exceptions taken

ROICC 1 (rev 5/92) ★U.S.GPO:1992-0-623-055/41147

SEC: 02221- Earthwork For Structures And Pavements _ _ _ _ _ #5-

This is a partial submittal to avoid delay in the work schedule.

1.4.1 - Certified Test Reports

d. Select material for controlled fill

1). "SM" material - 8/31/92

-- Material Classification "SM" conforms with ¶ 2.1.2.3 - General Site Fill and Embankment.

2). "GM-GC" material - 8-14-92

-- Material classification "GM-GC" conforms with ¶ 2.1.2.2 - General Backfill Adjacent to Structures.

Recommendation:

Approved

[signature] 9-18-92

(301) 868-2880

SUBCONTRACTOR'S CERTIFICATION

Date 9-15-92

Company Name RAYE VEST CORPORATION

Address P.O. BOX 669 WHITE PLAINS, MD. 20695

Contact CHRIS HAYDEN

Specification Section 02221 FILL MATERIAL

Shop Drawing # 1

Certification

I hereby certify that this submittal and/or shop drawing:

✓ Meets or exceeds the contract drawings and specifications without exception.

___ Meets the contract drawings and specifications except as hereby noted in our cover letter dated ____________________, describing said deviations for approval.

DATE 9-15-92 AUTHORIZED SIGNATURE Chris Hayden

ONE COPY OF THIS CERTIFICATION MUST BE ATTACHED TO EACH COPY OF YOUR SUBMITTAL.

JUWETT INCORPORATED

Item No. 501

Spec. Sect. 02221 Para. 1.41

It is hereby certified that the (material) (equipment) shown and marked in this submittal, shop drawings, catalog cut(s), etc., and approved / proposed to be incorporated into Contract Number 90-C-0544, is in compliance with the contract drawings and specifications, and can be installed in the allocated space, and is ✓ approved for use ____________________ submitted for Government approval

Authorized Reviewer ____________________ Date ________

Signature CQC Rep. John Malte Date 9-18-92

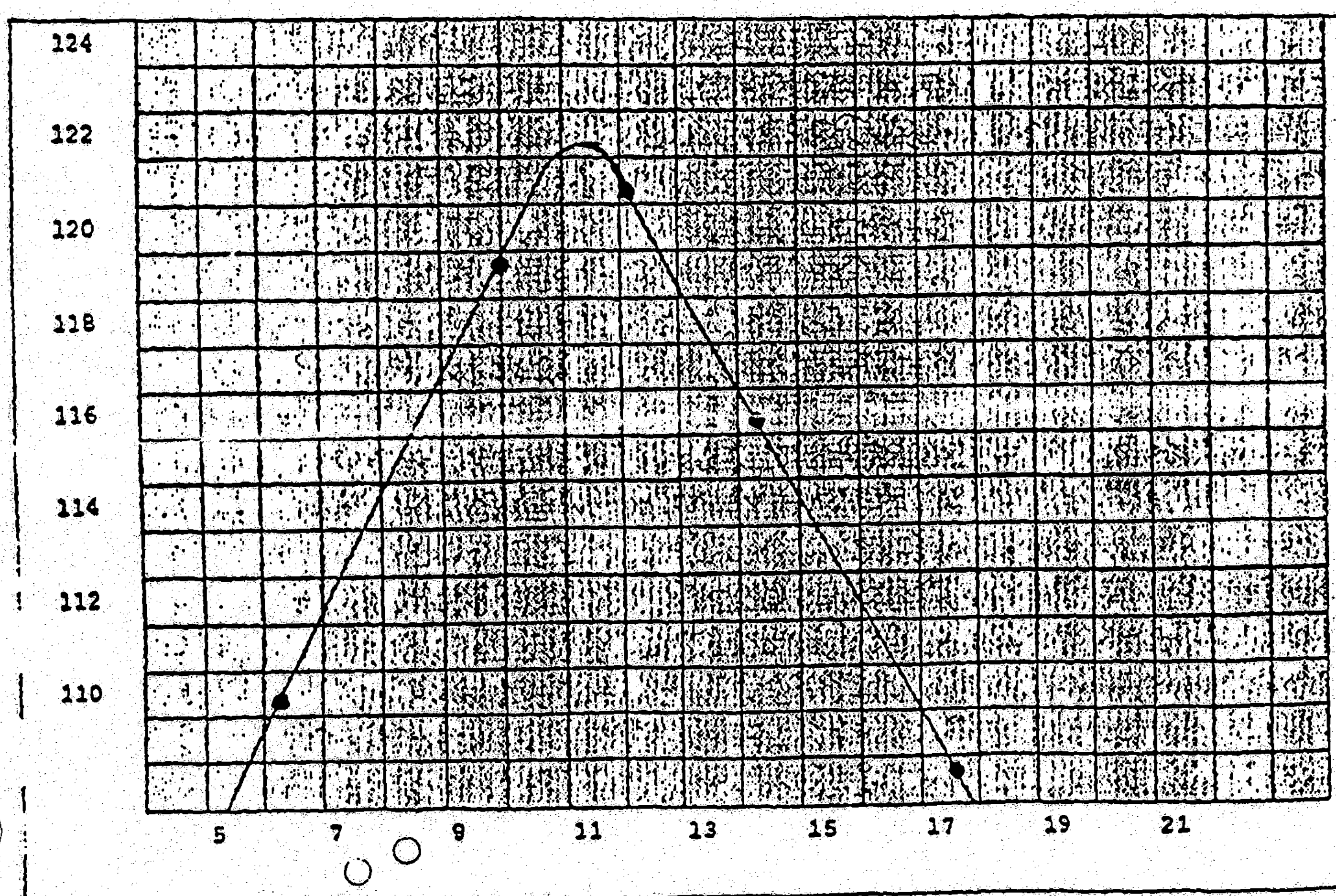
BOB TAYLOR ENGINEERING, INC
317 Great Mills Lane
LEXINGTON PARK, MARYLAND 20653

COMPACTION TEST
Moisture/Density Relationship

PROJECT VILLAGE LAKE APARTMENTS LAB NO. 92-028

SAMPLE LOCATION REDDISH BROWN CLAYEY SAND DATE 06-11-92

Cylinder No.	1	2	3	4	5
Volume - Cu. Ft.	1/30	1/30	1/30	1/30	1/30
Method of Compaction ASTM	D-1557	D-1557	D-1557	D-1557	D-155
Wt. Cylinder + Soil (lbs.)	13.19	13.67	13.82	13.71	13.55
Wt. Cylinder (lbs.)	9.28	9.28	9.28	9.28	9.28
Wt. Compacted Soil (lbs.)	3.91	4.39	4.54	4.43	4.27
Unit Wt. Wet (lbs./cu. ft.)	117.3	131.7	136.2	132.9	128.1
Water Content (%)	6.4	10.0	12.2	14.3	17.7
Unit Wt. Dry (lbs./cu. ft.)	110.2	119.7	121.4	116.3	108.8



Water Content (%)

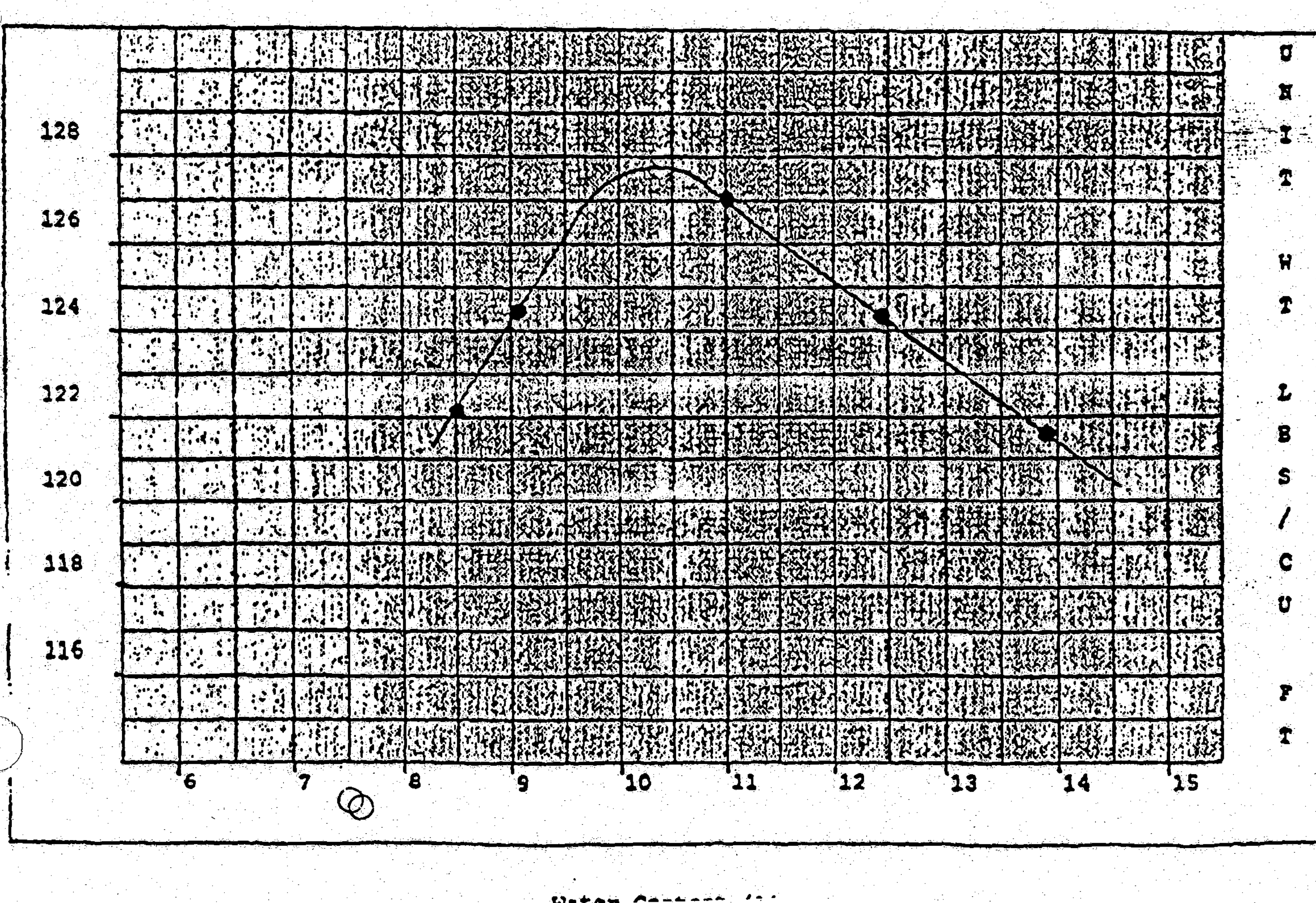
BOB TAYLOR ENGINEERING, INC.
317 Great Mills Lane
LEXINGTON PARK, MARYLAND 20653

COMPACTION TEST
Moisture/Density Relationship

PROJECT VILLAGE LAKE APARTMENTS LAB NO. 92-028

SAMPLE LOCATION SANDY BANK RUN GRAVEL DATE 07-10-92

Cylinder No.	1	2	3	4	5
Volume - Cu. Ft.	1/13.33	1/13.33	1/13.33	1/13.33	1/13.33
Method of Compaction ASTM	D-1557-C	D-1557-C	D-1557-C	D-1557-C	D-1557-C
Wt. Cylinder + Soil (lbs.)	22.42	22.65	33.05	22.95	22.86
Wt. Cylinder (lbs.)	12.47	12.47	12.47	12.47	12.47
Wt. Compacted Soil (lbs.)	9.95	10.18	10.58	10.48	10.39
Unit Wt. Wet (lbs./cu. ft.)	132.6	135.7	141.0	139.7	138.5
Water Content (%)	8.5	9.1	11.0	12.4	13.8
Unit Wt. Dry (lbs./cu. ft.)	122.2	124.4	127.0	124.3	121.7



BOB TAYLOR ENGINEERING, INC.
GEOTECHNICAL SERVICES • MATERIALS TESTING

ROBERT F. TAYLOR, P.E.
PRESIDENT

317 GREAT MILLS LANE
LEXINGTON PARK, MD 20653
(301) 862-4300 • (301) 932-5575

September 9, 1992
Job No. 92-166

Raye Vest Excavating, Inc.
P. O. Box 669
White Plains, Maryland 20695

Ref: Miscellaneous Soil Testing

Gentlemen:

Enclosed with this letter are the following:

- Invoice Number 40992 Dated 09/09/92
- ASTM D-4318 Liquid Limit, Plastic Limit and Plasticity Index of Soil (Two)
- ASTM C-136 Sieve or Screen Analysis of Fine and Coarse Aggregates (Two)
- A copy of the Field Report Dated 08/27/92

Should you have any questions or concerns, please don't hesitate to call.

Sincerely,

Robert F. Taylor, P.E.
President

Enclosures

BTE BOB TAYLOR ENGINEERING, INC.
GEOTECHNICAL SERVICES • MATERIALS TESTING

ROBERT F. TAYLOR, P.E.
PRESIDENT

317 GREAT MILLS LANE
LEXINGTON PARK, MD 20653
(301) 862-4300 • (301) 932-5575

ASTM C-136
TESTS ON FINE AGGREGATE FOR SIEVE ANALYSIS

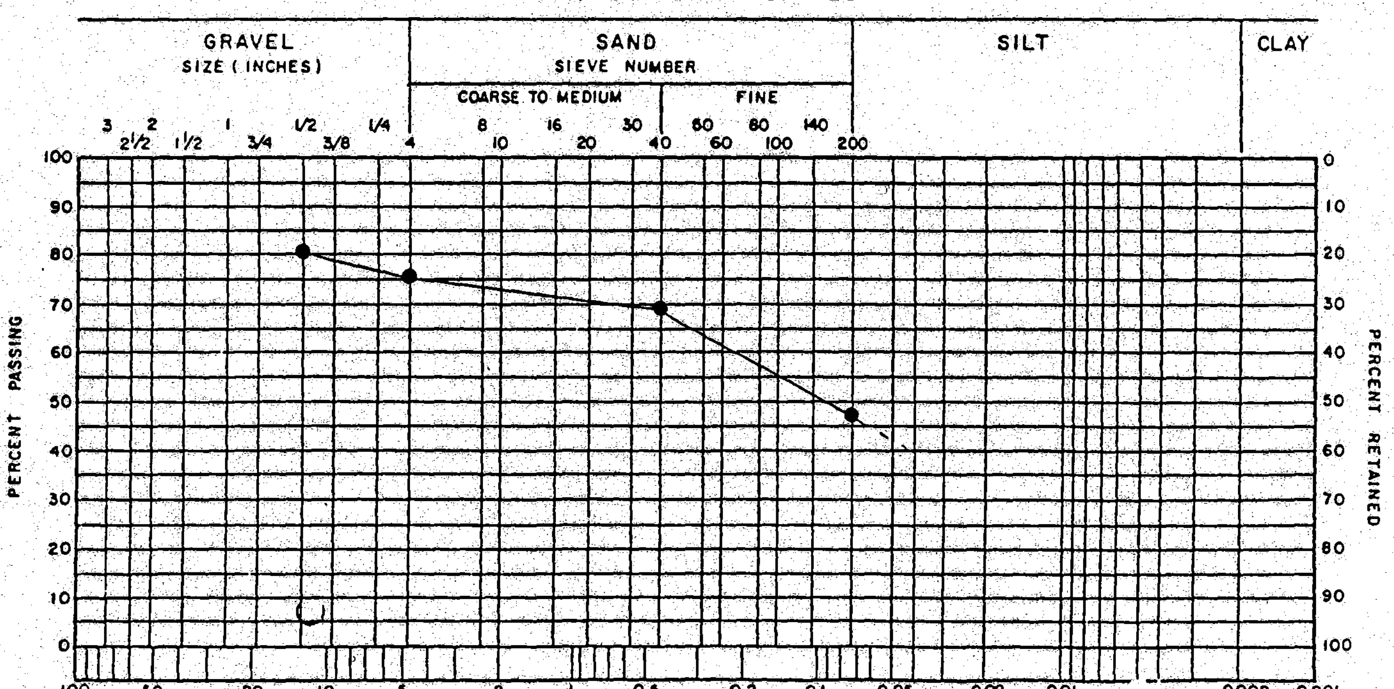
CLIENT: RAYE VEST EXCAVATING, INC. JOB NUMBER: 92-166

PROJECT: MISCELLANEOUS SOIL TESTING SIEVE NUMBER: TWO

DATE OF TESTING: AUGUST 31, 1992 MATERIAL: SM

SAMPLE LOCATION: RAYE VEST GRAVEL PIT

SIEVE	WT. G	%	% PASS	% RET.
1/2"	49.60	18.55	81.45	18.55
	.00	.00	81.45	18.55
No. 4	13.90	5.20	76.25	23.75
	.00	.00	76.25	23.75
No. 40	18.10	6.77	69.48	30.52
	.00	.00	69.48	30.52
No. 200	55.60	20.79	48.69	51.31
Elut.	130.20	48.69	.00	100.00
TOTAL	267.40	100.00		



BOB TAYLOR ENGINEERING, INC.
GEOTECHNICAL SERVICES • MATERIALS TESTING

ROBERT F. TAYLOR, P.E.
PRESIDENT

317 GREAT MILLS LANE
LEXINGTON PARK, MD 20653
(301) 862-4300 • (301) 932-5575

CLIENT:	Raye Vest Excavating, Inc.	JOB NUMBER:	92-166
PROJECT:	Miscellaneous Soil Testing	SAMPLE NUMBER:	Two
DATE SAMPLE:	August 27, 1992	DATE TESTED:	08-31-92
SAMPLE LOCATION:	Raye Vest Gravel Pit		

RESULTS OF LABORATORY TESTING

Liquid Limits (LL) as per ASTM D-4318-84

LL = 35

Plastic Limits (PL) as per ASTM D-4318-84

PL = 27

Plasticity Index (PI) = LL - PL

PI = 8

Soil Description:

Orange/Brown Fine Sand with some Silt, little Gravel and few Coarse Sand

COMMENTS:

The soil sample labeled Two does meet the specifications entitled Earthwork For Structures and Pavements - Section 2.1.2.3 which states that a soil must be provided which can be classified as GP, GM, GC, SP, SM, SC by ASTM D-2487.

Robert F. Taylor

BOB TAYLOR ENGINEERING, INC.
317 Great Mills Lane
LEXINGTON PARK, MARYLAND 20653

(301) 862-4300
(301) 932-5575

RAYE VEST EXCAVATING, INC.
P. O. BOX 669
WHITE PLAINS, MARYLAND 20695

JOB NO.	92-166
DATE	08/27/92
PROJECT	MISCELLANEOUS SOIL TESTING
LOCATION	WALDORF, MARYLAND
PRESENT AT SITE	CARL LEACH
	BTE BILLABLE TIME: 2.5 HOURS

FIELD REPORT

A soil sample was collected per ASTM D-75 from the orange/brown fine sand material. This sample will be laboratory tested per ASTM C-136 and ASTM D-2847 according to the job specifications.

B.T.
REVIEWER'S INITIALS

TECHNICIAN'S SIGNATURE

8-27-92
DATE

EARTHWORK

Transmittal Form Number: [illegible] (Submital Log)

From: [illegible] (Contractor) Date: [illegible]

Title: [illegible]

Subj: Submittal for Contract [illegible] in accordance with Specification Section [illegible] Paragraph(s) 1.4.1

Transmitted Herewith are:

For: ( )Acceptance or Approval ( )clarification (X) [illegible]

I hereby certified that the (equipment)(material)(article) shown and marked in this submittal is that proposed to be incorporated into this contract, is in compliance with the contract drawings and specification, can be installed in the allocated spaces, and is submitted for Government approval.

Contractors Signature and certification: [illegible]

From: ROICC Code ________ Date: [illegible]

To: ________

for review and comments no later than ________.

From: [illegible] Date: [illegible]

To: ROICC Code [illegible]

(X) Approved; ( ) Returned for Corrections; ( ) Disapproved; ( ) Approved, as noted; ( ) ________

Remarks:

[illegible]

From: ROICC Code 09RB10 Date: 9-23-92

To: JOWETT

Submittal is: (X) Approved; ( ) returned for correction; ( ) Approved as noted; ( ) Disapproved; ( ) ________

Remarks:

Approved

No Exceptions taken

ROICC 1 (rev 5/92) ★U.S.GPO:1992-0-623-055/41147

SEC: 02221 - Earthwork For Structures And Pavements _ _ _ _ _ _ #5-

This is a partial submittal to avoid delay in the work schedule.

1.4.1 - Certified Test Reports

d. Select material for controlled fill

1). "SM" material - 8/31/92

—— Material Classification "SM" conforms with ¶ 2.1.2.3 - General Site Fill and Embankment.

2). "GM-GC" material - 8-14-92

—— Material classification "GM-GC" Conforms with ¶ 2.1.2.2 - General Backfill Adjacent to Structures.

Recommendation:

Approved

[signature] 9-18-92
(301) 868-2880

SUBCONTRACTOR'S CERTIFICATION

Date 9-15-92

Company Name RAYE VEST CORPORATION

Address P.O. BOX 669 WHITE PLAINS, MD. 20695

Contact CHRIS HAYDEN

Specification Section 02221 FILL MATERIAL

Shop Drawing # 1

Certification

I hereby certify that this submittal and/or shop drawing:

✓ Meets or exceeds the contract drawings and specifications without exception.

___ Meets the contract drawings and specifications except as hereby noted in our cover letter dated ________________, describing said deviations for approval.

DATE 9-15-92 AUTHORIZED SIGNATURE Chris Hayden

ONE COPY OF THIS CERTIFICATION MUST BE ATTACHED TO EACH COPY OF YOUR SUBMITTAL.

JUWETT INCORPORATED

Item No. 501

Spec. Sect. 02221 Para. 1.4.1

It is hereby certified that the (material) (equipment) shown and marked in this submittal, shop drawings, catalog cut(s), etc., and approved / proposed to be incorporated into Contract Number 90-C-0544, is in compliance with the contract drawings and specifications, and can be installed in the allocated space, and is ✓ approved for use ________ submitted for Government approval

Authorized Reviewer ________ Date ______

Signature CQC Rep. [signature] Date 9-18-92

BOB TAYLOR ENGINEERING, INC.
GEOTECHNICAL SERVICES • MATERIALS TESTING

ROBERT F. TAYLOR, P.E.
PRESIDENT

317 GREAT MILLS LANE
LEXINGTON PARK, MD 20653
(301) 862-4300 • (301) 932-5575

September 9, 1992
Job No. 92-166

Raye Vest Excavating, Inc.
P. O. Box 669
White Plains, Maryland 20695

Ref: Miscellaneous Soil Testing

Gentlemen:

Enclosed with this letter are the following:

- Invoice Number 40992 Dated 09/09/92
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- ASTM C-136 Sieve or Screen Analysis of Fine and Coarse Aggregates (Two)
- A copy of the Field Report Dated 08/27/92

Should you have any questions or concerns, please don't hesitate to call.

Sincerely,

Robert F. Taylor, P.E.
President

Enclosures

BTE

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GEOTECHNICAL SERVICES • MATERIALS TESTING

ROBERT F. TAYLOR, P.E.
PRESIDENT

317 GREAT MILLS LANE
LEXINGTON PARK, MD 20653
(301) 862-4300 • (301) 932-5575

ASTM C-136
TESTS ON FINE AGGREGATE FOR SIEVE ANALYSIS

CLIENT: RAYE VEST EXCAVATING, INC. JOB NUMBER: 92-166

PROJECT: MISCELLANEOUS SOIL TESTING SIEVE NUMBER: TWO

DATE OF TESTING: AUGUST 31, 1992 MATERIAL: SM

SAMPLE LOCATION: RAYE VEST GRAVEL PIT

SIEVE	WT. G	%	% PASS	% RET.
1/2"	49.60	18.55	81.45	18.55
	.00	.00	81.45	18.55
No. 4	13.90	5.20	76.25	23.75
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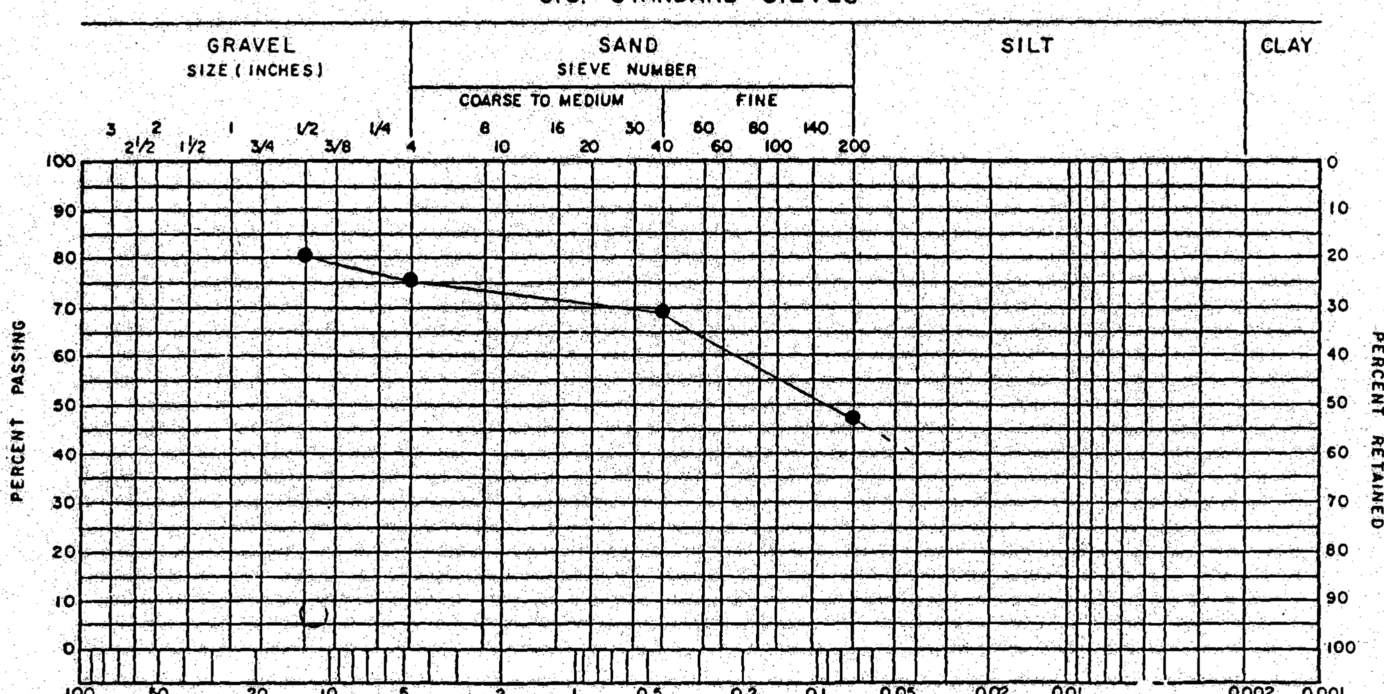
No. 40	18.10	6.77	69.48	30.52
	.00	.00	69.48	30.52
No. 200	55.60	20.79	48.69	51.31
Elut.	130.20	48.69	.00	100.00
TOTAL	267.40	100.00		

U.S. STANDARD SIEVES



BOB TAYLOR ENGINEERING, INC.

GEOTECHNICAL SERVICES • MATERIALS TESTING

ROBERT F. TAYLOR, P.E.
PRESIDENT

317 GREAT MILLS LANE
LEXINGTON PARK, MD 20653
(301) 862-4300 • (301) 932-5575

CLIENT: Raye Vest Excavating, Inc. JOB NUMBER: 92-166

PROJECT: Miscellaneous Soil Testing SAMPLE NUMBER: Two

DATE SAMPLE: August 27, 1992 DATE TESTED: 08-31-92

SAMPLE LOCATION: Raye Vest Gravel Pit

RESULTS OF LABORATORY TESTING

Liquid Limits (LL) as per ASTM D-4318-84

LL = 35

Plastic Limits (PL) as per ASTM D-4318-84

PL = 27

Plasticity Index (PI) = LL - PL

PI = 8

Soil Description:

Orange/Brown Fine Sand with some Silt, little Gravel and few Coarse Sand

COMMENTS:

The soil sample labeled Two does meet the specifications entitled Earthwork For Structures and Pavements - Section 2.1.2.3 which states that a soil must be provided which can be classified as GP, GM, GC, SP, SM, SC by ASTM D-2487.

Robert F. Taylor

BOB TAYLOR ENGINEERING, INC.
317 Great Mills Lane
LEXINGTON PARK, MARYLAND 20653

(301) 862-4300
(301) 932-5575

RAYE VEST EXCAVATING, INC.

P. O. BOX 669

WHITE PLAINS, MARYLAND 20695

JOB NO.	92-166
DATE	08/27/92
PROJECT	MISCELLANEOUS SOIL TESTING
LOCATION	WALDORF, MARYLAND
PRESENT AT SITE	CARL LEACH
	BTE BILLABLE TIME: 2.5 HOURS

FIELD REPORT

A soil sample was collected per ASTM D-75 from the orange/brown fine sand material. This sample will be laboratory tested per ASTM C-136 and ASTM D-2847 according to the job specifications.

B.T.
REVIEWER'S INITIALS

TECHNICIAN'S SIGNATURE

8-27-92
DATE

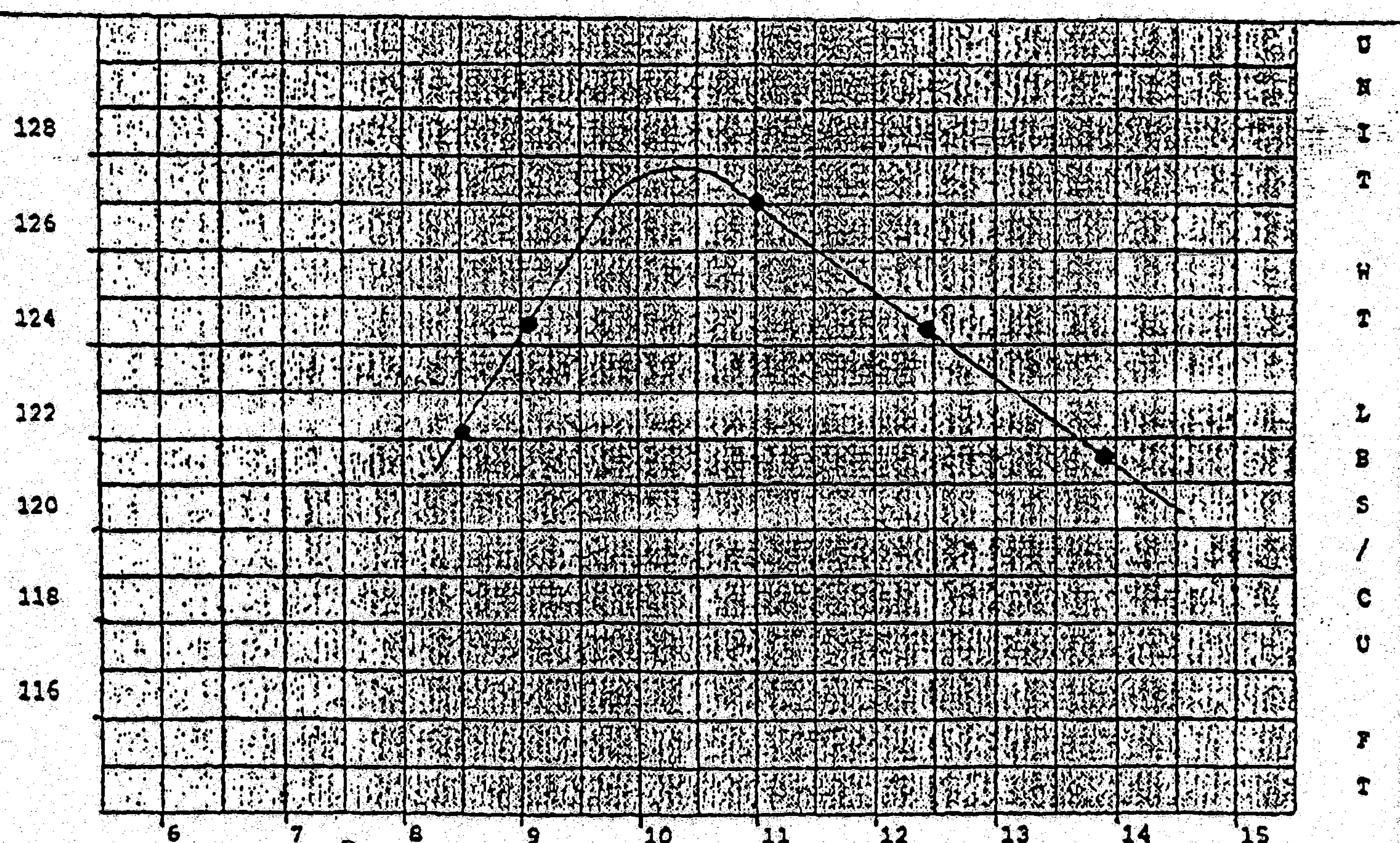
BOB TAYLOR ENGINEERING, INC.
317 Great Mills Lane
LEXINGTON PARK, MARYLAND 20653

COMPACTION TEST
Moisture/Density Relationship

PROJECT VILLAGE LAKE APARTMENTS LAB NO. 92-028

SAMPLE LOCATION SANDY BANK RUN GRAVEL DATE 07-10-92

Cylinder No.	1	2	3	4	5
Volume - Cu. Ft.	1/13.33	1/13.33	1/13.33	1/13.33	1/13.33
Method of Compaction ASTM	D-1557-C	D-1557-C	D-1557-C	D-1557-C	D-1557-C
Wt. Cylinder + Soil (lbs.)	22.42	22.65	33.05	22.95	22.86
Wt. Cylinder (lbs.)	12.47	12.47	12.47	12.47	12.47
Wt. Compacted Soil (lbs.)	9.95	10.18	10.58	10.48	10.39
Unit Wt. Wet (lbs./cu. ft.)	132.6	135.7	141.0	139.7	138.5
Water Content (%)	8.5	9.1	11.0	12.4	13.8
Unit Wt. Dry (lbs./cu. ft.)	122.2	124.4	127.0	124.3	121.7



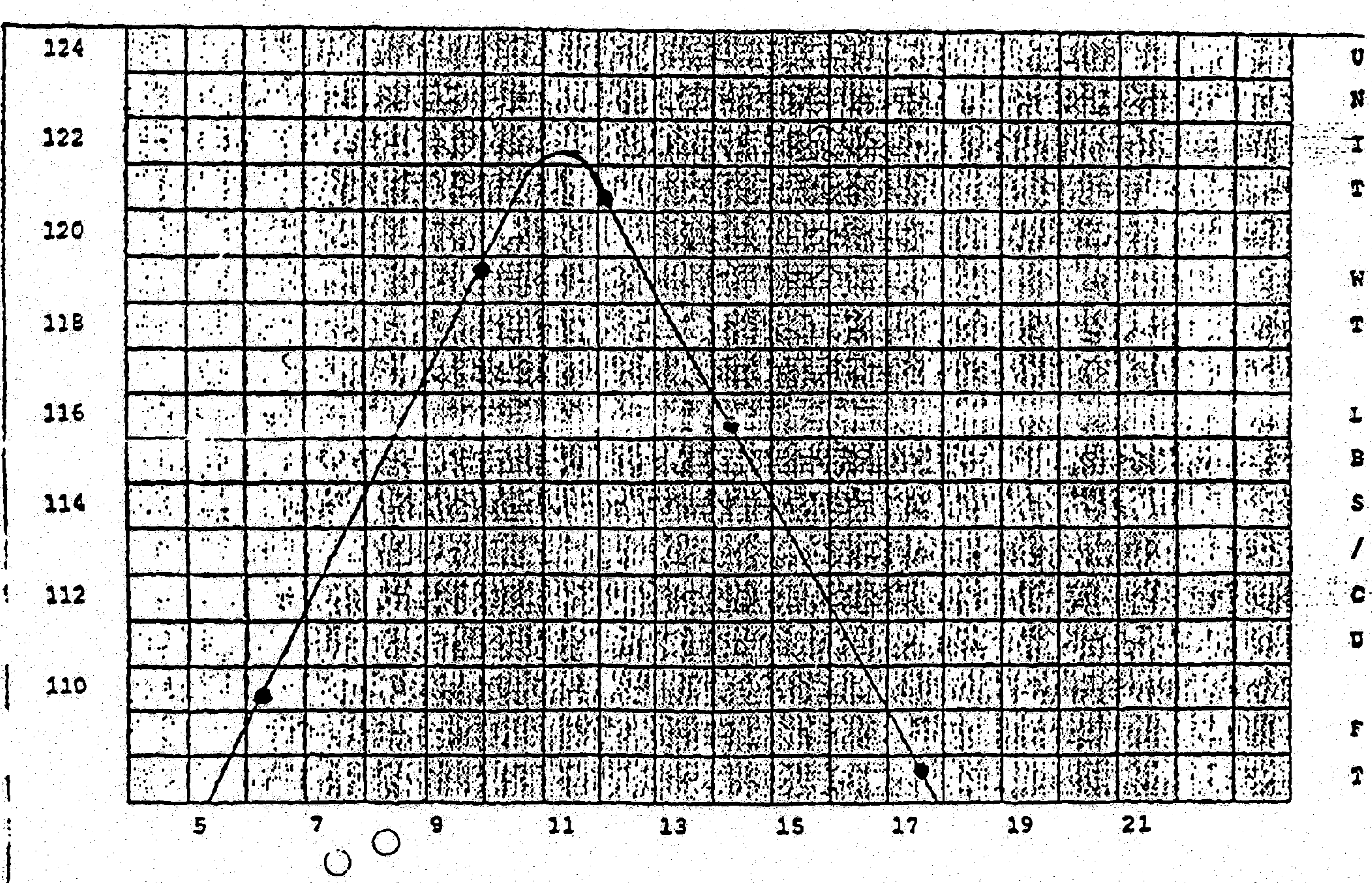
BOB TAYLOR ENGINEERING, INC
317 Great Mills Lane
LEXINGTON PARK, MARYLAND 20653

COMPACTION TEST
Moisture/Density Relationship

PROJECT VILLAGE LAKE APARTMENTS LAB NO. 92-028

SAMPLE LOCATION REDDISH BROWN CLAYEY SAND DATE 06-11-92

Cylinder No.	1	2	3	4	5
Volume - Cu. Ft.	1/30	1/30	1/30	1/30	1/30
Method of Compaction ASTM	D-1557	D-1557	D-1557	D-1557	D-155[illegible]
Wt. Cylinder + Soil (lbs.)	13.19	13.67	13.82	13.71	13.55
Wt. Cylinder (lbs.)	9.28	9.28	9.28	9.28	9.28
Wt. Compacted Soil (lbs.)	3.91	4.39	4.54	4.43	4.27
Unit Wt. Wet (lbs./cu. ft.)	117.3	131.7	136.2	132.9	128.1
Water Content (%)	6.4	10.0	12.2	14.3	17.7
Unit Wt. Dry (lbs./cu. ft.)	110.2	119.7	121.4	116.3	108.8



Water Content (%)

APPENDIX G: SITE 5 FIELD SAMPLING PLAN (JULY, 1991)

DRAFT FIELD SAMPLING PLAN

Naval Ordnance Station
Site 5
Indian Head, Maryland

Prepared For:

Environmental Engineering Branch
Chesapeake Division (Code 114)
Naval Facilities Engineering Command
Washington, D.C.

and

Air and Hazardous Waste Management Branch
Naval Ordnance Station
Indian Head, Maryland

DEPARTMENT OF THE NAVY ★ CHESAPEAKE DIV NAVFACENGCOM ★

Prepared By:

ABB ENVIRONMENTAL SERVICES, INC.
Washington, D.C.

Contract No. N62477-91D0043
Delivery Order No. 0001
Job No. 6942-00

July 24, 1991

FIELD SAMPLING PLAN

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FIELD SAMPLING PLAN

LIST OF FIGURES

1.0 INTRODUCTION

This document establishes the objectives, procedures, and schedule for the investigation of a drainage ditch adjacent to Building 731, located at Naval Ordnance Station (NOS), Indian Head, Maryland. The drainage ditch has been impacted by past photographic waste management practices originating within Building 731. These practices have resulted in elevated silver concentrations within ditch sediments. This investigation focusses on a segment of the silver-contaminated drainage ditch which is within an area designated for a military construction project. A facility and study site map which delineates construction areas along with the drainage ditch is provided as Figure 1.

Due to technical, occupational, health and safety, and production requirements associated with manufacture of tactical missile and propulsion systems, new mix, assemble and cure facilities are needed at the NOS. The proposed military construction project designed to meet these requirements consists of a 29,712 square foot facility on 24 acres of the NOS facility. Proposed construction includes a new Mix Building, two new Assembly Buildings, re-work of an existing Pre-Mix Building and expansion/ construction of explosion berms. Figure 2 provides a detailed diagram of the planned construction zone. As indicated on Figure 2, expansion of the berm northwest of Building 728 will result in filling approximately 300 feet of the drainage ditch, followed by burial beneath the earthen explosion berm. Construction plans include replacement of this drainage ditch segment with a new section in uncontaminated soil around the new berm.

Due to the presence of contamination within the planned construction zone, the Navy has undertaken a program to characterize the area of the ditch impacted by construction, evaluate associated risk, and develop a remedial action, if required. This Field Sampling Plan details the objectives of the study along with the methodology to be employed to characterize the drainage ditch impacted by construction.

1.1 Study Objectives

The objective of this focussed investigation is the development of a database sufficient to quantify the extent of and risks associated with existing drainage ditch contamination. This information will be used to determine the need for removal of contaminated soils/sediments prior to construction. Additional project requirements include streamlining this process to facilitate construction start-up. To achieve these requirements, a draft report addressing the extent of contamination, associated risks, and proposed remediation actions will be developed within six weeks after Navy approval of the Field Sampling Plan.

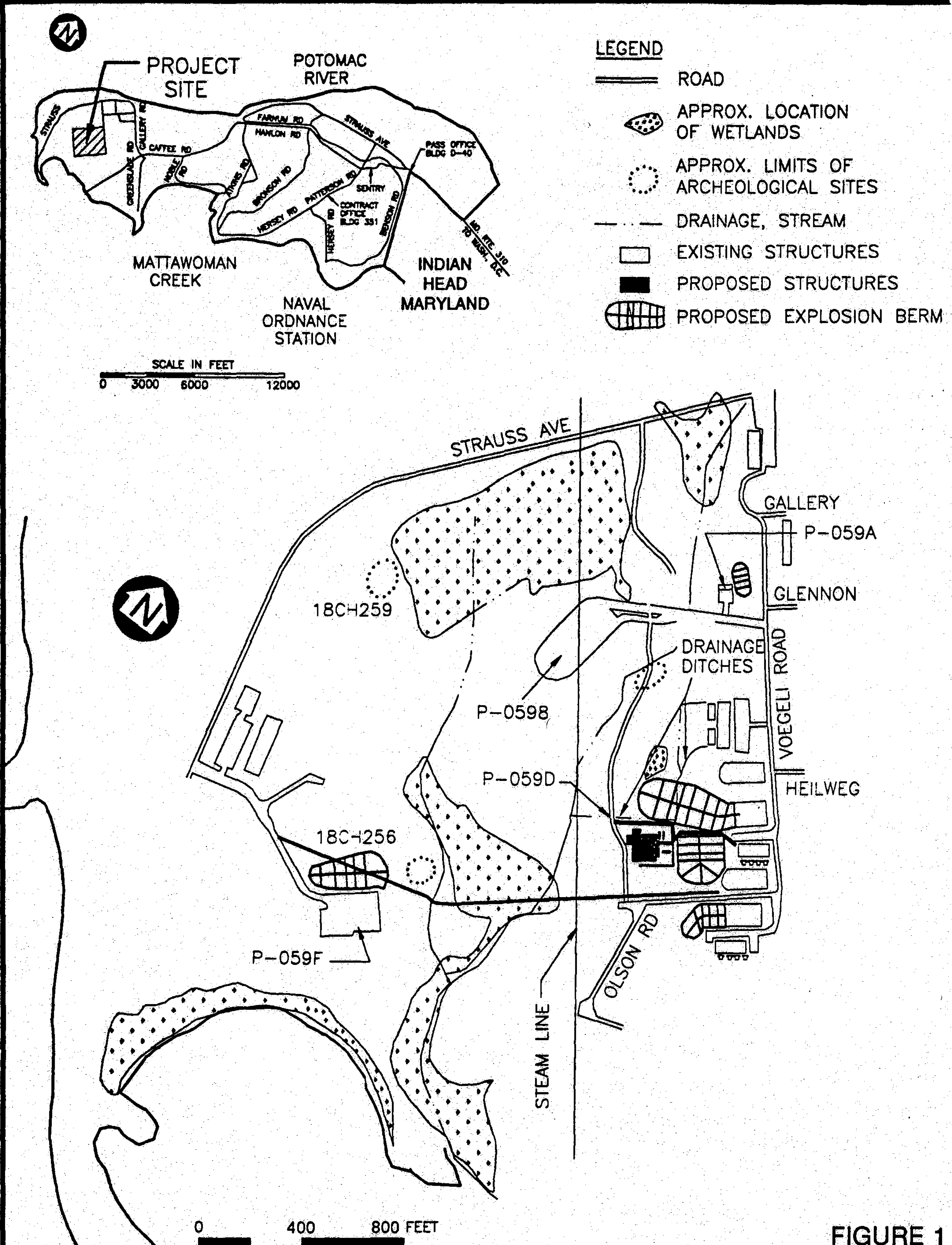

FIGURE 1
FACILITY AND STUDY SITE LOCATION MAP
NAVAL ORDNANCE STATION
INDIAN HEAD, MARYLAND

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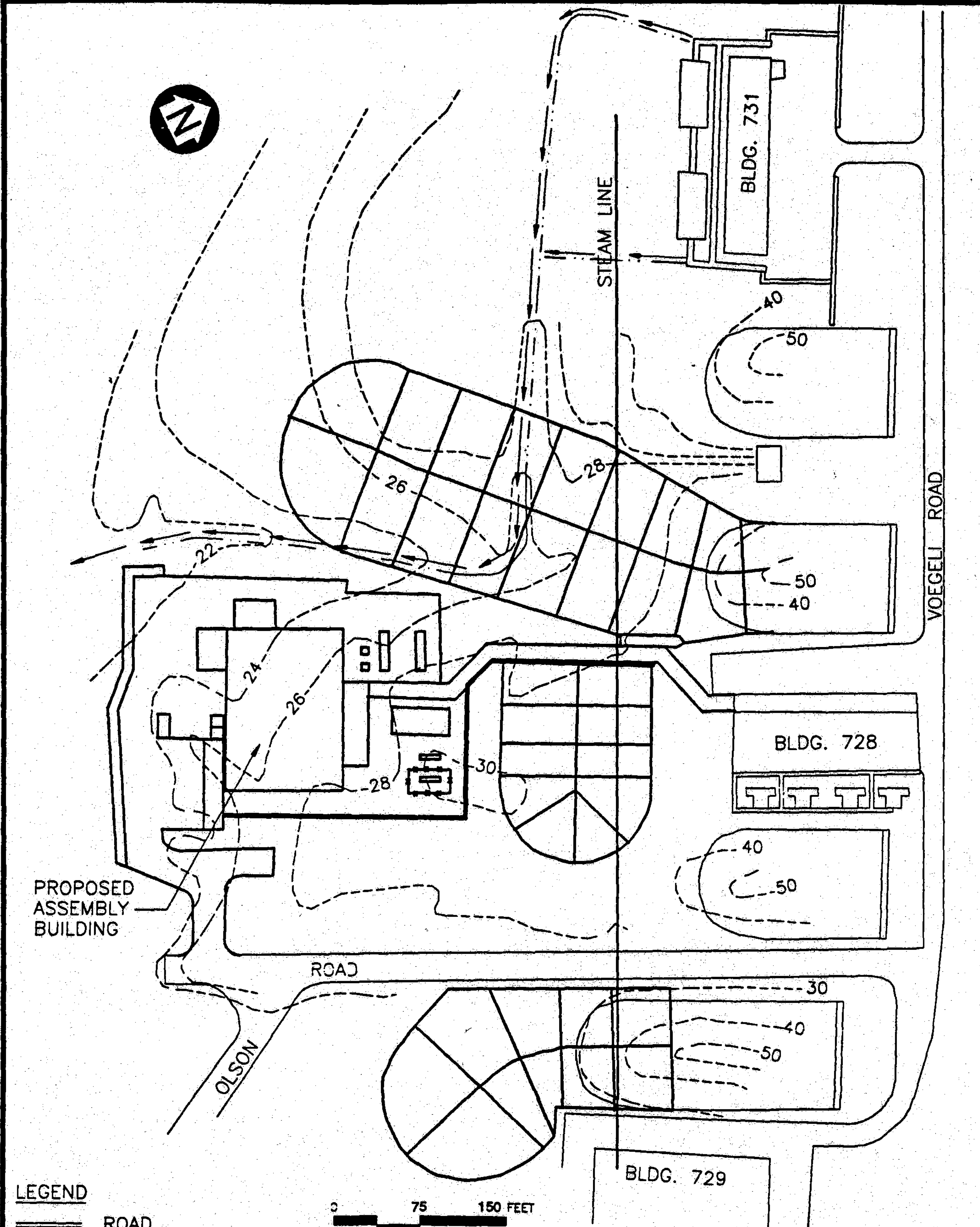

LEGEND

ROAD

DRAINAGE, STREAM

PATH OF SILVER-CONTAMINATED WASTEWATER

PROPOSED EXPLOSION BERM

CONTOUR LINE

FIGURE 2
PROPOSED CONSTRUCTION WITHIN SITE 5
NAVAL ORDNANCE STATION
INDIAN HEAD, MARYLAND

ABB ENVIRONMENTAL SERVICES INC.

1.2 Study Site Background

The silver-contaminated drainage ditch has been investigated under the Navy's Installation Restoration (IR) Program. In a 1983 Initial Assessment Study, three sites at NOS Indian Head were recommended for confirmation studies (NEESA, 1983). In 1985, the Naval Assessment and Control of Installation Pollutants (NACIP) Confirmation Study confirmed the presence of surficial silver contamination within sediments contained in the existing swales and man-made ditches located downgradient of Building 731, the X-ray Building. A total of 720 pounds of silver are estimated to have been released to the environment.

Quantification of silver concentrations in sediments and water was completed as part of the NACIP study. The silver concentrations in sediments (as silver sulfide) ranged from a high of 1,920 mg/kg in a composite sediment sample obtained from the western branch of the drainage ditch emanating from Building 731 to 2.25 mg/kg in sediments taken from the outlet of the tidal marsh into Mattawoman Creek. All of the samples taken exhibited silver concentrations above background concentrations for soils and sediments (0.05 to 0.1 mg/kg) (EA, 1990). In general, concentrations of silver decreased as a function of distance from Building 731. Sediment samples taken just upstream of the area to be impacted by construction contained 11.3 mg/kg of silver while sediments just downstream of the area contained 9.46 mg/kg of silver.

2.0 FIELD OPERATIONS

The investigation of the drainage ditch zone to be impacted by construction is designed to generate a valid data set to delineate surficial and shallow subsurface contaminant distribution. Additionally, the database will be used to determine risks associated with existing silver contamination and development of a proposed remedial action. Key components of the field investigation include:

- A Site Reconnaissance
- Site Survey/Sampling Grid Establishment
- Sampling Protocols/Methodology
- Boring Abandonment
- Field QA/QC
- Sample Preparation/Handling
- Recordkeeping/Documentation
- Analytical Program

The following subsections provided a discussion of each field operation/investigation component.

2.1 Site Reconnaissance

The initial project task consists of site reconnaissance, which involves a site visit designed to gather information to support project planning activities. The site reconnaissance task will consist of a site visit by the ABB project manager and lead senior technical personnel. During the visit, the ABB team will meet with the Engineer-in-Charge (E.I.C.) to discuss project scope and schedule, review the existing database, gather supplemental site information (P-059 Design Package, Environmental Assessment, etc.), and conduct a site walk-through. During the site walk-through, the investigation site will be photographed and existing site information will be field verified (e.g., cultural features, access areas, utilities, relative location of stream, berms, woodlands, high and average stream water levels, drainage patterns, etc.). This information will be used to support sampling program development.

2.2 Survey/Sampling Grid

This task will utilize data gathered during the site reconnaissance to develop a defensible, site-specific sampling strategy. Key parameters influencing sample grid development include sample size determination, sample locations, along with practical considerations such as logistics and costs. The stream area to be impacted by construction is approximately 300 feet in length. The investigation will consist of 24 systematic sampling locations within the contamination zone. Systematic sample locations are established across an area of concern by laying out a grid of sampling locations which follow a pattern. For the Silver-contaminated ditch investigation, samples will be obtained along 8 transects as defined in Figure 3, with three samples obtained at each transect. Individual sampling locations will be at midstream, average water-, and high-water-levels. This strategy will provide sufficient areal coverage to support horizontal contaminant delineation. To assess vertical migration within streambed sediments, the sampling procedure will include sample acquisition at 0 and 18 inches in depth, at each sampling location. One background location will be sampled at 0 and 18 inches.

Prior to initiating sampling, a survey of the investigation area will be completed. This survey will serve two purposes, delineation of the berm expansion boundaries followed by the staking of sample acquisition points. The survey will be tied to a site control point (reference point) to establish a permanent record of the sampling locations.

2.3 Sampling Procedures/Methodology

Sediment samples are to be collected in a manner which minimizes disturbance of the sediments and potential contamination of subsequent samples. Samples will be obtained at the most downstream transect (as shown in Figure 3) and subsequent sampling will progress upstream, transect by transect. The types of sample to be obtained under this study include both grab and composite samples. Grab samples will be collected at each of the 50 distinct sampling collection points in the study for silver and cyanide analyses. Ten composite samples (comprised of material from a maximum of five locations) will be used to complete TCLP waste characterization testing.

Sampling devices used to collect, store, preserve and transport samples will include the following equipment:

- o Stainless Steel Hand Auger or Hand Corer
- o Stainless Steel Spatulas/Spoons
- o Proper Sample Bottles
- o Cooler to Store/Transport Samples to Lab

Collection procedures to be employed are designed not to alter the sediments sampled. At each individual sampling location, the following procedures will be carried out:

1) Any vegetation that could interfere with sampling activities will be removed and saved for replacement after sampling procedures are completed.

2) Soil at and near the surface will be removed with a trowel or similar tool. The quantity of soil taken will be adequate to fill a sample bottle.

3) Using a stainless steel spoon, the sample bottle will be filled with the removed soil. Any excess soil will be stored on plastic sheeting for fill purposes after sampling activities have been completed.

4) The bottle cap's teflon liner will be checked. If it is present, the bottle will be tightly sealed with the cap.

5) The bottle will be labeled with the appropriate sample tag, with the sampler's initials, date, time, type sample, analytical parameter required, site or job I.D., and sampling location I.D. number.

6) The sample will be wrapped in bubblewrap and icepacks (or equivalent) to maintain sample integrity, and to maintain a temperature of 4° Celsius, during transport to the designated laboratory.

7) The soil and vegetation that have been saved for replacement will be returned as closely as possible to their original locations and condition.

8) All equipment coming in contact with soils at the sampling location will be decontaminated. The procedure will consist of a liquinox wash, followed by a potable water rinse, followed by a deionized water rinse.

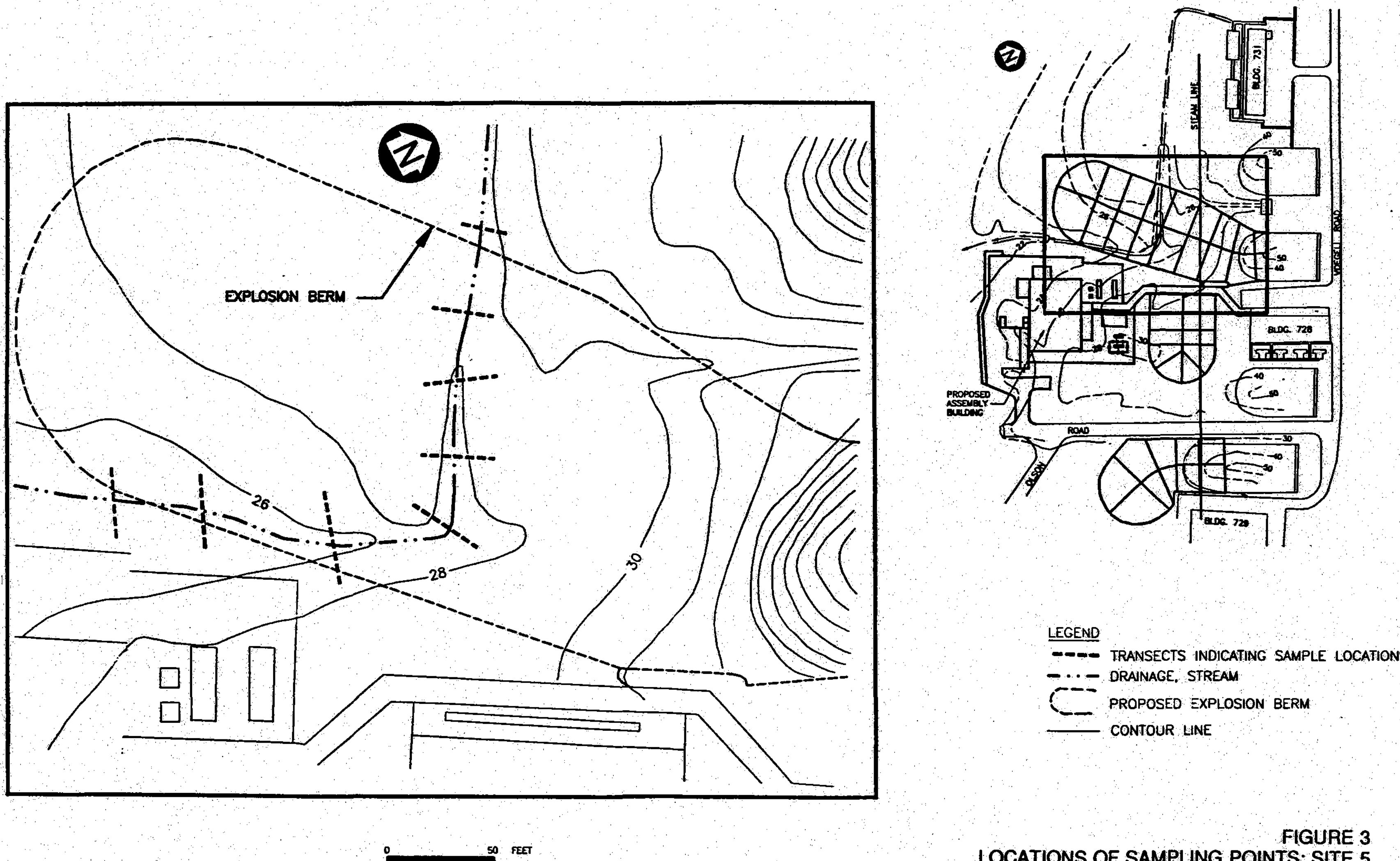

FIGURE 3
LOCATIONS OF SAMPLING POINTS; SITE 5
NAVAL ORDNANCE STATION
INDIAN HEAD, MARYLAND

ABB ENVIRONMENTAL SERVICES INC.

9) All appropriate documentation will be completed, including Chain- of-Custody and analytical request forms.

Upon collection of the individual site's surface sample, the following procedures will be carried out to collect the sub-surface sample:

1) Using a hand auger, soil from the sampling location will be removed to a depth of 18 inches. All soil removed by the auger will be stored on plastic sheeting for fill purposes after sampling activities have been completed.

2) Using a thin-walled tube sampler, a sample will be carefully extracted from the bottom of the borehole.

3) The core will be removed from the tube sampler, and the top two inches of the sample will be discarded. Using a stainless steel spoon, the sample bottle will be filled with the remainder of the soil core. Any excess soil will be stored on plastic sheeting for fill purposes after sampling activities have been completed.

4) Steps 4 through 9, as listed above, will be carried out.

2.4 Boring Abandonment

Boring abandonment procedures to be employed under this study will consist of backfilling the shallow borings with the native soils. Once the necessary samples have been taken, the soils removed will be replaced in the boring from which it was removed. Once soil has been replaced, the sod cover removed prior to sample acquisition will be replaced.

2.5 Field Quality Assurance/Quality Control

Field Quality Assurance/Quality Control (QA/QC) for this field investigation will focus on the use of good field practices as defined within ABB-ES Standard Operating Procedures (SOPs) and this Field Sampling Plan (FSP) for the collection, preparation, handling, transportation and documentation of environmental sampling activities. Due to the nature of this investigation, no field QA/QC sampling (duplicates/replicates, trip blanks, field blanks, or equipment blanks) will be taken. The remaining sections of this document present additional SOPs which will be employed to ensure data validity for sampling activities undertaken as part of this project.

2.6 Sample Preparation and Handling

The quality of samples is assured by proper preparation and handling subsequent to sample collection. This section will address the procedures for sample bottle preparation, sample preservation, and transportation to be used under this project. Use of these SOPs will minimize the potential for sample alteration by contamination, degradation, biological transformation, chemical interactions, and other factors during the time between sample collection and analysis.

Sample Preparation - Once the auger containing the appropriate sample has been removed from the boring, the core will be removed. Subsequent to this, the outer layer of soil which has contacted the auger will be removed. The remainder of the sample will be placed in the sample jar. Once the sample is in the proper container, all pertinent information will be recorded on the sample label, the Chain-of-Custody (COC) form, and the Analytical Request Form (ARF). Following the documentation process, samples will be placed in the sample cooler. When all samples have been collected, labels, COC and ARF forms, and the field log will be verified prior to shipment.

Preparation of Sample Containers - Sample containers used for this field investigation will be prepared as follows:

1. Wash bottles, closures, and teflon liners with hot tap water with laboratory grade non-phosphate detergent.
2. Rinse three times with tap water.
3. Rinse with 1:1 nitric acid.
4. Rinse three times with ASTM Type 1 deionized water.
5. Air dry in contaminant-free environment.
6. Place liners in closures and place closures on bottles.

Sample Preservation - The steps taken to maintain the integrity of samples under this program will involve refrigeration of samples at 4 degrees C immediately after containerizing and labeling of the samples.

Sample Handling - Regardless of the method of preservation used, strict adherence to holding times is necessary. Holding times represent the maximum amount of time that a preserved sample may be held from the time of sampling until extraction or analysis without compromising the validity of the analytical results. The following table presents holding time limits for analyses planned under this project.

Analyte	Analytical Method (Preparation/Analysis)	Holding Times
Silver (Ag)	SW 846 3050/6010	180 days
Cyanide (CN)	SW 846 9010	14 days
TCLP Metals	FR Vol 55, Sect 126	
ICP Analysis	SW 846 3005/6010	180 days
Mercury	SW 846 7470	28 days
Selenium	SW 846 7740	180 days

Holding time should not become an issue under this program due to priority sampling under this project (two week turnaround on all samples).

2.7 Recordkeeping/Documentation

The procedures to be used for recordkeeping and documentation ensure development of a thorough, accurate, and defensible record of field investigation activities. The elements of this task include the use of the following:

- o Field Logbook: The logbook serve the mechanism to record all information pertinent to the field investigation. The logbook will be a waterproof, bound book, preferably with consecutively numbered pages. Entries in the logbook will be made in water-resistant ink, and will include the following:

  - Names and affiliations of personnel on-site
  - General description of each day's field activities
  - Documentation of weather conditions during sampling
  - Location of sampling (station number as description)
  - Type of sample matrix
  - Date and time of collection
  - Sample identification numbers
  - Sample handling/preparation/distribution procedures
  - Observations of sample of collection environment
  - Any field measurements
  - Sampler's name
  - Type of sample (composite, grab, split, etc.)

- o Chain-of-Custody (COC): The chain-of-custody program is designed to track sample handling activities from the field through laboratory operations. The purpose of this activity is to assure that each sample is accounted for at all times and all pertinent information is permanently recorded. The COC is one component of ABB-ES's sample custody identification and control system. The comprehensive system consists of field data sheets, COC records, and analytical request forms (ARFs). This system assures that:

  - o All samples scheduled for collection are uniquely identified;
  - o The correct samples are analyzed and are traceable;
  - o Important sample characteristics are preserved;
  - o Samples are protected from loss or damage;
  - o Any alteration of samples (e.g., filtration, preservation) is documented; and
  - o A forensic record of sample integrity is established.

  The COC protocol for this project will consist of:

- o Recording of sampling locations, sample bottle identification, and specific sample acquisition measures on the appropriate forms;
- o Using detailed sample labels to document all information necessary for effective sample tracking;
- o Completing standard field data record forms to establish sample custody in the field before sample shipment.

The COC record will be completed in quadruplicate. Two copies accompany the samples to the laboratory, another is kept by the sample crew chief, and the last copy is maintained in the project file. Chain-of-Custody will also be assured by the use of custody seals on sample shipments.

2.8 Analytical Program

Samples obtained through the planned field investigation will be analyzes for total cyanides, silver, and TCLP metals. A summary of the analytical program is provided in the following table.

Analyte	Analytical Method (Preparation/Analysis)	Number of Samples
Silver (Ag)	SW 846 3050/6010	50
Cyanide (CN)	SW 846 9010	50
TCLP Metals	FR Vol 55, Sect 126	
ICP Analysis	SW 846 3005/6010	10
Mercury	SW 846 7470	10
Selenium	SW 846 7740	10

3.0 REFERENCES

ABB Environmental Services, Inc., 1991. "Draft Standard Operating Procedures for Site Investigations"; July, 1991.

U.S. Department of the Navy, 1990. "Environmental Assessment for the Construction of a Mix, Assemble and Cure Facility (P-059), Naval Ordnance Station, Indian Head"; July, 1990.

APPENDIX H: AA UNIT STANDARD OPERATING PROCEDURES

STANDARD OPERATING PROCEDURES

AUTHOR: STEPHEN DOUGHTY

ISSUING UNIT: ABB-ES

SOP: FSAA-001-02
DATE: 3-25-91

REVIEWED BY:______________________________

APPROVED BY:______________________________

TITLE: Field Screening Analysis of Inorganic Compounds by Atomic Absorption.

SCOPE: These procedures describe the preparation and analysis of environmental samples for inorganic compounds using atomic absorption (AA). Elements to be analyzed using this technique are project specific and will be selected by project site chemist prior to field screening activities. This method is used when quantification of specific inorganic compounds at low-part per million to percent level detection is required.

1.0 REQUIREMENTS: APPARATUS AND MATERIALS

INSTRUMENTATION: Field portable AA unit (Perkin/Elmer). Units can be equipped with a number of hollow cathode or electrodeless discharge lamps,for analysis of any number of inorganic parameters.

MATERIALS:

1. Hot plate
2. Test tubes (teflon lined screw caps) or disposable
3. Spatulas (plastic or teflon coated)
4. Grinding apparatus (mortar/pestle)
5. Sieve (-80 mesh prefered)
6. Blending apparatus
7. Analytic balance
8. Weighing pans
9. Drying oven
10. Micro variable pipets (with tips)
11. 100ml volumetric flasks
12. Analytical standards
13. Eppendorf repipet (with tips)
14. Vortex and centrifuge
15. Latex gloves and Aprons
16. 50/100 ml beakers
17. Acids (HNO3/HCL)
18. Bath pans
19. Thermometer

2.0 CONVENTIONS

Field screening activities will follow established guidelines for coding standards, logbook entries, calculations and quality assurance/quality control. Deviations from these guidelines will not be allowed without the issuance or a written variance or field change request. Logbook entry(s) detailing the reason(s) for the deviation(s), and a verbal discussion with the project chemist or qualified representive.

2.1 CHEMICAL STANDARDS

A.AQUEOUS: Aqueous chemical standards will be purchased through Sigma Co., Aldrich Chem. Co., VWR, or an equivalent supplier. Note: Stock aqueous standards are generally 1000ppm in concentration and are AA or ICP certified.

Documentation of standard concentrations (aqueous) should accompany the standards, along with project logbook entries entailing the following information.

1. Vendor name(s)
2. Concentration of standard(s)
3. Dilution records and calculations derived from stock standard(s) and associated concentration(s)
4. Lot number(s) of standard(s)
5. Code assigned to standards
6. Standard(s) expiration date

B. SOLIDS: Solid reference standards will be purchased through USGS,CANMET,NBS, or an equivalent supplier. Standards must be accompanied by analytical data (AA or ICP) supporting the standards concentration and reproducibity.

2.2 STANDARDS PREPARATIONS

A. AQUEOUS: Aqueous working/calibration standards will be prepared from single or multi-element stock solutions purchased from approved supplier. Working standards will be prepared at concentrations over the expected range of contamination on site.

Standards will be labeled, coded, and stored in appropriate containers. Standards preparation materials will be cleaned with 20% HNO_3 followed by three consecutive rinses with type II deionized water. NOTE: ALL GLASSWARE WILL FOLLOW SAME CLEANING PROCEDURE.

Standard codes and summary of standards preparation will be entered into project the logbook prior to analysis. New working standards will always be prepared whenever the quality of the standard(s) are in question.

Note: Shelf life (aqueous std's)
1.Stock standards: 2 yrs.
2.Calibration standards: 6 months

Note: Aqueous working/calibration standards should be stored in level II pre-cleaned, screw cap plastic bottles or precleaned(HNO3/DI), snap cap volumetric lasks (short term storage). CAP AND TIGHTEN STANDARD BOTTLES IMMEDIATELY AFTER USE.

Note: 1-2% of concentrated HNO3 or HCL (element dependant), WILL BE ADDED to the working/calibration standards during intial preparation, for standards matrix and concentration stability.

B. SOLIDS:

1. Purchased: Reblend every 4-6 months.

3.0 CALIBRATION

Prior to analysis, instrument operating conditions will be established and recorded in site logbook.

Calibration of AA will be preformed in two steps.

1. SETUP:Burner head alignment, nebulizer adjustment,set instrument parameters, lamp alignment, gas to air ratios, and flame intensity. NOTE: setup must be done using Cu at 324.8nm.
(See manufacturer's operations manual)

2. STANDARDS CALIBRATION: One to three standards can be use to calibrate the instrument. Calibration checks will be done following a maximum of 20 unknown samples completed consecutively. Calibration checks will also be done any time operator questions a standard point drift. Calibration standards must bracket the unknown samples concentration. Absorbance, stability, and linear range will dictate the bracket standard limits.

Blanking(zero) of AA will be done before sample analysis and at any time operator questions drift of baseline.

Any samples above instruments absorbance range must be deluted to linear range and system must be cleaned with with 20% HNO_3 until absorbance returns to baseline.

4.0 QUALITY CONTROL

In addition to instrument calibration, continuing calibration checks (as stated above), duplicates,and MS/MSD will be analyzed. The number and type of QA/QC samples will be determined and established on a site specific basis dependent upon project data quality objectives.

5.0 METHOD DETECTION LIMITS

Method detection limits will be established on an annual basis, extrapolated from aqueous standards at or near instrument detection limits. Pratical quantification limits will be establish based on data generated from the MDL study.

6.0 SAMPLE PREPARATION/DIGESTION

A. AQUEOUS SAMPLES: All aqueous samples must be receiced preserved, ph<2 with HNO_3, in appropriate containers and stored at 4 degrees centigrade.

1. Non-suspended particles: Direct aspiration

2. Suspended particles:
   a. 8.0 mls of liquid into test tube.
   b. Add 0.5 mls of conc. HNO_3,shake.
   c. Place samples in cool water bath <40 dgrees centigrade, heat to 90 degress centigrade, digest for 45min.
   d. Remove samples from bath, add 1.5 mls of 50% HCL, return to cool water bath, heat to 90 degrees centrigrade, digest for 45min.
   e. Cool to room temperature, analyze.

Note: EPA method 3010 may also be used.

SOLID SAMPLES PREPARATION: Samples must be received in appropriate containers and stored at 4 degrees centigrade.

1. Dry samples at @85 degrees centigrade (>4 hrs.)

2. Grind and/or sieve samples with 60-100mesh sieve
   note: sieving is mandatory on medium to coarse grained sands and nonrepresentative objects (i.e leaves, twigs, and cobbles >1-2mm in diameter).

3. Homogenize sample (blend 1-2min.)

SOLIDS DIGESTION

1. Weigh 0.50g of each homogenous sample into test tubes, place samples in test tube rack and start cool water bath.

2. Add 0.50ml of conc. HNO_3 to samples, shake rack and place in bath.

3. Bring bath to 90 degrees centigrade and digest for 45min.

4. After 45min. remove samples from bath, replace bath with cold water.

5. Add 1.5 mls of conc. HCL to samples, shake rack, place in bath.

6. Bring bath to 90 degrees centigrade and digest for 45min.

7. After 45mins remove samples from bath, allow to cool to room temperature.

8. Add 8.0 mls of type II deionized water to samples, shake and centrifuge.

9. Analyze.

NOTE: EPA method 3050 may also be used.

7.0 FIELD DOCUMENTATION PROCEDURES

A log of all analytical runs will be recorded in a bound logbook with sequentially numbered pages. A separate logbook will be maintained for each instrument used in the field. The logbook will be used to record all standards and sample analyses, sample IDs, date of analysis and any additional information particular to the analysis (e.g. sample volume and weight, color, odor).

Individual sections in the front of the logbook will be designated for recording information on standards preparation, instrument maintenance, and instrument operating conditions.

8.0 DATA REVIEW AND DELIVERABLES

Data from all sample analysis and other relevant information will be recorded in a dedicated instrument specific logbook. The field operator will review screening data for accuracy of continuing calibration and potential matrix interferences. Date summary table may be generated as required for each project. Data will undergo periodic technical review by the project chemist assigned to the project.

APPENDIX I: FIELD LOG BOOK

LABORATORY NOTEBOOK

NOS SITE 5

Ag- CONTAMINATED STREAMBED

REMEDIAL ACTION

<u>FIELD LOG BOOK</u>

LABORATORY NOTEBOOK

Notebook No.: ______________________

Assigned to: D. von Bushberger

Date: 9-NOV-1992

Use Nalgene Cat. No.
6301-1000
to reorder.

Rev. 1984

INSTRUCTIONS FOR KEEPING RESEARCH RECORDS

In addition to providing a complete record of your laboratory work which can be understood and repeated by yourself and others, this notebook has been designed to afford maximum patent right protection. Several practices must be followed to give the notebook value as a legal document in possible patent litigation:

1. Enter all data directly into this book; it is permanently bound with numbered pages so that pages can not be substituted or deleted. Insert a piece of carbon paper between each original and duplicate page in turn such that a copy of all dates, data and signatures are made as work progresses. These copies should be removed from the book and given to your group leader. Do not record data elsewhere for transfer into the book. Write in ink. Never make erasures. Thus, the integrity of the record will not be in question.
2. Record sufficient information. All procedures, reagents, apparatus, sketches, conditions, references, etc., should be entered into the book as the work is done. The purpose and significance of the experiment as well as observations, results, and conclusions should be made clear. What may seem trivial at the time may later prove of critical importance. Your entries should be clear and complete enough for someone else who is "skilled in the art" to read and comprehend what has been accomplished. Avoid sweeping negative statements, e.g.: "This procedure is worthless," which could later limit the scope of your claims.
3. Not only is the conception of an invention important, but so is the diligence shown in making a working model or demonstrating that the idea works—"reducing to practice." These two elements of an invention, conception and reduction to practice, must be corroborated by a witness. The records of the inventor(s) are not enough. Thus, each page of the notebook should be read, witnessed, and dated (daily, if possible) by someone who is competent to understand it, but who does not claim to be a co-inventor. Charts, tables, etc., should be complete, and lines should be drawn through any blank spaces prior to witnessing. It may be wise to perform key experiments in front of one or more witnesses. Spectra, charts, etc., should be signed, dated, witnessed, and if they can not be permanently attached to the notebook, they should be referred to with an entry in the book and kept on file. Dates and witnesses can establish your priority of invention.
4. To delete an entry, draw a line through it so that it is still legible. Corrections should be made adjacent to the deleted entry, and they should be initialed and dated by you and the corroborating witness. Changes made after the page has been witnessed should also be initialed and dated by you and the witness. Always use the current date.
5. The notebook and its contents are to be considered confidential and of great value. Exercise every care in preserving them. Report the loss or theft of a research notebook to your group leader immediately.
6. Index the contents and return each book as completed (or when not in use) for filing.
7. New ideas must be recorded and witnessed as they occur to establish priority of invention. Even ideas which do not pertain to the project at hand should be documented in the book.

Keep your research records as if each project were to be patented. Even though the work contained in the book may not result in a patent application, observance of these practices will provide a clear record for reports, publication, or future reference.

Instructions Read and Understood by ______________________________

Dated ______________________________

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Notebook No. ________ 1

PROJECT NDS Indian Head Ag-contaminate Continued From Page ________

LOG FOR REMEDIATION OVERSIGHT

09:00 - Arrived at facility; checked in and received badges ~~expire~~ December 9 1992.
09:30 - Steve Doughty arrives.

10:30 - Hazco delivery person arrives.
12:00 - Trailer ~~set~~ finished being set up. Steve and I begin installing lab equipment.
13:30 - Deal with electricity issues. Talk to Franco Grotley and Jowett electrical contractor. He'll be installing it. More equipment deliveries arrive.
16:30 - Finish setting up lab equipment. Leave for day.

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Read and Understood By

Signed: Doyle Forsythe Date: 11-9-92

Signed ________ Date ________

PROJECT NDS Ag project

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Spend entire day setting up AA equipment. Quantum supplied us with improper hose fittings for the compressed air regulator.

Explore site today. The clearing / grubbing of trees and other growth in the stream beds has been done improperly. Evidently Jewett, Inc. has done this work, and it was not done to spec. The trees in the bed have been pushed into the stream with a bulldozer, it looks like. This means that contaminated soils have potentially been tracked away from the streams. The soils have been tilled and overturned, which may induce new migration of contaminants. And since the trees themselves have been pushed into the contaminated zone, instead of being cut and removed, there's going to be much more decon needed than should have been necessary.

1?:05 Call Dave Schramm of OBG Tech. Says ~~[illegible]~~ OBG will be here either Friday or Monday, probably Monday

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PROJECT Nos Ag Project

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Again spend day dealing with lab equipment set up. Tried to track down fitting for compressed air hose, but it looks like the only way we're going to get it is from the Perkin/Elmer rep.

Phone installed in Jewett's break trailer for our use — # 301-743-5168

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LAB set up continues. OBG expected possibly tomorrow, so
still no site work except for the improperly felled trees.
Steve, Michelle Silkowski, and I take 62 samples from both streams

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PROJECT NOS Ag- project,

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Lab set up completed today. P/E representative expected Monday morning to approve our A+A set up. OBG is also expected monday, so still no site work.

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WEEK 2

PROJECT NDS Ag Contamination

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07:30 - OBG Arrives - I walk site with Tom Wehrle and Jim Manack. Tom is OBG's site superintendent, and Jim is Jowett's foreman. Jim tells how Jowett simply pushed the trees (even in the contaminated stream) over with a dozer. This was not done in accordance with the spec. I will talk to Jim Behrand today about de-con issues associated with this problem.

09:00 - Perkin-Elmer (P/E) reps arrive - I meet them at pass office

09:40 - Steve Doughty arrives - begin to set up A-A.

10:30 - Talk w/ Jim B. I suggest that any tree or part of a tree touching soils in the contaminated zone needs to be de-conned. Jim agreed. If OBG feels there is more material to clean that should have been there - this is between OBG and Jowett. I ask Jim about photographs - he emphasizes not allowed.

11:00 - P/E finishes

11:05 - Call ~~the~~ Shawn J. and Paul Berkman to give a heads up.

11:45 - P/E reps leave. A-A set-up approved by manufacturer.
Jim B. and I walk site so he can photograph it.

14:00 OBG setting up trailers and doing initial scrapes/grading

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where de-con pads will go.
Silt fence being installed.
Steve's been prepping preliminary samples from the stream - ~~[illegible]~~ these are the 62 that were taken 11-12-92. These should be fully analyzed by tonight.

15:30 Begin analyses of preliminary samples.

17:00 OBG leaves site for day.

18:00 Finish analyses. See C-OC forms dated 11-16-92.

18:30 Steve and I leave.

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PROJECT Ag Contamination – NOS IH. Notebook No. ______

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07:20 – OBG arrives

07:45 – OBG mobilizing more equipment. Begin clearing uncontaminated debris – I indicate to them what's uncontaminated and what needs to stay in place so it can be de-conned later.

08:25 – Clearing stream 01 (the more eastern of the two streams) continuing. Doing the job of pulling only the uncontaminated debris very deftly.

08:45 – Cement silo arrives for OBG – this will contain the additive to treat the contaminated soils.

09:00 – Called Jim B. for more photos. Called Franco – not in.

09:10 – Clearing progressing fine.

09:45 – Largely finished initial clearing of Stream 01. Stream 02 prelim. clearing begins.

10:00 – Clearing of 02 – not much can be done b/c almost all tree debris, brush, etc were felled into the direct stream zone. Some minor stuff near the building is getting moved, but not much else.

10:30 Jim Behrand arrives. He takes pictures to show situation after tree debris had been removed. I tell him about the higher-than-anticipated levels of Ag in the soils.

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10:45 - Called Paul Berkman - Left message

11:10 - Trenching for silt fence began over an hour ago. Progressed only about 100' before stopping. Tree debris pile at stream 02 is still here + waiting for a Range-Vest back-hoe to haul it away.

13:20 - Steve and I finish map on analytical results. Decide to take more samples to better delineate zone of excavation. We'll get Michelle out here again tomorrow to help collect samples.

14:00 - At stream 02 - looks like Jewett's improper clearing of stream 02 has clogged the culvert under the road - there's now water flow over the road. This may contaminate soils along the road. Decide to take samples to see if road needs removal of soils.

14:30 Took two samples from road: 02SSXX0300XLXF
02SSXX0300XRXF

15:00 Outer trench @ stream 01 largely finished - silt fence installed tomorrow

16:00 Walk site a final time w/ Tom Wehrle.
Demob for day.

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PROJECT NDS.IM Ag Contamination

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07:30 - Arrive @ site w/ Michelle - OBG just arriving - no Steve yet.

07:45 - Steve arrives - we begin planning sampling event. I call Jim Behrend to inform, but he's not yet in.

08:00 - Begin walking site - Some problems - ditch digger at stream 02 simply pushed the machine right through contaminated sediments - now it will have to be deconned. I tell him to put clean fill in here since a "bridge" is needed.

~~09:00~~
08:30 Meet up w/ Alan Felser. I walk site with him, and explain issues, schedule, etc. We meet Tom Wahlele, who shows that his copy of the specs do not show excavation all the way to bld. 731 for stream 01. I look at his plans and in fact they show no excavation for the forty-foot length of stream between 731 and the fence. These must be the old specs - the ~~one~~ dated February before the facility had a chance to comment. I'll call Jim Behrend about this issue.

09:20 Finish showing Alan the site. Help prepping sample bottles.

09:30 Plan to take 35 more samples for delineation. They'll all be five feet outward from the original samples, thus giving a 20-foot width in areas shown to be hot. 35 b/c that's where original hits > 10ppm were. This second round of samples will have a "y" in the sis code - the first round had an "x".

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PROJECT NDS IH Ag. Contamination

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10:00 - Begin Sampling

10:30 - silt fence installed properly (As per approval by Alan Felser) around both streams.

12:35 - Finish collecting samples from 10' either side of stream center line.

13:00 Began prep of samples in Lab. Currently baking in drying oven

14:30 Prepare samples for digestion.

16:20 OBG leaves site

17:30 Completed sample prep - leave for day.

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PROJECT NOS IH Ag Contamination.

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07:00 - Arrived on site.
07:15 - OBG arrived + brought big equipment with them - some of the mixing machines; pug mill on a flatbed.

07:30 - Walk site. silt fence about half completed around both streams. One thing happened yesterday that I was not aware of - OBG dug a trench in the dirt road to contain the flow of H_2O from stream 02. This will help prevent the spread (along the road) of Ag-Contaminated stuff. We'll have analytical results from the road samples today. Other samples results should be done today also.

07:50 Decon pad skeletons finished - the concrete is scheduled to get poured today. Talk to T. Wehde. He asks if it's ok to dump clean wastewater (as determined by analysis) into stream. I say no - all water must go (if analysis is ok) to site WWTP. He also mentions that stream 02 (western stream) seems to have a water source. When ABB, OBG, Jonett, etc inspected site months ago, there was no water in stream, so no diversion was planned for this job. Need to solve this problem.

Tom hoped to have a decision on the best design mix for treating the soils today. I'll call Franco & some w/ treatability study data.

08:05 Alan M arrives - Steve goes through AA procedures w/ him.

09:00 Walk site again - things seem ok. The silt fence should be finished by early afternoon.

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09:30 - Sample prep procedures continue.

10:20 - Fire up A-A. Began sample analysis.

11:00 - Walked site again. Concrete poured in decon pads. They're doing final slope finishing on them now and they look very good. Currently, the silt fence on Stream 01 does not extend close enough to the bldg. 731. This will be corrected when the chain fencing is removed, prior to excavation.

12:00 Analysis currently underway. Data are showing high levels of Ag again. Called potomac air/gas for another cylinder of air. Called Frano for decision on treatability study design mix.

13:00 Called office to report analytical results - not pleased because only 7 of the 38 new samples turned out to be cleaned. All contamination appears to be surficial. The two-foot depth samples are ~~the~~ almost all below 10 ppm.

14:00 Tried to call all client contacts for advice on what to do since ~~the~~ more soil will obviously need to be removed. Jim Belland not expected until Monday.

15:00 Finally got ahold of Paul Berkmann. He said to get 'em to him ASAP if we anticipate a cost over run. Steve and I plan to map out all sample locations and their assoc. data. I'll calculate an anticipated volume.

15:15 OBE's mobilization is looking good. Staging area is properly bermed, the silt fence is just about done, all grading looks good. Will take one last walk through site, then we're leaving for day.

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PROJECT NDS I.H. Ag Contamination

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07:30 - OBG has more equipment coming in - Steve and I picked the final 8 sampling locations, to completely (hopefully) delineate the ~~Ag~~ Ag-Contamination. We picked several at depth, to confirm that the two-foot depth along the stream is sufficient. We're taking a "Z" series in some areas of for 15-foot from centerline samples.

08:20 Walked site. Talked to Tom Wehrle. Silt fence installed properly and completely. Tom asks again about the area of excavation to be done near the bldg. 731. I tell him they have the out-dated spec for some reason but I don't know why yet

09:30 Steve and I began sampling. Dave Schramm (OBG's Project Manager) arrives. We chatted about project. We took ~~the~~ 8 samples 3 at two-foot depth and 5 at surface. Again, took some from 15-feet from stream center line - these are designated "Z" samples.

11:00 Call in to Franco. We need to find out why the contractor's specs don't show the area of stream 01 nearest to building 731 as an excavation area. They may have the old (February) spec - we need to get documentation from Jim Behrend for approval to excavate this area.
We currently have eight samples undergoing ~~sampling~~ lab preparation.

12:20 OBG's work progressing well. Silt fence trench dug completely; short length of silt fence yet to be installed. Berm for staging/treatment area almost complete.

13:00 Sample prep done; we'll digest and analyze first thing Monday. Two cylinders of air should be delivered on Monday.

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to the DC office. Raye Vest came in with a backhoe and removed uncontaminated tree debris from Stream 02.

13:30 Steve left for his flight. OBG people are setting up the treatment equipment in the bermed area right now.

15:15 Site looks very good — treatment equipment largely set up and ready. I was wrong about tree debris from Stream 02 — not yet ~~removed~~ removed.

15:30 Breaking down for evening

16:00 Off-site.

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PROJECT NDS I.H. Ag Contamination

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07:05 OBG + OTZ not yet here. Site is extremely wet from weekend rainstorms.

07:30 Contractors arrive.

07:40 Finally got air monitoring equipment ordered. Should arrive @ our office in time for excavation.

08:10 Walk site w/ Dave Schramm of OBG. He brings up a few of his concerns:

- Additional excavation of Stream 01 near bldg 731. He needs approval from Jowett for water diversion (from source), and for the excavation itself. (~40' of stream bed)
- Dirt road, which has been contaminated by the method of clearing employed @ stream 02. The surface of the road will have to be scraped and the surface treated.

09:00 Called Jim Behrend to discuss these issues. He said he'll talk to Jowett right away. He's aware that work is slow until dryer.

09:20 Call Shawn Jorgensen - his day off.

09:30 General update: Things sort of hitting a standstill, due to dewatering issues, mostly. OBG is finishing silt fence, and doing some minor water diversion to get things dryer. Excavation won't be happening today - maybe not till next week. OBG's C.I.H. - (Carolyn Miller) won't be down here till next week.

10:45 Discover why 40' section of Stream 01 is not included on contractor's spec drawings as excavation area - CHESDIV did not supply Jowett with the final version (Dated March

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PROJECT NDS I.H. Ag. Contamination

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10, 1992 of the Spec. I call Jim Behrend to let him know this.

11:30 Jim says he's given Chris Jewett the OK to do the additional work, ie, divert the flow of water @ the outfall; excavation of soils starting at the outfall, instead of 40' downstream.

12→13 Off site for Lunch.

13:30 Talked to David Schramm (OBG) who said he will wait for an approved change order before beginning any excavation-type work. I tell him this is expected and perfectly acceptable. They need assurance that they'll be paid for work above what they've bid on.

13:45 I began calculating soil volumes that may better represent the true quantity of Ag-contaminated soil.

14:30 I talked w/ David Schramm about progress. Things seem ok except he voiced some concern about the additional expense of removing the felled trees.

15:00 I finalized the order of air-monitoring equipment.

15:30 Talk to David Schramm again. I tell him to start excavation on the ~~smaller~~ longer, S-shaped stream (01) b/c the analytical data for the shorter stream (02) suggest more contamination - it's got to be better delineated.

16:10 OBG/OTZ leave for day.

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PROJECT NBS I.H. Ag-Contamination

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06:30 Arrive @ office to pick up compressed air and other items.

08:00 Arrive on site with additional supplies from supermarket. OBG/OTZ up and running. Tom Wehrle gives me a brief update — excavation will probably not begin until Monday. Today Steve and I will do a lot of lab-prep work. OBG/OTZ will do mostly water diversion tasks today.

08:40 Steve and I discuss additional sample's locations. We decide to take 6 more from the vicinity of stream 02. Two of these are located outside the chain-link fence, and are labeled with "XRFF" as the last four characters in their ISIS code, meaning "right-side-of stream, outside fence."

09:15 Acquiring samples; decided to take H_2O samples as well. 2 from 02 and 2 from 01 later.

11:00 Began sample prep. I walked the site. Things are slow but steady. Silt fence finally completely finished. OTZ is manually moving sediments to try to divert some standing H_2O. I remind all to decon shovels or anything else coming in contact w/ contaminated, or potentially contaminated, soils. OTZ is going to do some road construction in the un-contaminated upper staging area. Needed for equipment mobility. DBG guys are currently working on mixing equip.

13:15 I walked site. DBG guys are still working on the mixing equipment. OTZ laying down the gravel near the trailers. No water from either stream has been diverted from the source. (Stream 01's diversion begins @ steam line) Original diversion effort (from steam line) does not seem to be keeping stream very dry

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PROJECT NOS I.M. Ag Contamination

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Steve is currently prepping samples. They'll be analyzed first thing tomorrow.

14:30 Ask OBG about diversion of two streams. They say 01 should be diverted properly by tomorrow — they seem to not know what's going on with 02 — probably an issue w/ Jowett.

15:00 Called Shawn Jorgensen about problems w/ diverting stream 02. He says there should be no building-generated H_2O flowing thru stream. Earlier site inspections, performed months ago by ABB and OBG showed just that, but now there is building-generated flow thru the stream. Shawn said he'd try to find out what the flow is and if it could be stopped.

15:30 OBG/OTR shut down for day. Steve and I still waiting for digestion of samples to finish.

16:00 Samples digested — we leave.

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PROJECT NOS I.H. Ag Contamination

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07:00 I arrive on site + Steve already here, preparing A-A for use. OBG/OTC not yet here.

07:15 OBG/OTC arrived.

07:45 I walked site; very wet so no excavation today for sure. Today's plan is to do the proper stream diversion for Stream 01. "Proper" here means from the actual outfall from building 731 — not starting at the steam line, as the diversion now exists. Tom (OBG) asked me to ask Jim Behrand for photographic documentation of original diversion effort, and the catch basins and sumps. I guess they're still worried about contractual arrangements w/ Jewett.

08:30 Called Shawn Jorgensen — he said he'd come out to help find out what we can do about the diversion of Stream 02.

09:00 Called Jim Behrand about taking photos. He'll be out here later today.

09:15 New diversion digging progressing well. A lightning rod ground wire was exposed, but not damaged in the process. OTC has been careful to keep all equipment out of ~~[illegible]~~ contaminated areas.

11:00 Steve Doughty left. All analyses completed — see c-o-c forms. OBG setting up pug mill right now. OTC is dozing the entrance road. ~~[illegible]~~ Their goal is to leave by lunchtime.

12:05 OBG leaves site, OTC still cleaning equipment. Jim Behrand has not arrived to take pics yet. I call him again Monday.

12:30 OTC leaves, so I do too.

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PROJECT Nos I.H. As Contamination

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07:00 Arrived on site. No one here yet.

07:30 Tom from OBG arrives, along with OTR crew.

07:50 Walk site to get an idea of what's going to happen today. Possibly excavation could happen late in the day today. Ground condition is much better than expected.

08:30 Walked site again - checked out diversion of stream 01. Diversion looks good but sump is too slow; catch basin (concrete manhole) is full and is spilling into the original stream.

09:30 Steve Doughty (ABB) arrives. We go over all sample results, and decide to take seven more, with emphasis on containing stream 02. We'll take two samples from within the fenced-in area by 731 from stream 01.

10:00 Began Sampling episode.

11:00 Began prepping samples. (Drying samples in oven)

13:00 Began prep work on dried samples. I walked site again; Tom Wehrle (OBG) says excavation can be expected tomorrow, not today. Today they received several truckloads of fill material, which they are moving to appropriate areas now, mostly for berm construction around the treatment area. The large additive silo has been erected, other mixing equip. in place. Diversion equipment for stream 01 working well now. Samples should be digested by 4:00 pm

14:00 Shawn arrives. We discuss site briefly, he has no real questions or concerns.

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14:30 Franco Godoy (ABB) arrived, we all walk site together

15:30 Shawn Leaves, says he'll look into the problem of water flow into stream 02. Neither he, nor anyone else we've asked, knows what the building is discharging into the stream.

Tom Wehrle (OBG) says his CIH, along with Dan Schramm (project Manager) will be here tomorrow.

16:00 leave site

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PROJECT NOS - IH Ag Contamination

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07:10 - I arrive on site, Steve Doughty (ABB) is prepping samples.

07:20 OBG Arrived

07:30 Alan Felser (ABB) arrived.

08:00 Alan and I walked the site together. Very wet and rainy day, so excavation will probably get put off again. Everything is set up and ready to roll. OTR is ready to dig, but conditions are awful. One minor problem is the manhole that is receiving the diverted water from stream 01 is full; we are now pumping diverted water to an adjacent stream. Everything else seems fine.

09:00 Samples analyzed. See 12-1-92 C-OR form for data.

10:00 walk site again - nothing happening due to weather. Called Sharon Jorgensen about clogged manhole. He said he'd look into it.

13:00 Alan Back to office. I walk site again - still little activity due to rain. Bruce Buchanan (OTR) says he's doubtful will ever get 90% of Proctor compaction due to wetness of the base soil.

14:30 OTR leaves. OBG to soon follow, after discussion of tomorrow's strategy.

15:00 Everyone off site.

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PROJECT NOS - IH Ag-Contamination.

07:00 - Arrive at site - no one here.

07:30 OBG/OTR arrive.

08:10 Walked site with OBG/OTR. Discussed issues of mud, excavation, and de-con. Not much is going to happen today.

09:00 A meeting began between Jim Behrand, Dave Schramm, Tom Wehrle, Chip Jowett, and Jim Manack takes place. Steve Doughty and I are not in attendance.

09:30 Steve and I go out and measure the exact boundary areas of the contaminated areas that must be excavated. The boundaries are in accordance with the sample analytical results taken from the stream. We moved sample acquisition points laterally away from the stream center until the action level of 10 ppm of Ag was reached. We inserted wooden dowels to clearly mark the area; these will serve as reference during excavation.

The following excavation dimensions were decided on based on analytical data —

1st 40-foot length: 2-foot deep by 15-foot wide trench with 6" scrape in surrounding area.

Next section to first 90° bend: 2' x 10', with 6" scrape to get all contamination removed.

Remainder of stream, until just before dirt road, approx. 1' x 10' with similar scraping.

These dimensions will be drawn clearly on a map. The stream extends approx. 636' to beginning of road, and 781' to rip-rap at start of natural drainage area.

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PROJECT NOS SITE 5

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10:30 D. Schramm asks if BOD tests on dewatering water are feasible since they are 5-day tests. I tell him that's a valid point, Jim Behrend gave verbal approval to remove BOD tests from analytical requirements.

13:00 Walk site. OBG lays down recycled concrete gravel for a road surface - surface was getting almost impossible to drive across.
I have OBG/OTC install a PVC culvert under road near stream 02 (since original was clogged by Jowett's grubbing activities). They do this, and also scrape and collect a few inches of road surface that may have been contaminated by the flowing water. This material was then stockpiled for future treatment.

15:00 Begin to shut down. OBG's CIH (G. Moller) is flying home till Monday - this must mean no excavation till Monday.

16:00 Site vacated.

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PROJECT NDS SITES

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07:00 ON SITE

07:15 OBG / OLDE TOWNE arrive.

08:00 Walk site. Clearing brush / trees this morning. they are doing it properly, for the record.

09:00 Staked out stream 02 - Doing so showed data gaps - decide to take 5 more samples to fill gaps.

11:00 Begin sample prep.

12:45 OBG mobilizing S/S equipment. Steve is digesting prepped samples.

14:45 Call Paul Berkman. Explained status of site to him:

- Jewett / OBG contract issues
- Excess Ag-contaminated soil needing removal and treatment
- Incredibly inclement weather and associated problems
- Conflict arising from Draft / Final spec package confusion

Paul told me he'd get in touch with J. Behrend tomorrow to approve removal of excess soil. He said he's confident that there is sufficient funding available for extra work like that.

15:20 Most clearing / grubbing work finished. They may be able to begin excavation tomorrow. They finished surfacing the road with gravel.

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PROJECT NDS SITE 5

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16:00 Sample digestion finished

16:15 Site vacated.

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PROJECT NDS SITES

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07:05: Arrived on site. Contractors already here

07:55 First additive shipment arrived. Pumping it into silo right now. More trees and brush are being properly cleared, and decanned on the pads. OTC thinks they'll commence digging by this afternoon.

08:50 Lab results on last 5 samples show all to be > 10 mg/kg Ag. Steve and I go out to map out stream 02. Some areas of excavation @ stream 02 will be over 100' wide to get to ≤ 10 ppm Ag.

11:00 Additive entirely loaded into silo. Excess is stored in and under plastic sheets. T. ~~Wehle~~ werhle DVB says the S/S equipment is all set.

12:00 Tried calling J. Behrend and P. Berkeman. Both N/A.

14:00 Set up mini-ram units in three places surrounding site.

14:10 EXCAVATION BEGINS! Stream 01, between Building 731 and the temporary fence, is the first area dug. They are digging according to the map based on field sampling data.

15:00 Called J. Behrend and P. Berkeman to set up meeting for Tuesday @ 2:00 PM. Both can make it - it'll be @ Jim's conference room in the ROICC Building.

15:45 We are keeping track of volume of soil/sediments excavated in two ways: one is the number of truck loads filled (the trucks' bucket is 14 cy). The other is by very accurate measurements of the

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excavation cut as compared with the original ground surface. Both sets of numbers will be compared to each other.

16:00 Decon of contaminated trees and brush continues - this is going very well. Wastewater sump and pump also work well.

16:30 Excavation of initial area finished except for small volume of soil within beams supporting the steam line. Approximately 56 cy taken out. I collect 3 confirmatory samples (with according "A," "B," and "C" identifying code letters for confirmatory samples. Taken @ transect 01.

17:15 Site vacated; mini-ram units detected no particulates. [0.00 mg/m3; 0.00 mg/m3; 0.00 mg/m3]

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D Mw... 12/4/92

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PROJECT NOS SITE 5

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07:00 ABB on-site.
07:05 Contractors arrive

08:30 I set up mini-ram units in same places as yesterday. Excavation begins on the other side of the chain-link fence, ~~today~~ PJB to continue downstream along swale 01.

09:25 Collect one truckload (dump-truck-full)

10:20 Culvert near Building 731 was pulled up and shaken with the excavator to remove loose soils/sediments.

10:30 Took culvert to bermed stockpile area for storage before it is either de-conned or disposed of.

10:45 OTC employees hand digging soils around steam-line supports. OBG is testing S/S equipment with clean fill. Now up to six truckloads (4 yesterday, 2 today.)

11:30 Loaded seventh truck load.

11:50 Loaded 8th load.

12:15 Loaded 9th. S/S equipment now running with contaminated soil in the process. Seems fine.

12:40 Loaded 10th

14:00 Loaded 11th. OBG's CIH is taking ~~the~~ air-quality measurements at various locations within the exclusion

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zone. Meanwhile, decon is still progressing successfully.

14:30 Loaded 12th

15:00 Loaded 13th Excavation currently at first left bend.

15:20 Loaded 14th

15:45 Loaded 15th They're now at point where one-foot deep trench begins (trench previous to this was two-feet deep) (bgs)

16:05 16th load filled.

16:25 17th (last load of the day) collected. Steve and I collected 12 more confirmatory samples today; excavation proceeded through 4 transects. These samples are now digesting for analysis tomorrow. Mini-ram readings: 0.00 mg/m3; 0.00 mg/m3; 0.04 mg/m3. Well below action level.

17:30 OBG, OTZ leave site. ABB leaves.

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07:00 Contractors arrive on site.

08:00 I set the three mini rams around the site perimeter.
08:05 Excavation begins
08:15 ~~1st~~ load finished – all load numbers from here on will reflect that day's loads only.

09:30 5th load ~~(?)~~ (0.3) collected. OBG sets up the S/S machinery. They express concern about the moisture in the contaminated soils. Steve and I prepare to collect the next round of confirmation samples.

11:20 7th load collected. S/S going very well. They're nearing the 100 cy-mark in terms of treated material. We will collect a split from this first sample. It will be called "TM100-01"

13:30 13th load collected. Acquire split of OBG's first treated material sample for TCLP analysis.

14:00 14th load collected. Excavation has proceeded to the second 90° bend in the stream. OBG is receiving it's second additive delivery.

15:30 17th load collected. Called J. Behrend again – line's been busy all day. Decoming of brush has halted b/c no more room for decon water. We may need to have the maximum H_2O quantity allowed on site raised.

16:30 21st and last load of the day. Mini-rams taken down readings: 0.06, 0.00, 0.02 mg/m3

17:00 Site vacated.

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07:00 Everyone arrives on site; Steve fires up the A-A, which shows all confirmatory samples collected so far to be < 10 ppm Ag.

08:00 Set up mini rams.

08:30 OTR begins bull-dozing mound of treated material onto the first lift within the berm footprint. Excavation has not yet begun. S/S equipment being set up.

09:40 Treated material just spread is being scarified and compacted. Excavation and S/S treatment have still not yet begun.

10:15 S/S begins - excavation has not because OTR still spreading and compacting the treated material

10:40 Excavation begins - S/S going smoothly. Significant plastic sheeting installed within and around machinery to control dust.

11:50 4th load of excavated completed. Steve and I collect more confirmatory samples, as well as make measurements of all excavation cuts.

13:45 9th load collected

15:00 10th load collected

16:00 13th load collected; another shipment of additive arrives - this is the third.

16:20 15th and final load collected - mini rams showed: 0.02, 0.00, and 0.06 mg/m3.

17:00 All leave site.

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PROJECT NDS SITES

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08:00 MAJOR SNOWFALL

Arrived on site after treacherous trip — nothing will be able to happen today. Steve and I finish analyses on confirmatory samples collected. All are ≤ 10 ppm.

We leave after analyses are completed.

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PROJECT NOS SITE 5

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07:00 Arrive on site – extremely wet, muddy morning. OBG is cleaning / maintaining S/S machinery. OTZ is trying to dewater the excavation trench, which completely filled with water over the weekend. Hopefully, more treatment will begin later today.

10:30 Called D. Schramm of OBG to inform of meeting with ~~other~~ OBG J. Behrend and Jowett.

13:30 Treatment begins – progress hindered due to wet soil. Excavation may resume on Wednesday – but no earlier.

14:30 Another delivery of additive – although very little of the previous delivery has been used.

16:00 J. Behrend comes by to take photos. I explain to him the halt in real progress b/c of the weather. He understands.

17:00 Site work ends for the day – tomorrow probably will consist only of mixing ~~of~~ OBG the stockpiled material. Also further de-watering is planned.

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PROJECT 110S SITE 5

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07:00 Arrive on site. Incredibly wet. No excavation will happen today because of wetness. No mixing until at least later today, because of the muckiness of the soil.

08:30 Talked with Paul Berkmanyer. He told me that J. Behrend has already sent through the request for funding for additional soil removal. He said approval would be obtained tomorrow.

OTC is currently dewatering one of the "lakes" that has formed b/c of the wet weather. Very little is getting done b/c little can get done.

13:00 Spoke to L. O'Meara of Coast-to-Coast. She confirmed receipt of our samples.

14:45 S/S work begins. I ask OTC to start using a bigger pump to dewater — this one's too slow. They agree.

16:30 New pump worked great — almost all water removed.

No mini-ram use today — no excavation, and no dry material.

17:00 Site vacated.

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PROJECT NDS SITE 5

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07:00 Contractors arrive on site.

07:30 First batch of decon water gets released to the facility's wastewater treatment plant. OTC is spreading and scarifying one of the mounds of treated material. DBG is setting up S/S equipment.

08:30 Decon water release unsuccessful b/c of holding tank design. The tanks aren't quite full, however, so they'll try to de-water the decon pad by pumping into the remaining storage space. S/S treatment should begin soon + excavation should begin a bit later.

10:00 S/S begins + running OK.
Excavation not happening yet b/c there's little room for excavate in ~~[illegible]~~ DA3 bermed storage area.

14:30 Chesdiv employees arrive - Steve and I show the site, lab.

15:00 We leave for meeting

SEE PAGE 39 FOR MEETING MINUTES

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Progress report Meeting:

- Introductions: J. Behrand } CHESDIV
P. Berkman
D. Jordan
C. Jowett } JOWETT
D. Schramm } OBG TECH
T. Wehle
F. Godoy } ABB-ES
D. von Bushberger

- J. Behrand asks about sampling/additional scope of project. Franco replies as to how 1077 cy was reached quickly due to high Ag levels. Lag time was minimized. S/S tasks going smoothly.
- Chris asks about funding; Dave mentions original bid vs. what's actually been done. He notes that excavation is going slower than planned, mostly due to weather.
- Paul stresses that all work should get done with minimal or no lag time. Asks about arrangement between OBG and Jowett.
- Dave replies that he wants to look at extra work estimate to develop a fixed price estimate on the new work. He emphasizes rentals, time, etc. He'd like to iron out SOW w/ ABB on site. ABB and OBG will work out SOW together.
- Chris says that steam line construction has been impeded. It may or may not cost extra for the government. He asks if longer work shifts would help progress.
- Dave replies that OBG/OTC work longer shifts than Jowett's crew. They can't work after dark b/c of safety

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PROJECT NDS SITES (meeting)

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- Dave talks about wetness of soils, and how it's dealt with. He estimates at least 3 more weeks of treatment, concurrent with excavation. At least 4 more weeks w/ no major delays. He estimates they've removed about 750 cy; treated maybe half that.
- Franco asks about placement of treated material. Dave replies that it's going more smoothly. He says he may go to portland cement for additive. He says it will compact better and get harder when it cures. May go with a combination of the two. On the water tests, TSS is high, but no Ag detected.
  Dave also agrees that CIH on site is not necessary - dust production is not an issue. Paul says it will be considered.
  Dave says that he can get an itemized SOW to Jowett early next week
- Jim makes it clear he wants OBG to stay on site no matter what, in spite of potential problems b/t OBG and Jowett.
- Jim and Chris say there's no real limit to how much treated material the berm can hold, as long as it has a proper soil cover. Therefore, if the extra excavated material can be placed before actual berm construction is slated to begin, it can all go in there.
- Paul asks when OBG will de-mob if contract mod w/ Jowett is not completed - OBG says two weeks (December 31, '92)
- Jim says that OBG will not have to de-mob.

Meeting adjourns at 4:20 PM.

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PROJECT NOS SITE 5

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07:00 - Arrive on site; tremendous wetness
OBG / OTC say they cannot operate b/c of rain / wetness.

00:30 - We decide to leave site and do office work; Steve
Doughty will try to fly home today since there
won't be any analytical needs tomorrow

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07:00 - Contractors arrive, and immediately begin de-watering procedures. They also start some in-place mixing of the excavated, contaminated material, to try to get it dry enough to go thru the S/S equip.

07:45 Additive delivery. Blown into berm area, again to help dry the stuff before S/S. OTR is now filtering the decon water so it can pass the TSS requirements → spent bag filters go into S/S equip.

08:30 Stored, filtered decon water released to WWTP.

10:00 I continue measurements of excavation cuts — these will develop the official excavated volume estimates. These are measured @ each transect.

11:00 Looks like no excavation again — still incredibly wet. Tom and Dave Schamon of OBG are now working on proposal / SOW for second stream area now, so S/S has halted.

12:00 Tom and Dave leave, to finish their paper work. OTR continues pre S/S mixing to dry the excavated material.

15:30 De-watering and preliminary mixing finished for day. OTR covers bermed are w/ plastic to keep dry.

16:00 All head out.

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PROJECT NOS SITE 5

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07:00 OBG / OTZ setting up for day.

08:00 S/S begins - not smooth, b/c of course it rained more this weekend.
OTZ complains to me about their water source for de-con purposes - it is a spicket, maybe 700' from the decon pad, that cannot provide the necessary volume / pressure.
I call Jim about improvements - today's his day off.

09:30 First truckloads of soil fill arrive. OTZ not letting it stockpile - they're dozing it right into the trench. Going fast. S/S is progressing well. OTZ is dewatering the wet areas of the trench - the fill is going in the dry.

11:30 OBG runs out of additive.

13:40 Additive truck arrives.

15:30 Again, no excavation today. They will begin first thing tomorrow morning, at my insistance. OBG is mixing remainder of last additive delivery into berm for more pre mixing. Things look good for tomorrow.

16:00 Shut down.

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PROJECT NBS SITE 5

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07:00 OTZ arrives

07:30 OBG arrives.

Backfill trucks arriving; again the fill process goes very quickly. OBG expects an additive delivery later; they'd like to pump it directly into the stream to help dry the bed for excavation. OTZ is doing some minor de-watering work.

08:00 Additive truck arrives. Begin pumping dust under plastic into streambed.

08:30 Fill done to 2nd 90° bend. I order them to stop b/c that's near where our sampling data ends.

09:00 I collect water sample from 2nd batch of clean water to be analyzed (see 12-22-92 C-O-C form).

10:30 Additive truck finished pumping. Estimate that 45 cy have been added to stream — this will not be counted as excavated material.

11:15 Excavation finally resumes.

12:00 problem – discover that manhole near 731 is overflowing with diverted cooling water. This overflow is causing the stream to ~~??~~ pond again — the newly placed fill is becoming saturated. This halts excavation.

12:30 I call J. Behrand to see how we can get the sewer un-clogged. He says not much Navy can do. My idea is to pump the diverted water not to a sewer, but to natural drainage downgradient of the site thru a fire hose. Tomorrow we'll ask Jowett to supply the hose. Neither Chip Jowett nor Behrand is available.

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13:00 Replacement culverts arrive — they're too small! Twelve-inch i.d. instead of 14".

14:00 More dewatering activities resume.

15:00 Excavation begins again. They've taken 4 truckloads so far — this includes some excavated additive.
New additive delivery for silo/bermed area arrives.

15:30 Steve and I collect confirm. samples from the next transect. (Transect 11)

15:50 Excavation uncovers a 55-gallon drum! B. Buchanan of OHZ, excavator operator, ran fearfully from the cab of his excavator upon seeing the drum. He says he punctured the drum w/ the excavator's teeth. The drum is currently inside the hoe's bucket.
Steve and I emphasize for everyone to stay away from the drum. They said they ~~did~~ Did felt no unusual symptoms.

15:55 We tape off an approximate 150' x 150' area to make an exclusion zone for the drum. This is performed in full tyveks w/ full face masks and organic cartridges.

16:30 Called DC office (Franco). He contacted base environmental to notify proper people. Called ABB's HSO (Cindy Sundquist) — she's not available. We're instructed to halt work and try to get Base's environmental folks to sample tomorrow. Mini-Ram: 0.00; 0.00; 0.02 mg/m^3

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07:00 Contractors arrive on-site.

08:00 Talk to OTZ employees, who report no ill-effects from close exposure to drum. Work is still halted.

09:00 We notified Cindy Sundquist (HSO) of details of situation. She said our procedures until now had been appropriate.

Navy's HAZMAT team arrives (Shawn Jorgensen and Fred ?) They will deal with sample situation entirely. Takes samples in a 4-oz jar, looks like paint scrapings. No way to eliminate head space. Liquid samples were ~~[illegible]~~ D.S. acquired and contained in 40 ml VOA vials, with head space eliminated. Total of 4 liquid samples and 1 solid sample.

09:20 Shawn asks me if ABB-ES can deal totally with analytical. I call Frank; we set up contract with EA Labs. For: Target Compound List sampling, and Energetics testing. ~~composed of~~: D.S. Analyticals include:

VOAs	Cyanides	
SVOAs	Pesticides	and Energetics.
TAL's	PCBs	

10:00 Samples are packed and will be shipped via Fed-Ex tonight. Job is shut down until Monday, Jan 4, when holidays are over/analyses complete.

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PROJECT NOS SITE 5

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07:00 Contractors arrive on-site. Huge amount of water in unfilled excavation trenches. Significant de-watering efforts, plus drying, will be needed.

09:30 OBG guys say getting much S/S done today is unlikely. B. Buchanan of OTC says Wednesday will be earliest excavation day (assuming the drum is properly dealt with by then).

10:30 Called EA for analyticals — VOAs are in — clean except for 191 ppb of acetone. I call Sherry McCahill of NOS Environmental to tell her this. She and her colleagues are very anxious for data.

12:30 OBG begins S/S.

13:00 Clogging due to wet soil is considerable, but it's working.

15:00 J. Behrend arrives. I tell him in detail about our progress, setbacks, and planned schedule.

15:30 S/S ceases - OTC is spreading, scarifying, and compacting treated material.

16:30 Site vacated

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PROJECT NOS SITE 5

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07:00 Contractor (OBG) arrives — OTR not here because of torrential rain last night. Excavation is underwater again.
T. Wehrle of OBG expects additive shipment @ 14:00 today. If weather OK, he may try some S/S at that point. If so, he'll call OTR to come out to operate the loader.

08:30 Steve and I try to collect samples downstream of the road, to assess whether treatment of those soils/sediments is still necessary. Can't do it — too much water.

13:30 Additive load arrives. Silo is filled, and the remainder goes in bermed area for pre-mixing. OTR arrives, starts de-watering. Weather has really improved.

15:30 Stop for day - big treatment day planned for tomorrow.

16:00 All leave site.

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07:00 Arrive; OTC begins pumping pit excavation area that's full of H2O. pre mixing begins in bermed area.

08:00 S/S begins. Last night was dry. Things should go quickly today. Called Ben Landas @ EA - results on solids not ready yet. (Drum sample)

10:00 Called Ben Landas again. Tests are done, he says. VOAS clean except for small bits of acetone/toluene. no energetics, no cyanide.

10:50 Treatment looks good. Awaiting two more loads of additive; one now, one later in the afternoon.

13:00 Additive being pumped into silo and the bermed area. I talked to J. Behrend briefly, as well as to Lt. Wink. Jim says he's not sure about status of second stream yet. I give them both a tour of the site.

13:40 Shawn Jorgensen and Donna Jordan (CHESDIV) arrive. We tour the site together, showing the entire remedial process. Donna seems to think that the second stream now will not get done. All drum results are in - drum's not harmful in any way. OTC is removing it from the excavator, freeing it to dig once again.

15:00 Shawn and Donna leave. Additive still being pumped.

15:30 Ask ~~Shawn~~ Jim Behrend DVB again about stream 02. He says, definitely, that it will not be performed under the current contract.

16:15 Done for the day.

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PROJECT NDS SITE 5

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7:00 Contractors arrive; Steve and I acquire 4 sediment samples downstream of the dirt road (in Stream 01)

08:00 OBG is expecting another load of additive around noon. Currently, they are demining brush and pre-mixing the bermed contaminated soil.

09:30 Treatment begins; Steve and I measure out lengths and widths of last segment of contaminated zone to be excavated. I set up mini-rams. (Even though it's wet)

10:00 Excavation begins. Material is soaking wet and is loaded with organic material.

10:10 First load collected.

10:25 2nd Load collected

10:30 Here we go again. Excavator uncovered two rocket motor shells, or casings. This stops digging again. We seem to have reached an unexpected edge of a nearby landfill.

10:40 I call Sherry and Shawn @ Environmental. Sherry seems certain that the motors could not be live but she tells me to stop the digging. She wants to get a base person out to document the motors and dispose of them properly. We agree that we've reached a possible edge of the nearby landfill. We both confirm that continuing excavation will only uncover more potentially hazardous (or harmful) debris. She said she'd call Paul Berkman with the news.

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10:50 Steve and I decide to take more samples of the remaining un-excavated portion of Stream 01. Maybe with the tremendous drainage the stream has seen lately, Ag levels have been reduced enough to allow for less, or even no more, excavation.

11:10 We talk to B. Buchanan of OTC. I suggest that best plan may be to scrape a few inches with the excavator for the rest of the way, then take samples. Bruce wants to wait until after conferring about safety issues with C. Miller, OBG's C.I.H.

11:20 I called Sherry McCahill again - she said she'd send out explosives ~~experts~~ to our safety people, as well as S. Jorgensen, to look @ motors.

11:40 Explosives safety people arrive. Head safety person says that stuff in motor is probably inert, but he can't be positive. He takes samples from the two casings. The two explosives people are Mr. Mahaffy and Mr. Albritton. They said the facility will perform energetics testing. They feel the motors have already been fired.

12:45 Additive truck arrives. S/S going OK, but excavation obviously has stopped.

13:30 Jim Behrend arrives. He surprises me by asking why we're not digging. He and Jowett seem to opine that we should continue digging. We do not resume yet, however, due to possible safety concerns.

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PROJECT NDS SITES

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15:00 I talk to T. Wehrle, who tells me he only just found out about the decision to not ~~continue~~ remediate stream 02. He answers to Chip Jowett as to why they are not digging.
I get a message on our office phone answering machine from T. Albritton, that he "doesn't have a problem" with us resuming excavation.

15:05 I call ABB-ES Washington to explain.

15:40 We acquire our second split QC sample of the treated material. OBG has collected 7 so far.

15:50 D. Schramm arrives; he, C. Miller, ~~and J.~~ leave site to meet w/ J. Behrend.

16:00 Shut down for day; Mini-rams: 0.00; 0.00; 0.00 mg/m3.

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07:10 - Arrival of Contractors. Samples from yesterday should be analyzed by noon.

07:30 Talk to D. Schramm. Tells me in some detail about options he proposed to J. Behrend last evening, about doing the next stream w/ minimal impact on Jowett's progress. He said Jim seemed interested if Jowett was.

08:40 Franco and I meet with Jim. We discuss potential compaction problems, and the issue of completing the second stream. Jim emphasizes that he'd go for the idea of finishing the second stream if Jowett would not be slowed down.

09:15 Meeting: Jim, D. Schramm, T. Wehrle, Franco, myself. Dave explains his ideas for the second stream. The question is raised if there is an advantage for waiting until spring — consensus is yes & no.

10:30 Meeting in Jowett's trailer: Chip, Jim B., D. Schramm, T. Wehrle, Jim Manick, myself. Chip makes ~~it~~ it very clear he wants OBG, OTC, and ABB-ES off the site. He also says that, in fact, Steam line construction has not been impeded by our presence as yet. This contradicts everything else we've been hearing.

We talk about use of a magnetometer to guard against possibly digging up anything else that could be dangerous.

11:10 Analyticals are received from Steve - the sample shows 48 mg/kg - we'll have to dig more.

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14:00 Call J. Behrend, let him know about test results requiring more digging. I also tell him that OBG/072 see no need for magnetometer use.

14:30 Shut down for the day.

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7:00 All on-site.

7:45 Today is wet, cloudy and cold (32°F) but OTZ/ OBG want to dig anyway. J. Behrend still does not have a definite answer about Stream 02.

09:30 I set up mini-rams, but dust production, in this drizzle, will be nil.

10:00 Excavation begins. Water behind excavation is perhaps 2-feet deep. This is being pumped concurrently w/ excavation.

10:40 Second load completed.

11:00 While filling third truckload, two 55-gallon drums are un-earthed. They have been crushed and opened by the digging process. The facility has assured us that the stuff in this landfill is not hazardous; ~~[illegible]~~ DVB based on this, and the attitudes of Jowett, they decide to lay the drums on the side of the stream and continue digging. A lot of other debris is being dug up, including a rocket motor.

11:25 Uncovers a broken container that spills out a white, powdery substance. OBG's C.I.H. sees this.

11:30 Forth load of excavated completed.

13:15 8th load + S/S begins.

13:55 I call S. Jorgensen about what to do with newly-accumulated trash items. He says he'll get back to me.

17:00 S/S Shut down, finished for the day.

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PROJECT NDS SITE 5

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07:00 Weather is awful. Heavy rain, cold.

08:00 Contractors arrive

09:00 Call J. Behrend about Stream 02 - no new news, but attitude among DBG/OTZ is it's a no-go. They may even begin some de-mob. today.

09:30 Excavation of last few yards of Stream begins. I do not set up mini-rams b/c of the rain. This goes better than expected - the trash encountered must not have been part of the landfill - it was its own isolated pile.

10:30 Shawn calls about the potentially-hazardous trash that was removed. He says the base will collect and dispose of it.

11:20 Shawn arrives to see the trash - 55-gallon drums, rocket motors, etc. He says he'll get the proper people to collect the stuff soon.

12:00 Samples recently acquired are analyzed - one hit, in the stream's center by the trash pile (digging was shallower here to avoid removing trash). OTZ will dig more from here tomorrow.

17:00 Shut down due to weather.

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PROJECT NOS SITE 5

7:00 : Contractors arrive.

07:45 : Call J. Behrend - he's not in.

08:15 Digging @ last small hot spot begins.

08:30 I halt digging - Steve and I take samples to see if remaining soils are ≤ 10 mg/kg Ag.

09:30 Sample prep is started.

10:00 Called J. Behrand again - still not in.

10:00 Talked to T. Wehrle about perhaps starting on decon tasks for second stream. He is hesitant; he feels it's out of scope and it's senseless since the stream is probably not going to get done yet anyway.

10:45 Called J. Behrend again. He was in. I asked about stream 02 again - he's still not sure. His stance is that the government is still owed something relative to stream 02. I suggest that unless the stream is going to get remediated in the next few weeks, it would be best to do nothing to prevent the migration of more silver. Jim said that it's up to Jewett/OBG to decide who's responsible for any remaining work.

14:00 Additive delivery - they're blowing it into bermed area for more pre mixing.

15:30 Sample analysis shows that sample is ≤ 10 ppm; therefore excavation is complete, and all contaminated soils > 10 ppm have been removed.

16:30 Shut down for day.

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07:00 : Arrival of everyone. S/S and dewatering starts almost immediately. Goes very smoothly.

08:30 : Additive delivery. Two more expected — one @ Noon, and one late afternoon. Large Trojan Dumptruck being deconned.

09:30 Large Trojan Truck de-mobed.

12:15 Additive delivery. Fills silo. I try to reach J. Behrend by phone — not available.

13:45 Called J. Behrend again — no answer. S/S progressing well.

15:10 Fuel line in stacke conveyor breaks. This necessarily shuts S/S down.

16:00 Problem - additive may no longer be available. OBK's broker is looking for other sources. There may be another delivery later today, with a maximum of 2 more tomorrow.

16:30 Work stopped, all begin to leave.

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07:00 ~~Additive~~ DVB Arrival of everyone on-site.

07:30 Truck load of additive arrives. Blown into stockpile area. Dewatering, decanning are currently happening.

09:00 T. Wehrle gets replacement fuel line for stack conveyor. He begins this repair.

10:30 Treatment begins. Goes well; additive shipment expected soon.

12:00 Additive delivery arrives.

13:00 I put in my name; tomorrow (~~Sat~~urday) we'll need to be here for another work day.

15:00 Third additive delivery arrives. Call Jim Behrand about verifying weekend passes for all involved. He says they have all been submitted.

16:00 S/S done for the day.

16:30 We leave site.

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07:00 Contractors, along with first additive delivery, arrive. OTC immediately begins dewatering excavation that requires it.

07:15 Begin to fill silo.
S/S to begin when full.

08:00 S/S begins; they are going at an excellent pace. Weather (very nice) helping considerably.

10:15 Pumping of excavation pits finished — 2nd additive delivery arrives. Blown mostly into stockpile area.

12:30 Third additive load arrives.

16:00 S/S finished — I go to measure excavation cut dimensions to estimate excavated volume of soil.

17:30 Shut down, leave the site.

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08:00 All arrive.
Almost all soil treated; some treatment will happen today, along with dewatering, and de-mobilization of the shower trailer (no more untreated hazards).

10:00 Work progressing fine; some equipment is getting serviced/maintained during S/S and dewatering.

15:30 Finish for the day.

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07:00 Arrival -

07:15 First load of additive delivered (only load scheduled) will be used for treating the soils in the berm, along with other minor quantities of soil.

08:00 4 loads of fill received. Used for road improvement, none used yet to fill excavation.

09:00 Geotech engineer to do compaction testing arrives. He'll be doing tests on fill and treated material.

09:50 Tom decides that only the inside half of the berm soil will get removed and treated.

10:00 Geotech begins soil tests.

11:00 Geotech and I discuss how to get sufficient testing from internal layers of the fill and treated material, which have not been tested before. He took 8 measurements from the surface which ranges in elevation from about 0.5 feet to 5 feet a.g.s. We have tests done for these 1-foot lifts: 2-3'; 3-4'; and 4-5'. We still need tests for 0-1' and 1-2'. We'll dig holes to get these tests.

12:00 Fill trucks coming in steadily. Stream now being filled. Soil treatment very nearly done.

13:30 Took last two wker tests from bottom layers.

14:40 Talk again with the geotech — he's testing the fill

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from the streambed. He'll make a complete report with a map

15:30 Last decoming, and some general site cleaning going on. looks very good.

16:30 Shut down. Leave site

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06:40	Arrival
07:00	Fill trucks arriving steadily. Fill of stream, cleaning of site going well.
08:30	Hammermill being moved to expose piles of hidden contaminated soil. This will be treated w/out going in hammermill first.
09:45	Treatment begins. Fill/grading of the cut near 731 is happening now.
11:00	Begin filling where first culvert will go. Used a surveying scope to assure proper grade. One of the new, smaller diameter culverts being used here. Hydraulically, this shouldn't matter. I tell this to Shawn, who OK's it.
12:15	LAST SOIL TREATED. I collect treated soil for geotech engineering ~~firm~~ (Schnabel) compressive strength tests. I collect 2 samples; about 4 ft^3 each.
13:00	Fill continuing with no major snags.
16:00	Fill trucks stop coming, site shut down for the day.

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07:00 Arrival, warm-up of vehicles.

07:30 OTC excavates slightly where culvert near bldg. 73C will go.

07:35 First fill load.

08:00 Fill being spread.

8:35 Fifth fill load. S/S equipment being taken down they'll start decontaminating it soon.

10:00 10 th fill load.

11:30 Decon of S/S equipment begins. 15 th Fill load arrives

13:10 20 th fill load arrives.

14:30 S/S silo comes down — 25 fill load.

15:35 30 th fill load arrives. This is last load Silo cleaned thoroughly of the additive dust.

16:00 Finish for day.

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07:00 Arrival of first fill trucks. Today will be mostly fill and grading work. Some of the fill from yesterday was poor in terms of potential compactibility - this may cause problems. All clean H_2O should be analyzed today, allowing for its disposal.

08:30 OTC is digging up fill areas that showed inadequate compaction. They dug until ground looked dry and firm. Laying soil in 1-foot lifts and rolling - this will be as compact as practicable.

09:05 Dismantling / removing more SCS equipment. Some contaminated material still in these machines - this is being manually removed, then mixed with additive by hand in the proper proportion. It will be added to the regular mound of treated material.

11:30 20th fill truck arrives.

13:30 Talked to J. Behrend. Asked him about stream 02 issues. He said that the Navy wants the felled trees removed and decanned. This was communicated to Jewett but not to OBG Tech.
Moderate rain started.
Called S. Jorgensen just to give a heads up.

14:10 OBG begins laying the jute-matting down along the new stream.

15:15 Jute matting laid almost all the way to the dirt road - done exactly to spec.

16:00 Decanned pugmill / hammermill demobed

16:30 Shut down for day.

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0800 Awful weather; steady rain. No fill trucks coming today. More demob/decon is all that's expected to happen today.

10:00 Last of S/S equipment deconned and de-mobed. The culvert for under the dirt road is now being deconned - will be installed on Monday (I hope).

12:00 Leave site due to weather

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07:00	OTR arrives. Fill trucks arrive soon after. First few loads going towards road improvement.
08:00	OTR begins breaking apart the decon pad near Stream 02. This will be added to the non-hazardous debris pile to be removed by Jowett.
09:00	Fill trucks having trouble getting to proper areas b/c of mud.
10:00	Analyticals for decon water look good - it will be disposed of soon. Set up a meeting at 2:30 pm w/ Jim Behrend. Told him capping is progressing - looks good -
11:00	Drying better - trucks having an easier time. up to 20 fill loads.
13:00	Soil cap over treated material about ~~[illegible]~~ DB 1/4 complete. being laid out and rolled according to spec.
14:30	Meeting w/ J. Behrend. He shows some of the photos he took, plus a phone bill from Jowett. He asks if OBG mentioned anything about their plans for Stream 02 - they haven't, and I tell him so.

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07:00 OTZ arrives
Fill trucks begin arriving soon after.

07:40 A Jowett-hired tree removal firm enters the site with no warning, no personal protective equipment, etc. They are looking at site to prepare for a tree-clearing task.

08:00 Jim Behrend not in his office. OTZ just laid the second culvert (adjacent original culvert) under the dirt road. Fill has been placed and it has been compacted — looks very good.

09:30 J. Behrend still not in.

10:00 J. Manack (Jowett's foreman) came to site and said that our job was officially shut down by Jowett. Manack said that Chip Jowett has already told OBG that they should not be capping the treated material. Tom Wehrle of OBG says he's received no instruction from anyone to stop work.

10:30 Jim Behrend came to site. He said he didn't know why this was happening but Jowett can do whatever they want if they don't violate the spec. I reminded him of the OSHA training requirement for all site personnel.

12:00 Chip evidently changed his mind; contacted OBG and instructed them to continue capping. They immediately resumed the work.

14:00 Seeding of the filled area is complete. Stream 01 is finished except for cap construction, which is about 3/4 finished.

15:00 Finish for the day.

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07:05 Fill trucks arriving. Cap construction resumed.

10:00 Treated material cap is just about finished — Should be done today.

11:40 Called J. Bertrand. Asked him for something in writing, allowing the silt fence to remain in place around Stream 02. This will help minimize ~~and~~ and any Ag-migration. He says he will do this. I tell him we need him to photograph the site when finished, but he says he's not worried about the condition of the site ~~once~~ the exclusion zone fences come down.
We discuss having a final meeting w/ D. Jordan, OTZ, OBG, himself, Franco, and myself.

12:30 Geotech will be on-site tomorrow to do last density / compaction tests.

14:30 I called Jim to ask him to come out on Friday for final photographs. He agrees.

16:00 Decon of everything that could possibly have been contaminated with Ag-laden soil is complete.
OTZ begins to break up the decon pad by stream 01. Last fill truck arrives.
OTZ arranges all the concrete to be picked up and hauled for recycling.

17:00 Shut down for the day.

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PROJECT NOS SITE 5

07:00 All arrive. Cleanup and restoration day, along with de-mob of last equipment.

08:00 Still waiting on trucks to pick up the decon pad concrete. Jowett said other trucks would be out to remove other debris.

08:30 Talked to Sherry Duskins of Environmental, she said she'd take the lead on removing the hazardous debris. (Drums, rocket motors)

10:00 Geotech arrives. Takes tests.
Talked to T. Wehrle. He said that when Jowett's trucks come to haul the debris (that which is not decon pad concrete and not hazardous) he and OTZ would load their trucks for them. If the trucks don't show before complete de-mob - they will not help load.

See Geotech's report on test results. Tests show compaction either meets spec or comes very close - the places where it only comes close are those ~~[illegible]~~ that had bad moisture problems from run-in. The geotech said that the fill is compacted to a density much greater than the surrounding soils.

16:00 Break down for day.
Tomorrow will be just final clean-up, final de-mob.

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07:05 Trucks arrive to remove the broken concrete. Jowett's trucks did not arrive yesterday to remove the other non-hazardous debris. The base environmental people who were supposed to remove the drums and rocket motors have not shown up yet, either. Sherry Duskins said they'll be out either today or Monday.

11:00 Chip Jowett, Jim Monacke, and Tom Wehrle all walk site for a final "inspection." I do not know what was said during this meeting. Chip seemed to have a problem with water flowing in stream 02 that created some ponding adjacent to the road.
Tom points out that they have already installed a culvert in (under) the road, because Jowett fouled the original one during their first clearing effort. But OBG/OTZ agree to build a small berm along the road such that any ponding water near the road will not reach the road and will flow back down the stream. This is done evidently to Chip's satisfaction. He leaves with Jim Monacke.

14:00 Last equipment removed — both debris piles still untouched. NOS environmental folks supposed to be coming soon. Jowett says its trucks will haul the stuff either today or soon.

Nothing left to do. OBG/OTZ leave permanently. Site looks very clean; all debris except for aforementioned removed.

15:00 I leave site.

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