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REMOVAL ACTION FINDINGS REPORT

Naval Surface Warfare Center
Site 5
Indian Head, Maryland

Prepared For:

Environmental Restoration Branch
Chesapeake Division (Code 181)
Naval Facilities Engineering Command
Washington, DC

and

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

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Naval Surface Warfare Center
Site 5
Indian Head, Maryland

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LIST OF ACRONYMS USED

AA . . . . . Atomic Absorption
ABB-ES . . . . . ABB Environmental Services, Inc.
Ag . . . . . Silver
bls . . . . . below land 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

1. INTRODUCTION

This report documents the objectives, procedures, and results of a removal action performed at Site 5, Naval Surface Warfare Center (NAVSURWARCEN), Indian Head, Maryland (Facility) (See Figure 1-1), from November 1992 through January 1993. ABB Environmental Services, Inc. (ABB-ES) provided preconstruction support and Title II services throughout the removal action. The removal 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. During the site characterization study, Toxicity Characteristic Leaching Procedure (TCLP) analysis was performed on soil and sediment samples. The TCLP results indicated that the soils at the site were not hazardous waste.

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 removal 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 removal 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

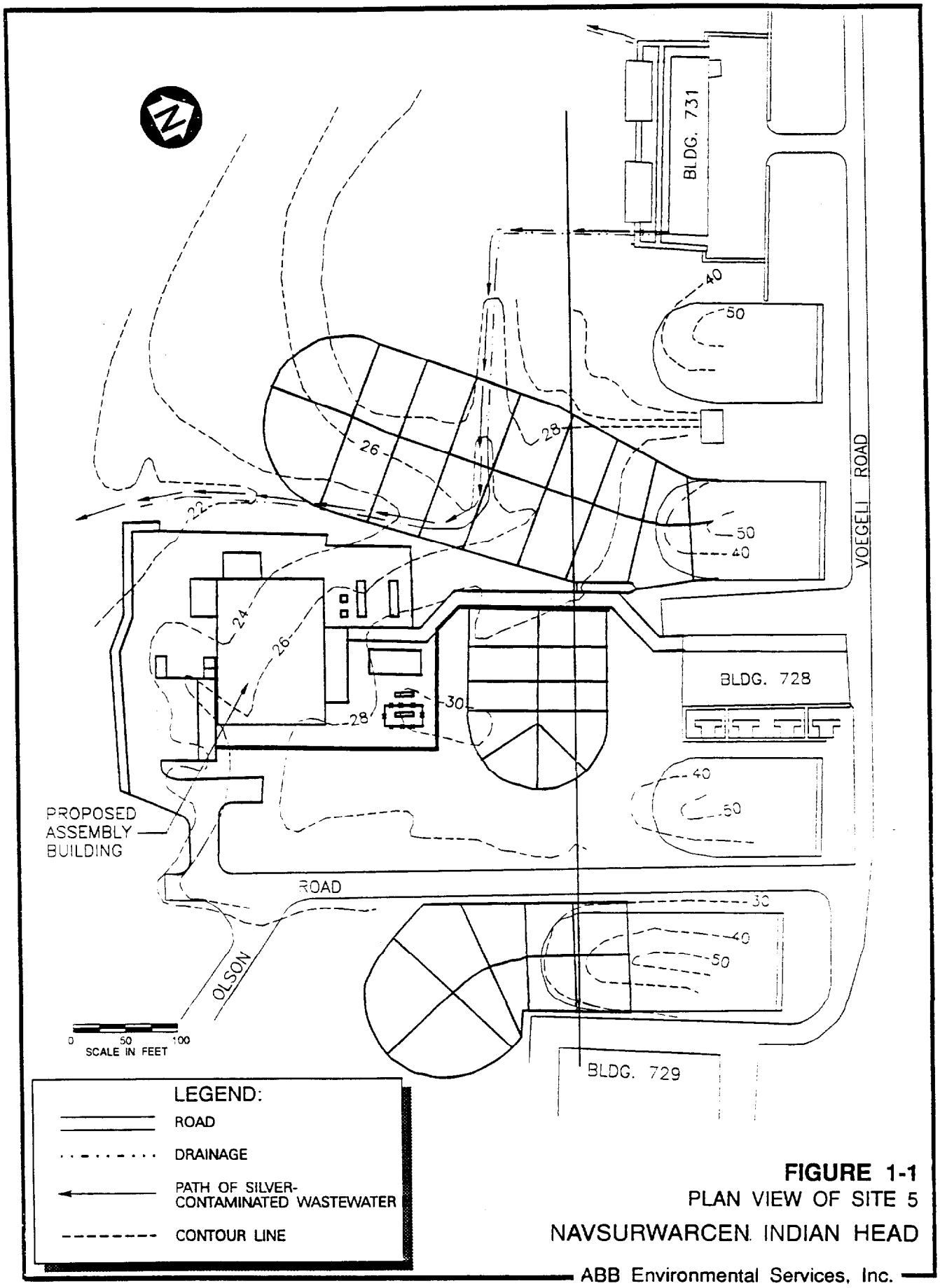

FIGURE 1-1
PLAN VIEW OF SITE 5
NAVSURWARCEN INDIAN HEAD
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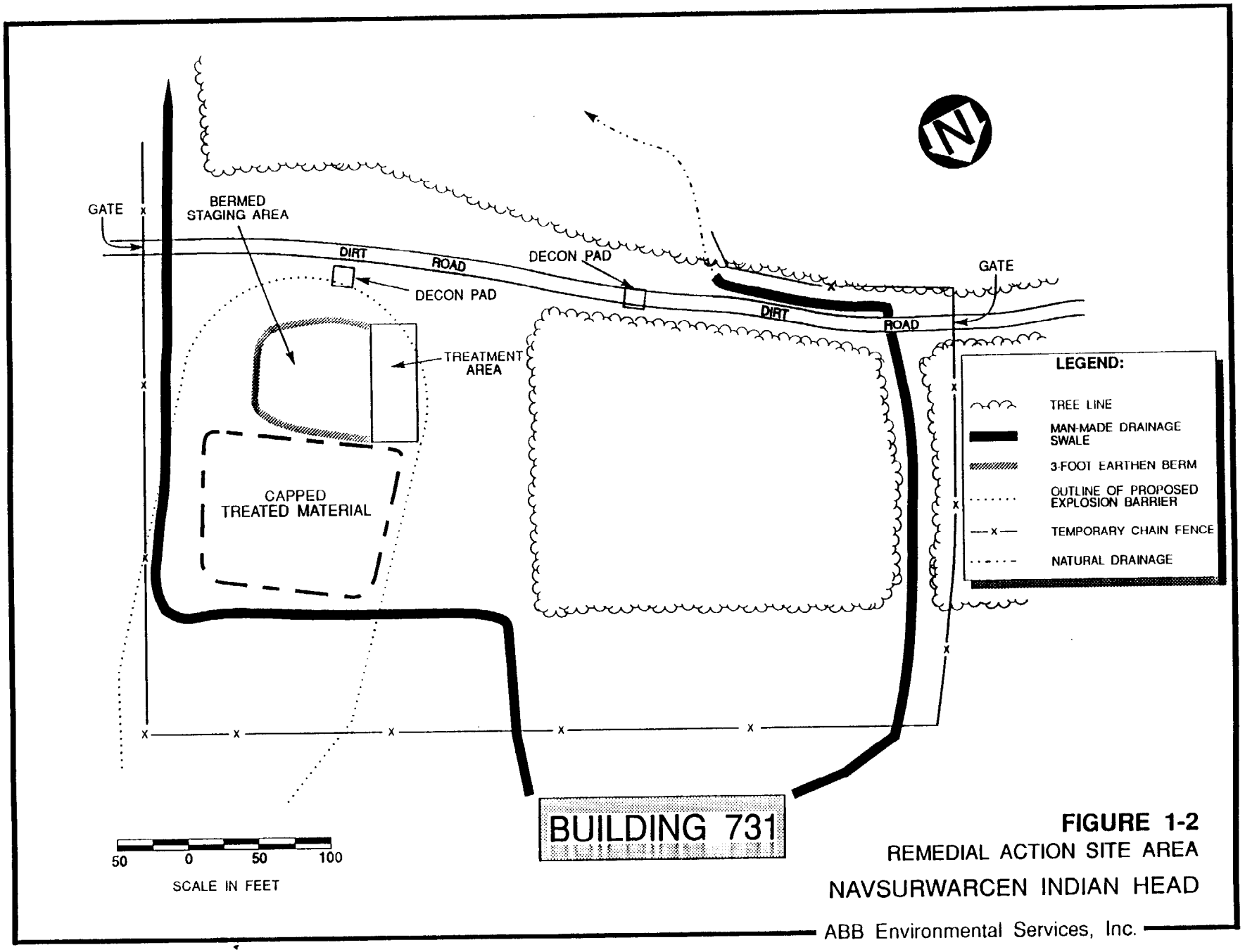

FIGURE 1-2
REMEDIAL ACTION SITE AREA
NAVSURWARCEN INDIAN HEAD
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log maintained by the ABB-ES field engineer. The remainder of this report is organized as follows:

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

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

- **Original Remedial Work Plan:** Contractor Work Plan submittal as originally received by the Government Representative

- **Addendum to the Remedial Work Plan:** Contractor submittal that satisfied unmet Work Plan requirements

- **Regulatory Correspondence:** Transmittals between NSWC Indian Head and the Maryland Department of the Environment

- **Excavated Soil Volume Estimates:** Graphically portrayed estimates of: (1) the volume of soil excavated from the remediated swale, and (2) the volume of soil needed to be excavated from the non-remediated swale.

- **Treatability Study Results:** Contractor-performed treatability study for solidification/stabilization additives

- **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 removal 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 (AA) 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 removal 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 removal 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 removal 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 removal 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 removal 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 removal 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 sampling, if necessary.

Figure 1-3 is a photograph depicting typical removal of contaminated soil as it was performed during this removal action.

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

FIGURE 1-3
REMOVAL OF CONTAMINATED
SOILS AND SEDIMENTS

NAVSURWARCEN INDIAN HEAD

ABB Environmental Services, Inc.

mounds of treated material in an area immediately adjacent to the final placement area. The treatment equipment in use is shown in Figure 1-4. The stabilized material is the light-grey soil-like material in a mound under the stack conveyor. Some material (also light-grey in color) has already been spread and compacted in the final placement area.

1.2.3 Placement/Long-term Management

The treated material was spread 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, Inc. (Jowett), the general contractor for the MILCON project. 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. Figure 1-4 shows the placed and compacted treated material. The photograph in Figure 1-5 shows clean soil being used to backfill and re-grade the drainage swale to its pre-excavation condition. Figure 1-6 depicts the site as it looked upon completion of the removal action. The treated material placement area, after capping and compaction, can be seen in the rear as an area of slightly higher elevation than the surrounding areas. At right is the backfilled streambed, after placement of grass seed and anti-erosion matting.

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;

FIGURE 1-4

TREATEMENT AND PLACEMENT OF CONTAMINATED SOILS AND SEDIMENTS

NAVSURWARCEN INDIAN HEAD

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FIGURE 1-5
BACKFILLING OF EXCAVATED DRAINAGE SWALE

NAVSURWARCEN INDIAN HEAD

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FIGURE 1-6
COMPLETION OF REMOVAL ACTION

NAVSURWARCEN INDIAN HEAD

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- 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;
- Inspection of all backfilling and compaction activities; and
- Inspection of 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 removal action. The subcontractor for this removal 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 subcontracted 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.

The Government Representative forwarded copies of the two Work Plan documents to the environmental department of NAVSURWARCEN Indian Head, addressed to Shawn Jorgensen. On 9 December 1992 the Contractor's Work Plan was forwarded to State environmental officials by Ken Morin, P.E. A copy of the letter accompanying the Work Plan, along with other regulatory correspondence, is provided in Appendix D.

2.2 Negotiation Support Summary

ABB-ES provided the Resident Officer in Charge of Construction (ROICC) technical support in evaluation of removal 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 removal 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 excavating and hauling tasks, arrived simultaneously with OBG Tech personnel.

The documentation of the removal action work performed by OBG Tech and its subcontractors is presented in the subsections that follow. All work described is categorized by its corresponding 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 removal 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.

The Government Representative forwarded copies of the two Work Plan documents to the environmental department of NAVSURWARCEN Indian Head, addressed to Shawn Jorgensen. On 9 December 1992 the Contractor's Work Plan was forwarded to State environmental officials by Ken Morin, P.E. A copy of the letter accompanying the Work Plan, along with other regulatory correspondence, is provided in Appendix D.

Prior to mobilization, the Contractor was required to prepare a Erosion and Sediment Control Plan, to allow execution of the removal 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 removal 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 removal 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 removal action.

Special Project Procedures

This section of the specifications package indicates certain procedures and requirements unique to this removal 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 removal 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 removal 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 of the MILCON contract to construct the mix, assemble, and cure facility. All removal action wastes requiring off-site 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 removal 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 E 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 removal 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 removal 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 removal 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 Underwriters Laboratories 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 removal 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 removal 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 removal 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 Removal 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 Removal 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.

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[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 Removal 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 removal 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 Removal 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 removal 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 removal 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 land surface (bls). 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 bls. 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 removal 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. The contaminated soils and sediments were not removed primarily because the westernmost ditch was not in an area to be impacted by future construction; therefore, worker exposure to silver-contaminated media was not a concern. Also, the greater-than-expected silver contamination in the easternmost ditch required the removal of a volume of soils and sediments roughly equal to the volume originally estimated for both ditches.

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 bls, 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 F.) 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 G). 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 F). 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 more thorough mixing and reduced the clumps of moist soil and additive to a fine, dry, more powder-like final product. 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 of 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

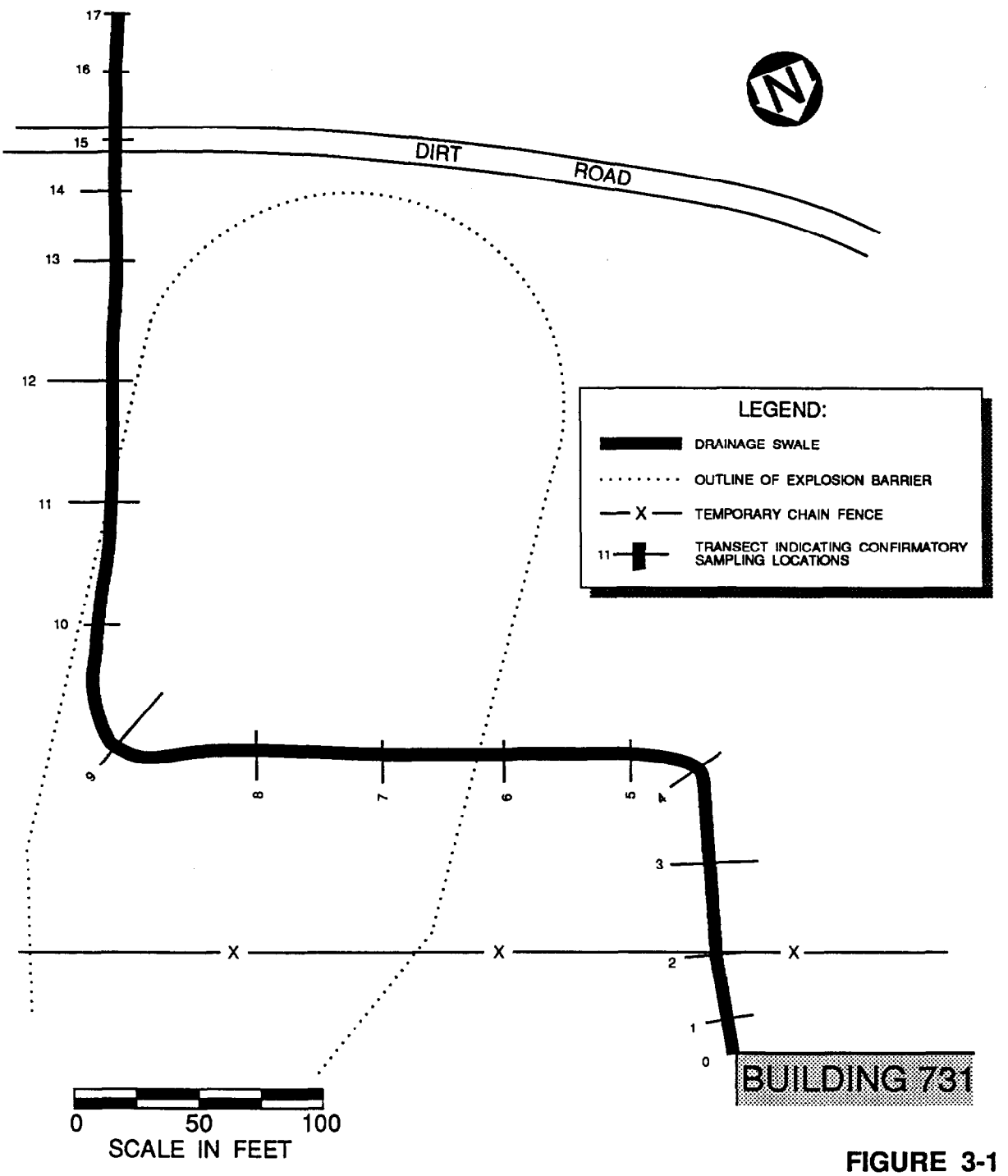

FIGURE 3-1

SAMPLING TRANSECT LOCATIONS AT EAST SWALE

NAVSURWARCEN INDIAN HEAD

ABB Environmental Services, Inc.

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 edge of the excavation, along the same transect. 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 H.

The analytical work was performed in a mobile laboratory trailer, properly equipped for 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 I.

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 G.

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. The TCLP data are provided with the other analytical data in Appendix G.

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 6×10^{-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 J).

REMOVAL ACTION FINDINGS REPORT

APPENDICES

Naval Surface Warfare Center
Site 5
Indian Head, Maryland

Prepared For:

Environmental Restoration Branch
Chesapeake Division (Code 181)
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, 7800-00

December, 1993

REMOVAL ACTION FINDINGS REPORT

Naval Surface Warfare Center
Site 5
Indian Head, Maryland

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APPENDIX A: SUBMITTAL REVIEW CORRESPONDENCE

ABB
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.

ABB Environmental Services Inc.

1400 16th Street, N.W.
Suite 720
Washington, D.C. 20036

Telephone (202) 797-6500

Fax (202) 797-6501

- 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 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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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:

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

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

- 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:

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

- recruiting, hiring, and training suitably qualified personnel
- allocating sufficient staff, time, materials, and equipment to accomplish required tasks
- 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
- efficiently responding to corrective action requirements identified by QAM

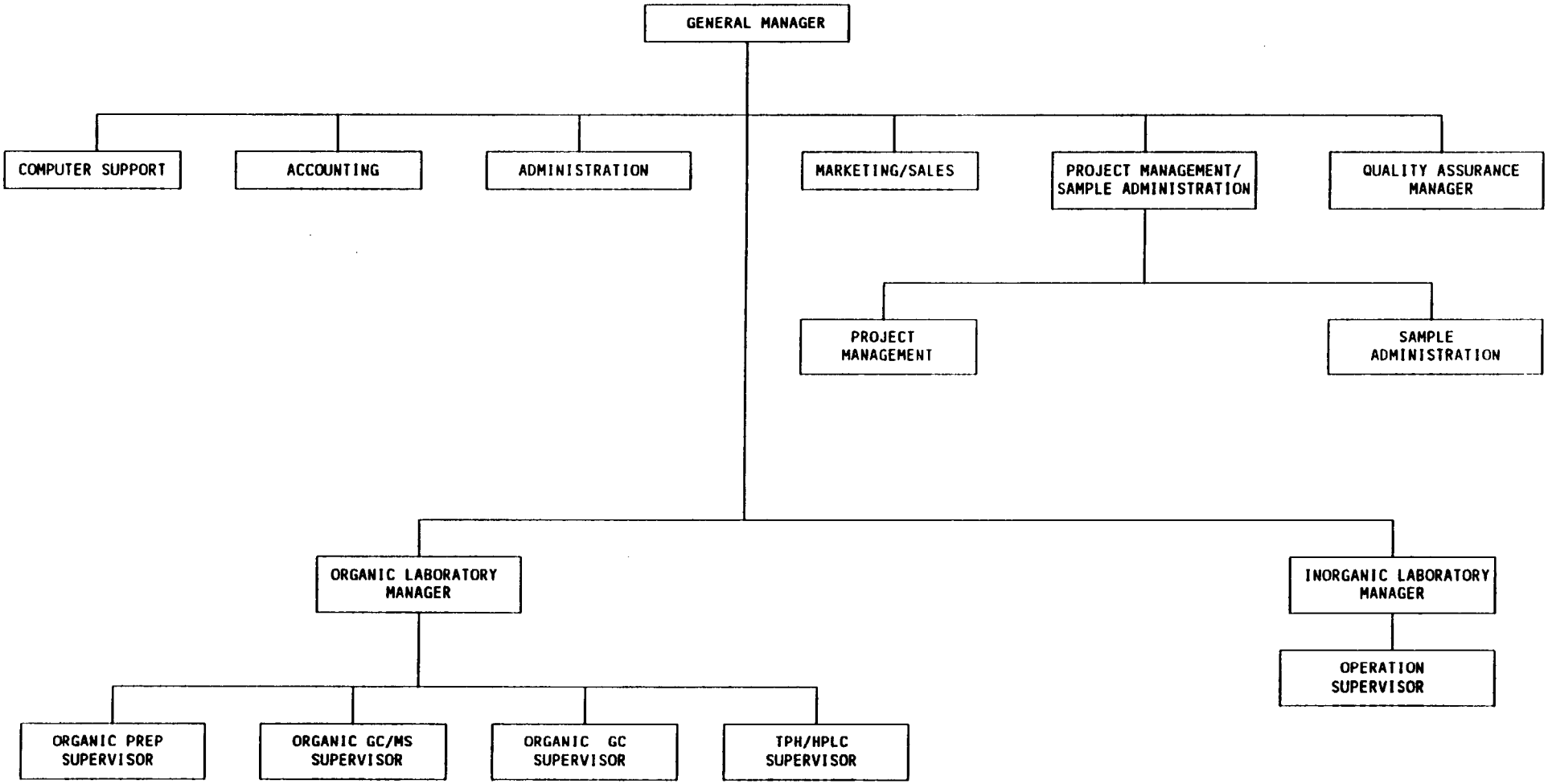
- o assignment of SOP writing to the appropriate laboratory personnel
- o review and approval of SOPs

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 1
ORGANI N 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

4.0 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.

5.0 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.

6.0 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:

- Compound name.
- Purity.
- Manufacturer and lot number (for neat or stock).
- 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 ±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 ±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 ±10% of true value	4. a. Recalibrate instrument. b. Rerun ICV: must be within ±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 ±10% of true value.	3. a. Rerun CCV; must be ±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 ≥ 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 ±20 RPD for Water. 2. Must agree to ±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 ±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 ±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 beinglyzed. 3. One standard should be at or near the detection limit. 4. Correlation coefficient (r) must be ≥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 ±20% of true value.	3. If ICV is not within ±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 ±20% of the true value.	3 a. If CCV is not within ±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 ±20 RPD for water. 2. Must agree to ±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 ±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 ≥ DL, then all associated samples must be redigested.
G. LCS	1 per digestion batch.	Recovery must be ±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

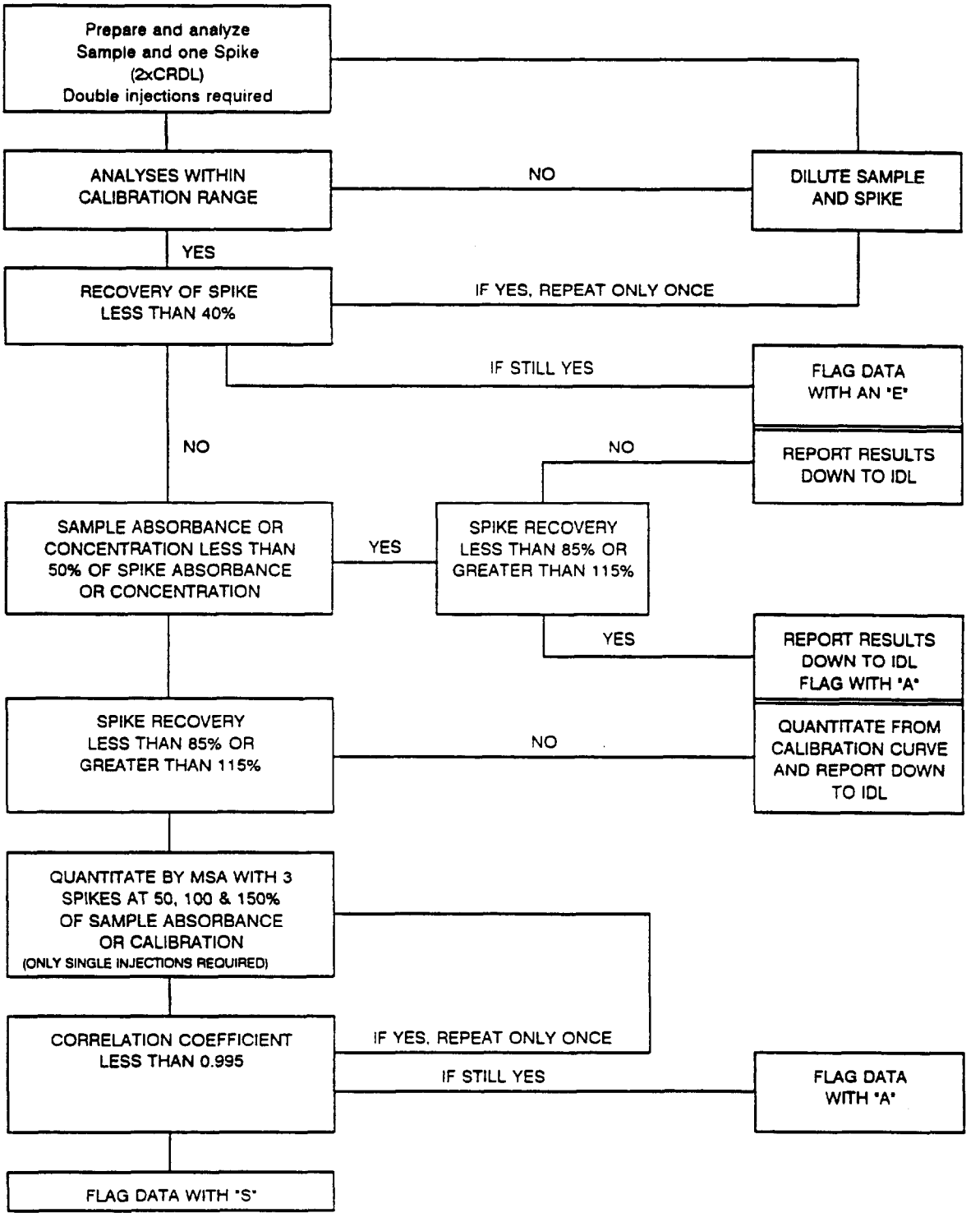
Activity	Frequency	Acceptance Criteria	Corrective Action*
MS/MSD	One per 20 samples for QC levels III and IV	(See attached).	Data flagged and discussed in case narrative.
Method 8270			
Calibration			
Initial	As necessary	1. RF's calculated for each compound. 2. SPCC's RF $\geq$0.05. 3. CCC % RSD < 30%.	2 & 3. Recalibrate if 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

Furnace Atomic Absorption Analysis Scheme



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

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

GAS CHROMATOGRAPHS/MASS SPECTROMETERS:

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

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

HIGH PRESSURE LIQUID CHROMATOGRAPHS (HPLC)

- Waters pumps
- 1 pump and solvent conditioner for up to quaternary gradient
- autosamplers: Waters WISP
- column-switching capabilities
- column ovens
- 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
- computer controlled
- high resolution optics

ATOMIC ABSORPTION SPECTROPHOTOMETERS (AAS)

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

Perkin Elmer 3100 Mercury Analyzer
- fully automated

ION CHROMATOGRAPH

Dionex 4000 I
- fully automated
- microprocessor controlled

INFRARED SPECTROPHOTOMETER

Perkin Elmer
- ratio recording

UV/VIS SPECTROPHOTOMETER

Varian 6000

MISCELLANEOUS

- Electronic Analytical Balance
- Ph Meters/Ion Specific Electrodes
- Centrifuges
- Incubators
- Ultrasonic Disrupters
- Rotary Evaporators
- Shakers
- TCLP Extractors
- ZHE TCLP Extractors
- 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 2

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, M 045
(301) 730-8525

CHAIN OF CUS DY RECORD

PROJECT

SAMPLERS: (Signature)

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

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 5

01/07/92
PAGE 1

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

********** PROJECT: NIOSH PATS
NON - REPORTED SAMPLES COMPANY: NIOSH
ORGANIC - SPECIFIC CONTRACT REPORT PROJECT MGR: MARSHA
****

LIENT ID	CLIENT	CON NUM	TAS NUM	DATE REC	DATE DUE	DATE SAMPLED	MATRIX	TYPE	pH	ACD	BN	PST (OCL)	PST (OP)	VOA	PCB	HRB	EXP	TPH IR	TPH GC	PHEN	OSG	GAS	OTH	VOA GC	VOA OTHER	COMMENTS	LOC	HOLD DATE	DAYS LEFT	QA LEVEL
23-1	EPAS	9800	066	01/07/92	01/31/92	/ /	AIR	TCL																A		PCE, TCE	BF	01/31/92	24	2
08-2	EPAS	9800	066	01/07/92	01/31/92	/ /	AIR	TCL																A		PCE, TCE	BF	01/31/92	24	2
08-3	EPAS	9800	066	01/07/92	01/31/92	/ /	AIR	TCL																A		PCE, TCE	BF	01/31/92	24	2
08-4	EPAS	9800	066	01/07/92	01/31/92	/ /	AIR	TCL																A		PCE, TCE	BF	01/31/92	24	2
23-5	EPAS	9800	066	01/07/92	01/31/92	/ /	AIR	TCL																A		PCE, TCE	BF	01/31/92	24	2

1,1,1 Trichloroethane

5 SAMPLE 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:

- Transcriptions are checked for accuracy and use of appropriate units.
- QC data are reviewed to assure that internal specifications and contract requirements have been met.
- 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.

Second Level Review

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.

Third Level Review

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	≤28	38-107	≤23
BN	Acenaphthene	46-118	≤31	31-137	≤19
BN	2,4-Dinitrotoluene	24-96	≤38	28-89	≤47
BN	Pyrene	26-127	≤31	35-142	≤36
BN	N-Nitroso-Di-n-Propylamine	41-116	≤38	41-125	≤38
BN	1,4-Dichlorobenzene	36-97	≤28	28-104	≤27
Acid	Pentachlorophenol	9-103	≤50	17-109	≤47
Acid	Phenol	12-89	≤42	26-90	≤35
Acid	2-Chlorophenol	27-123	≤40	25-102	≤50
Acid	4-Chloro-3-Methylphenol	23-97	≤42	26-103	≤33
Acid	4-Nitrophenol	10-80	≤50	11-114	≤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:

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

- 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.

- 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:

- 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.

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

Representativeness: 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.

Comparability: 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.:

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

9.4 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:

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

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

- 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.

- 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.

Precision

Control charts for precision are plots of the relative percent difference (RPD) between pairs of sample duplicates or matrix spike duplicates. Relative Percent Difference is calculated as 100% x (range/average). Each matrix should be plotted separately. Also, since precision is typically concentration-dependent, care must be taken to chart low-level and high-level samples separately.

The control levels for precision are defined as:

$$warning\ limits = \overline{RPD}\ x\ 2.51$$

$$control\ limits = \overline{RPD}\ x\ 3.27.$$

10.0 RECORDS

10.1 Laboratory Notebooks

Each analyst is assigned a bound notebook to assure the integrity of his/her records. The notebook entries are written in ink and contain the procedures used, date of analysis or extraction, name of analyst, and name of the contract. Calculations and results are also reported. Other note keeping procedures may be used upon client request. Some analyses, due to their repetitive scheduling, have notebooks already formatted for use by analyst.

10.2 Instrument Logbook

Each instrument or apparatus which requires maintenance, standardization, tuning or calibration will have a logbook maintained. This logbook will contain documentation of the instrument's performance and maintenance.

10.3 Standard Logbook

Logbooks containing dates for standard preparations are maintained. In general, the logbooks contain:

a. Date of preparation.
b. Preparer's initial.
c. Volumes, weights, solvents, etc.
d. Purpose or procedure for which the standards or reagents are to be used.
e. Source of standards (vendors, lot, purity).

10.4 Chain-of-Custody/Sample Logbook

The sample logbook for routine and chain-of-custody samples contains the following information:

- Client name, contract
- Date received, date due, date sampled
- Sample location (after log-in)
- AENI's No. (sequential), Client No. (off chain-of-custody)
- Analytes to be determined
- Matrix, pH, container type
- Comments
- Client specific information
- Log-in and data input personnel initials

This information is then put into the computer and analyte specific reports and client reports may be generated from it. The Project Manager certifies and signs off on all computer entries and result reports generated from the sample management system.

11.0 QUALITY ASSURANCE AUDITS

11.1 Internal Audits

The correct operation and full implementation of the internal Quality Assurance/Quality Control Procedures outlined in this manual and in Project Standard Operating Procedures will be confirmed by semi-annual audits conducted by the Quality Assurance Manager. The QAM will generate a report on the basis of these audits which will be submitted to the President along with a plan for corrective actions where necessary.

The basis for the Quality Assurance audit may include the American Environmental Network, Inc. Quality Assurance/Quality Control Procedures Manual, Standard Operation Procedures Manuals, technical specifications contained in contracts, and good laboratory practices. Technical files, documents facilities and personnel will be available to the auditor upon request and at the discretion of the President. The proper functioning of the QC system will be assured by reviewing:

- Adherence to standard operating procedures detailed in the procedures manuals.
- Organization chart identifying responsible personnel.
- Sign-offs by appropriate personnel on data sheets and sample progress record.
- Document filing storage and retrieval systems.
- Evidence of report review before finalization.
- Quality status reports.
- Documentation of precision, accuracy and completeness.
- Records of deficiencies, analytical events out of control, and corrective actions required and taken.

- Evidence of instrument and analyst certification and technical training.
- Laboratory facilities and equipment.

The audit report submitted to the President will contain finding of deficiencies and will state corrective actions to be taken and/or new procedures to be implemented. A reasonable time limit will be recommended by the auditor for completion of such actions.

11.2 Audits of Subcontractors

Analysis performed by subcontractors should meet or exceed the requirements of American Environmental Network Inc.'s QA/QC program. Potential organizations will be screened and suitable candidates identified by the Marketing Department.

The QA Manager will evaluate the QA Program of the subcontractor through review of the laboratory's written Quality Assurance Plan, typical SOP's, USEPA performance evaluation sample results or State Certification. If PE results are not available, American Environmental Network, Inc. may submit blind PE samples to the subcontractor as necessary.

Under certain contracts, American Environmental Network, Inc. may be a subcontractor. In these instances, the Prime Contractor also has the right to evaluate American Environmental Network Inc.'s subcontractor according the their SOP's.

12.0 CORRECTIVE ACTION

Documentation of analytical problems and corrective action taken is an essential part of the data record for each project. Identification, implementation, and monitoring of the actions that could have prevented the analytical problem provide a method for improving the quality of laboratory performance. A Corrective Action Report sheet has been designed to record problems, corrective actions, impact on analytical results, and suggested preventive actions for the future. A copy of this report sheet is included as Figure 6.

The Corrective Action Report must show complete background information about the event, including date and shift, analysis and phase, the client name, the sample identification number, and a description of the event which occurred. The report must further include the corrective action taken; indication of the status of the system; an assessment of impact of analytical results; and suggestions for preventive action.

The Corrective Action Report is initiated within the same shift as the occurrence by the person experiencing or noticing the discrepancy and completed by his or her supervisor. For example, the initiator provides the description of the event and corrective action taken and the supervisor adds the impact and preventive action.

The report is forwarded to the Laboratory Manager and the Project Manager , who assess the overall impact and need for follow-up. The Project Manager will contact the client if there is potential impact on analytical results. Once the non-conformance situation has been resolved, a copy of the report is forwarded to the QA Manager. The QAM will review the Corrective Action Report to ascertain adequate resolution of each event and to detect trends. Any cases or apparent trends that the QAM feels require further investigation or follow-up are discussed with the Laboratory Manager and the supervisor. The Corrective Action Reports are filed in the QA office. All effective

preventive action is documented for all appropriate laboratory sections. Supervisors of each area are responsible for any SOP revision needed to reflect these preventive actions.

Initial preventive action plans which are evaluated as being ineffective, cause an investigation to be performed to identify the cause of the problem and the effective preventive action. This investigation is led by the supervisor of the area where the initial problem occurred and the QAM. Progress of the investigation is reported to the General Manager and filed in the QA Office.

FIGURE 6
CORRECTIVE ACTION RECORD
AMERICAN ENVIRONMENTAL NETWORK, INC.

NDIVIDUAL GENERATING COMMENTS:
Section Supervisor ( ) Analyst ( ) Lab Manager ( ) QA Officer ( ) Project Manager ( )

CLIENT/AENI NUMBER(S): _____

PROBLEM: _____

_____

_____

****

Analyst Comments:

Analyst: Date:

****

Section Supervisor Comments/Action:

Section Supervisor: Date:

****

Laboratory Manager's Comments/Action:

Laboratory Manager: Date:

****

Quality Assurance Review and Approval:

QA Officer: Date:

****

Scheduled follow-up by QAO: _____
Findings:

Date/Initials: _____

3.0 BIBLIOGRAPHY

Regulations

40 CFR 136.3e	Required containers, preservation techniques, and holding times.
40 CFR 136	Guidelines establishing test procedures for the analyses of pollutants un the Clean Water Act.
40 CFR 136	Methods of Organic Chemical Analysis of Appendix A Municipal and Industrial Wastewater.

Manuals

EPA 600/4-79-020	Method for Chemical Analysis of Water and Wastes (1983)
EPA 600/4-79-012	Quality Assurance Handbook for Analytical Quality Control in Water an Wastewater Laboratories (1979)
SW-846	Test Methods for Evaluating Solid Wastes, Third Edition (1986)
	Standard Methods for the Examination of Water and Wastes, 16th Editi American Public Health Association.
CAMS 005/80	Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans, USEPA Office of Monitoring System and Quality Assuranc December 29, 1980

APPENDIX A

Appendix A
HOLDING TIMES, PRESERVATION, AND CONTAINERS

Holding Times, Containers, and Preservation Requirements

Parameter	Matrix	Method(s)	Minimum Volume Required	Container	Preservative	Holding Time
pH	W	SW9040	25mL	P;G	None	analyze immediately in field
	S	SW9045				
Temperature	W	EPA170.1	1000mL	P;G	None	analyze immediately in field
Specific Conductivity	W	SW9050	100mL	P;G	Cool, 4°C	28 days
Common Anions (Cl, SO_4, NO_3)	W	EPA300	500mL	P;G	Cool, 4°C	28 days
Ignitability	W;S	SW1010	500mL;500g	G	Cool, 4°C	
Corrosivity	W;S	SW1110	500mL;500g	G	Cool, 4°C	
Reactivity	W;S	SW1846	1000mL;500g	P	Cool, 4°C	see CN-holding time
Toxicity-TCLP extraction procedure	W;S	SW1310 SW1311	1000mL per test; 1Kg	G G	Cool, 4°C Cool, 4°C	*see following table on TCLP extraction holding times
Soil Moisture Content	S	ASTM D2216	200 g	P;G	Airtight container cool, 4°C	ASAP

Holding Times, Containers, and Preservation Requirements, Cont.

Parameter	Matrix	Method(s)	Minimum Volume Required	Container	Preservative	Holding Time
Cyanide	W S	SW9010 SW9010	500mL 500g	P;G P;G	Cool to 4°C NaOH to pH>12	14 days 14 days
Phenols	W S	SW9067		G only	Cool to 4°C H_2SO_4 to pH<2	28 days
Mercury	W S	SW7470 SW7471	1000mL 200g	P;G P;G	HNO_3 to pH<2	28 days 13 days (plastic)
ICP Metals	W,S	SW6010 digestion: various SW846 methods	1000mL 200g; 1000mL	P;G P;G	W-HNO^3 to pH<2	6 months
ICP Metals (dissolved)	W	SW6010 digestion; various SW846 methods	1000 mL	P;G	Field filter; HNO_3 to pH<2	6 months
Furnace AA (Ag, As, Cr, Pb, Sb, Se, Tl)	W,S	Various SW846	1000 mL 200 g	P;G	W-HNO_3 to pH<2	6 months
Furnace (dissolved)	W	Various SW846 methods	1000 mL	P;G	Field filter, HNO_3 to pH<2	6 months

Holding Times, Containers, and Preservation Requirements, Cont.

Parameter	Matrix	Method(s)	Minimum Volume Required	Container	Preservative	Holding Time
GC Methods:*						
Volatiles, halogenated	W	SW3510 or 3520/8010/8015	80mL	G	Teflon[R] septa, VOA vials; No headspace; 4 drops concentrated HCl/40 mLs; cool to 4°C	14 days
	S	SW3550/8010/8015 8080	80mL		Teflon[R] septa, VOA vials; No headspace; cool to 4°C14 days	14 days
					14 days	
Volatiles Aromatic	W	SW3510 or 3520/802	80mL	G	4Teflon[R] septa, VOA vials, No headspace; 4 drops concentrated HCl/40 mLs; cool to 4°C	(7 days if not preserved)
	S	SW3550/8020	80g		Teflon[R] septa, VOA vials, No headspace; cool to 4°C	14 days
Herbicides	W	SW3510 or 3520/8150	1000mL	G	Teflon[R] cap; cool to 4°C	7 days
	S	SW3510/8150	200g	G	cool to 4°C	

Holding Times, Containers, and Preservation Requirements, Cont.

Parameter	Matrix	Method(s)	Minimum Volume Required	Container	Preservative	Holding Time
Pesticide/PCB's	W	SW3510 or 350/ 8088	1000mL	G	Teflon septa; cool to 4°C	7 days
	S	SW3550/8080	200g	G		14 days
GC/MS Methods: (extracted as above)						
Volatiles	S,W	SW8240, 8260	80mL	G	Teflon septa; VOA vials; no headspace; 4 drops concentrated HCl to pH<2; cool to 4°C	14 days
Semivolatiles	S,W	SW8250, 8270	1000mL	G	Teflon septa; 0.008% $Na_2S_2O_3$; cool to 4°C	W=7 days S=14 days

* See Attached List for Organicsy

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

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AUG 24 1992

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)
ew 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

State	Certification Number	Organization Authorizing Certification	Parameters Certified
New York	10605	New York SDH	Environmental Analysis Air and Emissions Including: Drinking Water Metals Non-Metals Microextractables Trihalomethanes Non-Potable Water 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

Section 01410 Sampling and Analysis Plan

Wastewater from the decontamination pads will be collected in a 1000 gallon tank and sampled when the tank is full. The water will be sampled for silver (SW-846 7770), BOD (EPA 405.1) and TSS (EPA 160.1). The sample container for the silver samples will be 1 liter plastic laboratory certified clean bottle with HNO_3 added for preservative. The BOD and TSS sample container will be a 1 liter amber bottles with no preservative.

The treated material analytical sampling will be performed every 100 cubic yards. The sample containers will be 8 oz. amber bottles.

Samples will be alpha and numerically coded. This will be recorded on the sample container, the chain of custody and in the field notebook.

Soil samples will be collected using disposable utensils and/or dedicated equipment. Samples will handled using new latex gloves and will be placed into laboratory certified clean bottles. Samples will be labeled and placed in a cooler containing ice to maintain the samples at 4 C. Chain of custody forms will be compiled and completed for all samples and will remain with sample/bottles throughout shipping, sampling and analysis procedures.

Section 01310 The staging area for the contaminated soil will be as shown in Figure 1 and will be bermed with clean fill. The berm will be approximately 2 feet high and 3 feet wide at the base. Trucks delivering the contaminated soil to the staging area will back onto the berm and dump into the staging area. The contaminated soil will be immediately moved to a stockpile within the staging area with a loader to allow access to the staging area. The berm in the dumping area will be maintained so that the tires of the trucks do not contact the contaminated soil when dumping.

The sump capacity in the decontamination pads will be 30 to 55 gallons. The sumps will be pumped to a portable 1000 gallon holding tank.

Sections 02081 & 02082 Off-site disposal of debris (tree stumps) will be the responsibility of Jowett, Inc. The stumps will be decontaminated, loaded into trucks and disposed of at an off-site non-hazardous landfill.

Section 02205 The width of soil to be excavated will be ten (10) feet wide in accordance with page 02205-1. Section 2, Figure 4 has been changed from 12 feet to read 10 feet accordingly.

The clean fill that is used in the berm around the staging area will be used as part of the soil cover placed over the treated soil. As soil on the inside of the berm could potentially be contaminated, it will be treated after all the contaminated soil is treated.

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.

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

Target Detection Limits[a] (continued)

latiles	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; refore, 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 (μg/L)
Aldrin	0.004
α-BHC	0.003
β-BHC	0.006
δ-BHC	0.009
ϒ -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

[a] Sample TDLs are highly matrix-dependent. The TDLs listed herein are provided for guidence and may not always be achievable.
[b] 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] ..ple 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 µg/L	Limit soil µg/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
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SOP NO.	TITLE	REVISION	DATE
4502.390	METHOD FOR THE DETERMINATION OF PURGEABLE (VOLATILE) ORGANIC COMPOUNDS IN WATER: EPA SOW 3/90 WITH REVISIONS	1	2/18/92
4503.390	METHOD FOR THE DETERMINATION OF PURGEABLE (VOLATILE) ORGANIC COMPOUNDS IN SOIL AND SEDIMENT: EPA SOW 3/90 WITH REVISIONS	1	2/18/92
4505.390	METHOD FOR THE DETERMINATION OF PESTICIDES AND PCBS IN WATER AND SOIL: EPA SOW 3/90 WITH REVISIONS	1	5/6/92
4507.390	METHOD FOR THE DETERMINATION OF EXTRACTABLE BASE/NEUTRALS AND ACID (SEMI-VOLATILES) ORGANIC COMPOUNDS IN WATER AND SOIL: EPA SOW 3/90 WITH REVISIONS	1	3/32/92
4508	SAMPLE STORAGE AND MAINTENANCE EPA CLP	1	2/11/87
4509	SAMPLE RECEIPT AND LOGGING - EPA CLP	1	9/29/87
4512	ORGANIC SAMPLE QUALIFYING PROCEDURE - EPA CLP	0	1/30/89
4513	ORGANIC BLANK EVALUATION PROCEDURE - EPA CLP	0	1/30/89
4515	PCT IN SOILS: CLP-TYPE FORMAT	0	6/22/90
4516	PCT IN WATER: CLP-TYPE FORMAT	1	6/22/90

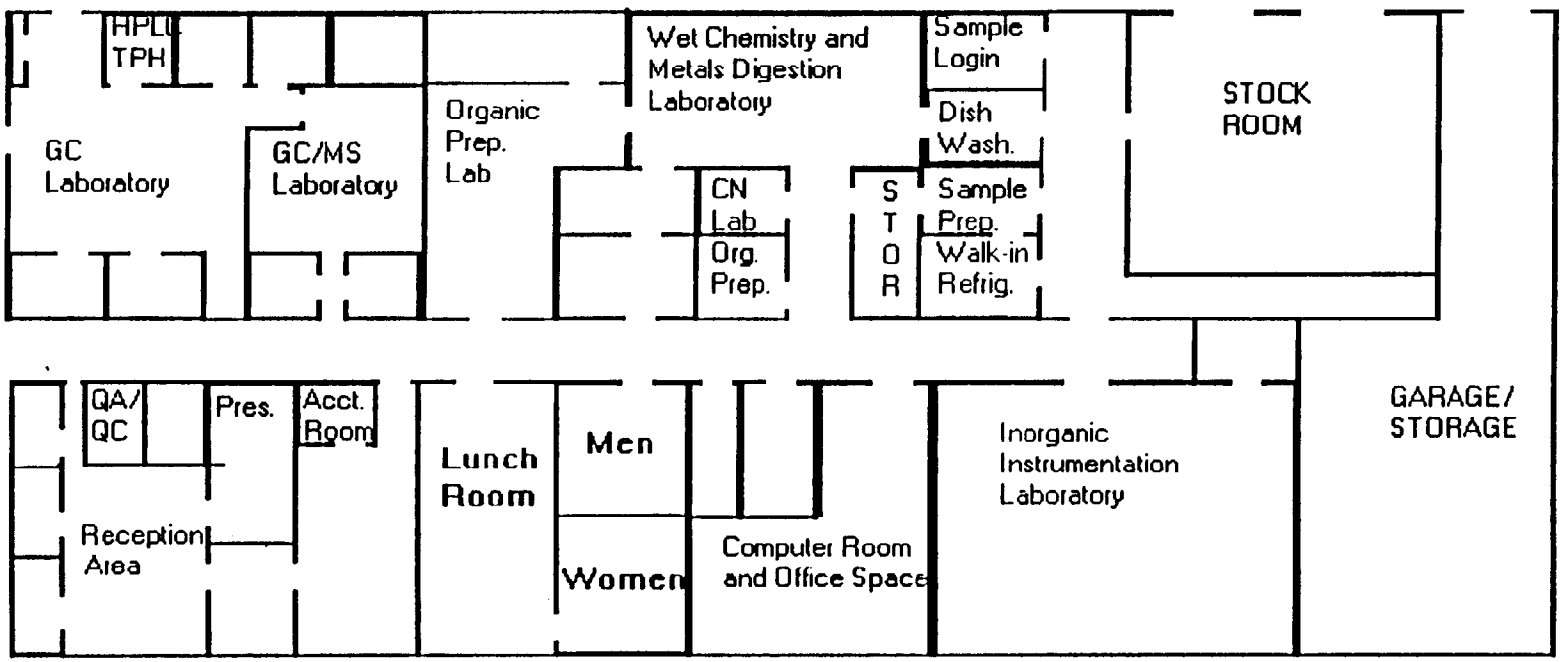
HEAI LABORATORY
STANDARD OPERATING PROCEDURES
INDEX

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: REGULATORY CORRESPONDENCE

DEPARTMENT OF THE NAVY
NAVAL ORDNANCE STATION
INDIAN HEAD, MARYLAND 20640-5000

5090
Ser 0965/812
20 Dec 91

Maryland Department of the Environment
CERCLA Response Division
Attn: Mr. Mark Schoppet
2500 Broening Highway
Baltimore, MD 21224

Gentlemen:

The purpose of this letter is to obtain your concurrence on the cleanup level for silver contaminated soil located near Building 731 at our facility. As you know, this site is in our Installation Restoration (IR) Program, and is located in the area where an explosive berm will be extended for a new $8 million mix, cure, and assembly facility. The maximum silver contamination discovered at this site was 571 parts per million (ppm).

Enclosed is a letter from our contractor, ABB, who is responsible for sampling and developing a site remediation plan. They have sampled the site to determine the extent of silver contamination. The area of highest contamination (571 ppm) was tested using the Toxicity Characteristic Leachate Procedure (TCLP) and did not exhibit the hazardous waste characteristic.

The proposed action limit, as given by 40 Code of Federal Regulations (CFR) Part 264, Subpart S, requires cleanup of soil that contains 200 ppm silver. The majority of the silver contamination is under 100 ppm except directly where the photographic solution was discharged. Therefore, it is reasonable to remediate the soil to a level of 10 ppm as stated in the enclosure.

Although it is not TCLP toxic, the silver contaminated soil present in the existing swale, which passes through the proposed construction area, will be removed, stabilized, and placed in the explosive berm. The amount of stabilized soil to be placed in the berm from the swale will be approximately 300 cubic yards (cy), which is under 1% of the total soil in the berm.

In addition, we plan to remediate the silver contaminated soil that is located at the west end of Building 731. This swale was used before the existing swale and samples show that it has a lower silver contamination level. Therefore, we plan to use the same cleanup criteria to remediate both swales at the same time. We estimate that the maximum volume of soil from the second swale

5090
Ser 0965/812

to be excavated, stabilized, and placed in the explosive berm is 600 cy. The total volume of stabilized soil in the berm will compose less than 2% of the explosive berm.

Cleanup of the soil to a level of 10 ppm of silver will be accomplished by the removal and stabilization of soil down to a 2 foot depth and 4 foot width from the center of the swale. This same process of soil removal will also be used to remove contamination from the swale at the west end of Building 731.

If you have any questions on this matter, please feel free to call Mr. Shawn Jorgensen of my office on (301) 743-6745.

Sincerely,

KENNETH D. MORIN, P.E.
Director, Utilities/
Environmental Division
By direction of
the Commanding Officer

Encl:
(1) ABB ltr of 10 Dec 1991

December 10, 1991

MEMORANDUM

To: Paul Berkman

From: Franco Godoy

Subject: Site 5, Naval Ordnance Station, Indian Head, MD; Contract No. N62477-91-D-0043, Delivery Order No. 0001

This memorandum has been developed to address outstanding issues associated with environmental conditions at the above-referenced site and planned military construction at and adjacent to the site. The goal of the document is to provide key decision-makers with a synopsis of pertinent site background, characterization, regulatory, and environmental management information. The material provided herein supplements the Draft Site Characterization and Remediation Evaluation Report, Naval Ordnance Station, Site 5, Indian Head, MD dated September 13, 1991. The specific material addressed in this memorandum includes:

1. A discussion of the **Project Origin/Purpose.**

2. **Site Background/Characterization** information defining the source, nature, and extent of contamination at the site.

3. Key **Regulatory Issues** pertinent to actions which may be appropriate for environmental management of conditions at the site.

4. An overview of and rationale for the **Proposed Management Approach** to address site conditions.

1. Project Origin/Purpose

Materials and ingredients required for the production of today's weapons are rapidly changing and Naval Ordnance Station (NOS) Indian Head, MD has limited facilities which meet these requirements. To support the Station's mission requirements, construction of a new Mix, Assemble and Cure Facility has been authorized by Congress. A MILCON project designed to provide adequate, secure, and properly configured facilities will be constructed on 24 acres within NOS; however, environmental media within an area of the construction zone has been impacted by past waste management practices. Due to the presence of contamination within the planned construction zone, the Navy has undertaken a program to characterize the area impacted by construction, evaluate associated risk, and identify remedial alternatives, should remediation be warranted. All remedial response actions must be completed prior to construction start-up, scheduled for the spring of 1992.

2. Site Background/Characterization

Due to past photographic waste management practices at Site 5, drainage ditch sediments have been impacted. Previous studies (1985) completed at the site indicated maximum silver sediment concentrations of 1,920 mg/kg, with concentration of 11.3 and 9.46 mg/kg found within the area impacted by MILCON P-059 (explosion berm expansion). A recent study, completed by ABB-ES, focused on the segment of the drainage ditch within and upstream of the area designated for construction. The sampling program, completed in August 1991, consisted of acquisition and analysis of 48 ditch sediment samples along transects within the drainage ditch

adjacent to Building 731 as depicted in Figure 1. The analytical program involved testing for total silver and cyanide, along with TCLP metals to support a waste management determination, should remediation be necessary. The study results suggest that silver concentrations in sediments have decreased at areas adjacent to the source (Bldg. 731), while concentration within the planned berm zone have increased to an average of 61 mg/kg. A statistical summary of silver concentrations by depth and distance from center stream are provided in Table 1.

Figure 1
Sampling Locations

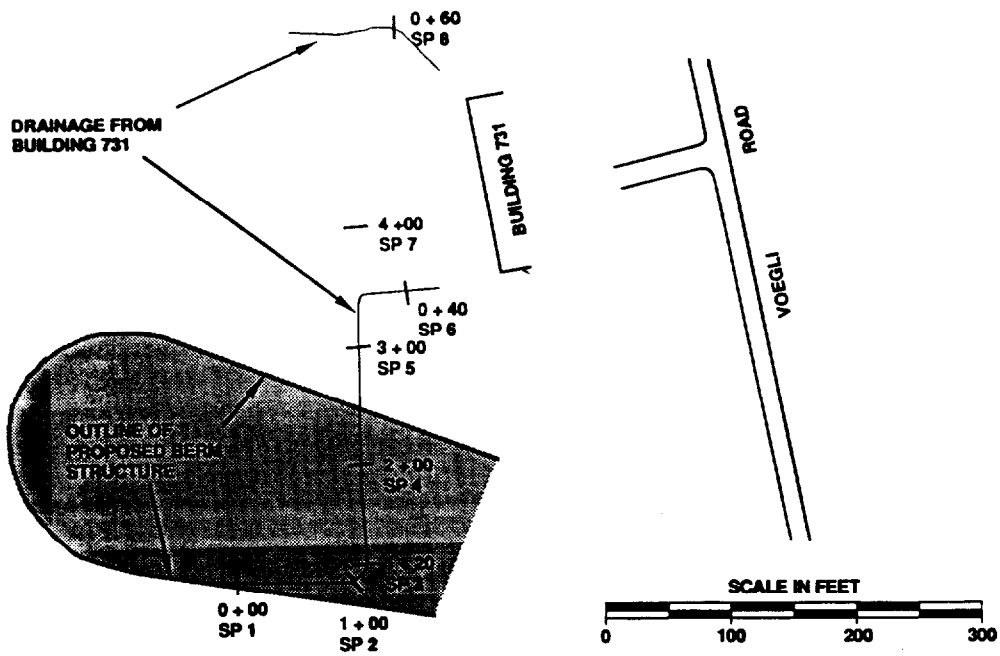
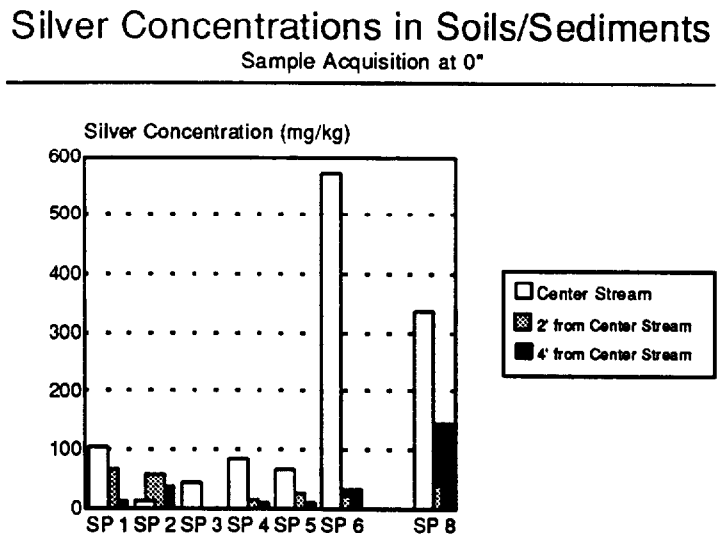
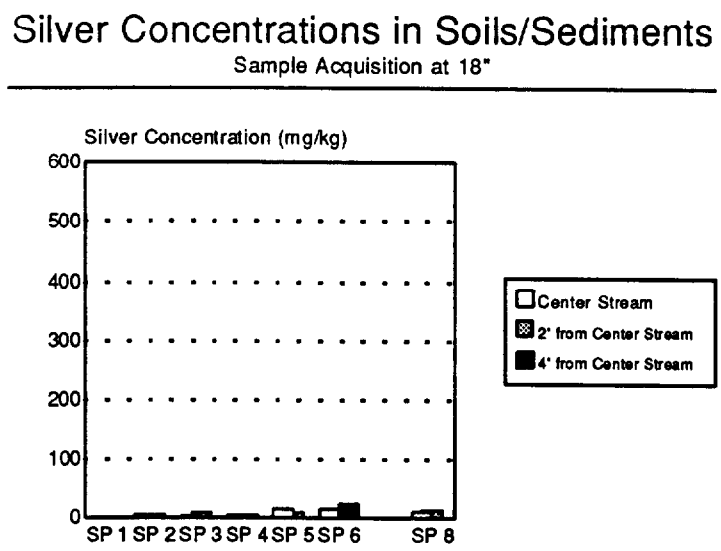


Table 1
Silver Distribution
in Drainage Ditch
(mg/kg)

Sampling Depth		Sampling Point: Center Stream	2' from Center	4' from Center
0"	Max Value	571	67	144
	Min Value	7.3	ND	ND
	Average Value	153	30	32
18" bgs	Max Value	16	13	23
	Min Value	ND	ND	ND
	Average Value	6	5	3

Study analytical results are presented graphically in Figure 2. These data indicate that migration of silver has occurred from hotspot areas adjacent to Building 731 (SP 6) to locations downstream. In terms of vertical migration of silver within sediments, values of silver at 18 inches in depth are significantly below surficial levels, slightly above background levels (approx. 1ppm). Distribution within the drainage ditch indicates that surficially the highest concentrations are located at center stream and rapidly decrease with distance from that location. The migration of the silver appears to predominantly occur through surficial sediment/surface water flow within the drainage ditch channel. Vertical migration within the subsurface is minimal, likely due to setting conditions which retard subsurface vertical migration (clays and silts).





3. Regulatory Issues

Regulatory issues addressed in this section focus on those relevant to management of contaminated sediments at the NOS facility. The three key issues involve:

1. The classification of excavated sediments (hazardous vs. non-hazardous);

2. Proposed action levels for silver in soil; and

3. Regulations impacting treatment of excavated sediments.

To be categorized as a hazardous waste, a material must fall within one of three categories: (1) a listed waste from a specific source, (2) a listed waste from a non-specific source, or (3) a waste which exhibits the characteristics of a hazardous waste as defined within 40 CFR 261. The silver-contaminated sediments are not listed waste and do not exhibit the characteristics of a hazardous waste as defined by TCLP criteria. TCLP metals testing completed on composite samples at each sampling transect and on a non-composite sample obtained from sediments exhibiting the highest silver concentrations were all non-detect for silver; therefore, excavated sediments are not a hazardous waste.

Currently there exist no final or proposed rules concerning cleanup levels for silver in soils, sediments or debris. Proposed action levels for concentrations of silver in soils have been promulgated, in 55 FR 30798, as rules to be included in Subpart S of 40 CFR 264. As described in 55 FR 30798, contamination exceeding the proposed action level indicates "a potential threat to human health or the environment which may require further study." The proposed action level for silver in soils is 200 milligrams per kilogram (mg/kg).

The EPA has recently (June 1, 1990; and May 30 & October 24, 1991) proposed rules for **Contaminated Soil and Debris** which impact the treatment of hazardous wastes containing heavy metals. Under these regulations, treatment standards will be developed using a concentration-based Best Demonstrated Available Technology (BDAT) approach. The EPA is investigating three general categories, extraction, destruction and immobilization techniques. To date, for most metals, the data received by the Agency indicate that concentrations below characteristic levels can be achieved through the use of either stabilization or vitrification. The treatment strategy recommended for long-term onsite management of excavated sediments is stabilization, which is consistent with current BDAT data.

4. Proposed Management Approach

The objective of the remediation strategy for contaminated sediments within the construction zone centers on protection of human health and the environment. Due to the study's focused nature on primary source areas, the scope of remediation can be characterized as a source control action. When assessing the need for and development of remediation alternatives, the following key information was used to select the most feasible approach:

(1) Silver distribution within sediments at the site is surficial in nature (approximately at background levels at 18" in depth).

(2) The primary migration mechanism involves transport through surficial sediment/surface water flow as indicated by study data.

(3) Sediments are not a RCRA hazardous waste.

(4) Developing BDAT treatment standards for heavy metal Contaminated Soil and Debris indicate that solidification/stabilization is an effective technology in reducing mobility. Additionally, the

technique augments desirable physical/chemical properties (compressive strength, leachability, etc.)

(5) Ecological risk information presented in the Draft Site Characterization and Remediation Evaluation Report suggests silver concentrations in the sediments may pose a risk at the site.

Based on this material, removal and treatment (stabilization/solidification) of sediments containing greater than 10 ppm of silver followed by onsite management within the planned explosion berm expansion is recommended. The primary objective of solidification of upstream sediments centers on producing a suitable material for incorporation into the explosion berm. The containment remediation strategy effectively removes contaminated materials from the active transport pathway. Additionally, TCLP testing completed on sediments indicates that mobilization of silver is not occurring under test conditions. Treatment through solidification should further reduce the potential for migration; however, the principal goal of treatment is to enhance constructability. Subsequent to the removal of materials from the drainage ditch, the ditch will be relocated approximately 20' laterally to further minimize the potential for future site disturbance. The lateral displacement of the ditch effectively eliminates any residual sediment contamination concerns with respect to future transport. The remediation project would consist of the following elements:

a. Treatability Study - This project component is necessary to determine optimal binder formulation and develop physical/chemical data defining the treated waste.

b. Site Preparation - Which would include clearing/grubbing of vegetated areas and process-specific site preparation (e.g., treatment pad, utilities, etc.).

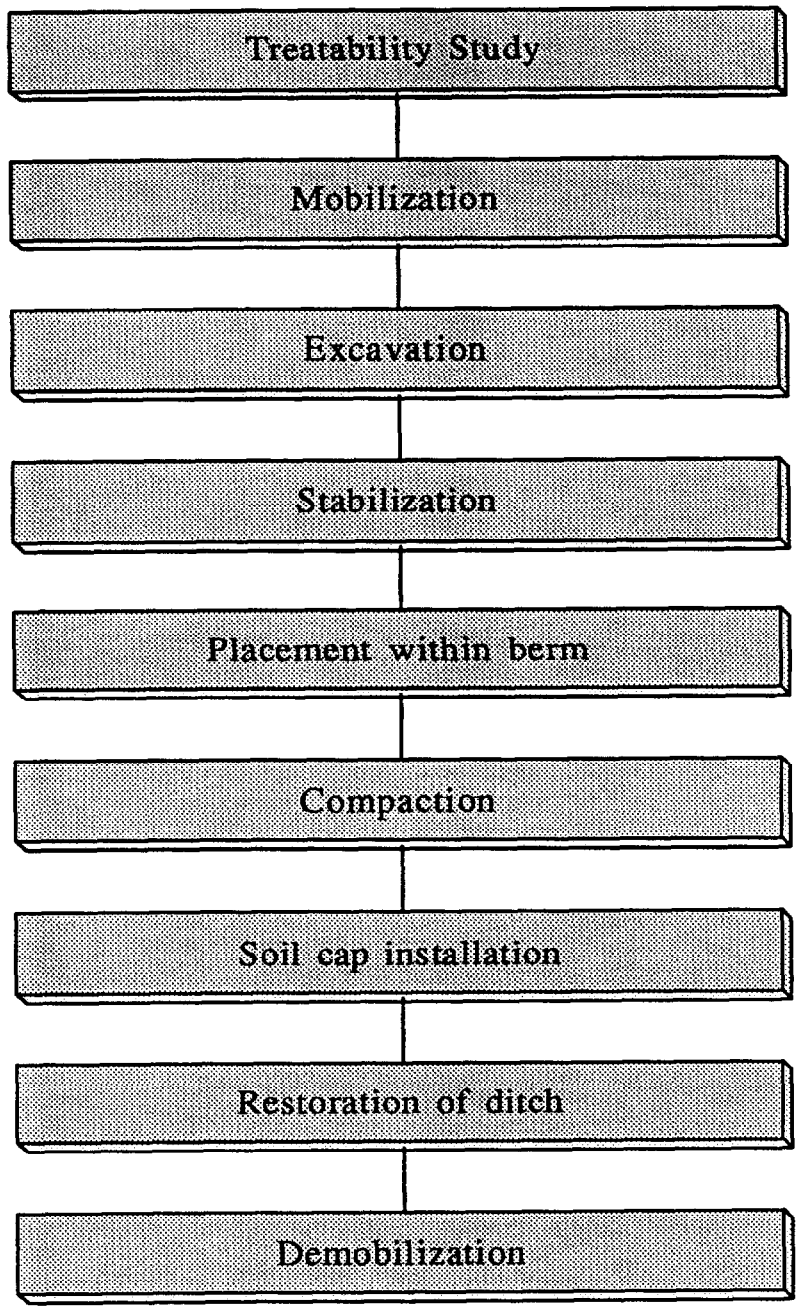
c. Excavation/Stabilization/Placement - This project element would consist of removing contaminated sediments to a depth of 2 feet, solidification using a formulation developed through treatability testing, and placement of material within the berm. Based on preliminary drawings of the MILCON P-059 site area, the volume of material that composes the explosion berm is estimated to be approximately 28,500 cubic yards (cy). The estimated volume of soils and sediments to be excavated from the drainage ditch is 600 cy, only about 2 percent of the total berm volume. The above factors (the solidification process, and the relatively small volume of solidified materials) should ensure a minimal effect on the structural integrity of the berm.

d. Compaction/Soil Cover Installation - This component would involve shaping, grading and compacting the treated material and placement of a 1' thick soil cover on contaminated materials within the berm footprint.

e. Restoration of the Drainage Ditch - Which would consist of re-establishing the drainage network (displaced laterally by 20') using suitable backfill material along with appropriate erosion control techniques.

The net effect of this remediation strategy would be removal of silver-contaminated sediments from the migration pathway, removal of the high concentration source area, as well as restoration/relocation of the ditch network above the planned construction zone. This approach satisfies site risk management needs indicated by both human health and ecological assessments by lowering sediment concentration to less than 1 ppm in the 0 to 2 foot zone in the drainage ditch and laterally moving the ditch 20' to eliminate the potential for any migration.

Process Flow Diagram for Onsite Management of Silver-Contaminated Materials



STATE OF MARYLAND
DEPARTMENT OF THE ENVIRONMENT
2500 Broening Highway Baltimore, Maryland 21224
(410) 631-3454

William Donald Schaefer
Governor

Robert Perciasepe
Secretary

January 10, 1992

Mr. Kenneth D. Morin
Director, Utilities/Environmental Division
Department of the Navy
Naval Ordnance Station
Indian Head, MD 20640-5000

Re: Silver Contaminated Soils from Building 731

Dear Mr. Morin:

While the State concurs with your approach and the proposed clean-up levels at the above referenced site, several issues must be addressed either as part of this project or as part of future remedial activities:

1. This proposal calls for removal of soils in the ditch only as far as the proposed berm. The State recommends that the area of excavation extend at least as far as the two ponds at the bottom of the Olson Road Landfill. The approach also calls for the ditch to be relocated to direct the surface water away from the remediated ditch. The State is concerned about the remaining contaminated soils that will not be remediated and could be carried into the Matawoman Creek.

2. The areal extent of silver contamination has not been determined as evidenced by the following:

   a. The analytical results from sediment sampling at the Olson Road Landfill reveals elevated levels of silver at the furthest sampling point downstream. Additional sampling is required to fully determine the extent of silver contamination, and should include sampling of the sediments beneath the ponds at the bottom of the ditch.

   b. There has only been one sample taken from the ditch on the west side of Building 731. Therefore, it is unknown how far the silver contamination has spread.

   c. With the exception of the two ponds at the bottom of the Olson Road Landfill, surface water has not been sampled.

The State considers this action as source removal, and therefore, further study will be required to evaluate the risks associated with any remaining contaminants and whether any surface water has been affected. If you have any questions or wish to discuss this further, please contact me at (410) 631-3454.

Sincerely,

Mark J. Schoppet

Mark J. Schoppet
Remedial Project Manager
CERCLA Response Division

MJS:bjw

cc: Mr. Richard Collins
Mr. Frank Henderson

DEPARTMENT OF THE NAVY
INDIAN HEAD DIVISION
NAVAL SURFACE WARFARE CENTER
101 STRAUSS AVE
INDIAN HEAD MD 20640-5035

5090
Ser 0965/180
24 Mar 92

Maryland Department of the Environment
CERCLA Response Division
Attn: Mr. Mark Schoppet
2500 Broening Highway
Baltimore, MD 21224

Gentlemen:

The purpose of this letter is to provide you with the Plans and Specifications for the cleanup of the silver contaminated swales at Building 731. These specifications will be incorporated into the existing Military Construction contract (MILCON) P-059, which involves the construction of a mix, cure, and assembly facility.

Although MILCON P-059 was awarded on March 3, 1992, this remedial action must be performed prior to construction. Therefore, to avoid loss of funding due to delays in construction, we ask that you review this document by April 13, 1992.

We are also enclosing the final draft of the Engineering Evaluation and Cost Analysis (EECA) of our Installation Restoration (IR) Site 8. Responses to your initial comments, as well as those addressed by the Technical Review Committee (TRC), have been incorporated into this document. We would appreciate if you would review the EECA before the next TRC meeting, which will be held on May 18, 1992.

We sincerely appreciate the support you have given us concerning MILCON P-059. If you should have any questions or comments concerning either of these documents, please contact Mr. Shawn Jorgensen of my office at (301) 743-6745.

Sincerely,

KENNETH D. MORIN
Director, Utilities/
Environmental Division
By direction of
the Commander

Encl:
(1) Plans and Specifications Remedial Action, Naval Ordnance Station, Site 5
(2) Final Draft, Engineering Evaluation and Cost Analysis Report, Site 8 Nitroglycerin Plant Office

DEPARTMENT OF THE NAVY
INDIAN HEAD DIVISION
NAVAL SURFACE WARFARE CENTER
101 STRAUSS AVE
INDIAN HEAD MD 20640-5035

5090
Ser 0952/785
9 Dec 92

Mr. Milton Marder
Maryland Department of the Environment
CERCLA Response Division
2500 Broening Highway
Baltimore, MD 21224

Dear Mr. Marder,

We are forwarding you a copy of the work plan, enclosure (1), for the removal of silver contamination at former Installation Restoration (IR) Site 5. The silver contamination was from radiographic operations located in Building 731. The work plan is based on the plans and specifications that we forwarded to you on March 24, 1992.

We originally requested your concurrence to clean the two swales that received the discharge from Building 731 in our letter of December 20, 1991, enclosure (2). You approved our general approach with several comments in your letter of January 10, 1992, enclosure (3).

The plans and specifications sent to you on March 24, 1992, addressed your comments, with the exception of the two ponds at the bottom of the Olson Road Landfill, IR Site 44. Since that area is a natural wetlands and is located downgradient of IR Site 44, we have decided to include further testing and any remedial actions at the ponds with IR Site 44.

Cleanup of the site began on December 2, 1992. If you have any questions concerning this matter, please contact Mr. Shawn Jorgensen of my staff on (301) 743-6745/46.

Sincerely,

KENNETH D. MORIN, P.E.
Director,
Environmental Division
By direction of
the Commander

Encl:
(1) Remedial Work Plan
IR Site 5
(2) IHDIVNAVSURFWARCEN ltr 5090
Ser 0965/812 of 20 Dec 91
(3) MDE ltr of 10 Jan 92

Copy to: (w/o encl)
CHESNAVFACENGCOM (Code 181)

APPENDIX E: TREATABILITY STUDY RESULTS

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)

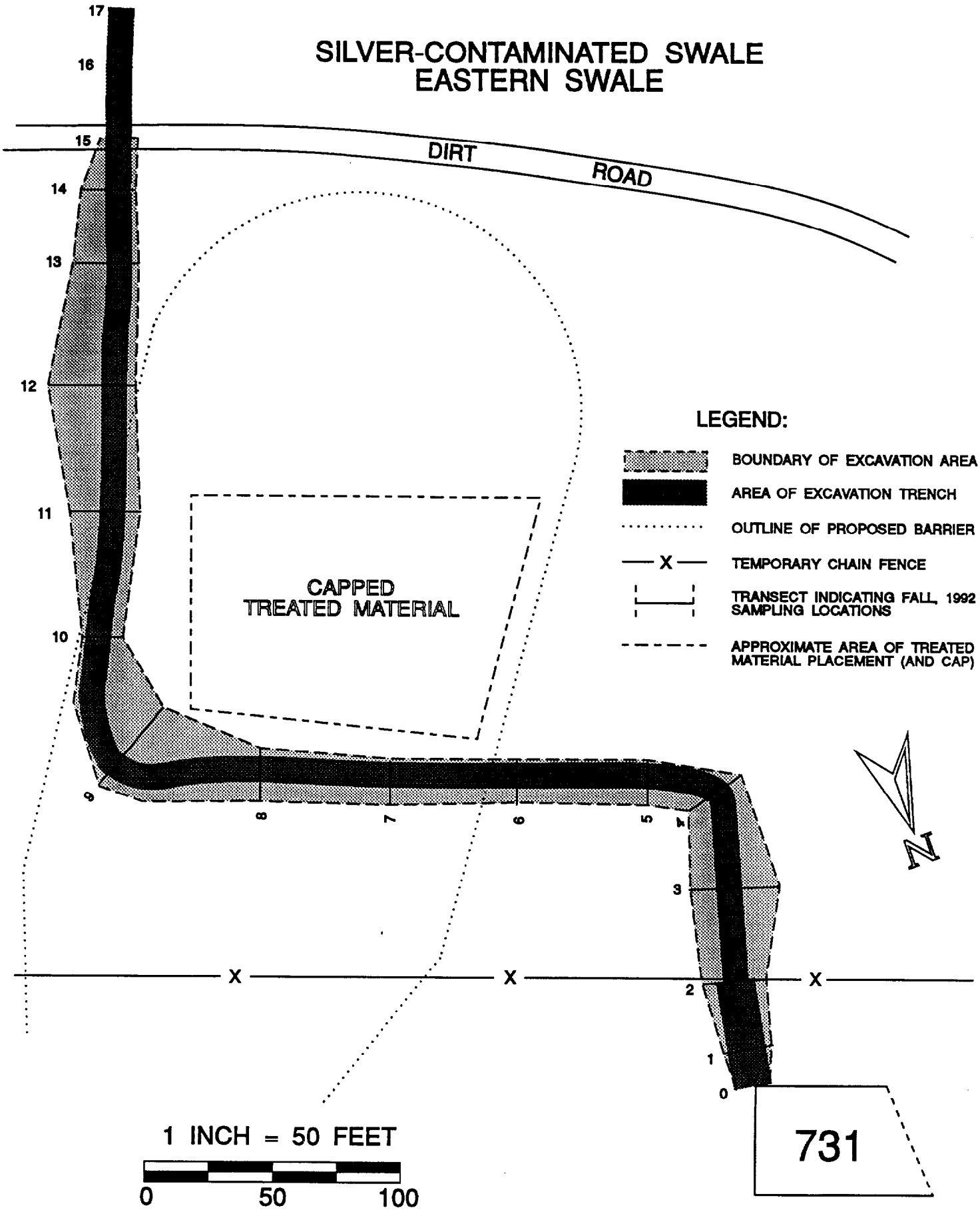
BEG = 30% K-10 by total wet wgt of waste
CHG = 20% ICC CKD by wet wgt of waste
* = Too friable to test; cylinder crumbled before load applied.

TABLE 2 NOS SEDIMENTS PLUS POZZOLANIC BINDER

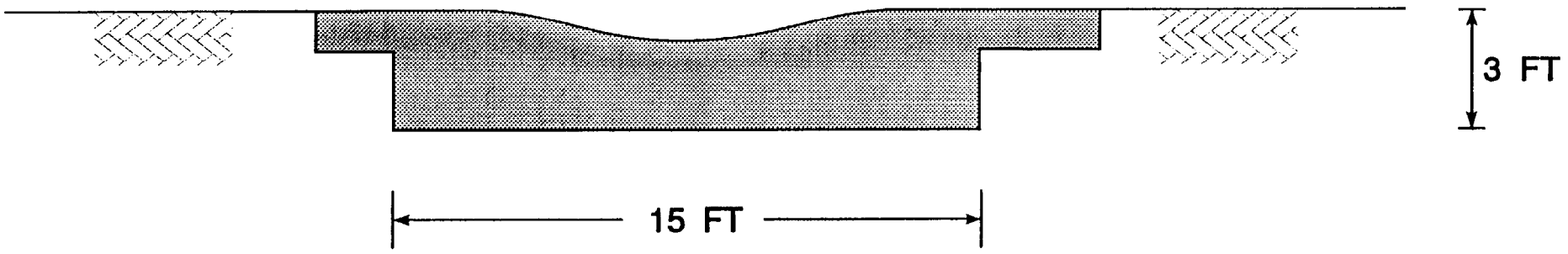
Sample ID	Mix Code	Delay of Compaction (days)	Additional Cure (days)	Moisture, % as produced	Dry Density, pcf (condition)	UCS, psi (condition)
SP-1	BEG	0	7	18.6	109 (Moist)	323 (Good)
	BEG	3	7	19.0	97 (Sl Dry)	96 (Dry)
	BEG	5	7	19.0	92 (Dry)	96 (Dry)
SP-6	BEG	0	7	17.5	113 (Moist)	215 (Good)
	BEG	3	7	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 F: EXCAVATED SOIL VOLUME ESTIMATES


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

EXAMPLE TRANSECT CROSS-SECTION
(TRANSECT 1)



CONTAMINATED SOILS (EXCAVATION ZONE)

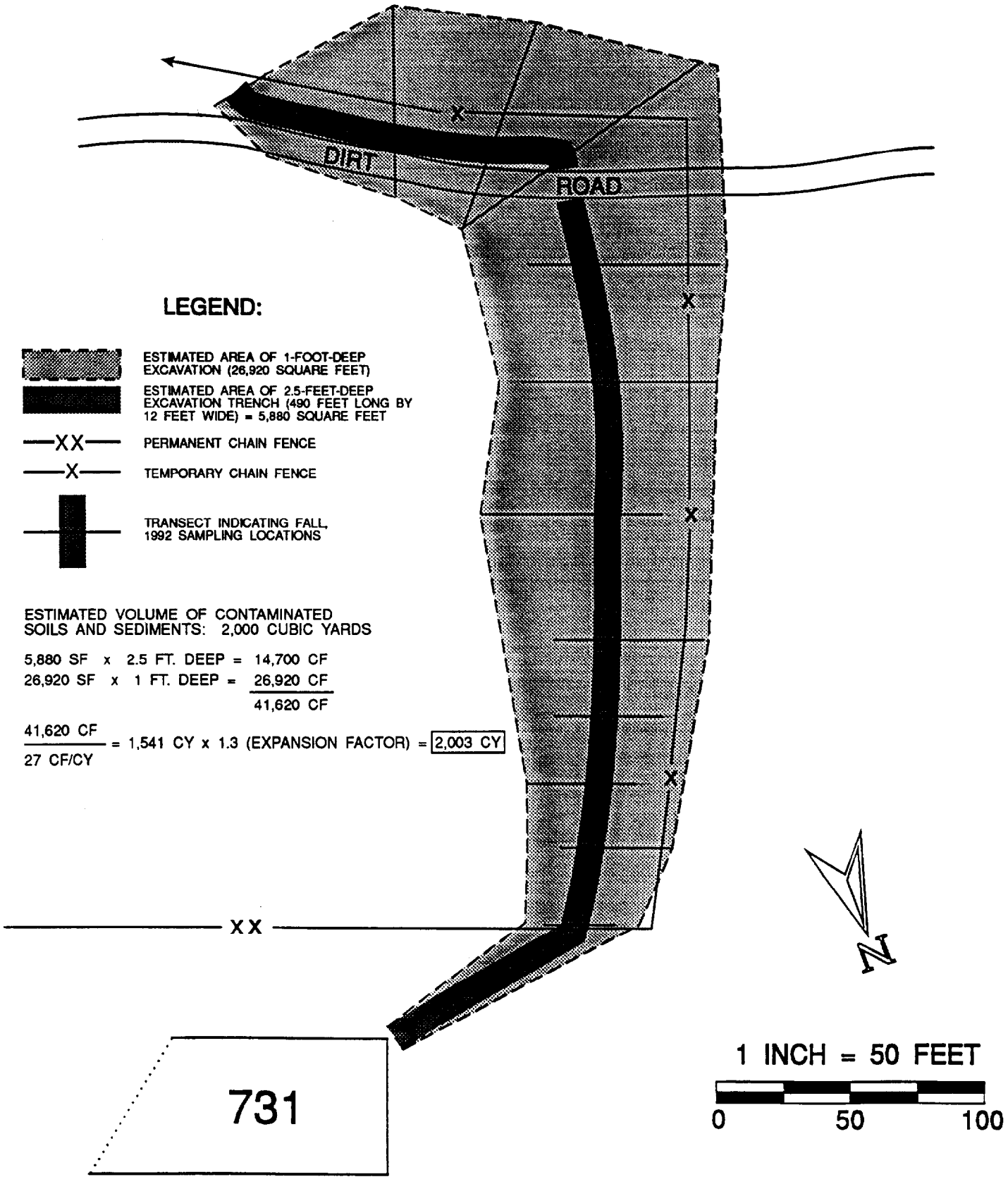
CLEAN SURROUNDING SOILS

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



LEGEND:

- ESTIMATED AREA OF 1-FOOT-DEEP EXCAVATION (26,920 SQUARE FEET)
- ESTIMATED AREA OF 2.5-FEET-DEEP EXCAVATION TRENCH (490 FEET LONG BY 12 FEET WIDE) = 5,880 SQUARE FEET
- —XX— PERMANENT CHAIN FENCE
- —X— TEMPORARY CHAIN FENCE
- TRANSECT INDICATING FALL, 1992 SAMPLING LOCATIONS

ESTIMATED VOLUME OF CONTAMINATED SOILS AND SEDIMENTS: 2,000 CUBIC YARDS

5,880 SF x 2.5 FT. DEEP = 14,700 CF
26,920 SF x 1 FT. DEEP = 26,920 CF
41,620 CF

$\frac{41,620 \text{ CF}}{27 \text{ CF/CY}}$ = 1,541 CY x 1.3 (EXPANSION FACTOR) = 2,003 CY

APPENDIX G: 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 this case, the *X*'s stand for place holders; therefore, *XX0* means at ground surface, *XX5* would mean five feet below ground surface, etc. 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*. 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). If a particular sample showed a level of silver higher than the target level, the next sample along that transect would generally be acquired five feet further laterally from the center of the swale than the previous hot sample. 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. (In at least one case, a sample was labeled *2Z*, meaning 20 feet from the center of the swale. The need for samples from a 20-foot lateral distance from the swale's center was not expected before analytical work began.) An *F* in this space denotes that the sample was acquired from a point adjacent to the fence along the western stream; a *2F* denotes that the sample was acquired five feet laterally from the fence, away from the center of the swale. Finally, the last character, *F* for the example above and for every sample acquired, means that the sample was analyzed in the field.

The above description of the code is valid for the samples acquired before excavation began. 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: the one from the left-most edge of the excavation was assigned *XA* instead of *XL*, as described above. The one from the midpoint of the swale was assigned *XB* (instead of *XM*), and the one from the right-most edge of the excavation was assigned *XC* (instead of *XR*). For example, a confirmatory soil sample acquired from the east swale, 375 feet downstream of Building 731, on the right-hand side of the excavation, at land surface, would be coded: *01SSXX0375XCXF*.

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	

Table of Confirmatory Target Level Sampling Study Data

ISIS CODE	Date Collected	Date Analyzed	Collected By	Analyzed By	Concentration of Ag	Remarks
01SSXX0X10XAXF	12/4/92	12/8/92	DVB	SLD	8.0	
01SSXX2X10XBXF	12/4/92	12/8/92	DVB	SLD	2.0	
01SSXX0X10XCXF	12/4/92	12/8/92	DVB	SLD	<2.0	
01SSXX0X25XAXF	12/7/92	12/8/92	SLD	SLD	2.0	R=2.0
01SSXX2X25XBXF	12/7/92	12/8/92	SLD	SLD	6.0	
01SSXX0X25XCXF	12/7/92	12/8/92	SLD	SLD	2.0	
01SSXX0X57XAXF	12/7/92	12/8/92	SLD	SLD	2.0	
01SSXX2X57XBXF	12/7/92	12/8/92	SLD	SLD	2.0	
01SSXX0X57XCXF	12/7/92	12/8/92	SLD	SLD	2.0	
01SSXX0X75XAXF	12/7/92	12/8/92	DVB	SLD	2.0	
01SSXX2X75XBXF	12/7/92	12/8/92	DVB	SLD	<2.0	
01SSXX0X75XCXF	12/7/92	12/8/92	DVB	SLD	2.0	
01SSXX0100XAXF	12/8/92	12/9/92	SLD	SLD	2.0	
01SSXX1100XBXF	12/8/92	12/9/92	SLD	SLD	2.0	
01SSXX0100XCXF	12/8/92	12/9/92	SLD	SLD	2.0	
01SSXX0150XAXF	12/8/92	12/9/92	SLD	SLD	<2.0	
01SSXX1150XBXF	12/8/92	12/9/92	SLD	SLD	2.0	
01SSXX0150XCXF	12/8/92	12/9/92	SLD	SLD	2.0	
01SSXX0200XAXF	12/8/92	12/9/92	SLD	SLD	<2.0	
01SSXX1200XBXF	12/8/92	12/9/92	SLD	SLD	2.0	
01SSXX0200XCXF	12/8/92	12/9/92	SLD	SLD	2.0	
01SSXX0250XAXF	12/8/92	12/9/92	SLD	SLD	2.0	R=2.0
01SSXX1250XBXF	12/8/92	12/9/92	SLD	SLD	2.0	
01SSXX0250XCXF	12/8/92	12/9/92	SLD	SLD	2.0	
01SSXX0300XAXF	12/9/92	12/10/92	SLD	SLD	2.0	
01SSXX1300XBXF	12/9/92	12/10/92	SLD	SLD	<2.0	

(Confirmatory Target Level Sampling Data – Continued)

ISIS CODE	Date Collected	Date Analyzed	Collected By	Analyzed By	Concentration of Ag	Remarks
01SSXX0300XCXF	12/9/92	12/10/92	SLD	SLD	<2.0	R=<2
01SSXX0350XAXF	12/9/92	12/10/92	SLD	SLD	6.0	
01SSXX1350XBXF	12/9/92	12/10/92	SLD	SLD	2.0	
01SSXX0350XCXF	12/9/92	12/10/92	SLD	SLD	6.0	
01SSXX0400XAXF	12/10/92	12/11/92	DVB	SLD	8.0	
01SSXX1400XBXF	12/10/92	12/11/92	DVB	SLD	4.0	
01SSXX0400XCXF	12/10/92	12/11/92	DVB	SLD	2.0	
01SSXX0450XAXF	1/7/93	1/8/93	SLD	SLD	6.0	
01SSXX1450XBXF	1/7/93	1/8/93	SLD	SLD	48	R=54
01SSXX0450XCXF	1/7/93	1/8/93	SLD	SLD	22	
01SSXX0500XAXF	1/7/93	1/8/93	SLD	SLD	2.0	
01SSXX0500XBXF	1/7/93	1/8/93	SLD	SLD	76	R=68
01SSXX0500XCXF	1/7/93	1/8/93	SLD	SLD	<2.0	
01SSXX0540XAXF	1/7/93	1/8/93	SLD	SLD	<2.0	
01SSXX0540XBXF	1/7/93	1/8/93	SLD	SLD	30	
01SSXX0540XCXF	1/7/93	1/8/93	SLD	SLD	2.0	
01SSXX0450XAYF	1/11/93	1/12/93	DVB/SLD	SLD	2.0	
01SSXX1450XBYF	1/11/93	1/12/93	DVB/SLD	SLD	44	R=44
01SSXX0450XCYF	1/11/93	1/12/93	DVB/SLD	SLD	10	
01SSXX0500XAYF	1/11/93	1/12/93	DVB/SLD	SLD	2.0	
01SSXX1500XBYF	1/11/93	1/12/93	DVB/SLD	SLD	2.0	
01SSXX0500XCYF	1/11/93	1/12/93	DVB/SLD	SLD	2.0	
01SSXX0540XAYF	1/11/93	1/12/93	DVB/SLD	SLD	<2.0	R=2.0
01SSXX1540XBYF	1/11/93	1/12/93	DVB/SLD	SLD	2.0	
01SSXX0540XCYF	1/11/93	1/12/93	DVB/SLD	SLD	2.0	
01SSXX0579XAXF	1/11/93	1/12/93	DVB/SLD	SLD	2.0	
01SSXX1579XBXF	1/11/93	1/12/93	DVB/SLD	SLD	4.0	

(Confirmatory Target Level Sampling Data – Continued)

ISIS CODE	Date Collected	Date Analyzed	Collected By	Analyzed By	Concentration of Ag	Remarks
01SSXX0579XCXF	1/11/93	1/12/93	DVB/SLD	SLD	<2.0	
01SSXX0629XAXF	1/11/93	1/12/93	DVB/SLD	SLD	6.0	
01SSXX1629XBXF	1/11/93	1/12/93	DVB/SLD	SLD	<2.0	
01SSXX0629XCXF	1/11/93	1/12/93	DVB/SLD	SLD	2.0	
01SSXX0450XBZF	1/13/93	1/13/93	DVB/SLD	SLD	8.0	R=12
Matrix Spike Analysis:						
01SSXX0X10XAXF	12/22/92	12/23/93	SLD	SLD	48	
01SSXX0X25XAXF	12/22/92	12/23/93	SLD	SLD	48	
01SSXX0X57XAXF	12/22/92	12/23/93	SLD	SLD	51	
01SSXX0X75XAXF	12/22/92	12/23/93	SLD	SLD	49	
01SSXX0100XAXF	12/22/92	12/23/93	SLD	SLD	49	
01SSXX0150XAXF	12/22/92	12/23/93	SLD	SLD	48	
01SSXX0200XAXF	12/22/92	12/23/93	SLD	SLD	49	
01SSXX0250XAXF	12/22/92	12/23/93	SLD	SLD	50	
01SSXX0300XAXF	12/22/92	12/23/93	SLD	SLD	48	
01SSXX1350XBXF	12/22/92	12/23/93	SLD	SLD	48	

Quality Control Data
TCLP and Total Silver Analyses

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

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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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

COAST - TO - COAST ANALYTICAL SERVICES

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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: 202/797-6[illegible]0
FAX: 202/797-6[illegible]1
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.[illegible]
This is NOT an Invoice

JBB/LJO
12-16

Please contact CCAS promptly if you have any questions.

YP 21692

COAST - TO - COAST ANALYTICAL SERVICES

141 Suburban Road	San Luis Obispo, CA 93401	543-2553	FAX (805) 543-2685
751 S. Kellogg, Suite A	Goleta, CA 93117	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

Page 1 of 1

• 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: NDS 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	12/16/92 7:05 PM	[illegible]	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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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

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

Sample No. : WA-51011-1
Report Date: 12/21/92
PO No. : SE207668
Project : 7800-00

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
02SSXX0300XRFF	Soil	D. VON BUSHBERGER	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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Fax (207) 775-4029

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

Sample No. : WA-51011-1
Report Date: 12/21/92
PO No. : SE207668
Project : 7800-00

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
02SSXX0300XRFF	Soil	D. VON BUSHBERGER	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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CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

Sample No. : WA-51011-2
Report Date: 12/21/92
PO No. : SE207668
Project : 7800-00

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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CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

Sample No. : WA-51011-3
Report Date: 12/21/92
PO No. : SE207668
Project : 7800-00

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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CLIENT: FRANKO GODOY
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Sample No. : WA-51011-3
Report Date: 12/21/92
PO No. : SE207668
Project : 7800-00

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
01SSXX2X25XBXF	Soil	D. VON BUSHBERGER	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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CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

Sample No. : WA-51011-4
Report Date: 12/21/92
PO No. : SE207668
Project : 7800-00

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
01SSXXOX57XCXF	Soil	D. VON BUSHBERGER	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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CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

Sample No. : WA-51011-4
Report Date: 12/21/92
PO No. : SE207668
Project : 7800-00

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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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 BUSHBERGER	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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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 BUSHBERGER	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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Fax (207) 775-4029

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

Sample No. : WA-51011-6
Report Date: 12/21/92
PO No. : SE207668
Project : 7800-00

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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Fax (207) 775-4029

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

Sample No. : WA-51011-6
Report Date: 12/21/92
PO No. : SE207668
Project : 7800-00

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
01SSXX0X25XLYF	Soil	D. VON BUSHBERGER	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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CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

Sample No. : WA-51011-7
Report Date: 12/21/92
PO No. : SE207668
Project : 7800-00

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
02SSXX0275XLXF	Soil	D. VON BUSHBERGER	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

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

Sample No. : WA-51011-7
Report Date: 12/21/92
PO No. : SE207668
Project : 7800-00

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
02SSXX0275XLXF	Soil	D. VON BUSHBERGER	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

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-51011-8
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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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
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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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
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

(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-51011-10
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 BUSHBERGER	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: 202/797-6[illegible]0
FAX: 202/797-6[illegible]1
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

	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
2	WA51011-2	01SSXX0X10XAXF	04 DEC 1630	15 DEC	[illegible]O
	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.[illegible]
This is NOT an Inv[illegible]ce

LJO
12-16

Please contact CCAS promptly if you have any questions.

[illegible]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 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.

* 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	M. Bartel	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

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-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		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 #
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 7:00 PM	Jon Bartt	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: _____
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.

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	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

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.

Continued From Page

AL16-L MV 12/16/92

Sample Number	Dig Type	Init Vol (ml) ~~MV 12/16/92~~	Final Vol (ml)	Client
PBW	HCl	100	100	
SD				
50001-1				[redacted]
-1 TCLP SPK				↓
50008-1				[redacted]
-1 TCLP SPK				
-2				
-2 TCLP SPK				
TCLP BLANK-FL#1				
TCLP BLANK-FL#2				
TCLP BLANK-FL# (12/15/92)				
WA51006-1				WABB-DC
-1 TCLP SPK				↓
WA50016-1		100	100	[redacted]
-2				
-3				
-4				
-5				
-6				
-7				
-8				
-9		50	50	
WA50015 -~~2~~3 DUP MV 12/16/92		100	100	
WA50015 -~~2~~3 SPK				
WA50017 -1		50	50	
-2				
-3				
-4				
WA50015-1 DIS		100	100	[redacted]
-2				
-3				
-4				
-5				

Continued on Page 28

Read and Understood By

Signed	Date	Signed	Date
Michael D Vaden	12/16/92	D. Nadeau	12/21/92

PROJECT ALIG - LBWMP

Notebook No. _____

Continued From Page 27

SAMPLE NUMBER	Dig Type	Init Vol (mL)	Final Vol (mL)	Client
PBLO	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				
-2				
-3				
-4				
-5				
-6 TOT				[redacted]
WA50015-6 TOT	HNO3	100	100	
-6 TOT DUP				
-6 TOT SPK				
15-4 TOT				
15-5 TOT				
SEE Page 26 for Spikes & Recoveries				

Continued on Page

Spiking Witnessed AB 12/16/92

Read and Understood By

Michael D. Vel — Signed — 12/16/92 Date

D. Nadeau — Signed — 12/21/92 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		000009
MATRIX	Clay	↓		

TOTAL SOLIDS DETERMINATION (ALL WEIGHTS IN GRAMS)

A) Weight of Empty Filtrate Vessel		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)				

NA – 100% Solids

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

000023

L16-L

L10-L

L16-L

ABB-DC

[redacted]

PBW LCS IV	Zn Ca Ni, Fe, Mn Cr, Be Cu, Ag, Mg, Na
TCLP BL1 12/4	Cd, Cr, V, Ag, Ba
TCLP BL2 12/15	Ag
WA51006-1TCLP-1SPK	Ag
WA50001-1 TCLP-1SPK	Cd, Cr, Ag
WA50008-1-2TCLP-1SPKS	Cd, Cr, Ag, V
WA50011-1-3	Zn, Ni, Cr, Be, Cu, Ag
WA50012-1-3	Zn, Ni, Mn, Cr, Cu
WA50016-1-4, 6-8	Fe, Mn, Ca, Mg, Na
WA50015-1d1S-3d4S-5dis	Zn, Ni, Fe, Mn, Cr, Be, Cu, Ag, Mg, Ca
WA50015-6d4S tot	↓
WA50015-4-5tot	Ca, Mg

12/16/92 10:59

cal std	rep	1	Zn213.8	em	9958.4	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	16272.5	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	16121.6	conc 2.5000	
	rep	2	Ag328.1	em	14931.8	conc 2.5000	
	rep	2	Ba455.4	em	107690.6	conc 20.0000	
	rep	2	Mg279.6	em	117964.1	conc 50.0000	
	rep	2	Ca393.4	em	194364.8	conc 50.0000	
	rep	2	Na589.6	em	27638.3	conc 50.0000	
	rep	3	Zn213.8	em	10669.0	conc 5.0000	
	rep	3	Cd214.4	em	16631.6	conc 5.0000	
	rep	3	Ni231.6	em	6365.0	conc 5.0000	
	rep	3	Fe238.2	em	35985.6	conc 10.0000	
	rep	3	Mn257.6	em	132603.7	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	15038.2	conc 2.5000	
	rep	3	Ba455.4	em	110869.2	conc 20.0000	
	rep	3	Mg279.6	em	116680.9	conc 50.0000	
	rep	3	Ca393.4	em	197942.5	conc 50.0000	

CWD
12-21-92.

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Zn213.8	av	10373.93	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	289.630	%cv	4.79	conc	5.0000
Fe238.2	av	35469.25	sd	556.999	%cv	1.55	conc	10.0000
Mn257.6	av	129559.47	sd	2610.448	%cv	2.01	conc	5.0000
Cr267.7	av	15229.25	sd	413.124	%cv	2.73	conc	2.5000
V292.4	av	31318.35	sd	480.234	%cv	1.53	conc	5.0000
Be313.0	av	183977.94	sd	3067.847	%cv	3.70	conc	0.5000
Cu324.8	av	16274.53	sd	153.686	%cv	0.94	conc	2.5000
Ag328.1	av	14320.66	sd	308.455	%cv	3.05	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	195953.50	sd	1821.145	%cv	0.93	conc	50.0000
Na589.6	av	27318.46	sd	348.821	%cv	1.28	conc	50.0000

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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	8.4	window edge
	rep	3	Ni231.6	em	21.9	window edge
	rep	3	Fe238.2	em	41.4	
	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	

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Zn213.8	av	37.20	sd	9.437	%cv	25.37	
Cd214.4	av	24.77	sd	15.550	%cv	62.77	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

blank	rep	Zn213.8	em	15.1	
	rep	Cd214.4	em	31.2	window edge
	rep	Ni231.6	em	33.4	
	rep	Fe238.2	em	40.0	
	rep	Mn257.6	em	5.0	
	rep	Cr267.7	em	53.0	
	rep	V292.4	em	75.5	
	rep	Be313.0	em	144.6	
	rep	Cu324.8	em	41.8	window edge
	rep	Ag328.1	em	16.9	
	rep	Ba455.4	em	5.1	window edge
	rep	Mg279.6	em	5.9	
	rep	Ca393.4	em	24.0	
	rep	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	111.6	
	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	

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Zn213.8	av	19.42	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	11.414	%cv 16.03
Be313.0	av	130.82	sd	17.186	%cv 13.14
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]	av	[illegible]		sd	[illegible]	%cv	[illegible]
[illegible]	av	[illegible]		sd	[illegible]	%cv	[illegible]
[illegible]	av	[illegible]		sd	[illegible]	%cv	[illegible]
[illegible]	av	[illegible]		sd	[illegible]	%cv	[illegible]

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rep	1	Zn213.8	em	10543.4	conc	5.0000	
rep	1	Cd214.4	em	16144.5	conc	5.0000	
rep	1	Ni231.6	em	6194.7	conc	5.0000	
rep	1	Fe238.2	em	35061.9	conc	10.0000	
rep	1	Mn257.6	em	133621.0	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	168586.6	conc	0.5000	
rep	1	Cu324.8	em	16557.0	conc	2.5000	
rep	1	Ag328.1	em	14954.6	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	32332.9	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

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Zn213.8	av 10921.411	sd 68.75391	%cv	0.63	conc	5.0000
Cd214.4	av 16304.830	sd 151.39905	%cv	0.93	conc	5.0000
Ni231.6	av 6145.0112	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 16378.445	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 15052.970	sd 87.75549	%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 191.02071	%cv	0.17	conc	50.0000
Ca393.4	av 195906.71	sd 4746.3515	%cv	1.40	conc	50.0000
Na589.6	av 27923.392	sd 118.14777	%cv	0.42	conc	50.0000

rep	[illegible]	[illegible]	conc	[illegible]	mg/L
rep	[illegible]	[illegible]	conc	[illegible]	mg/L
rep	[illegible]	[illegible]	conc	[illegible]	mg/L
rep	Fe238.2	[illegible]	conc	[illegible]	mg/L
rep	Mn257.6	[illegible]	conc	[illegible]	mg/L
rep	Cr267.7	[illegible]	conc	[illegible]	mg/L
rep	V292.4	[illegible]	conc	[illegible]	mg/L
rep	Be313.0	[illegible]	conc	[illegible]	mg/L
rep	Cu324.8	[illegible]	conc	[illegible]	mg/L
rep	Ag328.1	[illegible]	conc	[illegible]	mg/L
rep	1 Ba455.4	conc	[illegible]	[illegible]	mg/L
rep	1 Mg279.6	conc	27.5119	mg/L	
rep	1 Ca393.4	conc	26.2876	mg/L	
rep	1 Na589.6	conc	26.0278	mg/L	
rep	2 Zn213.8	conc	2.4366	mg/L	
rep	2 Cd214.4	conc	2.5407	mg/L	
rep	2 Ni231.6	conc	2.5021	mg/L	
rep	2 Fe238.2	conc	5.1155	mg/L	
rep	2 Mn257.6	conc	2.5718	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

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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	1.2721 mg/L	sd	0.00498	%cv	0.39 102
Ba455.4	av	10.2657 mg/L	sd	0.09615	%cv	0.94 103
Mg279.6	av	26.9666 mg/L	sd	0.53155	%cv	1.97 108
Ca393.4	av	26.6360 mg/L	sd	0.35454	%cv	1.33 107
Na589.6	av	25.7379 mg/L	sd	0.25781	%cv	1.00 103

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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	V292.4	conc	-0.0038 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	0.0180 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		

ICB

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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	742.53 <
Ba455.4	av	0.0078 mg/L	sd	0.00614	%cv	78.45 Reran below contract
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

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	-0.0011 mg/L	window edge
rep	1	Ba455.4	conc	0.0012 mg/L	
rep	1	Mg279.6	conc	0.0536 mg/L	

rep	1	Ni231.6	conc	[illegible] mg/L	
rep	1	Mn257.6	conc	[illegible] mg/L	
rep	1	Cr267.7	conc	[illegible] mg/L	
rep	1	V292.4	conc	0.0382 mg/L	
rep	1	Be313.0	conc	[illegible] mg/L	
rep	1	Cu324.8	conc	-0.0032 mg/L	window edge
rep	1	Ag328.1	conc	-0.0037 mg/L	
rep	1	Ba455.4	conc	[illegible] 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	[illegible] 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	0.0314 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

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

/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	0.4711 mg/L
rep	2	Ag328.1	conc	1.0083 mg/L
rep	2	Ba455.4	conc	0.4953 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

Ni231.6	av	0.9443 mg/L	sd	0.01165	%cv	1.23	4
Mn257.6	av	0.4823 mg/L	sd	0.00688	%cv	1.43	17
Cr267.7	av	0.4866 mg/L	sd	0.01100	%cv	2.26	97
V292.4	av	0.4757 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

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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

rep	1	Zn213.8	conc	0.0318	mg/L
rep	1	Cd214.4	conc	0.0093	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	0.0137	mg/L
rep	1	V292.4	conc	0.0935	mg/L
rep	1	Be313.0	conc	0.0080	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	0.0339	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	0.0158	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

2/18/92 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 CCB 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	<

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	0.0111 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	2	Cd214.4	conc	0.0113 mg/L	
rep	3	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	-0.0005 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	0.0054 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	0.0215 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

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	2.3941	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	25.0445	mg/L
rep	1	Mn257.6	conc	2.6241	mg/L
rep	1	Cr267.7	conc	1.0056	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	1.2409	mg/L
rep	1	Ag328.1	conc	1.2318	mg/L
rep	1	Ba455.4	conc	0.3612	mg/L
rep	1	Mg279.6	conc	25.6580	mg/L
rep	1	Ca393.4	conc	25.5994	mg/L
rep	1	Na589.6	conc	24.5149	mg/L
rep	2	Zn213.8	conc	2.5397	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	5.1825	mg/L
rep	2	Mn257.6	conc	[illegible]	mg/L

rep	3	Be313.0	conc	0.2393	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	25.8451	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
12/14	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

	av	2	[illegible]	[illegible]	[illegible]	[illegible]
	rep	3	Ag328.1	conc	0.0050 mg/L	

WA51006-1T/5+5
12/18/92 12:18

Ag328.1	av	0.0008 mg/L		sd	0.00431 %cv	860 87<0.075

12/18/92 12:30

WA51006-1T/5+1	rep	1	Ag328.1	conc	0.9898 mg/L
	rep	2	Ag328.1	conc	0.9813 mg/L
	rep	3	Ag328.1	conc	0.9745 mg/L

WA51006-1T/5+1
12/18/92 12:20

Ag328.1	av	0.9835 mg/L		sd	0.00683 %cv 0.7097

12/18/92 12:22

WA51006-1T5/5	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

WA51006-1T5/5
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

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	105
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	101
Fe238.2	av	[illegible] mg/L	[illegible]	[illegible]	[illegible]	102
Mn257.6	av	0.0018 mg/L	[illegible]	[illegible]	[illegible]	100
Cr267.7	av	[illegible] mg/L	[illegible]	[illegible]	[illegible]	104
V292.4	av	[illegible] mg/L	[illegible]	[illegible]	[illegible]	99
Be313.0	av	[illegible] mg/L	[illegible]	[illegible]	[illegible]	93
Cu324.8	av	[illegible] mg/L	[illegible]	[illegible]	[illegible]	96
Ag328.1	av	[illegible] mg/L	[illegible]	[illegible]	[illegible]	96
Ba455.4	av	[illegible] mg/L	[illegible]	[illegible]	[illegible]	94
Mg279.6	av	23.4210 mg/L	[illegible]	[illegible]	[illegible]	102
Ca393.4	av	33.5105 mg/L	[illegible]	[illegible]	[illegible]	102
Na589.6	av	24.5317 mg/L	[illegible]	[illegible]	[illegible]	98

2/18/92 12:30

ICS	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	0.0066 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	-0.0001 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

2/18/92 12:34

Zn213.8	av	0.0044 mg/L	sd	0.00638	%cv 145.12 <
Cd214.4	av	0.0051 mg/L	sd	0.00236	%cv 46.30 <
Ni231.6	av	-0.0018 mg/L	sd	0.01403	%cv 765.55 <
Fe238.2	av	0.0017 mg/L	sd	0.00525	%cv 309.86 <

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	av	-0.0008 mg/L		sd	0.00451	%cv	2935 [illegible]
[illegible]	av	0.0001 mg/L		sd	[illegible]	%cv	[illegible]
[illegible]	av	0.0024 mg/L		sd	0.00372	%cv	153 [illegible]
Ag323.1	av	-0.0004 mg/L		sd	0.00222	%cv	595 48<
Ba455.4	av	0.0077 mg/L		sd	0.00306	%cv	39.50 Out - Rerun da above + below
Mg279.6	av	0.0217 mg/L		sd	0.01029	%cv	47.33 [illegible]
Ca393.4	av	0.0489 mg/L		sd	0.02435	%cv	50.1 Out - Rerun above + below
Na589.0	av	0.0707 mg/L		sd	0.06305	%cv	87.8 See above

[illegible] 8/92 12:37

L16 TCLP BL2	rep	1	Cd214.4	conc	-0.0003	mg/L
	rep	1	Cr267.7	conc	-0.0026	mg/L
12/15	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 window edge
	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

WA50001-1T/5+0
12/18/92 12:42

Cd214.4	av	0.0010 mg/L	sd	0.00432	%cv	429.91 < 0.002
Cr267.7	av	0.0002 mg/L	sd	0.00109	%cv	550.83 < 0.075
Ag328.1	av	0.0034 mg/L	sd	0.00859	%cv	252.89 < 0.075
Ba455.4	av	0.0365 mg/L	sd	0.00071	%cv	1.93 Rerun

12/18/92 12:44

WA50001-1T/5+1	rep	1	Cd214.4	conc	1.0865	mg/L
	rep	1	Cr267.7	conc	0.9986	mg/L
	rep	1	Ag328.1	conc	0.9383	mg/L
	rep	1	Ba455.4	conc	0.9535	mg/L
	rep	2	Cd214.4	conc	1.0958	mg/L
	rep	2	Cr267.7	conc	1.0153	mg/L
	rep	2	Ag328.1	conc	0.9570	mg/L
	rep	2	Ba455.4	conc	0.9328	mg/L
	rep	3	Cd214.4	conc	1.1030	mg/L
	rep	3	Cr267.7	conc	0.9984	mg/L

[illegible]

[illegible]

[illegible]	av	[illegible] mg/L	sd	[illegible]	%cv	[illegible]
[illegible]	av	[illegible] mg/L	sd	[illegible]	%cv	[illegible]
Ag328.1	av	0.9326 mg/L	sd	0.01794	%cv	[illegible]
[illegible]	av	0.9333 mg/L	sd	[illegible]	%cv	[illegible] Rerun

[illegible] 12:47

[illegible]	rep	[illegible]	Cd214.4	conc	[illegible] mg/L
	rep	1	Cr267.7	conc	[illegible] mg/L
	rep	1	Ag328.1	conc	0.4570 mg/L
	rep	1	Ba455.4	conc	[illegible] mg/L
	rep	2	Cd214.4	conc	0.2202 mg/L
	rep	2	Cr267.7	conc	[illegible] mg/L
	rep	2	Ag328.1	conc	0.4271 mg/L
	rep	2	Ba455.4	conc	[illegible] 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

WA50001-1T6/5
12/18/92 12:49

Cd214.4	av	0.2156 mg/L	sd	0.00730	%cv	3.39 × 5 = 1.08
Cr267.7	av	0.9190 mg/L	sd	0.01102	%cv	1.20 × 5 = 4.60
Ag328.1	av	0.4446 mg/L	sd	0.01556	%cv	3.50 × 5 = 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	845.35 <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	0.00155	%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	4.38 Rerun

12/18/92 12:54

WA50008-1T/5+1	rep	1	Cd214.4	conc	0.9843 mg/L
	rep	1	Cr267.7	conc	0.9218 mg/L
	rep	1	V292.4	conc	0.8557 mg/L
	rep	1	Ag328.1	conc	0.8840 mg/L
	rep	1	Ba455.4	conc	1.0677 mg/L
	rep	2	Cd214.4	conc	1.0308 mg/L
	rep	2	Cr267.7	conc	0.9431 mg/L
	rep	2	V292.4	conc	0.9145 mg/L
	rep	2	Ag328.1	conc	0.8718 mg/L
	rep	2	Ba455.4	conc	1.0149 mg/L
	rep	3	Cd214.4	conc	1.0371 mg/L
	rep	3	Cr267.7	conc	0.9526 mg/L
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] mg/L

	rep	3	Ag328.1	conc	[illegible]	mg/L		
	rep	3	Ba455.4	conc	[illegible]	mg/L		

WA50008-1T/5+1
12/18/92 13:53

Cd214.4	av	0.0174 mg/L	sd	0.00585	%cv	2.34	102
Cr267.7	av	0.9392 mg/L	sd	0.01574	%cv	1.68	94
V292.4	av	0.8655 mg/L	sd	0.02941	%cv	3.32	89
Ag328.1	av	0.8505 mg/L	sd	0.00805	%cv	0.95	88
Ba455.4	av	1.0463 mg/L	sd	0.02779	%cv	2.66	Rerun

12/18/92 13:56

WA50008-1TS/5	rep	1	Cd214.4	conc	0.1988 mg/L	
	rep	1	Cr267.7	conc	0.8906 mg/L	
	rep	1	V292.4	conc	-0.0088 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	winnow edge
	rep	2	Ag328.1	conc	0.5017 mg/L	
	rep	2	Ba455.4	conc	1.4589 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 ~ 253
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	0.00238	%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	0.9392 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	1.0625 mg/L

rep	3	[illegible]	conc	[illegible]	mg/L	
rep	3	Be313.0	conc	[illegible]	mg/L	
rep	3	Cu324.8	conc	[illegible]	mg/L	
rep	3	Ag328.1	conc	[illegible]	mg/L	
rep	3	Ba455.4	conc	[illegible]	mg/L	

[illegible]
[illegible]

Cd214.4	av	[illegible]	mg/L	sd	[illegible]	%cv	[illegible] 73.07
Cr267.7	av	[illegible]	mg/L	sd	[illegible]	%cv	[illegible] 0.8394
V292.4	av	[illegible]	mg/L	sd	[illegible]	%cv	[illegible] 0.8093
Ag328.1	av	[illegible]	mg/L	sd	[illegible]	%cv	[illegible] 3.487
Ba455.4	av	[illegible]	mg/L	sd	[illegible]	%cv	[illegible] 3.72 Rerun

12/18/92 13:09

W450006-2TS/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	0.8843 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

150008-2TS/5
12/18/92 13:11

Cd214.4	av	0.1967 mg/L	sd	0.00536	%cv	2.73 × 5 = 0.984
Cr267.7	av	0.8829 mg/L	sd	0.02266	%cv	2.57 × 5 = 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 × 5 = 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	2.3336 mg/L
	rep	1	Be313.0	conc	0.2233 mg/L
	rep	1	Cu324.8	conc	1.1125 mg/L
	rep	1	Ag328.1	conc	1.1176 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	2.3636 mg/L
	rep	2	Cd214.4	conc	2.7186 mg/L
	rep	2	Ni231.6	conc	2.4314 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	2.3711 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	1.1382 mg/L

rep	3	Mg [illegible]	conc	[illegible]	mg/L
rep	3	Ca393.4	conc	22.[illegible]37	mg/L
rep	3	Na589.6	conc	22.0530	mg/L
rep	3	Zn213.8	conc	2.4649	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	1.0103	mg/L
rep	3	V292.4	conc	2.3399	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

Rerun 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	0.0526	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	-0.0069	mg/L
rep	3	Cd214.4	conc	-0.0019	mg/L

rep	3	[illegible]	conc	[illegible]	mg/L	
rep	3	[illegible]	conc	[illegible]	mg/L	
rep	3	V292.4	conc	-0.0014	mg/L	
rep	3	Be313.0	conc	0.0011	mg/L	
rep	3	Cu324.8	conc	-0.0003	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	0.0078	mg/L	
rep	3	Ca393.4	conc	0.0285	mg/L	
rep	3	Na589.6	conc	0.1849	mg/L	

CCB
12/18/92 13:33

Zn213.8	av	0.0012	mg/L	sd	0.00735	%cv	609.75 <
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-carry over
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 - carry over
Na589.6	av	0.0975	mg/L	sd	0.02746	%cv	28.15 Rerun - carry over

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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
	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

window edge

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 <

WA50011-1	av	1	Zn213.8	conc	0.0771 mg/L	
	rep	1	Cd214.4	conc	0.0049 mg/L	
	rep	1	Ni231.6	conc	0.0118 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	0.0063 mg/L	
	rep	2	Zn213.8	conc	0.0748 mg/L	
	rep	2	Cd214.4	conc	0.0008 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	0.0005 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	0.0135 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

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	368.47	Rerun
Ni231.6	av	-0.0028 mg/L	sd	0.00665	%cv	233.58	<
Cr267.7	av	0.0102 mg/L	sd	0.00257	%cv	25.27	<
Be313.0	av	0.0002 mg/L	sd	0.00019	%cv	102.36	<
Cu324.8	av	0.0007 mg/L	sd	0.00060	%cv	80.96	<
Ag328.1	av	0.0016 mg/L	sd	0.00176	%cv	107.59	<

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rep	[illegible]	[illegible]	[illegible]	[illegible]	
rep	[illegible]	Cr267.7	conc	[illegible]	mg/L
rep	[illegible]	Be313.0	conc	[illegible]	mg/L
rep	[illegible]	Cu324.8	conc	[illegible]	mg/L
rep	1	Ag328.1	conc	-0.0020	mg/L
rep	1	Zn213.8	conc	[illegible]	mg/L
rep	1	Cd214.4	conc	-0.0007	mg/L
rep	1	Ni231.6	conc	[illegible]	mg/L
rep	1	Cr267.7	conc	[illegible]	mg/L
rep	1	Be313.0	conc	[illegible]	mg/L
rep	1	Cu324.8	conc	0.0131	mg/L
rep	1	Ag328.1	conc	0.0077	mg/L
rep	2	Zn213.8	conc	0.0946	mg/L
rep	2	Cd214.4	conc	0.0042	mg/L
rep	2	Ni231.6	conc	0.0046	mg/L
rep	2	Cr267.7	conc	0.0159	mg/L
rep	2	Be313.0	conc	0.0005	mg/L
rep	2	Cu324.8	conc	0.0237	mg/L
rep	2	Ag328.1	conc	0.0004	mg/L

WA50011-3
12/16/92 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	17.55<
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	1082.8<
Mn257.6	av	0.0080 mg/L	sd	0.00058	%cv	7.33<
Cr267.7	av	-0.0005 mg/L	sd	0.00412	%cv	827.34<
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
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]	rep	1	Mn257.6	conc	[illegible] mg/L
[illegible]	rep	1	Cr267.7	conc	[illegible] mg/L
[illegible]	rep	2	Cu324.8	conc	[illegible] mg/L

[illegible]
[illegible] 12:55

Zn213.8	av	0.0408 mg/L	sd	[illegible]	%cv	[illegible]
Ni231.6	av	0.0012 mg/L	sd	[illegible]	%cv	[illegible] <
Mn257.6	av	0.0234 mg/L	sd	[illegible]	%cv	[illegible]
Cr267.7	av	0.0050 mg/L	sd	[illegible]	%cv	[illegible] <
Cu324.8	av	0.0044 mg/L	sd	[illegible]	%cv	[illegible] <

[illegible]/[illegible] [illegible]

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	51.9711 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

rep	1	[illegible]	conc	[illegible]	mg/L
rep	1	Mn257.6	conc	[illegible]	mg/L
rep	1	Mg279.6	conc	[illegible]	mg/L
rep	1	Na589.6	conc	[illegible]	mg/L
rep	2	Fe238.2	conc	[illegible]	mg/L
rep	2	Mn257.6	conc	[illegible]	mg/L
rep	2	Mg279.6	conc	[illegible]	mg/L
rep	2	Ca393.4	conc	[illegible]	mg/L
rep	2	Na589.6	conc	[illegible]	mg/L

[illegible]
[illegible] 14:06

Fe238.2	av	0.0140 mg/L	sd	0.00227	%cv	[illegible]
Mn257.6	av	0.0393 mg/L	sd	0.00054	%cv	1.38
Mg279.6	av	8.4933 mg/L	sd	0.18004	%cv	1.39
Ca393.4	av	42.1511 mg/L	sd	0.50127	%cv	1.19
Na589.6	av	7.7370 mg/L	sd	0.08989	%cv	1.16

12/18/92 14:05

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	3.1822 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	3.1690 mg/L
	rep	3	Ca393.4	conc	11.9760 mg/L
	rep	3	Na589.6	conc	42.1674 mg/L

.50016-4
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	3.1967 mg/L	sd	0.03719	%cv 1.16
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

av	[illegible]	conc	[illegible]	mg/L	
rep	Co214.4	conc	[illegible]	mg/L	
rep	[illegible]	conc	[illegible]	mg/L	
rep	Fe238.2	conc	[illegible]	mg/L	
rep	Mn257.6	conc	2.5966	mg/L	
rep	Cr267.7	conc	[illegible]	mg/L	
rep	V292.4	conc	2.4640	mg/L	
rep	Be313.0	conc	[illegible]	mg/L	
rep	Cu324.8	conc	[illegible]	mg/L	
rep	Ag328.1	conc	1.1645	mg/L	
rep	Ba455.4	conc	9.1828	mg/L	
rep	Mg279.6	conc	24.8871	mg/L	
rep	Ca393.4	conc	24.4641	mg/L	
rep	Na589.6	conc	23.7450	mg/L	
rep 2	Zn213.8	conc	2.5261	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	

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	out
Ni231.6	av	2.6435 mg/L	sd	0.09546	%cv	3.61	106
Fe238.2	av	5.2123 mg/L	sd	0.08395	%cv	1.61	104
Mn257.6	av	2.5677 mg/L	sd	0.02664	%cv	1.04	103
Cr267.7	av	1.0525 mg/L	sd	0.01418	%cv	1.35	105
V292.4	av	2.4564 mg/L	sd	0.04338	%cv	1.77	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	0.75	94
Ag328.1	av	1.1885 mg/L	sd	0.00882	%cv	0.74	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	1.11	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 Cd above below

12/18/92 14:22

CCB	rep 1	Zn213.8	conc	0.0071	mg/L
	rep 1	Cd214.4	conc	-0.0053	mg/L
	rep 1	Ni231.6	conc	0.0009	mg/L
	rep 1	Fe238.2	conc	0.0042	mg/L
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

rep	1	Fe238.2	conc	[illegible]	mg/L
rep	1	Cu324.8	conc	[illegible]	mg/L
rep	1	Ag328.1	conc	[illegible]	mg/L
rep	1	Be455.4	conc	[illegible]	mg/L
rep	1	Mg279.6	conc	[illegible]	mg/L
rep	1	Ca393.4	conc	[illegible]	mg/L
rep	1	Na589.6	conc	[illegible]	mg/L - carry over
rep	2	Zn213.8	conc	[illegible]	mg/L
rep	2	Cd214.4	conc	[illegible]	mg/L window edge
rep	2	Ni231.6	conc	[illegible]	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 < O.K. window edge

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 < Rerun Cd below
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	3629.1 <
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

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	11.1653 mg/L
	rep	2	Fe238.2	conc	0.0119 mg/L
	rep	2	Mn257.6	conc	0.2582 mg/L
	rep	2	Mg279.6	conc	2.3599 mg/L
	rep	2	Ca393.4	conc	12.5870 mg/L
	rep	2	Na589.6	conc	11.4490 mg/L
	rep	2	[illegible]	conc	[illegible] mg/L

[illegible]

WA50016-8

12/18/92 14:30

Fe238.2	av	0.0142 mg/L	sd	0.00407	%cv	28.44
Mn257.6	av	0.0550 mg/L	sd	0.00533	%cv	[illegible]
Mg279.6	av	3.8160 mg/L	sd	0.08221	%cv	2.15
Ca393.4	av	12.3520 mg/L	sd	0.07306	%cv	0.59
Na589.6	av	11.3687 mg/L	sd	0.15573	%cv	[illegible]

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	1.6685	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	0.6468	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	15.7683	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	0.70448	%cv	0.96

12/18/92 14:40

WA50015-1Dis	rep	1	Zn213.8	conc	0.0182	mg/L	
	rep	1	Cd214.4	conc	-0.0013	mg/L	
	rep	1	Ni231.6	conc	0.0287	mg/L	
	rep	1	Fe238.2	conc	-0.0018	mg/L	window edge

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

sd	1	Ni231.6	conc	-0.0071 mg/L		
rep	1	Fe238.2	conc	0.0031 mg/L		
rep	1	Mn257.6	conc	0.0336 mg/L		
rep	1	Cr267.7	conc	0.0063 mg/L		
rep	1	Be313.0	conc	0.0001 mg/L		
rep	1	Cu324.8	conc	0.0053 mg/L		
rep	1	Ag328.1	conc	0.0001 mg/L		
rep	1	Mg279.6	conc	1.0326 mg/L		
rep	1	Ca393.4	conc	5.7410 mg/L		

WA50015-3D 8
12/18/92 14:47

Zn213.8	av	0.0243 mg/L	sd	0.01354	%cv	55.73<
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	808.33<
Fe238.2	av	0.0051 mg/L	sd	0.00465	%cv	90.85<
Mn257.6	av	7.8296 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

WA50015-3D16	rep	1	Zn213.8	conc	0.0321 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	

WA50015-3D15
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	326.50 Rerun
Ni231.6	av	0.0015 mg/L	sd	0.01661	%cv	1131.1<
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
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]	[illegible]	[illegible]	[illegible] mg/L		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible] mg/L		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible] mg/L		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible] mg/L		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	

[illegible] 14:55

[illegible]	rep	[illegible]	[illegible]	conc	[illegible] mg/L	
	rep		Cd214.4	conc	[illegible] mg/L	
	rep	1	Ni231.6	conc	[illegible] mg/L	window edge
	rep	1	Fe238.2	conc	[illegible] mg/L	
	rep	1	Mn257.6	conc	[illegible] mg/L	
	rep	1	Cr267.7	conc	[illegible] mg/L	
	rep	1	Be313.0	conc	[illegible] mg/L	
	rep	1	Cu324.8	conc	[illegible] mg/L	
	rep	1	Ag328.1	conc	[illegible] mg/L	
	rep	1	Mg279.6	conc	[illegible] mg/L	
	rep	1	Ca393.4	conc	[illegible] mg/L	
	rep	2	Zn213.8	conc	0.0080 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	76.38	<
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	[illegible]	conc	[illegible] mg/L	

rep	3	Zn213.8	conc	0.5489	mg/L
rep	3	Cd214.4	conc	0.0542	mg/L
rep	3	Ni231.6	conc	0.5358	mg/L
rep	3	Fe238.2	conc	1.1030	mg/L
rep	3	Mn257.6	conc	0.5500	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	0.2563	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	0.0023 mg/L	
	rep	2	Ag328.1	conc	-0.0013 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	

	av	[illegible]		sd	[illegible]		
	av	[illegible]	mg/L	sd	[illegible]	mg/L	
	rep	[illegible]	mg/L		[illegible]	mg/L	

WA50015-4Dis
[illegible]

Zn213.8	av	0.0148 mg/L	sd	[illegible]	%cv	[illegible]	<
Cd214.4	av	-0.0025 mg/L	sd	[illegible]	%cv	[illegible]	Rerun
Ni231.6	av	-0.0009 mg/L	sd	[illegible]	%cv	[illegible]	<
Fe238.2	av	0.0038 mg/L	sd	[illegible]	%cv	[illegible]	<
Mn257.6	av	0.0006 mg/L	sd	[illegible]	%cv	[illegible]	<
Cr267.7	av	0.0023 mg/L	sd	[illegible]	%cv	[illegible]	<
Be313.0	av	0.0001 mg/L	sd	[illegible]	%cv	[illegible]	<
Cu324.8	av	0.0021 mg/L	sd	[illegible]	%cv	[illegible]	<
Ag328.1	av	0.0011 mg/L	sd	[illegible]	%cv	[illegible]	<
Mg279.6	av	0.0100 mg/L	sd	[illegible]	%cv	[illegible]	<
Ca393.4	av	0.0343 mg/L	sd	0.00517	%cv	5.84	

12/18/92 15:10

WA50015-5Dis	rep	1	Zn213.8	conc	0.0645 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	0.0000 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	0.0106 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	

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
rep	[illegible]	Fe233.3	conc	[illegible]	mg/L
rep	1	Mn257.6	conc	[illegible]	mg/L
rep	[illegible]	Cr267.7	conc	[illegible]	mg/L
rep	[illegible]	V292.4	conc	[illegible]	mg/L
rep	[illegible]	Be313.0	conc	[illegible]	mg/L
rep	[illegible]	Cu324.8	conc	[illegible]	mg/L
rep	1	Ag328.1	conc	[illegible]	mg/L
rep	[illegible]	Ba455.4	conc	[illegible]	mg/L
rep	[illegible]	Mg279.6	conc	[illegible]	mg/L
rep	[illegible]	Ca393.4	conc	[illegible]	mg/L
rep	[illegible]	Na589.6	conc	[illegible]	mg/L
rep	3	Zn213.8	conc	3.5759	mg/L
rep	2	Cd214.4	conc	3.8134	mg/L
rep	3	Ni231.6	conc	2.6155	mg/L
rep	2	Fe238.2	conc	5.1644	mg/L
rep	3	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	24.4725	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	104
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	[illegible]	Mn257.6	conc	[illegible]	mg/L

window edge

rep	2	Zn213.8	conc	-0.0027	mg/L	
rep	2	Cd214.4	conc	-0.0015	mg/L	
rep	2	Ni231.6	conc	0.0238	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	0.0623 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

B
12/18/92 15:34

Na589.6	av	0.0895 mg/L	sd	0.01714	%cv	19.16 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	-0.0757 mg/L	window edge

[illegible] -0.0148 mg/L [illegible] 0.0835 [illegible] <

-02 HCSA D1

Remove Cd below

12/18/92 15:37

WA50015-6Tot	rep	1	Zn213.8	conc	0.0788	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	2.6379	mg/L
	rep	1	Cr267.7	conc	0.0187	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 Remove
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	[illegible] mg/L

rep	3	[illegible]	[illegible]	[illegible]	[illegible]
rep	3	Mn257.6	[illegible]	[illegible]	mg/L
rep	3	Cr267.7	conc	[illegible]	mg/L
rep	3	Be313.0	conc	[illegible]	mg/L
rep	3	Cu324.8	conc	[illegible]	mg/L
rep	3	Ag328.1	conc	[illegible]	mg/L
rep	3	Mg279.6	conc	[illegible]	mg/L
rep	3	Ca393.4	conc	[illegible]	mg/L
rep	3	Zn213.8	conc	[illegible]	mg/L
rep	3	Cd214.4	conc	[illegible]	mg/L
rep	3	Ni231.6	conc	[illegible]	mg/L
rep	3	Fe238.2	conc	[illegible]	mg/L
rep	3	Mn257.6	conc	[illegible]	mg/L
rep	3	Cr267.7	conc	[illegible]	mg/L
rep	3	Be313.0	conc	[illegible]	mg/L
rep	3	Cu324.8	conc	[illegible]	mg/L
rep	3	Ag328.1	conc	[illegible]	mg/L
rep	3	Mg279.6	conc	[illegible]	mg/L
rep	3	Ca393.4	conc	[illegible]	mg/L

WA50015-5DTot
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	10.15 Rerun
Ni231.6	av	0.0021 mg/L	sd	0.00325	%cv	153.41 <
Fe238.2	av	19.0143 mg/L	sd	0.38634	%cv	2.03
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	17.3911 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	3.1510 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	[illegible]	[illegible]	[illegible] mg/L

[illegible]

[illegible]

[illegible]	av	[illegible] mg/L	sd	[illegible] %cv	[illegible]
[illegible]	av	[illegible] mg/L	sd	[illegible] %cv	[illegible]
[illegible]	av	[illegible] mg/L	sd	[illegible] %cv	[illegible]
[illegible]	av	[illegible] mg/L	sd	[illegible] %cv	[illegible]
[illegible]	av	[illegible] mg/L	sd	[illegible] %cv	[illegible]
[illegible]	av	[illegible] mg/L	sd	[illegible] %cv	[illegible]
[illegible]	av	[illegible] mg/L	sd	[illegible] %cv	[illegible]
[illegible]	av	[illegible] mg/L	sd	[illegible] %cv	[illegible]
[illegible]	av	[illegible] mg/L	sd	[illegible] %cv	[illegible]
[illegible]	av	[illegible] mg/L	sd	[illegible] %cv	[illegible]
[illegible]	av	[illegible] mg/L	sd	[illegible] %cv	[illegible]

[illegible]

[illegible]	rep	1	Mg279.6	conc	[illegible] 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
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] 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	2.8390 mg/L	sd	0.03235	%cv	1.14	107
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	0.0063	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	0.0008	mg/L	
rep	3	Ni231.6	conc	0.0007	mg/L	

rep	3	W267.7	conc	0.007 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	-0.0004 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	0.0043 mg/L	
rep	3	Ca393.4	conc	0.0001 mg/L	
rep	3	Na589.6	conc	-0.0133 mg/L	

ccs

12/18/92 16:06

Zn213.8	av	0.0031 mg/L	sd	0.00295	%cv	93.21<
Cd214.4	av	-0.0002 mg/L	sd	0.00166	%cv	709.51<
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	124.9<
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 16:13

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	85.51
Mn257.6	av	0.0091 mg/L	sd	0.00139	%cv	15.32
Cr267.7	av	0.0005 mg/L	sd	[illegible]	%cv	[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

[illegible]	rep	[illegible]	Zn213.8	conc	[illegible]	mg/L
	rep	[illegible]	Cd214.4	conc	[illegible]	mg/L
	rep	[illegible]	Ni231.6	conc	[illegible]	mg/L
	rep	[illegible]	Mn257.6	conc	[illegible]	mg/L
	rep	[illegible]	Cr267.7	conc	[illegible]	mg/L
	rep	1	V292.4	conc	[illegible]	mg/L
	rep	[illegible]	Be313.0	conc	[illegible]	mg/L
	rep	[illegible]	Cu324.8	conc	[illegible]	mg/L
	rep	[illegible]	Ag328.1	conc	[illegible]	mg/L
	rep	1	Ba455.4	conc	[illegible]	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	0.00101	%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	-0.0030	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	0.0016	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
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

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	0.0090	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	0.0749	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

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

[illegible]

Zn213.8	BW	[illegible] mg/L	50	[illegible]	[illegible]	[illegible]	[illegible]	103
Cd214.4	BW	[illegible] mg/L	50	0.00033	%RSD	43.89	[illegible]	69
Ni231.6	BW	0.0375 mg/L	50	[illegible]	%RSD	[illegible]	[illegible]	72
Mn257.6	BW	[illegible] mg/L	50	[illegible]	%RSD	[illegible]	[illegible]	110
Cr267.7	BW	0.0139 mg/L	50	[illegible]	%RSD	[illegible]	[illegible]	65
V292.4	BW	0.0983 mg/L	50	0.00317	%RSD	[illegible]	[illegible]	92
Ba313.0	BW	0.0038 mg/L	50	0.00012	%RSD	[illegible]	[illegible]	88
Cu324.8	BW	[illegible] 0497 mg/L	50	0.00499	%RSD	[illegible]	[illegible]	99
Ag328.1	BW	0.0164 mg/L	50	0.00500	%RSD	30.90	[illegible]	82

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/[illegible]/92
PHONE: 202/797-[illegible]00
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 $55[illegible]0
This is NOT an Invoice

JBB/LJO
12-16

Please contact CCAS promptly if you have any questions.

YP 21692

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	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: NDS 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.

* 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
Dvon Bush	12/16/92 7:05 PM	Jon Bortel	12-15-92	1400	

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

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: _____
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: _____
Laboratory Quality Assurance

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

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

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: [illegible]
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
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	o RAW DATA
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	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	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.

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.

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				Acceptance		Concentration or Quantity				Matrix Spike Recovery (%)				
Parameter	CCAS Sample No.	Units	Measurement Rep 1	Rep 2	Mean Conc	RPD (%)	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

000006

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 - LIS

Continued From Page _____

SAMPLE NUMBER	Dig Type	Init Vol (mL) or Wt (g)	Final Vol (mL)	Client
PBW	HCl	100	100	
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				
-4				
-5 DUP				
MV 12/15/92 SPK				
PBS				
LCSS		0.3001		
WA50019-1		0.53		[redacted]
WA50023-1		2.18g		[redacted]
WA49006-6		2.06g		[redacted]
6 DUP		2.18g		
6 SPK MV 12/15/92		2.06g		
-7		2.18g		
-8		2.06g		
-9		2.02g		
-10		2.18g		
WA50026-1 DIS				
MV 12/15/92 WA50015-1 DIS		100	100	[redacted]
-6 DIS				
-7 DIS				

Continued on Page

Read and Understood By

Michael D. Vosh — Signed — 12/15/92 — Date

D. Nadeau — Signed — 12/15/92

ALIS-2/S

	Dig Type	Init Vol (ml) or WDP (g)	Final Vol (ml)	Client
	HNO_3	100	100	
-1	DIST			[redacted]
-2				12/15/92
-3				
-4				
-5				
-6				
-7		mv. NOT NEEDED 12/15/92		
-8				
-1	DUP			
-1	SPK			
S		0.2 g		
SS		0.2964		
A49006-6		2.01 g		[redacted]
-6	DUP	2.11 g		
-6	SPK	mv 12/15/92		
-7		2.11		
-8		2.13 g		
-9		2.15 g		
-10		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 Vail — Signed — 12/15/92 Date

D. Nadeau — Signed — 12/18/92 Date

PROJECT ALIS - LIS

Notebook No. _____

Continued From Page _____

SAMPLE NUMBER	DIG TYPE	Init Wt (g)	Final Vol (mL)	Client
WA51011-1	HCl	1.01	100	CHESDIV
1 MS		1.01		
1 MSD		1.02		
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 CLP-SPK-1 to each
D. Bruner 12/15/92

Reagents: HCL F068222
HNO_3 F260076
H_2O_2 F110415

SPIKES:				
	CLPP-CICV-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		
	CLPP-CVA	115-S		
	CLPP-10	111-S		

Continued on Page

Read and Understood By

Signed: [illegible] Date: 12/15/92

Signed: D. Nadeau Date: 12/18/92

GM 12/16/92

L

LO-S		PBS	Zn, Cd, Ni, Fe, Cr, Al
LOS-L		PBW, LCSW	Co
LO-S		LCSS	Zn, Cd, Cr, Ni, Ag, Fe, Al
LOS-S	[redacted]	WA50002-1-4	Zn, Cd, Ni, Cr
LO-S	[redacted]	WA50007-1	Cd, Ni, Zn, Fe, Ca, Mg
LS-S		PBS, LCSS	Cd, Cr, Ag, Ba
	ABB-DC	WA51011-1, MS, MSD-10	Ag
↓	[redacted]	WA51007-1	Ag, Ba, Cd, Cr

CWO 12-17-92

12/16/92 10:34

wcai 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	79795.6	conc	50.0000	
	rep	3	Ca393.4	em	135633.5	conc	50.0000	

wcai std
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

[illegible]

[illegible]

[illegible]

[illegible]

[illegible] 10:40

[illegible]	rep	1	Zn213.8	em	[illegible]	
	rep	1	Cd214.4	em	[illegible]	
	rep	1	Co228.6	em	[illegible]	
	rep	1	Ni231.6	em	[illegible]	
	rep	1	Fe238.2	em	[illegible]	
	rep	1	Cr267.7	em	[illegible]	
	rep	1	Ag328.1	em	[illegible]	
	rep	1	Al396.2	em	57.2	
	rep	1	Ba455.4	em	26.5	
	rep	1	Mg279.6	em	55.6	
	rep	1	Ca393.4	em	102.2	
	rep	2	Zn213.8	em	39.2	
	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	18.3	
	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	3.8	
	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	[illegible]	em	[illegible]	

rep	2	Ni231.6	em	70.4	
rep	2	Fe238.2	em	33.1	window edge
rep	2	Cr267.7	em	31.7	
rep	2	Ag328.1	em	33.2	
rep	2	Al396.2	em	17.0	
rep	2	Ba455.4	em	5.6	
rep	2	Mg279.6	em	5.0	
rep	2	Ca393.4	em	12.7	
rep	3	Zn213.8	em	30.4	
rep	3	Cd214.4	em	21.7	
rep	3	Co228.6	em	48.4	
rep	3	Ni231.6	em	32.4	
rep	3	Fe238.2	em	33.6	
rep	3	Cr267.7	em	-1.6	
rep	3	Ag328.1	em	49.9	window edge
rep	3	Al396.2	em	33.3	
rep	3	Ba455.4	em	4.5	
rep	3	Mg279.6	em	3.1	
rep	3	Ca393.4	em	11.9	

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

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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	26673.1	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	7137.1	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	71752.6	conc 20.0000

rep	3	Ba455.4	av	14844.0	sd	[illegible]	%cv	[illegible]	conc [illegible]

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Zn213.8	av	8347.2564	sd	164.46109	%cv	1.98	conc	5.0000	
Cd214.4	av	13419.833	sd	473.40701	%cv	3.53	conc	5.0000	
Co228.6	av	6933.5317	sd	225.70935	%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	5.15	conc	10.0000	
Cr267.7	av	12379.895	sd	133.45401	%cv	1.07	conc	2.0000	
Ag328.1	av	11856.602	sd	106.56098	%cv	0.90	conc	2.5000	
Al396.2	av	23532.482	sd	1010.8615	%cv	4.30	conc	20.0000	
Ba455.4	av	73546.309	sd	1413.1529	%cv	1.92	conc	20.0000	
Mg279.6	av	84215.604	sd	696.92657	%cv	0.83	conc	50.0000	
Ca393.4	av	135637.98	sd	7234.5310	%cv	5.33	conc	50.0000	

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ICV

rep	1	Zn213.8	conc	2.6903	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

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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

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rep	1	Cd214.4	conc	0.0145 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	0.0025 mg/L	
rep	1	Cr267.7	conc	-0.0004 mg/L	window edge
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	0.0250 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	

ICB

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Zn213.8	av	-0.0023 mg/L	sd	0.00642	%cv	273.24
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

NA

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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	27958.5	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	137292.8	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	4839.7	conc	5.0000
rep	2	Fe238.2	em	29298.6	conc	10.0000
rep	2	Cr267.7	em	12943.7	conc	2.0000
rep	2	Ag328.1	em	11848.3	conc	2.5000

rep	3	Ca393.4	em	133441.9	conc	50.0000
Blk						
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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		

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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
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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

Fe238.2	av	0.0381 mg/L	sd	0.16574	%cv	3.16	102
Cr267.7	av	0.0404 mg/L	sd	0.00300	%cv	0.33	104
Ag328.1	av	1.2772 mg/L	sd	0.01734	%cv	1.36	102
Al396.2	av	10.2561 mg/L	sd	0.48012	%cv	4.68	105
Ba455.4	av	10.7642 mg/L	sd	0.12404	%cv	1.15	108
Mg279.6	av	25.7438 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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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	0.0223	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
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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 <

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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
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Ba455.4	av	0.0011 mg/L	sd	0.00080	%cv	72.46

rep	1	Zn213.8	conc	[illegible] mg/L		
rep		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
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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	751.10
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

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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
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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

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throw away	rep	1	Zn213.8	conc	0.0023 mg/L

rep	1	Ni231.6	conc	-0.0113	mg/L	
rep	1	Fe238.2	conc	0.1580	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	0.0058	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

[illegible]	av	[illegible]		sd	[illegible]	%cv	[illegible]
Cd214.4	av	0.0091 mg/L		sd	0.00847	%cv	[illegible]
Cr228.6	av	0.1021 mg/L		sd	0.00949	%cv	[illegible]
[illegible]	av	0.0729 mg/L		sd	[illegible]	%cv	[illegible]
Cr267.7	av	0.0132 mg/L		sd	0.00637	%cv	[illegible]
Ag328.1	av	0.0174 mg/L		sd	0.01038	%cv	[illegible]

12/92 11:46

[illegible] PBS	rep	1	Zn213.8	conc	0.0169 mg/L	
	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	1268.1<

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

[illegible]

12/16/92 11:54

\Zn213.8	av	1.7299 mg/L	sd	0.03546	%cv	2.21
\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	0.5339 mg/L	sd	0.00911	%cv	1.70
\Ag328.1	av	0.0082 mg/L	sd	0.00066	%cv	33.05

12/16/92 11:56

L10 LCSS/10	rep	1	Fe238.2	conc	5.6406 mg/L
	rep	1	Al396.2	conc	4.6390 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 ×10 = 57.8
\Al396.2	av	4.6880 mg/L	sd	0.03457	%cv 0.74 ×10 = 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	25.5459 mg/L
	rep	1	Ca393.4	conc	25.9061 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	2.5926 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	25.2896 mg/L
	rep	2	Ca393.4	conc	26.4791 mg/L
	rep	3	Zn213.8	conc	2.5753 mg/L

rep	3	[illegible]	conc	[illegible]	mg/L
rep	3	Fe238.2	conc	0.1095	mg/L
rep	3	Cr267.7	conc	0.0198	mg/L
rep	3	Ag328.1	conc	0.0230	mg/L
rep	3	Al396.2	conc	0.7069	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

ICV

12/16/92 12:04

Zn213.8	av	2.6009 mg/L	sd	0.02845	%cv	1.02 104
Cd214.4	av	2.5781 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	0.18291	%cv	3.58 102
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

/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	4573.2 <
Co228.6	av	-0.0096 mg/L	sd	0.01276	%cv	133.32 <
Ni231.6	av	-0.0101 mg/L	sd	0.00881	%cv	87.16 <
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 <

Ba455.4	av	0.0031 mg/L	sd	0.00232	%cv	61.34	< Below calibrator
Mg279.6	av	0.0131 mg/L	sd	0.00673	%cv	51.33	<
Ca393.4	av	0.0138 mg/L	sd	0.00747	%cv	53.51	<

12/16/92 13:13

CCB	rep	1	Ba455.4	conc	0.0005	mg/L
	rep	2	Ba455.4	conc	0.0010	mg/L window error
	rep	3	Ba455.4	conc	0.0003	mg/L

CCC

12/16/92 13:13

Ba455.4	av	0.0008	mg/L	sd	0.00038	%cv	63.74 <

12/16/92 13:15

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

12/16/92 12:33

Zn213.8	av	0.3073 mg/L	sd	0.01659	%cv	5.67	
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 12:34

WA50007-1	rep	1	Cd214.4	conc	0.1425 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	0.3536 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 12:34

Cd214.4	av	0.1416 mg/L	sd	0.00978	%cv	6.91
Ni231.6	av	0.3636 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 = 16.4

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	448.51 <
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

rep	1	Fe238.2	conc	1.1519 mg/L
rep	1	Ba455.4	conc	1.5548 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	1.6332 mg/L

LIB LCS3
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	0.00548 %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

CCB

12/16/92 12:46

Zn213.8	av	0.0527 mg/L	sd	0.0041	%cv	0.78 106
Cd214.4	av	1.7188 mg/L	sd	0.09257	%cv	5.38 109
Co228.6	av	2.7202 mg/L	sd	0.03902	%cv	1.43 109
Ni231.6	av	2.5337 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	1.0366 mg/L	sd	0.01812	%cv	1.67 109
Ag328.1	av	0.2905 mg/L	sd	0.01413	%cv	4.86 103
Al396.2	av	10.6046 mg/L	sd	0.17243	%cv	1.63 106
Ba455.4	av	10.7910 mg/L	sd	0.08442	%cv	0.78 108
Mg279.6	av	23.5740 mg/L	sd	0.32800	%cv	1.39 106
Ca393.4	av	20.0061 mg/L	sd	0.13873	%cv	0.69 104

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
	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

window edge

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	25.32 <

12/16/92 12:55

WA51011-1MSD	rep	1	Ag328.1	conc	0.4415	mg/L

rep 3 Ag328.1 conc 0.0548 mg/L

WA51011-1RSD
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 0.0234 mg/L
rep 3 Ag328.1 conc 0.0259 mg/L

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 0.0464 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 0.2533 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

12/16/92 13:15
Ag328.1 av 0.0450 mg/L sd 0.03410 %cv 75.78

12/16/92 13:15
A51011-10 rep 1 Ag328.1 conc 0.3279 mg/L
rep 2 Ag328.1 conc 0.3037 mg/L
rep 3 Ag328.1 conc 0.3194 mg/L
A51011-10
12/16/92 13:15
Ag328.1 av 0.6270 mg/L sd 0.00717 %cv 1.15

12/16/92 13:21
CCV rep 1 Zn213.8 conc 2.6027 mg/L
rep 1 Cd214.4 conc 2.6598 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 1.2592 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 1.99 104
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 window edge
rep 1 Ni231.6 conc -0.0070 mg/L
rep 1 Fe238.2 conc 0.0201 mg/L

rep	1	Al396.2	conc	-0.0033 mg/L		
rep	1	Ni231.6	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	-0.0038 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	wincow 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	NA
	rep	2	Cd214.4	conc	0.0799 mg/L	
	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	

rep	3	Fe238.2	conc	0.0435 mg/L		
rep	3	Cr267.7	conc	-0.0014 mg/L		
rep	3	Ag328.1	conc	0.0040 mg/L		
rep	3	Al396.2	conc	0.0749 mg/L		
rep	3	Ba455.4	conc	0.0008 mg/L		
rep	3	Mg279.6	conc	0.0075 mg/L		
rep	3	Ca393.4	conc	0.0080 mg/L		
rep	3	Zn213.8	conc	-0.0273 mg/L	window edge	
rep	3	Cd214.4	conc	-0.0008 mg/L		
rep	3	Co228.6	conc	-0.0100 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	97.81 <
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 <

/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	25.6010 mg/L

WA50007-1/100

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	
	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	102.15
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	1106.8 <
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

[illegible]

[illegible] 14:[illegible]

[illegible] 4 av [illegible] mg/L sd 0.00050 %cv [illegible] <

12/16/92 14:11

CCV

	rep	1	Ca393.4	conc	20.6601 mg/L
	rep	2	Ca393.4	conc	20.6540 mg/L
	rep	3	Ca393.4	conc	20.3403 mg/L

CCV

12/16/92 14:11

Ca393.4 av 20.6501 mg/L sd 0.30792 %cv 1.49 HCL 107 107 12-16

12/16/92 14:15

CCB

	rep	1	Ca393.4	conc	0.0038 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 46.29
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	3	[illegible]	conc	[illegible]	mg/L
rep	3	[illegible]	conc	[illegible]	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

CBAB

12/16/92 14:23

Zn213.8	av	1.0243 mg/L	sd	0.00888	%cv	0.87 102
Cd214.4	av	0.9516 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	114.93
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	0.20255	%cv	77.25
Ba455.4	av	-0.0003 mg/L	sd	0.00086	%cv	249.07
Mg279.6	av	0.2722 mg/L	sd	0.18608	%cv	68.37
Ca393.4	av	0.2745 mg/L	sd	0.21006	%cv	76.53

rep	1	Zn213.8	conc	0.0470	mg/L
rep	1	Cd214.4	conc	0.0145	mg/L
rep	1	Co228.6	conc	0.1539	mg/L
rep	1	Ni231.6	conc	0.1009	mg/L
rep	1	Cr267.7	conc	0.0300	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	0.0185	mg/L
rep	2	Co228.6	conc	0.1539	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

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

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	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.

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	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.

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				Acceptance	Concentration or Quantity				Matrix Spike Recovery (%)					
Parameter	CCAS Sample No.	Units	Rep 1	Rep 2	Mean Conc	RPD (%)	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.

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 Soil 788 PQL=0.10%

Continued From Page _____

ASTM CLASS 1 WEIGHTS (g)	INITIAL (g)	FINAL (g)
2.000	2.000	2.000
5.000	5.000	5.000
10.000	10.000	9.999

OVEN TEMP 103°C

TIME IN: 6:00 P.M. 12-15-92

TIME OUT: 8:00 A.M. 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	WA5104-1	0255 0300 XAFF	4	1.602	2.509	2.500
Dupe	WA5104-1	↓	5	~~1.562~~ 1.558	~~2.521~~ 2.514	2.514
	WA5104-2	0155 X0X10 XAXF	6	1.572	2.404	2.396
Dupe	WA5104-2	↓	7	1.542	2.412	2.404
	WA5104-3	0155 X23 XBXF	8	1.579	2.590	2.600
Dupe	WA5104-3	↓	9	1.617	2.615	2.613
	WA5104-4	0155 X0X37 XCXF	10	1.543	2.786	2.777
Dupe	WA5104-4	↓	11	1.539	2.778	2.771
	WA5104-5	0155 X2X 75XBXF	12	1.562	2.661	2.650
Dupe	WA5104-5	↓	13	1.557	2.667	2.655
	WA5104-6	0155 X0X 25XLXF	14	1.648	2.597	2.578
Dupe	WA5104-6	↓	15	1.531	2.609	2.590
	WA5104-7	0255 X0275 XLXF	16	1.612	2.695	2.685
Dupe	WA5104-7	↓	17	1.550	2.710	2.700
	WA5104-8	0155 X0X37 XRXF	18	1.546	2.604	2.586
Dupe	WA5104-8	↓	19	1.570	2.597	2.581
	WA5104-9	0255 X2125 XAXF	20	1.665	2.508	2.498
Dupe	WA5104-9	↓	21	1.555	2.500	2.490
	WA5104-10	0255 X0X550 XeFF	22	1.537	2.230	2.223
Dupe	WA5104-10	↓	23	1.551	2.237	2.229

Continued on Page

Read and Understood By

SET-UP	12-15-92		
Signed	Date	Signed	Date
12.16.92		12/17/92	

Notebook No. _____

PROJECT TOTAL SOLIDS ELA SOW 7/88 PQL = 0.10%

Continued From Page _____

CLIENT	SAMPLE ID	SYR ID	DISH ID	DISH wt (g)	DISH + wet (g)	DISH + dry (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	2.657	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		

12-16-92

$$\% \text{ SOLIDS} = \frac{\text{SAMPLE DRY WEIGHT (g)}}{\text{SAMPLE WET WEIGHT (g)}} \cdot 100$$

J. Fine 12-16-92

Continued on Page

Read and Understood By

J. Fine (SET UP)	12-15-92		
J. Fine (Completion)	12-16-92		12/17/92
Signed	Date	Signed	Date

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-[illegible]00
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

	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 $51[illegible]0
This is NOT an Invoice

LJO
12 16

Please contact CCAS promptly if you have any questions.

[illegible]

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	964-7838	FAX (805) 967-4386
6006 Egret Ct.	Benicia, CA 94510	) 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.

* 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	[illegible]	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

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-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	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 #
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 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

COAST - TO - COAST ANALYTICAL SERVICES

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Certified Hazardous Waste, Chemistry, Bacteriology & Bioassay Laboratories

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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

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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: 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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Fax (207) 775-4029

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

Sample No. : WJ-0073-1
Report Date: 01/29/93
PO No. : SE207668
Project : 7800-00

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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Fax (207) 775-4029

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

Sample No. : WJ-0073-2
Report Date: 01/29/93
PO No. : SE207668
Project : 7800-00

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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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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Fax (207) 775-4029

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

Sample No. : WJ-0073-3
Report Date: 01/29/93
PO No. : SE207668
Project : 7800-00

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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CLIENT: FRANKO GODOY
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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
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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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
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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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

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

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
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

COAST - TO - COAST ANALYTICAL SERVICES

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Northeastern Division
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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
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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

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

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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
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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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
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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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-0073-9
Report Date: 01/29/93
PO No. : SE207668
Project : 7800-00

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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Fax (207) 775-4029

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

Sample No. : WJ-0073-9
Report Date: 01/29/93
PO No. : SE207668
Project : 7800-00

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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Fax (207) 775-4029

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

Sample No. : WJ-0073-10
Report Date: 01/29/93
PO No. : SE207668
Project : 7800-00

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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Fax (207) 775-4029

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

Sample No. : WJ-0073-10
Report Date: 01/29/93
PO No. : SE207668
Project : 7800-00

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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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
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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CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
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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

* 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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CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

Sample No. : WJ-0073-12
Report Date: 01/29/93
PO No. : SE207668
Project : 7800-00

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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340 County Road, No. 5 • P.O. Box 720 • Westbrook, ME 04098

(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. : WJ-0073-12
Report Date: 01/29/93
PO No. : SE207668
Project : 7800-00

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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Fax (207) 775-4029

CLIENT: FRANKO GODOY
ABB Environmental Svcs., Inc.
1400 16th Street, N.W., Suite 720
Washington, DC 20036

Sample No. : WJ-0073-13
Report Date: 01/29/93
PO No. : SE207668
Project : 7800-00

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

* 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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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
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: 202/797-6[illegible]0
FAX: 202/797-6[illegible]1
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	AMOU[illegible]
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

JJC012293

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

R)RT 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/$

I)ICE: 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.: 7800-00

PROJECT NAME: NDS/I.H. Ag CONTAMINATION

SAMPLERS (SIGNATURE): [signature]

	STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	SAMPLE TYPE: ICP-Ag (TOTAL)	SAMPLE TYPE: 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	

ABB Environmental Services, Inc.

OH-62

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: _____
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
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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.
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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
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Duplicate and Matrix Spike/Matrix Spike Duplicate Results

		DUPLICATE RESULTS						MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS									
			Sample Measurement				Acceptance Range	Concentration or Quantity				Matrix Spike Recovery (%)					
Parameter	CCAS Sample No.	Units	Rep 1	Rep 2	Mean Conc	RPD (%)	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	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.

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		000207
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	~~[illegible]~~ 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	~~[illegible]~~ 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~~ NA		

Analyst: [signature] Date: 012593 Reviewer: _____ Date: _____

TEMPLATE. FORMS\DATA\TCLPLOG.WK1

PROJECT SA 26 - L/S

Notebook No. 14

Continued From Page

~~Sample~~	Dis Type	Int Vol. or Wet Wt (g)	Final Vol	Client
PBSH	HCl	~~0.25~~	100	[redacted]
LCSSH		~~0.25~~ 0.2750g		
WS00073-2		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		
-2MS		1.14		
-2MSD		~~1.11~~		
WS00~~74~~ 53 -1		1.03		[redacted]
		1.09		
PBW		100 mL		
LCSW				
WSW73-1 (1/25/93)				[redacted]
~~0000125~~ -13 Tap				
-1 SPL				
-1 DupSPL				
-1 TapSPL		100 mL		
		0.3148g		
PBSN	HNO3	12		
LCSSN		10 3148		
WS00053-1		1.16		[redacted]
-1 Dup		1.00		
-1 SPK		1.03		

Loss of HNO3 out 25mL HCl by accident mL 1-26-93

Continued on Page 57

Read and Understood By

Signed	Date	Signed	Date
[illegible]	1-26-93	[illegible]	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	32-S	0.2 mL
CLPF-PSPK-1	128-S	0.2 mL

HCl F26050
H_2O_2 F30829
HNO_3 F4046

MLV 1-26-93

Continued on Page —

Read and Understood By

Michael D. Vaden 1-26-93 Signed Date

[illegible] 1/27/93 Signed Date

WR 1-27-93

A26-L PBW, LCSW, TCLP BL 2
↓ ABB-DC WJ0073-1 TCLP d4S, TCLPspk
A26-S PBS, LCSS
↓ ABB-DC WJ0073-2, MS, MSD, 3-13

Ag
000010

1/27/93

```
01/27/93 09:08
wcal std          rep   1  Ag328.1    em      20528.1 conc 2.5000
                  rep   2  Ag328.1    em      21079.8 conc 2.5000
                  rep   3  Ag328.1    em      20897.0 conc 2.5000
wcal std
01/27/93 09:08
    Ag328.1     av  20834.96              sd   281.051 %cv   1.35 conc  2.5000

01/27/93 09:10
blank             rep   1  Ag328.1    em        53.7
                  rep   2  Ag328.1    em        61.7
                  rep   3  Ag328.1    em        -7.8                window edge
blank
01/27/93 09:10
    Ag328.1     av     35.88              sd    38.033 %cv 106.00

01/27/93 09:11
blank             rep   1  Ag328.1    em         9.3                window edge
                  rep   2  Ag328.1    em        80.8
                  rep   3  Ag328.1    em        36.4
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     1.2693 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   0.00751 %cv   0.59
```

102

```
01/27/93 09:16
[illegible]       rep   1  Ag328.1    conc    0.0038 mg/L
[illegible]       rep   2  Ag328.1    conc    0.0045 mg/L
                  rep   3  Ag328.1    conc   -0.0014 mg/L
[illegible]
```

Ag328.1 av 0.0022 mg/L sd 0.00021 %cv 9.1 <

01/27/93 09:18
ICSA rep 1 Ag328.1 conc 0.0032 mg/L
rep 2 Ag328.1 conc 0.0039 mg/L
rep 3 Ag328.1 conc 0.0027 mg/L
ICSA
01/27/93 09:18
Ag328.1 av 0.0033 mg/L sd 0.00060 %cv 18.33

000011

01/27/93 09:20
ICSAB rep 1 Ag328.1 conc 1.0023 mg/L
rep 2 Ag328.1 conc 0.9766 mg/L
rep 3 Ag328.1 conc 0.9714 mg/L
ICSAB
01/27/93 09:20
Ag328.1 av 0.9834 mg/L sd 0.01654 %cv 1.68 98%

01/27/93 09:22
throw away rep 1 Ag328.1 conc 0.0013 mg/L
rep 2 Ag328.1 conc 0.0085 mg/L
rep 3 Ag328.1 conc 0.0071 mg/L
throw away
01/27/93 09:22
Ag328.1 av 0.0057 mg/L sd 0.00384 %cv 67.97

01/27/93 09:23
CRI rep 1 Ag328.1 conc 0.0242 mg/L
rep 2 Ag328.1 conc 0.0108 mg/L
rep 3 Ag328.1 conc 0.0193 mg/L
CRI
01/27/93 09:24
Ag328.1 av 0.0181 mg/L sd 0.00676 %cv 37.40 91%

01/27/93 09:25
A26 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
A26 PBW
01/27/93 09:25
Ag328.1 av 0.0057 mg/L sd 0.00588 %cv 102.45 <

01/27/93 09:27
A26 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
A26 LCSW
01/27/93 09:27
Ag328.1 av 1.2871 mg/L sd 0.00334 %cv 0.26

01/27/93 09:29
A26 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
A26 TCLP BL
01/27/93 09:29
Ag328.1 av -0.0003 mg/L sd 0.00205 %cv 611.23 <

27/93 09:30
WJ0073-1T/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
WJ0073-1T/5
01/27/93 09:3
Ag328.1 av 0.0018 mg/L sd 0.00410 %cv 232.81 <0.075

WJ0073-1DT/5 rep 1 Ag328.1 conc 0.0022 mg/L
rep 2 Ag328.1 conc 0.0093 mg/L
rep 3 Ag328.1 conc 0.0056 mg/L

WJ0073-1DT/5
01/27/93 09:33
Ag328.1 av 0.0057 mg/L sd 0.00356 %cv 62.70 <0.075

01/27/93 09:34
WJ0073-1ST rep 1 Ag328.1 conc 0.0458 mg/L
rep 2 Ag328.1 conc 0.0464 mg/L
rep 3 Ag328.1 conc 0.0411 mg/L

WJ0073-1ST
01/27/93 09:34
Ag328.1 av 0.0444 mg/L sd 0.00291 %cv 6.54

000012

01/27/93 09:36
CCV rep 1 Ag328.1 conc 1.2449 mg/L
rep 2 Ag328.1 conc 1.2377 mg/L
rep 3 Ag328.1 conc 1.2517 mg/L

CCV
01/27/93 09:36
Ag328.1 av 1.2448 mg/L sd 0.00698 %cv 0.56 100%

01/27/93 09:38
CCB rep 1 Ag328.1 conc 0.0046 mg/L
rep 2 Ag328.1 conc 0.0054 mg/L
rep 3 Ag328.1 conc 0.0048 mg/L

CCB
01/27/93 09:38
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 0.5848 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 1.1648 mg/L
rep 3 Ag328.1 conc 1.1653 mg/L

WJ0073-2
01/27/93 09:46
Ag328.1 av 1.1645 mg/L sd 0.00100 %cv 0.09

01/27/93 09:47
WJ0073-2MS rep 1 Ag328.1 conc 1.2189 mg/L

	rep	3	Ag328.1	conc	[illegible] mg/L	
WJ0073-2MS						
01/27/93 09:47						
Ag328.1	av	1.5445 mg/L		sd	0.02605 %cv	3.17
01/27/93 09:49						
073-2MSD	rep	1	Ag328.1	conc	1.5562 mg/L	
	rep	2	Ag328.1	conc	1.5732 mg/L	
	rep	3	Ag328.1	conc	1.5513 mg/L	
WJ0073-2MSD						
01/27/93 09:49						
Ag328.1	av	1.5603 mg/L		sd	0.01156 %cv	0.73
01/27/93 09:51						
WJ0073-3	rep	1	Ag328.1	conc	0.7936 mg/L	
	rep	2	Ag328.1	conc	0.7856 mg/L	
	rep	3	Ag328.1	conc	0.8112 mg/L	
WJ0073-3						
01/27/93 09:51						
Ag328.1	av	0.7968 mg/L		sd	0.01310 %cv	1.64
01/27/93 09:53						
WJ0073-4	rep	1	Ag328.1	conc	0.8691 mg/L	
	rep	2	Ag328.1	conc	0.8869 mg/L	
	rep	3	Ag328.1	conc	0.8795 mg/L	
WJ0073-4						
01/27/93 09:53						
Ag328.1	av	0.8785 mg/L		sd	0.00892 %cv	1.02
01/27/93 09:55						
WJ0073-5	rep	1	Ag328.1	conc	0.0420 mg/L	
	rep	2	Ag328.1	conc	0.0425 mg/L	
	rep	3	Ag328.1	conc	0.0471 mg/L	
WJ0073-5						
01/27/93 09:55						
Ag328.1	av	0.0439 mg/L		sd	0.00281 %cv	6.41
01/27/93 09:57						
WJ0073-6	rep	1	Ag328.1	conc	0.0936 mg/L	
	rep	2	Ag328.1	conc	0.1053 mg/L	
	rep	3	Ag328.1	conc	0.0928 mg/L	
WJ0073-6						
01/27/93 09:57						
Ag328.1	av	0.0972 mg/L		sd	0.00697 %cv	7.16
01/27/93 09:59						
CCV	rep	1	Ag328.1	conc	[illegible] mg/L	
	rep	2	Ag328.1	conc	[illegible] mg/L	
	rep	3	Ag328.1	conc	[illegible] mg/L	
CCV						
01/27/93 [illegible]						
Ag328.1	av	[illegible] mg/L		sd	[illegible] %cv	[illegible]
01/27/93 10:01						
CCB	rep	1	Ag328.1	conc	[illegible] mg/L	
	rep	2	Ag328.1	conc	[illegible] mg/L	
	rep	3	Ag328.1	conc	[illegible] mg/L	
01/27/93 10:01						
Ag328.1	av	[illegible] mg/L		sd	[illegible] %cv	[illegible]
01/27/93 10:03						
WJ0073-7	rep	1	Ag328.1	conc	[illegible] mg/L	
	rep	2	Ag328.1	conc	[illegible] mg/L	
	rep	3	Ag328.1	conc	[illegible] mg/L	

000013

002

01/27/93 10:03
Ag328.1 av 0.0591 mg/L sd 0.00546 %cv 9.23

01/27/93 10:05
WJ0073-8 rep 1 Ag328.1 conc 0.7879 mg/L
rep 2 Ag328.1 conc 0.7944 mg/L
rep 3 Ag328.1 conc 0.7923 mg/L
WJ0073-8
01/27/93 10:05
Ag328.1 av 0.7915 mg/L sd 0.00330 %cv 0.42

000014

01/27/93 10:07
WJ0073-9 rep 1 Ag328.1 conc 1.0779 mg/L
rep 2 Ag328.1 conc 1.1280 mg/L
rep 3 Ag328.1 conc 1.1204 mg/L
WJ0073-9
01/27/93 10:07
Ag328.1 av 1.1088 mg/L sd 0.02698 %cv 2.43

01/27/93 10:09
WJ0073-10 rep 1 Ag328.1 conc 0.0064 mg/L
rep 2 Ag328.1 conc -0.0003 mg/L
rep 3 Ag328.1 conc 0.0042 mg/L
WJ0073-10
01/27/93 10:09
Ag328.1 av 0.0035 mg/L sd 0.00342 %cv 98.98 <

01/27/93 10:11
WJ0073-11 rep 1 Ag328.1 conc 0.3286 mg/L
rep 2 Ag328.1 conc 0.3362 mg/L
rep 3 Ag328.1 conc 0.3567 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 0.0566 mg/L
rep 3 Ag328.1 conc 0.0608 mg/L
WJ0073-12
01/27/93 10:13
Ag328.1 av 0.0578 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 Ag328.1 conc 0.0012 mg/L
CCB
01/27/93 10:19

01/27/93 10:20

ICSA	rep	1	Ag328.1	conc	0.0026	mg/L
	rep	2	Ag328.1	conc	0.0077	mg/L
	rep	3	Ag328.1	conc	0.0089	mg/L

ICSA
01/27/93 10:21
Ag328.1 av 0.0063 mg/L sd 0.00319 %cv 49.18

000015

01/27/93 10:23

ICSAB	rep	1	Ag328.1	conc	0.9870	mg/L
	rep	2	Ag328.1	conc	0.9979	mg/L
	rep	3	Ag328.1	conc	0.9763	mg/L

ICSAB
01/27/93 10:23
Ag328.1 av 0.9871 mg/L sd 0.01080 %cv 1.09 99%

01/27/93 10:24

throw away	rep	1	Ag328.1	conc	-0.0037	mg/L
	rep	2	Ag328.1	conc	0.0026	mg/L
	rep	3	Ag328.1	conc	0.0101	mg/L

window edge

throw away
01/27/93 10:24
Ag328.1 av 0.0030 mg/L sd 0.00692 %cv 230.11

01/27/93 10:26

CRI	rep	1	Ag328.1	conc	0.0189	mg/L
	rep	2	Ag328.1	conc	0.0235	mg/L
	rep	3	Ag328.1	conc	0.0163	mg/L

CRI
01/27/93 10:26
Ag328.1 av 0.0196 mg/L sd 0.00366 %cv 18.69 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				Acceptance	Concentration or Quantity				Matrix Spike Recovery (%)				
Parameter	CCAS Sample No.	Units	Rep 1	Rep 2	Mean Conc	RPD (%)	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.

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

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

000020

OVEN TEMP 103°C TIME IN: 5:30PM 1-25-93
TIME OUT: 8:00AM 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
ARB-DC	WJ00073-1	TM100-02	D	1.554	5.028	4.415
Dupe	WJ00073-1	↓	E	1.567	5.008	4.432
	WJ00073-2	0255XX0304	F	1.572	2.662	2.650
Dupe	WJ00073-2	↓	G	1.593	2.669	2.655
	WJ00073-3	0255XXXX25	H	1.557	2.701	2.687
Dupe	WJ00073-3	↓	I	1.649	2.704	2.70
	WJ00073-4	0255XX2425	J	1.639	2.666	~~2.600~~ 2.650 1-26
Dupe	WJ00073-4	↓	K	1.556	2.577	2.562
	WJ00073-5	0255XX0350	L	1.550	2.597	2.578
Dupe	WJ00073-5	↓	M	1.591	2.623	2.608
	WJ00073-6	0255XX0629	N	1.614	2.729	2.725
Dupe	WJ00073-6	↓	O	1.606	~~2.640~~ 2.735 1-25-93	2.717
	WJ00073-7	0255XX0400	P	1.607	2.725	2.713
Dupe	WJ00073-7	↓	Q	1.570	2.732	2.722
	WJ00073-8	0255XX0X75	R	1.601	2.682	2.662
Dupe	WJ00073-8	↓	S	1.572	2.711	2.691
	WJ00073-9	0255XX0X75	T	1.580	2.682	2.670
Dupe	WJ00073-9	↓	U	1.637	2.716	2.698
	WJ00073-10	0255XX1629	V	1.582	2.742	2.729
Dupe	WJ00073-10	↓	W	1.559	2.762	2.745

Continued on Page 1

Signature: [signature] Date: 1-25-93

Read and Understood By

Signed: [signature] Date: 1-26-93 Signed: [signature] Date: 1/27/93

Comments:

Notebook No. 10

PROJECT TOTAL SOLIDS CLP SOW 2/88 PQL = 0.10%

Continued From Page 3

CLIENT	Sample ID	Size ID	Dish ID	Dish wt (g)	Dish + wet wt (g)	Dish + Dry wt (g)
ABB-DC	WJ0073-1	0155xx145	X	1.567	2.641	2.629
DUPE	WJ0073-1	↓	Y	1.578	2.642	2.624
	WJ0073-2	0155xx045	Z	1.565	2.611	2.599
DUPE	WJ0073-2	↓	AA	1.604	2.615	2.600
	WJ0073-3	0155xx067	BB	1.603	2.737	2.727
DUPE	WJ0073-3	↓	CC	1.603	2.748	2.728

00002

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	✓ mcam 1/27/93	
	LCS#3	1.576	5.002	4.978	3.426	3.402	99.299	✓ mcam 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	✓ mcam 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	✓ mcam 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	✓ mcam 1/27/93	
	WJ0073-11	1.567	2.641	2.629	1.074	1.062	98.883	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		

$$\% \text{ SOLIDS} = \frac{\text{SAMPLE DRY WEIGHT (g)}}{\text{SAMPLE WET WEIGHT (g)}} * 100$$

1-26-93

Continued on Page

1-25-93

Read and Understood By

SERVA

Signed — Date — Signed — Date

1-26-93 — 1/27/93

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/[illegible]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

PROJECT: 7800-00

PO: SE207668

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

JJC0122

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

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. 7000-00

PROJECT NAME NDS/I.H. Ag CONTAMINATION

SAMPLERS (SIGNATURE)

	STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	SAMPLE TYPE: ICP-Ag (TOTAL)	SAMPLE TYPE: 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)
	1/21/93 19:00		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	

010025

OH-62

ABB Environmental Services, Inc.

Analytical Data for Contents of 55-Gallon Drum Excavated During the Removal Action

EA Laboratories

EA Laboratories
Telephone: 410-771-4920
800-677-9706
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,

Benjamin R. Landas,
Laboratory Project Manager

enclosure

CHAIN OF CUSTODY RECORD

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	8270 - SVOA	6010 - TMIA	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)
D. Pitman	12/29/91 19:00				
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	

ABB Environmental Services, Inc.

OH-62

CHAIN OF CUSTODY RECORD

PROJECT NO.

PROJECT NAME

SAMPLERS (SIGNATURE)

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]	1	X											[illegible]
[illegible] 2	[illegible]	[illegible]		✓	[illegible]	1	X											
[illegible]	[illegible]	[illegible]		[illegible]		1	X											
[illegible] 1	[illegible]	[illegible]		[illegible]		1	X											[illegible]
[illegible] 1	[illegible]	[illegible]		✓	[illegible] 1	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	

OH-62

ABB Environmental Services, Inc.

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.

Semivolatiles

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

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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.

12 January 1993

Walter E. Miller, Organics Manager

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

L 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

I 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: ____

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)ug/Kg	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

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

METHOD 8330 EXPLOSIVES ANALYSIS DATA SHEET

EPA SAMPLE NO.

METHOD BLANK

WITHIN DRUM

Lab Name: EA LABORATORIES Contract: _____

Lab Code: EAENG Case #: _____ SAS #: _____ SDG:

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

CONCENTRATION UNITS: (ug/L or ug/g) ug/g

CAS NO.	COMPOUND	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 No: 1474 Locator Code: GCMS

ABB WASH

CHAIN OF CUSTODY RECORD

PROJECT NO. 7800-00

PROJECT NAME: NOS INDIAN HEAD Ag REMEDIATION

SAMPLERS (SIGNATURE): N/A MR. FRANCO GODOY

DRAFT INVOICE L2431

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	8240 - VOA	8270 - SVOA	6010 - TMA	9012 - CYANIDE	8080 - PESTICIDES	8330 - EXPLOSIVES	NOT ENOUGH SAMPLE	WILL SAMPLE MORE	ON 12/29/92 D. VAN BUS ABBEGAR	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/LS
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)
[signature]	12/23/92 19:00				[signature] 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	

ABB Environmental Servi[illegible]s, Inc.

Job No: 479 Locator Code: D10 Temp: 4°

ABB WASH

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7800-00

PROJECT NAME: NOS INDIAN HEAD Ag REMED.

SAMPLERS (SIGNATURE): N/A MR. FRANCO GODSY

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		✓	WITHIN DRUM	4	✓	✓	✓	✓	✓			11951			SOLID MATERIAL
																	L2435 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. 931-2021

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
D. Wm[illegible]	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	

ABB Environmental Services, Inc.

OH-62

Remediation Contractor-Generated Laboratory Data

TECHNICAL SERVICES

Transmittal

P.O. Box 5240 / 5000 Brittonfield Parkway / Syracuse, New York 13220 / (315) 437-6400

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.
1	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 Joseph Dembowski
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
CLIENT: O'BRIEN & GERE
DATE: 15-Dec-92
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

CHAIN OF CUSTODY RECORD

(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	✓				1	1624					RUSH ☆		NA
COMPOSITE #1	12-8-92	1:15pm	WATER	1		✓	✓		1	1625							NA
TRIP BLANK	12-8-92	1:15pm	WATER	1				✓	1	1626					HOLD		NA

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	[illegible] 12/8/92			
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:**		

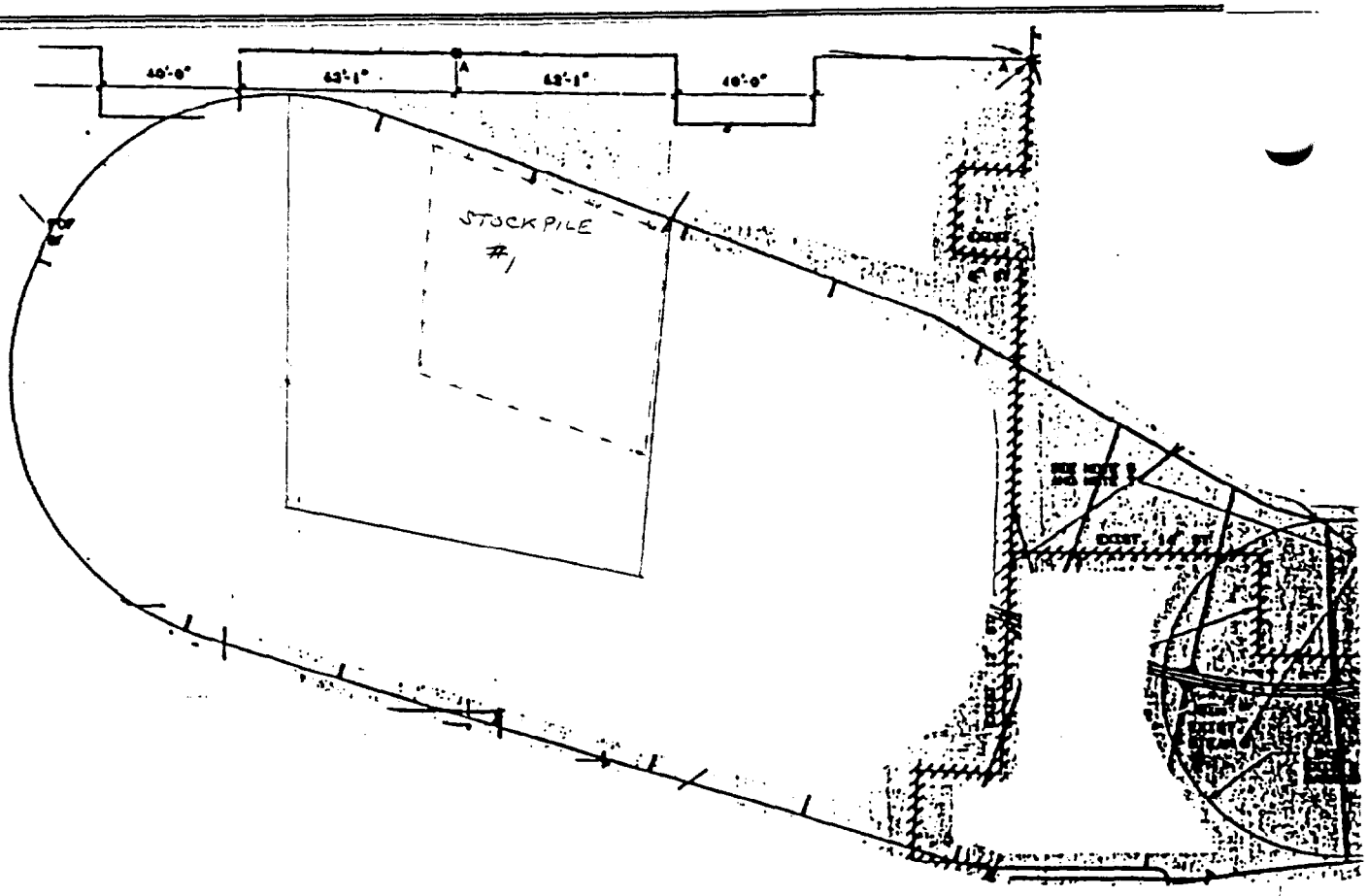
OBG TECHNICAL SERVICES

DAILY SAMPLE AND ANALYSIS REPORT

Date: 12-8-92 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 bag 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

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

CHAIN OF CUSTODY RECORD

9151 Rumsey Road, Columbia, MD 21045
(410) 730-8525

PROJECT: N.O.S. INDIANHEAD, MD

SAMPLERS: (Signature) Thomas B Wehle

SAMPLE NUMBER	DATE	TIME	MATRIX	NO. CONTAINERS	TCLP SILVER										REMARKS OR SAMPLE LOCATION	ICED	SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN
STOCKPILE #2	12-14-92	1:15pm	SOIL	1	✓		17749								*RUSH & Early		—

Relinquished by: (Signature) ①	Date / Time	Received by: (Signature)	Relinquished by: (Signature) ④	Date / Time	Shipped via:
	12/14/92 1470	* Kristina Tomanek			
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:**		

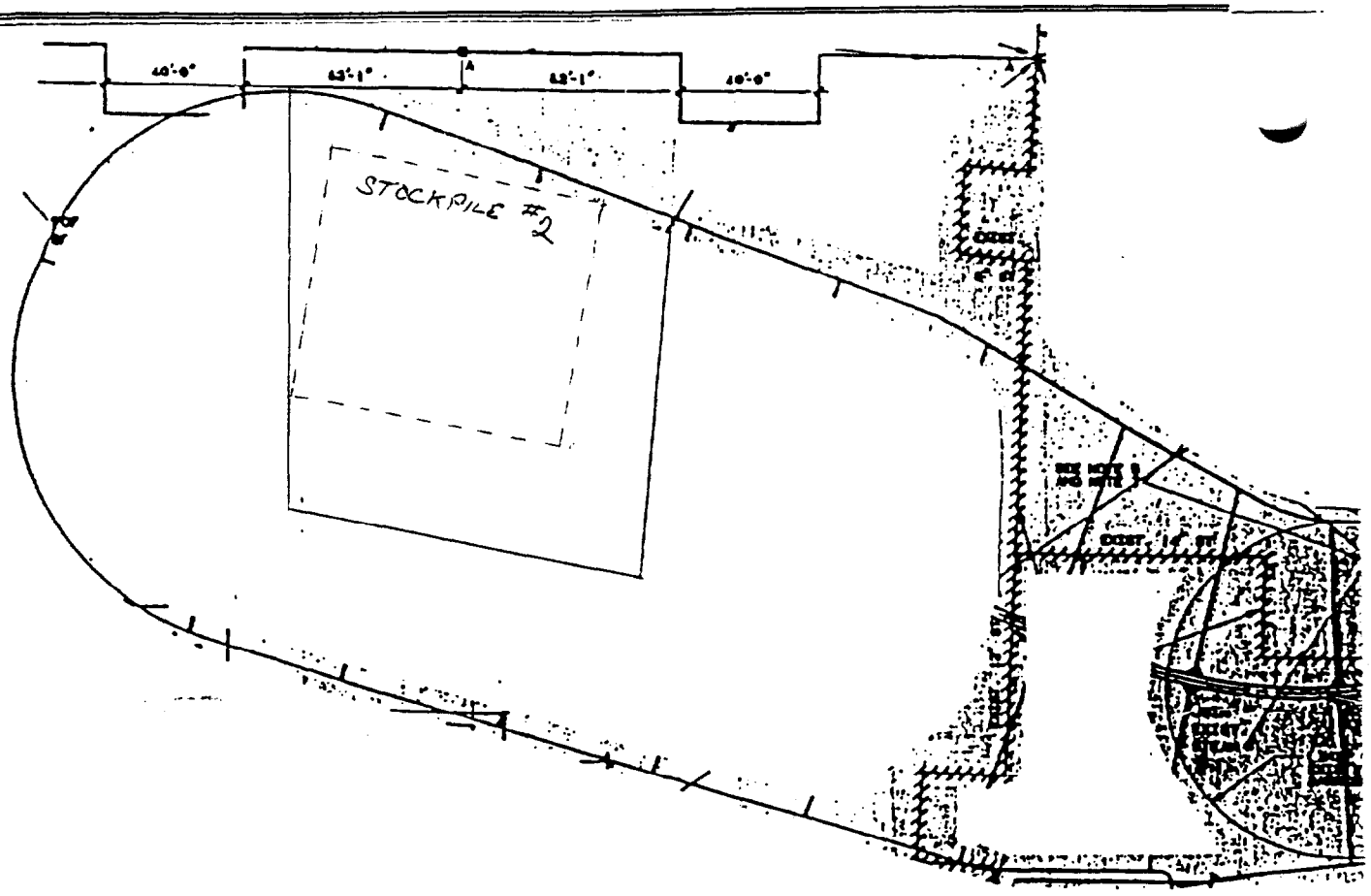
OBG TECHNICAL SERVICES

DAILY SAMPLE AND ANALYSIS REPORT

Date: 12-14-92 Sample Location: Explosion Beam

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

DATE: 18-Dec-92

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

CLIENT: OBG--0204

DATE: 18-Dec-92

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

PROJECT
NOS Indian Head, MD

SAMPLERS: (Signature)
Caroline Miller

SAMPLE NUMBER	DATE	TIME	MATRIX	NO. CONTAINERS	TCLP Silver		178	111							REMARKS OR SAMPLE LOCATION	ICED	SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN
Stockpile #3	12-16-92	1:39p	Soil	1	✓		178	111							Rush		—
Stockpile #4	12-16-92	1:39p	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 1600 2:40p	Richard B. Zamarri			
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:**		

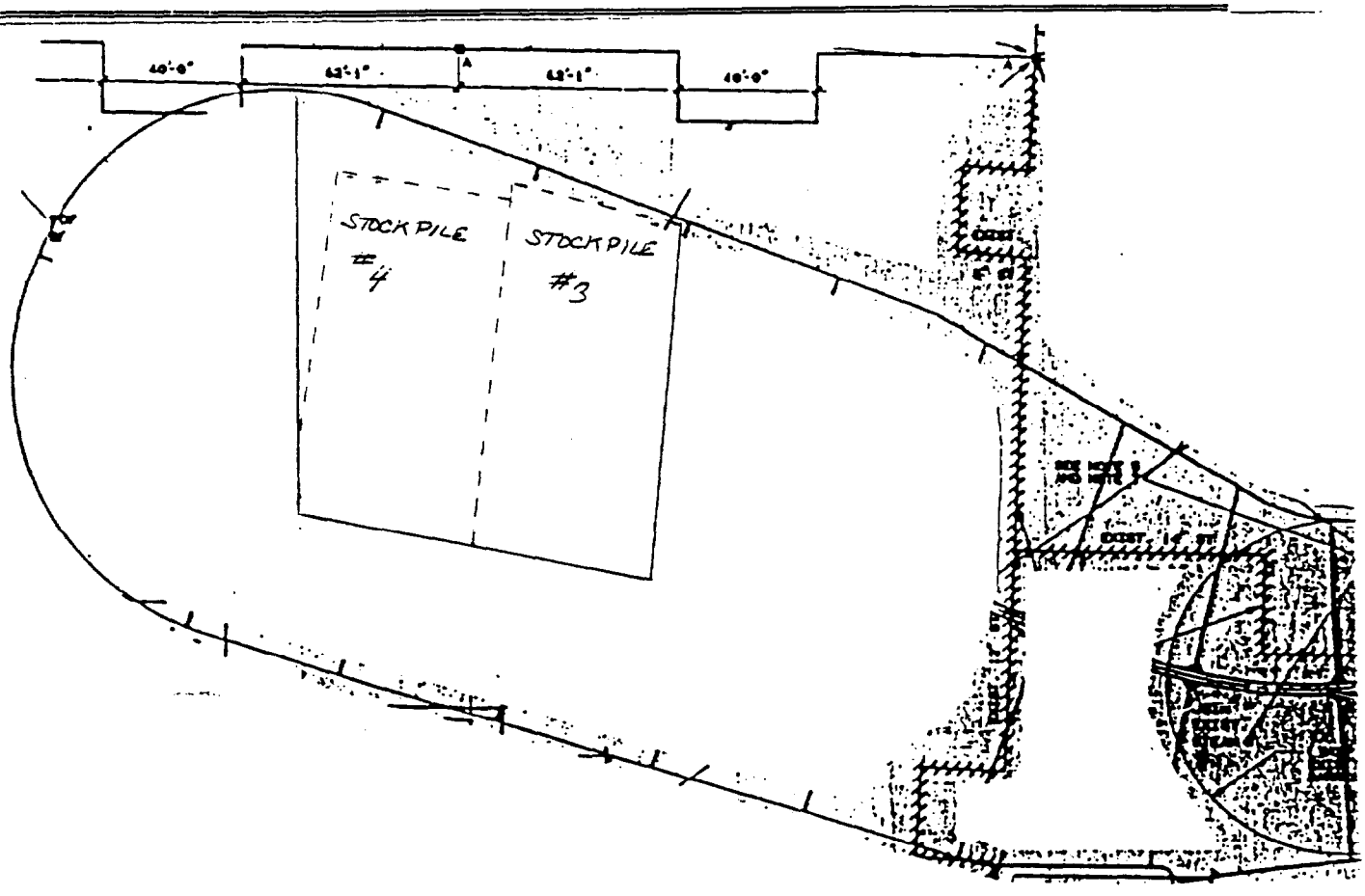
OBG TECHNICAL SERVICES

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. 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 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 _____
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

CLIENT: O'BRIEN & GERE

DATE: 29-Dec-92

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:08G-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

OUG-0295
R-13/ 92
D-11 , 12
RC 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) 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	✓					121	95				*RUSH**		NA
Composite #2	12-22-92	8:00am	water	1		✓	✓			121	96						NA
Trip Blank	12-22-92	8:00am	water	1				✓		121	97				Hold		NA
											↑	Hold					

Relinquished by: (Signature) ①	Date / Time	Received by: (Signature)	Relinquished by: (Signature) ④	Date / Time	Shipped via:
Thomas B. Gehle	12/22/92 1505 pm 3:05	Richard B. Hanson			
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:**		

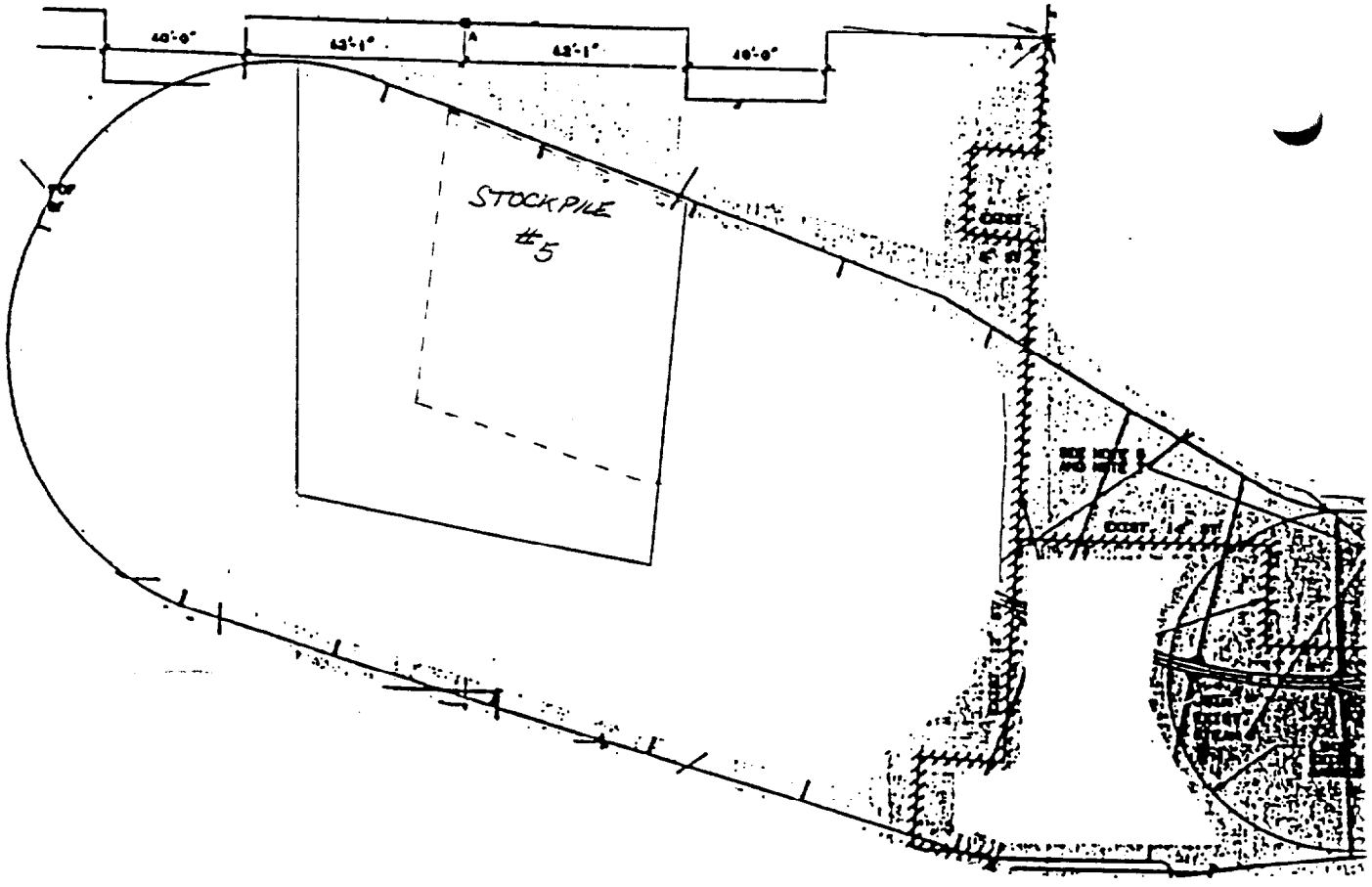
OBG TECHNICAL SERVICES

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, 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 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 _____
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

CLIENT: O'BRIEN & GERE

DATE: 29-Dec-92

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

ENT: O'BRIEN & GERE

PROJECT: NOS-INDIAN HEAD MD

REPORT PREPARED BY

CONTRACT NO:08G-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

OBG-0205
R-12/ 2
D-01 9/92
RC 2
LOC 1

AMERICAN ENVIRONME TAL 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 Miller

SAMPLE NUMBER	DATE	TIME	MATRIX	NO. CONTAINERS	TCLP Silver	Total Cyanide/Solid	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	✓					1981	95					*RUSH*		NA
Composite #2	12-22-92	8:00am	water	1		✓	✓			1981	96							NA
Trip Blank	12-22-92	8:00am	water	1				✓		1981	97					Hold		NA
												on Hold						

Relinquished by: (Signature) ①	Date / Time	Received by: (Signature)	Relinquished by: (Signature) ④	Date / Time	Shipped via:
Thomas B. Schuh	12/22/92 3:05 PM	Richard B. Nemeth			
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:**		

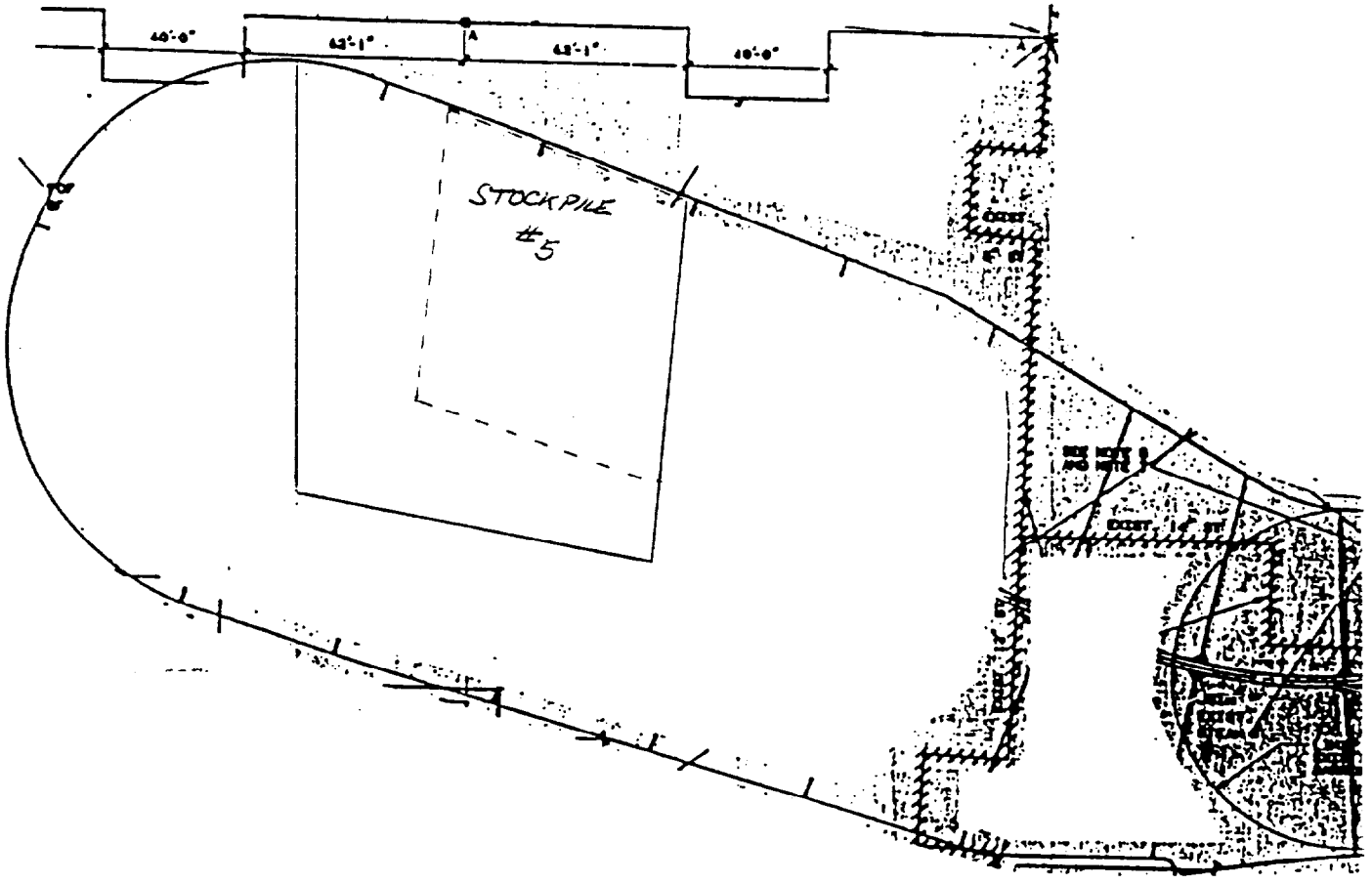
OBG TECHNICAL SERVICES

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 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

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

REPORT PREPARED BY

CONTRACT NO:OBG-0206

DATA RELEASED BY

REPORTING DATE: 11-Jan-93

MATRIX: WATER

****

CLIENT ID:		COMPOSITE #2A
AENM ID:		307
PARAMETERS	DETECTION LIMIT & UNITS	
---	---	
TSS	4.0 MG/L	637

OBG-0206
R-1/7/93
D-1/11/93
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) [signature]

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	12:45	Soil	1	✓		306	RUSH		
Composite #7A	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:
[signature]	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.**
			[signature]	1/7/93 10:55	
Relinquished by: (Signature) ③	**Date / Time**	**Received by: (Signature)**	**Remarks:**		

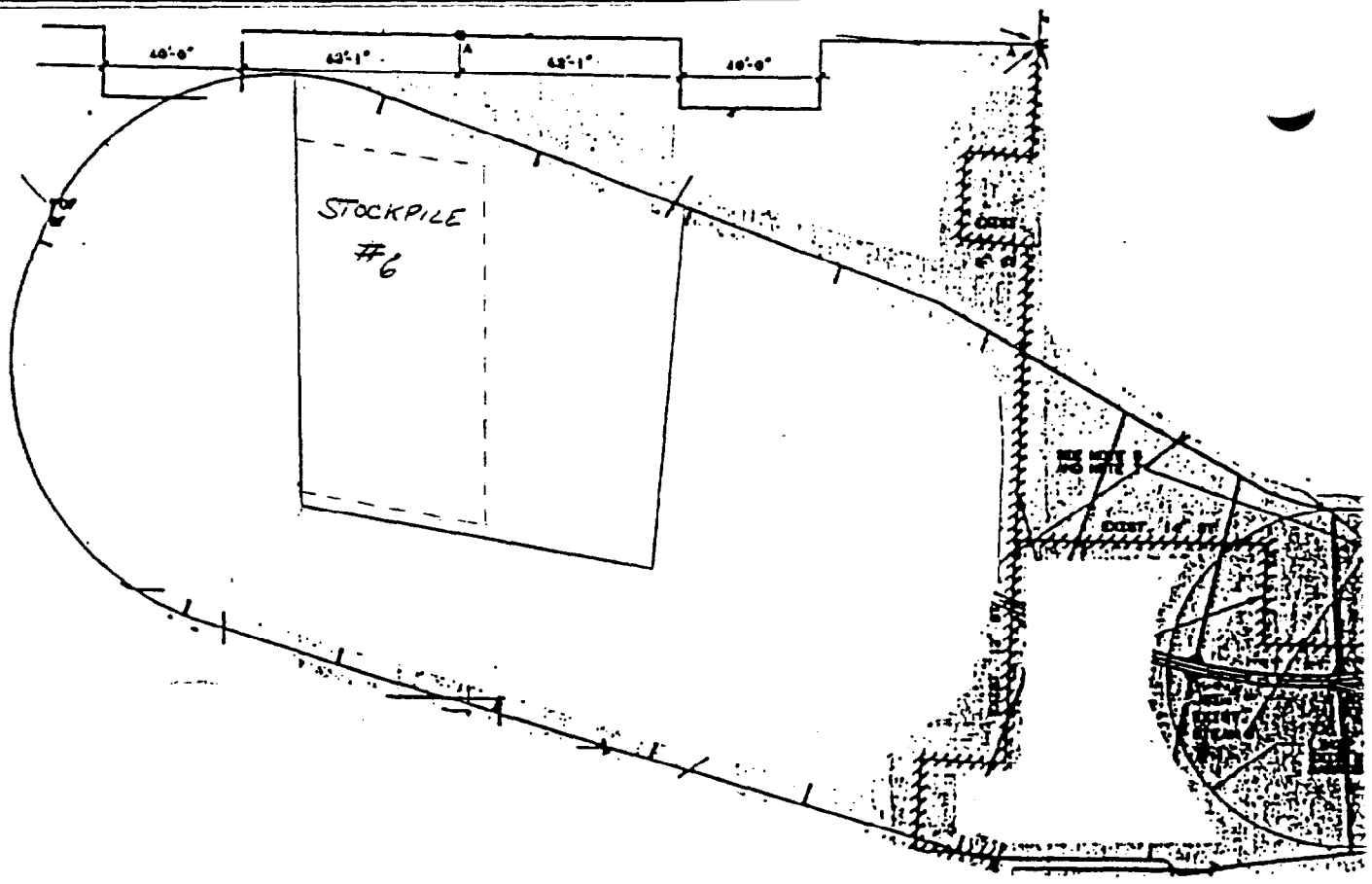
OBG TECHNICAL SERVICES

DAILY SAMPLE AND ANALYSIS REPORT

Date: 1-6-93 Sample Location: Explosion 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 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
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

CLIENT: OBG-0207

DATE: 12-Jan-93

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

CLIENT: 08G-0207

DATE: 12-Jan-93

AENM SAMPLE #: 399

CLIENT SAMPLE #: STOCKPILE #8

UNITS: ug/L in LEACHATE

ANALYTE	METHOD	REPORT LIMIT	SAMPLE RESULT
SILVER	6010	500	<500

GRG- GRG 1
R- 1/8/93
D- 1/12/93
GC- 0
LC- 1

AMERICAN ENVIRONM NTAL 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		REC #								REMARKS OR SAMPLE LOCATION	PRESERVATION: ICED	PRESERVATION: SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN
Stockpile ~~Composite~~ #7	1/7/93	10:45	soil	1	X		3986								RUSH		NA
Stockpile #8	1/7/93	3:30	soil	1	X		3991										NA

Relinquished by: (Signature) ①	Date / Time	Received by: (Signature)	Relinquished by: (Signature) ④	Date / Time	Shipped via:
Stuart Williams	1-8-92 9:25am	[illegible] 1/8/92			
Relinquished by: (Signature) ②	**Date / Time**	**Received by: (Signature)**	**Received for Laboratory by: (Signature)**	**Date / Time**	**Shipping Ticket No.**
			Christine Kimmerik	1/8/93 11:20p	
Relinquished by: (Signature) ③	**Date / Time**	**Received by: (Signature)**	**Remarks:**		

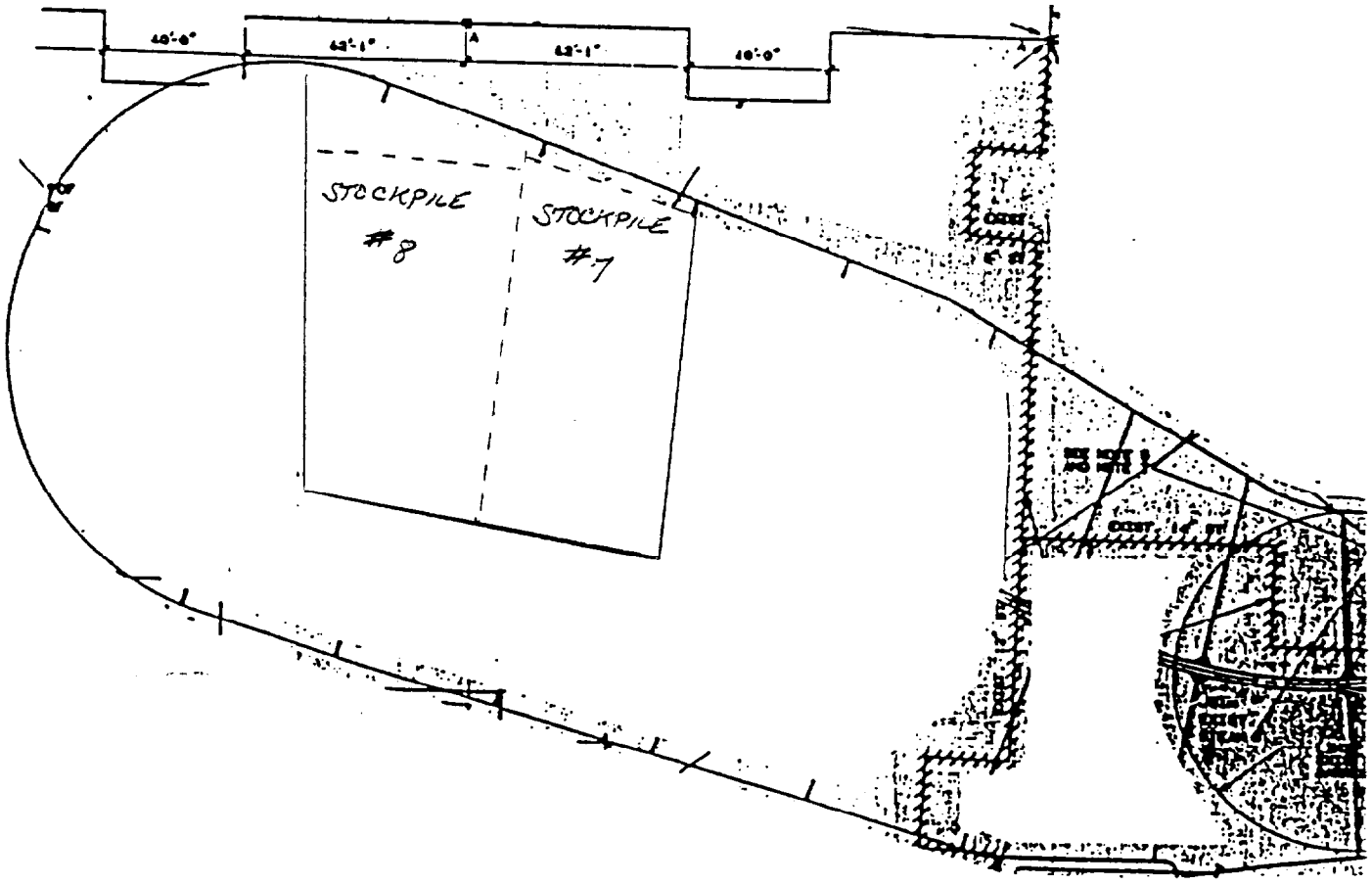
OBG TECHNICAL SERVICES

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 ENVIRONMENTAL NETWORK, INC.

CBU -
~~01550202~~

AMERICAN ENVIRONMENTAL NETWORK INC
9151 Rumsey Road, Columbia, MD 21045
(410) 730-8525

CHAIN OF CUSTODY RECORD

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		NA

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	[illegible] 12/8/92			
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:**		

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 Yemasik

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 16725

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: [signature]	DATE 11/21/92	TIME 80

COMMENTS:

METHOD OF SHIPMENT:

FED-X ON 11-20-92

airbill #3204819634 STAT. DELIVERY TO AMER ENV. NETWO

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

QCLEVEL 2

CLIENT: O'BRIEN & GERE

DATE: 01-Dec-92

AENM SAMPLE #: 16721

CLIENT SAMPLE #: SP-6 MIX ATG

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 $\mu g/l$ 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
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
Project Manager

obg-0201
Enclosures
aif

EMSI ENGINEERING INC.
6997 Gateway Court
MANASSAS, VIRGINIA 22110

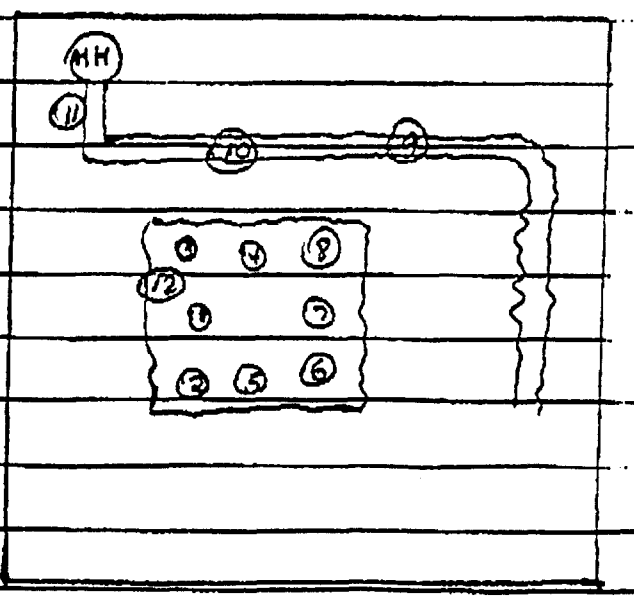
(703) 818-8519

TO O.B.G Technical Service

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)	

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.
(a) 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 gravel sand (Borrow material). Test result are on attachment sheet.



COPIES TO

FIELD REPORT

SIGNED Bijan

PRODUCT 2413 NEBS The Green Page 75411 To Order PHONE TOLL FREE 1-800-225-6380

EMSI ENGINEERING 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
1	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	"	"	95.2	
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	17.4	95.9	102	21.0	94.1	

* Approximate elevations, for lift measurements only

SHEET NO.
FILE NO.: CTS.WK1

JAN-21-93 THU 14:10 P.1

EMSI ENGINEERING INC.
6997 Gateway Court
MANASSAS, VIRGINIA 22110

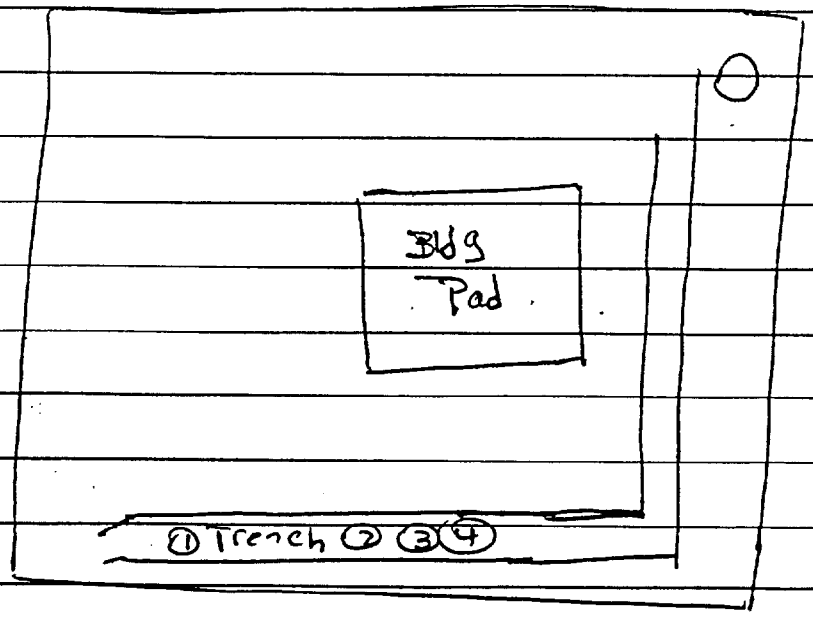
(703) 818-8519

TO

DATE 1-20-93	JOB NO. 93-106
PROJECT OBG Navy	
LOCATION Indian Head, MD	
CONTRACTOR OBG	OWNER Navy
WEATHER P. cloudy	TEMP 38.5 °at 11:00 AM °at PM
PRESENT AT SITE Tom (OBG), Bilan (EMSI) Frank (Jewett)	

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 required optimum moisture.
② Average compaction is 89% which is considered acceptable grass area
①②③④ Tests locations. Specs sec: 02221



COPIES TO

FIELD REPORT

SIGNED Bilan

PRODUCT 241-2 NEBS Inc. Groton Mass 01471 To Order PHONE TOLL FREE 1-800-225-6380

EMSI ENGINEERING INC.

COMPACTION TEST SUMMARY

MADE FOR:
LOCATION: Indian Head
PROJECT: OB-C

TECHNICIAN: Bilon
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-[redacted]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

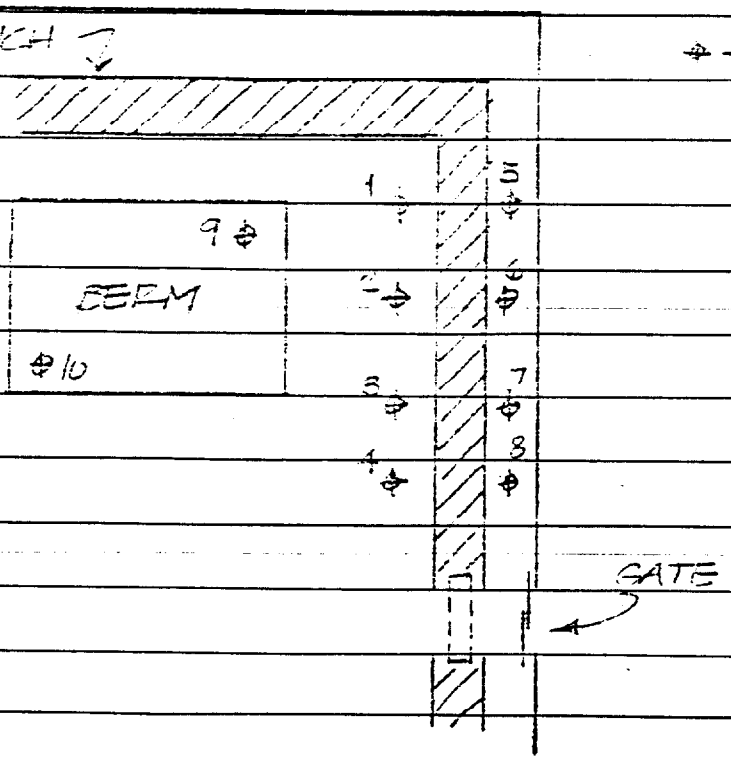
(703) 818-8519

TO OBG

DATE 01/28/93	JOB NO.
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	

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

PRODUCT 241-2 NEBS Inc., Groton, Mass. 01471. To Order PHONE TOLL FREE 1-800-225-6380

EMSI ENGINEERING INC.

6997 Gateway Court; Manassas, VA 22110

COMPACTION TEST SUMMARY

Made for: CBG

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	01-28-13	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	19.70T	133306
12-16-92	MRI	1-049 9-586	CKD	21.10T	133305
12-18-92	MRI	TRAILER 9-526	CKD	18.36	133292
12-21-92	MRI	TRACTOR 2717 TRAILER 9-536	CKD	19.08	133296
12-22-92	MRI	2-686 TRAIL 9-527	CKD	16.68	133294
12-22-92	MRI	2726 TRAILER 9526	CKD	23.30	133293
1-5-93	MRI	1-050 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	2530 9569	CKD	28.45	3363
1-16-93	MRI	2753 9526	CKD	17.01	3366
1-18-93	MRI	2719 9121	CKD	15.55	3364

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 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
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

CLIENT: OBG-0207

DATE: 12-Jan-93

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

CLIENT: OBG-0207

DATE: 12-Jan-93

AENM SAMPLE #: 399

CLIENT SAMPLE #: STOCKPILE #8

UNITS: ug/L in LEACHATE

ANALYTE	METHOD	REPORT LIMIT	SAMPLE RESULT
SILVER	6010	500	<500

Order - Order 1
R - 1/8/93
D - 1/12/93
GC - 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	REC #	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	3986	RUSH		NA
Stockpile #8	1/7/93	3:30	soil	1	X	3991			NA

Relinquished by: (Signature) ①	Date / Time	Received by: (Signature)	Relinquished by: (Signature) ④	Date / Time	Shipped via:
Stuart Williams	1-8-92 9:25AM	[illegible] 1/8/92			
Relinquished by: (Signature) ②	**Date / Time**	**Received by: (Signature)**	**Received for Laboratory by: (Signature)**	**Date / Time**	**Shipping Ticket No.**
			Kristine Kumanik	1/8/93 11:20p	
Relinquished by: (Signature) ③	**Date / Time**	**Received by: (Signature)**	**Remarks:**		

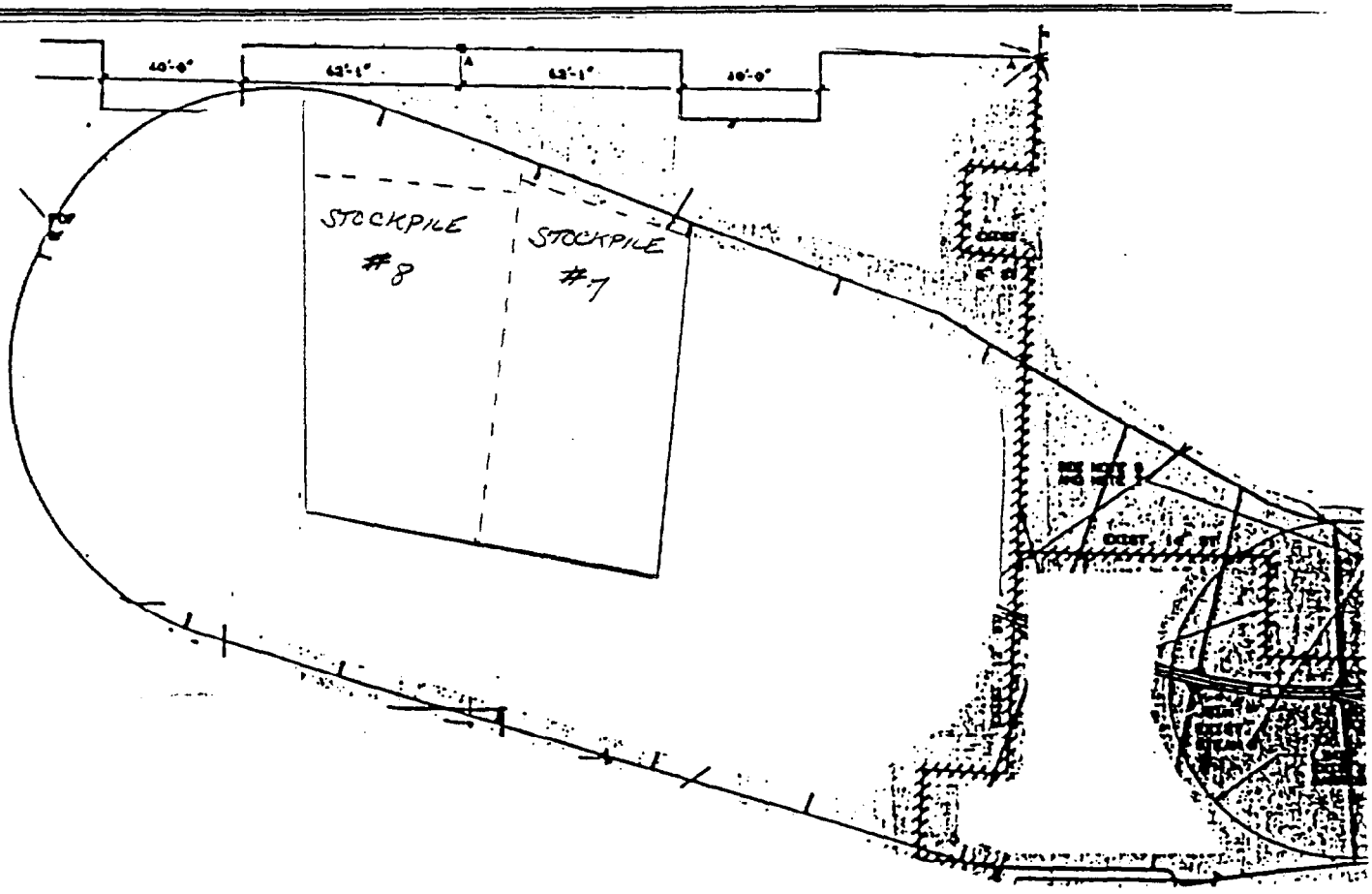
OBG TECHNICAL SERVICES

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 lag 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 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

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

QCLEVEL: 2

CLIENT: O'BRIEN & GERE

DATE: 20-Jan-93

UNITS: ug/L IN LEACHATE

ANALYTE	METHOD	METHOD BLANK	% RECOVERY LABORATORY CONTROL SAMPLE
SILVER	6010	<500	89

OBG-0200
R-11 #3
D-1/14/93
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: DB Jowett - Indian Head (OBG Tech)

SAMPLERS: (Signature) [signature]

SAMPLE NUMBER	DATE	TIME	MATRIX	NO. CONTAINERS	ANALYSIS REQUIRED: TCLP Silver	ACID										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:
[signature]	1-15-93 3:40	[signature]			
Relinquished by: (Signature) ②	**Date / Time**	**Received by: (Signature)**	**Received for Laboratory by: (Signature)**	**Date / Time**	**Shipping Ticket No.**
			[signature]	1/15/93	
Relinquished by: (Signature) ③	**Date / Time**	**Received by: (Signature)**	**Remarks:**		

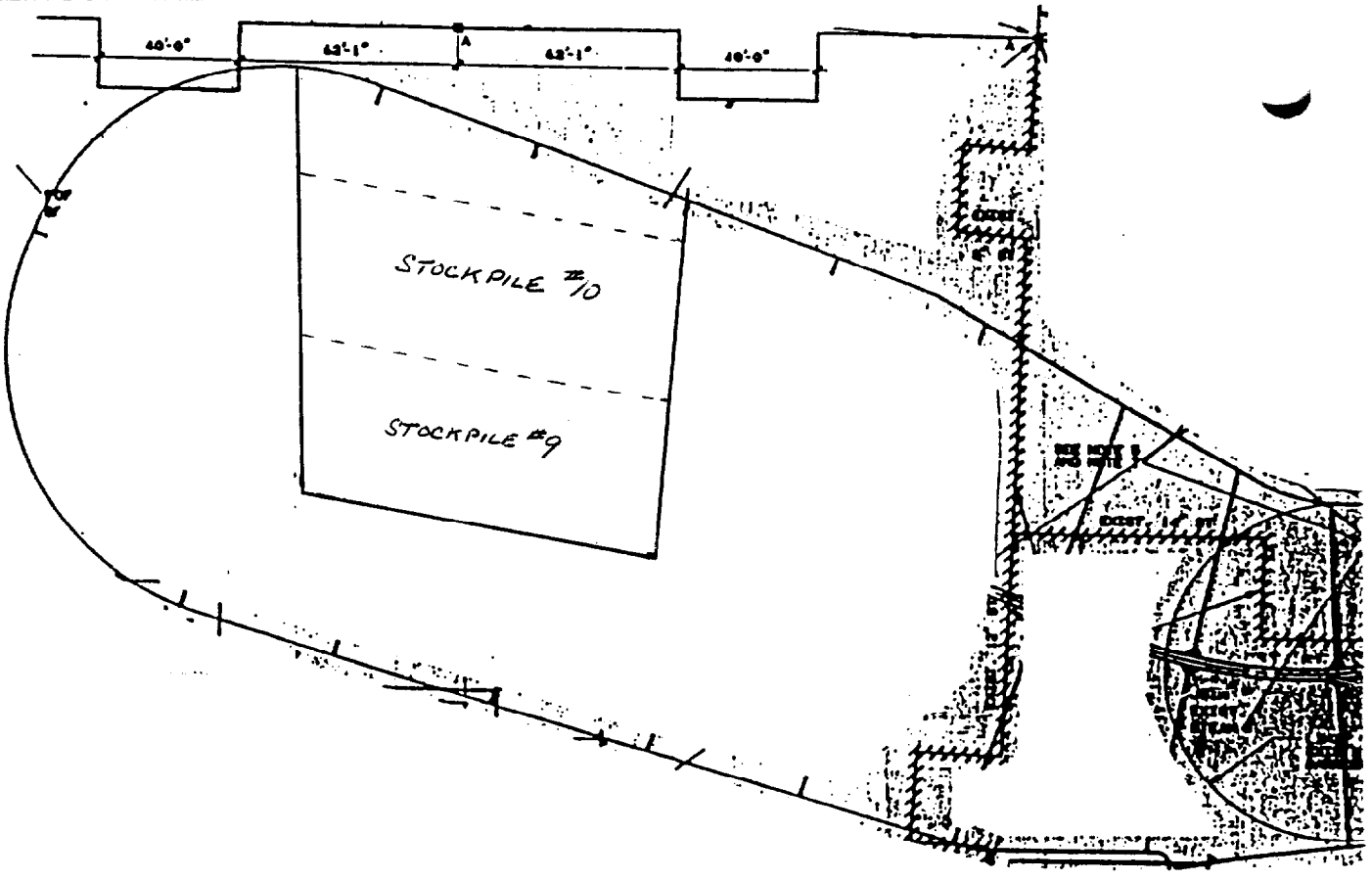
OBG TECHNICAL SERVICES

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 analyzed 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
CLIENT: OBG--0209 DATE: 22-Jan-93
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

CLIENT: OBG--0209

DATE: 22-Jan-93

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

CLIENT: OBG--0209

DATE: 22-Jan-93

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

CLIENT: OBG--0209

DATE: 22-Jan-93

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

GRC GRC1
R 1/21/93
D 1/21/93
LC-25
GC-2

AMERICAN ENVIRONMENTAL NETWORK, INC.

AMERICAN ENVIRONMENTAL NETWORK, INC.
9151 Rumsey Road, Columbia, MD 21045
(410) 730-8525

CHAIN OF CUSTODY RECORD

PROJECT: Jowett (Indian Head) Obs Tech

SAMPLERS: (Signature) [illegible]

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					4040		

Relinquished by: (Signature) ①	Date / Time	Received by: (Signature)	Relinquished by: (Signature) ④	Date / Time	Shipped via:
[illegible]	1/19/93 1515	[illegible]	[illegible]		
Relinquished by: (Signature) ②	**Date / Time**	**Received by: (Signature)**	**Received for Laboratory by: (Signature)**	**Date / Time**	**Shipping Ticket No.**
			[illegible]	1/20/93 9:20	
Relinquished by: (Signature) ③	**Date / Time**	**Received by: (Signature)**	**Remarks:**		

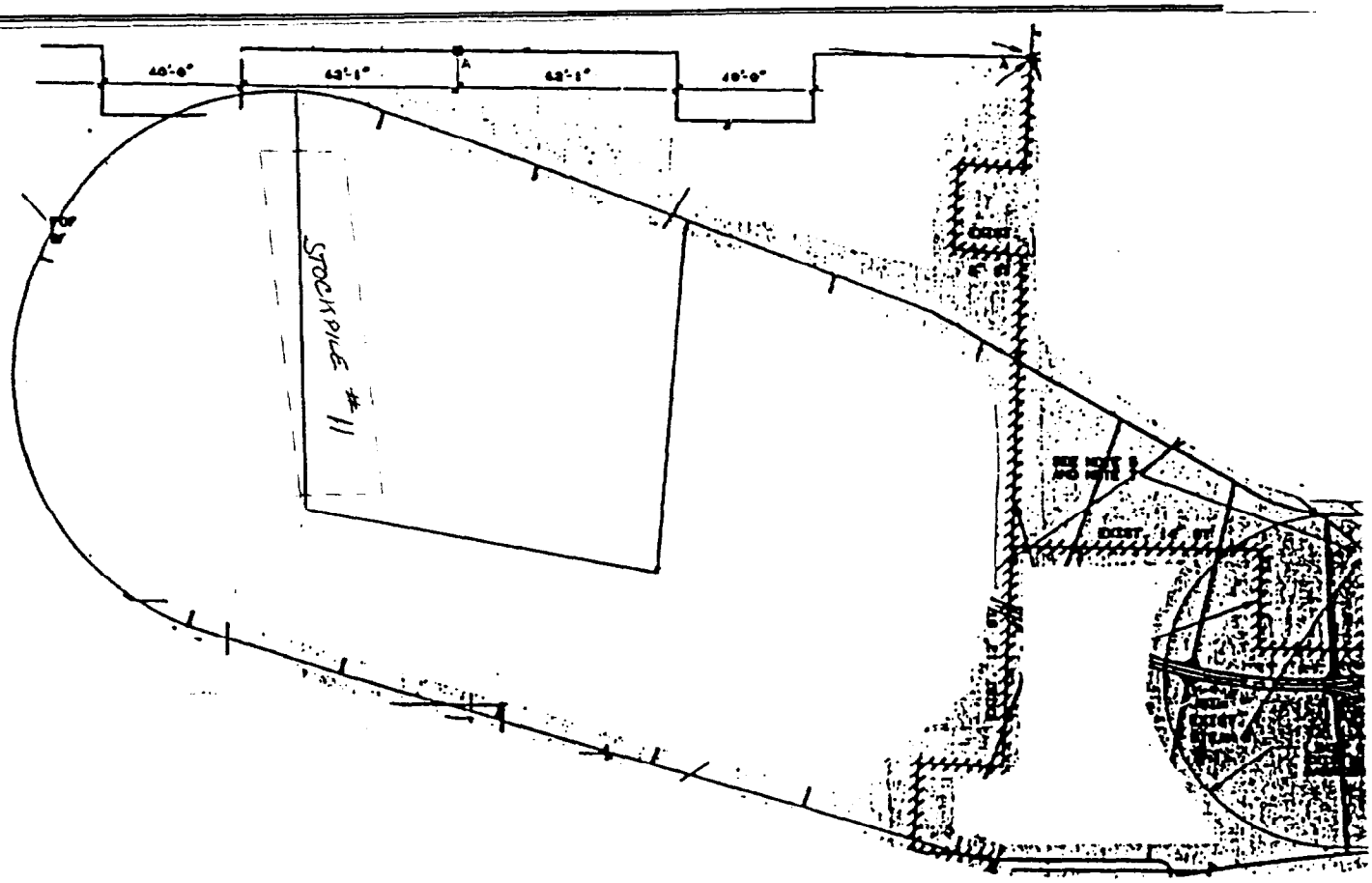
OBG TECHNICAL SERVICES

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.



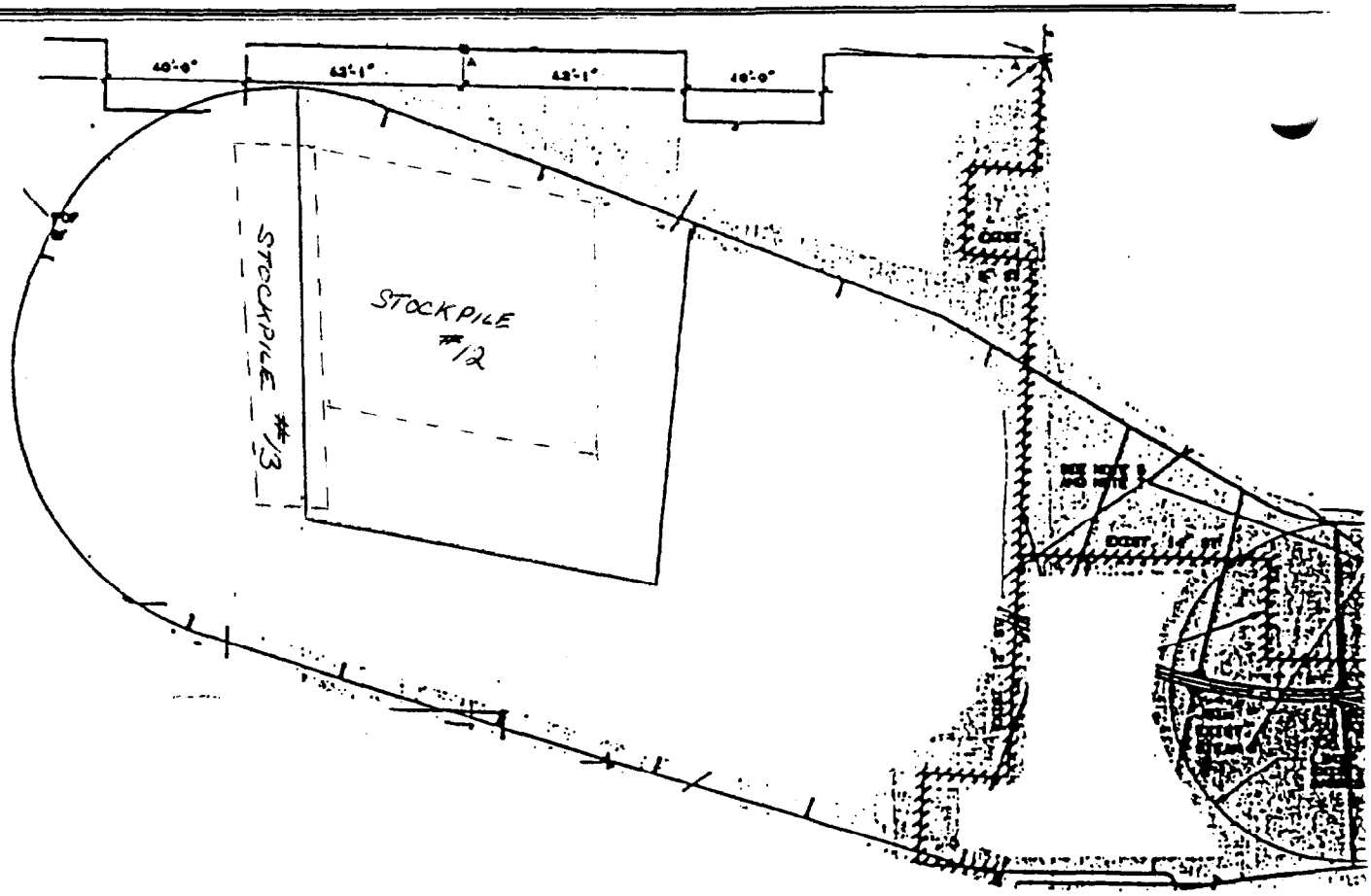
OBG TECHNICAL SERVICES

DAILY SAMPLE AND ANALYSIS REPORT

Date: 1-16-93 Sample Location: Explosion Berm

Sample Number: Stockpile #12 + #13 Time: 9:30 am / 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.



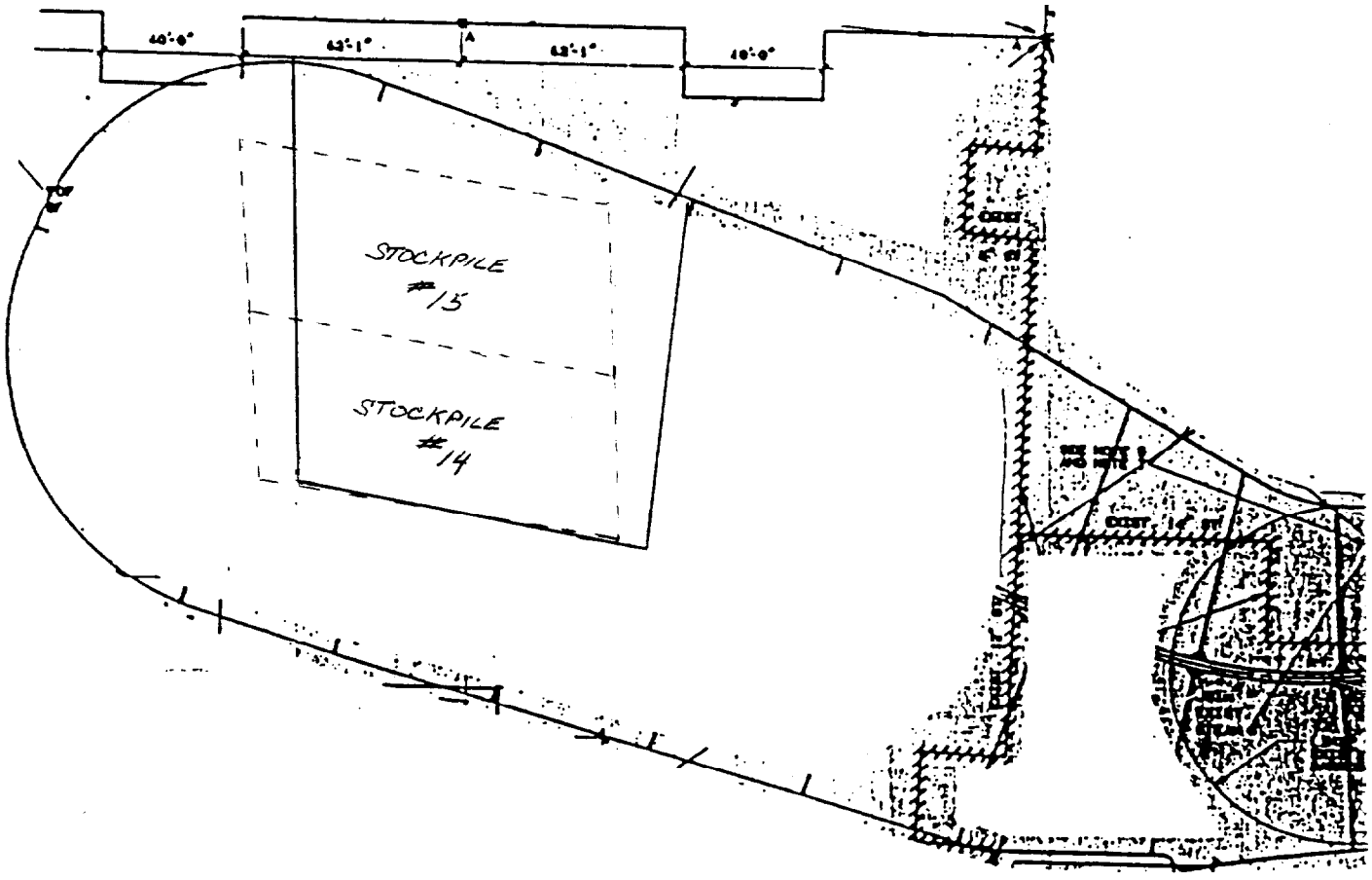
OBG TECHNICAL SERVICES

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.



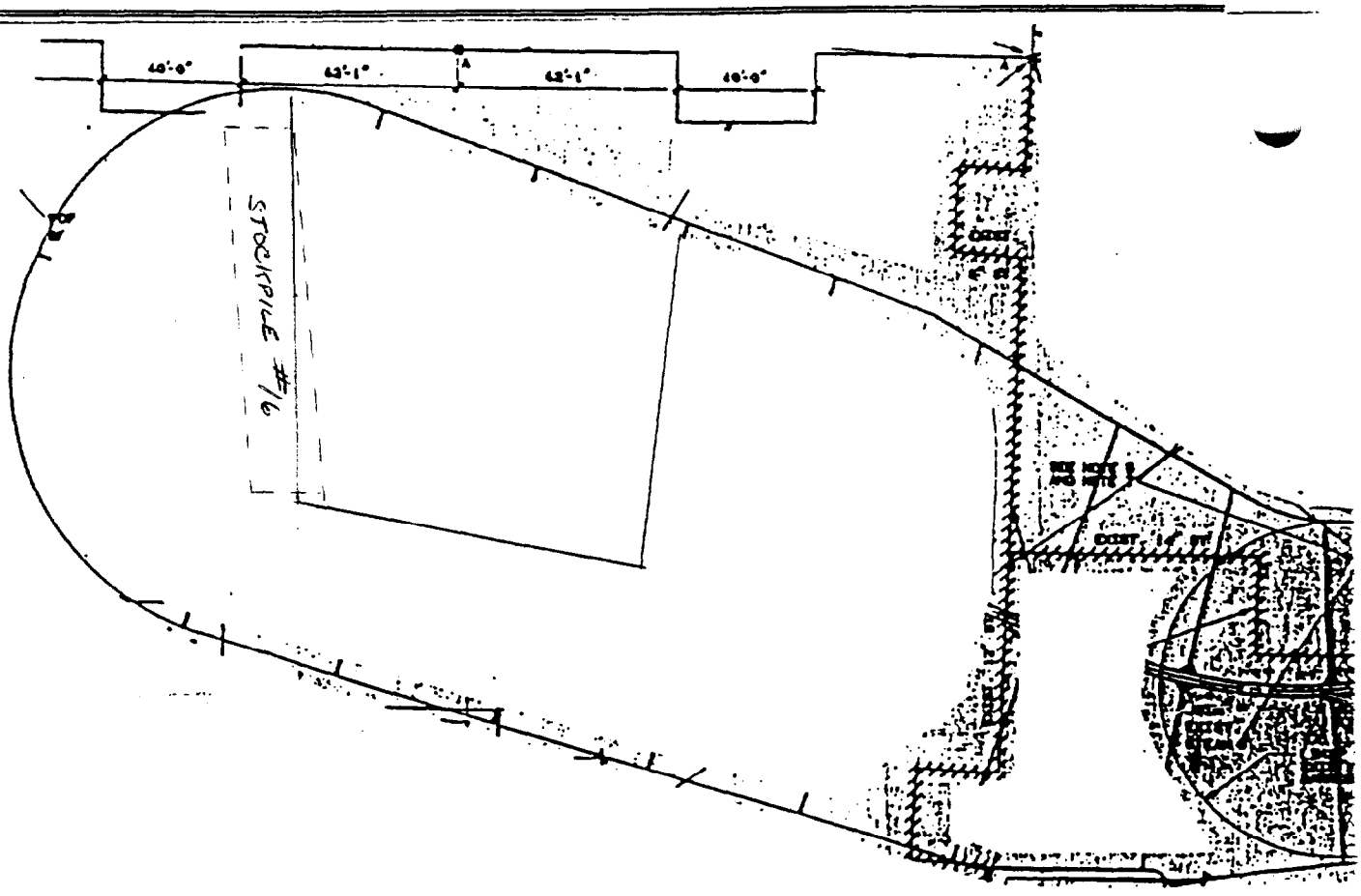
OBG TECHNICAL SERVICES

DAILY SAMPLE AND ANALYSIS REPORT

Date: 1-17-93 Sample Location: Explosion Berm

Sample Number: Stockpile #6 Time: 2:00 pm

Notes: Collected one - five part composite sample and analyzed the sample for TCLP silver. The treated soil was spread as shown below.



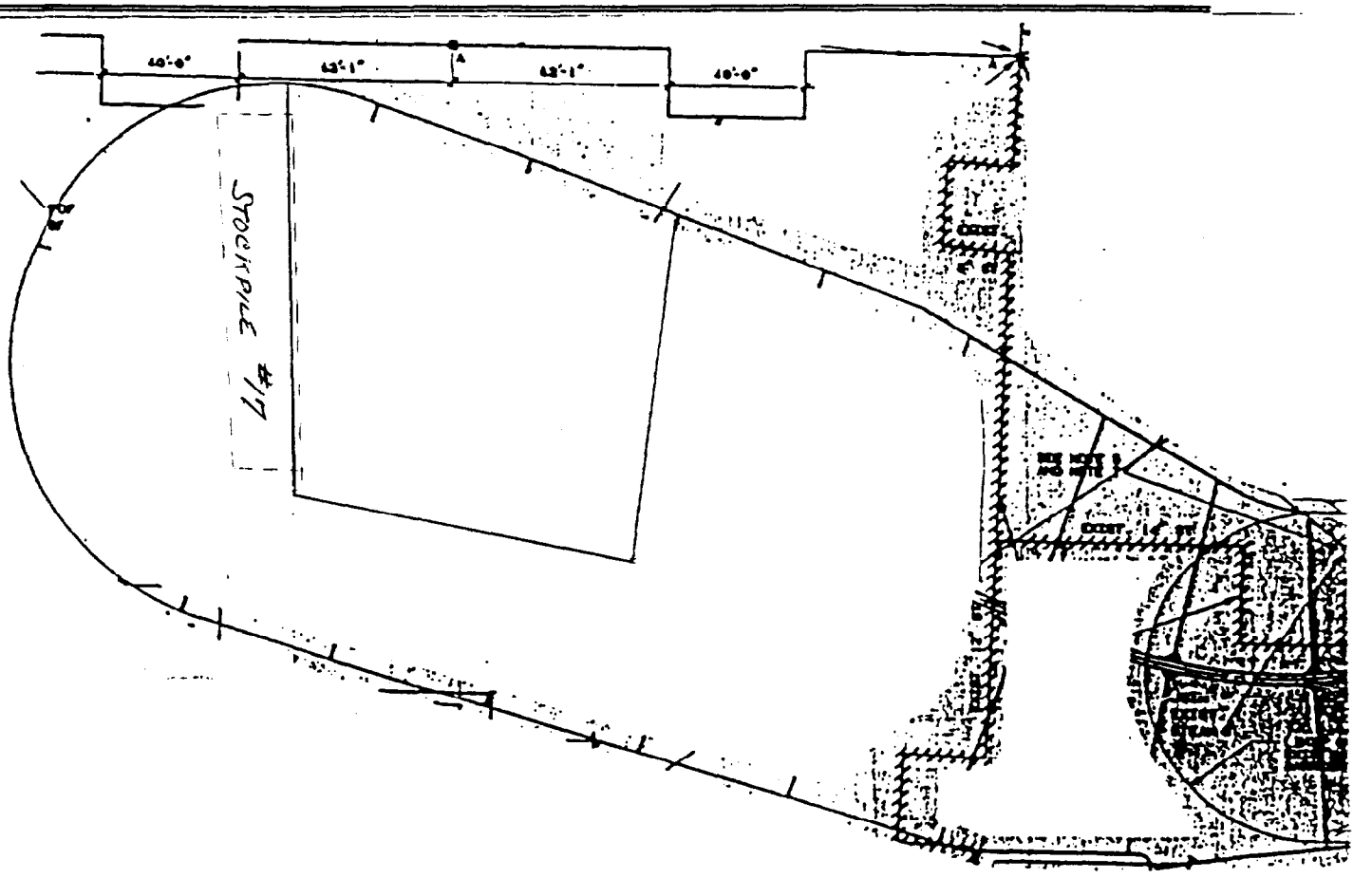
OBG TECHNICAL SERVICES

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 Joseph Dembowski
Joseph Dembowski
Inorganic Laboratory Manager

AMERICAN ENVIRONMENTAL NETWORK OF MARYLAND
ANALYTICAL REPORT

CLIENT: O'BRIEN & GERE

PROJECT: N.O.S. Indian Head Md

REPORT PREPARED BY KP

CONTRACT NO:OBG-0133

DATA RELEASED BY

REPORTING DATE: 15-Dec-92

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

CLIENT: O'BRIEN & GERE

DATE: 15-Dec-92

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

CHAIN OF CUSTODY RECORD

(410) 730-8525

PROJECT: NOS INDIANHEAD, MD

SAMPLERS: (Signature) Thomas B Wehle

SAMPLE NUMBER	DATE	TIME	MATRIX	NO. CONTAINERS	TCLP SILVER	TOTAL UNFILTERED SILVER	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	✓				116284					RUSH ☆		NA
COMPOSITE #1	12-8-92	1:15pm	WATER	1		✓	✓		116285							NA
TRIP BLANK	12-8-92	1:15pm	WATER	1				✓	116286					HOLD		NA

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	[illegible] 12/8/92			
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:**		

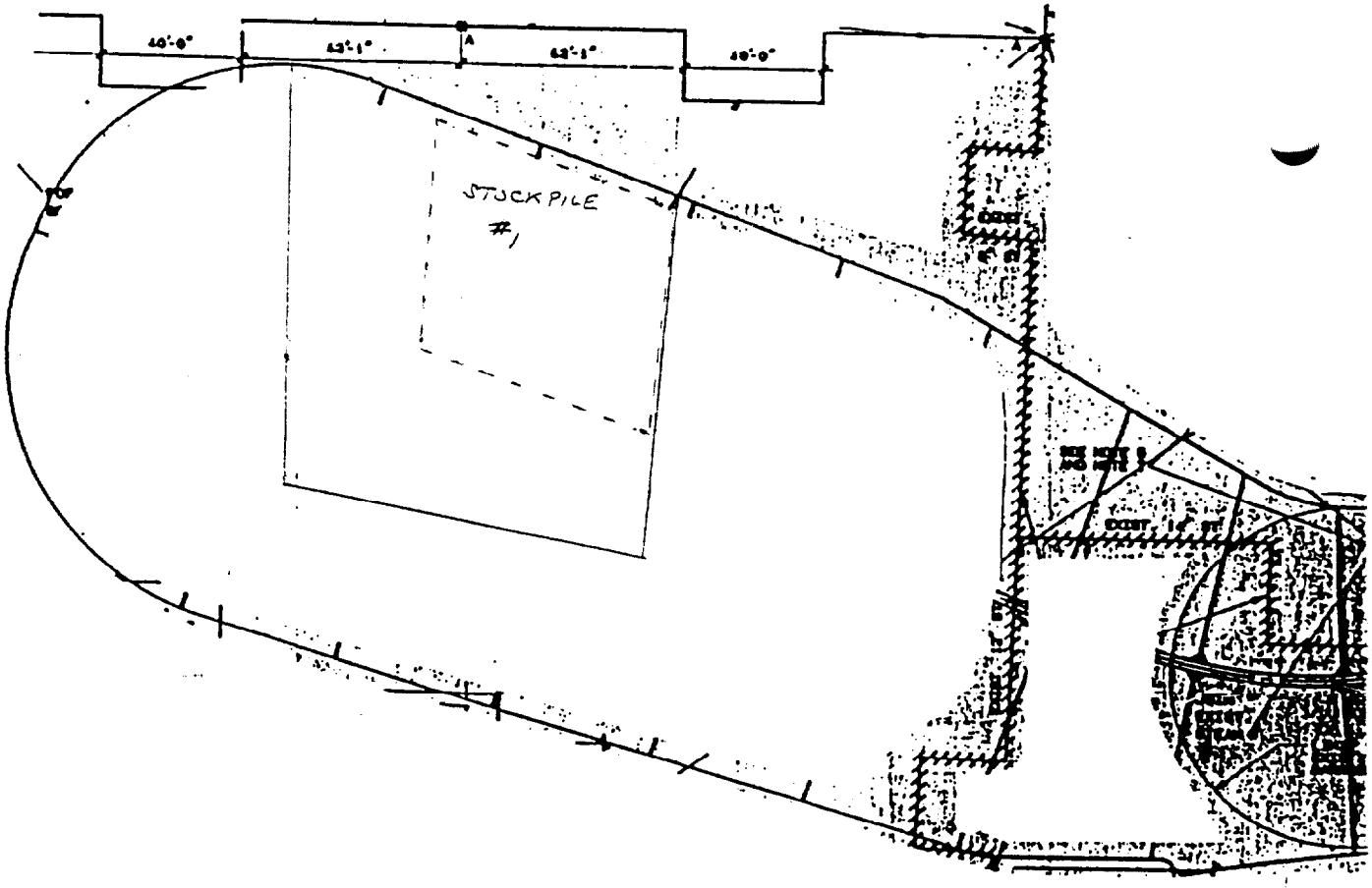
OBG TECHNICAL SERVICES

DAILY SAMPLE AND ANALYSIS REPORT

Date: 12-8-92 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 bag 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

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

REPORT PREPARED BY

CONTRACT NO:OBG-0206

DATA RELEASED BY

REPORTING DATE: 11-Jan-93

MATRIX: WATER

****

CLIENT ID:		COMPOSITE #2A
AENM ID:		307
PARAMETERS	DETECTION LIMIT & UNITS	
---	---	
TSS	4.0 MG/L	637

OBG-0206
R-1/7/93
D-1/11/93
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) Caudine 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:
Caudine Miller	1/7/93 9:15am	[illegible] 1/7/93			
Relinquished by: (Signature) ②	**Date / Time**	**Received by: (Signature)**	**Received for Laboratory by: (Signature)**	**Date / Time**	**Shipping Ticket No.**
			Douglas C. Goldy	1/7/93 10:55	
Relinquished by: (Signature) ③	**Date / Time**	**Received by: (Signature)**	**Remarks:**		

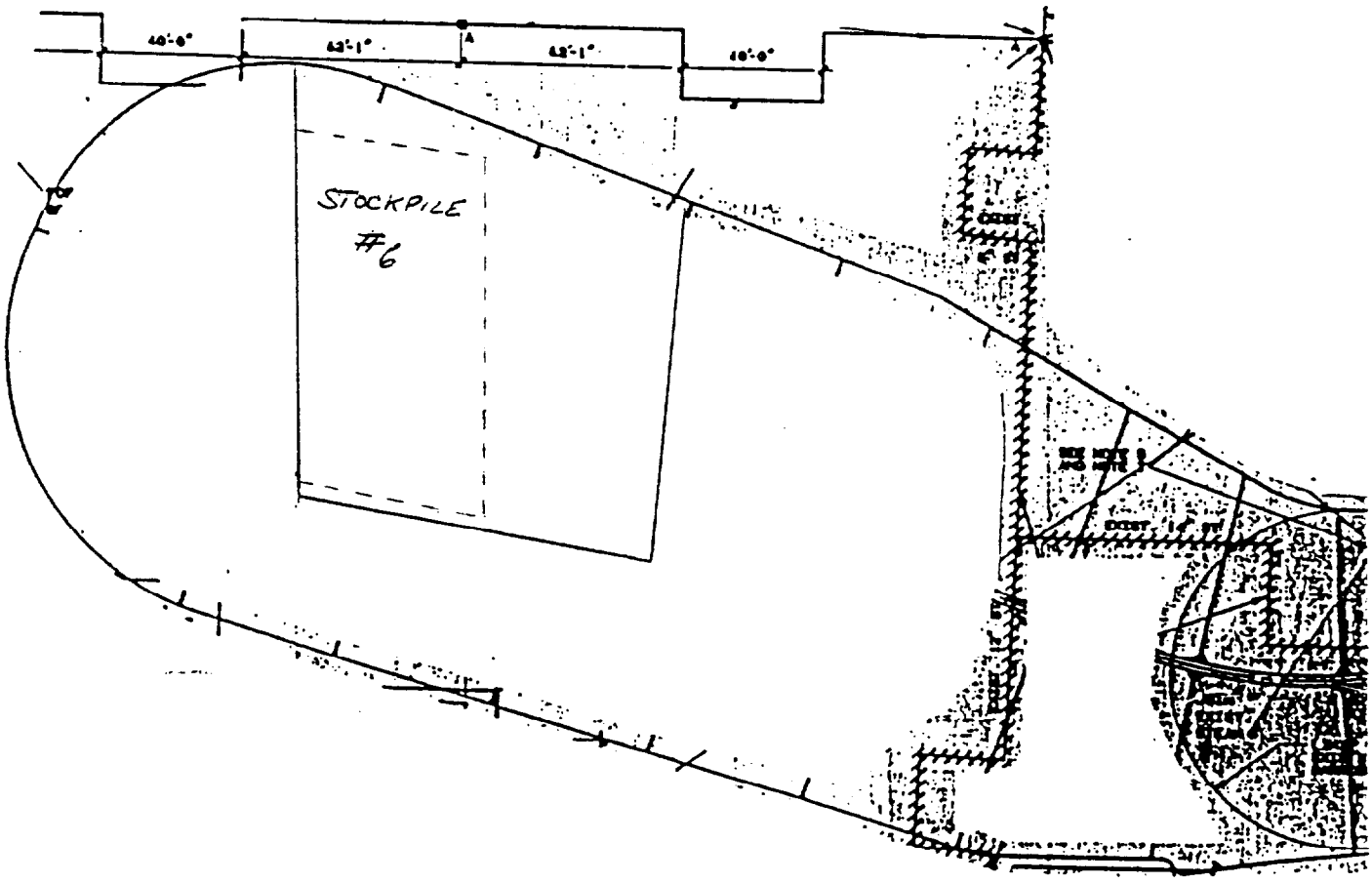
OBG TECHNICAL SERVICES

DAILY SAMPLE AND ANALYSIS REPORT

Date: 1-6-93 Sample Location: Explosion 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 _____
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

CHAIN OF CUSTODY RECORD

5151 Ramsey Road, Columbia, MD 21045
(410) 730-8525

PROJECT: N.O.S. INDIANHEAD, 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	✓		17719								*RUSH & Early		—

Relinquished by: (Signature) ①	Date / Time	Received by: (Signature)	Relinquished by: (Signature) ④	Date / Time	Shipped via:
	12/14/92 1430	* Kristina Yannicik			
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:**		

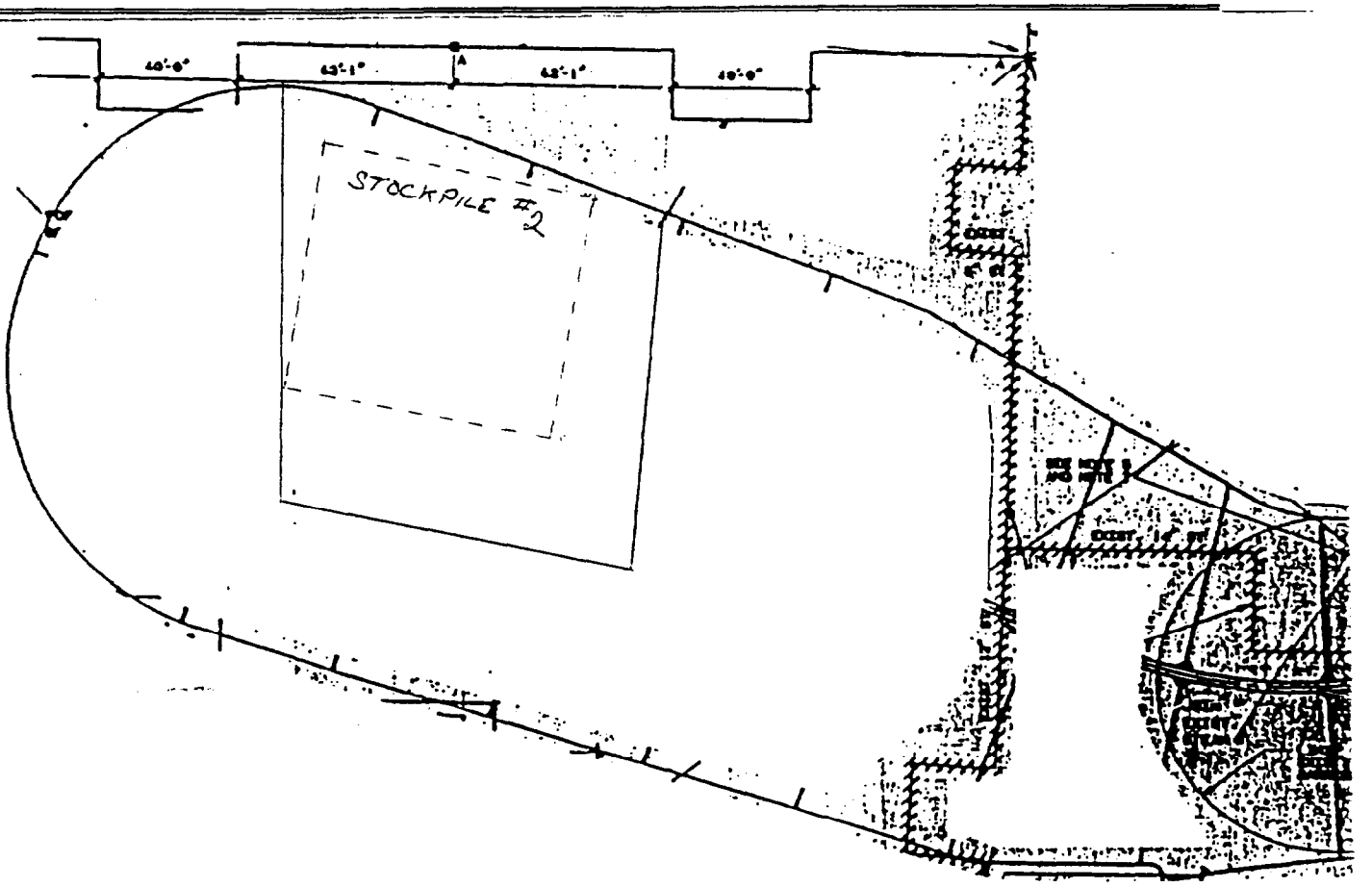
OBG TECHNICAL SERVICES

DAILY SAMPLE AND ANALYSIS REPORT

Date: 12-14-92 Sample Location: Explosion Beam

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

DATE: 18-Dec-92

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

CLIENT: OBG--0204

DATE: 18-Dec-92

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

PROJECT: NOS In[illegible] in Head, MD

SAMPLERS: (Sig[illegible]re) Caroline Miller

SAMPLE NUMBER	DATE	TIME	MATRIX	NO. CONTAINERS	TCLP SVOC		178	44							REMARKS OR SAMPLE LOCATION	ICED	SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN
Stockpile #3	12-16-92	1:39p	Soil	1	✓		178	44							Rush		—
Stockpile #4	12-16-92	1:39p	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 1800 2:9p	[illegible]			
Relinquished by: (Signature) ②	**Date / Time**	**Received by: (Signature)**	**Received for Laboratory by: (Signature)**	**Date / Time**	**Shipping Ticket No.**
			[illegible]	12/17/92	11:51
Relinquished by: (Signature) ③	**Date / Time**	**Received by: (Signature)**	**Remarks:**		

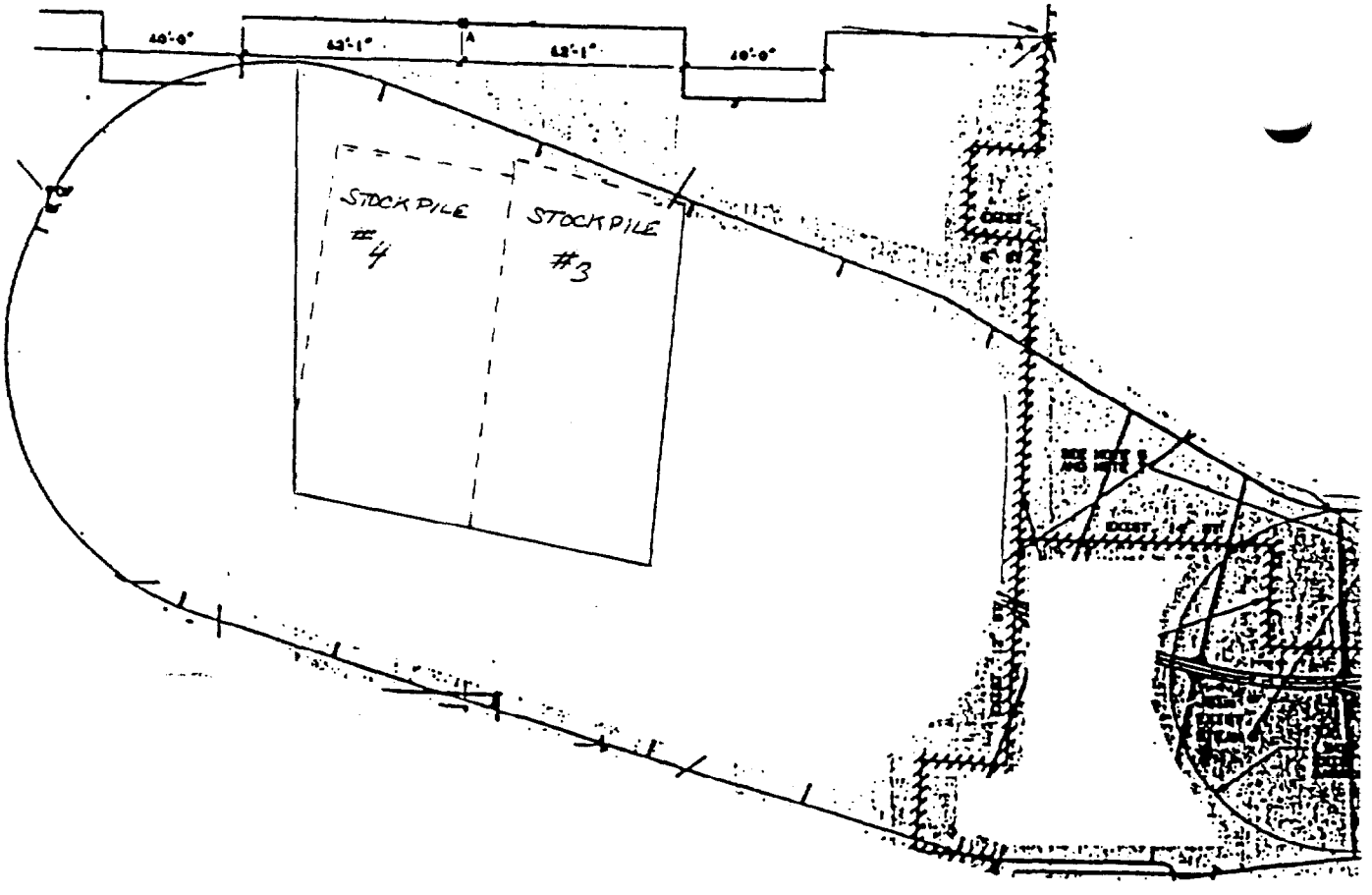
OBG TECHNICAL SERVICES

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.



EARTHWORK

Transmittal Form Number: [illegible]
(Submital Log)

From: [illegible] Date: [illegible]
(Contractor)

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

N/O 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

John Mello 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. [illegible] Date 9-18-92

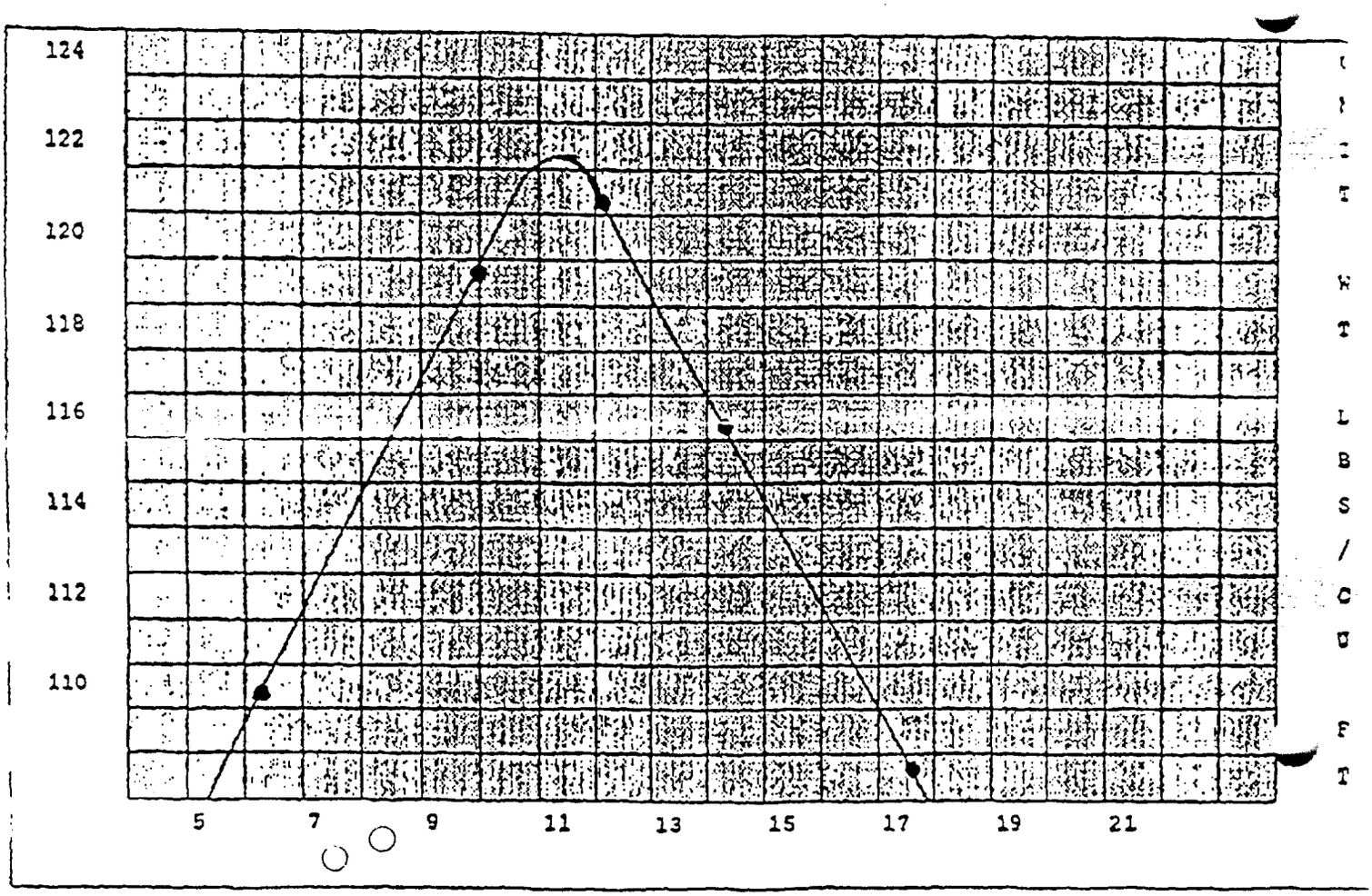
ROB TAYLOR ENGINEERING, INC
317 Great Mills Lane
LEXINGTON PARK, MARYLAND 20653

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	13.65
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



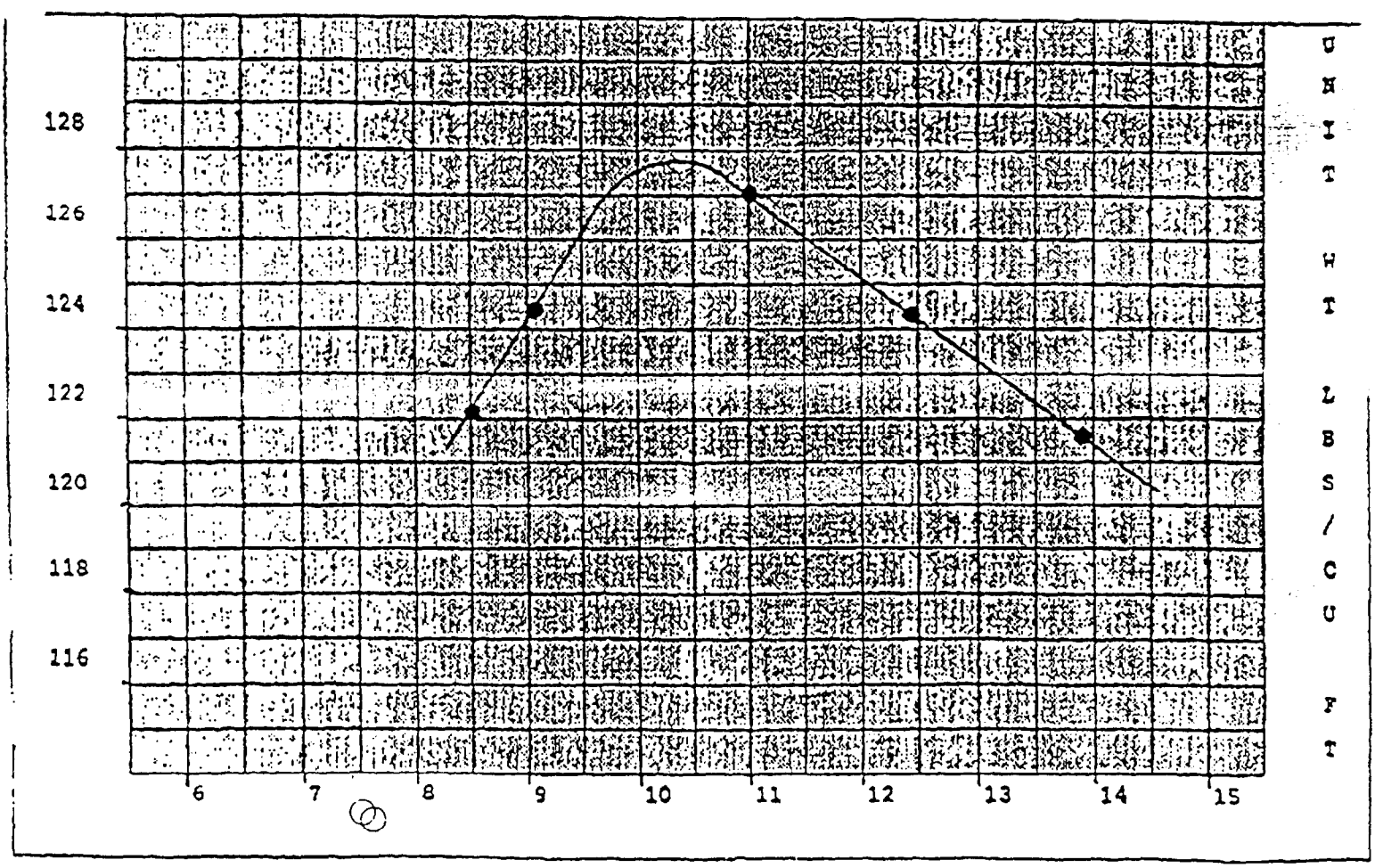
JOB TAYLOR ENGINEERING, INC.
317 Great Mills Lane
LEXINGTON PARK, MARYLAND 20653

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

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

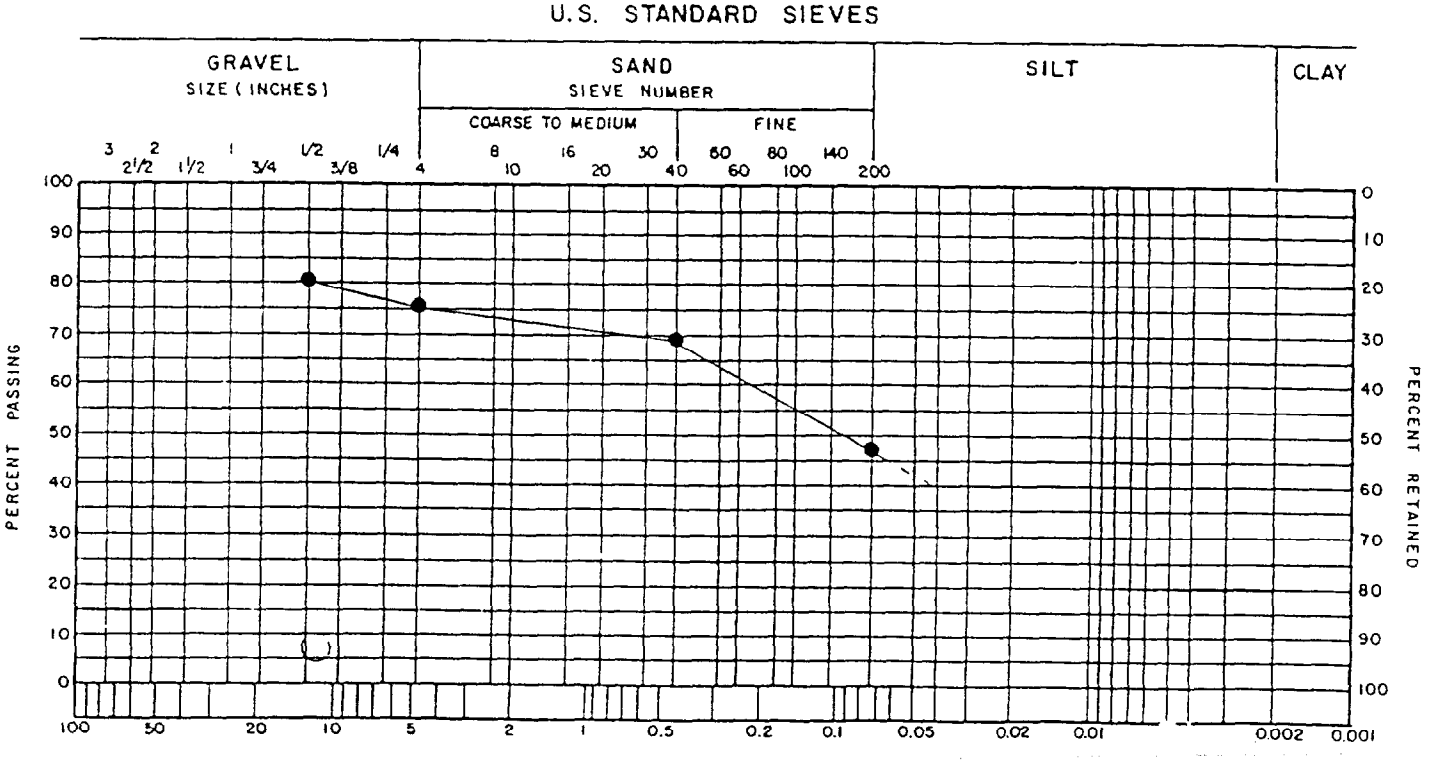
SIEVE NUMBER: TWO

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.

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] Date: [illegible]
(Contractor)

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;
(X) Approved, as noted; ( ) _____
Remarks:

[illegible]

From: ROICC Code 09RB10 Date: 9-23-92
To: JOWETT
Submittal is: (X) Approved; ( ) returned for correction;
(X) 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

John Quello 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-0344, 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 Martin Date 9-18-92

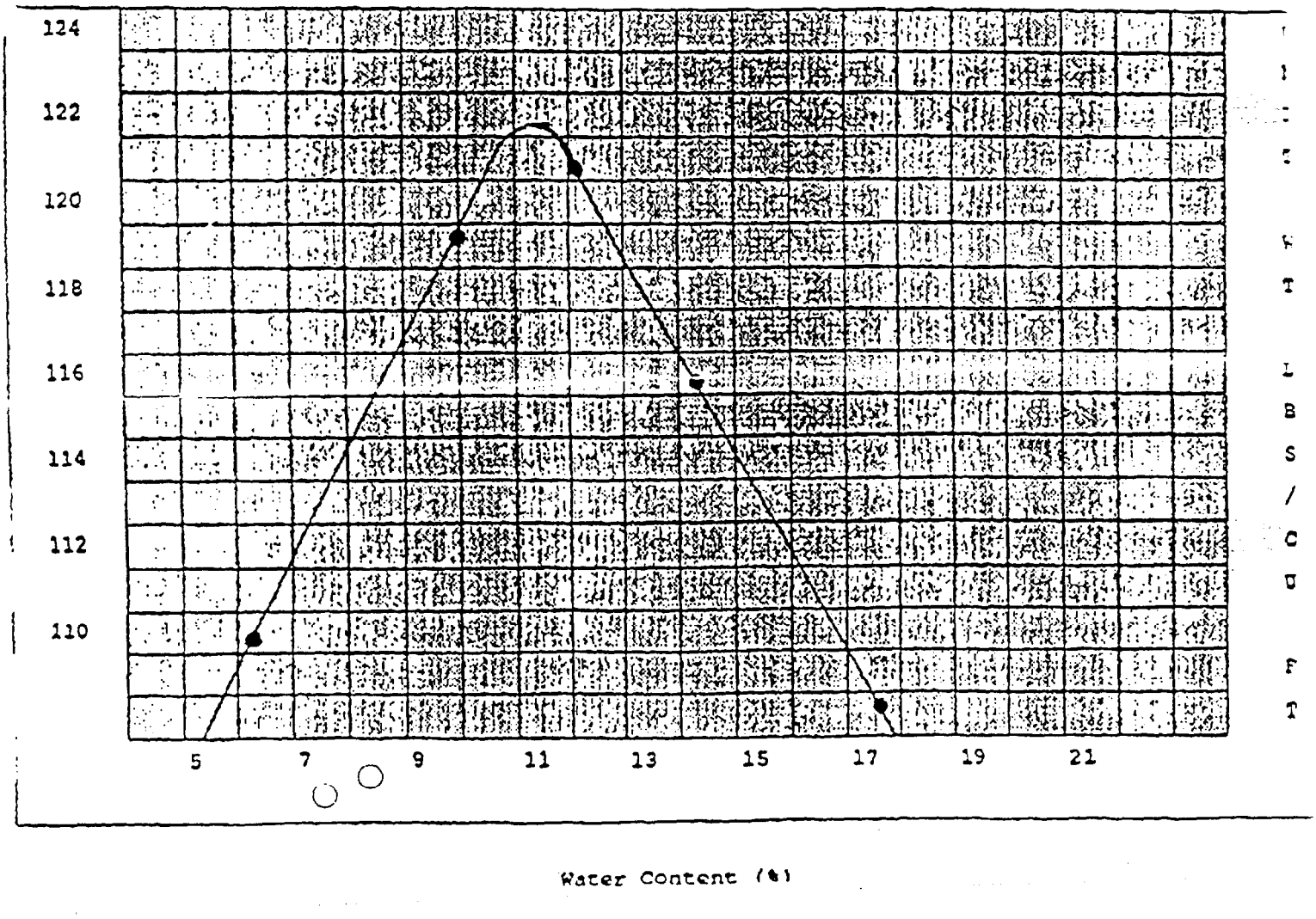
ROB TAYLOR ENGINEERING, INC
317 Great Mills Lane
LEXINGTON PARK, MARYLAND 20653

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



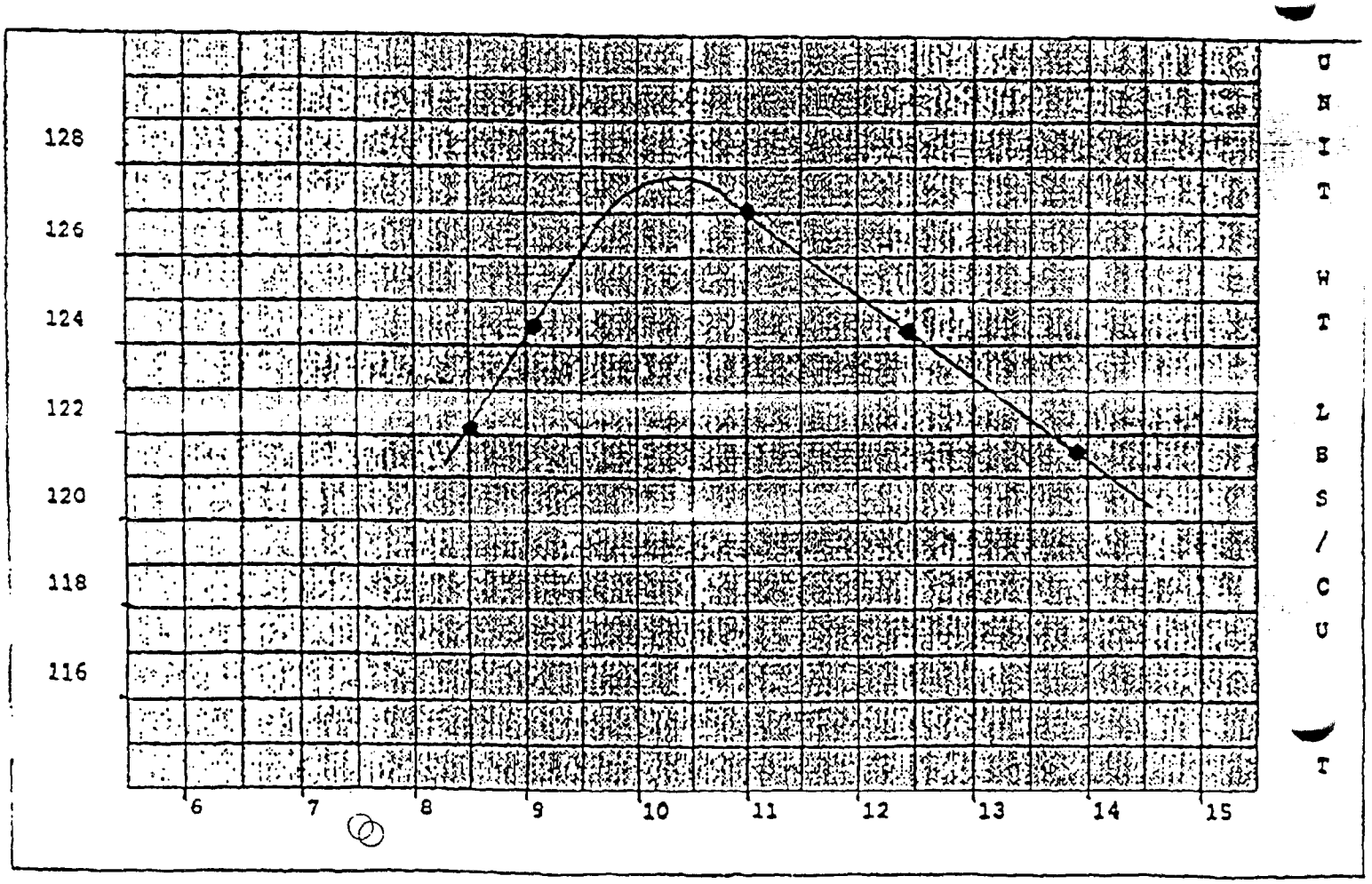
JOB TAYLOR ENGINEERING, INC.
317 Great Mills Lane
LEXINGTON PARK, MARYLAND 20653

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

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

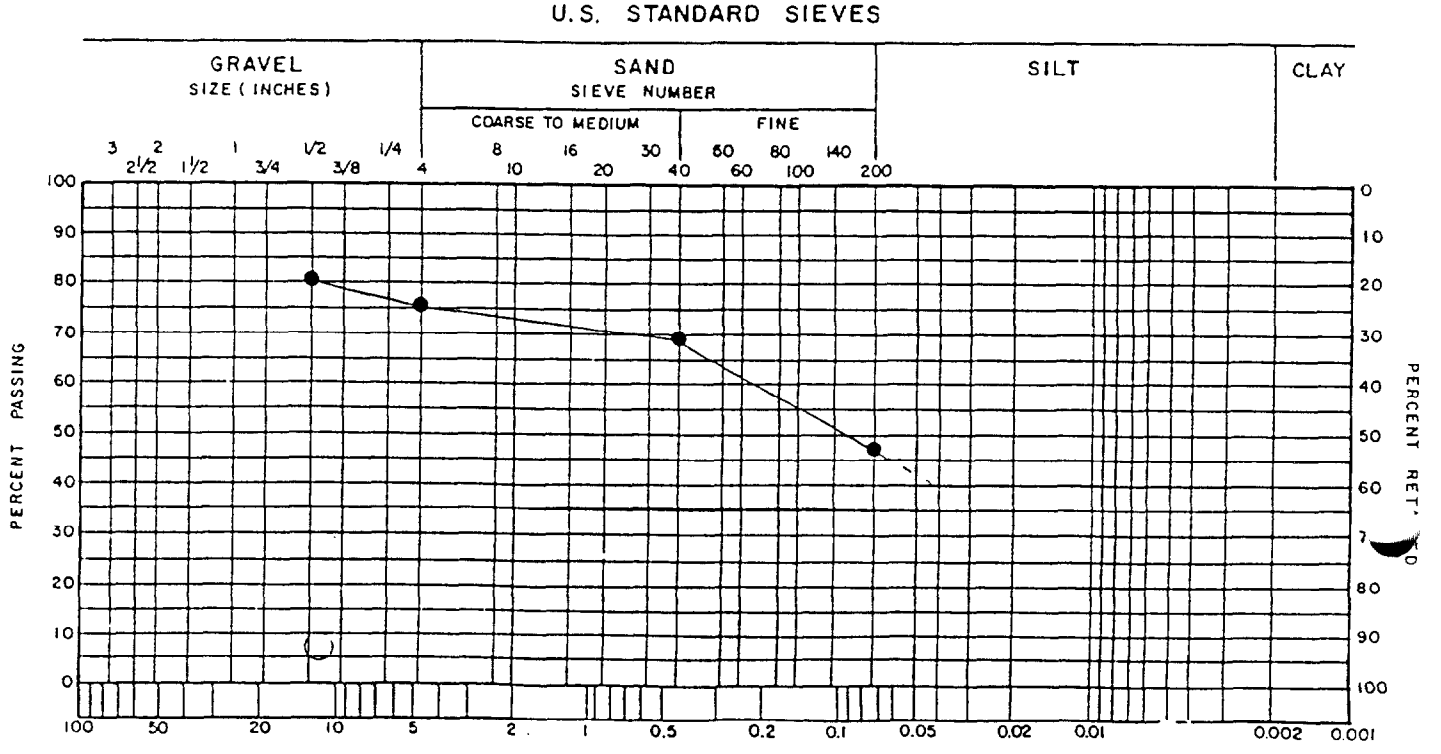
CLIENT: RAYE VEST EXCAVATING, INC. JOB NUMBER: 92-166

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.

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

RAYE VEST EXCAVATING, INC.

P. O. BOX 669

WHITE PLAINS, MARYLAND 20695

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] Date: [illegible]
(Contractor)

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;
( ) 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

John Kuello 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. John Mallo 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
- 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

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

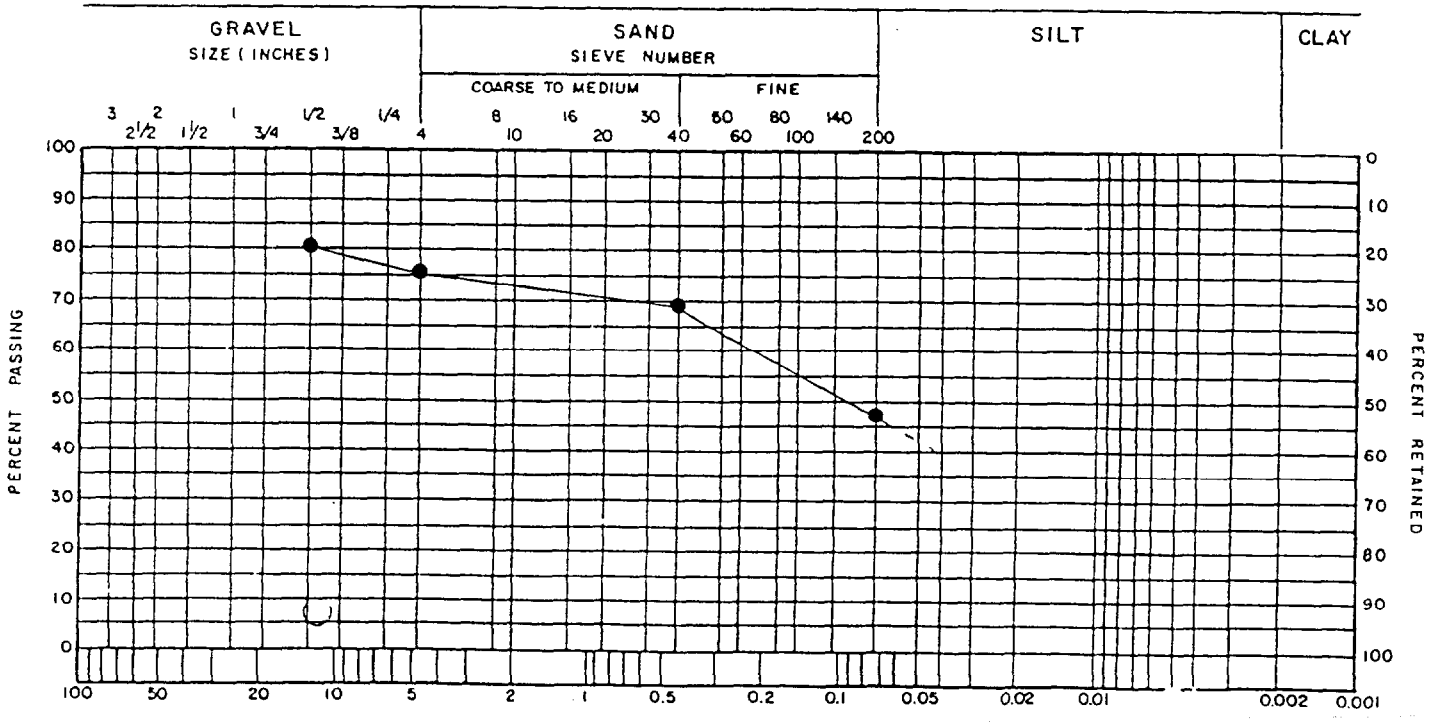
DATE OF TESTING: AUGUST 31, 1992

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		

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.

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

RAYE VEST EXCAVATING, INC.

P. O. BOX 669

WHITE PLAINS, MARYLAND 20695

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

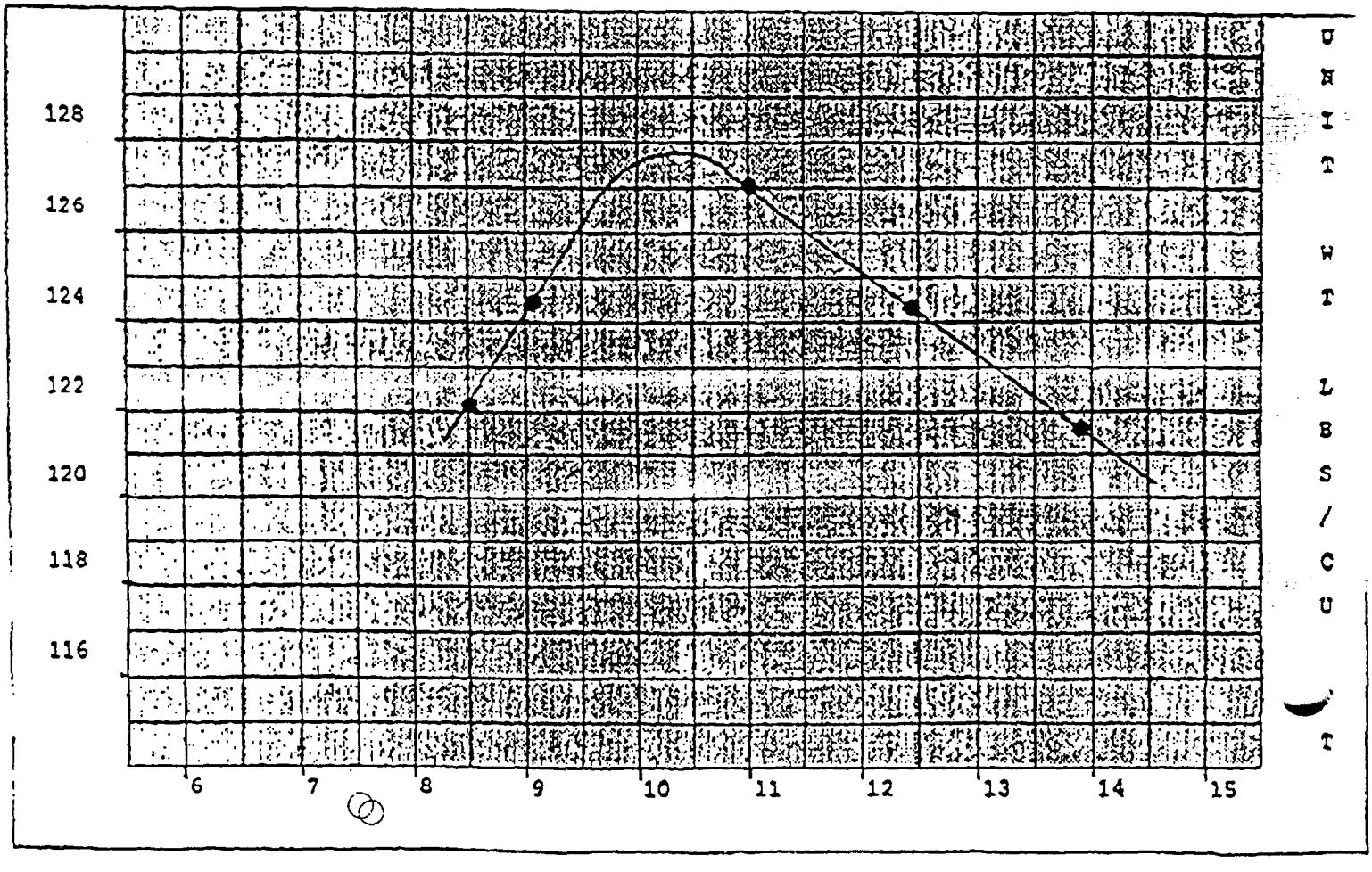
JOB TAYLOR ENGINEERING, INC.
317 Great Mills Lane
LEXINGTON PARK, MARYLAND 20653

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



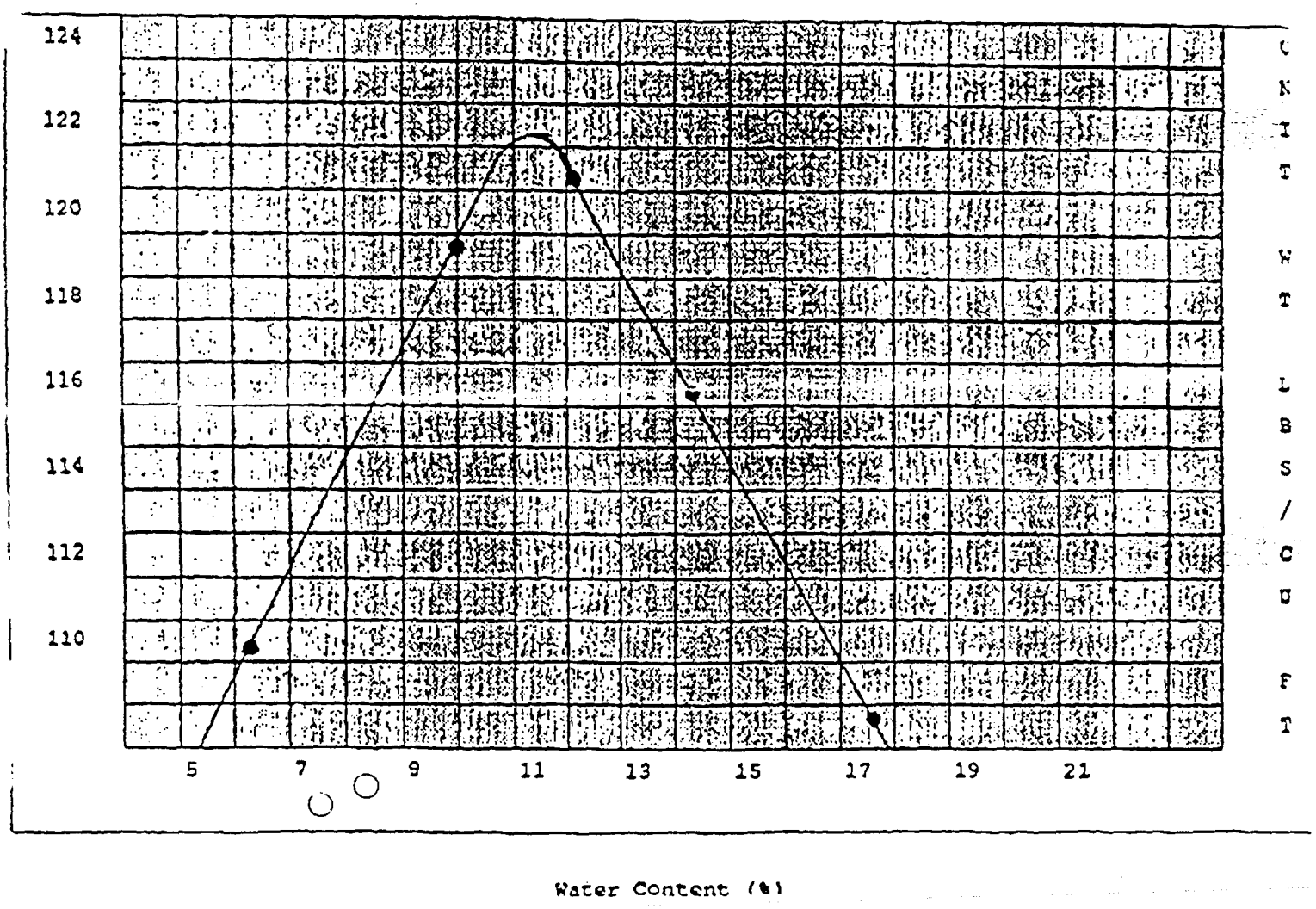
BOB TAYLOR ENGINEERING, INC
317 Great Mills Lane
LEXINGTON PARK, MARYLAND 20653

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
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



APPENDIX H: 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

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

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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.

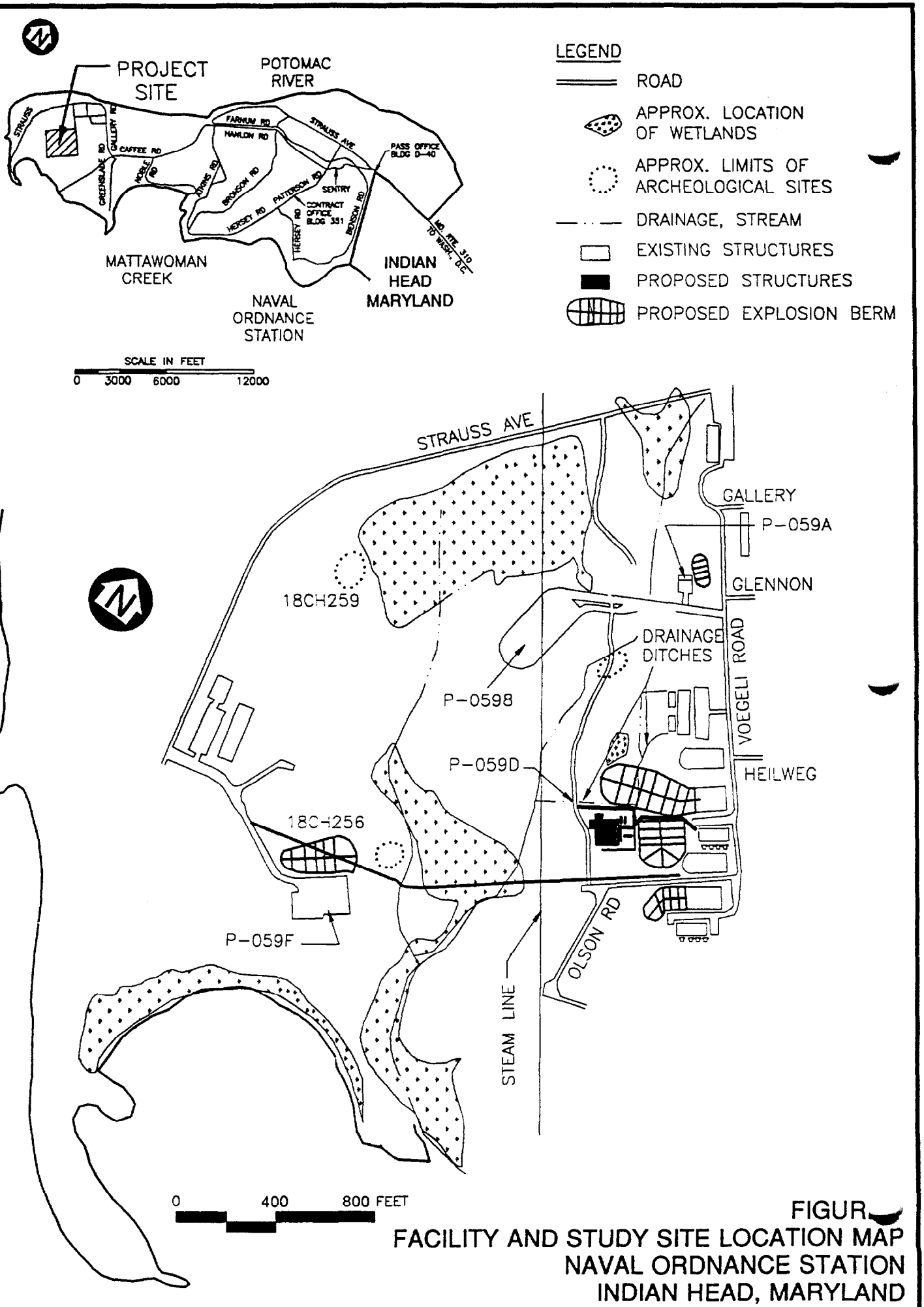


FIGURE
FACILITY AND STUDY SITE LOCATION MAP
NAVAL ORDNANCE STATION
INDIAN HEAD, MARYLAND
ABB ENVIRONMENTAL SERVICES INC.

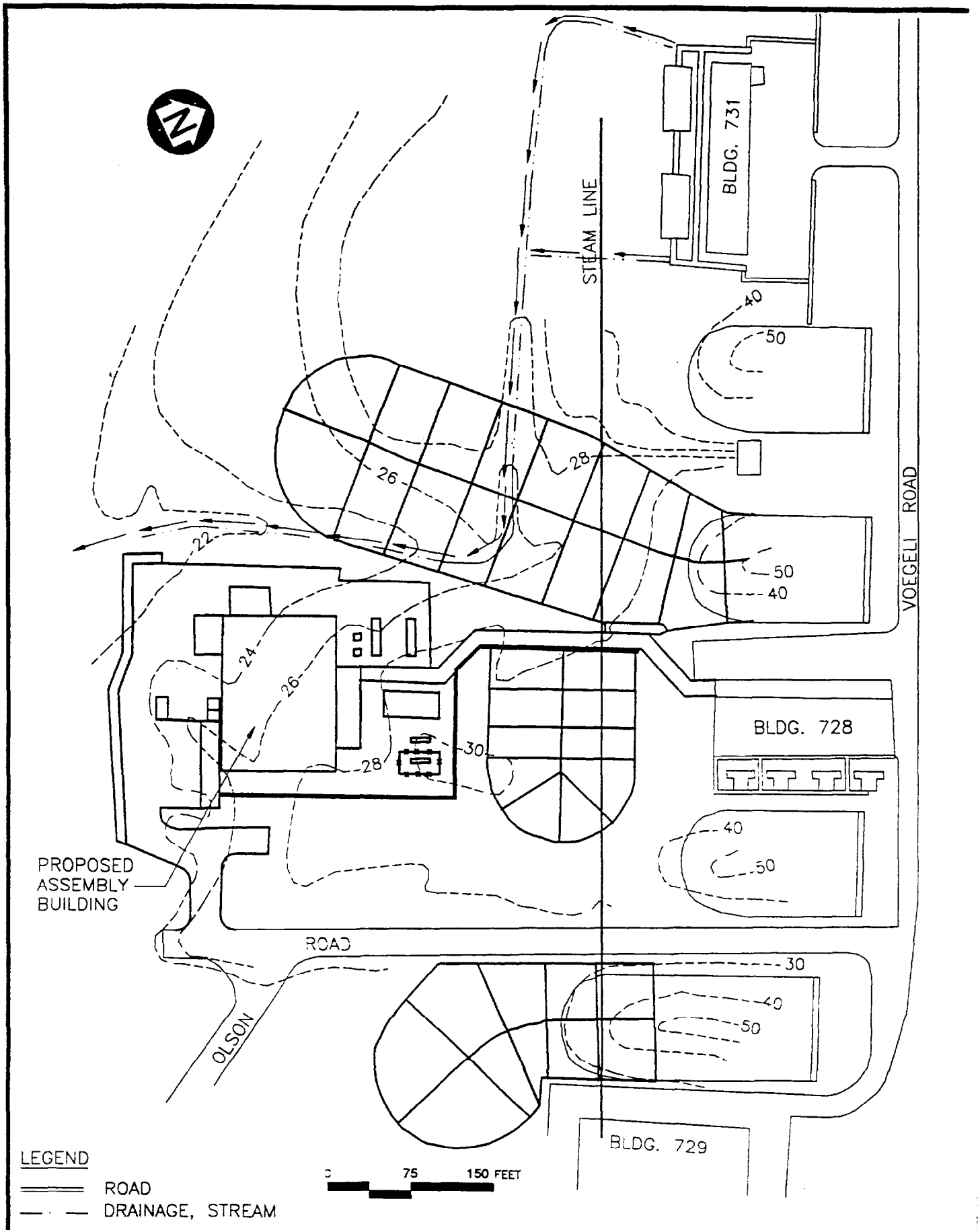


FIGURE 2
PROPOSED CONSTRUCTION WITHIN SITE 5
NAVAL ORDNANCE STATION
INDIAN HEAD, MARYLAND

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.

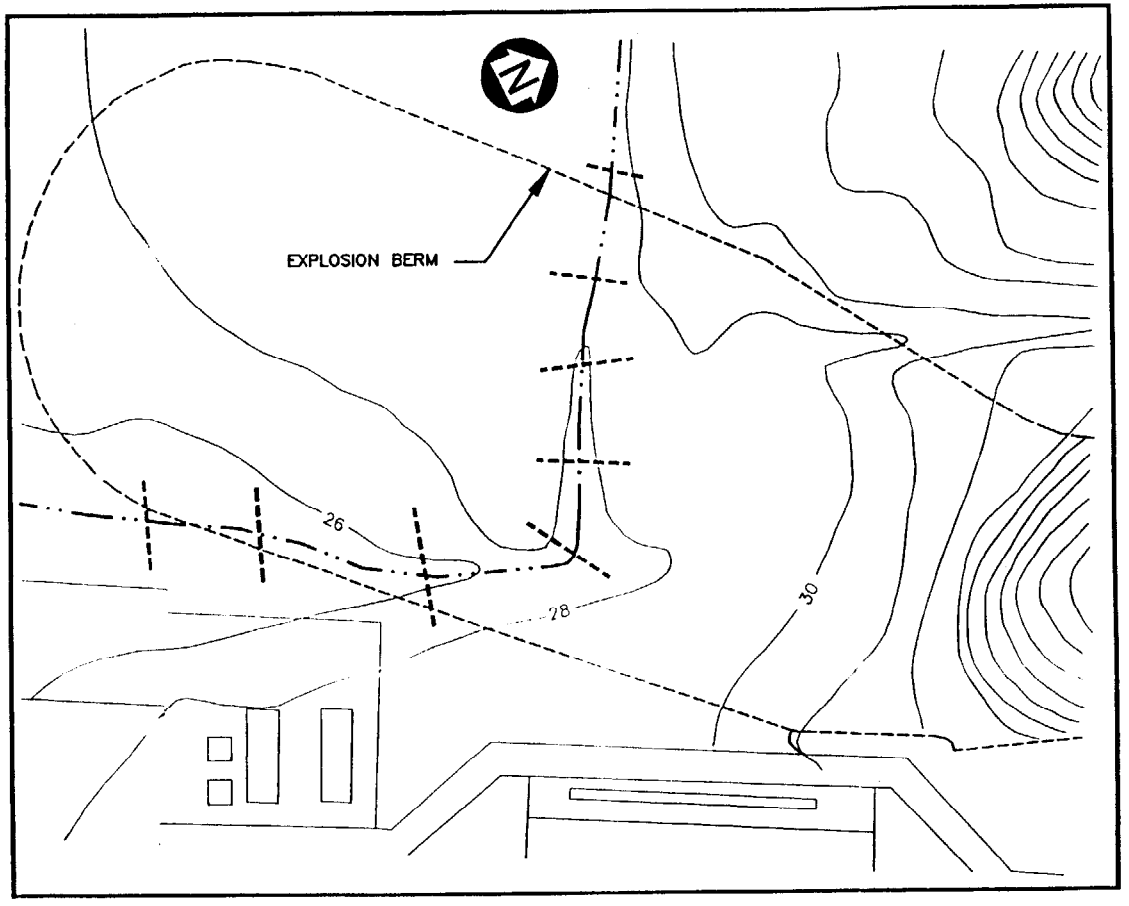
2.2 Survey/Sampling Grid

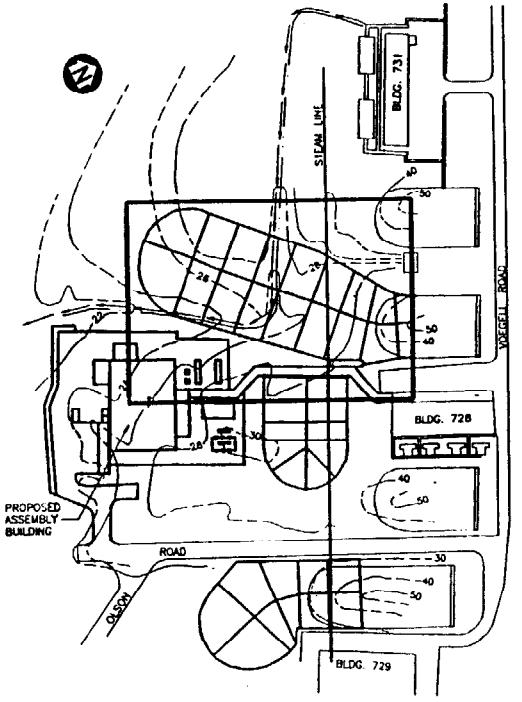
This task will utilize data gathered during the site reconnaissance to develop a defensible, site-specific sampling strategy. Key parameters influencing sample grid development include sample size determination, sample locations, along with practical considerations such as logistics and costs. The stream 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





LEGEND

- TRANSECTS INDICATING SAMPLE LOCATIONS
- DRAINAGE, STREAM
- PROPOSED EXPLOSION BERM
- CONTOUR LINE

0 50 FEET

FIGURE 3
LOCATIONS OF SAMPLING POINTS; SITE 5
NAVAL ORDNANCE STATION
INDIAN HEAD, MARYLAND

ABB ENVIRONMENTAL SERVICES, INC.

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:

- Stainless Steel Hand Auger or Hand Corer
- Stainless Steel Spatulas/Spoons
- Proper Sample Bottles
- 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.

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:

- 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.)

- 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:

  - All samples scheduled for collection are uniquely identified;
  - The correct samples are analyzed and are traceable;
  - Important sample characteristics are preserved;
  - Samples are protected from loss or damage;
  - Any alteration of samples (e.g., filtration, preservation) is documented; and
  - 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 I: Atomic Absorption Unit Standard Operating Procedures

STANDARD OPERATING PROCEDURES

AUTHOR: STEPHEN DOUGHTY

ISSUING UNIT: ABB-ES

SOP: FSAA-001-02
DATE: 3-25-91

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% HNO3 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 HNO3, 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. HNO3,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. HNO3 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 J: FIELD LOG BOOK

LABORATORY NOTEBOOK

Notebook No.: _____

Assigned to: D. VON BUSHBERGER

Date: 9-NOV-1992

Use Nalgene Cat. No.
6301-1000
to reorder.

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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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PROJECT NDS Indian Head Ag-contamination

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LOG FOR REMEDIATION OVERSIGHT

09:00 - Arrival at facility; checked in and received badges expires December 9, 1992.

09:30 - Steve Doughty arrives.

10:30 - Hazco delivery person arrives.

12:00 - Trailer ~~[illegible]~~ finished being setup. Steve and I begin installing lab equipment.

13:30 - Deal with electricity issues. Talk to Franco Godoy and Jowett electrical contractor. He'll be installing it. More equipment deliveries arrives.

16:30 - Finish setting up lab equipment. Leave for day.

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Read and Understood By

Signed	Date	Signed	Date
[signature]	11-9-92		

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.

14:05 Call Dave Schramm of OBG Tech. Says ~~[illegible]~~ OBG will be here either Friday or Monday, probably Monday.

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PROJECT NDS Ag Project

Continued From Page _____

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

Continued on Page

Read and Understood By

Signed	Date	Signed	Date
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PROJECT NDS Ag Project.

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LAB set up continues. OBC 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

Continued on Page

Read and Understood By

Signed	Date	Signed	Date
[illegible]	11-12-92		

PROJECT NOS Ag- project

Continued From Page _____

Lab set up completed today. P/E representatives expected Monday morning to approve our A+A set up. OBG is also expected monday, so still no site work.

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Signed	Date	Signed	Date
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PROJECT _____

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08:30 - OBG Arrives - I walk site with Tom White 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 Behant 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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Read and Understood By

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Signed | Date | Signed | Date

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PROJECT _____

Continued From Page 7

Where de-con pads will go.
Silt fence being installed.
Steve's been ~~[illegible]~~ 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-OEC forms dated 11-16-92.

18:20 Steve and I leave.

Continued on Page

Read and Understood By

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[signature]	11-16-92		

07:20 - OBC arrives

07:45 - OBC mobilizing more equipment. Begin clearing uncontaminated debris - I indicate to them what is uncontaminated and what needs to stay in place so it can be decontaminated 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 OBC - this will contain the additive to treat the contaminated soils.

09:00 - Called Jim B. for more photos. Called Franco - not in.

:00 - 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.

10:20 Jim Rehard 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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11-17-92

Signed | Date | Signed | Date

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 Rage-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: 0255XX0300XLXF
0255XX0301XRXF

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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Read and Understood By

Signed _____ Date 11-17-92 Signed _____ Date _____

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 decomned. I tell them to put clean fill in here since a "bridge" is needed.

~~Noon~~

08:30 Meet up w/ Allan Felser. I walk site with him, and explain issues, schedule, etc. We meet Tom Wehrle, 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 ones dated February before the facility had a chance to comment. I'll call Jim Behrend about this issue.

09:00 Finish showing Allan 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. The second round of samples will have a "Y" in the sis code — the first round had an "X".

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Read and Understood By

11-18-92

Signed Date Signed Date

Notebook No. _____

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 centerline.

13:00 Begin 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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Read and Understood By

Signed	Date	Signed	Date
[signature]	11-18-92		

07:00 - Arrival on site.
:15 - OBG arrival - 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. Wendale. 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 division 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 G. soon w/ treatability study data.

08:05 Alan M arrives - Steve goes through AA procedures w/ him.

08:10 Walk site again - things seem ok. The silt fence should be finished by early afternoon.

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PROJECT NDS IH Ag Contamination

Notebook No. _____

Continued From Page _____

09:30 - Sample prep procedures continue.

10:30 - Fire up A-A. Begin 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 Analyses currently underway. Data are showing high levels of Ag again. Called potomac air/gas for another cylinder of air. Called Franco 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 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 Behrend not expected until Monday.

15:00 Finally got ahold of Paul Berkman. He said to get bench 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 head home leaving for day.

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Read and Understood By

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PROJECT NDS I.H. Ag Contamination

Continued From Page _____

07:30 - OBG has most equipment coming in - Steve and I picked the final 8 sampling locations, to completely (hopefully) delineate the 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 for 15-foot from centerline samples.

08:20 Walked site. Talked to Tom Wehmle. 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 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. Rage Vest came in with a backhoe and removed uncontaminated tree debris from Stream 02.

13:30 Steve left for his flight. DBG 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 ~~[illegible]~~ removed.

15:30 Breaking down for evening
16:00 Off-site.

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Read and Understood By

Signed	Date	Signed	Date
[signature]	11-20-92		

07:05 OBG + OTZ not yet there. 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 & OBG. He brings up a few of his concerns:

- Additional excavation of Stream 01 near bldg 731. He needs approval from Jarrett for water diversion (from source), and for the excavation itself. (~40' of streambed)

- 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'd talk to Jarrett 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 - CH2SDIV did not supply Jarrett with the final version (Dated March

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Read and Understood By

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Signed | Date | Signed | Date

10, 1992 of the Spec. I call Jim Behrend to let him know this.

11:30 Jim says he's given Chip 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 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.

16:00 OBG/OTZ leave for day.

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Read and Understood By

Signed: [signature] Date: 11-23-92 Signed: Date:

06:30 Arrive @ office to pick up compressed air and other items.

08:00 Arrive on site with additional supplies from supermarket. DBG / OTZ up and running. Tom White gives me a brief update — excavation will probably not begin until Monday. Today Steve and I will do a lot of lab-prep work. DBG / 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 "XREF" 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.

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 reminded all to decon gloves 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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Steve is currently prepping samples. They'll be analyzed first thing tomorrow.

14:30 Ask OBG about diversion of two streams. They say O1 should be diverted properly by tomorrow — they seem to not know what's going on with O2 — probably an issue w/ Jewett.

15:00 Called Shawn Jorgensen about problems w/ diverting stream O2. 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 / O2 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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Read and Understood By

Signed	Date	Signed	Date
[signature]	11-24-92		

PROJECT NOS I.H. Ag Contamination

Continued From Page _____

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 stream line, as the diversion now exists. Tom (OBG) asked me to ask Jim Behrend 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 Behrend 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 Dougherty left. All analyses completed - see c-o-c forms. OBG setting up pg 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 Behrend has not arrived to take pics yet. I call him again Monday.

12:30 OTC leaves, so I do too.

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Read and Understood By

Signed	Date	Signed	Date
[signature]	11-25-92		

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 Dighty (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 seven 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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11-30-92

Signed | Date | Signed | Date

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 Dave Schramm (Project Manager) will be here tomorrow.

16:00 leave site

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Read and Understood By

Signed	Date	Signed	Date
[signature]	11-30-92		

PROJECT NOS - IH Ag Contamination

Notebook No. _____

Continued From Page _____

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 pushed off again. Everything is set up and ready to roll. OTC 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-O-C form for data.

10:00 Walk site again - nothing happening due to weather. Called Shawn Jurgensen 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 (OTC) says he's doubtful will ever get 90% of Proctor compaction due to wetness of the base soil.

14:30 OTC leaves. OBG to Sam Gallow, after discussion of tomorrow's strategy.

15:00 Everyone off site.

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Read and Understood By

Signed	Date	Signed	Date
[illegible]	12-1-92		

PROJECT NOS IH Ag-Contamination.

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07:00 Arrive at site - no one here.

07:30 OBG/OTC arrive.

08:10 Walked site with OBG/OTC. Discussed issues of mud, excavation, and de-con. Not much is going to happen today.

09:00 A meeting began between Jim Berard, 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" scraper in surrounding area.

Next section, to first 90° bend: 2' x 10', with 6" scraper 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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12-2-92

Signed | Date | Signed | Date

10:30 D. Schramm asks if BOD tests on decon 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/OTZ 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 CIM (C. Moller) is flying home till Monday — this must mean no excavation till Monday.

16:00 Site vacated.

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Read and Understood By

Signed	Date	Signed	Date
[signature]	12/2/92		

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:

- Jowett / 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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1670 Sample digestion finished.

1615 Site vacated.

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PROJECT NDS SITES

Continued From Page 30 (DVB)

07:05 Arrived on-site. Contractors already here

07:55 First delditic shipment arrived. Pumping it into Silo right now. More trees and brush are being properly cleared, and cleaned 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 Hg. 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 Hg.

11:00 Additive entirely loaded into Silo. Excess is stored in and under plastic sheets. T. ~~tokinde~~ weirhle says the S/S equipment is all set. (DVB)

12:00 Tried calling J. Behrend and P. Berkman. Both N/A.
1:00 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. Berkman to set up meeting for Tuesday @ 2:00 PM. Both can make it — it'll be @ Jim's conference room in the RCICC 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 seams 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; min'-ram units detected no particulates. [0.00 mg/m³; 0.00 mg/m³; 0.00 mg/m³]

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D. M. Smith 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~~ PYB to continue downstream along Swale 01.

09:25 Collect one truckload (dump-truck-full)

10:20 Culvert near Building 731 was picked 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-canned 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 ~~[illegible]~~ 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. Miniram readings 0.00 mg/m³; 0.00 mg/m³; 0.04 mg/m³. Well below action level.

17:30 OBG, OTC leave site. ABB leaves

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D. Fuller 12/7/92

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PROJECT NOS SITE 5

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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 confirmatory 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. Decanning of trash 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 ug/m3

17:00 Site vacated.

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PROJECT NOS SITE 5

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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 into 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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08:00 MAJOR SNOWFALL

Arrived on site after treacherous trip — nothing will be able to happen today. Steve and I finish analyses on confirmating samples collected. All are ≤ 10 ppm.

We leave after analyses are completed.

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PROJECT NDS SITE 5

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07:00 Arrive on site — extremely wet, muddy morning. OBG is cleaning/maintaining S/S machinery. OTR is trying to dewater the excavation trench, which completely filled with water over the weekend. Hopefully, mix treatment will begin later today.

10:30 Called D. Schramm of OBG to inform of meeting with ~~other~~ DJS 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 DJS the stockpiled material. Also further dewatering is planned

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DJ Fuller	12/14/92		

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 Berkmeyer. 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]~~ (013) burned storage area.

14:30 Chesdir 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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12/16/92

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Progress report Meeting:

— Introductions: J. Behrend, P. Berkman, D. Jordan } CHESDIV
C. Jowett — JOWETT
D. Schramm, T. Wethle } OBG TECH
F. Godoy, D. von Bushbergesk } ABB-ES

- J. Behrend asks about sampling/additional scope of project. Franco replies as to how 1077 cy was reached quickly due to high Hg 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 controls, 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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- 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 Hg detected.

Dave also says that CPM 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 bill to Jowett early next week

- Jim makes it clear he wants OBG to stay on site no matter what, in spite of potential problems w/ 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 started 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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Read and Understood By

D. Smith 12/16/92

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07:00 - Arrive on site; tremendous wetness
OBE / OTC say they cannot operate b/c of rain / wetness.

09:30 - 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 Schamen 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 paperwork. OTR continues pre S/S mixing to dry the excavated material.

15:30 De-watering and preliminary mixing finished for day. OTR covers berms are w/ plastic to keep dry.

16:00 All head out.

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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 spigot, 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.

3:40 Additive truck arrives.

18:30 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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Doug [illegible] 12/21/92

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PROJECT NBS SITE 5

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07:00 OTR 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. OTR is doing some minor dewatering work.

08:00 Additive truck arrives. Begin pumping dust under plastic into streambed.

08:30 End down 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~~ pond again — the newly placed fill is becoming saturated. This halts excavation.

12:30 I call J. Behrend 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 Chris Jowett nor Behrend 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 OTC, 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 ~~felt~~ did not felt no unusual symptoms

15:55 We tape off an approximately 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/m³

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07:00 Contractors arrive on-site

08:00 Talk to OTC 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 Jorgenson and Fred ?) They will deal with sample situation entirely. Takes sample in a 4-oz jar, looks like paint scrapings. No way to eliminate head space. Liquid samples were ~~taken~~ DUB 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.B Analyticals include:

VOAs	Cyanides
SVOAs	Pesticides and Energetics
T.A.M.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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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 McGahill 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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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 lined 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 Will leave site.

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07:00 Arrive; OTC begins pumping out 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 @ Ecl + results on solids not ready yet. (Drum sample)

10:00 Called Ben Landas again. Tests are done, he says. VOAS clean except for small hits 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. Bernard 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 Jorgenson 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 Jim Bernard (OVB) 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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7:00 Contractors arrive; Steve and I acquire 4 sediment samples downstream of the dirt road (in Stream 01)

8:00 OBG is expecting another load of additive around noon. Currently, they are clearing brush and pre-mixing the burned 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-ramps. (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 worry 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 our explosives ~~[illegible]~~ 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 Behrand 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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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 Towett 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. OBC has collected 7 so far.

15:50 D. Schramm arrives. He, C. Miller, ~~and J.~~ DVB 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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07:00 - 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 could 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 Manack, myself. Chip makes ~~it~~ (US) 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.

11:00 Analyticals are received from Steve - one sample shows 48 mg/kg - we'll have to dig more.

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14:00 Call J. Behand, let him know about test results requiring more digging. I also tell him that OB6/OT2 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; 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. D.B.

11:25 Uncovers a broken container that spills out a white, powdery substance. OBG's C.I.H. sees this.

11:30 Fourth 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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D.L. [illegible] 1-11-93

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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/OTC 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). OTC will dig more from here tomorrow.

17:00 Shut down due to weather.

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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 Hg.

09:30 Sample prep is started.

10:00 Called J. Behrend 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 Jacobs/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.

: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 decommed.

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 stack conveyor breaks. This necessarily shuts S/S down.

16:00 Problem - additive may no longer be available. OOK'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~~ DUB Arrival of everyone on-site.

07:30 Truck load of additive arrives. Blown into stockpile area. Dewatering, decanning are currently happening.

08:00 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 (Saturday) 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, more 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 nuke 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 decomming, 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, clearing 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 Begun filling where first culvert will go. Used a surveying scope to assure proper grade; one of the new, smaller diameter culverts being used here. Physically, 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 (Schnabel) compressive strength tests. I collect 2 samples; about 4 ft³ 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 OTR excavates slightly wide culvert near bldg. 731, will go.

07:35 First fill load.

08:00 Fill being spread.

8:35 Fifth fill load. S/S equipment being broken down they'll start decanning it soon.

10:00 10 ⅟ fill load.

11:30 Decan of S/S equipment begins. 15 ⅟ fill load arrives

13:10 20 ⅟ fill load arrives.

14:30 S/S silo comes down — 25 fill load.

15:35 30 ⅟ 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 area 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 SLS 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 20 ~~cy~~ 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 Jowett 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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-2800 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 decomned and de-mobed. The culvert for under the dirt road is now being decomned - will be installed on Monday (I hope).

12:00 Leave site due to weather

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07:00 OTC arrives. Fill trucks arrive soon after. First few loads going towards road improvement.

08:00 OTC 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 Analytical 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 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 OBC mentioned anything about their plans for Stream 02 - they haven't, and I tell him so.

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07:00 OTR 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. OTR just laid the second culvert (a deconnect 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~~ 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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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 OTC 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 that had bad moisture problems from run-on. 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 Dustins said they'll be out either today or Monday.

11:00 Chip Jowett, Tim Manack, 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 Tim Manack.

14:00 Last equipment removed — both debris piles still untouched. NDS 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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