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FIELD SAMPLING AND QUALITY ASSURANCE PLAN
FOR
SITE 12, AREA A
NAVAL WEAPONS STATION YORKTOWN
YORKTOWN, VIRGINIA

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OHM Remediation Services Corp.
A Subsidiary of OHM Corporation

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1.0 INTRODUCTION

OHM Remediation Services, Corp. (OHM) is pleased to submit this Field Sampling and Quality Assurance Plan (FSQAP) to guide the sampling and analytical activities associated with the successful completion of Delivery Order 0093, Remediation of Site 12, Area A Soil at Naval Weapons Station Yorktown, Yorktown, Virginia. The sampling tasks described in this plan will be performed by members of OHM Northern Region Field Analytical Services Group located in Trenton, New Jersey and/or Glen Allen, Virginia.

The contaminant of concern targeted in this remedial action is lead. All soils containing lead above 400 mg/kg (ppm) will be delineated and placed under the cap to be constructed over Site 12.

The following documents were used in the preparation of this FSQAP:

- Delivery Order 0093, Remediation of Site 12, Area A Soil at Naval Weapons Station Yorktown, Yorktown, Virginia
- Remedial Action Contract No. N62470-93-D-3032
- Naval Installation Restoration Laboratory Quality Assurance Guide, Naval Facilities Engineering Services Center, Port Hueneme, CA, 1996
- Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, 3rd Ed., United States Environmental Protection Agency, 1994

2.0 SAMPLING AND ANALYSIS OBJECTIVES

A sampling and analysis program is required as part of the remedial action to be conducted at Site 12. The objective of this sampling and analysis program is to verify the lateral extent of the landfill cap. This will ensure that soils with lead concentrations exceeding 400 mg/kg will be covered by the cap.

To achieve the objective mentioned above, the sampling and analysis program to be implemented will include the following tasks:

- Initial Sampling Event - The collection and analysis of soil samples along the anticipated edge of the cap to verify lead concentrations below 400 mg/kg.
- Supplemental Sampling Event - The collection and analysis of additional soil samples if any initial soil samples contain lead concentrations greater than 400 mg/kg.

All incidental waste will be located under the cap. Therefore, no sampling and/or analyses will be required.

Soil samples will be collected during an initial sampling event, with additional soil samples to be collected, as required, during supplemental sampling events. Field sampling procedures are found in Section 5.0, and analytical procedures are found in Section 8.0 of this FSQAP.

3.0 DATA QUALITY OBJECTIVES

The United States Environmental Protection Agency (USEPA) currently defines five levels of data quality for environmental projects, which relate to data precision, accuracy, and completeness. Naval Facilities Engineering Services Center (NFESC) has adopted three of these levels for data reporting. The five defined levels of data quality are:

1. Screening (Level 1): This provides the lowest data quality, but the most rapid results. It is often used for health and safety monitoring at the site, preliminary comparison to Applicable or Relevant and Appropriate Requirements (ARARs), initial site characterization to locate areas for subsequent and more accurate analyses, and for engineering screening of remedial alternatives (bench-scale tests). These types of data include those generated onsite through the use of organic vapor analyzers, temperature and conductivity meters and other similar real time monitoring equipment at the site.

2. Field Analysis (Level 2): This provides rapid results and better quality than Level 1. These types of data include those generated by mobile laboratories.

3. Engineering (Level 3)/NFESC Level 'C': This provides an intermediate level of data quality and is used for site characterization and engineering analysis. It may include mobile lab generated data and some analytical lab methods (e.g., laboratory data with quick turnaround used for screening, but without full quality control documentation).

4. Conformational (Level 4)/NFESC Level 'D': This provides the highest level of data quality and is used for purposes of risk assessment, engineering design, and cost analyses. These analyses require the implementation of full Contract Laboratory Program (CLP) analytical and data validation procedures in accordance with USEPA requirements.

5. Non-Standard (Level 5)/NFESC Level 'E': This refers to analyses by non-standard protocols, for example, when exacting detection limits, or analysis of an unusual chemical compound is required. These analyses often require method development or adaptation. The level of quality control is usually similar to Level 4 data.

OHM will generate data that conform to Data Quality Objective (DQO) Levels 1 and 3/NFESC 'C' for these remedial analyses.

- DQO Level 1 corresponds to instrument data generated during field screening. This data will be obtained for Health and Safety monitoring, by screening open sample holes.

- DQO Level 3/NFESC 'C' corresponds to all data generated in support of aqueous and vapor analyses.

The method detection limit (MDL) for lead will be below 400 mg/kg. The MDLs for Toxicity Characteristic Leaching Procedure (TCLP) results will be at or below regulatory limits.

3.1 LABORATORY METHODS

The subcontract laboratory will perform all analyses using accepted EPA SW-846 methodology. Table 5-1 presents the intended analytical methods for this project. A copy of the subcontract laboratory's Quality Assurance Plan will be provided for inclusion into this document upon selection of the laboratory.

3.2 QUALITY ASSURANCE/QUALITY CONTROL SAMPLES

OHM will obtain the following site-specific quality assurance/quality control (QA/QC) samples to assure accuracy, precision, and representativeness of the analytical data.

3.2.1 Duplicate samples

Duplicate samples are obtained to determine the degree of precision for sampling and analysis. Ten percent of the samples will be obtained in duplicate, by sequentially filling sample containers at the designated sample points. The analytical results for the duplicate pair will be compared; and the difference expressed as a relative percentage difference (RPD). A high level of precision is shown by a small RPD. The actual RPD should be within +/- 20 percent.

3.2.2 Trip Blanks

Equipment rinsate samples will be collected and analyzed each day samples are collected. After the sample equipment has been decontaminated, contaminant-free water will be poured over the equipment surfaces which contact the sampled soils and collected in appropriate sample containers. Equipment rinsate samples help to verify that no cross-contamination is occurring between samples.

3.3 DATA DELIVERABLES

Laboratory data derived from the analytical methods prescribed in Table 5-1 will be reported in NFESC Level C deliverable format, as shown in Table 3-1 of this FSQAP. Associated laboratory QA/QC will be included as an appendix to the analytical results.

TABLE 3-1
NFESC LEVEL C DATA DELIVERIES

Parameter	Method Requirements	Deliverables
Organics	Method blank spikes with results and control charts. Run with each batch of samples processed.	Control chart
	Results to be reported on CLP Form 1 or spreadsheet per Sect. 9. Sample results using CLP data flags.	Form 1 or Sect. 9 1/Sample chromatograms/ and mass spectra
	Surrogate recovery from samples reported on CLP Form 2. Surrogates to be used in volatiles, semivolatiles, pesticides/PCB. For volatiles by gas chromatography (GC), the names of surrogates should be provided to identify the surrogate used.	Form 2
	Matrix spike/spike duplicate -1 spike and spike duplicate per 20 samples of similar matrix reported on Form 2.	Form 3
	Method blank reported on CLP Form 4.	Form 4 or Sect. 9
	For volatiles by GC, a similar format will be used as CLP Form 4 for blanks.	
	GC/mass spectrometry (MS) tuning for volatiles/semivolatiles. Report results on Form 5.	Form 5

TABLE 3-1 (Cont.)
NFESC LEVEL C DATA DELIVERIES

Parameter	Method Requirements	Deliverables
Organics	Initial calibration data reported on Form 6.	Form 6
	For volatiles by GC, the initial calibration data with response factors must be reported.	No Form
	For pesticide/PCB data Form 9 must be used for calibration data.	Form 9
	Continuing calibration GC/MS data reported on Form 7.	Form 7
	For volatiles GC data, the response factors and their percent differences from the initial must be reported.	No Form
	Internal Standard Area for Volatiles and Semivolatiles.	Form 8
	For pesticides/PCB data, the CLP Form 9 must be presented.	Form 9
	No chromatograms or mass spectra are presented for calibration. These data should be filed in the laboratory and available if problems arise in reviewing/validating the data. The calibration information should be available for checking during on-site audits.	
	Internal standards are for GC/MS analyses; CLP Form VIII shall be supplied.	Form VIII
	Second column confirmation shall be carried out for all GC work when compounds are detected above reporting limits. Chromatograms of confirmation must be provided.	Chromatograms
Metals	Sample results with CLP flagging system.	CLP Form 1 or Sect. 9
	Initial and continuing calibration.	CLP Form 2, Part 1 only
	Blanks at 10% frequency.	Form 3
	Method blank taken through digestion (1/20 samples of same matrix).	Form 3 or Sect. 9
	Inductively coupled argon plasma spectrometry (ICP) interference check sample.	Form 4
	Matrix spike recovery (1 per 20 samples of similar matrix).	Form 5, Part 1
	Post-digestion spike sample recovery for ICP metals. Only done if predigest spike recovery exceed CLP limits.	Form 5, Part 2 [never used for graphite furnace absorption spectroscopy (GFAA) work]
	Post-digest spike for GFAA.	Recovery will be noted on raw data
	Duplicates (1 per 20 samples will be split and digested as separate.	Form 6
	Method blank spike information will be plotted on control chart, one per batch of samples processed.	Control chart
	Standard addition. The decision process outlined in CLP page E-3 will be used to determine when standard additions are required.	Form 8
	Holding times.	Form 1
Wet Chemistry	Blank Spike 1/batch.	Control chart
	Method Blank 1/batch.	Report result No format
	Sample results.	Report result No format
	Matrix spike/spike duplicate or calibration information.	Report result if applicable
	Calibration check - report percent relative standard deviation (RSD) or percent difference from initial calibration.	No format

3.4 DATA REDUCTION AND TABULATION

Data generated from the site activities can be grouped into two broad categories:

- Field data, such as data collected during screening of volatile organic compounds (VOCs) using photoionization detector (PID); and
- Chemical data for environmental samples generated by the project laboratory and accompanying QA/QC data package deliverables as required for DQO Level III/NFESC Level "C".

Copies of all analytical results will be maintained on-site. Original analytical data will be stored in the Project File in the OHM office in Trenton, New Jersey. At the conclusion of the project, field log books, sample logs, sample data sheets and chain-of-custody records will be placed in the Project File.

4.0 PROJECT ORGANIZATION AND RESPONSIBILITY

4.1 DATA ACQUISITION ACTIVITIES

Data acquisition activities for the project will be accomplished using personnel from both OHM and the subcontract analytical laboratories. A complete organization chart for the project is presented in Section 2.0 of the Work Plan.

For this project, OHM personnel will be responsible for the following activities:

- Development and/or revisions to all project submittals and plans.
- Collection, documentation, and off-site shipment of all site samples.
- Maintaining project communication with the subcontract laboratory.
- Review and/or validation of all subcontract generated data.

A discussion of OHM personnel titles and duties is presented in the subsection below.

4.2 PROJECT PERSONNEL WITH SAMPLING/ANALYSIS RESPONSIBILITIES

Project personnel with sampling and analytical responsibilities include:

- Project Manager - Bill Snow is the Project Manager for this Delivery Order. He is responsible for all financial, safety and quality concerns on the job. Mr. Snow will maintain project status interactions with the Naval representative(s).

- Field Analytical Services Coordinator - Michael J. Lacy, Ph.D., serves as the Field Analytical Services Coordinator for all LANTDIV delivery orders. Dr. Lacy is responsible for all facets of analytical data generation, including oversight of field sampling personnel, procurement of analytical laboratory, review of analytical data, and communication with the laboratory.

- Senior Technician - The senior technician implements all field sampling and completes all field documentation, ensuring all corporate, contract and project procedures are followed. The senior technician is also responsible for sample management and shipment to the off-site analytical laboratory.

5.0 FIELD SAMPLING PROCEDURES

5.1 SAMPLE LOCATIONS

Soil samples will be collected initially every 75 feet along the anticipated perimeter of the cap. These samples will be collected between 0 to 6 inches and 18 to 24 inches.

5.2 SAMPLE PROCEDURES

5.2.1 Sample Collection

Soil samples will be collected through the use of chemically-inert, disposable, sample scoops for surface (0 - 6 in.) samples and hand augers for the shallow sub-surface (18 - 24 in.) samples. The soil from the appropriate depth will be placed in a decontaminated stainless-steel mixing bowl and composited before the sample container is filled. The mixing bowl and hand auger will be decontaminated between samples. The soil between 6 and 18 in. will be removed using a second hand auger, which will be decontaminated between sample locations.

5.2.2 Sampling Frequency and Sample Handling

Sampling frequency is specified in Table 5-1. Sample containers, preservatives, and holding times are shown in Table 5-2.

TABLE 5-1
ANALYSIS AND SAMPLE FREQUENCY

Analyte(s)	Sample Type	Method	Frequency
Lead	Soil	6 inch composite	Every 75 ft @ 0-6 & 18-24 inches

mty ?

TABLE 5-2
SAMPLE CONTAINER , PRESERVATIVE AND HOLDING TIME

Analyte(s)	Matrix	Sample Container	Preservative	Holding Time
Lead	6010	250 mL glass	HNO_3 to pH <2	6 months

5.2.3 Decontamination Procedures

All non-disposable sampling equipment (augers, stainless steel trowels) will be decontaminated prior to, and between, sampling events by the following procedure:

- Detergent/tap water wash
- Distilled/de-ionized (DI) water rinse
- 10% nitric acid rinse
- DI water rinse
- Acetone rinse
- Air dry.

Use of these procedures will ensure that material transfer between sampling points is minimized; that is, cross-contamination will not occur. This will be verified by the use of equipment rinsate samples.

5.3 DOCUMENTATION

All pertinent sampling and field survey information will be recorded in a logbook to facilitate reconstruction of events that occurred during closure activities. Logs will be kept in a waterproof bound notebook with numbered pages. All entries will be printed in waterproof ink. No pages will be removed and corrections will be made by drawing a single line through the incorrect data and initializing and dating the correction that was made to the side of the error. Entries in the logbook will contain, at a minimum, the following information:

- Location of sampling point
- Name and address of field contact
- Type of waste (i.e., soil, wastewater, etc.)
- Number and volume of samples taken
- Purpose of sampling (i.e., closure activities)
- Description of sampling point and sampling methodology
- Date and time of collection
- Collector's sample identification number
- Sample distribution and the method of transporting or shipment (i.e., name of laboratory, UPS, FedEx)
- References, such as maps, photographs or sketches of the sampling site
- Field observations
- Any field measurements made (PID readings)
- Signatures of personnel responsible for observations.

These link the sample with the project, sampler, time, location, procedures, changes to the work plan, sample history, transfer to the laboratory, and ensures tamper-free transit.

Data, calibration, and maintenance records, samples, and documents, must be accounted for and retrievable at any time during an investigation. Chain-of-custody (COC) records (Section 6.0) are necessary to document sample identity, handling, and shipping procedures.

5.3.1 Sample Numbering

Each sample will be identified by a unique sample number. The makeup of each sample number is described below.

- A two-digit sample number for lead samples (01 through 89)
- The letter "A" or "B" representing 0-6 or 18-24 inches, respectively
- Example:

  - 03B (sample location 3 at 18-24 inches)

5.3.2 Sample Labels

The sample label will contain the following additional information:

- Sample Number
- Date

- Time (Military)
- Sample Description
- Preservatives used
- Sampler's Initials
- Witnesses' Initials
- Number of Containers

The sample description will note the sample type, e.g., confirmation sample and the depth at which the sample is obtained.

5.3.3 Field Sampling Log Book

The OHM Sample Technician will maintain a detailed, accurate account of the sampling event in the Field Sampling Log Book. The Field Sampling Log will contain:

- All information found on the sample label, as listed above.
- Other information such as:
  - Weather conditions
  - Personnel on-site
  - Site map which indicates sample locations
- The log book will also include a Table of Contents.
- Chain-of-custody information includes the names of the individuals involved in a custody transfer, a custody number (from the upper right corner of the COC form), a list of all samples for which the COC form applies.

6.0 SAMPLE CUSTODY AND SHIPMENT

Because of the evidentiary nature of samples collected during enforcement investigations, the possession of samples must be traceable from the time the samples are collected until they are introduced as evidence in legal proceedings.

Documentation of sample custody following sample collection is accomplished using a standard COC Record. This document traces possession of every sample from the time of collection through sample analysis.

In general, chain of custody protocols follow those outlined in USEPA guidelines. This documentation begins immediately following sample collection and proper labeling. The chain-of-custody record provides information on the sealing of samples, the sample number, sample description, date and time of collection, number of sample containers, type of analysis requested, and any pertinent remarks. An example of a COC Record is shown on Figure 6.1. The COC Record also documents the condition of sample containers upon their receipt at the support laboratory. This form is completed using indelible black ink.

6.1 INSTRUCTIONS FOR COMPLETING CHAIN-OF-CUSTODY RECORD

The following list of information shall be provided in completing the COC Record:

1. Project Name - Yorktown
2. Project Location - City and state in which the project is located; use street address if possible.
3. Project Number - Number assigned by OHM (17932).
4. Project Contact - Usually an OHM employee who is responsible for overseeing the sampling operation.
5. Project Telephone Number - Telephone number of OHM's on-site office trailer
6. Client Representative - The individual employed by the client to oversee and coordinate work performed by OHM on-site [i.e., contract coordinator, on-scene coordinator (OSC), on-site representative (OSR)].
7. Project Manager/Supervisor - The name of the OHM designated project manager.
8. Sample Number - Number assigned in the field during collection of samples.
9. Date - Date of sample collection.
10. Time - Time of sample collection (24-hour time).
11. Composite/Grab - Checkmark the appropriate column to indicate whether sample is composite or grab.

12. Sample Description (Include Media and Sample Point) - Indicate whether sample is soil, liquid, air, oil, etc., along with any useful description, such as appearance (color, density, odor, etc.) Include the location, designation, such as monitoring well number, soil sample coordinates, or EPA description number. This information must be the same as the information on the sample label.

13. Number of Containers - Number, size (volume), and types of containers that are sealed and labeled for transfer to another location.

14. Analysis Desired (Indicate Separate Containers) - The name of the test (e.g., PCB) or series of tests (VOAs) with the appropriate method number is to be entered on the diagonal lines. For each sample container designated in the number of containers, a checkmark (√) should appear in the column for the desired analysis.

15. Remarks - Enter sample specific instructions, cautions, or priorities (e.g., "do cyanide test first on this sample" or "caution, may contain hydrofluoric acid;" also indicate preservation of sample (i.e., "sulfuric acid added"). Enter a sample specific comment (e.g., "sample lost in shipping").

16. Item Number - Each sample number is considered a separate item. Use sequential number (1,2,3...). Item numbers begin with No. 1 on each form. Do not carry item numbers from one form to another. List items 1,2,3... that you accepted.

17. Transfers Relinquished By - Name of person and affiliation transferring or surrendering the sample to another person, (do not use only the name of an organization).

18. Transfers/Accepted By - Person signing this part is responsible for the sample(s). In addition to the person's name, he should include his company name or agency(s) initial. The person accepting sample(s) is also responsible for making sure that all samples are accounted for when he signs an acceptance. If a common carrier is used, include the carrier name and bill-of-lading number or airbill number.

19. Date - Date on which sample is released to the next person.

20. Time - Time at which sample is released to the next person.

21. Remarks - Enter general instruction or requests, such as, fax report, turnaround times requested, and preservatives added.

22. Sampler's Signature - The signature of the individual performing, or having immediate oversight of the sampling should appear in this section.

23. Laboratory name, telephone number, and contact.

6.2 FIELD CUSTODY PROCEDURES

In collecting samples for evidence, collect only that number of samples which provides a fair representation of the media being sampled. To the extent possible, the quantities and types of samples and sample locations are determined prior to the actual field work. Minimization of sample transfers is always considered.

The field sampler is personally responsible for the care and custody of the samples collected until they are transferred or properly dispatched.

Sample labels shall be completed for each sample using indelible ink unless prohibited by weather conditions.

Throughout the course and at the end of the field work, the project chemist/scientist will determine whether these procedures have been followed and whether additional samples are required.

Custody seals will be placed over the cap of each sample container and the lids of shipping containers before the samples and containers leave the custody of the shipping personnel. The Custody seals will be preprinted adhesive-backed labels with perforations designed to break if the containers are opened.

6.3 TRANSFER OF CUSTODY AND SHIPMENT

Samples are accompanied by a COC record. When transferring the possession of samples, the individuals relinquishing and receiving sign, date, and note the time on the record. The person receiving the samples should always inspect for correct sample description and sample count. The COC Record documents transfer of custody of samples from the sampler to another person, a mobile laboratory, or an analytical laboratory. The original record will accompany the shipment, and a copy will be retained in the project files.

Samples will be properly packaged in accordance with Department of Transportation (DOT) regulations for shipment and dispatched to the selected laboratory for analysis with a separate custody record prepared for each laboratory. COC records will be placed in a gallon Ziploc™ bag and taped inside the cooler lid. All glass sample containers will be placed in Ziploc™-type bags for shipment. Also, Ziploc™-type bags will be filled with ice and placed between and around the samples in the cooler. Sufficient ice will be used to maintain sample temperature at 4° C $\pm$ 2° C. Vapor samples will be returned to Microseeps, Corp. Ice will not be required for vapor sample transport.

Airbills from the courier will be retained as part of the permanent documentation. The person relinquishing the sample signs off his custody and enters the courier company's name and the bill-of-lading number or airbill number.

When samples are split with the facility or another government agency, a separate custody record is completed to indicate this. In addition, the sample numbers from all the labels are recorded on the custody record. The person relinquishing the samples to the facility or agency should request the signature of a representative of the appropriate party, acknowledging receipt of the samples. If a representative is unavailable or refuses to sign, this is noted in the "received by" space. When appropriate (i.e., the representative is unavailable), the COC should contain a statement that the samples were delivered to the designed location at the designated time. The copy of the COC record may be given to the facility or agency upon request.

6.4 LABORATORY CUSTODY PROCEDURES

Once the sample arrives at the laboratory, custodial responsibility of the sample is transferred to that facility. The minimum requirements for a laboratory custodial system are:

- Designation of a sample custodian whose duties include:
  - Receiving samples
  - Initiating paperwork within the laboratory
  - Inspecting and documenting sample conditions, e.g. temperature, pH, leakage, breakage, seals
  - Verifying and recording agreement of information on the sample documents
  - Marking/labeling of samples for laboratory use
  - Distributing samples to appropriate analysts
  - Placing samples and extracts into the appropriate storage and/or secure areas
  - Controlling access to samples and extracts
  - Monitoring storage conditions for proper temperature and prevention of cross-contamination
  - Proper disposal of samples and extracts
- Secure appropriate storage for samples and extracts
- Sample tracking system
- Controlled access to storage areas
- Monitoring procedures for storage areas

LAB COPY

OHM Corporation

CHAIN-OF-CUSTODY RECORD

Form 0019
Field Technical Services
Rev. 08/89

136200

O.H. MATERIALS CORP. • P.O. BOX 551 • FINDLAY, OH 45839-0551 • 419-423-3526

PROJECT NAME		PROJECT LOCATION	
PROJ. NO.	PROJECT CONTACT	PROJECT TELEPHONE NO.	
CLIENT'S REPRESENTATIVE		PROJECT MANAGER/SUPERVISOR	

ITEM NO.	SAMPLE NUMBER	DATE	TIME	COMP	GRAB	SAMPLE DESCRIPTION (INCLUDE MATRIX AND POINT OF SAMPLE)	NUMBER OF CONTAINERS	ANALYSIS DESIRED (INDICATE SEPARATE CONTAINERS)								REMARKS
1																
2																
3																
4																
5																
6																
7																
8																
9																
10																

TRANSFER NUMBER	ITEM NUMBER	TRANSFERS RELINQUISHED BY	TRANSFERS ACCEPTED BY	DATE	TIME	REMARKS
1						
2						
3						
4						SAMPLER'S SIGNATURE

FIGURE 6-1

7.0 CALIBRATION PROCEDURE AND FREQUENCY

Routine and periodic calibration of instrument used for chemical analysis, as well as for field monitoring should be performed. This will ensure the proper functioning or operation of the instrument so that data quality is not compromised.

7.1 LABORATORY CALIBRATION

The subcontract laboratory is expected to perform calibrations that will meet the requirements of the analytical methods being used. The subcontract laboratory's calibration procedures and frequencies will be submitted prior to conducting any analytical work.

7.2 FIELD CALIBRATIONS

On-site photoionization detector(s) (PID) will be calibrated before use according to manufacturer's instruction and/or Section 7.0 (Air Monitoring) of OHM's Health and Safety Plan.

8.0 ANALYTICAL PROCEDURE

The analytical parameter of concern in the remediation of Site 12 is lead. The appropriate analytical method and practical quantitation limit for soil are listed in Table 8-1.

8.1 LABORATORY CERTIFICATION

The selected laboratory will meet all applicable U.S. Navy contract and Virginia state requirements.

8.2 TURN-AROUND TIME

All sample analyses will be performed within a 24-hour turn-around time for lead analyses.

TABLE 8-1
PRACTICAL QUANTITATION LIMITS FOR REMEDIATION OF SITE 12

Analyte(s)	Method	Practical Quantitation Limit
Lead	6010	58

9.0 LABORATORY QUALITY CONTROL

Quality control related to the acquisition of the chemical, geotechnical engineering, and geosynthetic material data has two main elements once the samples arrive at the laboratories. The first involves the documented handling of the samples as they are processed through the laboratory. The second involves the project requirements for the method specified quality control. These two elements are discussed separately in the following two sections.

9.1 SAMPLE HANDLING IN THE LABORATORY

The proper handling begins with the document receipt by the laboratory of the samples from the field team. After signing the COC Record, the sample receipt personnel will inspect the shipping containers and samples and document the condition in which the samples were received, especially noting any deficiencies in the "Remarks" box of the COC Record and the sample log book.

Following the initial receiving tasks, the samples will be logged into a hardbound handwritten notebook and the computer data system. The work requests generated from the data system will be reviewed for accuracy and will be placed in the proper file.

In general, the receiving laboratory's sample custodian will:

- Examine the integrity of the shipping cooler and inner shipping containers, determine if the proper temperature has been maintained during shipment and verify the completeness of the chain of custody. If samples have been damaged during shipment, the remaining samples will be carefully examined to determine whether they were affected. Any samples affected shall also be considered damaged. It will be noted on the Analysis Request and COC Record that specific samples were damaged and that the samples were removed from the sampling program. Field personnel will be notified as soon as possible that samples were damaged and that they must be resampled, or the testing program changed, and an assessment of the damage.

- Compare samples received against those listed on the COC Record.

- Verify that sample holding times have not been exceeded as described in Table 3-1.

- Sign and date the Analysis Request and COC Record and attach the waybill to it.

- Denote the samples in the laboratory sample log-in book with the following information:

  - Project identification number
  - Sample numbers
  - Type of samples
  - Date received in laboratory
  - Record of the verified time of sample receipt (VTSR)
  - Date put into storage after analysis is completed
  - Date and method of sample disposal.

  Note: The last two items will be added to the log when the action is taken.

- Notify the laboratory project manager of sample arrival.
- Place the completed Analysis Request and COC Records in the project file.

Holding times for the samples associated with this project will begin at the time of sample collection.

9.2 LABORATORY SAMPLE STORAGE

The primary considerations for sample storage are:

- Maintenance of prescribed temperature, if required, which is typically 4 degrees Celsius
- Extracting and/or analyzing samples within the prescribed holding time for the parameters of interest

The requirements for temperatures and holding times will be followed. Placing of samples in the proper storage environment is the responsibility of the Sample Custodian, or designee, who will notify the Laboratory Group/Team Leaders, or designated representative, if there are any samples which must be analyzed immediately because of holding-time limitation.

9.3 METHOD SPECIFIC QUALITY CONTROL

The methods of analysis are the standard methods and will be followed without deviation. The analytical methods have specific quality control requirements and/or recommendations and the laboratory will meet or exceed these requirements. This includes calibration procedures and frequency (including the GC/MS tune date), laboratory quality control checks (internal standards and surrogate spike recoveries), detection limits, corrective actions and reporting.

9.4 DATA QUALITY EVALUATION

The data quality evaluation that will be completed at the laboratory will be a combination of contract compliance review and limited data evaluation. All data generated will be reviewed to ensure that they meet the written requirements. This review will be based on comparison of the information generated by the Laboratory with the written requirements of the Sampling and Analytical Plan for the project. The second portion of this process which deals more with data evaluation will involve review of the quality control results and preparation of a summary report qualifying the data. Review will include all quality control parameters such as holding times, detection limits, method blanks, surrogate recoveries, matrix spikes, matrix spike duplicates, interference check sample result, internal standard data, GC/MS tune data and the initial and continuing calibration data. The data evaluation summary is intended to provide a qualitative judgment of the overall integrity and usefulness of the data.

10.0 DATA REDUCTION AND VALIDATION

The results or data obtained from chemical analysis, as well as those from field monitoring, should be reviewed and validated. The extent of this review/validation effort will depend on the quality level required for the data.

10.1 DATA REDUCTION AND TABULATION

Data generated from the site activities can be grouped into two broad categories:

- Field data, such as data collected during VOC screening; and
- Chemical data for environmental samples generated by the project laboratory and accompanying QA/QC data package deliverables as required for DQO Level 2 and Level 3.

These data will be compiled and managed using a central project filing system. The field and laboratory data filing system will be a manual storage system established at the OHM's field office at the Site. Field and laboratory data will be filed chronologically. Field log books, sample logs, sample data sheets, chain-of-custody records, laboratory log books, and laboratory calculation sheets shall be labelled with a task number and date.

10.2 GENERAL PROCEDURES FOR DATA REVIEW/VALIDATION

10.2.1 Level 1 Data

Level 1 data (e.g., health and safety screening for VOCs) will be reviewed to ensure that the acquired data is of acceptable quality. This review will include calibration and maintenance records for each applicable instrument, and field logbooks to verify that appropriate Standard Operating Procedures (SOPs) were followed. The acceptance of field instrument screening data is based upon the satisfactory calibration of the instrument as described in the instrument SOP/directions and the collection and analysis of samples as per the associated SOP/instrument directions.

Level 1 data (e.g., screening for VOCs) will be validated by reviewing calibration and maintenance records for field instruments and field logbook information associated with individual data sets to ensure that appropriate SOPs were followed. Data validation, therefore, will be qualitative, and will focus on whether field screening data are of acceptable quality based upon supporting documentation. Acceptance or rejection of data will be determined by the judgement of experienced field personnel familiar with the SOPs.

10.2.2 Level 3 Data

Generation of the Level 3 data will include the analysis of QA/QC samples, including blanks, calibration and reference standards, and possibly spiked samples in some instances; however, a complete CLP QA/QC analysis program will not be performed for these samples. Items that will be reviewed to validate the data include:

1. Integrity and completeness of the data package,
2. Holding times from sample receipt at the laboratory to sample extraction and analysis or holding times from sample receipt to analysis, as appropriate,

3. Trip blank and laboratory method blank sample results,

4. Matrix spike, matrix spike duplicate, and replicate analyses,

5. Surrogate recoveries,

6. Field blank sample results, and

7. Field duplicate results.

Data validation will be a qualitative process. Review of precision, accuracy, representativeness, completeness and comparability criteria will be included whenever measurement data are reviewed. The analytical laboratory will provide numerical precision and accuracy data that will be compared to the acceptance criteria. Precision and accuracy values for project data sets that are within the ranges for the type of sample and analytical method used will be considered acceptable. In some cases, data of apparently poor precision and/or accuracy may be somewhat useful. The judgement to accept such data, with appropriate qualifications, will be made by a data validator with appropriate technical expertise.

10.3 DATA REPORTING

OHM Project Manager, Bill Snow, will provide all analytical results to the Resident Officer in Charge of Construction (ROICC), LTJG Fohner. Entries with associated quality assurance limitations will be appropriately flagged.

The project laboratory will report the data in a certificate of analysis format. Sample analytical results and accompanying QA/QC sample results will be reported to the ROICC on computer diskette files suitable for transfer to the spreadsheet data base.

Analytical data will be identified according to the project laboratory's procedures for establishing sample lots, so that sample analysis data can be matched to corresponding QA/QC samples, control charts, and calibration data.

11.0 PERFORMANCE AND SYSTEM AUDITS

Quality assurance (QA) audits are performed to ensure and document that required procedures and QA/QC measures are being used by laboratory personnel to provide data of acceptable quality, and that subsequent calculations, interpretation, and other project outputs are checked and validated. Both scheduled and unscheduled audits are included in a QA program. In addition, technical and peer reviews will be conducted by designated laboratory personnel and senior managers.

The designated QA Manager of the subcontract laboratory will conduct system, method, and performance audits of laboratory activities. These audits will be performed in accordance with the subcontract laboratory QA/QC plan. If the audits identify issues affecting the reliability of data reported by the laboratory, the QA Manager will take appropriate corrective action. In addition, the QA/QC Officer may perform independent system and performance audits of the laboratory.

11.1 SYSTEM AUDITS

A system audit is conducted to ensure that the mechanisms or structures that are in place for a selected project activity contain the necessary components to meet overall project requirements, and to assess whether personnel in laboratory settings are adhering to established procedures and QA/QC requirements. Examples of activities that could be audited include laboratory analysis and sample tracking programs and data management systems. A system audit of a sample tracking program may include an evaluation of the methods used to ensure that appropriate sample custody is maintained throughout the receipt, preparation, extraction, and analysis steps within the laboratory, and that laboratory personnel are familiar with and effectively use the sample tracking system. The overall objective of a system audit is to assure that the QA/QC framework that has been developed is adequate to maintain acceptable data quality, and is being followed by laboratory personnel.

System audits may include the assessments of:

- Laboratory analytical programs, including equipment calibration, use of QC samples (e.g., blanks, spikes, reference standards, and duplicates), and documentation regarding solvents and reagents used in sample preparation
- Sample tracking systems, preventive maintenance programs, and data storage and reporting systems for subcontract laboratories involved in chemical and physical testing
- Data validation procedures and in-house management and statistical evaluation of validated data

11.2 PERFORMANCE AUDITS

A performance audit, based upon a quantitative review of QC samples (including blanks, reference and calibration standards, and duplicates as applicable) is considered appropriate for the project for Level 2 and 3 data. Performance audits of Level 1 analyses will be qualitative and focused on adherence to calibration and screening protocols.

The performance audit of Level 3 analyses will focus on the precision and accuracy of measurements through quantitative evaluations of reproducibility, and will also include assessment of blanks and matrix spikes to determine whether cross-contamination or matrix interferences are occurring. Sampling decontamination procedures will be evaluated through review of data from rinse blanks and

duplicate samples. The performance audit for Level 2 data will include review of maintenance and calibration records.

The required data quality levels and anticipated end uses for the specific types of information being gathered will affect the level of detail required for performance audits. For example, evaluating the quality of data from headspace screening (Level 1 data) requires only an assessment of sample handling techniques, site conditions, and instrument calibration, whereas more sophisticated sampling that includes spikes, duplicates, and blank samples requires a more rigorous QA review. Details regarding the specific types and frequency of collection of QC samples to be included in various data collection activities are provided in Sections 3.0 and 5.0 of this plan.

12.0 PREVENTATIVE MAINTENANCE

Preventative maintenance measures are implemented to avoid the need for corrective action. These measures are to be implemented on both the analytical instrument in the subcontract laboratory and on devices used in field monitoring.

12.1 SUBCONTRACT LABORATORY

The subcontract laboratory is expected to perform preventative maintenance on all analytical instrumentation in order to minimize instrument downtime and the need for corrective action(s).

12.2 FIELD INSTRUMENTATION

The PID will be maintained as described in Section 7.0 (Air Monitoring) of the Health and Safety Plan.

13.0 CORRECTIVE ACTION

Corrective actions may be required when an out-of-control situation occurs. This type of situation can occur in either the field/sampling or the laboratory and may adversely affect data quality or quantity. Each of these areas is addressed below. All corrective actions will be noted and the documentation will be provided to the appropriate OHM and/or client management.

13.1 FIELD SAMPLING

Field sampling situations which may require corrective actions include, but are not limited to:

1. Unavailability of predetermined sample locations
2. Improperly packaged samples
3. Mislabeled samples
4. Deficient execution of FSQAP

These situations will be corrected through discussions with the sampler, Project Chemist, Project Manager and laboratory, if required. If necessary, the client representative will also be notified. Part of the corrective action will be to ensure that procedures are written/amended to alleviate the problem, if possible. Corrective actions will be implemented at the lowest possible management level to speed resolution.

13.2 LABORATORY

No analytical corrective actions will be performed by OHM. Laboratory corrective action(s) may be required if:

1. Any QC data is outside of the acceptable limits for precision and accuracy.

2. Any blanks or laboratory control samples contain contaminants above acceptable limits.

3. Undesirable trends are detected in spike and/or surrogate recoveries, or duplicate sample RPD.

4. There are unusual changes in the method detection limits.

5. Deficiencies are detected by the QA department during internal or external audits or from the results of performance evaluation samples.

6. Inquiries concerning data quality are received from the Contracting Officer.

Corrective action procedures for out-of-control events in the following areas will be included in the contract laboratories Quality Assurance Plan (to be submitted prior to mobilization).

1. Incoming samples
2. Sample holding times
3. Instrument calibrations
4. Practical quantitation limits
5. Method QC
6. Calculation errors
7. Laboratory audits

Short term corrective actions are initiated and performed by the analyst during sample analysis procedures. These corrective actions are necessary for analyses to be completed successfully. Examples of the situations requiring corrective actions are listed below:

- Instrument performance does not meet acceptable criteria
- Standard degradation/volatilization during storage
- Results of calibration check standard are outside of acceptable range
- Contamination identified in blanks, QC samples or the instrument
- Quality Control data is outside of acceptable limits

Long term corrective actions may be initiated to correct repetitive problems, unusual occurrences or trends, or as a result of internal/external audits. A long term corrective action will include some or all of the following, depending upon the type of irregularity:

- Review of relevant data
- Evaluation of detection limit(s)
- Standards validation
- Evaluation of instrument and equipment performance
- Re-analysis of sample
- Evaluation of contamination and matrix interference effects
- Training
- Review/revision of operating procedure

Other causes for corrective actions may include:

- Client identified errors in analysis/reporting

- Data review corrective actions - Errors, deviations and omissions from standard laboratory protocols identified during a review for QC data quality and compliance with overall quality objectives may result in corrective action(s).

- Client recommended corrective actions

14.0 DELIVERABLES

OHM will provide the U.S. Navy the following deliverables:

- **Contractor Production Report (CPR)** will include all sampling activities which were performed during each day of on-site activities. All available data will be indicated on the Sample Summary Matrix. The CPR will also list all applicable personnel and equipment and any expendables purchased which were needed to complete the days activities. Any field modifications will be noted on the CPR. Additionally, all problems encountered and corrective actions will be noted.

- **Sample Summary Matrix** will include all analytical and quality control sample numbers and locations, date sampled, whether the sample was a grab or composite and the analyses performed. There will also be space for sample specific comments. This matrix will be updated when samples are collected and the modified matrix will be included as an attachment to the CPR.

- **Quality Control Summary Report** will be submitted to the Navy upon completion of site activities. All quality control measures which relate to sampling and analyses of relevant matrices will be discussed. The QC discussion will include laboratory data, tables, graphs, calibration curves, standards used and any other information necessary to provide a full discussion of applicable QC, including any problems encountered and corrective actions taken.