63.15-6/1/2000-2542A

WORK PLAN
FOR
SITE 89 LTTD SOIL REMEDIATION
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

Prepared for:

DEPARTMENT OF THE NAVY
Contract No. N62470-93-D-3032
Task Order No. 050

Atlantic Division
Naval Facilities Engineering Command
6506 Hampton Boulevard
Building A (South East Wing) 3rd Floor

Prepared by:

OHM Remediation Services Corp.
A member of THE IT GROUP

11560 Great Oaks Way, Suite 500
Alpharetta, GA 300022

June 2000

OHM Project No. 803011

03:15-6/1/2000-2542A

WORK PLAN
FOR
SITE 89 FENCE REPAIR AND INSTALLATION
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

Prepared for:

DEPARTMENT OF THE NAVY
Contract No. N62470-97-D-5000
Task Order No. 0050

Atlantic Division
Naval Facilities Engineering Command
6506 Hampton Boulevard
Building A (South East Wing) 3rd Floor
Norfolk, Virginia 24311-6287

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May 2000
OHM Project No. 803011

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APPENDICES

1.0 INTRODUCTION

This Work Plan has been generated by OHM Remediation Services Corporation (OHM) under Task Order 050 of LANTDIV Contract No. D62470-97-D5000 for the design, repair and/ or installation of permanent security fencing at Site 89, MCB Camp Lejeune, North Carolina. The fencing will be used to protect the planned pond aeration system and surface waters, located topographically downgradient of the Low Thermal Treatment Desorbtion (LTTD) system at the site.

This submittal provides the execution of field operational tasks required for a successful repair and installation. This Work Plan has been developed to accompany the Work Plan for Site 89 Creek Aeration, based on the requirements of the Task Order (TO) 050 Scope of Work as well as subsequent discussions with Navy and their supporting contractors.

2.0 EXECUTION OF SCOPE OF WORK

2.1 LOCATION AND DESCRIPTION

Fencing locations have been designed to prohibit general access to the following three areas:

1. The LTTD system and surface waters south of the system
2. The pond and equipment associated the pond's aeration system
3. The Edwards Creek alignment at Site 44, downstream of the pond

The locations of the fencing are shown in the attached figure. All fencing will be 6 feet in height.

The gates should be designed to swing open in both directions. Line posts shall be spaced equidistant at intervals of 96-inches or less. The attached drawing provides approximate locations of the gates and entry-ways. Exact locations will be provided on the as-built drawings provided at project close out.

Warning signs similar to the existing signs on the Site 44 fence should be installed on the new fencing at approximately 200' spacing with additional signs as needed at each access gate and priority placement to ensure visibility from White Street Extension and the Seaboard Coast railroad right-of-way.

2.2 Existing fence

The existing fencing located around the future LTTD system (Site 89) and along Edwards Creek (Site 44) will be inspected, replaced and repaired as required, including all fencing wire, gate hardware, and signage. Brush and/ or trees that have intersected the fence sytem or present the potential to impact the fencing will be removed. Damaged areas of the fencing will be repaired. Measures will be made to re-use fencing materials that are found to be in good condition as an installation cost saving.

2.3 NEW FENCE INSTALLATION

All vegetated areas where new fencing is to be installed will first be cleared using gas powered trimmers and/or chainsaws. Care will be taken that only the minimum amount of clearing needed to install the fence will be conducted.

The fencing material will meet U.S. Federal SPEC RR-F-191 and American Society for Testing and Materials (ASTM) Publication A-120-84 Pipe, Steel, Block and Hot Dipped Zinc-Coated Galvanized, Welded, Seamless, for Ordinary Uses and ASTM Publication A-153-82 Zinc Coating (Hot Dip) on Iron and Steel Hardware. The fencing will be 9-gauge galvanized wire with (2-ounce per square foot of coating area) woven in 2-inch mesh. Gates shall be additionally braced with a 5/16-inch, minimum thickness, diagonal through rod. Latches, hinges, stops, keepers, rollers, caps, and other hardware items shall be furnished to provide a complete fencing and gate system. Latches shall be arranged for padlocking so that the padlock will be accessible from both sides of the gate regardless of the latching arrangement.

Fence posts shall be zinc-coated, Schedule 40 steel pipe meeting ASTM 120-84. Line posts shall be 2-inch in diameter and of the same class throughout the fence. Terminal (corner and pull) and man-way and latch posts shall be 2-1/2-inch diameter and of the same class throughout the fence. All gateposts shall be 6-inch in diameter. Braces shall be zinc-coated, steel pipe. All ferrous-accessories shall be zinc coated per ASTM A-153. Truss rods shall be furnished for each terminal post. Truss rods shall be provided with turnbuckles or other equivalent provisions for adjustment. Concrete will follow ASTM C-94 using ¾-inch maximum size aggregate, and having a minimum compressive strength of 3,000 psi at 28 days.

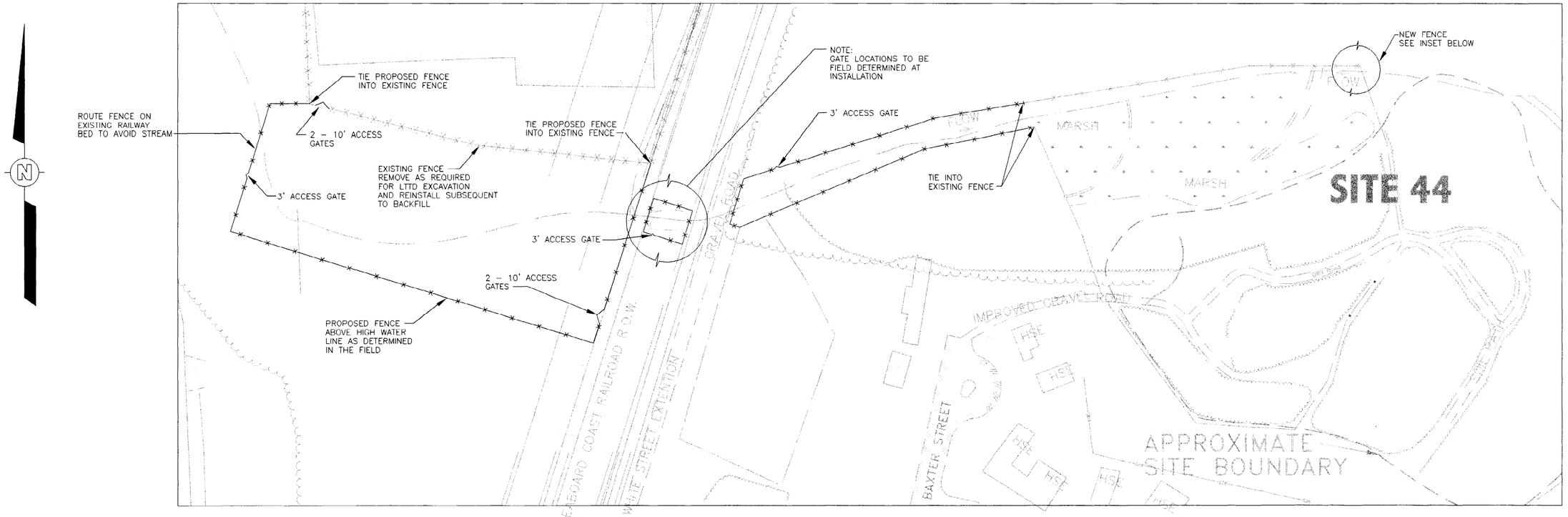
Posts shall be set plumb and in alignment. Posts shall be set in concrete as shown in the attached drawing. Concrete will be thoroughly consolidated around each post so as to be free of voids and finished to form a dome. Concrete and grout shall be allowed to cure for 72 hours prior to attachment of any item to the posts. Braces and truss rods shall be furnished as required and in conformance with the standard practice from the fence manufacturer. Horizontal (compression) braces and diagonal truss (tension) rods shall be installed. Braces and truss rods shall extend from terminal posts to line posts. Diagonal braces shall form an angle of approximately 40 to 50 degrees with the horizontal. Chain-link mesh shall be installed on the side of the post away from the equipment. The chain-link mesh shall be attached to terminal posts with stretcher bars and tension bands. Bands shall be spaced at approximately 15-inch intervals and fastened to tension wires at approximately 24-inch intervals or closer based on the fence manufacturer's recommendation. Chain-link mesh shall be sized by untwisting and removing pickets and splicing is not acceptable. The bottom of the installed chain-link mesh shall be one inch (plus or minus ½-inch) above the ground.

Sites will be maintained in a clean and orderly fashion throughout the project. Debris and trash will be properly containerized on site until final clean up. All cleared areas will be allowed to restore by natural re-vegetation.

APPENDIX A

Figures

IMAGE ---
X-REF ---
OFFICE Atlanta, GA
DRAWING NUMBER 803011-FIC-4



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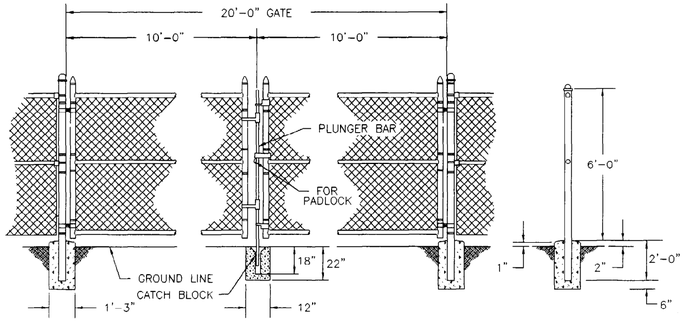
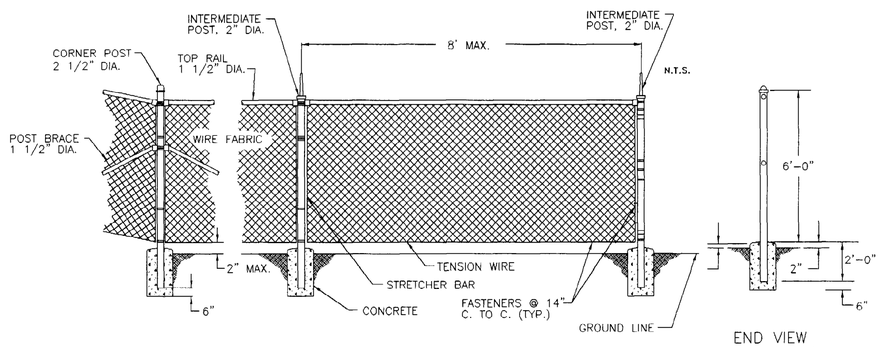


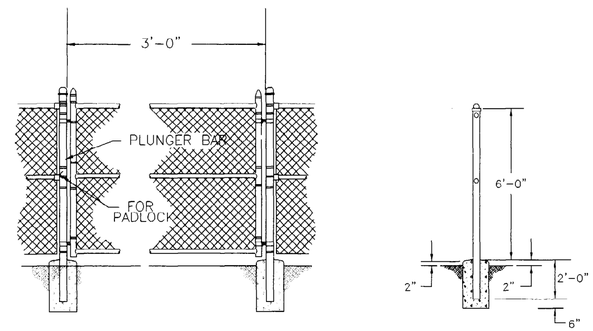
CHAIN LINK FENCE GATE DETAIL (A)
N.T.S.



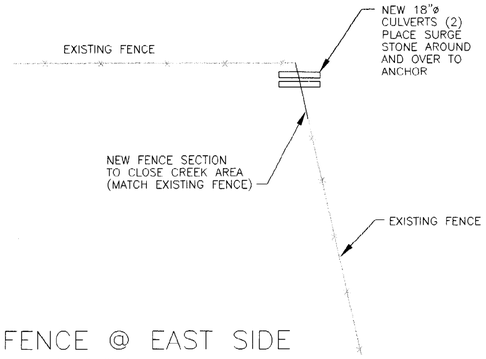
CHAIN LINK FENCE DETAIL (B)
N.T.S.

NOTES:

1. EXISTING FENCE TO BE CLEARED OF DEBRIS AND PLANT GROWTH AND REPAIRED AS NECESSARY.
2. ALL GATES TO BE PROVIDED WITH MASTER 0536 LOCKS.



3' GATE DETAIL (C)



NEW FENCE @ EAST SIDE OF SITE 44

REVISIONS					
REV	DATE	BY	CHK'D	APPR'VD	DESCRIPTION/ISSUE
1	5/2/00	JL		JAD	INCORPORATE REVIEW COMMENTS

OHM Remediation Services Corp.
PROJECT NO. 803011

DESIGNED BY
DRAWN BY
CHECKED BY JEL
APPROVED BY JAD

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
NORFOLK, VIRGINIA
NAVAL STATION ATLANTIC DIVISION JACKSONVILLE, N.C.
MCB CAMP LEJEUNE SITE 89

FENCING PLAN AND DETAILS

SCALE: AS SHOWN
SIZE: D
TASK ORDER NO. 0050
CONSTR. CONTRACT NO. N62470-97-D-5000
NAVFAC DRAWING NO. -
SHEET I.D. 3

PLOT DATE: ?/?/99
FORMAT REVISION 3/25/99

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FOR
SITE 89 LTTD SOIL REMEDIATION
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Atlanta Division
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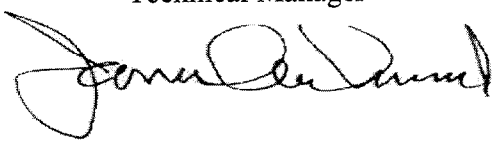

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Program Manager

July 2000
Revision 2
OHM Project No. 803011

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FIGURES

APPENDICES

1.0 INTRODUCTION

This document reviews OHM Corporation's approach to implementing the remediation of volatile organic compound (VOC) contaminated soils from Site 89 located at Marine Corps Base (MCB) Camp LeJeune, North Carolina. Low temperature thermal desorption (LTTD) is selected for the treatment of the contaminated soil. This document is prepared by OHM Corporation for the Department of the Navy, Naval Facilities Engineering Command, Atlantic Division (LANTDIV) under Contract Number N62470-97-D-5000, Task Order 050.

Several other plans have been developed for this task order and are to be considered as complementary components to this work plan. They include:

- Environmental Protection Plan (EPP) (included in Section 4.0 of this document)
- Site Specific Health and Safety Plan (SSHSP) Addendum
- Sampling and Analysis Plan (SAP)
- Construction Quality Control Plan (CQCP)

This work plan identifies and describes how OHM will implement the major tasks employing LTTD at Site 89. It includes the following sections:

- Section 1.0 presents an Introduction and Background of the site.
- Section 2.0 presents a description of the Pre-construction Activities including pre-construction submittals and permits.
- Section 3.0 presents the Remedial System Description and Design Criteria.
- Section 4.0 presents a description of Environmental Protection efforts that include temporary road construction, protection of trees, shrubs and grass, water resources protection and emission control.
- Section 5.0 presents a description of the Mobilization and Site Preparation.
- Section 6.0 presents a description of the Remediation Activities that include contaminated soil excavation, backfilling, equipment compound installation, thermal treatment system installation, piping and electrical power installation, and treated soil handling.
- Section 7.0 presents the Site Restoration and Demobilization efforts.
- Section 8.0 presents the Transportation and Disposal efforts that include debris, decontaminated water and PPE disposal and waste disposal coordination.
- Section 9.0 presents a description of the Performance Testing
- Section 10.0 presents the Reporting procedures, and
- Section 11.0 presents the Project Schedule.

1.1 Remedial Action Objectives

The remediation of the Site 89 contaminated soil is considered to be a Time Critical Removal Action (TCRA). The overall goal of the Site 89 TCRA is to provide protection of human health and the environment by removal and treatment of soil contaminated by high levels of VOC. The contaminated soil presents a possible threat to human health and the environment since concentrations exceed the EPA Region III risk-based concentrations (RBCs) for

industrial land use and because the contaminants are migrating to groundwater and into Edwards Creek. The primary remedial objectives can be summarized as follows:

- Minimize the potential for human exposure to soil contaminated in excess of EPA Region III industrial RBCs via direct contact, inhalation, and ingestion (hand –to-mouth contact).
- Use of 1,1,2,2-tetrachloroethane (PCA) at an action level of 1ppm, as the indicator compound for treatment levels and excavation limits.
- Reduce the potential for contaminants in soil to migrate to groundwater, surface water, and sediment by removal of a primary source of contamination.

In order to satisfy the above remedial objectives, the following tasks or scope of work will be implemented:

- Removal of soil within the vadose zone at Site 89 that is contaminated by VOCs in exceedance of the EPA Region III industrial RBCs, utilizing 1,1,2,2,tetrachloroethane PCA) as indicator compound.
- Treatment of this soil by low-temperature thermal desorption (LTTD) to the negotiated treatment standard of 1ppm PCA.
- Placement of treated soil back into the excavation and/or disposal of treated soil in the Camp LeJeune on-base Subtitle D landfill, as appropriate
- Backfill the excavation with treated soil and/or clean soil from an off-site borrow source
- Maintaining the existing high-density polyethylene (HDPE) tarp cap over the southern portion of Site 89 to minimize surface infiltration until contaminated soil is removed.

1.2 Site Description

Site 89 is the current Defense Reutilization and Marketing Office (DRMO) lot located in the Camp Geiger area of MCB Camp LeJeune. It is located near the intersection of "G" and Eighth Streets in Camp Geiger. The location of the site is shown in Figure 1. A site plan depicting site features is presented in Figure 2. The site is surrounded by Edwards Creek to the west and south, while a railroad and a gravel road adjoins the site to the east.

1.3 Site Background

Prior to DRMO operations, the area had multiple uses as a vehicle maintenance yard, vehicle storage lot, and a staging/storage area for fuel bladders. In addition, a former waste oil underground storage tank (UST) was located in the northern portion of the site. Recent sampling results taken from the site and surrounding areas indicate the need for immediate actions to be taken at the site to prevent and/or reduce the possibility of exposure of workers and nearby residents to site contaminants and to prevent release of contaminants from on-site media to the sensitive wetland ecosystem of Edward's Creek.

Elevated levels of chlorinated solvents have been detected in the soil and groundwater at Site 89 during recent site investigations. Contaminants detected at the site in exceedance of USEPA Region III industrial soil RBC's include 1,1,2,2-tetrachloroethane (PCA) and vinyl chloride (VC). The contaminants that are present in site soil are a potential source of

groundwater contamination, which in turn is a potential source of surface water and sediment contamination in Edwards Creek.

The threat to current industrial workers has been temporarily addressed by placing a high-density polyethylene (HDPE) cover and tarp over the impacted, unpaved area in the southern portion of the DRMO. Because of the cover and tarp, there is no current exposure of industrial workers to contaminated soil. The tarp prevents dermal, ingestion and inhalation exposure to soils by industrial workers. The TCRA using thermal desorption will provide a permanent means of reducing this potential threat of exposure.

1.4 Site Characteristics

Site surface and shallow subsurface soil at Site 89 generally consists of fine sand, trace to some silt, and trace to little clay. This soil type is generally amenable to treatment by LTTD. Some clay lenses of 4 to 5 feet thick were encountered in borings in the vicinity of the DRMO in previous investigations (Remedial Investigation for Sites 89 and 93, Baker, June 1998). In general, clay soils are more difficult to handle and are not as amenable to treatment by LTTD.

1.5 Previous Investigations

A number of site investigations were performed at Site 89. These site investigation reports present more detailed site characterization information and are listed below:

- Phase I Remedial Investigation (RI) for Site 89 (Baker Environmental, November 1996)
- Remedial Investigation for Sites 89 and 93 (Baker Environmental, June 1998)
- Long-term Monitoring Report for O.U. 16 (Baker Environmental, April 1999)
- October 1999 Focused Site Investigation Letter Report (Baker Environmental, November 3, 1999)
- December 1999 Focused Site Investigation Letter Report (Baker Environmental, February 1, 2000)
- Additional TCRA Investigation data provided 3/31/00 (Baker Environmental)

Table 1 presents a summary of the maximum concentrations of VOCs detected at Site 89.

Table 1 – Site 89 Maximum Detected VOCs in Soil

Volatile Compounds	Maximum Detection (ug/kg)	Detection Frequency
1,1,2,2–Tetrachloroethane (PCA)	18,000,000	37/88
1,1,2–Trichloroethane	390	7/87
1,1–Dichloroethene	12	3/87
1,2–Dichloroethane	5	1/87
2–Butanone (MEK)	15	11/87
4-Methyl-2-pentanone (MIBK)	6	2/87
Acetone	570	25/89
Benzene	1,000	3/90
Cis-1,2–Dichloroethylene	65,000	36/91
Trans-1,2–Dichloroethylene	65,000	36/91
Ethylbenzene	860	7/90
Tetrachloroethene (PCE)	31,000	15/87
Toluene	4,100	9/91
Trichloroethene (TCE)	210,000	45/88
Vinyl chloride	5,900	20/89
Xylenes, total	6,800	10/91

2.0 *PRE-CONSTRUCTION ACTIVITIES*

2.1 Pre-Construction Submittals

The following plans have been developed for this task order and are to be considered as complementary components to this work plan:

- EPP (included in Section 4.0 of this document)
- SSHSP Addendum
- SAP
- CQCP

2.2 Permits

OHM will prepare all appropriate permit applications for submission by the base as required for the operation of the LTTD, and will coordinate with the state/federal agencies, Camp LeJeune personnel, and LANTDIV as needed. This will consist of utility clearance and base construction permits primarily.

In addition, draft copies of the following permits for on site activities will be submitted 15 days prior to beginning on-site work as dictated by Baker Technical Specifications Section 01115:

- Hot works permit; from the Public Works Officer, Utilities Division
- Excavation permit; from the Public Works Officer, Utilities Division
- Outage permit; from the Public Works Officer, Utilities Division

Due to the CERCLA status of the site, no formal permit applications will be made to regulatory agencies for operation of the LTTD unit. The performance testing of the unit will demonstrate however, that the substantive requirements of a State issued permit will be met.

2.3 Procurement

Upon approval of this work plan, OHM will complete procurement of equipment, materials, and subcontractors necessary for the execution of this project. Specialty subcontractors may be procured to execute certain portions of work. The following is a list of anticipated subcontractors procured for the project:

- LTTD subcontractor-Midwest Soils Remediation
- Primary and secondary electrical power installation-Sandi's Electric
- Laboratory analytical services-STL Laboratories and Mitkem
- Concrete subcontractor-B&H and Hatcher Construction
- LTTD stack testing subcontractor-Entropy

2.4 Pre-Construction Meeting

OHM will participate in a pre-construction meeting at MCB Camp LeJeune with Base, LANTDIV, and other parties prior to mobilization to the site. OHM representatives will include at a minimum the Project Manager and the Site Supervisor. The purpose of this meeting will be to:

- Confirm roles and responsibilities of key personnel and flow of communications for project execution
- Review project schedule, work hours, sequence of tasks and key milestones
- Identify and discuss Base-specific issues relative to the upcoming mobilization and construction activities
- Obtain the necessary security clearances for operations personnel
- Review air discharge permit and water discharge options with Base.

3.0 REMEDIAL SYSTEM DESCRIPTION AND DESIGN CRITERIA

3.1 Remedial System Description

The Low Temperature Thermal Desorption (LTTD) system is a proven technology that vaporizes contaminants from soils through the application of heat and then destroys these contaminants in downstream air pollution control devices. The LTTD proposed for the current project consists of a countercurrent rotary desorber, a pulse jet baghouse, and a thermal oxidizer. A process block flow diagram of the LTTD configured for the Camp Lejeune project is shown in Figure 3. A typical layout and side view drawing of the LTTD unit is shown in Figure 4.

3.1.1 LTTD Operation

Soils removed from the excavation will first be transported to a mobile screening plant to prepare the soil for feed into the LTTD unit. This unit will consist of a single shaft, flail type shredder followed by a fixed screen system. Soil passing through the shredder is then transported by belt to a three deck screen box were 4 way separation of the soil is accomplished. The screening plant is diesel powered and capable of screening up to 165 tons per hour. Th processed soil from the screening unit will then be transported to the feed hopper of the LTTD unit for treatment. The soil is then conveyed over a weigh scale and enters the "cool end" of the rotary drum. As the contaminated soil travels through the drum, it is contacted with hot combustion gases flowing in the opposite direction. This counter-current flow of soil and hot combustion gases heats the soil and reduces the gas temperature to approximately 400 degrees F.

As the soil is heated, contaminants in the soil are vaporized and enter the gas stream. The rotary drum is equipped with speed, slope, and temperature controls to provide a variable soil retention time of 6 to 12 minutes. While the unit can achieve soil discharge temperatures as high as 1000 degrees F, OHM anticipates that the remediation objectives can be achieved at soil discharge temperatures of approximately 350 degrees F based on contaminant boiling points, contaminant concentrations and the desire to eliminate possible furan/dioxin formation concern.

The petroleum and dust laden air stream exiting the desorber is routed to a pulsejet baghouse equipped with over 1,350 square feet of P84 filter cloth. Dust fines collected in the baghouse are conveyed to the rotary discharge auger. The particulate-free gases exiting the baghouse are then routed to the thermal oxidizer where the combination of high temperature and residence time converts all of the organic contaminants to carbon dioxide (CO_2) and water vapor (H_2O).

The hot soils exiting the thermal desorber are expected to be around 300 degree F. The hot soils pass into the discharge auger where they are mixed with dust fines removed in the baghouse. The auger is equipped with water spray nozzles that cool and rehydrate the soil.

The treated soil will then be temporarily stockpiled via a discharge auger. The auger discharges to a steel, three sided temporary holding bin, where a loader then transfers the treated soil to the treated soil storage bins. Confirmation testing is then performed on-site and the soil is transported back to the excavation as backfill if determined to meet treatment standard.

3.1.2 LTTD Equipment Specifications

The following is a description of the major LTTD system components for the project:

- Feeder bin - 6 cu. Yds
- Rotary desorber - 66-inch dia. X 24-inch long, counter-current flow
  400 – 1000 deg F soil discharge temp.
  17 MM Btu/hr burner, 25 tph max throughput
- Desorber gas flow - 8,900 acfm
- Baghouse - 231 P84 bags; 1,350 square feet
  250-500 deg F. max inlet temperature
  99.8% control efficiency, pressure drop 3 – 10 " w.c.
- Thermal oxidizer - 19 sq. ft. by 22' long
  1800 deg F max. exit temperature
  10.8 MM Btu/hr burner, 35,000 acfm exhaust
  0.5 – 0.7 seconds avg. residence time at 1600 deg F

3.1.3 Utility Requirements

The utility requirements for the LTTD is as follows:

- Electricity - 300A/ 460V/ 3 Phase
- Water for cooling treated soil - 15 gpm
- Diesel Fuel - 200 gal/hr

3.1.4 LTTD Stack Emissions Projection

The proposed LTTD system utilizes a dry off gas cleaning system. The projected stack emission rate based on soil having an average PCA content of 300 ppm is shown below:

Compound (Principal Organic Hazardous Constituent or POHC)	Soil avg Level, ppm	Chlorine Fraction, %	Chlorine Content, ppm	POHC to emit, lbs/hr	HCl Emission Rate, lbs/hr
PCA	300.000	84.34	253.012	12.00	10.12
DCA	2.167	71.43	1.548	0.09	0.06
PCE	0.517	85.37	0.441	0.02	0.02
TCE	3.500	80.77	2.827	0.14	0.11

Vinyl Chloride	0.096	51.47	0.051	0	0
BETX	0.213	0	0	0.01	0
Total	306.495		257.878 ppm	12.26 lbs/hr	10.32 lbs/hr
Tons per year for 24,000 tons soil:				7.36 t/y	6.19 t/y

3.1.5 LTTD Waste Feed Cutoff Controls

The LTTD is equipped with monitoring instrumentation that will automatically cut off the waste feed in case a set parameter or equipment failure occurs. Below is a list of the waste feed cutoffs engineered into the system.

Waste Feed Cutoff #	Parameter	Element	Device	Limits
1	Primary burner failure	UV scanner	Burner control	On/off
2	Discharge soil temp.	T/C	Process monitor	To be set
3	System fan failure	--	Start control	On/off
4	Max feed rate	Transducer	Weigh board	20 tph
5	Baghouse inlet temp.	T/C	Process monitor	> 450 F
6	Oxidizer outlet min.	T/C	Process monitor	To be set
	15 min. avg. CO @ 7% O2	CO sensor	CEM PLC	100 ppm

3.2 Production Rates

The LTTD is estimated to process approximately 20 tons per hour of feed soil based on the following assumptions:

1. The contaminated soil consists mostly of fine sand, with trace to small amount of silt, and trace to little clay.
2. The contaminated soil can be dried by gravity to a moisture content of no more than 17% prior to treatment by LTTD.
3. The average contaminant concentration is less than 300 ppm of PCA as represented in the soil samples collected for the Treatability Study Tests.

3.3 Remediation Goal

The remediation goal for thermally treating the contaminated soil is to achieve a cleanup level of 1 ppm of PCA. Excavation will also occur until a 1ppm limit is reached.

4.0 *ENVIRONMENTAL PROTECTION*

The Environmental Protection Plan (EPP) has been prepared in accordance with standard OHM procedures and policies. The EPP provides specific information relating to the scope of work under Task Order 050 of LANTDIV Contract No.D62470-97-D-5000 at Site 89, MCB Camp LeJeune, North Carolina. The plan will provide site-specific information for:

- Land resources management
- Water resource management
- Air and noise pollution control
- Non-compliance/corrective action
- Post-excavation clean-up

The control of environmental pollution will consider air, water and land impacts as well as noise and solid waste management.

The land resources within the property of MCB Camp LeJeune, but outside the limits of permanent work, will be preserved in their condition or restored to a condition that does not detract from the appearance of the area after completion of construction. As much as is possible, construction activities will be limited to areas defined by the plans and specifications.

4.1 Temporary Road Construction

In the event that temporary construction roads are required at the project site, road construction will be performed in a manner as to minimize the impact to the natural environment. Water will be used for dust control, as necessary.

4.2 Protection of Trees, Shrubs, and Grass

Prudent steps will be taken to protect trees and shrubs outside of the excavation zone as necessary. Trees and shrubs within the excavation zone will be cut down to ground level and removed by OHM. However, tree stumps or roots within the excavation activities will be cut into manageable pieces and moved from the project site as not to interfere with operations. Precautions will be taken to minimize the construction activities' impact on existing vegetation and will include but not limited to:

- Utilization of existing or temporary construction roads
- Closely supervise equipment operators with an emphasis place on preservation of vegetation in non-work area
- Proper guidance of heavy equipment and truck operators by site personnel to minimize damage to adjacent vegetation not directly affected by construction activities

4.3 Water Resources Protection

4.3.1 Surface Water Management

The waterways which could possibly be impacted by construction activities if proper sediment and erosion protection measures are not taken include Edwards Creek. To protect against damage, stormwater surface run-off leaving the site will be controlled by temporary erosion / sediment control techniques such as berms, silt fencing and grading. The area of bare soil at any time by construction activities will be minimized.

4.3.2 Erosion Control

Prior to disturbance of native vegetation and soils, temporary erosion/sediment control will be established on the down gradient side of each excavation. Control techniques to be utilized will involve silt fencing.

Silt fencing will be installed with the fabric a minimum of 6 inches below grade and extending 36 inches above grade and fastened to posts no more than 6 feet apart. The posts will be installed a minimum of 24 inches below grade and extend a minimum of 36 inches above grade. Fabric will be attached to the upslope side of the posts using 1-inch staples or tie wires. Silt fences will be inspected after every rain and daily during extended rainfall. Accumulated sediment will be removed before the thickness reaches 12 inches.

4.3.3 Spill and Discharge Control

Measures will be taken to prevent chemicals, fuels, oils, greases, bituminous materials and contaminated materials from entering streams, rivers and lakes. Absorbents will be available to solidify any leaks outside containment and any soil contaminated with fuel spills will be immediately removed and placed into appropriate containers and sampled to determine proper disposition. Additionally, both the LTTD unit and diesel supply tanks will be located on concrete pads, with containment curbing and collection sumps as shown in Figure 5.

4.4 Emissions Control

4.4.1 Air and Noise Control

Personnel and ambient air monitoring will be conducted as necessary in order to determine airborne dust and contaminant levels. Ambient air monitoring will be conducted at working locations and on occasion at the perimeter of the project site. This ensures that respiratory protection is adequate to protect personnel against the contaminants that are encountered as well as ensuring that harmful levels of airborne contaminants are not leaving the site.

OHM will also conduct continuous daily monitoring for fugitive volatile emission from the excavation and the soil treatment area using a combination of instrumentation. Around the immediate excavation and work areas, PID instrumentation will be utilized to screen for total organics. Draeger tubes may also be used to determine semi-quantitative concentrations of individual contaminants of concern such as vinyl chloride. At the site fence line or beyond a real time, data logging infra-red (IR) analyzer will be used to read PCA, TCE, and vinyl chloride simultaneously. Each day of monitoring data will be downloaded to a laptop

computer at days end for print out. The location of the fixed monitoring may change based on the days wind pattern.

OHM will only perform operation of heavy equipment during daylight hours to minimize the impact of off-site noise pollution. Noise exposure to off-site residents or personnel is expected to be minimal. Hearing protection for on-site workers will be implemented if necessary as specified in the SSHSP Addendum.

4.4.2 Particulate Emissions Control

Specific measures to be take to minimize particle emissions for major activities during site construction include the following:

4.5 Soil Excavation, Handling, Site Grading, and Transportation

- Apply water to work and traffic areas as necessary to minimize dust emissions
- Cover stockpiles with sheeting to minimize wind and / or stormwater erosion
- Move and loaf soil for transport within the site that limits free fall of material and is least likely to generate dust emissions
- Halt dust-generating work when on-site wind conditions exceed 35 miles per hour

4.6 Movement of Equipment

- Water traffic areas as required to minimize dust emissions
- Designate equipment traffic patterns to minimize travel distance and vehicular dust emissions
- Limit vehicle speed to minimize dust emissions

4.7 Site Restoration and Cleanup

All excavation equipment will be decontaminated on a pad to demobilizing from the site. Decontamination will consist of scraping and pressure washing to remove visible soil and debris from tires and undercarriage of vehicles and heavy equipment. Decontamination liquids will be containerized, sampled, analyzed, and disposed.

4.8 Gravel

Upon completion of backfill placement, area, which had previously graveled, will be covered with gravel meeting NCDOT Standard Specification for Roads and Structures, Section 905. Gravel thickness will match existing thickness of adjacent area. Gravel will be compacted using tracked equipment. Density testing will not be completed.

4.9 Seeding

Grass seed matching existing vegetation will be placed at a rate of 5 pounds per 1,000 square feet over topsoil areas. Fertilizer Type I, Class 2, 10-10-10 analysis will be applied at a rate of 25 pounds for 1,000 square feet.

OHM will take all necessary steps to protect Edwards Creek during TCRA implementations. Methods to be used are described earlier and will include erosion control and sedimentation control.

5.0 MOBILIZATION AND SITE PREPARATION

5.1 Mobilization

To augment the current workforce at Camp LeJeune, OHM may mobilize personnel and equipment as necessary from its attendant facilities including Covington, Georgia; Alpharetta, Georgia; and/or Clermont, Florida. Prior to beginning work on site, training will be conducted to brief all site personnel on the Site Health and Safety Plan, construction drawings, operation procedures, and other relevant site-specific plans. Site hazards and conditions will be discussed and all personnel will acknowledge their understanding and compliance with the plan by signing an approved acceptance form.

5.2 Site Preparation

Project site setup and preparation will consist of the following main activities:

5.2.1 Utility Clearance

OHM will work with Base personnel to identify and mark all known utilities potentially within the work zones. OHM will exercise caution while performing ground-intrusive work and will implement its Standard Operating Procedures for excavation near utilities. Techniques for minimizing damage to existing utilities will include the use of location devices and hand digging. A Base issued dig permit or excavation permit will be obtained from the Public Works Officer, Utilities Division prior to beginning work.

5.2.2 Temporary Facilities Installation

A temporary field office trailer, and supply/ decontamination trailers will be set up on site. The field office trailer will serve as the control checkpoint for contractor/subcontractor personnel entering the site.

5.2.3 Site Survey

OHM will mark the location for the utilities, the contaminated soil excavation area, the excavated soil stockpile area, the treated soil stockpile area, the LTTD equipment area, the equipment lay down areas, the equipment decontamination area, and other areas as required for this operation. The locations will be marked using spray paint or wood stakes. The locations will be rechecked just prior to construction or as the need arises.

5.2.4 Environmental Protection

As previously discussed in Section 4, OHM will implement environmental protection measures at the site to prevent damage to the environment during the execution of this remedial action.

5.2.5 Fence Construction

OHM personnel will erect safety fencing around the designated work areas. Fencing will be 3-foot-high, bright orange, polyethylene-mesh to prevent unauthorized personnel from accidentally entering a working area.

A fence will be installed that extends from the DRMO to enclose the part of Edwards Creek that is impacted by groundwater from Site 89.

5.2.6 Site Security

All persons entering the site will be required to sign in and out daily. OHM reserves the right to deny access to any individual not showing proper identification.

5.2.7 Demolition of Asphalt or Other Structures

In association with the construction of the treatment/staging areas, the asphalt paved areas and other structures may be demolished as required to make room for the project execution.

5.2.8 Health and Safety Zones

The site will be segregated into work areas based on degree of hazard and personal protective equipment (PPE) requirements. Personnel working within the Contamination Reduction Zones (CRZ) will be required to wear the appropriate PPE as outlined in the Site Specific Health and Safety Plan. Excavation areas within the CRZ will be designated the exclusion zone and will be delineated by orange safety fencing.

OHM health and safety personnel will monitor air quality during excavation of areas of contaminated soil and will adjust work zone boundaries as appropriate.

5.2.8.1 Decontamination Areas

In areas of excavation of contaminated soil, personnel and equipment decontamination areas will be provided within the CRZ upon exiting the contaminated working areas. The SSHSP addresses these areas in more detail.

5.2.8.2 Personnel Decontamination Facility

OHM will set up a personnel decontamination area at the site. The location will be near areas depending on the phase of remediation activities. All decontamination and cleaning water generated from decontamination will be collected, tested and treated at either the on-Base water treatment system, Site 89/Lot 203 Plant, or the Site 78 North Treatment Plant.

5.2.8.3 Equipment Decontamination Pad

OHM will establish a temporary equipment decontamination pad at the site as needed. The pad will be bermed and equipped with a sump to collect decontamination and cleaning water. All decontamination and cleaning water generated from decontamination will be collected and treated with on-Base water treatment system prior to disposal. The LTTD pad will be used to decon the LTTD unit and other equipment at the jobs conclusion.

6.0 REMEDIATION ACTIVITIES AND DESCRIPTION

6.1 Contaminated Soil Excavation

The extent of soil excavation at Site 89 was estimated based on soil analytical information obtained during previous site investigations. Based on information available at this time, approximately 16,000 cubic yards (24,000 tons) of contaminated soil will be excavated for treatment at Site 89 (this does not include soil to be excavated due to sloping back the excavation side walls). During excavation activities, side walls may be sloped back or shoring may be used as required in order to complete the excavation.

6.2 Confirmation Sampling

Confirmatory sampling will be conducted to determine if VOC-contaminated soil has been removed to the specified remediation goals. Samples will be collected at 50-foot intervals along the excavation side walls and on a 500-square-foot frequency on the bottom of the excavation, unless excavation proceeds to groundwater. Rapid turn-around analysis will be performed in the project mobile laboratory to expedite the TCRA. Samples will be analyzed for VOCs using a modified Method 8100 on site with a 10% confirmation rate at an of site lab using EPA Method 8260.

The excavation will remain open while results of the laboratory confirmation testing are obtained.

6.3 Backfill/Compacting/Grading

The preferred method for disposal of the LTTD treated soil is to backfill into the excavation areas. In addition, imported clean soil may be used to backfill the excavations.

Any off-site borrow material to be used as backfill will be sampled and analyzed for contaminants prior to transport and use on site.

After backfilling, the excavation areas will be compacted to pre-existing conditions using the equipment on site. The backfilled area will be graded so that the surface will drain to existing surface water-run-off drainage structures.

6.4 Soil Stockpile/ Staging Area

A contaminated soil stockpile/ staging area will be constructed on the existing asphalt pad for storage of excavated soil prior to treatment. This area will be constructed using concrete jersey barriers placed to form bins measuring 35 feet by 35 feet, with 200 tons of capacity for each bin. Soil will be gravity dewatered to less than 20% moisture content prior to treatment in the LTTD unit. The area will be sloped towards the excavation area to prevent migration of contaminated water and soil onto uncontaminated areas.

The soil stockpile will be covered with a tarp or other means to control dust and prevent rainwater from rewetting the excavated soil when necessary.

6.5 Equipment Compound Installation

The equipment compound will consist of the following four major areas – the feed storage bin area, LTTD pad, treated soil storage bins, and the diesel fuel storage pad. A general layout drawing of the equipment compound is shown in Figure.

6.5.1 Feed Storage Pad

The feed storage area will be constructed on the existing asphalt pad north of the feed soil excavation area. The feed area will be sized to hold six days supply of feed soil, and will be sloped towards the excavation area such that the gravity drained water from soil dewatering will run into the excavated area.

6.5.2 LTTD Equipment Pad

The LTTD equipment will be set on a 40 feet by 100 feet concrete pad. A 4-inch high curb and a water collection sump will be constructed for containment purpose. A submersible pump will be installed in the sump to pump any collected water to a temporary storage tank prior to hauling to the on-Base water treatment plant for treatment.

The LTTD equipment will be anchored on the equipment pad to withstand a hurricane wind force equal to a 100 miles per hour.

6.5.3 Treated Soil Storage Pad

The treated soil storage area will also be sized to consist of six bins with each bin capable of holding 200 tons of treated soils. The bins will be divided by means of jersey concrete barriers similar to the feed storage area described in section 6.4. The bins are enclosed on three sides and open on one end for loader or vehicular traffic.

6.5.4 Diesel Fuel Storage Pad

A diesel fuel storage pad, 25 feet by 50 feet, will be constructed to hold a 2000 gallon above ground diesel fuel storage tank for site equipment and a 9500 gallon tank trailer to supply the LTTD system. An 18 inch containment curb and a water collection sump will be constructed for containment of stormwater. A submersible pump will be installed in the sump to pump any collected water to a temporary storage tank prior to hauling to the appropriate on-Base water treatment plant for treatment.

6.6 Treated Soil Handling

Soil treated by the LTTD process will be temporarily stockpiled in the treated soil bins until confirmatory sampling results are received to determine the soil meets the treatment standards. If the treated soil meets the treatment criteria, the soil will be backfilled in the excavations. However, if the treated soil does not meet the treatment criteria, the soil will be retreated by the LTTD process.

6.7 Treated Soil Confirmatory Sampling

Treated soils will be stockpiled in discrete 200 ton lots and then sampled to verify that the LTTD unit has successfully reduced the contaminants in the soil to the concentrations below the cleanup levels.

Treated soil samples will be collected and combined in such a manner that one composite sample, consisting of six discrete grab samples, is collected for confirmation of LTTD performance analysis for every 200 tons of treated soil processed.

The composite sample collected every 200 tons of treated soil processing will be split and analyzed by the on-site lab and 10% will be sent to a certified off-site lab for lab confirmation using SW846 Method 8260 for VOCs. The individual treated soil samples will be analyzed in IT's on-site GC laboratory using a modified EPA Method 8100 to analyze the treated soil samples for VOCs for quick turnaround.

6.8 Treated Soil Disposal

The treated soil will be placed back into the excavation after determination that treatment standards have been attained.

6.9 Management of Contaminated Water

Contaminated water will be generated from a number of sources during implementation of the TCRA. Possible sources of contaminated water include:

- Decontamination water
- Stormwater collected from the LTTD pad
- Stormwater collected from the diesel fuel containment area.

The most cost-effective option will depend on the volume of water that is expected to be generated during implementation of the TRCA. To a large extent, the volume of contaminated water generated depends on whether dewatering is required to facilitate the excavation of soils at depth.

Based on current projections, OHM anticipates that minimal water will be generated from soil excavation. The remaining amount of water collected from soil dewatering and decontamination activities can be hauled via tank trucks and treated with the appropriate groundwater treatment plant as discussed in section 5.2.8.2.

6.10 Drums/Tanks/Miscellaneous Demolition and Removal

Demolition of structures is not anticipated for this project. Recyclable materials such as metal drums and rubber material will be pressure washed in the decontamination pad and taken off Base after cleaning.

Pavement in areas that are to be excavated will be demolished, tested for contaminants, and pressure washed (if necessary), prior to disposal in the on-Base Subtitle D landfill.

7.0 SITE RESTORATION AND DEMOBILIZATION

Upon completion of remediation of contaminated soils, OHM will perform site restoration activities and then demobilize from the site.

7.1 Site Restoration

After confirmatory sampling results indicate that the contamination has been removed from the site, the excavated areas will be backfilled with treated soil or soil from off-site borrow sources. The backfill will be spread and compacted such that it will provide a surface suitable for paving. A fence will also be installed that extends from the DRMO area to the southern side of Edwards Creek to enclose the portion of the creek that receives groundwater from Site 89 as presented in the Fencing Work Plan for the site.

Grass areas destroyed or disturbed during remediation activities will be seeded. OHM will not repair asphalt pavement areas and roadway surfaces damaged or destroyed during this project activity, these areas will be seeded with an appropriate grass mixture.

7.2 Decontamination and Decommissioning

All equipment used for handling untreated and treated soils will be decontaminated and removed from the site. The LTTD unit will be shut down, cleaned and inspected. On-site treatment units including water treatment and the LTTD unit will be decontaminated, dismantled or disposed of as appropriate. The sedimentation tank associated with water collection and treatment will be drained and cleaned. The sediment will be removed, dried via gravity, sampled and tested, and dispose of at the on-Base Subtitle D landfill if it meets the landfill criteria.

7.3 Demobilization

Upon completion of site restoration, all equipment, support trailers and personnel associated with this LTTD phase of work will be demobilized from the project site. Heavy equipment will be returned to the equipment yard where they originated, and the project personnel will return to their respective home offices.

8.0 TRANSPORTATION AND DISPOSAL

This section deals with the transportation and disposal of debris and PPE. Transportation and disposal of treated soil and contaminated water are described in earlier sections.

8.1 Waste Streams

8.1.1 Debris

Debris could consist of concrete, asphalt, piping, lumber etc. The debris will be stockpiled in a lined area, tested for the on-Base Subtitle D landfill parameters, and transported to the Base landfill if acceptable analytical results are obtained.

8.2 PPE

PPE will be placed on the debris pile or stored in plastic bags, tested for the on-Base Subtitle D landfill parameters, and transported to the Base landfill if acceptable analytical results are obtained.

8.3 Waste Disposal Coordination

OHM will assign a Transportation and Disposal (T&D) Coordinator to this project to act as a single point-of-contact for waste management activities. Prior to disposal of debris and PPE, the T&D officer will coordinate with the Base representative to obtain approval.

9.0 PERFORMANCE TESTING

After the LTTD system is installed, the unit will go through a cold start-up and functional check. This is to ensure that all mechanical, electrical, and instrumentation systems are functioning properly. After which, the unit will be heated up to go through a hot start-up.

After all system is started up, shake-down, and deemed functional, a Proof-of-Process (POP) test will be performed. Contaminated soil will be used for this test. The primary objectives of the POP demonstration phase will be:

- To observe soil feed handling characteristics. To check if the feed soil is in a friable condition and suitably blended to homogenize the contaminants and moisture in the soil, which will aid in stabilizing the LTTD unit operating parameters and insure the cleanup levels are met.
- To demonstrate attainment of treated material to the required soil standard for PCA under "worst case" LTTD unit operating conditions
- To demonstrate that the LTTD unit stack gas emissions meet the applicable air discharge criteria under "worst case" operating conditions
- To demonstrate the critical/ optimum operational and process parameters for Automatic Waste Feed Cutoff (AWFCO) Systems
- To establish the operational parameters for the LTTD unit to attain the site specific cleanup objectives and meet the air emission standards.

The POP test will consist of operational periods of ten-hour operating and treating soil workdays.

A certified stack testing company, Entropy, will conduct stack testing for air emissions compliance during the performance testing. Testing will confirm the site specific operating parameters of the LTTD unit. Pre-treatment and post-treatment soil analysis will be taken to insure that the site-specific cleanup goals for soil treatment are met.

The following Table summarizes the performance testing program including the sampling frequency, media types, and lab analysis scheduled to demonstrate the LTTD unit is meeting all regulatory imposed criteria

Summary of LTTD Performance Testing

Process/ Media	Parameter	Sampling Method	Analysis Method	Sampling Frequency
Stack gas	Dioxins/ Furans	M0023 A	8290	Once
	Volatile Organics	MOO30/ M0031	8260B	Once
	Semi-volatile Organics	MM0015	8270C	Once
	THC/ CO	CEMs	CEMs	Continuous
Treated Soil/ Fines	Dioxins/ Furans	Composite	8290	Once
	PCA	Composite (avg.)	8100 M (on-site) 8260B (off-site)	Every 200 Tons

All samples will be analyzed by State of North Carolina approved laboratories and a quick analysis turnaround will be requested so that data results may be reviewed in a timely manner. Currently, dioxin analysis will be analysis requiring the longest turnaround time. OHM is striving for a 14 day turnaround on dioxin analyses.

10.0 REPORTS AND SUBMITTALS

The following paragraphs discuss the reports OHM plans to prepare during this project.

10.1 As-Built Records

OHM will maintain two sets of full size drawings marked to show any deviations which have occurred, including buried or concealed construction and utility features revealed during the course of construction. OHM will record horizontal and vertical locations of buried utilities that differ from the contract drawings. These drawings will be available for review by the ROICC and NTR at any time. At the completion of the work, OHM will prepare final as-built drawings for inclusion in the Contractors Closeout Report.

10.2 Environmental Conditions Report

Prior to starting work, OHM will be available to perform a pre-construction survey with the ROICC and NTR. OHM will take photographs showing existing environmental conditions on and adjacent to the site.

10.3 QC Meeting Minutes

The QC representative will document QC meetings by delivering copies of the minutes to the ROICC and NTR within 3 calendar days after each QC meeting.

10.4 Test Results Summary Report

A summary report of field tests and laboratory analytical results will be submitted in the Contractors Closeout Report.

10.5 Contractor Production Report (CPR)

The CPR will be prepared and submitted daily to the ROICC and NTR, as presented in the QC Plan provided as Appendix C.

10.6 QC Report

The QC Report will be submitted by the QC representative to the ROICC and NTR every day work is performed, material is delivered, direction is pending, or a labor force is present.

10.7 Contractor's Closeout Report

The Contractor's Closeout Report will be submitted upon completion of the project. This report will include:

- Introduction
- Summary of actions
- Final Health and Safety report
- Summary of record documents
- Field changes and contract modification
- As-built drawings

- Complete set of field test and laboratory analytical results
- Complete set of data validation results
- Documentation of offsite transportation and treatment of materials
- QC summary report
- Final cost data
- An evaluation of the system including quantities of contaminated soil treated, contaminants removed, quality of effluent, problems encountered, and solutions implemented.

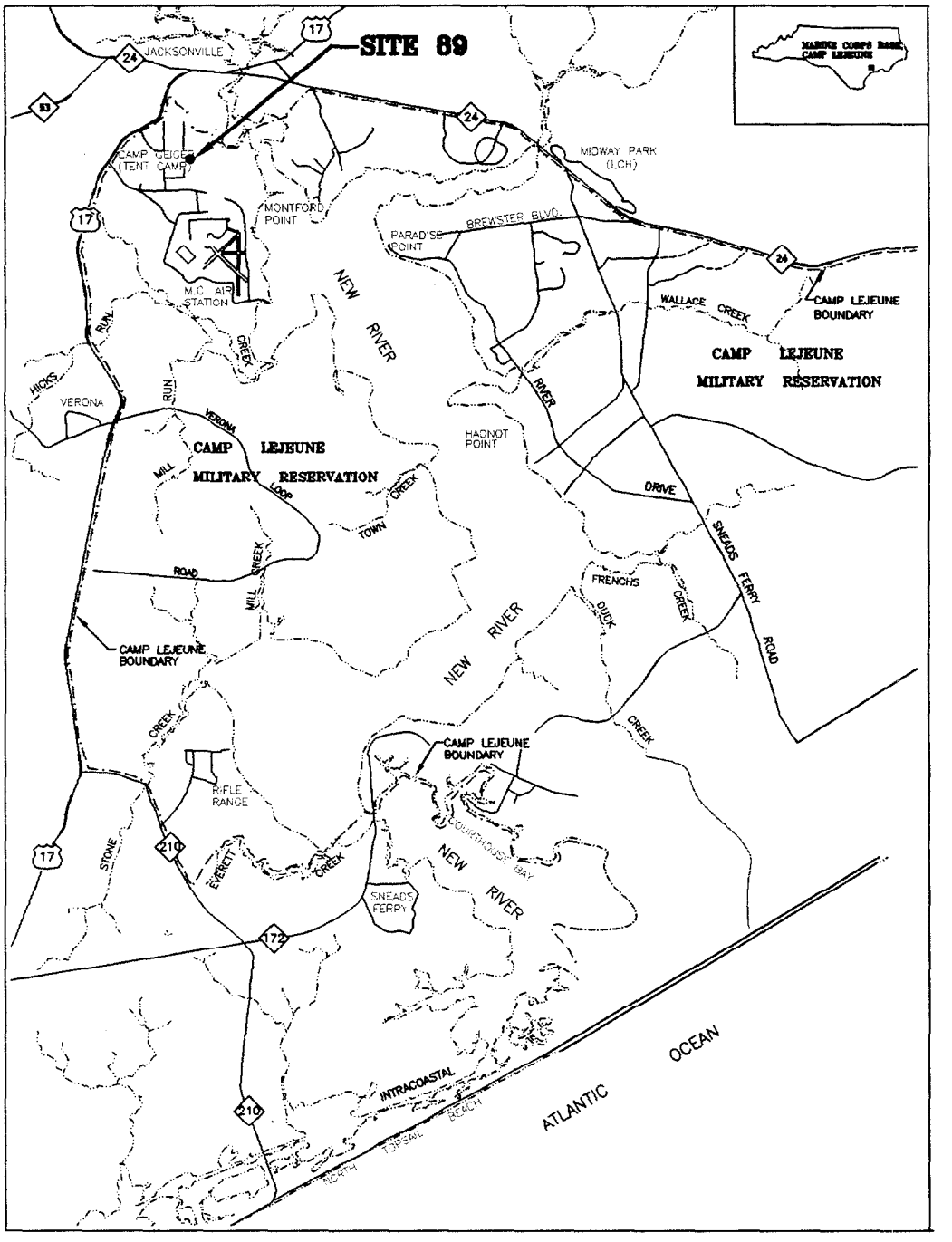
11.0 PROJECT SCHEDULE

The anticipated schedule for this TCRA phase of work is shown in the attached chart.

FIGURES

IMAGE	X-REF	OFFICE	DRAWING NUMBER
---	---	NORCROSS, GA	776506-VIC

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA



VICINITY MAP

1"= 3 MILES

0 1.5 3 4.5 6 7.5

REV	DATE	BY	CHK'D	APPR'D	DESCRIPTION/ISSUE
0	5/00	JEL	RBK	JAD	DRAFT WORK PLAN

REVISIONS

OHM Remediation Services Corp.
PROJECT NO. 776506

DESIGNED BY		CHECKED BY	RBK
DRAWN BY	JEL	APPROVED BY	JAD

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
NORFOLK, VIRGINIA
NAVAL STATION
ATLANTIC DIVISION
MARINE CORPS BASE
CAMP LEJEUNE, N.C.

SITE 89
LTTD SOIL REMEDIATION

VICINITY MAP

SCALE:	SIZE:
AS SHOWN	A

DELIVERY ORDER NO.
0050

CONSTR. CONTRACT NO.
N62470-97-D-5000

NAVFAC DRAWING NO.
-

SHEET I.D.
1

PLOT DATE: 5/21/99
FORMAT REVISION 3/25/99

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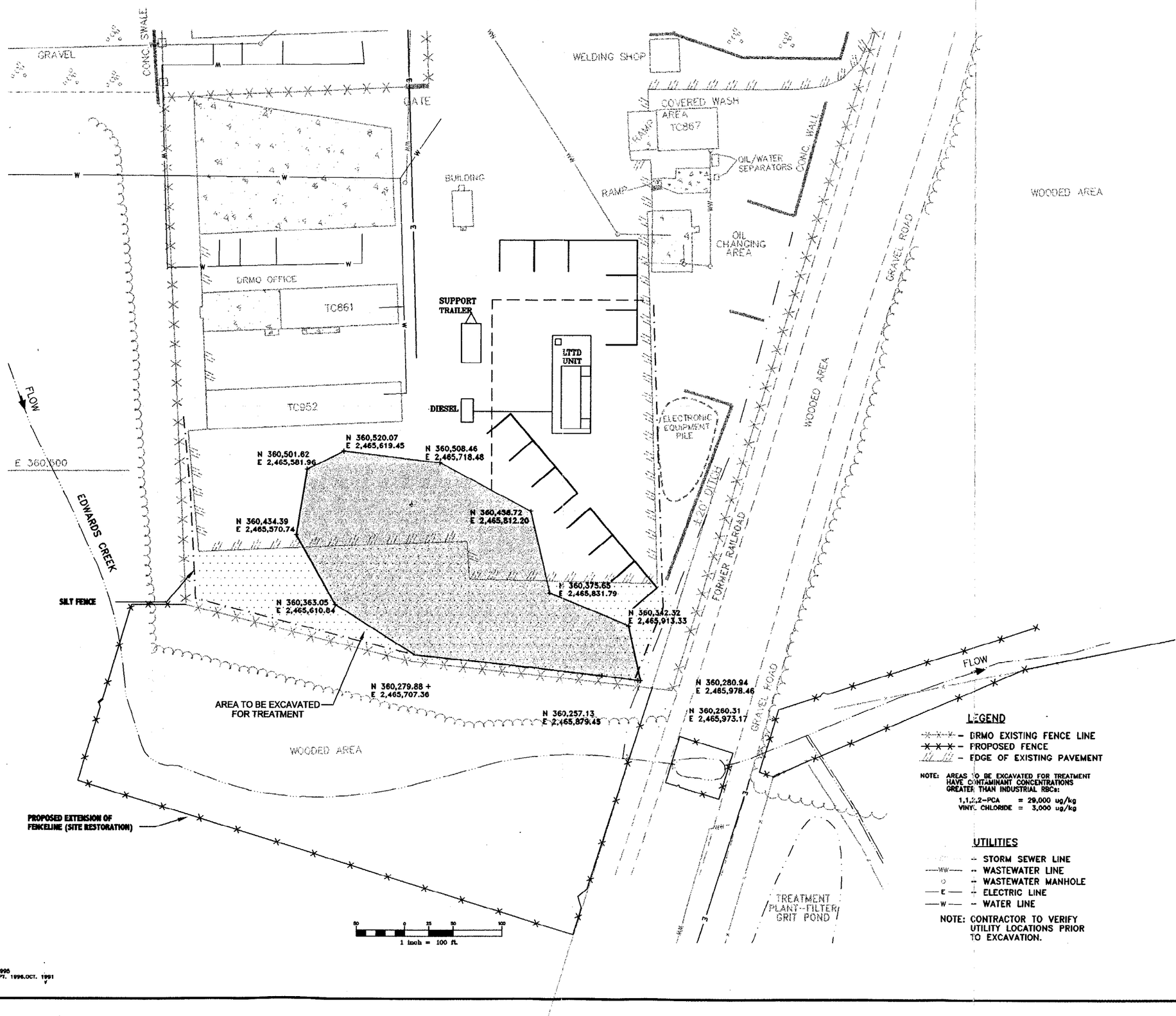

LEGEND

- DRMO EXISTING FENCE LINE
- PROPOSED FENCE
- EDGE OF EXISTING PAVEMENT

NOTE: AREAS TO BE EXCAVATED FOR TREATMENT HAVE CONTAMINANT CONCENTRATIONS GREATER THAN INDUSTRIAL RBCs:

1,1,2,2-PCA = 29,000 ug/kg
VINYL CHLORIDE = 3,000 ug/kg

UTILITIES

- STORM SEWER LINE
- WASTEWATER LINE
- WASTEWATER MANHOLE
- ELECTRIC LINE
- WATER LINE

NOTE: CONTRACTOR TO VERIFY UTILITY LOCATIONS PRIOR TO EXCAVATION.

SOURCE: LANTDIV, FEBRUARY 1982
SURVEY: BRENT A. LANIER AND ASSOCIATES, 1995
SOURCE: BARDEN LANIER AND ASSOCIATES, SEPT. 1996-OCT. 1991

PLOT DATE: 4/19/00
FORMAT REVISION 3/25/99

REV	DATE	BY	CHK'D	APPR'D	DESCRIPTION/ISSUE
0	5/00	JEL	RBK	JAD	DRAFT WORK PLAN

REVISIONS

OHM Remediation Services Corp.
PROJECT NO. 803011

DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY
JEL	JEL	RBK	JAD

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
NORFOLK, VIRGINIA
ATLANTIC DIVISION
JACKSONVILLE, N.C.
NAVAL STATION
MCB CAMP LEJEUNE
SITE 89
LTTD SOIL REMEDIATION

MSRU-12 TYPICAL SITE LAYOUT

SCALE:	SIZE:
AS SHOWN	B

TASK ORDER NO. 0050
CONSTR. CONTRACT NO. N62470-97-D-5000
NAVFAC DRAWING NO. N/A
SHEET I.D. 2

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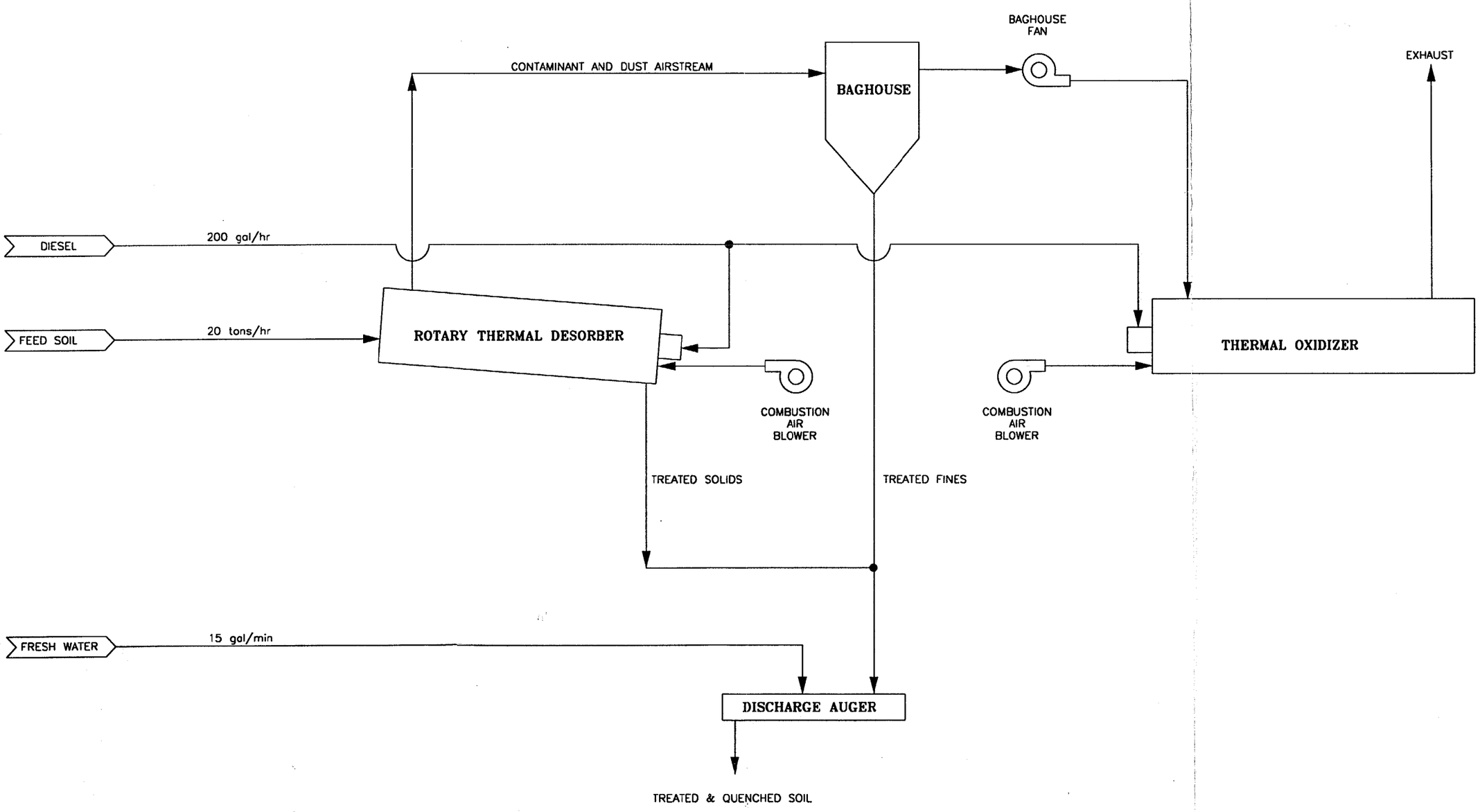

NOTE: SOURCE PROVIDED BY MIDWEST SOIL REMEDIATION, INC.

IMAGE	X-REF	OFFICE	DRAWING NUMBER
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REVISIONS					
REV	DATE	BY	CHK'D	APP'VD	DESCRIPTION/ISSUE
0	5/00	JEL	RBK	JAD	DRAFT WORK PLAN
1	6/00	JEL	RBK	JAD	FINAL WP

OHM Remediation Services Corp.
PROJECT NO. 803011

DESIGNED BY: JEL
DRAWN BY: JEL
CHECKED BY: RBK
APPROVED BY: JAD

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
NORFOLK, VIRGINIA
NAVAL STATION
MCB CAMP LEJEUNE
ATLANTIC DIVISION
JACKSONVILLE, N.C.
SITE 89
LTTD SOIL REMEDIATION
BLOCK FLOW DIAGRAM

SCALE: AS SHOWN
SIZE: B
TASK ORDER NO. 0050
CONTRACT NO. N62470-97-D-5000
DRAWING NO. N/A
SHEET I.D. 3

PLOT DATE: 4/19/00
FORMAT REVISION 3/25/99

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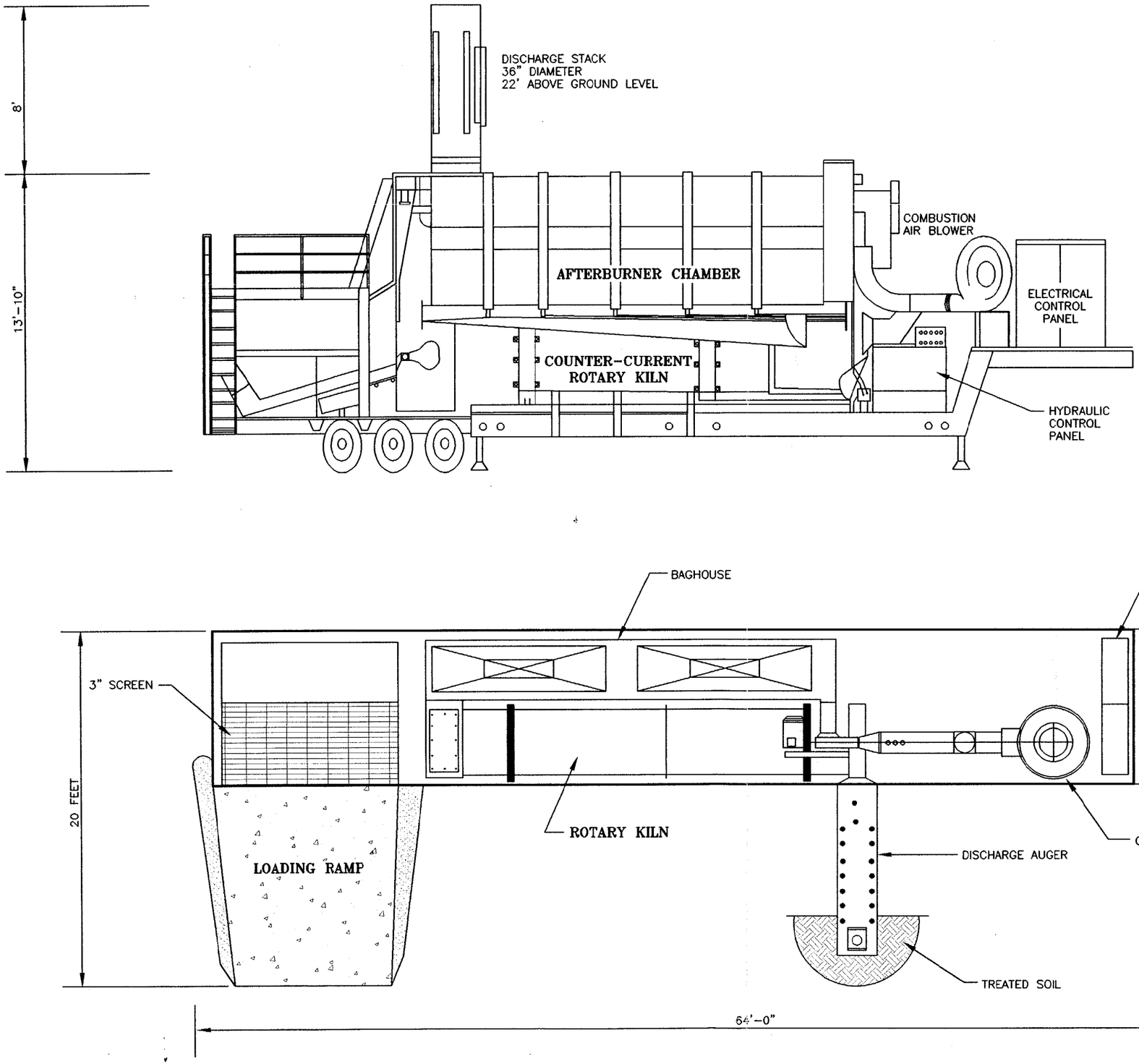


PLOT DATE: 4/19/00
FORMAT REVISION 3/25/99

REV	DATE	BY	CHK'D	APRV'D	DESCRIPTION/ISSUE
0	5/00	JEL	RBK	JAD	DRAFT WORK PLAN

REVISIONS

OHM Remediation Services Corp.
PROJECT NO. 803011

DESIGNED BY	DRAWN BY
JEL	JEL

CHECKED BY	APPROVED BY
RBK	JAD

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
NAVAL STATION NORFOLK, VIRGINIA
MCB CAMP LEJEUNE JACKSONVILLE, N.C.

ATLANTIC DIVISION

SITE 89
LTTD SOIL REMEDIATION

TYPICAL LTTD EQUIPMENT

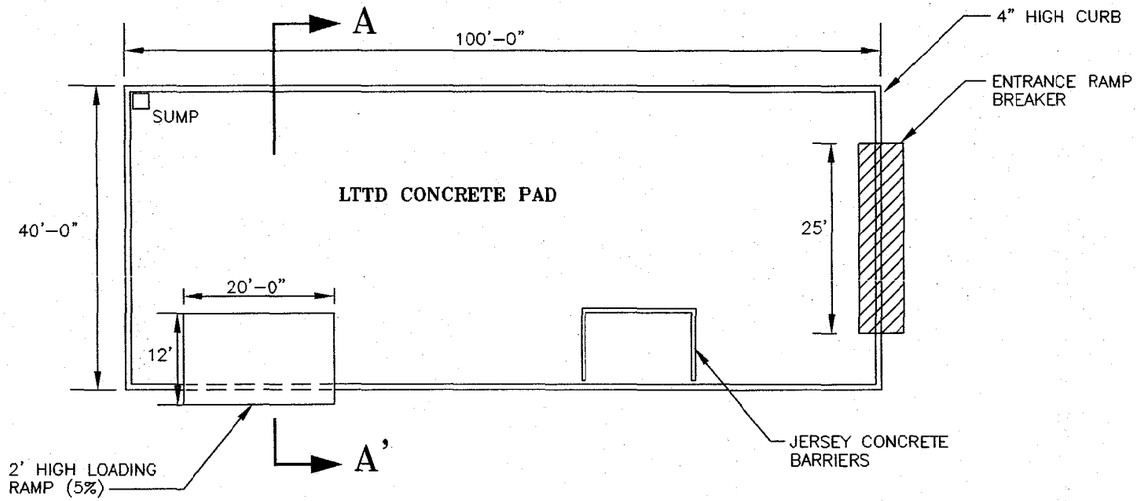
SCALE: AS SHOWN
SIZE: B

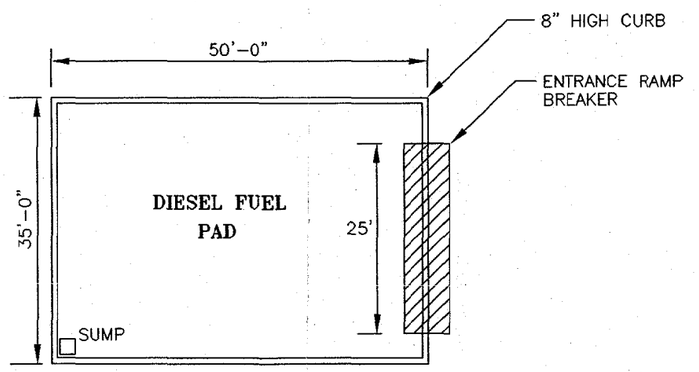
TASK ORDER NO. 0050

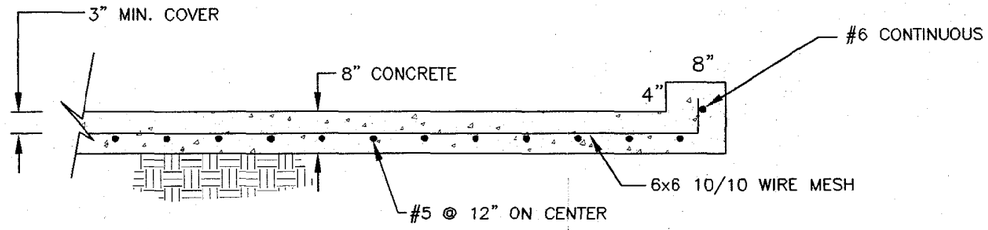
CONSTR. CONTRACT NO. N62470-97-D-5000

NAVFAC DRAWING NO. N/A

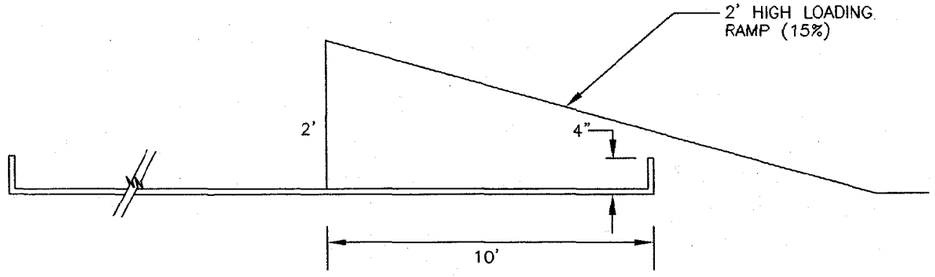
SHEET I.D. 4



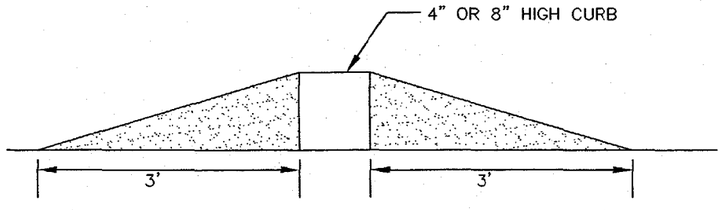




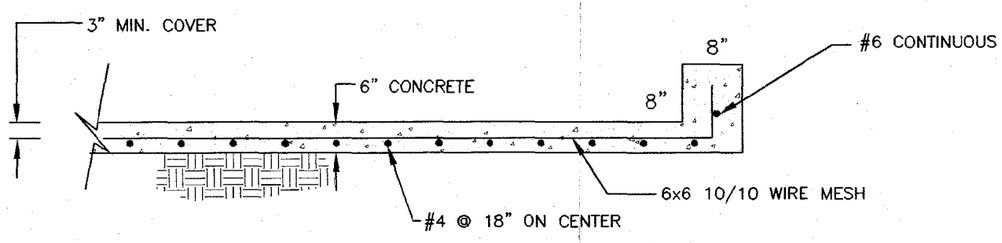
TYPICAL LTTD PAD DETAIL



SECTION A–A'



ENTRANCE RAMP BREAKER



TYPICAL DIESEL FUEL PAD DETAIL

NOTES;

1. PAD SHALL SLOPE 1/8 INCH PER FOOT TO SUMP
2. SUMP SHALL HAVE 85 GALLON CAPACITY
3. CONCRETE SHALL BE 4000 psi

IMAGE	X-REF	OFFICE	DRAWING NUMBER
---	---	Atlanta, GA	803011-LTTD-4

PLOT DATE: 4/19/00
FORMAT REVISION 3/25/99

REV	DATE	BY	CHK'D	APPR'D	DESCRIPTION/ISSUE
0	5/00	JEL	RBK	JAD	DRAFT WORK PLAN

REVISIONS

OHM Remediation Services Corp.
PROJECT NO. 803011

CHECKED BY: RBK | APPROVED BY: JAD
DESIGNED BY: JEL | DRAWN BY:

DEPARTMENT OF THE NAVY
NAVAL STATION MCB CAMP LEJEUNE
NAVAL FACILITIES ENGINEERING COMMAND ATLANTIC DIVISION
NORFOLK, VIRGINIA
JACKSONVILLE, N.C.

SITE 89
LTTD SOIL REMEDIATION

CONCRETE PAD DESIGN AND DETAILS

SCALE: AS SHOWN | SIZE: B
TASK ORDER NO. 0050
CONSTR. CONTRACT NO. N62470-97-D-5000
NAVFAC DRAWING NO. N/A
SHEET I.D. 5

APPENDIX A

SITE SPECIFIC HEALTH AND SAFETY PLAN

OHM/IT Site Health and Safety Plan Addendum No. 1

Project Name:	**Remediation of VOC-Contaminated Soil by Low Temperature Thermal Desorption at Site 89**
Contract/Delivery Order No.:	**N62470-97-D-5000/DO050, Task Order 050**
Project Number:	**803011**
Location:	**MCB Camp Lejeune, North Carolina**
Date:	**May 2000**

1.0. Scope of Work

This Health and Safety Plan focuses on fence removal and installation, the installation of a water aeration system in a small pond, and on the site contaminants and the set-up and operation of a Low-Temperature Thermal Desorption (LTDU) of soils contaminated with Volatile Organic Compounds (VOCs) at Site 89.

The principal tasks to be conducted are listed below:

- Site Preparation
- Fence Demolition and Installation
- Installation of Pond Aeration System
- Survey Activities
- Soil Boring/Soil Sampling/Well Installation
- Clearing and Grubbing
- Excavation and Backfill
- Constructing Concrete Pad
- Set-up of Thermal Desorption
- Operation of the Thermal Desorption Unit
- Feeding Activities Associated with the LTTD Unit
- Handling Treated Materials

These activities have been analyzed for potential hazards for which control measures are provided in Attachment 1, Activity Hazard Analysis. Additional AHA's will be developed for the LTDU operations (i.e. maintenance) whenever new activities are identified.

2.0 Organization and Authorities

The Project Supervisor is responsible for the safe implementation of field activities and is ultimately responsible for site safety. The Health and Safety Manager is responsible for providing guidance to the Site Safety Officer (SSO) and Project Supervisor on the implementation of the site safety plan. The SSO is responsible for implementing the site safety plan on-site and enforces the plan by performing routine site inspections. The SSO has the authority to immediately shut down site operations where unsafe conditions or practices are observed and takes the lead during site emergencies. Site personnel are responsible for following the requirements of this plan and the directions of the SSO. OHM/IT subcontractors will provide

OHM/IT with Activity Hazards Analyses (AHAs)for site activities and comply with the OHM/IT site safety plan. The following personnel are designated to perform these job functions.

Project Manager:	James Dunn
Project Supervisor:	Randy Smith
Site Safety Officer:	Dale Saurers
Health and Safety Manager:	Robert Brooks
Major Subcontractors:	Midwest Soils Remediation

3.0 Hazard Evaluation

This section outlines the potential chemical and physical hazards, which workers may be to during work at Site 89. Table 3.1 lists know contaminants at Site 89. Chemicals which may be brought to the site for which an MSDS is necessary, is included in the MSDS book located in the office trailer.

Based on site historical records and previous investigations, the primary site contaminants at Site 89 include the following:

TABLE 3-1

CHEMICAL	EXPOSURE ROUTES	PEL/TLV	HEALTH HAZARDS/ PHYSICAL HAZARDS
1,1 Dichloroethene	Skin, Eye, Inhalation, Ingestion	5 ppm	• The substance irritates the eyes, the skin and the respiratory tract. Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis. May cause effects on the CNS • The substance can readily form explosive peroxides. The substance will polymerize readily due to heating or under the influence of oxygen, sunlight, copper or aluminum, with fire or explosive hazard. May explode on heating or contact with flames. The substance decomposes on burning producing toxic and corrosive fumes. (hydrogen chloride, phosgene and chlorine). Reacts violently with oxidants.
Perchloroethylene	Skin, eye, inhalation	25 ppm	• An animal carcinogen; headache, dizziness, vertigo, narcosis, unconsciousness; a skin and eye irritant, defatts skin tissue; affects the CNS • On contact with hot surfaces or flames this

CHEMICAL	EXPOSURE ROUTES	PEL/TLV	HEALTH HAZARDS/ PHYSICAL HAZARDS
			substance decomposes forming toxic and corrosive fumes (hydrogen chloride, phosgene and chlorine), The substance decomposes slowly on contact with moisture producing trichloroacetic acid and hydrochloric acid. Reacts with metals such as aluminum, lithium barium, and beryllium.
1,1,2,2 – Tetrachloroethane	Skin, eye, inhalation, ingestion	1 ppm (7 mg/m3)	• A skin, eye irritant; dermatitis; headache, nausea, vomiting, abdominal pain; narcosis, tingling, numbness in limbs, fingers; jaundice • The substance decomposes on burning under influence of air, moisture, and UV light producing toxic and corrosive gases including hydrogen chloride and phosgene. Reacts violently with alkali metals, strong bases and powdered metals producing toxic explosive gases. Attacks plastic and rubber.
Trichloroethylene	Skin, eye, inhalation, ingestion	50 ppm	• A skin and eye irritant; dermatitis; headache, vertigo, visual distortion, fatigue, nausea, vomiting, irregular heart rhythm • On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive fumes (hydrogen chloride, phosgene and chlorine) The substance decomposes on contact with strong alkali producing dichloroacetylene, which increases fire hazards. Reacts violently with metals such as lithium, magnesium, aluminum, titanium, barium and sodium. Slowly decomposed by sun light in presence of moisture, with formulation of corrosive hydrochloric acid.
Vinyl Chloride	Skin, eye, inhalation, ingestion	1 ppm	• A carcinogen; headache, vertigo, narcosis, collapse; affects CNS; skin and eye irritation • The substance can form peroxides, initiating explosive polmerization. The substance will polymerize readily due to heating and under the influence of air, light and contact with a catalyst, strong oxidizing agents and metals such as copper and aluminum, with fire or explosion hazard. The substance decomposes on burning producing toxic and corrosive fumes. (hydrogen chloride, phosgene and chlorine)

The following general symptoms may indicate exposure to a hazardous chemical. Personnel will be removed from the work site and provided immediate medical attention if the following symptoms occur:

- Dizziness or stupor
- Nausea, headaches, or cramps
- Irritation of the eyes, nose, or throat
- Chest pains and coughing
- Rashes or burns

4.0 Site Control

5.1 Work Zones

Site operations will be segregated in three work zones: an Exclusion Zone (EZ); where potential exposures to site contaminants exists; a Contamination Reduction Zone (CRZ) where personnel and equipment decontamination operations are performed; and a Support Zone (SZ) where site support facilities are located. The boundary of the EZ/CRZ will be marked with warning signs or barrier tape and access control points will be designated to restrict access to authorized personnel. A site map depicting these work zones will be developed during site mobilization and posted. The Buddy System will be implemented on-site for those tasks performed in the EZ.

4.2 Site Communications

On-site communications will be established between site work zones and will consist of verbal communications, line of sight observations, or two-way radios. Off-site communications will be established in the support zone to summon off-site emergency services and will consist of either on-site cellular telephones or identifying the location of the nearest telephone to the site.

4.3 Safe Operating Procedures

IT's Health and Safety procedures apply to OHM/IT's hazardous waste and emergency response operations. These procedures are contained in the Basewide SSHP and IT's Health and Safety Procedures Manual. Both documents are located in the Site Office trailer.

5.0 Personal Protective Equipment

The following protection levels have been established for the site work activities based on the information provided in Delivery Order 050, concerning the levels of site contaminants and the scope of work. Results of site air monitoring and visual inspection of the work activities may indicate the need for changes in PPE level(s).

Task	Initial PPE Level	Upgrade PPE Level	Skin Protection	Respiratory Protection	Other PPE
Site Setup, Fence demolition and installation.	D	NA	Generally none; Some clearing activities may	None	Hard-hat, Steel-toe work boots, goggles/face

Task	Initial PPE Level	Upgrade PPE Level	Skin Protection	Respiratory Protection	Other PPE
Installation of pond aeration system, Clearing, Pad installation, Set up of TDU, Clean Operations of the TDU (i.e.: Control Panel) Handling treated soils once initial sampling has shown the material to be non-hazardous , Backfilling.			require Tyvek coveralls to prevent insect bites/contact with poisonous plants		shield, latex gloves, latex boots and hearing protection >85 dBA
Grubbing, Soil Excavation, Soil and boring sampling, Contaminated Operations of the TDU (i.e.: Feeding soils)	C	B	Tyvek coveralls, poly-coated coveralls when handling contaminated liquids.	Initial: Full face air purifying respirator Upgrade: Positive Pressure Air Supplied respirator	Hard-hat, Steel-toe work boots latex inner gloves, nitrile outer gloves, latex boots and hearing protection >85 dBA
Handling treated materials prior to sampling, Equipment decontamination	Level D+	---	PVC rain suit or Tyvek coveralls	None	Hard-hat, Steel-toe work boots, goggles/face shield, latex gloves, latex boots and hearing protection >85 dBA
General SZ Activities	Level D	---	None	None	Hard-hat, Steel-toe work boots, Safety glasses

Personal protective equipment requirements for the above designated Levels of Protection is as follows:

LEVEL B

Respiratory Protection: SCBA or Pressure Demand Airline Respirator w/ 5 min. egress
Protective Clothing: Sarans
Boots/Booties: Tingleys
Gloves (inner/outer): Latex/Nitrile
Head/Face Protection: Hard Hat/Splash Shield and goggles as required by task

LEVEL C

Respiratory Protection: Full Facepiece Respirator (Survivair 2020)
Respirator Cartridge: P-100
Protective Clothing: Tyvek coveralls or Poly-coated for contaminated liquids
Boots/Booties: Latex
Gloves (inner/outer): Latex/Nitrile
Head/Face Protection: Hard Hat

MODIFIED LEVEL D
Protective Clothing: Tyvek coveralls or Poly-coated for contaminated liquids
Boots/Booties: Latex
Gloves (inner/outer): Latex/Nitrile
Head/Face Protection: Hard Hat
Eye Protection: Safety glasses

LEVEL D
Boots: Steel Toe/Shank Boots
Head/Face Protection: Hard Hat
Eye Protection: Safety Glasses

IT's Respiratory Protection Health and Safety Procedures apply to the use, maintenance, and care of air-purifying and supplied air respirators. All personnel required to wear a respirator to perform work activities at Site 89 MUST have received a QUANTITATIVE FIT TEST, with a pass level of 1000 or greater, within the last 6 months.

Respirator cartridges will be changeout on the following schedule:

CONTAMINANT	CONCENTRATION OF CONTAMINANT	CARTRIDGE CHANGEOUT
Vinyl Chloride	At or below 2.0 ppm	20 minutes
	Above 2.0 ppm	Stop work and evaluate. Contact the Health and Safety Manager
All other site contaminants: 1,1,2,3-Tetrachloroethane Trichloroethylene Perchloroethylene	At or above 10 ppm	Every 8 hour
	Above 10 ppm	Upgrade to Level B

Note: Survivair Respirator Cartridge Service Life Estimates are in Attachment 2.

6.0 Decontamination Procedures

Personnel and equipment decontamination procedures will be developed, communicated to site personnel, and implemented on-site before work commences in the EZ. Standard work practices that minimize personnel and equipment contamination may include one or more of the following, where feasible: avoiding obvious areas of contamination on-site; using remote handling/sampling equipment; covering instruments/equipment; wearing disposable outer garments; and enclosing

contaminant source with sheeting/overpacks.

All personnel exiting the EZ will perform personnel decontamination procedures in accordance with the Basewide Site Specific Health and Safety Plan (SSHP). Contaminated disposable clothing will be bagged or drummed and disposed of accordingly. Contaminated equipment will be decontaminated using a high pressure washer, steam cleaner or other appropriate washing techniques. Wash water will be collected and disposed of accordingly. The SSO will monitor these decontamination procedures to determine their effectiveness and will take corrective measures when warranted.

7.0 Air Monitoring

During grubbing, soil excavation, soil and boring sampling and contaminated operations of the LTDU (i.e.: Feeding soils), direct reading air monitoring will be performed in the EZ to determine exposure to workers and in the Support Zone to ensure the integrity of the work enclosure. A Flame Ionization Detector (FID) or a Photoionization Detector (PID) with and 11.7 lamp will be used to monitor for volatile organic compounds and a particulate meter (Miniram or Dataram) will be used to monitor for airborne particulate. A summary of air monitoring information is provided in the table below.

Monitoring Device	Monitoring Location/ Personnel	Monitoring Frequency	Action Level	Action
Mini-Ram (total nuisance dust)	EZ and Treat Soils area Recovery Technicians, Equipment Operators and Sample Technicians	At the start of activities and periodically	<5.0 mg/m^3 (TWA) 5.0-15.0 mg/m^3 - >15.0mg/m^3 .	Level D Level C Stop Work and Evaluate.
FID or PID with 11.7 lamp	EZ Recovery Technicians, equipment Operators and Sample Technicians	Continuous during Grubbing, soil excavation, soil and boring sampling, screening and contaminated operations of the TDU	< 1 ppm* >1 ppm <25 ppm >25 ppm	Level D+ Test for vinyl chloride Level D Shut down site operations until levels drop to <25 ppm
Tubes Vinyl Chloride	EZ Recovery Technicians, equipment Operators and Sample Technicians	Sustained PID readings of 1 ppm	<1 ppm 1-2 ppm >2 ppm	Level D+ Level C Engineering Controls and/or Level B

Monitoring Device	Monitoring Location/ Personnel	Monitoring Frequency	Action Level	Action

*Sustained levels above background for 5 minutes

ATTACHMENT 1

ACTIVITY HAZARD ANALYSIS

ACTIVITY HAZARD ANALYSIS FOR SITE PREPARATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Equipment/ Facility Set-up	Slips, Trips, Falls	• Clear walkways work areas of equipment, tools, vegetation, excavated material and debris • Mark, identify, or barricade other obstructions		
	Spills	• Clean up spills before initiating maintenance • Review maintenance procedures for safety practices		
	Struck By/ Against Heavy Equipment	• Wear reflective warning vests when exposed to vehicular traffic • Isolate equipment swing areas • Make eye contact with operators before approaching equipment • Understand and review hand signals • Follow hand signals of ground workers for equipment manipulation when placing/loading equipment into bucket. • Step away from equipment when bucket adjustments are made • Do not attempt verbal communication in high noise backgrounds.	Warning vests, Hard hat, Safety glasses, Steel toe work boots	
	Pinch points	• Review equipment adjustment procedures, identify pinch points • Isolate/block pinch points to limit motion when inserting pins, fasteners, closing tackles	Leather gloves	
	Equipment failure	• Perform daily maintenance inspections on operating equipment		

ACTIVITY HAZARD ANALYSIS FOR SITE PREPARATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Equipment/facility set-up (continued)	Electrical Shock	• De-energize or shut off utility lines at their source before work begins • Use double insulated or properly grounded electric power-operated tools • Provide an equipment-grounding conductor program or employ ground-fault circuit interrupters • Use qualified electricians to hook up electrical circuits • Inspect all extension cords daily for structural integrity, ground continuity, and damaged insulation • Cover or elevate electric wire or flexible cord passing through work areas to protect from damage • Keep all plugs and receptacles out of water • Use approved water-proof, weather-proof type if exposure to moisture is likely • Inspect all electrical power circuits prior to commencing work • Follow IT procedure HS315 – Control of Hazardous Energy Sources	Lockout/Tagout Devices	Voltage Meter or Tic Tracer
	Handling Heavy Objects	• Observe proper lifting techniques • Obey sensible lifting limits (60 lb. Maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads • Avoid carrying heavy objects above shoulder level		
	Sharp Objects	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition	Leather gloves	

ACTIVITY HAZARD ANALYSIS FOR SITE PREPARATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Equipment/facility setup (continued)	Ladders	• Inspect ladders before use for mud buildup on treads • Clean mud from boots before climbing on ladders • Follow the three point of contact rule		
	High Noise Levels	• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period) • Assess noise level with sound level meter if possibility exists to exceed 85 dB A TWA	Ear plugs	Sound Level Meter
	Burns associated with loading/unloading equipment on trucks	• Identify heavy objects for loading that may have hot surfaces • Allow objects to cool or cover hot surfaces with non-combustible material to protect workers from buns		
	Insect/ Animal Bites	• Review injury potential with workers • Avoid insect nests areas, habitats outside work areas • Emphasize The Buddy System where such injury potential exists • Use insect repellant to protect against sting injuries • Wear PPE and tape joints to keep insects away from the skin • Use protective insect repellents containing DEET to prevent insect bites • Check limbs/body for insects/ insect bites during decontamination and/or shower	Tyvek coveralls, duct tape bottom of coveralls to boots or latex boot covers	
	Walking on machine tracks	• Avoid walking on machine tracks whenever possible; clean tracks for safe walking/working surfaces • Observe track surfaces when walking, move cautiously on uneven, slippery surfaces • Avoid sudden awkward motions (pulling/jerking fuel hoses)		

ACTIVITY HAZARD ANALYSIS FOR SITE PREPARATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Equipment/facility setup (continued)	High/Low Ambient Temperature	• Monitor for Heat Stress in accordance with OHM/IT Health and Safety Procedures HS400 • Provide fluids to prevent worker dehydration		Meteorological Equipment
EQUIPMENT REQUIRED		**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**	
• Forklifts/hand carts • Ladders • Hand tools		• Daily equipment inspections as per manufacturers requirements • Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers)	• Review AHA with all task personnel • Review Basewide SSHP and Addendum #1. • Review operations/safety manuals for all equipment utilized	

ACTIVITY HAZARD ANALYSIS FOR FENCE DEMOLITION/ INSTALLATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Fence Demolition/ Installation	Sharp Objects	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition • Keep guards in place during use	Leather gloves	
	Slips, Trips, Falls	• Clear walkways, work areas of equipment, tools, vegetation, excavated material, and debris • Mark, identify, or barricade other obstructions		
	Handling Heavy Objects	• Observe proper lifting techniques • Obey sensible lifting limits (60 lb. maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads		•
	Eye Injuries	• Wear face shield, goggles when operating powered clearing / grubbing equipment	Goggles and face shield	•
	High Noise Levels	• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period) • Assess noise level with sound level meter if possibility exists that level may exceed 85dBA TWA	Ear plugs	• Sound Level Meter
	Overexertion	• Use the right tool for the task at hand • Avoid actions/activities that produce overexertion		•
	Horseplay	• Prohibit horseplay at all project sites • Review rules about horseplay with subcontractor • supervisors and workers • Remind workers not to respond/participate in horseplay • started by others		•

ACTIVITY HAZARD ANALYSIS FOR FENCE DEMOLITION/ INSTALLATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Fence Demolition/ Installation (continued)	Electrical Shock	• De-energize or shut off utility lines at their source before work begins • Use double insulated or properly grounded electric power-operated tools • Maintain tools in a safe condition • Provide an equipment-grounding conductor program or employ ground-fault circuit interrupters • Use qualified electricians to hook up electrical circuits • Inspect all extension cords daily for structural integrity, ground continuity, and damaged insulation • Cover or elevate electric wire or flexible cord passing through work areas to protect from damage • Keep all plugs and receptacles out of water • Use approved water-proof, weather-proof type if exposure to moisture is likely • Inspect all electrical power circuits prior to commencing work • Follow Lockout-Tagout procedures in accordance with the Site Specific Lockout/Tagout/Try plan and IT's HS315-The Control of Hazardous Energy Sources	Lockout-Tagout Devices	• Voltage Meter or "Tic" Tracer
	Allergic Reaction	• Review allergy hazards with work crew • Identify workers with allergies • Review work assignments PPE upgrades	Tyvek coveralls, duct tape bottom of coveralls to boots; latex gloves, if required	•
	Insect Stings	• Avoid hand mowing/clearing in dense brush areas, suspected Areas of stinging insects	Leather gloves, chaps	•

ACTIVITY HAZARD ANALYSIS FOR FENCE DEMOLITION/ INSTALLATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Fence Demolition/ Installation (continued)	Contact with Poison Ivy	• Identify workers who are known to contract poison ivy • Wear PPE and tape joints to keep poison ivy irritants/ plant matter away from skin • Use protective creams and wash with poison ivy preventing soaps when working in suspected exposure area	Long sleeve shirts, Tyvek coveralls, Leather gloves	•
	Insect/ Animal Bites	• Review injury potential with workers • Avoid insect nests areas, habitats outside work areas • Emphasize The Buddy System where such injury potential exists • Use insect repellant to protect against sting injuries • Wear PPE and tape joints to keep insects away from the skin • Use protective insect repellents containing DEET to prevent insect bites • Check limbs/body for insects/ insect bites during decontamination and/or shower	Tyvek coveralls, duct tape bottom of coveralls to boots or latex boot covers	
	High/Low Ambient Temperature	• Monitor for Heat/Cold stress in accordance with IT's Health and Safety Procedures # HS400, HS401 • Provide fluids to prevent worker dehydration	Insulated Clothing (subject to ambient temperature)	• Meteorological Equipment
EQUIPMENT REQUIRED		**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**	
• Heavy equipment for removing and installing fence poles • Auger (hand or fueled) • Concrete • Hand tools		• Daily equipment inspections as per manufacturers requirements • Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers)	• Review AHA with all task personnel • Review Basewide SSHP and Addendum #1. • Review operations/safety manuals for all equipment utilized	

ACTIVITY HAZARD ANALYSIS FOR INSTALLATION OF AERATION SYSTEM				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Installation of Aeration System	Slips, Trips, Falls	• Clear walkways, work areas of equipment, tools, construction debris and other materials • Mark, identify, or barricade other obstructions		
	Sprains and Strains	• Observe proper lifting techniques • Obey sensible lifting limits (60 lb. maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads		
	Struck by/ Against Heavy Equipment, Protruding Objects	• Wear reflective warning vests when exposed to vehicular traffic • Isolate equipment swing areas • Make eye contact with operators before approaching equipment • Barricade or enclose the work area • Restrict work area entry to authorized personnel only during construction activities • Wear hard hats, safety glasses with side shields, and steel-toe safety boots • Understand and review hand signals	Warning vests, Hard hat, Safety glasses, Steel toe work boots	
	Sharp Objects	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition • Keep guards in place during use	Leather gloves	

ACTIVITY HAZARD ANALYSIS FOR INSTALLATION OF AERATION SYSTEM				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Installation of Aeration System (continued)	Insect/ Animal Bites	• Review injury potential with workers • Avoid insect nests areas, habitats outside work areas • Emphasize The Buddy System where such injury potential exists • Use insect repellant to protect against sting injuries • Wear PPE and tape joints to keep insects away from the skin • Use protective insect repellents containing DEET to prevent insect bites • Check limbs/body for insects/ insect bites during decontamination and/or shower	Tyvek coveralls, duct tape bottom of coveralls to boots or latex boot covers	
	Electrical Shock	• De-energize or shut off utility lines at their source before work begins • Use double insulated or properly grounded electric power-operated tools • Maintain tools in a safe condition • Inspect all electrical power circuits prior to commencing work • Provide an equipment-grounding conductor program or employ ground-fault circuit interrupters • Use qualified electricians to hook up electrical circuits • Inspect all extension cords daily for structural integrity, ground continuity, and damaged insulation • Use approved water-proof, weather-proof equipment • Follow the Site Specific Lockout/Tagout/Try procedure in accordance with IT's Health and Safety Procedures HS315	Lockout-Tagout Devices	Voltage Meter or "Tic" Tracer

ACTIVITY HAZARD ANALYSIS FOR INSTALLATION OF AERATION SYSTEM				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
EQUIPMENT REQUIRED		**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**	
• Heavy equipment for installing equipment • Aeration equipment • Hand tools		• Daily equipment inspections as per manufacturers requirements • Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers)	• Review AHA with all task personnel • Review Basewide SSHP and Addendum #1. • Review operations/safety manuals for all equipment utilized	

ACTIVITY HAZARD ANALYSIS FOR SITE SURVEY ACTIVITIES				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Survey of Site	Struck By/ Against Motor Vehicles/ Operating Equipment	• Wear reflective warning vests when exposed to vehicular traffic • Isolate potential equipment swing areas • Avoid/isolate survey activities in high traffic areas, warehouse ship/receive areas • Make eye contact with vehicle operators before approaching/crossing high traffic areas • Understand and review hand signals • Emphasize The Buddy System where injury potential exists • Do not attempt verbal communication in high noise backgrounds	Hard hat, safety glasses, steel toe work boots	
	Slips, Trips, Falls	• Clear walkways, work areas of equipment and tools • Mark, identify, or barricade other obstructions		
	Handling Heavy Objects	• Observe proper lifting techniques • Obey sensible lifting limits (60 lb. maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads • Warm up muscles before engaging in manual lifting activities • Avoid actions/activities that contribute to over exertion • Review lifting posture/techniques regularly at safety meetings		

ACTIVITY HAZARD ANALYSIS FOR SITE SURVEY ACTIVITIES				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Survey of Site (continued)	Sharp Objects	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition • Keep guards in place during use • Close doors, windows on heavy equipment to prevent injuries from tree branches and other vegetation	Leather gloves	
	Insect/ Animal Bites	• Review injury potential with workers • Avoid insect nests areas, habitats outside work areas • Emphasize The Buddy System where such injury potential exists • Use insect repellant to protect against sting injuries • Wear PPE and tape joints to keep insects away from the skin • Use protective insect repellents containing DEET to prevent insect bites • Check limbs/body for insects/ insect bites during decontamination and/or shower	Tyvek coveralls, duct tape bottom of coveralls to boots or latex boot covers	
	Contact Dermatitis/ Poison Ivy	• Wear long sleeveshirts / trousers to avoid skin contact with plants or other skin irritants • Identify and review poisonous plants with workers • Avoid unnecessary clearing of plant/vegetation areas • Cover vegetation with plastic(visqueen) where survey position raises exposure potential • Apply protective cream/lotion to exposed skin to prevent poison ivy or similar reactions • Identify workers who are known to contract poison ivy	Tyvek coveralls, duct tape bottom of coveralls to boots or latex boot covers	
	Horseplay	• Prohibit horseplay on all project sites • Review rules about horseplay with subcontractors • Do not respond to horseplay started by others		

ACTIVITY HAZARD ANALYSIS FOR SITE SURVEY ACTIVITIES				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Survey of Site (continued)	High/Low Ambient Temperature	• Monitor for Heat/Cold stress in accordance with OHM/IT Health and Safety Procedures # HS400, HS401 • Provide fluids to prevent worker dehydration	Insulated Clothing (subject to ambient temperature)	Meteorological Equipment
EQUIPMENT REQUIRED		**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**	
• Survey Equipment		• Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers)	• Review AHA with all task personnel • Review Basewide SSHP and Addendum #1.	

ACTIVITY HAZARD ANALYSIS FOR SOIL BORING/SOIL SAMPLING/WELL INSTALLATION				
Task Breakdown	**Potential Hazards**	**Hazard Control Measures**	**Personal Protective Equipment Level D, and**	**Air Monitoring**
Soil Boring/ Sampling Drilling/Well Installation	Inhalation and Contact with Hazardous Substances or exhaust gases	• Review hazardous properties of site contaminants with workers before sampling operations begin • Ensure hazardous levels of vapors are not present • Open well from an upwind position • Provide workers proper skin, eye and respiratory protection based on the exposure hazards present • If it is necessary to drill within an enclosed area, make certain that exhaust gases are vented out of the area.	Level C: Tyvek coveralls, inner sample gloves, outer nitrile gloves, neoprene or latex boots Full face air purifying respirator	PID (11.7) lamp or FID and colorimetric tubes
	Musculoskeletal Disorders (MSD)	• Observe proper lifting techniques • Obey sensible lifting limits (60 lb. maximum per person manual lifting) • Ensure proper body positioning, do not work in awkward positions		
	Slips, Trips, Falls	• Mark, identify, or barricade other obstruction • Work areas, platforms, and walkways should be kept free of materials, debris, and obstructions such as ice, grease or oil that could cause a surface to become slick or otherwise hazardous • Clear walkways and drilling overburden • Clean mud and grease from your boots before mounting a drill platform. Watch for slippery ground when dismounting from the platform		

ACTIVITY HAZARD ANALYSIS FOR SOIL BORING/SOIL SAMPLING/WELL INSTALLATION				
Task Breakdown	**Potential Hazards**	**Hazard Control Measures**	**Personal Protective Equipment Level D, and**	**Air Monitoring**
Soil Boring/ Sampling Drilling/Well Installation (continued)	Fire/ Explosion	• Eliminate sources of ignition from the work area • Prohibit smoking • Provide ABC (or equivalent) fire extinguishers in all work areas, flammable storage areas, generator and compressor locations • Store flammable liquids in well ventilated areas • Prohibit storage, transfer of flammable liquids in plastic containers • Post "NO SMOKING" signs • Store combustible materials away from flammables • Separate Flammables and Oxidizers by 20 feet minimum • Bonding/ground cables must be used when transferring fuel.	Portable Fire Extinguisher (ABC)	
	Overhead Utilities	• Maintain at least 10 feet from overhead power lines, up to 50 kV • For voltages over 50 kV, add 0.4 inches per kV to obtain the safe distance between equipment and power lines • If voltage is unknown, remain at least 20 feet from overhead power lines. • Do not drive the drill rig from hole to hole with the mast in the raised position. Before raising the mast, check for overhead obstructions.		
	Underground Utilities	• Identify all underground and overhead utilities around the excavation site before work commences • Cease work immediately if unknown utility markers are uncovered		

ACTIVITY HAZARD ANALYSIS FOR SOIL BORING/SOIL SAMPLING/WELL INSTALLATION				
Task Breakdown	**Potential Hazards**	**Hazard Control Measures**	**Personal Protective Equipment Level D, and**	**Air Monitoring**
Soil Boring/ Sampling Drilling/Well Installation (continued)	Caught In/between	• Driller and helper must be present during all active operations • Identify and understand parts of equipment which may cause crushing, pinching, rotating or similar injuries • Driller helper and other site personnel must know location of emergency shut off switch and test before each start up • Ensure jewelry is removed, loose clothing is buttoned and loose PPE is secured close to the body to avoid being caught in moving parts. • Area of drilling operation must be cordoned off/barricaded • Should the rope grab the cathead it could become tangled in the drum. Release the rope and sound an appropriate alarm for all personnel to rapidly back away and stay clear • Always maintain a minimum clearance of 18 inches between the operating hand and the cathead drum when driving samplers, casing or other tools with the cathead and rope method • Assure guards are in place to protect from these parts of equipment during operation • Provide and use proper work gloves when the possibility of pinching, or other injury may be caused by moving/ handling large or heavy objects • Maintain all equipment in a safe condition • Keep all guards in place during use • De-energize and lock-out machinery before maintenance or service		

ACTIVITY HAZARD ANALYSIS FOR SOIL BORING/SOIL SAMPLING/WELL INSTALLATION				
Task Breakdown	**Potential Hazards**	**Hazard Control Measures**	**Personal Protective Equipment Level D, and**	**Air Monitoring**
Soil Boring/ Sampling Drilling/Well Installation (continued)	Sharp Objects	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition • Keep guards in place during use • Use a long handle shovel to move auger cuttings away from the auger.	Cut resistant gloves	
	Struck-by or Against Pinch Point	• Driller helper and other site personnel must know location of emergency shut off switch and test before each start up • Pipe, drill rods, casing, augers, and similar drilling tools should be orderly stacked on racks or sills to prevent spreading, rolling or sliding • Always maintain a minimum clearance of 18 inches between the operating hand and the cathead drum when driving samplers, casing or other tools with the cathead and rope method.		
	Falls	• Climbing the mast while it is erected is prohibited • Work on the mast in the down position • Working at heights above 6 feet requires fall protection and on-site training in the use and maintenance of fall protection equipment		

ACTIVITY HAZARD ANALYSIS FOR SOIL BORING/SOIL SAMPLING/WELL INSTALLATION				
Task Breakdown	**Potential Hazards**	**Hazard Control Measures**	**Personal Protective Equipment Level D, and**	**Air Monitoring**
Soil Boring/ Sampling Drilling/Well Installation (continued)	Equipment Malfunction/Damage	• Conduct daily inspections. Use the Drill Rig Inspection Checklist for the drilling subcontractor to complete, and the Drilling Safety Checklist for the IT Field representative to complete (As referenced in Appendix A) • Shut down drill rig to make repairs or adjustments to drill rigor to lubricate fittings. Release all pressure on the hydraulic systems, the drilling fluid system, and the air pressure systems of the drill rig prior to performing maintenance • For start-up, all gear boxes must be in neutral, all hoist levels are disengaged, all hydraulic levers are in the correct non-actuating positions and the cathead rope is not on the cathead before starting a drill rig engine • Maintain all equipment in a safe condition • Keep all guards in place during use • De-energize and lock-out machinery before maintenance or service		
	Unstable placement; failure of stabilizing plates, jacks or out riggers; rollover of drill rig	• Choose level ground; Use adequate blocking materials; Engage emergency brake; When on wet or loose soil, consider guy wires to be attached to derrick for additional stability for rig		
	Adverse weather conditions: -lightening -high winds -driving rain	• Monitor weather forecast • Shut down operations should severe weather conditions exist		

ACTIVITY HAZARD ANALYSIS FOR SOIL BORING/SOIL SAMPLING/WELL INSTALLATION				
Task Breakdown	**Potential Hazards**	**Hazard Control Measures**	**Personal Protective Equipment Level D, and**	**Air Monitoring**
Soil Boring/ Sampling Drilling/Well Installation (continued)	Drum Handling	• Drums will be safely transported onsite using conventional drum handling techniques including a bobcat, dump truck, or front-end loader. • Extreme care will be taken during drum handling operations to prevent release and to ensure safe working conditions. Once at the staging cell, drums will be placed on wooden pallets to facilitate drum movement and to protect the liner of the staging cell. All drums will be staged and labeled in accordance with the RCRA drum storage regulations. • Ensure that your body, material, tools and equipment are safe from such unexpected movement as falling, slipping, rolling, tripping, blowing, or any other uncontrolled motion. • Trucks (i.e., flat beds) hauling equipment or materials must not be moved once rigging has been released. • Chock all material and equipment (such as pipe, drums, tanks, reels, trailers, and wagons) as necessary to prevent rolling.	Leather gloves, and chemical protection	
	Insect/ Animal Bites	• Review injury potential with workers • Avoid insect nests areas, habitats outside work areas • Emphasize The Buddy System where such injury potential exists • Use insect repellant to protect against sting injuries • Wear PPE and tape joints to keep insects away from the skin • Use protective insect repellents containing DEET to prevent insect bites • Check limbs/body for insects/ insect bites during decontamination and/or shower	Tyvek coveralls, duct tape bottom of coveralls to boots or latex boot covers	

ACTIVITY HAZARD ANALYSIS FOR SOIL BORING/SOIL SAMPLING/WELL INSTALLATION				
Task Breakdown	**Potential Hazards**	**Hazard Control Measures**	**Personal Protective Equipment Level D, and**	**Air Monitoring**
Soil Boring/ Sampling Drilling/Well Installation (continued)	High Noise Levels	• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)	Ear plugs	
	Spills into clean areas	• Provide spill control containment (Hay bales, plastic, etc.).		
EQUIPMENT REQUIRED		**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**	
• Drill rig • Split spoons • Sample containers and coolers		• Daily equipment inspections as per manufacturers requirements • Excavation inspection/permit • Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers)	• Review AHA with all task personnel • Review Basewide SSHP and addendum No. 1. • Review operations/safety manuals for all equipment utilized • Review site specific chemical hazards	

ACTIVITY HAZARD ANALYSIS FOR CONSTRUCTING CONCRETE PAD				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Constructing Concrete Pad	Struck By/ Against Motor Vehicles/ Operating Equipment	• Wear reflective warning vests when exposed to vehicular traffic • Isolate potential equipment swing areas • Avoid/isolate survey activities in high traffic areas, warehouse ship/receive areas • Make eye contact with vehicle operators before approaching/crossing high traffic areas • Understand and review hand signals • Emphasize The Buddy System where injury potential exists • Do not attempt verbal communication in high noise backgrounds	Hard hat, safety glasses, steel toe work boots	
	Slips, Trips, Falls	• Clear walkways, work areas of equipment and tools • Mark, identify, or barricade other obstructions		
	Handling Heavy Objects	• Observe proper lifting techniques • Obey sensible lifting limits (60 lb. maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads • Warm up muscles before engaging in manual lifting activities • Avoid actions/activities that contribute to over exertion • Review lifting posture/techniques regularly at safety meetings		

ACTIVITY HAZARD ANALYSIS FOR CONSTRUCTING CONCRETE PAD				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Constructing Concrete Pad (continued)	Sharp Objects	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition • Keep guards in place during use • Close doors, windows on heavy equipment to prevent injuries from tree branches and other vegetation	Leather gloves	
	Insect/ Animal Bites	• Review injury potential with workers • Avoid insect nests areas, habitats outside work areas • Emphasize The Buddy System where such injury potential exists • Use insect repellant to protect against sting injuries • Wear PPE and tape joints to keep insects away from the skin • Use protective insect repellents containing DEET to prevent insect bites • Check limbs/body for insects/ insect bites during decontamination and/or shower	Tyvek coveralls, duct tape bottom of coveralls to boots or latex boot covers	
	Contact Dermatitis/ Poison Ivy	• Wear long sleeveshirts / trousers to avoid skin contact with plants or other skin irritants • Identify and review poisonous plants with workers • Avoid unnecessary clearing of plant/vegetation areas • Cover vegetation with plastic(visqueen) where survey position raises exposure potential • Apply protective cream/lotion to exposed skin to prevent poison ivy or similar reactions • Identify workers who are known to contract poison ivy	Tyvek coveralls, duct tape bottom of coveralls to boots or latex boot covers	

ACTIVITY HAZARD ANALYSIS FOR CONSTRUCTING CONCRETE PAD				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Constructing Concrete Pad (continued)	Insect/ Animal Bites	• Review injury potential with workers • Avoid insect nests areas, habitats outside work areas • Emphasize The Buddy System where such injury potential exists • Use insect repellant to protect against sting injuries • Wear PPE and tape joints to keep insects away from the skin • Use protective insect repellents containing DEET to prevent insect bites • Check limbs/body for insects/ insect bites during decontamination and/or shower	Tyvek coveralls, duct tape bottom of coveralls to boots or latex boot covers	
	Horseplay	• Prohibit horseplay on all project sites • Review rules about horseplay with subcontractors • Do not respond to horseplay started by others		
	Inhalation and Contact with Concrete Dust	• Provide workers proper skin and eye protection. • Review MSDS for concrete with workers before operations begin	Nitrile gloves	
	Operation of Hand Tools	• Review power/pneumatic tool operation before starting work • Maintain steady even pressure when drilling into concrete/hard materials • Avoid actions that cause over exertion or binding of drills		
	High/Low Ambient Temperature	• Monitor for Heat stress in accordance with OHM/IT Health and Safety Procedures # HS400 • Provide fluids to prevent worker dehydration		Meteorological Equipment

ACTIVITY HAZARD ANALYSIS FOR CONSTRUCTING CONCRETE PAD				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
EQUIPMENT REQUIRED		**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**	
• Survey Equipment		• Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers)	• Review AHA with all task personnel • Review Basewide SSHP and Addendum #1.	

ACTIVITY HAZARD ANALYSIS FOR CLEARING AND GRUBBING				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Clearing, Grubbing	Struck By/ Against Heavy Equipment	• Isolate equipment swing areas • Make eye contact with operators before approaching equipment • Understand and review hand signals	Hard hat, safety glasses, Steel toe work boots	
	Slips, Trips, Falls	• Clear walkways, work areas of equipment, tools, vegetation, and debris • Clean mud and grease from your boots before mounting equipment Watch for slippery/unstable ground when dismounting equipment		
	Handling Heavy Objects	• Observe proper lifting techniques • Use Dozer or Trackhoe to move logs and brush		
	Eye Injuries	• Wear face shield, goggles when operating powered clearing / grubbing equipment	Face shield, goggles	
	Sharp Objects	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition • Keep guards in place during use • Close doors, windows on heavy equipment to prevent injuries from tree branches and other vegetation	Leather gloves	

ACTIVITY HAZARD ANALYSIS FOR CLEARING AND GRUBBING				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Clearing and Grubbing (Continued)	Insect/ Snake Bites	• Review injury potential and types of snakes with workers • Avoid insect nests areas, likely habitats of snakes outside work areas • Emphasize The Buddy System where such injury potential exists • Use insect repellant, wear PPE to protect against sting/bite injuries	Tyvek coveralls, duct tape bottom of coveralls to boots	
	Contact Dermatitis	• Wear PPE to avoid skin contact with contaminated soil, plants, or other skin irritants • Identify and review poisonous plants with workers • Apply protective cream/lotion to exposed skin to prevent poison ivy or similar reactions	Tyvek coveralls, duct tape bottom of coveralls to boots	
	Operations of power clearing tools (brush saws, weed wackers)	• Wear eye, face, hand & hearing protection when operating power clearing equipment • Shut-off / idle power tools walking between work areas • Store flammable liquids in well ventilated areas, away from work areas • Shut off equipment during re-fueling • Prohibit smoking while operating clearing equipment • Provide ABC (or equivalent) fire extinguishers for all work	Face shield, goggles, cloth gloves, ear plugs, Steel toe work boots	
	High Noise Levels	• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period) • Assess noise level with sound level meter if possibility exists that level may exceed 85 dB A TWA	Ear plugs	Sound Level Meter
	High/Low Ambient Temperature	• Monitor for Heat stress in accordance with OHM/IT Health and Safety Procedures # HS400 • Provide fluids to prevent worker dehydration		Meteorological Equipment

ACTIVITY HAZARD ANALYSIS FOR CLEARING AND GRUBBING

Task Breakdown	Potential Hazards	Critical Safety Practices	Personal Protective Clothing and Equipment	Monitoring Devices
Clearing and Grubbing (Continued)	Unstable ground; rollover of equipment.	• Identify path of travel before moving dozer or track hoe and inspect area for stable ground. • Clearly mark any unstable areas.		
	Walking on machine tracks	• Avoid walking on machine tracks whenever possible; clean tracks for safe walking/working surfaces • Observe track surfaces when walking, move cautiously on uneven, slippery surfaces • Avoid sudden awkward motions (pulling/jerking fuel hoses)		
	Adverse weather conditions: -lightening -high winds -driving rain	• Monitor weather forecast • Shut down operations should severe weather conditions exist		

EQUIPMENT REQUIRED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
• Excavator and/or dozer • Power clearing tools (brush saws, weed wackers) • FID or PID with 11.7 lamp for grubbing operations, colorimetric tubes	• Daily equipment inspections as per manufacturers requirements • Inspect all safety equipment (fire extinguishers, first aid kits and eye washes)	• Review AHA with all task personnel • Review Basewide SSHP and addendum #1. • Review any potential site contaminants • Review operations/safety manuals for all equipment utilized • Review potential hazardous plants and insects/animals

ACTIVITY HAZARD ANALYSIS FOR SOIL EXCAVATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Excavation of Soil	Underground/ Overhead Utilities	• Identify all utilities around the site before work commences • Cease work immediately if unknown utility markers are uncovered • Use manual excavation within 3 feet of known utilities • Utility clearance shall conform with 29 CFR 1926.955 (high voltage >700 kv) 15 feet phase to ground clearance; 31 feet phase to phase clearance		
	Struck By/ Against Heavy Equipment	• Wear reflective warning vests when exposed to vehicular traffic • Isolate equipment swing areas • Make eye contact with operators before approaching equipment • Understand and review hand signals	Warning vests, hard hat, safety glasses, steel toe work boots	
	Sharp Objects	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition • Keep guards in place during use	Leather gloves	
	High Noise Levels	• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period) • Assess noise level with sound level meter if possibility exists that level may exceed 85dBA TWA	Ear plugs	Sound Level Meter

ACTIVITY HAZARD ANALYSIS FOR SOIL EXCAVATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Soil Excavation (continued)	Slips, Trips, Falls	• Clear walkways, work areas of equipment, vegetation, excavated material, tools, and debris • Mark, identify, or barricade other obstructions		
	Handling Heavy Objects	• Observe proper lifting techniques • Obey sensible lifting limits (60 lb. maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads		
	Inhalation and Contact with Hazardous Substances	• Provide workers proper skin, eye and respiratory protection based on the exposure hazards present • Review hazardous properties of site contaminants with workers before operations begin • Monitor breathing zone air to determine levels of contaminants • Dampen soil using light water spray to prevent fugitive dust emissions • Cover stockpiled soil with plastic sheeting to prevent fugitive dust emissions	Level C: Tyvek coveralls, inner sample gloves, outer nitrile gloves, neoprene or latex boots Full face air purifying respirator	Colorimetric Tubes, PID(11.7 lamp) or FID particulate meter

ACTIVITY HAZARD ANALYSIS FOR SOIL EXCAVATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Soil Excavation (continued)	Excavation Wall Collapse	• Construct diversion ditches or dikes to prevent surface water from entering excavation • Provide good drainage of area adjacent to excavation • Collect ground water/rain water from excavation and dispose of properly • Store excavated material at least 2 feet from the edge of the excavation; prevent excessive loading of the excavation face • Provide sufficient stairs, ladders, or ramps when workers enter excavations over 4 feet in depth • Place ladders no more than 25 feet apart laterally • Treat excavations over 4 feet deep as confined spaces • Complete confined space permit entry procedure • Monitor atmosphere for flammable/toxic vapors, and oxygen deficiency • Slope, bench, shore, or sheet excavations over 5 feet deep if worker entry is required • Assign a competent person to inspect, decide soil classification, proper sloping, the correct shoring, or sheeting • Inspect excavations (when personnel entry is required) daily, any time conditions change • Provide at least two means of exit for personnel working in excavations	Hard hat, safety glasses	
	High/Low Ambient Temperature	• Monitor for Heat stress in accordance with OHM/IT Health and Safety Procedures #HS400. • Provide fluids to prevent worker dehydration		Meteorological Equipment

ACTIVITY HAZARD ANALYSIS FOR SOIL EXCAVATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Backfilling	Slips, Trips, Falls	• Clear walkways, work areas of equipment, vegetation, excavated material, tools, and debris • Mark, identify, or barricade other obstructions		
	Struck By/ Against Heavy Equipment	• Wear reflective warning vests when exposed to vehicular traffic • Isolate equipment swing areas • Make eye contact with operators before approaching equipment • Understand and review hand signals	Warning vests, hard hat safety glasses, steel toe work boots	
	Insect/ Animal Bites	• Review injury potential with workers • Avoid insect nests areas, habitats outside work areas • Emphasize The Buddy System where such injury potential exists • Use insect repellant to protect against sting injuries • Wear PPE and tape joints to keep insects away from the skin • Use protective insect repellents containing DEET to prevent insect bites • Check limbs/body for insects/ insect bites during decontamination and/or shower	Tyvek coveralls, duct tape bottom of coveralls to boots or latex boot covers	
	Sharp Objects	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition • Keep guards in place during use	Leather gloves	

ACTIVITY HAZARD ANALYSIS FOR SOIL EXCAVATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
EQUIPMENT REQUIRED		**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**	
• Excavator • Dump Trucks • FID or PID with 11.7 lamp, colorimetric tubes		• Daily equipment inspections as per manufacturers requirements • Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers)	• Review AHA with all task personnel • Review Basewide SSHP and Addendum #1. • Review operations/safety manuals for all equipment utilized	

ACTIVITY HAZARD ANALYSIS FOR THERMAL DESORPTION UNIT (TDU) SET UP				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
TDU Set Up	Slips, Trips, Falls	• Clear walkways work areas of equipment, tools, vegetation, excavated material and debris • Mark, identify, or barricade other obstructions • Full body harness and lanyard are require for all work above 6 feet • Anchorage points must be rated for 5400 lbs	Full body harness and lanyard	
	Struck By/ Against Heavy Equipment	• Wear reflective warning vests when exposed to vehicular traffic • Isolate equipment swing areas • Make eye contact with operators before approaching equipment • Understand and review hand signals • Follow hand signals of ground workers for equipment manipulation when placing/loading equipment into bucket. • Step away from equipment when bucket adjustments are made • Do not attempt verbal communication in high noise backgrounds. • Prohibit all personnel from work activities in the 'blind' swing areas of the crane • Test lift objects if center of gravity or similar critical factors are uncertain • Never lift any object if weights are unknown • **Never stand under a suspended load**	Warning vests, Hard hat, Safety glasses, Steel toe work boots	

ACTIVITY HAZARD ANALYSIS FOR THERMAL DESORPTION UNIT (TDU) SET UP				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
TDU Set Up (continued)	Pinch points	• Review equipment adjustment procedures, identify pinch points • Isolate/block pinch points to limit motion when inserting pins, fasteners, closing tackles	Leather gloves	
	Equipment failure	• Perform daily maintenance inspections on operating equipment		
	Electrical Shock	• De-energize or shut off utility lines at their source before work begins • Use double insulated or properly grounded electric power-operated tools • Provide an equipment-grounding conductor program or employ ground-fault circuit interrupters • Use qualified electricians to hook up electrical circuits • Inspect all extension cords daily for structural integrity, ground continuity, and damaged insulation • Cover or elevate electric wire or flexible cord passing through work areas to protect from damage • Keep all plugs and receptacles out of water • Use approved water-proof, weather-proof type if exposure to moisture is likely • Inspect all electrical power circuits prior to commencing work • Follow the Site Specific Lockout/Tagout/Try procedure in accordance with IT procedure HS315 – Control of Hazardous Energy Sources	Lockout/Tagout Devices	Voltage Meter or Tic Tracer

ACTIVITY HAZARD ANALYSIS FOR THERMAL DESORPTION UNIT (TDU) SET UP				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
TDU Set Up (continued)	Handling Heavy Objects	• Observe proper lifting techniques • Obey sensible lifting limits (60 lb. Maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads • Avoid carrying heavy objects above shoulder level		
	Sharp Objects	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition	Leather gloves	
	Ladders	• Inspect ladders before use for mud buildup on treads • Clean mud from boots before climbing on ladders • Follow the three point of contact rule		
	High Noise Levels	• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period) • Assess noise level with sound level meter if possibility exists to exceed 85 dB A TWA	Ear plugs	Sound Level Meter
	Underground/ Overhead Utilities	• Identify all utilities around the site before work commences • Cease work immediately if unknown utility markers are uncovered • Utility clearance shall conform with 29 CFR 1926.955 (high voltage >700 kv) 15 feet phase to ground clearance; 31 feet phase to phase clearance		

ACTIVITY HAZARD ANALYSIS FOR THERMAL DESORPTION UNIT (TDU) SET UP				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
TDU Set Up (continued)	Adverse weather conditions: -lightening -high winds -driving rain	• Monitor weather forecast • Shut down operations should severe weather conditions exist		
	Caught In/ Between Moving Parts	• Identify and understand parts of equipment which may cause crushing, pinching, rotating or similar injuries • Assure guards are in place to protect from these parts of equipment during operation • Provide and wear proper work gloves when the possibility of crush, pinch, or other injury may be caused by moving/stationary edges or objects • Maintain all equipment in a safe condition • Keep all guards in place during use • De-energize and lock-out machinery before maintenance or service		
	Horseplay	• Prohibit horseplay on all project sites • Review rules about horseplay with subcontract supervisors and workers • Remind workers not to respond/participate in horseplay started by others		

ACTIVITY HAZARD ANALYSIS FOR THERMAL DESORPTION UNIT (TDU) SET UP				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
TDU Set Up (continued)	Fire/ Explosion	• Eliminate sources of ignition from the work area • Prohibit smoking • Provide ABC (or equivalent) fire extinguishers in all work areas, flammable storage areas, generator and compressor locations • Store flammable liquids in well ventilated areas • Prohibit storage, transfer of flammable liquids in plastic containers • Post "NO SMOKING" signs • Store combustible materials away from flammables • Store all compressed gas cylinders upright, caps in place when not in use • Separate flammables and oxidizers by 20 feet minimum	Portable fire extinguishers (ABC)	LEL/O_2
	Tag Lines	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by tag lines • Prohibit looping / winding tag lines around hands or body • Prohibit positioning, moving load using tag lines	Leather gloves	
	Rigging Equipment	• Identify the proper rigging equipment for the type of lift • Inspect rigging devices to verify slings, chains, straps are free from defects and rated for the lift weight • Prohibit use of equipment with missing documentation tags, or defective equipment • Ensure tag-lines are free of knots and defects • Review rigging techniques, positioning of load, tag lines with workers involved in rigging activities		

ACTIVITY HAZARD ANALYSIS FOR THERMAL DESORPTION UNIT (TDU) SET UP				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
TDU Set Up (continued)	Roadways	• Ensure that the roadways are designed to handle the weight of the vehicles		
	Insect/ Animal Bites	• Review injury potential with workers • Avoid insect nests areas, habitats outside work areas • Emphasize The Buddy System where such injury potential exists • Use insect repellant to protect against sting injuries • Wear PPE and tape joints to keep insects away from the skin • Use protective insect repellents containing DEET to prevent insect bites • Check limbs/body for insects/ insect bites during decontamination and/or shower	Tyvek coveralls, duct tape bottom of coveralls to boots or latex boot covers	
	High/Low Ambient Temperature	• Monitor for Heat Stress in accordance with OHM/IT Health and Safety Procedures HS400 • Provide fluids to prevent worker dehydration		Meteorological Equipment
EQUIPMENT REQUIRED		**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**	
• Forklifts/hand carts • Ladders • Full body harness and lanyards • Hand tools		• Daily equipment inspections as per manufacturers requirements • Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers)	• Review AHA with all task personnel • Review Basewide SSHP and Addendum #1. • Review operations/safety manuals for all equipment utilized	

ACTIVITY HAZARD ANALYSIS FOR THE CONTINUOUS OPERATION OF THE THERMAL DESORPTION UNIT				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Continuous Operation of the Thermal Desorption Unit	Slips, Trips, Falls	• Clear walkways work areas of equipment, tools, vegetation, excavated material and debris • Mark, identify, or barricade other obstructions		
	Spills	• Clean up spills before initiating maintenance • Review maintenance procedures for safety practices		
	Struck By/ Against Heavy Equipment	• Wear reflective warning vests when exposed to vehicular traffic • Isolate equipment swing areas • Make eye contact with operators before approaching equipment • Understand and review hand signals • Follow hand signals of ground workers for equipment manipulation when placing/loading equipment into bucket. • Step away from equipment when bucket adjustments are made • Do not attempt verbal communication in high noise backgrounds.	Warning vests, Hard hat, Safety glasses, Steel toe work boots	
	Pinch points	• Review equipment adjustment procedures, identify pinch points • Isolate/block pinch points to limit motion when inserting pins, fasteners, closing tackles	Leather gloves	
	Equipment failure	• Perform daily maintenance inspections on operating equipment		

ACTIVITY HAZARD ANALYSIS FOR THE CONTINUOUS OPERATION OF THE THERMAL DESORPTION UNIT				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Continuous Operation of the Thermal Desorption Unit (continued)	Electrical Shock	• De-energize or shut off utility lines at their source before work begins • Use double insulated or properly grounded electric power-operated tools • Provide an equipment-grounding conductor program or employ ground-fault circuit interrupters • Use qualified electricians to hook up electrical circuits • Inspect all extension cords daily for structural integrity, ground continuity, and damaged insulation • Cover or elevate electric wire or flexible cord passing through work areas to protect from damage • Keep all plugs and receptacles out of water • Use approved water-proof, weather-proof type if exposure to moisture is likely • Inspect all electrical power circuits prior to commencing work • Follow the Site Specific Lockout/Tagout/Try procedure in accordance with IT procedure HS315 – Control of Hazardous Energy Sources	Lockout/Tagout Devices	Voltage Meter or Tic Tracer
	Handling Heavy Objects	• Observe proper lifting techniques • Obey sensible lifting limits (60 lb. Maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads • Avoid carrying heavy objects above shoulder level		

ACTIVITY HAZARD ANALYSIS FOR THE CONTINUOUS OPERATION OF THE THERMAL DESORPTION UNIT				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Continuous Operation of the Thermal Desorption Unit (continued)	Sharp Objects	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition	Leather gloves	
	Ladders	• Inspect ladders before use for mud buildup on treads • Clean mud from boots before climbing on ladders • Follow the three point of contact rule		
	High Noise Levels	• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period) • Assess noise level with sound level meter if possibility exists to exceed 85 dB A TWA	Ear plugs	Sound Level Meter
	Hot Surfaces	• Identify and label all hot surfaces • Use appropriate sign or tag for the degree of hazard • Use proper work gloves • Allow objects to cool or cover hot surfaces with non-combustible material to protect workers from buns	Leather Gloves	
	Walking on machine tracks	• Avoid walking on machine tracks whenever possible; clean tracks for safe walking/working surfaces • Observe track surfaces when walking, move cautiously on uneven, slippery surfaces • Avoid sudden awkward motions (pulling/jerking fuel hoses)		
	Adverse weather conditions: -lightening -high winds -driving rain	• Monitor weather forecast • Shut down operations should severe weather conditions exist		

ACTIVITY HAZARD ANALYSIS FOR THE CONTINUOUS OPERATION OF THE THERMAL DESORPTION UNIT				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Continuous Operation of the Thermal Desorption Unit (continued	Caught In/ Between Moving Parts	• Identify and understand parts of equipment which may cause crushing, pinching, rotating or similar injuries • Assure guards are in place to protect from these parts of equipment during operation • Provide and wear proper work gloves when the possibility of crush, pinch, or other injury may be caused by moving/stationary edges or objects • Maintain all equipment in a safe condition • Keep all guards in place during use • De-energize and lock-out machinery before maintenance or service		
	Horseplay	• Prohibit horseplay on all project sites • Review rules about horseplay with subcontract supervisors and workers • Remind workers not to respond/participate in horseplay started by others		
	Fire/ Explosion	• Eliminate sources of ignition from the work area • Prohibit smoking • Provide ABC (or equivalent) fire extinguishers in all work areas, flammable storage areas, generator and compressor locations • Store flammable liquids in well ventilated areas • Prohibit storage, transfer of flammable liquids in plastic containers • Post "NO SMOKING" signs • Store combustible materials away from flammables • Store all compressed gas cylinders upright, caps in place when not in use • Separate flammables and oxidizers by 20 feet minimum	Portable fire extinguishers (ABC)	LEL/O_2

ACTIVITY HAZARD ANALYSIS FOR THE CONTINUOUS OPERATION OF THE THERMAL DESORPTION UNIT				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Continuous Operation of the Thermal Desorption Unit (continued	Inhalation and Contact with Hazardous Substances	• Provide workers proper skin, eye and respiratory protection based on the exposure hazards present • Review hazardous properties of site contaminants with workers before operations begin	Tyvek coveralls, nitrile gloves, latex or neoprene boots when in direct contact with contaminated, pre-treated of partially treated soils	PID (11.7) lamp or FID, Particulate meter, colorimetric tubes
	Insect/ Animal Bites	• Review injury potential with workers • Avoid insect nests areas, habitats outside work areas • Emphasize The Buddy System where such injury potential exists • Use insect repellant to protect against sting injuries • Wear PPE and tape joints to keep insects away from the skin • Use protective insect repellents containing DEET to prevent insect bites • Check limbs/body for insects/ insect bites during decontamination and/or shower	Tyvek coveralls, duct tape bottom of coveralls to boots or latex boot covers	
	High/Low Ambient Temperature	• Monitor for Heat Stress in accordance with OHM/IT Health and Safety Procedures HS400 • Provide fluids to prevent worker dehydration		Meteorological Equipment
EQUIPMENT REQUIRED		**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**	
• Forklifts/hand carts • Ladders • Hand tools • PID (11.7) lamp or FID, particulate meter, colorimetric tubes		• Daily equipment inspections as per manufacturers requirements • Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers)	• Review AHA with all task personnel • Review Basewide SSHP and Addendum #1. • Review operations/safety manuals for all equipment utilized	

ACTIVITY HAZARD ANALYSIS FOR FEEDING THE THERMAL DISORBTION UNIT (TDU)				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Feeding the TDU	Slips, Trips, Falls	• Clear walkways work areas of equipment, tools, vegetation, excavated material and debris • Mark, identify, or barricade other obstructions		
	Spills	• Clean up spills before initiating maintenance • Review maintenance procedures for safety practices		
	Struck By/ Against Heavy Equipment	• Wear reflective warning vests when exposed to vehicular traffic • Isolate equipment swing areas • Make eye contact with operators before approaching equipment • Understand and review hand signals • Follow hand signals of ground workers for equipment manipulation when placing/loading equipment into bucket. • Step away from equipment when bucket adjustments are made • Do not attempt verbal communication in high noise backgrounds.	Warning vests, Hard hat, Safety glasses, Steel toe work boots	
	Equipment failure	• Perform daily maintenance inspections on operating equipment		
	High Noise Levels	• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period) • Assess noise level with sound level meter if possibility exists to exceed 85 dB A TWA	Ear plugs	Sound Level Meter

ACTIVITY HAZARD ANALYSIS FOR FEEDING THE THERMAL DISORBTION UNIT (TDU)				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Feeding the TDU (continued)	Adverse weather conditions: -lightening -high winds -driving rain	• Monitor weather forecast • Shut down operations should severe weather conditions exist		
	Horseplay	• Prohibit horseplay on all project sites • Review rules about horseplay with subcontract supervisors and workers • Remind workers not to respond/participate in horseplay started by others		
	Inhalation and Contact with Hazardous Substances	• Provide workers proper skin, eye and respiratory protection based on the exposure hazards present • Review hazardous properties of site contaminants with workers before operations begin	Level C: Tyvek coveralls, inner sample gloves, outer nitrile gloves, latex or neoprene boots and full face respirator	PID (11.7) lamp or FID, particulate meter, colorimetric tubes
	Insect/ Animal Bites	• Review injury potential with workers • Avoid insect nests areas, habitats outside work areas • Emphasize The Buddy System where such injury potential exists • Use insect repellant to protect against sting injuries • Wear PPE and tape joints to keep insects away from the skin • Use protective insect repellents containing DEET to prevent insect bites • Check limbs/body for insects/ insect bites during decontamination and/or shower	Tyvek coveralls, duct tape bottom of coveralls to boots or latex boot covers	
	High/Low Ambient Temperature	• Monitor for Heat Stress in accordance with OHM/IT Health and Safety Procedures HS400 • Provide fluids to prevent worker dehydration		Meteorological Equipment

ACTIVITY HAZARD ANALYSIS FOR FEEDING THE THERMAL DISORBTION UNIT (TDU)				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
EQUIPMENT REQUIRED		**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**	
• Loader • Dump trucks • PID (11.7) lamp or FID, particulate meter, colorimetric tubes		• Daily equipment inspections as per manufacturers requirements • Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers)	• Review AHA with all task personnel • Review Basewide SSHP and Addendum #1. • Review operations/safety manuals for all equipment utilized	

ACTIVITY HAZARD ANALYSIS FOR HANDLING THE TREATED MATERIAL				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Handling the Treated Material	Slips, Trips, Falls	• Clear walkways work areas of equipment, tools, vegetation, excavated material and debris • Mark, identify, or barricade other obstructions		
	Spills	• Clean up spills before initiating maintenance • Review maintenance procedures for safety practices		
	Struck By/ Against Heavy Equipment	• Wear reflective warning vests when exposed to vehicular traffic • Isolate equipment swing areas • Make eye contact with operators before approaching equipment • Understand and review hand signals • Follow hand signals of ground workers for equipment manipulation when placing/loading equipment into bucket. • Step away from equipment when bucket adjustments are made • Do not attempt verbal communication in high noise backgrounds.	Warning vests, Hard hat, Safety glasses, Steel toe work boots	
	Equipment failure	• Perform daily maintenance inspections on operating equipment		
	High Noise Levels	• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period) • Assess noise level with sound level meter if possibility exists to exceed 85 dB A TWA	Ear plugs	Sound Level Meter
Handling The Treated Material (continued)	Adverse weather conditions:	• Monitor weather forecast • Shut down operations should severe weather conditions exist		

ACTIVITY HAZARD ANALYSIS FOR HANDLING THE TREATED MATERIAL				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
	Steam	• Avoid discharge area when unloading • Repair leaks in covers • Use caution when removing sealed lids and ducting.		
	Horseplay	• Prohibit horseplay on all project sites • Review rules about horseplay with subcontract supervisors and workers • Remind workers not to respond/participate in horseplay started by others		
	Inhalation and Contact with Hazardous Substances	• Initially, material should be treated as potentially contaminated until sample results confirm that the treated material is non-hazardous	Tyvek coveralls, nitrile gloves, latex or neoprene boots until the initial sample results indicate the material is non-hazardous, then Level D	PID (11.7) lamp or FID, particulate meter, colorimetric tubes
	Insect/ Animal Bites	• Review injury potential with workers • Avoid insect nests areas, habitats outside work areas • Emphasize The Buddy System where such injury potential exists • Use insect repellant to protect against sting injuries • Wear PPE and tape joints to keep insects away from the skin • Use protective insect repellents containing DEET to prevent insect bites • Check limbs/body for insects/ insect bites during decontamination and/or shower	Tyvek coveralls, duct tape bottom of coveralls to boots or latex boot covers	

ACTIVITY HAZARD ANALYSIS FOR HANDLING THE TREATED MATERIAL				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Handling the Treated Material (continued)	High/Low Ambient Temperature	• Monitor for Heat Stress in accordance with OHM/IT Health and Safety Procedures HS400 • Provide fluids to prevent worker dehydration		Meteorological Equipment
EQUIPMENT REQUIRED		**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**	
• Loader • Dump trucks • Hand tools • PID (11.7) lamp or FID, particulate meter, colorimetric tubes		• Daily equipment inspections as per manufacturers requirements • Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers)	• Review AHA with all task personnel • Review Basewide SSHP and Addendum #1. • Review operations/safety manuals for all equipment utilized	

ATTACHMENT 2

SURVIVAIR RESPIRATOR CARTRIDGE SERVICE LIFE ESTIMATE

ATTACHMENT 3

WORKER ACKNOWLEDGEMENT

WORKER ACKNOWLEDGEMENT TO HEALTH-AND-SAFETY PLAN ADDENDUM

I HAVE READ THE BASEWIDE SAFETY PLAN AND THE ADDENDUM FOR SITE 89 AND FULLY UNDERSTAND ITS CONTENTS.

NAME DATE

APPENDIX B

SAMPLING AND ANALYSIS PLAN

SAMPLING AND ANALYSIS PLAN
FOR
SITE 89 LTTD SOIL REMEDIATION
MCB CAMP LEJEUNE, NORTH CAROLINA

Prepared for:

DEPARTMENT OF THE NAVY
Contract No. N62470-97-D-5000
Task Order 050

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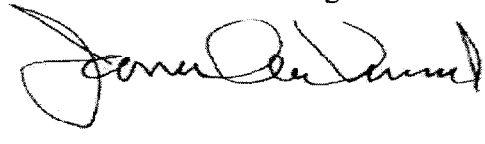

James A. Dunn Jr., P.E.
Senior Project Manager

Roland Moreau, P.E.
Program Manager

July 2000
OHM Project 803011
Revision 2

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2.3.1 Description of the Remediation Strategy

The primary objective of the LTTD remedial effort at Sites 89 is to thermally treat all soils to below the negotiated project action level of 1ppm PCA. As a component of the site remedial plan, aerating fountains will be installed in the pond located on Edwards Creek, south of the site, to treat any volatile organics occurring in the surface waters.

2.4 Project Organization

The project manager is the primary focal point for control of the project activities. The project manager will be supported by the QA Management team, which will provide reviews, guidance, and technical advice on project execution issues. Members of this staff will be on an "as-needed" basis to assist in smooth project execution. The project team consisting of a supervisory, health and safety, technical will support the project manager, and QA/QC staff to ensure that the project is safely executed in compliance with applicable laws, regulations, statutes, and industry codes. Individuals of the project team are responsible for fulfilling appropriate portions of the project QA program, in accordance with assignments made by the project manager. The project manager is responsible for satisfactory completion of the project QA program. The project manager may assign specific responsibilities to the deputy project manager and other members of the project staff.

The responsibilities of the key members in the project organization are:

Project Manager – Jim Dunn

The project manager is responsible for the overall direction of this project executed under his supervision. He provides the managerial administrative skills to ensure that resource allocations, planning, execution, and reporting meet contract requirements. He is ultimately accountable for all work activities undertaken on this project. Some of these responsibilities may be assigned by the project manager to the Site Supervisor, who will remain on site throughout the project field activities.

Site Supervisor – Randy Smith

The site supervisor is responsible for the day-to-day management of this specific delivery order. He will ensure sufficient resource allocations to maintain project schedule and budget. He will provide daily feedback to the project manager on project progress.

Project Chemical QA Officer - Terence A. Whitt

The chemical QA officer is responsible for implementing the project chemical QA program. He is responsible for informing the project manager of any site-specific QA issues such as nonconformance, identifying appropriate corrective actions, and performing follow-up audits to ensure that the corrective actions were successful.

Project Chemist – Kai Mack

The project chemist is responsible for implementing the project plans and ensuring that the quality assurance and data quality objectives are being met for the project. He will be responsible for sampling oversight conducting all analyses in the on -site mobile laboratory. He is also responsible for informing the chemical QA officer of any site-specific problems and for coordinating QA efforts with the contracted laboratory.

Laboratory Coordinator - Betsy McDaniel

The laboratory coordinator is responsible for procuring a certified laboratory based on the requirements needed for the project.

Sample Technician – Dumitru Radu

The sample technician will be responsible for carrying out all sampling in accordance with approved procedures and methodologies as defined in the SAP.

- Generating field blanks, equipment rinsate blanks, and acquiring field duplicate samples as required by the SAP.
- Completing sampling logbooks, sampling forms, labels, custody seals, and chain-of-custody forms and other paperwork as required by the SAP.
- Packaging and Shipping of samples to appropriate laboratories.

2.5 Data Quality Objectives for Measurement Data

Data generated from those tasks described in Section 2.3 will be used to verify the removal of all contaminated materials and for the disposal of the removed soil. Project specific quality objectives are listed in Table 2. These include the quantitation, project action, accuracy, precision, and completeness limits by which the data will be evaluated.

A Naval Facilities Engineering Service Center (NFESC)-certified or US Army Corps of Engineers-Missouri River Division (USACE-MRD)-approved laboratory will be used for all sample analyses. The laboratory will also be North Carolina-approved. A copy of the laboratory's QA Manual, statement of qualifications, and appropriate certificates of approval are kept on file in OHM's Alpharetta, Georgia office and are available upon request from

the NTR, LANTDIV, or other regulatory agencies. A copy of the approved Sampling and Analysis Plan will be forwarded to the laboratory selected to perform chemical analysis of the samples.

All off-site confirmation samples will meet OHM's maximum requirement for the QA/QC. If disposal analysis is required OHM standard data package will be required and no duplicates or rinsate blanks will be collected. All sampling and analytical activities will be in accordance with federal, state, and local regulations. A summary of the field QC sampling requirements is shown in Table 1.

The project chemist on all data will perform data evaluation before it is used. Third party data validation will not be performed on the final data. Data evaluation results will be provided in the project closeout report.

3.0 SAMPLING PROCEDURES

3.1 Sampling Methods and Procedures

The following section describes the major sampling and analysis tasks, frequencies, sample matrices, and measurements of contaminants of interest. Tables 1 presents a summary of these items.

3.1.1 Feed Soil Sampling

In order to maintain a more uniform feed stock for the LTTD unit, OHM may grab and analyze samples at random from soils incoming from the excavation area. These samples will be analyzed in the on-site laboratory for percent moisture and PCA. Grab samples will be collected as discussed below.

3.1.2 Treated Soil Sampling

Sampling and analysis of the treated soil output from the LTTD unit will be conducted during the performance testing period as well as the full scale treatment of soils. Each task will utilize a different sampling strategy.

During performance testing, samples will be collected from the treated soil and analyzed at a 50-ton frequency for PCA. Additional sampling will be conducted as discussed in section 3.1.6 This will allow the various LTTD system settings, as discussed in the performance testing section of the Work Plan, to be evaluated on a more rapid basis.

During the period of full-scale operation, one sample will be collected and analyzed for every 200 tons (one days production) of treated soil generated. A six point, composite sample will be generated in the on- site laboratory for analysis of PCA using a modified method 8100. Additionally, 10 percent of the samples collected during the project will be sent to the off site, subcontracted laboratory for analysis using method 8260. Methods for collecting grab and composite samples are presented below.

3.1.3 Post- excavation Sampling

Verification that the final limits of the excavation, based on the action level of 1ppm PCA, will be confirmed through the collection and analysis of side wall and floor samples from the excavation. One grab sample per 50 linear feet will be collected from excavation sidewalls, and one grab sample per 500 square feet will be collected from the excavation floor. As with other soil samples, analysis will occur at the on-site laboratory on a

expedited basis with ten percent of the samples collected sent to the off site subcontract laboratory.

Procedure for collecting grab samples using EnCore soil sampler:

1. Don clean sampling gloves.
2. Open the EnCore reusable package and remove the core device and cap.
3. Place into the T-handle with the plunger pulled back.
4. Push into the soil to be sampled, packing the soil into the sampler.
5. Remove from the soil, brush of the sides, and put the cap seal onto the sampler.
6. Label and reseal in the original package.
7. Place into the cooler for shipment.

Procedure for collecting composite samples for the offsite labortory:

1. Subdivide the area into five to six equally sized subareas.
2. Don clean sampling gloves.
3. Collect random grab samples within the subareas using the grab procedures outlined above.
4. Send all grab samples to the laboratory.
5. Instruct the laboratory to analyze samples by combining extract portions to create a composite sample analysis.
6. Fill the required sample container, label, and place into the cooler for shipment.

3.1.4 Backfill Sampling

A sample of the off-site borrow source may be required if analytical data is not available. Table 1 summarizes the parameters needed for this sample. One grab encore sample will be collected for the volatile portion and a 5-point grab for all other analysis. The volume of imported fill required is expected to be less than 500 cubic yards.

3.1.5 Disposal Sampling

A sample of other miscellaneous solids, such as used PPE, will require full TCLP analysis for off-site disposal. Before sampling for disposal contact the T&D Coordinator for verification of analytical parameters. Follow sampling procedures in Section 3.1.1 with exception of the subdivided areas.

3.1.6 Performance Sampling

Subsequent to the initial shakedown and operational testing of the LTTD unit, the kiln will be brought up to temperature, contaminated feed soil will be staged, and the performance testing of the unit will begin. Section 9.0 of the Work Plan describes all of the objectives of the performance test, which includes sampling and analysis of certain LTTD emissions and discharges as discussed as follows.

Sampling and analysis of the LTTD discharge stack will be conducted by a qualified stack testing company and the analysis will occur at a North Carolina certified laboratory. Stack samples will be collected during a one day sampling event and will be analyzed for volatile organics, semi-volatile organics, total hydrocarbons and carbon dioxide (THC/CO), and dioxins/ furans. Table 1 presents the sampling methods, analytical methods, and sampling frequency scheduled for performance stack testing.

The project analytical team will conduct sampling and analysis of the combined treated soil/ baghouse fine discharge. A composite sampling strategy, as discussed previously will be used to collect samples for analysis. Analysis for the volatiles PCA, TCE, and PCE will occur at the on-site lab with some split samples going to the off-site lab for confirmation. Analysis for dioxins and furans will occur at the off site laboratory.

3.2 Sample Identification System

Sample identification names, or sample IDs, are assigned based on the following combination of sample identifiers.

CLJ-XX-NNN-DD

Where:

CLJ = Camp Lejeune
XX= Task Order for the project (50)
NNN = Sequential number starting at 001, including QC samples such as field blank, equipment blanks, duplicates etc.
DD = Matrix identifier and QC identifier
e.g. SC for soil confirmation
DS for Disposal Soils
BF for Backfill Material

Other representative designations may be used, as needed based on field conditions. If the sample is a field QC sample, the following designations will be added as a suffix

FB - Field Blank (numbered sequentially such as FB01, FB02 etc)
RB- Equipment Rinsate Blank (numbered sequentially such as RB01, RB02 etc.)
(Duplicates will not be identified to the laboratory)

Sample location information will be included in the sample description area of the Chain-of-Custody (COC). Sample sequential numbers are not to be duplicated. Duplicate samples will be sent to the off-site laboratory blind.

3.3 Sample Preservation and Holding Times

Samples collected for off-site analyses will be sent to the laboratory within 24 hours after collection to ensure that the most reliable and accurate answers will be obtained as a result of the analysis. The holding time begins from the date and time of collection in the field.

All environmental and treatment system samples, except for aqueous samples for metals, will be preserved to a temperature of 4°C prior to shipment to the analytical laboratory, using ice or refrigeration. This temperature should be maintained during shipment by placing ice in leak-proof containers, and placing it above and below the sample containers. Other sample preservation requirements and holding times applicable to the sample matrix and analyses are listed in Table 1.

3.4 Field QC Samples

The appropriate number of field QC samples, as specified in the NFESC 1996 document, will be collected during this project. These samples will include field blanks, equipment rinsate blanks and field duplicate samples. These samples will be collected at the following frequencies and analyzed for the parameters listed in Appendix A, Table A-1.

Field Blanks (Ambient Blanks)

Field blanks, sometimes referred to as ambient blanks, are samples of contaminant-free media (reagent grade water) witch are prepared at the site and handled in the field in the same manner as all other field samples. Field blanks are collected during the course of field sampling and, to the extent possible, in the actual sampling locations. Field blanks are collected by placing contaminant-free medium (reagent grade water) in the same type of container as field sample. Field blanks are preserved and stored in the same manner as field samples. At a minimum, one field blank per contiguous site from each sampling event is

collected and is analyzed for those interfering contaminants that could potentially be present in ambient air at the sampling site.

Equipment Rinsate Blank

Equipment rinsate blanks are the final analyte-free water rinse from equipment cleaning collected daily for each matrix sampled. An equipment rinsate blank is collected in the same type of sample containers, and in all other ways is handled in the same manner as other field samples. The equipment rinsate blank must be collected during the sampling event (after collection of at least one field sample) after the sampling equipment has been decontaminated and prior to collection of the next field sample.

All equipment that comes into contact with field samples must be decontaminated prior to use. The use of disposable equipment is acceptable, but does not obviate the requirement for decontamination prior to use, or the requirement for collection of equipment rinsate blanks. Equipment rinsate blanks for disposable equipment are collected by passing contaminant-free medium through or over the decontaminated equipment. One equipment rinsate blank is collected per day, per sampling event for each matrix sampled that day. Equipment rinsates are analyzed for the same parameters as the sample collected that day.

Field Duplicate

Duplicates for soil samples are collected, homogenized, and split. All samples except volatiles are homogenized and split. Volatiles are not mixed, but select segments of soil are taken from the length of the core and placed in 4-oz glass jars. The duplicates for water samples are collected simultaneously. Field duplicates must be collected at a frequency of one sample per day per matrix or 10% of the field samples per matrix. All the duplicates should be sent to the primary laboratory responsible for analysis, along with the samples. Duplicates will be sent to the off-site laboratory blind.

Trip Blank

Trip blanks are defined as samples that originate from analyte-free water taken from the laboratory to the sampling site and returned to the laboratory with the volatile samples. One trip blank should accompany each cooler containing aqueous and non-aqueous volatile samples, should be stored at the laboratory with the samples, and analyzed by the laboratory. Trip blanks are only analyzed for volatile organic compounds and will not be required for this project for disposal samples. Trip blanks will accompany post-excavation and treated soil sample.

3.5 Decontamination

All sampling equipment (hand augers, spoons, stainless steel/glass mixing bowls, etc.) will be decontaminated before sampling commences, between each sample location, and prior to leaving the site.

- Remove gross contamination by scraping or brushing.
- Clean with tap water and phosphate-free laboratory detergent using a stiff brush to remove all surface contaminants.
- Rinse thoroughly with tap water.
- Rinse with 1:1 nitric acid (HNO_3) metals grade (only if samples are to be analyzed for metals).
- Rinse thoroughly with tap water.
- Rinse thoroughly with deionized/distilled water.
- Rinse twice with reagent grade isopropanol or methanol.
- Rinse thoroughly with organic-free water and allow to air dry. (Do not rinse with deionized/distilled water. If organic-free water is not available, allow equipment to air dry.)
- Wrap equipment with aluminum foil prior to storage or transportation to sample locations.

Decontamination fluids will be collected, properly labeled and staged in a secure area until final disposal unless other arrangements are made.

3.6 Sample Log Book

It is necessary for the sampling crew to maintain daily field notes. Items that must be included are sampling protocol, any changes to the procedures, meetings, instructions, safety precautions, personnel protection, and activities pertaining to the samples. The person taking notes must be knowledgeable enough about these activities to know which details are important.

Repetition of information recorded in other permanent logs should be avoided, but enough should be recorded to present a clear and accurate picture of technical activities. At a later date, should a question arise concerning a specific event or a procedure used, it will be answered from these notes. The following information should be logged into the logbooks and/or database:

- Date and time of sampling

- Sample number, locations, type, matrices, volumes, sample ID and descriptions, type and number of sample containers, names and signatures of individuals performing sampling tasks, Chain-of-Custody (COC) and air bill numbers, preservatives, and date samples were sent
- Name of laboratories and contacts to which the samples were sent, turn around time (TAT) requested, and data results, when possible
- Termination of a sample point or parameter and reasons
- Unusual appearance or odor of a sample
- Measurements, volume of flow, temperature, and weather conditions
- Additional samples and reasons for collecting them
- Levels of protection used (with justification)
- Meetings and telephone conversations held with LANTDIV, NTR, regulatory agencies, project manager, or supervisor
- Details concerning any samples split with another agency
- Details of QC samples collected

3.7 Sample Labels

Any samples placed into a sample container will be identified by a sample label. The Sample label will identify the following information:

- PROJECT NUMBER
- DATE- Month, day, year
- TIME- Military time
- SAMPLE NUMBER- See Section 3.2 for designations
- SAMPLE DESCRIPTION
- SAMPLER- Sampler's name
- PRESERVATIVES
- ANALYSIS REQUIRED

The information described above should be printed neatly using an indelible marker. After the sample is taken and the label is securely attached, the sample is logged into the sample log book.

3.8 Chain-of-Custody Procedures

In order to generate legally defensible data of the samples collected throughout the project, the possession of samples must be traceable from the time the samples are collected until

they are introduced as evidence in legal proceedings. To maintain and document sample possession, chain-of-custody procedures are followed as described below:

A sample is under your custody if:

- It is in your actual possession
- It is in your view, after being in your physical possession
- It was in your physical possession and then you locked it up to prevent tampering
- It is in a designated secure area

The following information is required on the COC:

- Project Name
- Project Location - City and State in which the project site is located
- Project Number
- Project Contact - OHM employee responsible for overseeing the sampling operation. This person should be the individual to whom questions are to be directed or verbal results are given (Project Manager, Site supervisor, or Project Chemist)
- Site Telephone Number - The telephone number of on-site office trailer or number where person responsible for samples can be contacted.
- Sample Date - Month, Day, Year
- Sample Time - Military time
- Sample Identification - Sample number and location
- Sample Type - Designation of sample as grab or composite
- Sample Description - Sample matrix, and a brief description of the sampling location
- Sample Preservation - Preservatives used
- Analytical Parameters Requested - Analytical parameter, method numbers, and specific compounds of interest, if applicable.
- Air bill Number
- Laboratory - Laboratory where samples are to be sent
- Laboratory Phone - Telephone number of laboratory
- Laboratory Contact - Contact person for laboratory
- Relinquished By - Signature of sender (OHM)
- Date Relinquished - Date samples were relinquished
- Accepted By - Signature of acceptor

- Date Received - Date samples were accepted
- Turnaround Time - Turnaround times requested or date the results are required from the lab
- Sampler's Signature - Signature of sampler

The COC will be sealed in a ziploc bag and taped in place on the underside of the top of the sample transport container (cooler).

3.9 Packaging, Handling, and Shipment of Samples

Samples will be packaged as to minimize shifting of the samples during shipment. An absorbent material, such as vermiculite or kitty litter, will be placed at the bottom of the shipment container in order to absorb any liquids in the event of sample breakage. All samples will be individually placed into appropriately sized ziploc bags and sealed.

Samples, which must be kept at 4°C, will be shipped on ice in insulated containers. Ice will be placed in a container such as a ziploc bag and sealed so that water will not fill the shipping container as the ice melts. The ice will be double bagged to insure the ice does not leak. Aqueous samples for metals analysis, except hexavalent chromium, shall not be shipped or stored under refrigeration.

Samples will be shipped via an overnight shipping agency to the appropriate laboratory. IATA regulations will be followed, as they are more applicable to OHM's method of sample shipment. These instructions are for shipping samples with unknown or limited hazards. All information will be entered as directed. No changes or substitutions to these instructions will be made irrespective of their significance.

4.0 ANALYSIS PROCEDURES

4.1 Analytical Method Requirements

Analytical requirements for this project are listed in Table 1. All samples will be analyzed according to USEPA SW-846 Test Methods for Evaluating Solid Waste, Physical/Chemical Methods whenever possible. Alternative methods of analysis from other sources (ASTM, NIOSH, Standard Methods, etc.) may also be used.

4.2 Quality Control Requirements

Project Quality Control (QC) requirements for precision, accuracy, completeness, and quantitation limits are listed in Table 2. QC procedures and acceptance limits must be met as specified in the individual methods. In addition, the laboratory must meet the specification and requirements as described in the NFESC, 1996 document.

4.3 Instrument Testing, Inspection, and Maintenance

Proper maintenance is critical to the performance of minimization of downtime of all equipment, whether it is for measurement or support. Inspection will be performed, at a minimum, prior to use of the instruments. Preventive maintenance will be performed as recommended by the manufacturer of the respective equipment. All routine maintenance and major repairs performed on field screening or analytical equipment will be recorded in bound maintenance logbooks that have been specifically designated for that instrument. Equipment that fails calibration or becomes inoperable during use will be removed from service and segregated to prevent inadvertent use, or will be tagged to indicate that it is out of calibration. Such equipment will be repaired and recalibrated or completely replaced.

4.4 Instrument Calibration

All calibrations on field instruments will be performed, as a minimum, on a daily basis. Every calibration will be recorded in the maintenance logbook for each instrument. Quality control check standards from a separate source will be used to check initial calibration, and acceptance and rejection criteria.

Monitoring instruments, such as the OVA or FID, O_2/LEL meter, Monitox, etc. will be calibrated as specified in the SSHASP. Off-site analytical instruments will be calibrated according to the method specifications and the laboratory's QA Manual.

5.0 DATA MANAGEMENT

Data management is the system by which data is reduced, reviewed, validated, reported, distributed, and finally archived. The criteria in this system are designed to meet the project objectives for both on- site and off-site laboratory generated data

5.1 Laboratory Data Reduction

Data reduction includes the identifications and calculations necessary to convert the raw instrument readings to the final reported compounds and their respective concentrations.

Responsibilities of Analyst

Each analyst is responsible for converting raw data into reportable values. These specific duties include:

- Proper identification of the analyte
- Generation of calculations
- Checking associated calibrations to ensure support of data
- Associated QA/QC checks are supportive of data
- Associated documentation is complete and accurate in respective log books
- Associated chromatograms and strip chart recordings are labeled with data, instrument number, run parameters and analyst

5.2 Laboratory Data Validation

All data generated for the project within the laboratory will be extensively checked for accuracy and completeness. The data validation process consists of data generation, reduction, and three levels of review.

The analyst who generates the raw data has the prime responsibility for the correctness and completeness of the data. All data generated and reduced will follow protocols specified in the laboratory SOP. Each analyst reviews the quality of his work based on an established set of guidelines. The guidelines are:

- Sample preparation information is correct and complete
- Analysis information is correct and complete
- The appropriate Standard Operating Procedures have been followed
- Analytical results are correct and complete
- Analysis is performed within prescribed holding times.
- QC sample results are within established control limits

- Blank sample results are within appropriate QC limits
- Special sample preparation and analytical requirements have been met
- Documentation is complete
- The next level of review is performed by the section supervisor or data review specialist. The review is structured to ensure that:
- Calibration data are scientifically sound, appropriate to method, and completely documented.
- QC results are within established limits.
- Reporting units are consistent with the method and the matrix.
- Quantitative results are correct.
- Data results are consistent with information on the COC.
- Documentation is complete.
- The data is ready for incorporation into a final report.
- The data package is complete and ready for data archive.

5.3 Project Data Review

Project Chemist Data Review Responsibilities

The project chemist is responsible for initial review of the data from the laboratory. This review includes:

- Verifying that all requested data are reported
- Verifying that samples are analyzed according to the contract specified method
- Verifying that all analytes requested are reported
- Verifying that holding times are not exceeded
- Verifying that matrix spike, matrix spike duplicate, and surrogate recoveries fall within the laboratory's acceptance criteria
- Reviewing blank data for contamination
- Reviewing field quality control results for inconsistencies
- Verifying that the data generated meet the project Data Quality Objectives specified in the SAP.

The project chemist is responsible for informing the Project Manager and Project Chemical QA/QC Officer of any laboratory and/or sampling deficiencies or issues. These issues and subsequent decisions will be documented on the data evaluation report produced by the Project Chemist for each data package.

5.4 Data Deliverables

Data deliverables will be in the electronic and hard copy format. The requirements for each deliverable format are discussed below:

5.4.1 Hard Copy Data Deliverable

The preliminary data will be faxed to the project chemist. This data may or may not have undergone the full laboratory review process and may contain errors and discrepancies. Prior to the use of data results for any decisions, the data will be reviewed by the project chemist and assessed against the project goals and data quality objectives. A copy of the preliminary data, including review comments from the project chemist will be submitted to the site and/or the project manager.

The hard copy data will be submitted within prescribed time as defined by the Terms and Conditions of the laboratory contract document. The hard and final copy data will be evaluated by the project chemist and assessed against the preliminary data, project goals and data quality objectives. Any errors, discrepancies, and nonconformances will be brought to the laboratory's and project manager's attention.

When QA issues have been satisfactorily settled and data evaluation has been completed, the project manager may release the data to the client and/or regulating agencies.

5.5 Data Storage and Archive

After OHM has completed its work for the project, all documents generated will be assembled in the project file. Individuals may retain clean (no handwritten comments) copies of documents for their personal files but only after personally verifying that the original or similar copy is in the project file. The project manager/supervisor is responsible for ensuring the collection, assembly, and inventory of all documents relative to the project at the time the objectives are met. The file then becomes accountable. Any records leaving the file must be signed out.

6.0 *DATA ASSESSMENT PROCEDURES*

Reliability in analytical determination is maintained through strict adherence to quality control procedures. Procedures are designed to control both the accuracy and precision of analytical results. For the validation of the data, a known method spike is routinely analyzed to ensure the accuracy of results. The procedure is to run the standard QA/QC and sample analysis with each lot of samples sent to the laboratory. If more than ten individual analyses are made, additional standards will be analyzed at a rate of one standard per ten analyses. Some procedures call for the use of either a surrogate spike or the standard addition of a known quantity of the analyte to a split of the sample being analyzed.

Control charts will be prepared using an estimate of the spike recovery obtained from the literature or determined by repeated analyses run in the laboratory. Each time the analyst runs a method spike, the results is entered on the control table. If a standard addition technique is used, a plot of instrument response versus added analyte concentration is made in order to determine analyte concentration in the original sample. These are further explained in the laboratory's QAM.

Replicate analyses will be performed on at least 10 percent of the samples processed by the laboratory. Blanks are also run with each batch of samples or individual sample analyzed regardless of the level of certification of the data.

The purpose of spikes, blanks, and replicates is to provide a sound scientific basis from which the degree of certification of the resultant data can be objectively concluded. These are not management decisions, but follow naturally from the results of the above QC procedures.

6.1 Accuracy

Data accuracy is a reflection of the efficiency of the analytical procedure. It is determined by use of spiked samples and standard reference materials or laboratory control samples performed at the rate of one set every 20 samples. A control chart is generated using historical laboratory data where warning and control limits are established to assess data accuracy.

The accuracy (check standards) samples will have concentration values of the mid-standard. During analysis, a minimum of 10 percent of samples are accuracy samples. The accuracy

samples are staggered through the analysis, not placed one after another. After a minimum of seven accuracy samples are analyzed, the percent recovery is calculated for each sample.

The accuracy criteria is determined by calculating the standard deviation of seven or more percent recovery values and setting the upper and lower control limits using the following equations:

Upper control limit = p + 3 SD
Lower control limit = p - 3 SD

Where:
p = Average percent recovery
SD = Standard deviation

After the standard deviation, for the seven or more samples has been calculated, the accuracy control limits are generated and are then used to determine if the analysis is out of control. This is done by checking the results against the control limits. If any values are above the upper control limit or below the lower control limit, all sample results after the last qualifying accuracy sample must be repeated or discarded. If seven consecutive values fall below the lower control limit, new limits are calculated using the new accuracy check values. If the values fall between the upper and lower limits, then conditions are reported as "within limits."

6.2 Precision

Duplicate and replicate samples analyzed by the laboratory assess the precision of the sampling effort. Control limits for duplicate/replicate Relative Percent Difference (RPD)s are listed in Table 2. Once a sufficient amount of replicate data becomes available, field precision control charts are constructed similar to the laboratory precision charts. For any given concentration, the mean and the standard deviation(s) of the replicates are calculated. Data from each sample set are pooled with the previous sample sets to generate control and warning limits for the next set. Control and warning limits for water samples are set at ± 2s and ± 3s, respectively. Control limits for solid samples are more liberally established due to matrix heterogeneity. Data outside any control limit are subject to QA review.

Precision is based upon the results of the RPDs as calculated from the percent recoveries of the matrix spike and duplicate samples. The control limits for precision is based on historical laboratory data.

MS and MSD samples on a per batch or a minimum frequency of 5 percent are analyzed to assess precision. Duplicate results are compared and the RPD is then determined. The RPD will be entered into the laboratory's data system and will be used to define the precision of the analysis.

6.3 Completeness

The field supervisor must ensure all sites are sampled for all the specified analyses, that sufficient sample volume has been provided to complete those analyses, and that all of the QA samples have been included with each sample set. The goal for completeness for each sample set shipped to the laboratory is 100 percent.

Completeness is expressed as the percentage of the amount of valid data obtained to the amount of data expected. For a set of data to be considered complete, it must include all QC data verifying its accuracy and precision.

If samples analyzed do not meet all QC requirements in terms of accuracy and precision for any specific parameter, the sample preparation and analysis will be repeated pending adequate volume.

6.4 Method Detection Limits and Practical Quantitation Limits

Method detection limits (MDLs) must be established by the laboratory. This should, at a minimum, be established on a yearly basis. MDL is the minimum concentration of a substance that can be identified, measured, and reported with 99% confidence that the analyte concentration is greater than zero.

Practical quantitation limit (PQL) is the lowest level that can be reliably determined within specified limits of precision and accuracy during routine laboratory operating conditions. The PQLs are generally 5-10 times the MDL. The PQL is the most applicable limit of reporting for this program.

6.5 Laboratory and Field Contamination

It is not unusual to find the following analytes at trace levels in the samples:

- Methylene chloride
- Acetone
- Freon (1,1,2-trichlorotrifluorethane)

- Bis(2-ethylhexyl)phthalate
- Hexane
- Isopropanol
- 2-Butanone

These are common solvents used in the field and in the laboratory.

To fully evaluate data containing trace levels of these contaminants, one must have data from trip blanks, field blanks, equipment blanks, and all applicable laboratory blanks for that batch of samples.

The determination on the use of the data will be made during the Data Validation process.

7.0 *PERFORMANCE AND SYSTEM AUDITS*

Audit is defined as systematic check to determine the quality of operation of field and laboratory activities. It is comprised of the following:

- Performance audit
- System audits

These include a detailed review of each operating component of the network. Auditing will ultimately assist in determining if each element within a system is functioning appropriately per the QA program requirements.

7.1 Field Performance Audits

Field performance audits are performed on an ongoing basis during the project as field data is generated, reduced, and analyzed. All numerical analyses, including manual calculations are documented. All records of numerical analysis are legible, of reproduction quality, and supporting to complete permit logical reconstruction by a qualified individual other than the originator.

Other indicators of the level of field performance are the analytical results of the blank, duplicate, and replicate samples. Each blank analysis is an indirect audit of effectiveness of measures taken in the field to ensure sample integrity. The results of the field duplicate and replicate analysis is an indirect audit of the ability of each field team to collect representative sample portions of each matrix type.

7.2 Field System Audits

System audits of site activities are accomplished by an inspection of all field activities by the Project Chemical QC Officer. This audit is composed of comparisons between current field practices and standard procedures.

After the audit, any deficiencies are discussed with the field staff, and corrections are identified. If any of these deficiencies might affect the integrity of the samples being collected, the QA Officer informs the field staff immediately, so corrections can be made. The field performance audit will be conducted at the start of the project, one before the end of the project, and as directed by the project manager. OHM will also submit to all requests by regulatory agencies, or other clients for external field systems audits.

7.3 Laboratory Performance Audit

The laboratory performance audit verifies the ability of the laboratory to correctly identify and quantify compounds in blind check samples submitted by an auditing agency. If the laboratory participates in Performance Evaluation (PE) programs such as USEPA WS/WP studies, AIHA, PAT studies, etc., results from these studies will be generally acceptable by OHM. However, during the course of the project, it may be necessary for the Project QA/QC Officer to send PE samples to the laboratory to evaluate specific parameters.

The contracted laboratories will undergo performance audits throughout the project consisting of field QC samples. Occasionally PE samples supplied by the client or external organizations will be spiked with the same analytical parameters that are being investigated on site. External laboratory performance audits by auditing agencies such as the USEPA, USACE-MRD, DOD, NFESC, etc., are not routinely scheduled. However OHM and its subcontracted laboratories will submit to any external audit upon request by the USEPA or the client.

7.4 Laboratory System Audits

The laboratory system audit is a review of analytical laboratory operations to verify that the facility has the necessary equipment, staff, and procedures in place to generate acceptable data. It is also to determine that each element within an activity is functioning appropriately and within the guidelines of applicable methodology, approved procedures, and the site QAPP. An on-site inspection is routinely performed by the laboratory's QA Manager and may also be frequently performed by the OHM Project Chemical QA/QC Officer. If the laboratory participates in certification programs, audits performed by the certifying agencies may satisfy the criteria of systems audits for the project.

If the laboratory is in question, a system audit can be directed by the client and performed by OHM or the client's representative. Any recommendations made will be considered for implementation and any corrective actions will be taken to correct any deficiencies found. Project-specific audit reports will be placed in the project files and laboratory audit reports will be kept by the laboratory for future reference.

8.0 CORRECTIVE ACTION

This corrective action may be necessary as a result of the following QA activities:

- Field and laboratory performance audits
- Field and laboratory system audits
- Inter-laboratory comparison studies
- Calibration data fall out of specified limits
- Failure to adhere to the CQMP
- Failure to adhere to the site
- Failure to adhere to standard operating procedures and methods
- Data completeness below required limits
- Control limits are exceeded for QC samples

If, during system and performance audits, deficiencies or problems are discovered, corrective action will be initiated immediately. The appropriate field and laboratory personnel will be notified immediately and an investigative process will be implemented immediately to find solutions to these issues. The investigative process will consist, but is not limited to, the following:

- Determining when the problem occurred
- Determining which systems were affected by the problem
- Determining the cause of the problem
- Determining a corrective action to eliminate the problem
- Assigning the responsibility for implementing the corrective action
- Implementing the corrective action
- Evaluating the effectiveness of the corrective action
- Investigating alternative corrective actions if the original action was not sufficient in eliminating the problem
- Documenting that the corrective action has eliminated the problem

The Project Chemical QC Officer has the authority to require that all site activities threatened by the problem be stopped or limited until the corrective action has been implemented and satisfactorily verified to eliminate the problem.

Corrective actions may include, but is not limited to:

- Modifications to procedures
- Recalibration of instruments
- Replacement of solvents, reagents, and/or standards
- Additional training of personnel
- Reassignment of personnel

8.1 Corrective Action Report

A Corrective Action Report (CAR) is necessary documentation of the investigative process. Depending on the issues, the CAR may be generated by the laboratory or the field personnel. Copies of the CAR will be given to the Project QC Officer and Project Manager, who will distribute it to the client. A copy of the CAR will be placed in the project files for future reference.

The CAR should include, but is not limited to:

- A description of the problem, deficiency, or issue
- Proposed resolutions
- Resulting actions
- Effectiveness of the resolutions
- Personnel responsible for implementation of the corrective actions
- Personnel responsible for monitoring the effectiveness of the actions.

TABLES

TABLE 1
PROJECT SAMPLING SUMMARY

Sample Task	Sample Point	Matrix	Sampling Frequency	Approx Sample No	Sampling Method	Sampling Equipment	TAT[1]	QC Level	Required Analysis	Analytical Method	Holding Time	Preservatives	Containers
FEED and TREATED SOIL SAMPLING													
On-site Analysis	LTTD Storage Bins and Excavation	Soil	*Performance Testing* 1 per 50 tons *Operations* 1 per 200 tons	100	Grab	Stainless trowel or Encore sampler	ASAP	On-site Screening	PCA TCE PCE	5030 B/ Modified 8100 W/ ECD	ASAP	Cool to 4 ^{0}C	4 oz jar and EnCore samplers
Off - site Analysis	LTTD Storage Bins and Excavation	Soil	*Performance Testing* 10 % *Operations 10%*	10	Grab	Stainless trowel or Encore sampler	5 Day	OHM Maximum	Volaitle Organics	5035/ B 8260	14 days	Cool to 4 ^{0}C	4 oz jar and EnCore samplers
PERFORMANCE/ STACK TESTING													
Off - site Analysis	LTTD Stack	Air	Random	1	M0023A	NA	14 Days	OHM Maximum	Dioxins/ Furans	8290	ASAP	NA	NA
Off - site Analysis	LTTD Stack	Air	Random	1	M0030/ M0031	NA	14 Days	OHM Maximum	Volatile Organics	8260B	ASAP	NA	NA

TABLE 1
PROJECT SAMPLING SUMMARY

Sample Task	Sample Point	Matrix	Sampling Frequency	Approx Sample No	Sampling Method	Sampling Equipment	TAT[1]	QC Level	Required Analysis	Analytical Method	Holding Time	Preservatives	Containers
Off - site Analysis	LTTD Stack	Air	Random	1	MM5/ M0010	NA	14 Days	OHM Maximum	Semi-Volatile Organics	8270C	ASAP	NA	NA
Off - site Analysis	LTTD Stack	Air	Random	1	THC/ CO	CEMs	Real time	OHM Maximum	THC/ CO	CEMs	NA	NA	NA
Off - site Analysis	LTTD Treated Soil/ Fies	Soil	Random	1	Composite 5 random grabs into 1 sample	Stainless trowel	14 Days	OHM Maximum	Dioxins/ Furans	8290	14 Day	NA	NA
POST- EXCAVATION SOIL SAMPLING													
On-site Analysis	Excavation	Soil	*Sidewalls* 1 per 50 feet	50	Grab	Stainless trowel or Encore sampler	ASAP	On-site Screening	PCA	5030 B/ Modified 8100 W/ ECD	ASAP	Cool to 4 °C	4 oz jar and EnCore samplers
Off - site Analysis	Excavation	Soil	*Sidewalls* 1 per 50 feet	5	Grab	Stainless trowel or Encore sampler	5 Day	OHM Maximum	Volaitle Organics	5035/ B 8260	14 days	Cool to 4 °C	4 oz jar and EnCore samplers
DISPOSAL SAMPLING													
Miscellaneous Debris	Composite of Materials in Roll-Offs or drums	Debris	1 per waste stream when required	1	Composite 5 random grabs into 1 sample	Scissors, knives, chisel, hammer as needed to obtain a representative sample, SS spoon, SS bowl	14 Days	OHM Minimum Deliverables;	TCLP Volatiles	1311/8260B	14 day TCLP extr; 14 day analysis	Cool to 4°C	1 ea 4 oz amber glass
									TCLP Semi-Volatiles	1311/8270C	14 day TCLP extr; 7 day extr; 40 day analysis	Cool to 4°C	1 ea 16 oz amber glass

TABLE 1
PROJECT SAMPLING SUMMARY

Sample Task	Sample Point	Matrix	Sampling Frequency	Approx Sample No	Sampling Method	Sampling Equipment	TAT[1]	QC Level	Required Analysis	Analytical Method	Holding Time	Preservatives	Containers
									TCLP Pesticides	1311/8081B	14 day TCLP extr; 7 day extr; 40 day analysis		
									TCLP Herbicides	1311/8151	14 day TCLP extr; 7 day extr; 40 day analysis		
									TCLP Metals	1311/6010A 7470	6 month TCLP extr; 6 month analysis Hg: 28 day TCLP extr; 28 day analysis		
									Reactivity	Chapter 7.3	None		
									Corrosivity	9045b	None		
									Ignitability	1010/1020A	None		

TABLE 1
PROJECT SAMPLING SUMMARY

Sample Task	Sample Point	Matrix	Sampling Frequency	Approx Sample No	Sampling Method	Sampling Equipment	TAT[1]	QC Level	Required Analysis	Analytical Method	Holding Time	Preservatives	Containers
Contractor Generated	Storage tanks or drums	Liquid	1 per waste stream when required	1	Grab	Sludge Judge or Bailer	14 Days	OHM Minimum Deliverables;	Volatiles	8260B	14 day	Cool to 4°C	2 ea 40ml
									Semi-Volatiles	8270C	7 day extr; 40 day analysis	Cool to 4°C	1 ea 1 liter amber glass
									Pesticides	8081B	7 day extr; 40 day analysis	Cool to 4°C	1 ea 1 liter amber glass
									Herbicides	8151	7 day extr; 40 day analysis	Cool to 4°C	1 ea 1 liter amber glass
									Metals	6010A 7470	6 month analysis Hg: 28 day TCLP extr; 28 day analysis	Cool to 4°C	1 ea 500 ml plastic HDPE
									Reactivity	Chapter 7.3	None	Cool to 4°C	1 ea 1 liter amber glass
									Corrosivity	9045b	None	Cool to 4°C	
									Ignitability	1010/1020A	None	Cool to 4°C	

TABLE 2
PROJECT QUALITY CONTROL OBJECTIVES

Method No	Analyte / Component	Project Action Limits	Minimum PQL	Accuracy Limits MS/MSD Recoveries	Precision Limits MS/MSD Deviation	Accuracy Limits LCS Recoveries	Precision Limits Field Dup Deviation	Completeness Limits
Volatiles		(mg/L)	(mg/L)	(%)	(%)	(%)	(%)	(%)
8260B	1,1-Dichloroethylene	0.7	0.1	50-150	<50	70-130	<50	95
8260B	1,2-Dichloroethane	0.5	0.1	50-150	<50	70-130	<50	95
8260B	Benzene	0.5	0.1	50-150	<50	70-130	<50	95
8260B	Carbon Tetrachloride	0.5	0.1	50-150	<50	70-130	<50	95
8260B	Chlorobenzene	100	20	50-150	<50	70-130	<50	95
8260B	Chloroform	6	1	50-150	<50	70-130	<50	95
8260B	Methyl Ethyl Ketone	200	20	50-150	<50	70-130	<50	95
8260B	Tetrachloroethylene	0.7	0.7	50-150	<50	70-130	<50	95
8260B	Trichloroethylene	0.5	0.1	50-150	<50	70-130	<50	95
8260B	Vinyl Chloride	0.2	0.05	50-150	<50	70-130	<50	95
Semi-Volatiles		(mg/L)	(mg/L)	(%)	(%)	(%)	(%)	(%)
8270C	1,4-Dichlorobenzene	7.5	1	50-150	<50	70-130	<50	95
8270C	2,4,5-Trichlorophenol	400	80	50-150	<50	70-130	<50	95
8270C	2,4,6-Trichlorophenol	2	0.4	50-150	<50	70-130	<50	95
8270C	2,4-Dinitrotoluene	0.13	0.02	50-150	<50	70-130	<50	95
8270C	Cresol	200	40	50-150	<50	70-130	<50	95
8270C	Hexachlorobenzene	0.13	0.02	50-150	<50	70-130	<50	95
8270C	Hexachloroethane	3	0.5	50-150	<50	70-130	<50	95
8270C	Hexachlorobutadiene	0.5	0.4	50-150	<50	70-130	<50	95
8270C	Nitrobenzene	2	0.4	50-150	<50	70-130	<50	95
8270C	Pentachlorophenol	100	80	50-150	<50	70-130	<50	95
8270C	Pyridine	5	1	50-150	<50	70-130	<50	95
Pesticides		(mg/L)	(mg/L)	(%)	(%)	(%)	(%)	(%)
8081A	Endrin	0.02	0.004	50-150	<50	70-130	<50	95
8081A	Lindane	0.4	0.08	50-150	<50	70-130	<50	95
8081A	Methoxychlor	10	1	50-150	<50	70-130	<50	95
8081A	Toxaphene	0.5	0.1	50-150	<50	70-130	<50	95
8081A	Chlordane	0.03	0.005	50-150	<50	70-130	<50	95

TABLE 2
PROJECT QUALITY CONTROL OBJECTIVES

		Project Action Limits	Minimum PQL	Accuracy Limits MS/MSD Recoveries	Precision Limits MS/MSD Deviation	Accuracy Limits LCS Recoveries	Precision Limits Field Dup Deviation	Completeness Limits
Method No	Analyte / Component							
8081A	Heptachlor and its Hydroxide	0.008	0.001	50-150	<50	70-130	<50	95

TABLE 2
PROJECT QUALITY CONTROL OBJECTIVES

Method No	Analyte / Component	Project Action Limits	Minimum PQL	Accuracy Limits MS/MSD Recoveries	Precision Limits MS/MSD Deviation	Accuracy Limits LCS Recoveries	Precision Limits Field Dup Deviation	Completeness Limits
Herbicides		(mg/L)	(mg/L)	(%)	(%)	(%)	(%)	(%)
8151A	2,4-D	10	2	50-150	<50	70-130	<50	95
8151A	2,4,5-TP	1	0.2	50-150	<50	70-130	<50	95
Metals		(mg/L)	(mg/L)	(%)	(%)	(%)	(%)	(%)
6010B	Arsenic	5	1	50-150	<50	70-130	<50	95
6010B	Barium	100	20	50-150	<50	70-130	<50	95
6010B	Cadmium	1	0.2	50-150	<50	70-130	<50	95
6010B	Chromium	5	1	50-150	<50	70-130	<50	95
6010B	Lead	5	1	50-150	<50	70-130	<50	95
7470	Mercury	0.2	0.04	50-150	<50	70-130	<50	95
6010B	Selenium	1	0.2	50-150	<50	70-130	<50	95
6010B	Silver	5	1	50-150	<50	70-130	<50	95
TCLP Volatiles		(mg/L)	(mg/L)	(%)	(%)	(%)	(%)	(%)
8260B	1,1-Dichloroethylene	0.7	0.1	50-150	<50	70-130	<50	95
8260B	1,2-Dichloroethane	0.5	0.1	50-150	<50	70-130	<50	95
8260B	Benzene	0.5	0.1	50-150	<50	70-130	<50	95
8260B	Carbon Tetrachloride	0.5	0.1	50-150	<50	70-130	<50	95
8260B	Chlorobenzene	100	20	50-150	<50	70-130	<50	95
8260B	Chloroform	6	1	50-150	<50	70-130	<50	95
8260B	Methyl Ethyl Ketone	200	20	50-150	<50	70-130	<50	95
8260B	Tetrachloroethylene	0.7	0.7	50-150	<50	70-130	<50	95
8260B	Trichloroethylene	0.5	0.1	50-150	<50	70-130	<50	95
8260B	Vinyl Chloride	0.2	0.05	50-150	<50	70-130	<50	95
TCLP Semi-Volatiles		(mg/L)	(mg/L)	(%)	(%)	(%)	(%)	(%)
8270C	1,4-Dichlorobenzene	7.5	1	50-150	<50	70-130	<50	95
8270C	2,4,5-Trichlorophenol	400	80	50-150	<50	70-130	<50	95

TABLE 2
PROJECT QUALITY CONTROL OBJECTIVES

		Project Action Limits	Minimum PQL	Accuracy Limits MS/MSD Recoveries	Precision Limits MS/MSD Deviation	Accuracy Limits LCS Recoveries	Precision Limits Field Dup Deviation	Completeness Limits
Method No	Analyte / Component							
8270C	2,4,6-Trichlorophenol	2	0.4	50-150	<50	70-130	<50	95
8270C	2,4-Dinitrotoluene	0.13	0.02	50-150	<50	70-130	<50	95
8270C	Cresol	200	40	50-150	<50	70-130	<50	95
8270C	Hexachlorobenzene	0.13	0.02	50-150	<50	70-130	<50	95
8270C	Hexachloroethane	3	0.5	50-150	<50	70-130	<50	95
8270C	Hexachlorobutadiene	0.5	0.4	50-150	<50	70-130	<50	95
8270C	Nitrobenzene	2	0.4	50-150	<50	70-130	<50	95
8270C	Pentachlorophenol	100	80	50-150	<50	70-130	<50	95
8270C	Pyridine	5	1	50-150	<50	70-130	<50	95
TCLP Pesticides		(mg/L)	(mg/L)	(%)	(%)	(%)	(%)	(%)
8081A	Endrin	0.02	0.004	50-150	<50	70-130	<50	95
8081A	Lindane	0.4	0.08	50-150	<50	70-130	<50	95
8081A	Methoxychlor	10	1	50-150	<50	70-130	<50	95
8081A	Toxaphene	0.5	0.1	50-150	<50	70-130	<50	95
8081A	Chlordane	0.03	0.005	50-150	<50	70-130	<50	95
8081A	Heptachlor and its Hydroxide	0.008	0.001	50-150	<50	70-130	<50	95
TCLP Herbicides		(mg/L)	(mg/L)	(%)	(%)	(%)	(%)	(%)
8151A	2,4-D	10	2	50-150	<50	70-130	<50	95
8151A	2,4,5-TP	1	0.2	50-150	<50	70-130	<50	95
TCLP Metals		(mg/L)	(mg/L)	(%)	(%)	(%)	(%)	(%)
6010B	Arsenic	5	1	50-150	<50	70-130	<50	95
6010B	Barium	100	20	50-150	<50	70-130	<50	95
6010B	Cadmium	1	0.2	50-150	<50	70-130	<50	95
6010B	Chromium	5	1	50-150	<50	70-130	<50	95
6010B	Lead	5	1	50-150	<50	70-130	<50	95

TABLE 2
PROJECT QUALITY CONTROL OBJECTIVES

		Project Action Limits	Minimum PQL	Accuracy Limits MS/MSD Recoveries	Precision Limits MS/MSD Deviation	Accuracy Limits LCS Recoveries	Precision Limits Field Dup Deviation	Completeness Limits
Method No	Analyte / Component							
7470	Mercury	0.2	0.04	50-150	<50	70-130	<50	95
6010B	Selenium	1	0.2	50-150	<50	70-130	<50	95
6010B	Silver	5	1	50-150	<50	70-130	<50	95
Characteristics		(mg/kg)	(mg/kg)	(%)	(%)	(%)	(%)	(%)
7.3	Reactive Sulfide	500	50	N/A	<50	N/A	<50	95
7.3	Reactive Cyanide	250	25	N/A	<50	N/A	<50	95
1010	Ignitability (Pensky Martens)	< 60 C or <140°F	40 C or 100°F	N/A	<50	N/A	<50	95
1020A	Ignitability (Setaflash)	< 60 C or <140°F	40 C or 100°F	N/A	<50	N/A	<50	95
1030	Ignitability of Solids	< 60 C or <140°F	40 C or 100°F	N/A	<50	N/A	<50	95
9040	pH (Corrosivity)	≤2 ; ≥12.5	N/A	N/A	<50	N/A	<50	95
Miscellaneous				(%)	(%)	(%)	(%)	(%)
9095A	Paint Filter	Pass	Pass/Fail	N/A	N/A	N/A	N/A	95

APPENDIX C

CONSTRUCTION QUALITY CONTROL PLAN

QUALITY CONTROL PLAN
FOR
SITE 89 LTTD SOIL REMEDIATION
MARINE CORPS BASE
MCB CAMP LEJEUNE, NORTH CAROLINA

Prepared for:

Department of the Navy
Contract No. N62470-97-D-5000
Task Order 050

Atlantic Division
Naval Facilities Engineering Command
6506 Hampton Boulevard
Building A (South East Wing) 3rd Floor
Norfolk, VA 24311-6287

Prepared by:
OHM Remediation Services Corp
11560 Great Oaks Way
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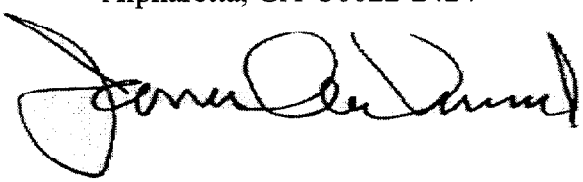
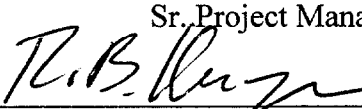
Alpharetta, GA 30022-2424



James A. Dunn, Jr., P.E.
Sr. Project Manager



Charles W. Hunter
Program Q.C. Manager

Roland Moreau, P.E.
Program Manager

June 2000
Version 1
OHM Project No. 803011

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1.0 STATEMENT OF QC PROGRAM

OHM Remediation Services Corp. (OHM), a subsidiary of IT Corporation, will provide and maintain an effective Quality Control (QC) Program. This program will be performed in accordance with the approved Program Quality Control Plan (PQCP) developed specifically to be responsive to the contract specification, Contract No. N62470-97-D-5000, Atlantic Division, Naval Facilities Engineering Command and to the Task Order (TO) 050 specification(s) made applicable to each project, task or work activity. OHM will perform the inspection and test required to ensure that materials, workmanship, and construction conform to drawings, specifications, and contract requirements.

Note to Employees

Quality Control should not be considered a person or an organization of personnel, but a concept to perform in such a manner that the end product of our efforts met established criterion, the customer's needs. The Quality Control individual or group cannot inspect quality into the final product, but only inspect and document the results of our efforts. The only person that can build quality into the product are the individuals performing the task of producing the end product.

It should be noted by all employees that the documentation requirements of OHM procedures, plans and the delivery order specifications are considered equally as important as the end product itself. When it is stated that the documentation will be approved prior to the start of work, this is exactly what is intended. To eliminate problems in this area requires careful planning and execution by everyone.

We would do well to remember that our livelihood depends on how well we satisfy our customer. To accomplish this requires teamwork and attention to detail by all employees and contractors.

2.0 QC ORGANIZATION AND RESPONSIBILITIES

2.1 ORGANIZATION

The QC organization is depicted in the Organizational Chart (Exhibit 2.1). Other positions are reflected to show organizational interface and lines of communication. Depending upon the scope, size and complexity of the project, the Project Superintendent may also fulfill the duties of the Project QC Manager when approved by the Navy.

2.2 QC MANAGERS

The Program QC Manager's resume is included in the Program QC Plan and the QC Manager's resume (delivery order specific) is included herein as Exhibit 2.2.

2.3 DUTIES, RESPONSIBILITIES AND AUTHORITIES

1. The **Program QC Manager** shall report to the Program Manager and shall be responsible for developing, maintaining, and enforcing the quality control program.

2. The **site QC Manager** shall report to the Program QC Manager and shall be responsible for the management and implementation of the Program QC Plan and the delivery order specific QC Plan for both on-and off-site activities. Specific duties include: attend the Coordination and Mutual Understanding Meeting; conduct the scheduled QC meetings; perform the three phases of control; perform submittal reviews; perform submittal approval except for submittals designated for Contracting Officer approval; ensure tests are performed; and prepare QC certifications and QC documentation as required by this Plan. Except for managing and implementing the QC program, the QC Manager shall perform no other duties without the authorization of the Contracting Officer. The QC Manager shall also be responsible for delivering the following documentation to the Contracting Officer:

    - Combined Contractor Production Report/Contractor Quality Control Report, original and one copy, by 10:00 a.m. the next working day after each day that work is performed.

    - Testing Plan and Log, three copies, at the end of each month.

- Monthly Summary Report of Field Tests, original and two copies attached to the Contractor Quality Control Report at the end of each month. (See paragraph entitled "Test Results" in Section 4.0).

- QC meeting minutes, three copies within two calendar days of the meeting.

- Rework items list, three copies at the end of each month.

- Completion Certification attesting that "the work has been completed, inspected, tested, and is in compliance with the contract."

3. The site QC Manager is expected to attend the daily site safety meetings and abide by all site rules and regulations.

2.4 APPOINTMENT LETTERS

The appointment letter for the site QC Manager is included as Exhibit 2.3. The appointment letter for the Program QC Manager can be found in the Program QC Plan.

3.0 SUBMITTALS

3.1 REVIEWING, APPROVING, AND MANAGING SUBMITTALS

A. Contractor's Responsibility

The following responsibilities are those of the contractor and not the QC organization. They are included only for the purpose of providing an understanding of the contractor's responsibility. While the QC organization is expected to assist the contractor in fulfillment of their responsibilities, no part of these responsibilities shall be assumed by the QC organization without the expressed written permission of the Contracting Officer.

1. Coordinate preparation and processing of submittals with performance of work so that work will not be delayed by submittal processing. Allow for potential requirements to resubmit.

2. Except as specified otherwise, allow a review period, beginning with receipt by the approving authority, that includes at least 15 working days for submittals for QC Manager approval and 20 working days for submittals requiring Contracting Officer approval. The period of review for submittals with Contracting Officer approval begins when the Government receives the submittal from the QC organization. The period of review for each resubmittal is the same as for the initial submittal.

3. Determine and verify field measurements, materials, field construction criteria; review each submittal; check and coordinate each submittal with requirements of the work and contract documents.

4. Transmit submittals to the QC organization in orderly sequence, in accordance with the submittal register, and to prevent delays in the work, delays to the Government, or delays to separate contractors.

5. Correct and resubmit submittals as directed by the approving authority. Direct specific attention, in writing or on resubmitted submittals, to revisions not requested by the approving authority on previous submissions.

6. Furnish additional copies of submittals when requested by the Contracting Officer, to a maximum limit of 20 copies.

7. Complete work that must be accomplished as a basis of a submittal in time to allow the submittal to occur as scheduled.

8. Ensure no work has begun until submittals for that work have been returned as "approved" or "approved as noted" except to the extent that a portion of the work must be accomplished as a basis of the submittal.

- **Format of Submittals**

Transmittal Form. Transmit each submittal, except sample installations and sample panels, to the office of the approving authority utilizing transmittal forms standard for the project. The transmittal form shall identify the Contractor, indicate the date of the submittal, and include information prescribed by the transmittal form and required in the paragraph entitled "Identifying Submittals". Process transmittal forms to record actions regarding sample panels and sample installations. Transmittal forms for submittals of sample panels and sample installations shall record any actions and locations of the samples.

Identifying Submittals. Identifying submittals, except sample panel and sample installation, submittals shall be identified with the following information permanently adhered to or noted on each separate component of each submittal and noted on the transmittal form. Mark each copy of each identically, with the following:

1. Project title and location.

2. Construction contract number and delivery order number.

3. The section and paragraph number of the section for which the submittal is required.

4. The Submittal Description (SD) number (see Exhibit 3.1) of each component of the submittal.

5. If a re-submittal, add an alphabetic suffix to the submittal description, for example, SD-10A, to indicate the resubmission.

6. The name, address, and telephone number of the subcontractor, supplier, manufacturer, and any other second tier contractor associated with the submittal.

7. Product identification and location in project.

- **Format of Product Data**

1. Present product data submittals for each section as a complete, bound volume. Include a table of contents listing page and catalog item numbers for product data.

2. Indicate, by prominent notation, each product that is being submitted, indicate the specification section number, and paragraph number to which it pertains.

3. Supplement product data with material prepared for the project to satisfy submittal requirements for which product data does not exist. Identify this material as developed specifically for the project.

- **Format of Shop Drawings**

1. Shop drawings shall be not less than 8 1/2 by 11 inches nor more than 30 by 42 inches.

2. Present 8 1/2 by 11 inches sized shop drawings as a part of the bound volume for the submittals required by the section. Present larger drawings in the sets.

3. Include on each drawing the drawing title, number, date, and revision numbers and dates, in addition to the information required in the paragraph entitled "Identifying Submittals."

4. Dimension drawings, except diagrams and schematic drawings; prepare drawings demonstrating interface with other trades to scale. Identify materials and products for work shown.

- **Format of Administrative Submittals**

1. When the submittal includes a document that is to be used in the project or become a part of the project record, other than as a submittal, do not apply the Contractor's approval stamp to the document, but to a separate sheet accompanying the document.

2. Operation and Maintenance Manual Data: Submit in accordance with the section entitled "Operation and Maintenance Data" of the individual delivery order.

- **Number of Copies of Product Data**

  1. Submit six (6) copies of submittals of product data requiring review and approval only by the QC organization and seven (7) copies of product data requiring review and approval by the Contracting Officer.

- **Number of Copies of Shop Drawings**

  1. For shop drawings presented on sheets larger than 8 1/2 by 14 inches, submit seven (7) prints of each shop drawing prepared for this project.

  2. For shop drawings presented on sheets 8 1/2 by 14 inches or less, conform to the quality requirements for the product data.

- **Number of Copies of Administrative Submittals**

  1. Unless otherwise specified, submit administrative submittals which are 8 1/2 by 14 inches or smaller in size in the quantity required for product data.

  2. Unless otherwise specified, submit administrative submittals larger than 8 1/2 by 14 inches in size in the quantities required for shop drawings.

B. QC Organization Responsibilities

The Quality Control (QC) organization shall be responsible for reviewing and certifying that submittals are in compliance with contract requirements. The approving authority on submittals is the QC Manager unless submission to the Contracting Officer is specified for the specific submittal. The specific QC responsibilities for submittals are as follows:

1. Note the date on which the submittal was received from the contractor on each submittal for which the Site QC Manager is the approving authority.

2. Determine and verify field measurements, materials, field construction criteria; review each submittal; and check and coordinate each submittal with requirements of the work and contract documents.

3. Review submittals for conformance with project design concepts and compliance with the contract documents.

4. Act on submittals, determining the appropriate action based on the review of the submittal.

- When the QC Manager is the approving authority, take the appropriate action on the submittal from the paragraph of "Possible Actions."

- When the Contracting Officer is the approving authority or when a variation has been proposed, forward the submittal to the Contracting Officer with the certifying statement or return the submittal marked "Not Reviewed" or "Revise and Resubmit" as appropriate.

5. Ensure that the material is clearly legible.

6. Stamp each sheet of each submittal with the appropriate stamp, except that data submitted in bound volume or on one sheet printed on two sides may be stamped on the front of the first sheet only. When agreed to by the Contracting Officer, a single cover sheet containing the required certification wording may be utilized instead of the above. The stamp or cover sheet shall contain the following wording:

   - When the approval authority is the Contracting Officer, the QC organization will certify submittals forwarded to the Contracting Officer with the following certifying statement:

     I hereby certify that the (equipment) (material) (article) shown and marked in this submittal is that proposed to be incorporated into Contract Number N62470-97D-5000, is in compliance with the Contract drawings and specification, can be installed in the allocated spaces, and is submitted for Government approval. Government approval of proposed variation, if any, is recommended.

     Certified by Submittal Reviewer _____, Date _____

     Certified by QC Manager _____, Date _____

   - When approving authority is the QC Manager, the QC Manager will use the following approval statement when returning submittals to the Contractor as "Approved" or "Approved as Noted":

     I hereby certify that the (equipment) (material) (article) shown and marked in this submittal is that proposed to be incorporated into Contract Number N62470-97-D-5000, is in compliance with the Contract drawings and specification, can be installed in the allocated spaces, and is ____ approved for use, ____ approved for use subject to Government approval of proposed variation.

     Certified by Submittal Reviewer _____, Date _____

     Approved by QC Manager _____, Date _____

7. Sign the certifying statement or approval statement. The signatures shall be in original ink. Stamped signatures are not acceptable.

8. Update the submittal register as submittal actions occur and maintain the submittal register at the project site until final acceptance by the Contracting Officer.

9. Retain a copy of approved submittals at the project site, including the contractor's copy of approved samples.

10. When the approving authority is the QC Manager, forward two copies of each approved submittal, except "Samples", where only one set is required, to the Contracting Officer.

- **Actions Possible**

Submittals returned to the contractor shall contain one of the following notations:

1. **"Not Reviewed"** shall indicate the submittal has been previously reviewed and approved, is not required as a submittal, does not have evidence of being reviewed and approved by the Contractor, or is not complete. A submittal marked "Not Reviewed" shall be returned with explanation of the reason it is not reviewed. Returned submittals deemed to lack review by the Contractor or to be incomplete shall be resubmitted with appropriate action, coordination, or change.

2. Submittals marked **"Approved"** or **"Approved as Submitted"** authorize the Contractor to proceed with the work covered.

3. Submittals marked **"Approved as Noted"** authorize the Contractor to proceed with the work as noted provided the Contractor takes no exception to the notations.

4. Submittals marked **"Revise and Resubmit"** or **"Disapproved"** indicates the submittal is incomplete or does not comply with the design concept or the requirements of the Contract documents and shall be resubmitted with appropriate changes.

3.2 PERSONNEL AUTHORIZED TO REVIEW AND CERTIFY SUBMITTALS

In addition to the QC Manager, the personnel listed in Exhibit 3.2 are authorized to review and certify submittals as indicated. Any additional personnel required to review and certify submittals will be submitted in writing to the Contracting Officer for approval.

3.3 SUBMITTAL REGISTER

The submittal register is shown in Exhibit 3.3. The submittal register shall be maintained as follows:

1. Column (a): List each specification section in which a submittal is required.

2. Column (b): List each submittal description (SD No. and type, e.g., SD-04, Drawings) required in each specification section. Follow each submittal description with the list of material of products to be addressed in each submittal description.

3. Column (c): List one principle paragraph in the specification section where a material or product is specified. This listing is only to facilitate submittal reviews. Do not consider entries in column (c) as limiting project requirements; do not consider that a blank must be filled in by the Contractor or the Government.

4. Column (d): Indicates approving authority for each submittal. A "G" indicates approval by the Contracting Officer; a blank indicates approval by the Site QC Manager.

5. Column (e): Indicates for submittals to be approved by Contracting Officer, specific reviewers other than the QC organization. This column may or may not be filled out on the copy supplied by the Government.

Columns (f) through (o) will be completed by the QC organization as follows:

6. Column (f): As submittals are processed, list a consecutive number assigned by the Contractor for each group of submittals. Place this same number in the appropriate block on the "Submittal Transmittal Form". For a resubmission, repeat transmittal control number of the original submittal with a suffix; e.g., No. "100B" is second resubmission of material originally transmitted under No. "100".

7. Column (g): List dates scheduled for approving authority to receive submittals. These dates are the scheduled beginnings of submittal review period. The Contractor proposes these dates and the Contracting Officer approves them to establish the approved submittal register.

8. Columns (h) and (I): Use to record Contractor's review when forwarding submittals to the QC organization.

9. Column (j): Enter date QC organization receives submittal from contractor.

10. Columns (k) and (l): If approving authority is Contracting Officer, enter date QC organization forwards certified submittal to Contracting Officer.

11. Columns (m) and (n): If approving authority is Contracting Officer, enter the Government action and date of action as shown on returned submittal. If approving authority is QC Manager, enter QC action and date of action.

12. Column (o): Enter date QC organization returns submittal to Contractor, regardless of who is approving authority. If QC Manager is approving authority, it is also the date the information is forwarded to the Government.

4.0 ACCREDITED LABORATORIES/TESTING LABORATORIES

4.1 TESTING LABORATORY REQUIREMENTS

Testing services will be provided by an independent accredited testing laboratory qualified to perform sampling and tests. When the proposed testing laboratory is not accredited by and acceptable accreditation program, as described by the paragraph entitled "Accredited Laboratories," submit to the Contracting Officer for approval, certified statements signed by an official of the testing laboratory attesting that the proposed laboratory meets or conforms to the following requirements:

1. Sampling and testing shall be under the technical direction of a registered professional engineer (PE) with at least five years of experience in sampling and testing.

2. Laboratories engaged in testing of concrete and concrete aggregates shall meet the requirements of ASTM C 1077, 1990.

3. Laboratories engaged in testing of bituminous paving materials shall meet the requirements of ASTM D 3666, 1990 (Rev. A).

4. Laboratories engaged in testing of soil and rock, as used in engineering design and construction, shall meet the requirements of ASTM D 3740, 1988.

5. Laboratories engaged in nondestructive testing (NDT)/nondestructive examination (NDE) shall meet the requirements of ASTM E 543, 1989 (Rev. A).

6. Laboratories performing work in connection with specific sampling and chemical analysis of contaminated media according to the delivery order specification shall be handled as defined in the Sampling and Analysis Plan (SAP).

4.2 ACCREDITED LABORATORIES

Acceptable accreditation programs are the National Institute of Standards and Technology (NIST), National Voluntary Laboratory Accreditation Program (NVLAP), the American Association of State Highway and Transportation Officials (AASHTO) program, and the American Association for Laboratory Accreditation (AALA) program. Furnish to the Contracting Officer, a copy of the Certificate of Accreditation, Scope of Accreditation and latest directory of the accrediting organization for accredited laboratories. The scope of the laboratory's accreditation shall include the test methods required by the contract.

4.3 INSPECTION OF TESTING LABORATORIES

Prior to approval of non-accredited laboratories, the proposed testing laboratory facilities and records may be subject to inspection by the Contracting Officer. Records subject to inspection include equipment inventory, equipment calibration dates and procedures, library of test procedures, audit and inspection reports by agencies conducting laboratory evaluations and certifications, testing and management personnel qualifications, test report forms, and the internal QC procedures.

4.4 TEST RESULTS

Test reports shall cite applicable contract requirements, tests or analytical procedures used. Provide actual results and include a statement that the item tested or analyzed conforms or fails to conform to specified requirements. Conspicuously stamp the cover sheet for each report in large red letters "CONFORMS" or "DOES NOT CONFORM" to the specification requirements, whichever is applicable. Test results shall be signed by a testing laboratory representative authorized to sign certified test reports. Furnish the signed reports, certifications, and other documentation to the Contracting Officer via the QC Manager. The QC Manager shall furnish a summary report of field tests by attaching a copy of the report to the last daily Contractor Quality Control Report of each month.

5.0 TESTING PLAN AND LOG

5.1 TESTING PLAN AND LOG

As tests are performed, the QC Manager shall record on the "Testing Plan and Log" (Exhibit 5.1) the date the test was conducted, the date the test results were forwarded to the Contracting Officer, any remarks and acknowledgment that an accredited or Contracting Officer approved testing laboratory was used. Attach a copy of the updated testing plan and log to the last daily Contractor Quality Control Report of each month.

In development of the Testing Plan and Log, consideration shall be given to the use of multiple Testing Plans and Logs subdivided by definable features of the specification and/or of different materials within a definable feature section of the specification. When materials are tested on a specific frequency, accumulated material totals shall be recorded in the remarks section or on an attachment to each specific Testing Plan and Log to provide assurance that the tests are conducted at the required intervals.

5.2 TESTING

Except as stated otherwise in the specification sections, perform sampling and testing required under the contract.

6.0 REWORK

6.1 REWORK DOCUMENTATION REQUIREMENTS

The QC Manager shall maintain a list of work that does not comply with the contract, identifying what items need to be reworked, the date the item was originally discovered, and the date the item was corrected. There is no requirement to report a rework item that is corrected the same day it is discovered. Attach a copy of the Rework Items List (Exhibit 6.1) to the last daily Contractor Quality Control Report of each month. The Contractor shall also be responsible for including on this list, items needing rework including those identified by the Contracting Officer.

7.0 MEETING

7.1 COORDINATION AND MUTUAL UNDERSTANDING MEETING

After submission of the QC Plan and prior to start of construction, meet with the Contracting Officer to discuss the QC program required for this contract. The purpose of this meeting is to develop a mutual understanding of the QC details, including forms to be used; administration of on-site and off-site work, and coordination of the Contractor's management, production and the QC Manager's duties with the Contracting Officer. A sample agenda is included as Exhibit 7.1. As a minimum, the Contractor's personnel required to attend shall include the Project Manager, Project Superintendent and QC Manager. Minutes of the meeting shall be prepared by the QC Manager and signed by both the Contractor and the Contracting Officer.

7.2 QC MEETINGS

After the start of construction, the QC Manager shall conduct QC meetings once every two weeks or as required scheduled by the Contracting Officer or delivery order. The meetings will be held at the work site, or where specified, with the project superintendent and the foreman responsible for the upcoming work in attendance. The QC Manager shall take steps as may be necessary to prevent the QC Meeting from becoming a production meeting. Often it is convenient to hold a production meeting following the QC meeting, however the minutes of these meetings shall be maintained separately. The QC Manager shall notify the Contracting Officer at least 48 hours in advance of each meeting. The QC Manager shall prepare the minutes of the meeting and provide a copy to the Contracting Officer within two working days after the meeting. As a minimum, the following shall be accomplished at each meeting:

1. Review the minutes of the previous meeting.

2. Review the schedule and the status of work.

   - Work or testing accomplished since last meeting.
   - Rework items identified since last meeting.
   - Rework items completed since last meeting.

3. Review the status of submittals.

   - Submittals reviewed and approved since last meeting.
   - Submittals required in the near future.

4. Review the work to be accomplished in the next two weeks and documentation required. Schedule the three phases of control and testing:

   - Establish completion dates for rework items.
   - Identify Preparatory Phases required.
   - Identify Initial Phases required.
   - Identify Follow-up Phases required.
   - Identify Testing required.
   - Identify status of off-site work or testing.
   - Identify documentation required.

5. Resolve QC and production problems.

6. Address items that may require revising the QC plan such as or changes in procedures.

7. In addition to the normal project distribution, which includes the Contracting Officer, a copy shall be forwarded to the C.O.T.R., LANTDIV, the Program QC Manager, and the OHM Program Manager.

8.0 THREE PHASES OF CONTROL

The QC Manager shall perform the three phases of control to ensure that work complies with contract requirements. The three phases of control shall adequately cover both on-site and off-site work and shall include the Inspection Plan activities (see Exhibit 8.0) of each definable feature of work as listed in Exhibit 9.1.

8.1 PREPARATORY PHASE

Notify the Contracting Officer at least two working days in advance of each preparatory phase. Conduct the preparatory phase meeting with the superintendent and the foreman responsible for the definable feature of work. Document the results of the preparatory phase actions in the daily Contractor Quality Control Report (Exhibit 8.1). Perform the following prior to beginning work on each definable feature of work:

- Review each paragraph of the applicable specification sections.
- Review the contract drawings.
- Verify that appropriate shop drawings and submittals for materials and equipment have been submitted and approved. Verify receipt of approved factory test results, when required.
- Review the testing plan and ensure that provisions have been made to provide the required QC testing.
- Examine the work area to ensure that the required preliminary work has been completed.
- Examine the required materials, equipment and sample work to ensure that they are on hand and conform to the approved shop drawings and submitted data.
- Review the safety plan and appropriate activity hazard analysis to ensure that applicable safety requirements are met, and that required Material Safety Data Sheets (MSDS) are submitted.
- Discuss construction methods.

8.2 INITIAL PHASE

Notify the Contracting Officer at least two working days in advance of each initial phase meeting. When crews are ready to start work on a definable feature of work, conduct the initial phase meeting with the personnel responsible for that definable feature of work. Observe the initial segment of the definable feature of work to ensure that the work complies with contract requirements. Document the results of the initial phase in the daily Contractor

Quality Control Report. Repeat the initial phase for changes in personnel assigned responsibility for the work, or when acceptable levels of specified quality are not being met. Perform the following for each definable feature of work:

- Establish the quality of workmanship required.
- Resolve conflicts.
- Review the Safety Plan and the appropriate activity hazard analysis to ensure that applicable safety requirements are met.
- Ensure that testing is performed.

8.3 FOLLOW-UP PHASE

Perform the following for ongoing work daily, or more frequently as necessary, until the completion of each definable feature of work and document in the daily Contractor Quality Control Report:

- Ensure the work is in compliance with contract requirements.
- Maintain the quality of workmanship required.
- Ensure that testing is performed.
- Ensure that rework items are being corrected.

8.4 NOTIFICATION OF THREE PHASES OF CONTROL FOR OFF-SITE WORK

Notify the Contracting Officer at least two weeks prior to the start of the preparatory and initial phases.

8.5 RECEIPT INSPECTION

The QC organization shall conduct Receipt Inspection of materials and equipment procured in accordance with the delivery order specification. In addition to the submittal documentation, which will be reviewed and approved as required under Section 3.0, Submittals, the following attributes will be inspected for each order/shipment as applicable:

- Material is same as specified by the Delivery Order Specification
- Quantity as specified by the procurement document
- Dimensions as required by the procurement document
- Shipping Damage
- Physical Damage
- Identification and Marking

- Protective Covers and Seals
- Cleanliness
- Workmanship

Materials and equipment found to be unacceptable at receipt inspection shall be rejected and "RED Tagged" (see Exhibit 8.5) until correction or replacement can be made. This material/equipment shall not be used until the corrective action results in satisfactory re-inspection.

The results of the receipt inspection, by attribute, will be included in the Contractor Quality Control Report (Exhibit 8.1) for the date of inspection.

8.6 DOCUMENTATION

Reports are required for each day that work is performed and for every seven consecutive calendar days of no work and on the last day of no work periods. Account for each calendar day throughout the life of the contract. The reporting of work shall be identified by terminology consistent with the construction schedule. Contractor Quality Control Reports are to be prepared, signed and dated by the QC Manager and shall contain the following information:

- Identify the control phase and the definable feature of work.
- Results of the preparatory phase meetings held, including the location of the definable feature of work and a list of personnel present at the meeting. Indicate in the report that for this definable feature of work, the drawings and specifications have been reviewed, submittals have been approved, materials comply with approved submittals, materials are stored properly, preliminary work was done correctly, the testing plan has been reviewed, and work methods and schedules have been discussed.
- Results of the initial phase meetings held, including the location of the definable features of work and a list of personnel present at the meeting. Indicate in the report that for this definable feature of work, the preliminary work was done correctly, samples have been prepared and approved, the workmanship is satisfactory, test results are acceptable, work is in compliance with the contract, and the required testing has been performed and include a list of who performed the tests.
- Results of the follow-up phase inspections held, including the location of the definable features of work. Indicate in the report that for this definable feature of work that the work complies with the contract as approved and that required testing has been performed and include a list of who performed the tests.
- Results of the three phases of control for off-site work, if applicable, including actions taken.

- List the rework items identified, but not corrected by close of business.
- As rework items are corrected, provide a revised rework items list along with the corrective action taken.
- Include in the remarks section of the report pertinent information including directions received, quality control problem areas, deviations from the QC Plan, construction deficiencies encountered, QC meetings held, acknowledgment that as-built drawings have been updated, corrective direction given by the QC Manager and corrective action taken by the contractor.
- When the QC Manager believes that an attribute list type inspection is more appropriate for the inspection of specific definable features of work, he/she may use any type of form desired for this purpose. However, this or any other form utilized shall become an attachment to the daily Contractor Quality Control Report and shall not preclude any other requirements of the contract or this plan.

9.0 DEFINABLE FEATURES OF WORK

9.1 DEFINABLE FEATURES OF WORK

Exhibit 9.1 contains a list of definable features of work for this delivery order. A definable feature of work is a task that is separate and distinct from other tasks and requires separate control requirements. As a minimum, each division of the specification is considered a definable feature of work. However, at times there may be more than one definable feature of work in each division of the specification or a definable feature of work may include several specification sections. The site QC Manager shall discuss the list with the Contracting Officer for possible expansion of the list.

10.0 EXHIBITS

The following forms are acceptable for providing the information required by this QC Plan and the contract, except as otherwise directed by the Contracting Officer. While use of these specific forms are not required by the contract, any other format used shall contain the same information and be approved by the Program QC Manager. Exhibit 10.1 includes additional forms used by the contractor. These forms and their use are not addressed in this QC Plan.

NOTE: Exhibit numbers refer to the paragraph from which the Exhibit was first addressed.

10.1 INDEX OF EXHIBITS

Exhibit 2.1

QC Organization Chart
OHM Remediation Services Corp.

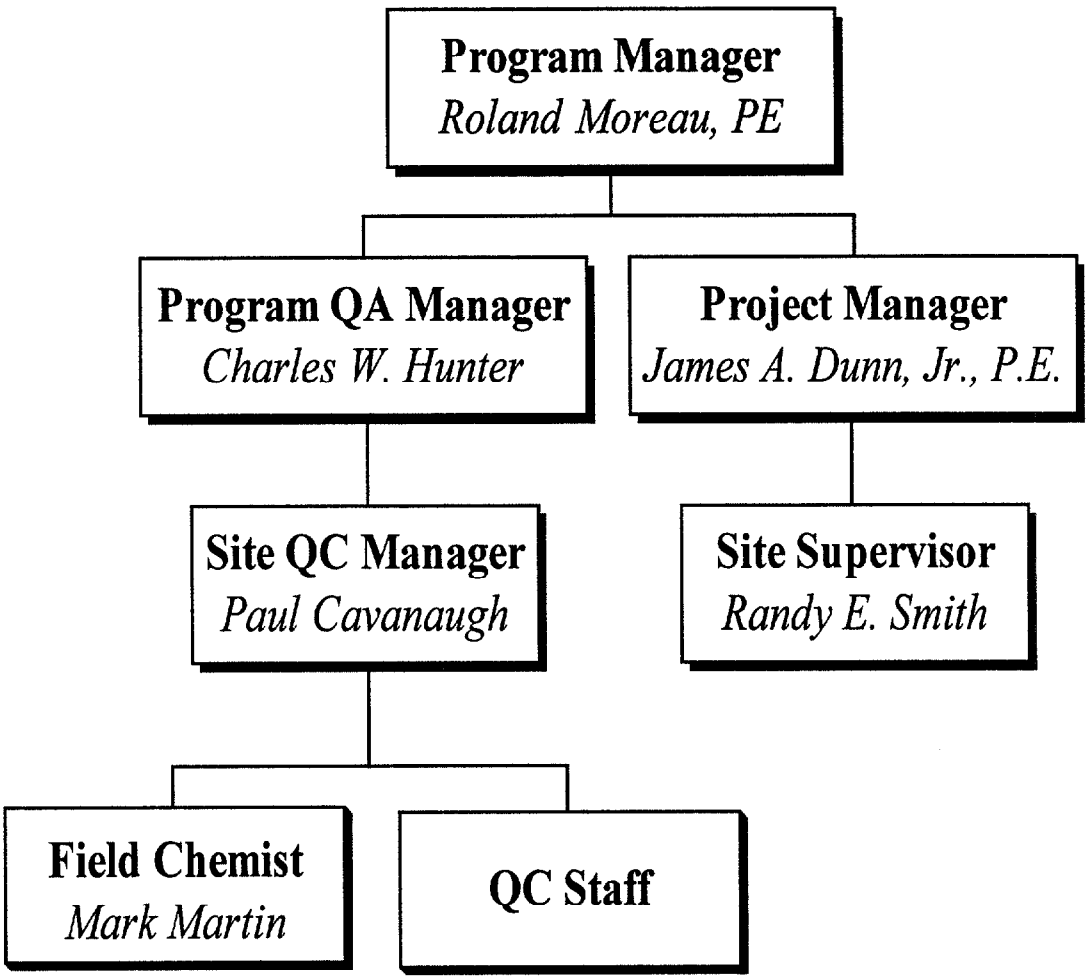

Exhibit 2.2

Site QC Manager/Representative Resume

OHM Remediation Services Corp.
A member of The IT Group

QA/QC SCIENTIST

PAUL M. CAVANAUGH

Mr. Cavanaugh has eight years experience in environmental sampling, with emphasis on biological and chemical sampling. Included in this experience is tank and drum sampling, labpacking and analysis, and development of reports related to sampling procedures. In his capacity as Field Sampling Technician, he is responsible for sampling, sample tracking and coordination of analysis for drum recovery, wastewater treatment, PCB cutting/bulking, hazardous waste disposal, soil excavation, facility decontamination, derailments, drum repacking, pesticide cleanup. He is also experienced in explosive/reactive handling and disposal, and compressed gas cylinder identification, handling and neutralization.

Experience and Background

Mr. Cavanaugh has participated in all phases of environmental sampling, transportation and disposal. He has gained a thorough working knowledge of drum recovery and bulking of acids, cyanides, flammables, organics, peroxides and oxidizers. His current position as Field Sampling Technician encompasses groundwater treatment systems, monitoring well, drum sampling, sludge, soil, concrete chip asbestos and other media sampling. He is additionally responsible for the utilization of Photoionization Detectors (PID) and Lower Explosive Limit (LEL) meters, and generating reports associated with sampling activities, including sampling and analysis plans and closure reports. Mr. Cavanaugh has experience with transportation and disposal, including manifesting, profiling, and associated waste tracking records. Examples of his OHM experience include:

- Staff Scientist, under LANTDIV RAC, at the 24-acre Old Landfill site, Quantico, Virginia. The project involved the removal of 2,000 cy of PCB-contaminated soils; installation of a landfill cap; and regrading and closure of the landfill. Served as Technical Lead for the development and installation of the bioremediation cell. Mr. Cavanaugh assisted the Senior Project Manager with the collection and interpretation of field data to verify levels of contamination and ensured adequate performance of the bioremediation cell. The project received two 100% award fees.

- Staff Scientist, under LANTDIV RAC, at the Camp Allen Landfill, Norfolk, Virginia. This 45-acre site contained soil and groundwater contaminated with a variety of chlorinated and petroleum organic compounds. Mr. Cavanaugh provided valuable backup services to other crew members with continuous monitoring of ambient air quality utilizing PID, LEL, OVA, CGI, monitox, dosimeter, and personal and stationary air monitors. He also assisted in the various soil and groundwater sampling activities required during the remedial investigation stage. Project received a 100% award fee.

- Staff Scientist, under LANTDIV RAC, at Bolling Air Force Base, Washington D.C. Mr. Cavanaugh assisted the Senior Project Manager in developing a work plan and installing/operating a free product recovery system for the removal of #2 and #6 fuel oil. Between three and five feet of floating product was found in monitoring wells adjacent to USTs located in the vicinity of Building #18 of the base's Heat Plant. Approximately 600 gallons of free product was recovered and 15 tons of contaminated drilling cuttings were prepared for transportation and disposal. He assisted in the monitoring and analysis activities required during all stages of the project. Project received a 100% award fee.

- Senior Technologist, under an U.S. Army Environmental Center Total Environment Program Support (TEPS) contract, at the Sudbury Training Annex, 2,700 acre site in Sudbury, Massachusetts. Contaminants of concern during this $6.9 million RI/FS were VOCs, metals, pesticides and dioxins. Mr. Cavanaugh collected over 200 groundwater, surface water/sediment, surface soil and subsurface soil samples. He also participated in an ecological risk assessment and a fish study at Puffer Road on the Annex.

- Staff Scientist, under LANTDIV RAC, at the US Naval Transmitting Station, Driver, Virginia. The crew was contracted to remove and dispose assorted surface debris, including PCB-contaminated concrete and 12 PCB transformers. Mr. Cavanaugh conducted a comprehensive physical site inspection prior to removal. The project received an overall rating of 95%, and was completed on time and within budget.

- Staff Scientist, under LANTDIV RAC, at the Yorktown Naval Weapons Station Fleet and Industrial Supply Center, Defense Fuel Supply Point Fields Annex remediation, Yorktown, Virginia. Mr. Cavanaugh collected and interpreted filed dates to verify the levels of contamination and evaluated

opportunities for enhancement of removal operations. OHM and the Navy's CLEAN contractor were closely integrated in the redesign (conceptualization) of an innovative technique for recovery of 1.5 million gallons of Navy Supply Fuel Oil (NFS) from groundwater. The physical characteristics of NFS necessitated the introduction of heat to achieve sufficient mobility for its recovery from soils. During the evaluation of alternate technologies, it was determined that the application of heat through enclosed conduits would sufficiently distribute heat and would mitigate environmental and engineering concerns. The proposed 40-gpm treatment system includes oil/water separation; particulate removal; carbon adsorption; water cooling for off-site discharge and a biofouling suppressant system. The project received a 100% award fee.

- Senior Technologist, under a USEPA Region II ERCS contract, at the White Chemical Superfund site in Newark, New Jersey. During this project, OHM characterized and repacked 9,000 drums, drained approximately 150 ASTs and USTs, and labpacked approximately 10,000 small containers. Level A, B, and C PPE was required. The contaminants consisted of air and water reactive materials as well as toxic, explosive, and corrosive hazardous chemicals. Mr. Cavanaugh was responsible for an eight person sampling and tracking crew. He participated in the development of a first-time computerized drum bulking system.

- QC Coordinator at the Drake Chemical USEPA Region III Superfund site, Lock Haven, Pennsylvania. Mr. Cavanaugh assisted during the startup operations of the incinerator. His duties included generating USACE daily reports associated with plant operations during the trial burn phase, and ensured all phases of contract compliance relating to engineering and technical controls. He was responsible for analytical interpretation and T&D of all wastes generated on site.

His additional experience includes the following:

- Experience performing density tests for soil compaction with Troxler nuclear density gauges.

- Performed elevation surveys with laser levels and transits for excavation and backfilling activities.

- Extensive experience in data management and interpretation on a variety of projects. Project experience includes facility decontamination, tank and drum removal, bioremediation, thermal incineration, soil excavation, water treatment, lab packing, and emergency response.

- Air monitoring experience involving the use of a PID, LEL, OVA, CGI, monitox, dosimeter, and personal and stationary air monitors.

- Familiar with the use of many field analytical methods, including immunoassay field screening, soil fertility testing, PCB screening, compatibility analysis, and bulk testing.

- Performed hydrogeological testing such as slug testing and aquifer drawdown tests. Familiar with well sampling, equipment, including peristalic pumps, submersible water level indicators, scavengers, water quality screening, and Stephens recorders.

Education

B.S., Biology, Northland College; 1988

Additional Training

OSHA 40-hour Training (29 CFR 1910.120)
OSHA 8-hour Refresher Training Certification; 1998
Licensed Pesticide Operator
Fifty (50) Hour Sampling Course; 1989
EOD Training; 1995
NRC Training Course; 1996
USACE, Construction Quality Management Course for Contractors; 1997

Registrations/Certifications

Troxler Certified, 1996

Exhibit 2.3

Sample Document

June 1, 2000

Paul Cavanaugh
OHM Remediation Services Corp.
Lot 203 Holcomb Blvd.
P O Box 8116
Camp Lejeune, NC 28542

Re: Site QC Manager
Site 89, MCB Camp Lejeune
Contract N62470-97-D-5000
Delivery Order 050

Dear Paul:

This letter will serve as your appointment as the Site Control Manager on the referenced project and will also clarify your duties and authority in this position. In this position, you will be authorized to use available resources to satisfy all applicable requirements of the Program and Delivery Order Quality Control Plans.

This authorization specifically gives you the authority to direct removal and replacement or correction of nonconforming materials or work and stop work authority when continuation would be unsafe to personnel, harmful to the environment, or result in a significant degradation of quality.

You will be expected to work closely with the Project Manger, Site Supervisor and other project personnel, but you will not be directly responsible to anyone but myself for resolution of quality issues when working in the capacity of Quality Control Manager.

Sincerely,

Peter Hunter
Program QC Manager
LANTDIV RAC Program

Exhibit 3.1

Submittal Descriptions

SD-01, Data
Submittals that provide calculations, descriptions, or other documentation regarding the work.

SD-02, Manufacturer's Catalog Data
Data composed of catalog cuts, brochures, circulars, specifications and product data, printed information in sufficient detail and scope to verify compliance with requirements of the contract documents. A type of data.

SD-03, Manufacturer's Standard Color Charts
Preprinted illustrations displaying choices of color and finish for a material or product. A type of product data.

SD-04, Drawings
Submittals that graphically show relationship of various components of the work, schematic diagrams of systems detail of fabrications, layout of particular elements, connections, and other relational aspects of the work. A type of shop drawings.

SD-05, Design Data
Design calculations, mix design, analyses, or other data written in nature and pertaining to a part of the work. A type of shop drawings.

SD-06, Instructions
Preprinted material describing installation of a product, system, or material, including special notices and Material Safety Data Sheets, if any, concerning impedances, hazards, and safety precautions. A type of product data.

SD-07, Schedules
A tabular list of data or tubular list including location, features, or other pertinent information regarding products, materials, equipment, or components to be used in the work. A type of shop drawing.

SD-08, Statements
A document, required of the contractor, or through the contractor by way of a supplier, installer, manufacturer, or other lower tier contractor, the purpose of which is to further the quality or orderly progression of a portion of the work by documenting procedures, acceptability of method or personnel, qualifications, or other verification of quality. A type of shop drawing.

SD-09, Reports
Reports of inspection and laboratory test, including analysis and interpretation of test results. Each report shall be properly identified. Test method used and compliance with recognized test standards shall be described.

SD-10, Test Reports
A report signed by an authorized official of a testing laboratory that a material, product, or system identified to the material, product or system to be provided has been tested in accordance with

requirements specified by naming the test method and material. The test report must state the test was performed in accordance with the test requirements; state the test results; and indicate whether the material, product, or system has passed or failed the test. Testing must have been within three years of the date of Contract award. A type of product data.

SD-11, Factory Test Reports
A written report that includes the findings of a test required to be performed by the Contractor on an actual portion of the work or prototype prepared for this project before it is shipped to the job site. The report must be signed by an authorized official of a testing laboratory and must state the test was performed in accordance with the test requirements; state the test results; and indicate whether the material, product or system has passed or failed the test. A type of shop drawing.

SD-12, Field Test Results
A written report that includes the findings of a test made at the job site, in the vicinity of the job site, or on a sample taken from the job site, on a portion of the work, during or after installation. The report must be signed by authorized official of a testing laboratory or agency and must state the test was performed in accordance with the test requirements; state the results; and indicate whether the material, product, or system has passed or failed the test. A type of shop drawing.

SD-13, Certificates
Statements signed by responsible officials of a manufacturer or a product, system or material attesting that the product, system, or material meet specified requirements. The statements must be dated after the award of this contract, name the project, and the list the specific requirements that it is intended to address. A type of shop drawing.

SD-14, Samples
Samples, including both fabricated and unfabricated physical examples of materials, products, and units of work as complete units or as portions of units of work. A type of sample.

SD-15, Color Selection Samples
Samples of the available choice of colors, textures, and finishes of a product or material, presented over substrates identical in texture to that proposed for the week. A type of sample.

SD-16, Sample Panels
An assembly constructed at the product site in a location acceptable to the Contracting Officer and using materials and methods to be employed in the work: completely finished; maintained during construction; and removed at the conclusion of the work or when authorized by the Contracting officer. A type of sample.

SD-17, Sample Installations
A portion of an assembly or material constructed where directed and, if approved, retained as a part of the work. A type of sample.

SD-18, Records
Documentation to ensure compliance with an administrative requirement or to establish an administrative mechanism. A type of administrative and close-out submittal.

SD-19, Operation and Maintenance Manuals
Data intended to be incorporated in an operations and maintenance manual. A type of administrative and close-out submittal.

Exhibit 3.2

List of Personnel Authorized to Review and Certify Submittals

Specification Section	Submittal Type	Authorized Personnel
01115, 01430, 02220, 02223, 02315, 02571, 03300	All	Randy Smith Jim Dunn Raymond Boyd Paul Cavanaugh Project Engineer

Exhibit 3.3
Submittal Register
Site 89, LTTD, MCB Camp Lejeune, North Carolina

Spec. No.	SD No. and Type of Submittal Material or Product	Spec. Para. No.	Approval by CO	Gov. or A/E Reviewer	Trans. Control No.	Planned Sub. Date	Action Code	Date of Action	Date Forwarded to Appro. Auth/Date Received from Contr.	Date Forwarded to Other Reviewer	Date Received from Other Reviewer	Action Code	Date of Action	Mailed to Contro./Recd. From Appro. Auth.	Remarks
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	p
01115	**SD-01 Reports:**	1.2													
	Work Plan					6/00									
	Health and Safety Plan					WP									
	QC Plan					WP									
	Sampling and Analysis Plan					WP									
	Environmental Protection Plan					WP									
	SD-11 Closeout Submittals:	1.2													
	As built records					CR									
	Environmental conditions report					CR									
	Status reports					CR									
	QC meeting minutes					CR									
	Test results summary Report					CR									
	Contractor production report					CR									
	QC report					CR									
	Rework items list					CR									
	Permits					CR									
	Pollution prevention plan					CR									
	Environmental quality board permits					CR									
	Contractor closeout report					CR									
01430	**SD-08 Statements**	1.2.1													
	Sample log					CR									
	SD-12 Field test reports:	1.2.2													
	Waste sampling analysis results					CR									
02220	**Sd-08 Statements**	1.4													
	Demolition plan														
	SD-11 Closeout submittals	1.4													
	Receipts					CR									
02223	**SD-08 Statements**	1.2.1													
	Treatment facility permit														
	SD-18 Records	1.2.2													
	Shipment manifest					CR									
	Delivery /disposal Certificates					CR									

Exhibit 3.3 Submittal Register continued:

02223	Disposal site decon certificate	1.2.2				CR									
	Work site decon certificate					CR									
02315	**SD-08 Statements**	1.3.1													
	Excavation /materials handling plan														
	Site health /safety plan														
	Field sampling/ lab testing plan														
	SD-12 Field test reports	1.3.2													
	Fill and backfill test					CR									
	Density test					CR									
02571	**1.2.1 Design data**	1.2.1													
	Bituminous job mix formula					CR									
03300	**SD-02 Shop drawings**	1.3													
	Formwork					CR									
	Reinforcing steel					CR									
	SD-03 Product data	1.3													
	Materials for curing concrete					CR									
	Joint sealants					CR									
	Joint filler					CR									
	Vapor barrier					CR									
	Waterstops					CR									
	SD-04 Samples	1.3													
	Slab finish sample					CR									
	SD-05 Design data	1.3													
	Concrete mix design					CR									

CR – Closeout Report
WP – Work Plan

A - Approved
AN – Approved as noted

Exhibit 5.1
Testing Plan and Log

Contract No. N62470-97-D-5000			**Project Title and Location** Site 89, LTTD MCB Camp Lejeune, North Carolina							**Contractor** OHM Remediation Services Corp.	
			Accredited/ Approved Lab				Location of Test				
Specification Section and Paragraph Number	Item of Work	Test Required	Yes	No	Sampled By	Tested By	On Site	Off Site	Date Completed	Date Forwarded to Contr. Off.	Remarks

EXHIBIT V-2

LIST OF PERSONNEL AUTHORIZED TO REVIEW & CERTIFY SUBMITTALS

SPECIFICATION SECTION:	SUBMITTAL TYPE:	AUTHORIZED PERSONNEL:
N/A	All	James A. Dunn Jr. Randy E. Smith Raymond R. Boyd II Project Engineer

Exhibit 6.1
Rework Items List

Contract No. and Title: N62470-97-D-5000 Delivery Order 0050 Site 89, LTTD, MCB Camp Lejeune, North Carolina

Contractor: OHM Remediations Services Corp.

Number	Date Identified	Description	Contract Requirement (Spec. Section and Par. No., Drawing No. and Detail No., etc.)	Action Taken by QC Manager	Resolution	Date Completed

Exhibit 7.1

SAMPLE DOCUMENT

COORDINATION AND MUTUAL UNDERSTANDING MEETING AGENDA
FOR
DELIVERY ORDER No. 0050
LTTD at SITE 89
MCB CAMP LEJEUNE, NORTH CAROLINA
_____ ___, 2000

The purpose of this meeting is to develop a mutual understanding of the QC details, including forms to be used; administration of on-site and off-site work, and coordination of the Contractors's management, production and QC Manager's duties with the Contracting Officer.

The QC program consists of a QC Organization, QC Manager, a QC Plan for this Delivery Order, this Coordination and Mutual Understanding Meeting, QC meetings, three phases of control, submittal review, submittal approval except for submittals designated for Contracting Officer approval, testing, and QC certifications and documentation necessary to provide materials, equipment, workmanship, fabrication, construction and operations which comply with requirements of this contract.

Project QC Manager duties (contract para. 6.6.1)

- Attend this meeting
- Conduct QC meetings
- Perform the three phases of control
- Perform submittal review
- Perform submittal approval
- Ensure testing is performed
- Prepare QC certifications and documentation
- Perform other activities when approved by the Contracting Officer

Submittal Reviewers Duties and Qualifications (contract para. 6.7)

- Provide submittal reviewers qualified in the disciplines being reviewed other than the QC Manager, to review and certify that the submittals meet the requirements of the contract.

QC Plan (contract para. 6.8)

- (as specified therein)

Coordination and Mutual Understanding Meeting (contract para. 6.9)

- (see purpose above)

QC meetings (contract para. 6.10)

- The QC Manager shall conduct QC meetings once every two weeks or as otherwise directed by the Contracting Officer.
- Meeting minutes to be prepared by the QC Manager I accordance with the contract outline and a copy provided to the Contracting Officer within two working days of the meeting.
- A copy will be distributed to the Program QC Manager

Three phases o f control (contract para. 6.11)

- Preparatory Phase meeting
- Initial Phase Meeting
- Follow-up Phase Inspection

Submittal review and approval (contract para. 6.12 and Part 7.0, "Submittals")

- Review
- Approval
- Certification
- Submittal Register

Testing (contract para. 6.13)

- Testing Laboratory Requirements
- Accredited Laboratories
- Inspection and Testing Laboratories
- Capability Checks
- Test Results

QC certifications (contract para. 6.14)

- Contractor Quality Control Report Certification
- Invoice Certification
- Completion Certification

Documentation (contra para.6.15)

- Contractor Production Report
- Contractor Quality Control Report
- Testing Plan and Log
- Rework Items List
- As-Built Records
- Report Forms
- Contractor Production Report
- Contractor Quality Control Report
- Testing Plan and Log
- Rework Items List

Exhibit 8.0

Inspection Schedule

Site 89, LTTD

MCB Camp Lejeune, North Carolina

Delivery Order No. 0050

Spec Section	Activity *	Prepratory Report No.	Initial Report No.	Follow-Up Report Nos.**

Page _____ of _____

*Also include scheduled date if a CPM network is invoked. **Includes first and final inspections only.

Exhibit 8.1

CONTRACTOR QUALITY CONTROL REPORT

(ATTACH ADDITIONAL SHEETS IF NECESSARY)

DATE

PHASE	Y - YES, N - NO, SEE REMARKS, BLANK - NOT APPLICABLE		IDENTIFY DEFINABLE FEATURE OF WORK LOCATION AND LIST PERSONNEL PRESENT
PREPARATORY	THE PLANS AND SPECS HAVE BEEN REVIEWED		
	THE SUBMITTALS HAVE BEEN APPROVED		
	MATERIALS COMPLY WITH APPROVED SUBMITTALS		
	MATERIALS ARE STORED PROPERLY		
	PRELIMINARY WORK WAS DONE CORRECTLY		
	TESTING PLAN HAS BEEN REVIEWED		
	WORK METHOD AND SCHEDULE DISCUSSED		
INITIAL	PRELIMINARY WORK WAS DONE CORRECTLY		TESTING PERFORMED & WHO PERFORMED TEST
	SAMPLE HAS BEEN PREPARED/APPROVED		
	WORKMANSHIP IS SATISFACTORY		
	TEST RESULTS ARE ACCEPTABLE		
	WORK IS IN COMPLIANCE WITH THE CONTRACT		
FOLLOW-UP	WORK COMPLIES WITH CONTRACT AS APPROVED IN INITIAL PHASE		TESTING PERFORMED & WHO PERFORMED TEST

REWORK ITEMS IDENTIFIED (NOT CORRECTED BY CLOSE OF BUSINESS)	REWORK ITEMS CORRECTED TODAY (FROM REWORK ITEMS LIST)

REMARKS

On behalf of the contractor, I certify that this report is complete and equipment and material used and work performed during this reporting period is in compliance with the contract drawings and specifications to the best of my knowledge except as noted in this report.

AUTHORIZED QC MANAGER AT SITE DATE

GOVERNMENT QUALITY ASSURANCE REPORT

DATE

QUALITY ASSURANCE REPRESENTATIVE'S REMARKS AND/OR EXCEPTIONS TO THE REPORT

AUTHORIZED QC MANAGER AT SITE DATE

Exhibit 8.1

CONTRACTOR QUALITY CONTROL REPORT CONTINUATION SHEET (ATTACH ADDITIONAL SHEETS IF NECESSARY)	DATE
CONTRACT NO.	REPORT NO.

PHASE	Y - YES, N - NO, SEE REMARKS, BLANK - NOT APPLICABLE		IDENTIFY DEFINABLE FEATURE OF WORK LOCATION AND LIST PERSONNEL PRESENT
PREPARATORY	THE PLANS AND SPECS HAVE BEEN REVIEWED		
	THE SUBMITTALS HAVE BEEN APPROVED		
	MATERIALS COMPLY WITH APPROVED SUBMITTALS		
	MATERIALS ARE STORED PROPERLY		
	PRELIMINARY WORK WAS DONE CORRECTLY		
	TESTING PLAN HAS BEEN REVIEWED		
	WORK METHOD AND SCHEDULE DISCUSSED		

PHASE	Y - YES, N - NO, SEE REMARKS, BLANK - NOT APPLICABLE		IDENTIFY DEFINABLE FEATURE OF WORK LOCATION AND LIST PERSONNEL PRESENT	TESTING PERFORMED & WHO PERFORMED TEST
INITIAL	PRELIMINARY WORK WAS DONE CORRECTLY			
	SAMPLE HAS BEEN PREPARED/APPROVED			
	WORKMANSHIP IS SATISFACTORY			
	TEST RESULTS ARE ACCEPTABLE			
	WORK IS IN COMPLIANCE WITH THE CONTRACT			

CONTRACTOR QUALITY CONTROL REPORT CONTINUATION SHEET (ATTACH ADDITIONAL SHEETS IF NECESSARY)			DATE
CONTRACT NO.			REPORT NO.
PHASE	Y - YES, N - NO, SEE REMARKS, BLANK - NOT APPLICABLE	IDENTIFY DEFINABLE FEATURE OF WORK LOCATION AND LIST PERSONNEL PRESENT	
FOLLOW-UP	WORK COUPLES WITH CONTRACT AS APPROVED IN INITIAL PHASE		TESTING PERFORMED & WHO PERFORMED TEST

Exhibit 9.1

Definable Features of Work
Site 89, LTTD
MCB Camp Lejeune, North Carolina

Specification Section (Baker):	Definable Features of Work:
01115	Site Preparation
01115	Piping, Electrical and Utilities Installation
01115	System startup
01115	Low Temperature Thermal Desorption Operation
01115	Site Restoration
01115	Demobilization
01430	Waste Sampling
02220	Site Demolition
02223	T & D of Contaminated Material
02315	Excavation & Fill
02571	Pavement Removal and Replacement
03300	Cast in Place Concrete

Exhibit 10.1a

CONTRACTOR PRODUCTION REPORT

(ATTACH ADDITIONAL SHEETS IF NECESSARY)

		DATE
CONTRACT NO.	TITLE AND LOCATION	REPORT NO.
CONTRACTOR		SUPERINTENDENT
AM WEATHER	PM WEATHER	MAX TEMP °F MIN TEMP °F

WORK PERFORMED TODAY

WORK LOCATION AND DESCRIPTION	EMPLOYER	NUMBER	TRACE	HRS

JOB SAFETY

WAS A JOB SAFETY MEETING HELD THIS DATE? ☒ YES ☒ NO
(If YES, attach copy of the meeting minutes)

WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? ☒ YES ☒ NO
(If YES, attach copy of completed OSHA report)

WAS TRENCHING/SCAFFOLD/HV ELECTRICAL/HIGH WORK DONE? ☒ YES ☒ NO
(If YES, attachment statement or checklist showing inspection performed)

WAS HAZARDOUS MATERIAL/WASTE RELEASED INTO THE ENVIRONMENT? ☒ YES ☒ NO
(If YES, attach description of incident and proposed action)

TOTAL WORK HOURS ON JOB SITE THIS DATE	
CUMULATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT	
TOTAL WORK HOURS FROM START OF CONSTRUCTION	

LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTED

	SAFETY REQUIREMENTS HAVE BEEN MET

EQUIPMENT MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY INCLUDE NUMBER OF HOURS USED TODAY

REMARKS

CONTRACTOR/SUPERINTENDENT _____ DATE _____

EXHIBIT 10.1b

LANTDIV RAC FIELD FORM

Contract No. _____
Task Order No. _____
Title/Location _____

DISTRIBUTION:

_____ CONTRACTING OFFICER/SPECIALIST (TD'S)
_____ ROICC
_____ RPM
_____ COTR:
OTHER: _____
_____
_____
FILE: _____

Form No.		**Date:**	**Respond *NLT:**
Initiated By:	☐ **Navy**	☐ **Contractor**	☐ **Other**
☐ **Technical Direction**	☐ **RFI**	☐ **Variance Request**	☐ **Overtime Authorization**
Description (Include location & attachments if necessary):			
Attachment ☐			
Drawing Ref:		Spec. Ref.	
Explanation/Recommendation:			
☐ **Scope Increase** ☐ **Scope Decrease** ☐ **No Change in Scope**		**Cost impact, fee excluded:** ☐ None ☐ Cost Increase ☐ Cost Decrease Rough Order of Magnitude: $	
WBS Codes Affected: New ☐ Existing ☐		**Schedule Impact** (assume response by *NLT date) ☐ None ☐ Increase in Time ☐ Decrease in Time Approximate Calendar Days:	
Contractor:	**Signature**	Date	
Site Representative:			
Project Manager:			
Reviewer Comments, incl RFI Response:			
Navy:	**Signature**	Date	
ROICC:			
RPM/EIC			
☐ Task Order Modification to Follow (contract action)		☐ No Task Order Modification Required	

777016-A1

OHM Remediation Services Corp.

Exhibit 10.1c

Routing: Contr. Adm. _____
Site Supv. _____
Proj. Acct. _____
CSE
QC
Job File

Project Name: _____
Delivery Order: _____
Contract Purchase Order N62470-97-D-5000
OHM Project Order _____

REQUEST FOR INFORMATION (RFI)

Date of Request: _____ Suspense Date: _____ VR No: _____

SITUATION/CONDITION REQUIRING CLARIFICATION
Dwg Ref: _____ Spec Sec: _____
Site Location _____

DESCRIPTION:

DATE RECEIVED BY:
Certifying Engineer: _____ Tech. Rep: _____ ROICC: _____

RESPONSE:

Note: This is a clarification and does not create additional work that could be considered as a change to the contract drawings and /or specification.

RPM: _____ Date: _____

ROICC/NTR: _____ Date: _____

OHM Remediation Services Corp.

Exhibit 10.1d

Routing: Contr. Adm. _____
Site Supv. _____
Proj. Acct. _____
CSE
QC
Job File

Project Name: _____
Delivery Order: _____
Contract Purchase Order N62470-97-D-5000
OHM Project Order _____

VARIANCE REQUEST (VR)

Date of Request: _____ Suspense Date: _____ VR No: _____

PROPOSED VARIANCE Dwg Ref.: _____ Spec Sec: _____
Site Location _____

DESCRIPTION:

Note: Approval of this variance will not result in an increase in cost or in time of performance to this contract.

Initiated By [ ] Navy
[ ] OHM
[ ] Regulatory Agency
[ ] Other

On-Site Engineer: _____ Date: _____
OHM Project Engineer _____ Date: _____
Site Quality Control Manager: _____ Date: _____
OHM Project Manager: _____ Date: _____

APPROVALS [ ] Approved [ ] Modified (see below) [ ] Rejected

Note: This is a clarification and does not create additional work that could be considered as a change to the cost of the project.

RPM: _____ Date: _____
ROICC/NTR: _____ Date: _____

Exhibit 10.1e
Quality Control Plan Review
Site 89, LTTD
MCB Camp Lejeune, North Carolina
Delivery Order No. 0050

By signing this document, I am stating that I have read and understand the site Quality Control Plan for this Delivery Order/Project. Any questions or comments should be addressed to either the Program or site QC Manager.

Name (Print)	***Signature***	***Title***	***Company***	***Date***
Charles Hunter		QC Manager		
James Dunn, Jr.		Sr. Project Manager		
Randy Smith		Project Superintendent		
Raymond Boyd		Sr. Project Engineer		
		Project General Foreman		
Mark Martin		Site Safety Officer		
Paul Cavanaugh		Site QC Manager		

APPENDIX D

TREATABILITY STUDIES

TREATABILITY TESTING REPORT FOR THE THERMAL TREATMENT OF CHLORINATED VOLATILE ORGANIC-CONTAMINATED MATERIAL FROM SITE 89 AT MARINE CORPS BASE CAMP LEJEUNE

Prepared By:

IT Technology Applications Laboratories
Knoxville, TN

Paul R. Lear, Ph.D.
Treatability Program Manager

May 10, 2000
IT Project 803011

1.0 OBJECTIVE

The objective of the bench-scale thermal treatability study was to determine the final soil treatment temperature required to desorb the volatile organic contaminants of concern. The contaminants of concern include 1,1,2,2-tetrachloroethane, tetrachloroethene (PCE), trichloroethene (TCE), and vinyl chloride.

SAMPLE CHARACTERIZATION

A 5-gallon bucket containing representative soil material from Site 89 was received at IT's Technology Development Laboratory on March 9, 2000. The sample was logged in, homogenized, and stored at 4°C until needed for testing. Portions of the homogenized sample material were analyzed for the parameters listed in Tables 1 through 3. Six 1 quart samples of soil from "hot spots" within Site 89 were received on March 31, 2000. Each sample were screened for chlorinated volatile organics (Table 5).

Table 1. Physical Characterization of the Site 89 Soil

Parameter	Result
Solids Content (%)	87.8
Ash Content (%)	87.5
BTU (btu/lb)	29.4

Table 2. Chemical Characterization of the Site 89 Soil

Parameter	Concentration (mg/kg)
TCE	<25
PCE	<25
Vinyl Chloride	<25
PCA	310

Note: All other volatile organics were less than 25 mg/kg

Table 3. Particle Size Analysis for Site 89 Soil

Diameter (mm)	Percent Passing	Diameter (mm)	Percent Passing
75.0	100.0	0.075	35.6
37.5	100.0	0.0485	21.7
19.0	100.0	0.0346	19.4
9.5	99.3	0.0221	17.2
4.75	99.2	0.0129	14.2
2.00	99.1	0.0092	12.7
0.850	98.8	0.0065	11.2
0.425	97.2	0.0046	10.5
0.250	94.2	0.0032	9.0
0.149	73.5	0.0014	7.5
0.106	48.7		

Table 4. Screening Levels of Volatile Organics in Additional Samples

Additional Sample	PCA	PCE	TCE	Vinyl Chloride
	Concentration (mg/kg)			
A	3405	92	21	<5
B	12,510	102	222	<5
C	2,783	9	35	<5
D	3,185	11	44	<5
E	4,379	23	186	<5
F	939	<5	21	<5

The difference between the solids and ash content indicate that the amount of organic material in the sample is small (0.3%). The low BTU content of the material suggests that there is little combustible organics present in the sample. The moisture content (100% - solids content) indicates that the sample contains approximately 12.25% water by weight, which must be volatilized by the LTTD system.

The data in Table 2 indicates that the only volatile organic contaminant present in the sample at appreciable concentrations is 1,1,2,2-trichloroethane (PCA). However, this compound has similar volatilization characteristics to the other contaminants of concern. The removal of 1,1,2,2-tetrachloroethane can be used to evaluate the efficacy of the thermal treatment. The data in Table 4 for the additional samples contained higher levels of the contaminants of concern than the original sample.

The particle size distribution indicates that a large percentage (35.6%) of the solids in the Site 89 sample material was less than 0.075 mm. in diameter. Typically, material finer than 0.075 mm has the potential to be collected in the LTTD air pollution control system as baghouse dust when the soil is treated in aerobic LTTD treatment units.

Thermal Treatability Testing

Portions of the original untreated sample were treated in a muffle furnace. The testing produced final treated temperatures of 225°F, 250°F, 300°F, and 350°F within residence times of 10 to 15 minutes. The treated material were removed from the muffle furnace at the end of the residence time and immediately quenched. The treated material from each run was analyzed for VOCs (Table 5).

Table 5. Concentrations of Volatile Organics in the Thermally Treated Site 89 Soil

Thermal Run	4	1	2	3
Final Soil Temperature (°F)	221	250	300	350
Run Time	15	12	10	8
Parameter	**Screening Concentration (mg/kg)**			
TCE	<0.025	<0.025	<0.025	<0.025
PCE	<0.025	<0.025	<0.025	<0.025
Vinyl Chloride	<0.025	<0.025	<0.025	<0.025
1,1,2,2-Tetrachloroethane	1.43	<0.025	<0.025	<0.025

Portions of the six additional samples were also treated in a muffle furnace. The testing produced final treated temperatures of 225°F, 250°F, and 350°F within residence times of 12 to 15 minutes. The treated material were removed from the muffle furnace at the end of the residence time and immediately quenched. The treated material from each run was screened for VOCs (Table 6).

Table 6. Thermal Treatment Results for the Additional Samples from Site 89

Additional Sample	Treated at 225°F for 12-15 minutes residence time				Treated at 250°F for 12-15 minutes residence time			
	PCA	PCE	TCE	Vinyl Chloride	PCA	PCE	TCE	Vinyl Chloride
	Screening Concentration (mg/kg)							
A	15.1	<0.5	<0.5	<0.5	2.73	<0.5	<0.5	<0.5
B	23.3	<0.5	<0.5	<0.5	25.8	<0.5	<0.5	<0.5
C	5.23	<0.5	<0.5	<0.5	1.78	<0.5	<0.5	<0.5
D	13.9	<0.5	0.91	<0.5	14.8	<0.5	<0.5	<0.5
E	11.5	<0.5	<0.5	<0.5	0.64	<0.5	<0.5	<0.5
F	74.3	<0.5	<0.5	<0.5	21.4	<0.5	<0.5	<0.5

Additional Sample	Treated at 350°F for 12-15 minutes residence time			
	PCA	PCE	TCE	Vinyl Chloride
A	1.35	<0.5	<0.5	<0.5
B	1.33	<0.5	<0.5	<0.5
C	0.42	<0.5	<0.5	<0.5
D	0.82	<0.5	<0.5	<0.5
E	1.24	<0.5	<0.5	<0.5
F	1.43	<0.5	<0.5	<0.5

Based on the results in Table 5, samples of Thermal Runs 1 (2194-025-2) and 4 (2194-030-2) were submitted to an outside laboratory for analysis for VOCs. A sample (C) from the 350°F thermal runs for the additional samples was also submitted to an outside laboratory for analysis for VOCs. The results of the outside laboratory confirm IT's screening results (Appendix A).

CONCLUSIONS

The soil samples from Site 89 were contaminated with high concentrations of 1,1,2,2-tetrachloroethane and had lower concentrations of tetrachloroethylen and trichloroethene. The low BTU content of the material suggests that there is little combustible organics present in the sample. The moisture content (100% - solids content) indicates that the sample contains approximately 12.25% water by weight.

The particle size distribution indicates that there is a potential for a large amount of the Site 89 material to be collected in the LTTD air pollution control system as baghouse dust, especially for aerobic LTTD systems.

The data in Table 5 indicates that the volatile organic contamination present in the Site 89 soil material can be thermally desorbed if the final treated soil temperature reaches 225°F. Treatment of the Site 89 soil material with this final soil temperature removed 99% of the 1,1,2,2,-tetrachloroethane contamination. The data in Table 6 indicate that a higher treated soil temperature may be considered to ensure that all of the volatile organics are desorbed during the treatment.

As with most treatability and laboratory studies, the results of this study were obtained under laboratory conditions using composite samples. Full scale processing under field conditions and/or variability in the materials to be treated may result in treated material which varies from the treated material produced under laboratory conditions or the use of additional reagents, equipment and/or processing time to produce a similar treated material to that produced under laboratory conditions.

APPENDIX A

ANALYTICAL REPORTS

Microbac Laboratories, Inc.
Kenwill Division
505 East Broadway Avenue Maryville, TN 37804
865/977-1200 Fax: 865/984-8616

CERTIFICATE OF ANALYSIS # 9915-00114 Page 1

ARIE GROEN
INTERNATIONAL TECHNOLOGY CORP
304 DIRECTORS DRIVE
KNOXVILLE, TN 37923

Date Reported 0/00/00
Date Received 3/14/00
Customer No. I003
P.O. Number 140065

Permit Number: Subject: CAMP LEJEUNE / 803011

PARAMETERS	RESULTS	UNITS	METHOD	DATE	TECH
SAMPLE: 1 2194-025-2 TREATED SOIL					
[Volatile Organics]			SW846 8260		
DICHLORODIFLUOROMETHANE	<0.005	MG/KG		3/21/00	JLB
VINYL CHLORIDE	<0.010	MG/KG		3/21/00	JLB
CHLOROMETHANE	<0.010	MG/KG		3/21/00	JLB
BROMOMETHANE	<0.010	MG/KG		3/21/00	JLB
CHLOROETHANE	<0.010	MG/KG		3/21/00	JLB
TRICHLOROFLUOROMETHANE	<0.005	MG/KG		3/21/00	JLB
1,1-DICHLOROETHYLENE	<0.005	MG/KG		3/21/00	JLB
METHYLENE CHLORIDE	<0.050	MG/KG		3/21/00	JLB
ACETONE	<0.050	MG/KG		3/21/00	JLB
ACROLEIN	<0.050	MG/KG		3/21/00	JLB
1,2 DIBROMOETHANE	<0.005	MG/KG		3/21/00	JLB
CARBON DISULFIDE	<0.010	MG/KG		3/21/00	JLB
ACRYLONITRILE	<0.050	MG/KG		3/21/00	JLB
TRANS-1,2-DICHLOROETHYLENE	<0.005	MG/KG		3/21/00	JLB
1,1-DICHLOROETHANE	<0.005	MG/KG		3/21/00	JLB
METHYL-T-BUTYL ETHER	<0.050	MG/KG		3/21/00	JLB
2-BUTANONE (MEK)	<0.050	MG/KG		3/21/00	JLB
CIS-1,2-DICHLOROETHYLENE	<0.005	MG/KG		3/21/00	JLB
BROMOCHLOROMETHANE	<0.005	MG/KG		3/21/00	JLB
CHLOROFORM	<0.005	MG/KG		3/21/00	JLB
2,2-DICHLOROPROPANE	<0.005	MG/KG		3/21/00	JLB
1,1,1-TRICHLOROETHANE	<0.005	MG/KG		3/21/00	JLB
1,1-DICHLOROPROPYLENE	<0.005	MG/KG		3/21/00	JLB
CARBON TETRACHLORIDE	<0.005	MG/KG		3/21/00	JLB
BENZENE	<0.005	MG/KG		3/21/00	JLB
1,2-DICHLOROETHANE	<0.005	MG/KG		3/21/00	JLB
TRICHLOROETHYLENE	<0.005	MG/KG		3/21/00	JLB
DIBROMOMETHANE	<0.005	MG/KG		3/21/00	JLB
1,2-DICHLOROPROPANE	<0.005	MG/KG		3/21/00	JLB
BROMODICHLOROMETHANE	<0.005	MG/KG		3/21/00	JLB
2-CHLOROETHYL VINYL ETHER	<0.050	MG/KG		3/21/00	JLB

*** Certificate Continues On Next Page ***

Microbac Laboratories, Inc.
Kenwill Division
505 East Broadway Avenue Maryville, TN 37804
865/977-1200 Fax: 865/984-8616

CERTIFICATE OF ANALYSIS # 9915-00114 Page 2

ARIE GROEN
INTERNATIONAL TECHNOLOGY CORP
304 DIRECTORS DRIVE
KNOXVILLE, TN 37923

Date Reported 0/00/00
Date Received 3/16/00
Customer No. I003
P.O. Number 140065

Permit Number: Subject: CAMP LEJEUNE / 803011

PARAMETERS	RESULTS	UNITS	METHOD	DATE	TECH
SAMPLE: 1 2194-025-2 TREATED SOIL					
CIS-1,3-DICHLOROPROPYLENE	<0.005	MG/KG		3/21/00	JLB
HEXANE	<0.005	MG/KG		3/21/00	JLB
TOLUENE	<0.005	MG/KG		3/21/00	JLB
TRANS-1,3-DICHLOROPROPYLENE	<0.005	MG/KG		3/21/00	JLB
1,1,2-TRICHLOROETHANE	<0.005	MG/KG		3/21/00	JLB
1,3-DICHLOROPROPANE	<0.005	MG/KG		3/21/00	JLB
DIBROMOCHLOROMETHANE	<0.005	MG/KG		3/21/00	JLB
1,2-DIBROMOETHANE (EDB)	<0.005	MG/KG		3/21/00	JLB
TETRACHLOROETHYLENE	<0.005	MG/KG		3/21/00	JLB
4-ISOPROPYLTOLUENE	<0.010	MG/KG		3/21/00	JLB
1,1,1,2-TETRACHLOROETHANE	<0.005	MG/KG		3/21/00	JLB
CHLOROBENZENE	<0.005	MG/KG		3/21/00	JLB
ISOPROPYLBENZENE	<0.005	MG/KG		3/21/00	JLB
ETHYLBENZENE	<0.005	MG/KG		3/21/00	JLB
M-XYLENE / P-XYLENE	<0.010	MG/KG		3/21/00	JLB
O-XYLENE	<0.005	MG/KG		3/21/00	JLB
STYRENE	<0.005	MG/KG		3/21/00	JLB
BROMOFORM	<0.005	MG/KG		3/21/00	JLB
1,2,3-TRICHLOROPROPANE	<0.005	MG/KG		3/21/00	JLB
BROMOBENZENE	<0.005	MG/KG		3/21/00	JLB
N-PROPYLBENZENE	<0.005	MG/KG		3/21/00	JLB
1,1,2,2-TETRACHLOROETHANE	0.76	MG/KG		3/21/00	JLB
2-CHLOROTOLUENE	<0.005	MG/KG		3/21/00	JLB
3-CHLOROTOLUENE	<0.005	MG/KG		3/21/00	JLB
4-CHLOROTOLUENE	<0.005	MG/KG		3/21/00	JLB
1,3,5-TRIMETHYLBENZENE	<0.005	MG/KG		3/21/00	JLB
TERT-BUTYLBENZENE	<0.005	MG/KG		3/21/00	JLB
1,2,4-TRIMETHYLBENZENE	<0.005	MG/KG		3/21/00	JLB
SEC-BUTYLBENZENE	<0.005	MG/KG		3/21/00	JLB
1,3-DICHLOROBENZENE	<0.005	MG/KG		3/21/00	JLB
1,4-DICHLOROBENZENE	<0.005	MG/KG		3/21/00	JLB
1,2-DICHLOROBENZENE	<0.005	MG/KG		3/21/00	JLB

*** Certificate Continues On Next Page. ***

Microbac Laboratories, Inc.
Kenwill Division
505 East Broadway Avenue Maryville, TN 37804
865/977-1200 Fax: 865/984-8616

CERTIFICATE OF ANALYSIS # 9915-00114 Page 3

ARIE GROEN
INTERNATIONAL TECHNOLOGY CORP
304 DIRECTORS DRIVE
KNOXVILLE, TN 37923

Date Reported 0/00/00
Date Received 3/14/00
Customer No. I003
P.O. Number 140065

Permit Number: Subject: CAMP LEJEUNE / 803011

PARAMETERS	RESULTS	UNITS	METHOD	DATE	TECH
SAMPLE: 1 2194-025-2 TREATED SOIL					
N-BUTYLBENZENE	<0.005	MG/KG		3/21/00	JLB
1,2,4-TRICHLOROBENZENE	<0.005	MG/KG		3/21/00	JLB
NAPHTHALENE	<0.005	MG/KG		3/21/00	JLB
HEXACHLOROBUTADIENE	<0.005	MG/KG		3/21/00	JLB
1,2,3-TRICHLOROBENZENE	<0.005	MG/KG		3/21/00	JLB
DCA SURROGATE RECOVERY	86	%		3/21/00	JLB
OL-D8 SURROGATE RECOVERY	99	%		3/21/00	JLB
FB SURROGATE RECOVERY	101	%		3/21/00	JLB
SAMPLE: 2 2194-024-2 FEED SOIL					
[Volatile Organics]			SW846 8260		
DICHLORODIFLUOROMETHANE	<25	MG/KG		3/21/00	JLB
VINYL CHLORIDE	<25	MG/KG		3/21/00	JLB
CHLOROMETHANE	<25	MG/KG		3/21/00	JLB
BROMOMETHANE	<25	MG/KG		3/21/00	JLB
CHLOROETHANE	<25	MG/KG		3/21/00	JLB
TRICHLOROFLUOROMETHANE	<25	MG/KG		3/21/00	JLB
1,1-DICHLOROETHYLENE	<25	MG/KG		3/21/00	JLB
METHYLENE CHLORIDE	<25	MG/KG		3/21/00	JLB
ACETONE	<25	MG/KG		3/21/00	JLB
ACROLEIN	<25	MG/KG		3/21/00	JLB
1,2 DIBROMOETHANE	<25	MG/KG		3/21/00	JLB
CARBON DISULFIDE	<25	MG/KG		3/21/00	JLB
ACRYLONITRILE	<25	MG/KG		3/21/00	JLB
TRANS-1,2-DICHLOROETHYLENE	<25	MG/KG		3/21/00	JLB
1,1-DICHLOROETHANE	<25	MG/KG		3/21/00	JLB
METHYL-T-BUTYL ETHER	<25	MG/KG		3/21/00	JLB
2-BUTANONE (MEK)	<25	MG/KG		3/21/00	JLB
CIS-1,2-DICHLOROETHYLENE	<25	MG/KG		3/21/00	JLB
BROMOCHLOROMETHANE	<25	MG/KG		3/21/00	JLB
CHLOROFORM	<25	MG/KG		3/21/00	JLB

*** Certificate Continues On Next Page ***

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Microbac Laboratories, Inc.

Kenwill Division
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CERTIFICATE OF ANALYSIS # 9915-00114 Page 4

ARIE GROEN
INTERNATIONAL TECHNOLOGY CORP
304 DIRECTORS DRIVE
KNOXVILLE, TN 37923

Date Reported 0/00/00
Date Received 3/14/00
Customer No. I003
P.O. Number 140065

Permit Number: Subject: CAMP LEJEUNE / 803011

PARAMETERS	RESULTS	UNITS	METHOD	DATE	TECH
SAMPLE: 2 2194-024-2 FEED SOIL					
2,2-DICHLOROPROPANE	<25	MG/KG		3/21/00	JLB
1,1,1-TRICHLOROETHANE	<25	MG/KG		3/21/00	JLB
1,1-DICHLOROPROPYLENE	<25	MG/KG		3/21/00	JLB
CARBON TETRACHLORIDE	<25	MG/KG		3/21/00	JLB
BENZENE	<25	MG/KG		3/21/00	JLB
1,2-DICHLOROETHANE	<25	MG/KG		3/21/00	JLB
TRICHLOROETHYLENE	<25	MG/KG		3/21/00	JLB
IBROMOMETHANE	<25	MG/KG		3/21/00	JLB
1,2-DICHLOROPROPANE	<25	MG/KG		3/21/00	JLB
BROMODICHLOROMETHANE	<25	MG/KG		3/21/00	JLB
2-CHLOROETHYL VINYL ETHER	<25	MG/KG		3/21/00	JLB
CIS-1,3-DICHLOROPROPYLENE	<25	MG/KG		3/21/00	JLB
HEXANE	<25	MG/KG		3/21/00	JLB
TOLUENE	<25	MG/KG		3/21/00	JLB
TRANS-1,3-DICHLOROPROPYLENE	<25	MG/KG		3/21/00	JLB
1,1,2-TRICHLOROETHANE	<25	MG/KG		3/21/00	JLB
1,3-DICHLOROPROPANE	<25	MG/KG		3/21/00	JLB
DIBROMOCHLOROMETHANE	<25	MG/KG		3/21/00	JLB
1,2-DIBROMOETHANE (EDB)	<25	MG/KG		3/21/00	JLB
TETRACHLOROETHYLENE	<25	MG/KG		3/21/00	JLB
4-ISOPROPYLTOLUENE	<25	MG/KG		3/21/00	JLB
1,1,1,2-TETRACHLOROETHANE	<25	MG/KG		3/21/00	JLB
CHLOROBENZENE	<25	MG/KG		3/21/00	JLB
ISOPROPYLBENZENE	<25	MG/KG		3/21/00	JLB
ETHYLBENZENE	<25	MG/KG		3/21/00	JLB
M-XYLENE / P-XYLENE	<25	MG/KG		3/21/00	JLB
O-XYLENE	<25	MG/KG		3/21/00	JLB
STYRENE	<25	MG/KG		3/21/00	JLB
BROMOFORM	<25	MG/KG		3/21/00	JLB
1,2,3-TRICHLOROPROPANE	<25	MG/KG		3/21/00	JLB
BROMOBENZENE	<25	MG/KG		3/21/00	JLB
N-PROPYLBENZENE	<25	MG/KG		3/21/00	JLB

*** Certificate Continues On Next Page ***

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Microbac Laboratories, Inc.

Kenwill Division
505 East Broadway Avenue Maryville, TN 37804
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CERTIFICATE OF ANALYSIS # 9915-00114 Page 5

ARIE GROEN
INTERNATIONAL TECHNOLOGY CORP
304 DIRECTORS DRIVE
KNOXVILLE, TN 37923

Date Reported 0/00/00
Date Received 3/14/00
Customer No. I003
P.O. Number 140065

Permit Number: Subject: CAMP LEJEUNE / 803011

PARAMETERS	RESULTS	UNITS	METHOD	DATE	TECH
SAMPLE: 2 2194-024-2 FEED SOIL					
1,1,2,2-TETRACHLOROETHANE	310	MG/KG		3/21/00	JLB
2-CHLOROTOLUENE	<25	MG/KG		3/21/00	JLB
3-CHLOROTOLUENE	<25	MG/KG		3/21/00	JLB
4-CHLOROTOLUENE	<25	MG/KG		3/21/00	JLB
1,3,5-TRIMETHYLBENZENE	<25	MG/KG		3/21/00	JLB
TERT-BUTYLBENZENE	<25	MG/KG		3/21/00	JLB
1,2,4-TRIMETHYLBENZENE	<25	MG/KG		3/21/00	JLB
SEC-BUTYLBENZENE	<25	MG/KG		3/21/00	JLB
1,3-DICHLOROBENZENE	<25	MG/KG		3/21/00	JLB
1,4-DICHLOROBENZENE	<25	MG/KG		3/21/00	JLB
1,2-DICHLOROBENZENE	<25	MG/KG		3/21/00	JLB
N-BUTYLBENZENE	<25	MG/KG		3/21/00	JLB
1,2,4-TRICHLOROBENZENE	<25	MG/KG		3/21/00	JLB
NAPHTHALENE	<25	MG/KG		3/21/00	JLB
HEXACHLOROBUTADIENE	<25	MG/KG		3/21/00	JLB
1,2,3-TRICHLOROBENZENE	<25	MG/KG		3/21/00	JLB
DCA SURROGATE RECOVERY	94	%		3/21/00	JLB
TOL-D8 SURROGATE RECOVERY	98	%		3/21/00	JLB
BFB SURROGATE RECOVERY	95	%		3/21/00	JLB
SAMPLE: 3 2194-030-2 TREATED SOIL					
[Volatile Organics]			SW846 8260		
DICHLORODIFLUOROMETHANE	<0.005	MG/KG		3/21/00	JLB
VINYL CHLORIDE	<0.010	MG/KG		3/21/00	JLB
CHLOROMETHANE	<0.010	MG/KG		3/21/00	JLB
BROMOMETHANE	<0.010	MG/KG		3/21/00	JLB
CHLOROETHANE	<0.010	MG/KG		3/21/00	JLB
TRICHLOROFLUOROMETHANE	<0.005	MG/KG		3/21/00	JLB
1,1-DICHLOROETHYLENE	<0.005	MG/KG		3/21/00	JLB
METHYLENE CHLORIDE	<0.050	MG/KG		3/21/00	JLB
ACETONE	<0.050	MG/KG		3/21/00	JLB

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Kenwill Division
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CERTIFICATE OF ANALYSIS # 9915-00114 Page 6

ARIE GROEN
INTERNATIONAL TECHNOLOGY CORP
304 DIRECTORS DRIVE
KNOXVILLE, TN 37923

Date Reported 0/00/00
Date Received 3/14/00
Customer No. I003
P.O. Number 140065

Permit Number: Subject: CAMP LEJEUNE / 803011

PARAMETERS	RESULTS	UNITS	METHOD	DATE	TECH
SAMPLE: 3 2194-030-2 TREATED SOIL					
ACROLEIN	<0.050	MG/KG		3/21/00	JLB
1,2 DIBROMOETHANE	<0.005	MG/KG		3/21/00	JLB
CARBON DISULFIDE	<0.010	MG/KG		3/21/00	JLB
ACRYLONITRILE	<0.050	MG/KG		3/21/00	JLB
TRANS-1,2-DICHLOROETHYLENE	<0.005	MG/KG		3/21/00	JLB
1,1-DICHLOROETHANE	<0.005	MG/KG		3/21/00	JLB
ETHYL-T-BUTYL ETHER	<0.050	MG/KG		3/21/00	JLB
2-BUTANONE (MEK)	<0.050	MG/KG		3/21/00	JLB
CIS-1,2-DICHLOROETHYLENE	<0.005	MG/KG		3/21/00	JLB
BROMOCHLOROMETHANE	<0.005	MG/KG		3/21/00	JLB
CHLOROFORM	<0.005	MG/KG		3/21/00	JLB
2,2-DICHLOROPROPANE	<0.005	MG/KG		3/21/00	JLB
1,1,1-TRICHLOROETHANE	<0.005	MG/KG		3/21/00	JLB
1,1-DICHLOROPROPYLENE	<0.005	MG/KG		3/21/00	JLB
CARBON TETRACHLORIDE	<0.005	MG/KG		3/21/00	JLB
BENZENE	<0.005	MG/KG		3/21/00	JLB
1,2-DICHLOROETHANE	<0.005	MG/KG		3/21/00	JLB
TRICHLOROETHYLENE	<0.005	MG/KG		3/21/00	JLB
DIBROMOMETHANE	<0.005	MG/KG		3/21/00	JLB
1,2-DICHLOROPROPANE	<0.005	MG/KG		3/21/00	JLB
BROMODICHLOROMETHANE	<0.005	MG/KG		3/21/00	JLB
2-CHLOROETHYL VINYL ETHER	<0.050	MG/KG		3/21/00	JLB
CIS-1,3-DICHLOROPROPYLENE	<0.005	MG/KG		3/21/00	JLB
HEXANE	<0.005	MG/KG		3/21/00	JLB
TOLUENE	<0.005	MG/KG		3/21/00	JLB
TRANS-1,3-DICHLOROPROPYLENE	<0.005	MG/KG		3/21/00	JLB
1,1,2-TRICHLOROETHANE	<0.005	MG/KG		3/21/00	JLB
1,3-DICHLOROPROPANE	<0.005	MG/KG		3/21/00	JLB
DIBROMOCHLOROMETHANE	<0.005	MG/KG		3/21/00	JLB
1,2-DIBROMOETHANE (EDB)	<0.005	MG/KG		3/21/00	JLB
TETRACHLOROETHYLENE	<0.005	MG/KG		3/21/00	JLB
4-ISOPROPYLTOLUENE	<0.010	MG/KG		3/21/00	JLB

*** Certificate Continues On Next Page ***

Microbac Laboratories, Inc.
Kenwill Division
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CERTIFICATE OF ANALYSIS # 9915-00114 Page 7

ARIE GROEN
INTERNATIONAL TECHNOLOGY CORP
304 DIRECTORS DRIVE
KNOXVILLE, TN 37923

Date Reported 0/00/00
Date Received 3/14/00
Customer No. I003
P.O. Number 140065

Permit Number: Subject: CAMP LEJEUNE / 803011

PARAMETERS	RESULTS	UNITS	METHOD	DATE	TECH
SAMPLE: 3 2194-030-2 TREATED SOIL					
1,1,1,2-TETRACHLOROETHANE	<0.005	MG/KG		3/21/00	JLB
CHLOROBENZENE	<0.005	MG/KG		3/21/00	JLB
ISOPROPYLBENZENE	<0.005	MG/KG		3/21/00	JLB
ETHYLBENZENE	<0.005	MG/KG		3/21/00	JLB
M-XYLENE / P-XYLENE	<0.010	MG/KG		3/21/00	JLB
O-XYLENE	<0.005	MG/KG		3/21/00	JLB
STYRENE	<0.005	MG/KG		3/21/00	JLB
BROMOFORM	<0.005	MG/KG		3/21/00	JLB
1,2,3-TRICHLOROPROPANE	<0.005	MG/KG		3/21/00	JLB
BROMOBENZENE	<0.005	MG/KG		3/21/00	JLB
N-PROPYLBENZENE	<0.005	MG/KG		3/21/00	JLB
1,1,2,2-TETRACHLOROETHANE	2.90	MG/KG		3/21/00	JLB
2-CHLOROTOLUENE	<0.005	MG/KG		3/21/00	JLB
3-CHLOROTOLUENE	<0.005	MG/KG		3/21/00	JLB
4-CHLOROTOLUENE	<0.005	MG/KG		3/21/00	JLB
1,3,5-TRIMETHYLBENZENE	<0.005	MG/KG		3/21/00	JLB
TERT-BUTYLBENZENE	<0.005	MG/KG		3/21/00	JLB
1,2,4-TRIMETHYLBENZENE	<0.005	MG/KG		3/21/00	JLB
SEC-BUTYLBENZENE	<0.005	MG/KG		3/21/00	JLB
1,3-DICHLOROBENZENE	<0.005	MG/KG		3/21/00	JLB
1,4-DICHLOROBENZENE	<0.005	MG/KG		3/21/00	JLB
1,2-DICHLOROBENZENE	<0.005	MG/KG		3/21/00	JLB
N-BUTYLBENZENE	<0.005	MG/KG		3/21/00	JLB
1,2,4-TRICHLOROBENZENE	<0.005	MG/KG		3/21/00	JLB
NAPHTHALENE	<0.005	MG/KG		3/21/00	JLB
HEXACHLOROBUTADIENE	<0.005	MG/KG		3/21/00	JLB
1,2,3-TRICHLOROBENZENE	<0.005	MG/KG		3/21/00	JLB
DCA SURROGATE RECOVERY	98	%		3/21/00	JLB
TOL-D8 SURROGATE RECOVERY	99	%		3/21/00	JLB
BFB SURROGATE RECOVERY	92	%		3/21/00	JLB

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Microbac Laboratories, Inc.
Kenwill Division
505 East Broadway Avenue Maryville, TN 37804
865/977-1200 Fax: 865/984-8616

CERTIFICATE OF ANALYSIS # 9915-00114 Page 8

ARIE GROEN
INTERNATIONAL TECHNOLOGY CORP
304 DIRECTORS DRIVE
KNOXVILLE, TN 37923

Date Reported 0/00/00
Date Received 3/14/00
Customer No. I003
P.O. Number 140065

Permit Number: Subject: CAMP LEJEUNE / 803011

PARAMETERS	RESULTS	UNITS	METHOD	DATE	TECH

RESPECTFULLY SUBMITTED: _____

MICROBAC LABORATORIES, INCORPORATED

Microbac Laboratories, Inc.
Kenwill Division
505 East Broadway Avenue Maryville, TN 37804
865/977-1200 Fax: 865/984-8616

CERTIFICATE OF ANALYSIS # 9916-00053 Page 1

PAUL LEAR
INTERNATIONAL TECHNOLOGY CORP
304 DIRECTORS DRIVE
KNOXVILLE, TN 37923

Date Reported 0/00/00
Date Received 4/06/00
Customer No. I003
P.O. Number

Permit Number: Subject: 2-3 DAY RUSH

PARAMETERS	RESULTS	UNITS	METHOD	DATE	TECH
SAMPLE: 1 2194-052-IR: TREATED SOIL: 4/4/00					
[Volatile Organics]			SW846 8260		
DICHLORODIFLUOROMETHANE	<1.0	MG/KG		4/07/00	JLB
VINYL CHLORIDE	<1.0	MG/KG		4/07/00	JLB
CHLOROMETHANE	<1.0	MG/KG		4/07/00	JLB
BROMOMETHANE	<1.0	MG/KG		4/07/00	JLB
CHLOROETHANE	<1.0	MG/KG		4/07/00	JLB
TRICHLOROFLUOROMETHANE	<1.0	MG/KG		4/07/00	JLB
1,1-DICHLOROETHYLENE	<1.0	MG/KG		4/07/00	JLB
METHYLENE CHLORIDE	<1.0	MG/KG		4/07/00	JLB
ACETONE	<1.0	MG/KG		4/07/00	JLB
ACROLEIN	<1.0	MG/KG		4/07/00	JLB
1,2 DIBROMOETHANE	<1.0	MG/KG		4/07/00	JLB
CARBON DISULFIDE	<1.0	MG/KG		4/07/00	JLB
ACRYLONITRILE	<1.0	MG/KG		4/07/00	JLB
TRANS-1,2-DICHLOROETHYLENE	<1.0	MG/KG		4/07/00	JLB
1,1-DICHLOROETHANE	<1.0	MG/KG		4/07/00	JLB
METHYL-T-BUTYL ETHER	<1.0	MG/KG		4/07/00	JLB
2-BUTANONE (MEK)	<1.0	MG/KG		4/07/00	JLB
CIS-1,2-DICHLOROETHYLENE	<1.0	MG/KG		4/07/00	JLB
BROMOCHLOROMETHANE	<1.0	MG/KG		4/07/00	JLB
CHLOROFORM	<1.0	MG/KG		4/07/00	JLB
2,2-DICHLOROPROPANE	<1.0	MG/KG		4/07/00	JLB
1,1,1-TRICHLOROETHANE	<1.0	MG/KG		4/07/00	JLB
1,1-DICHLOROPROPYLENE	<1.0	MG/KG		4/07/00	JLB
CARBON TETRACHLORIDE	<1.0	MG/KG		4/07/00	JLB
BENZENE	<1.0	MG/KG		4/07/00	JLB
1,2-DICHLOROETHANE	<1.0	MG/KG		4/07/00	JLB
TRICHLOROETHYLENE	<1.0	MG/KG		4/07/00	JLB
DIBROMOMETHANE	<1.0	MG/KG		4/07/00	JLB
1,2-DICHLOROPROPANE	<1.0	MG/KG		4/07/00	JLB
BROMODICHLOROMETHANE	<1.0	MG/KG		4/07/00	JLB
2-CHLOROETHYL VINYL ETHER	<1.0	MG/KG		4/07/00	JLB

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CERTIFICATE OF ANALYSIS # 9916-00053 Page 2

PAUL LEAR
INTERNATIONAL TECHNOLOGY CORP
304 DIRECTORS DRIVE
KNOXVILLE, TN 37923

Date Reported 0/00/00
Date Received 4/06/00
Customer No. I003
P.O. Number

Permit Number: Subject: 2-3 DAY RUSH

PARAMETERS	RESULTS	UNITS	METHOD	DATE	TECH
SAMPLE: 1 2194-052-IR: TREATED SOIL: 4/4/00					
CIS-1,3-DICHLOROPROPYLENE	<1.0	MG/KG		4/07/00	JLB
HEXANE	<1.0	MG/KG		4/07/00	JLB
TOLUENE	<1.0	MG/KG		4/07/00	JLB
TRANS-1,3-DICHLOROPROPYLENE	<1.0	MG/KG		4/07/00	JLB
1,1,2-TRICHLOROETHANE	<1.0	MG/KG		4/07/00	JLB
1,3-DICHLOROPROPANE	<1.0	MG/KG		4/07/00	JLB
DIBROMOCHLOROMETHANE	<1.0	MG/KG		4/07/00	JLB
1,2-DIBROMOETHANE (EDB)	<1.0	MG/KG		4/07/00	JLB
TETRACHLOROETHYLENE	<1.0	MG/KG		4/07/00	JLB
4-ISOPROPYLTOLUENE	<1.0	MG/KG		4/07/00	JLB
1,1,1,2-TETRACHLOROETHANE	<1.0	MG/KG		4/07/00	JLB
CHLOROBENZENE	<1.0	MG/KG		4/07/00	JLB
ISOPROPYLBENZENE	<1.0	MG/KG		4/07/00	JLB
ETHYLBENZENE	<1.0	MG/KG		4/07/00	JLB
M-XYLENE / P-XYLENE	<1.0	MG/KG		4/07/00	JLB
O-XYLENE	<1.0	MG/KG		4/07/00	JLB
STYRENE	<1.0	MG/KG		4/07/00	JLB
BROMOFORM	<1.0	MG/KG		4/07/00	JLB
1,2,3-TRICHLOROPROPANE	<1.0	MG/KG		4/07/00	JLB
BROMOBENZENE	<1.0	MG/KG		4/07/00	JLB
N-PROPYLBENZENE	<1.0	MG/KG		4/07/00	JLB
1,1,2,2-TETRACHLOROETHANE	<1.0	MG/KG		4/07/00	JLB
2-CHLOROTOLUENE	<1.0	MG/KG		4/07/00	JLB
3-CHLOROTOLUENE	<1.0	MG/KG		4/07/00	JLB
4-CHLOROTOLUENE	<1.0	MG/KG		4/07/00	JLB
1,3,5-TRIMETHYLBENZENE	<1.0	MG/KG		4/07/00	JLB
TERT-BUTYLBENZENE	<1.0	MG/KG		4/07/00	JLB
1,2,4-TRIMETHYLBENZENE	<1.0	MG/KG		4/07/00	JLB
SEC-BUTYLBENZENE	<1.0	MG/KG		4/07/00	JLB
1,3-DICHLOROBENZENE	<1.0	MG/KG		4/07/00	JLB
1,4-DICHLOROBENZENE	<1.0	MG/KG		4/07/00	JLB
1,2-DICHLOROBENZENE	<1.0	MG/KG		4/07/00	JLB

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CERTIFICATE OF ANALYSIS # 9916-00053 Page 3

PAUL LEAR
INTERNATIONAL TECHNOLOGY CORP
304 DIRECTORS DRIVE
KNOXVILLE. TN 37923

Date Reported 0/00/00
Date Received 4/06/00
Customer No. I003
P.O. Number

Permit Number: Subject: 2-3 DAY RUSH

PARAMETERS	RESULTS	UNITS	METHOD	DATE	TECH
SAMPLE: 1 2194-052-IR: TREATED SOIL: 4/4/00					
N-BUTYLBENZENE	<1.0	MG/KG		4/07/00	JLB
1,2,4-TRICHLOROBENZENE	<1.0	MG/KG		4/07/00	JLB
NAPHTHALENE	<1.0	MG/KG		4/07/00	JLB
HEXACHLOROBUTADIENE	<1.0	MG/KG		4/07/00	JLB
1,2,3-TRICHLOROBENZENE	<1.0	MG/KG		4/07/00	JLB
DCA SURROGATE RECOVERY	93	%		4/07/00	JLB
TOL-D8 SURROGATE RECOVERY	96	%		4/07/00	JLB
BFB SURROGATE RECOVERY	95	%		4/07/00	JLB
SAMPLE: 2 CL85002-D: FEED SOIL: 4/5/00					
[Volatile Organics]			SW846 8260		
DICHLORODIFLUOROMETHANE	<100	MG/KG		4/07/00	JLB
VINYL CHLORIDE	<100	MG/KG		4/07/00	JLB
CHLOROMETHANE	<100	MG/KG		4/07/00	JLB
BROMOMETHANE	<100	MG/KG		4/07/00	JLB
CHLOROETHANE	<100	MG/KG		4/07/00	JLB
TRICHLOROFLUOROMETHANE	<100	MG/KG		4/07/00	JLB
1,1-DICHLOROETHYLENE	<100	MG/KG		4/07/00	JLB
METHYLENE CHLORIDE	<100	MG/KG		4/07/00	JLB
ACETONE	<100	MG/KG		4/07/00	JLB
ACROLEIN	<100	MG/KG		4/07/00	JLB
1,2 DIBROMOETHANE	<100	MG/KG		4/07/00	JLB
CARBON DISULFIDE	<100	MG/KG		4/07/00	JLB
ACRYLONITRILE	<100	MG/KG		4/07/00	JLB
TRANS-1,2-DICHLOROETHYLENE	<100	MG/KG		4/07/00	JLB
1,1-DICHLOROETHANE	<100	MG/KG		4/07/00	JLB
METHYL-T-BUTYL ETHER	<100	MG/KG		4/07/00	JLB
2-BUTANONE (MEK)	<100	MG/KG		4/07/00	JLB
CIS-1,2-DICHLOROETHYLENE	<100	MG/KG		4/07/00	JLB
BROMOCHLOROMETHANE	<100	MG/KG		4/07/00	JLB
CHLOROFORM	<100	MG/KG		4/07/00	JLB

*** Certificate Continues On Next Page ***

CERTIFICATE OF ANALYSIS # 9916-00053 Page 4

PAUL LEAR
INTERNATIONAL TECHNOLOGY CORP
304 DIRECTORS DRIVE
KNOXVILLE, TN 37923

Date Reported 0/00/00
Date Received 4/06/00
Customer No. I003
P.O. Number

Permit Number: Subject: 2-3 DAY RUSH

PARAMETERS	RESULTS	UNITS	METHOD	DATE	TECH
SAMPLE: 2 CL85002-D: FEED SOIL: 4/5/00					
2,2-DICHLOROPROPANE	<100	MG/KG		4/07/00	JLB
1,1,1-TRICHLOROETHANE	<100	MG/KG		4/07/00	JLB
1,1-DICHLOROPROPYLENE	<100	MG/KG		4/07/00	JLB
CARBON TETRACHLORIDE	<100	MG/KG		4/07/00	JLB
BENZENE	<100	MG/KG		4/07/00	JLB
1,2-DICHLOROETHANE	<100	MG/KG		4/07/00	JLB
TRICHLOROETHYLENE	<100	MG/KG		4/07/00	JLB
DIBROMOMETHANE	<100	MG/KG		4/07/00	JLB
1,2-DICHLOROPROPANE	<100	MG/KG		4/07/00	JLB
BROMODICHLOROMETHANE	<100	MG/KG		4/07/00	JLB
2-CHLOROETHYL VINYL ETHER	<100	MG/KG		4/07/00	JLB
CIS-1,3-DICHLOROPROPYLENE	<100	MG/KG		4/07/00	JLB
HEXANE	<100	MG/KG		4/07/00	JLB
TOLUENE	<100	MG/KG		4/07/00	JLB
TRANS-1,3-DICHLOROPROPYLENE	<100	MG/KG		4/07/00	JLB
1,1,2-TRICHLOROETHANE	<100	MG/KG		4/07/00	JLB
1,3-DICHLOROPROPANE	<100	MG/KG		4/07/00	JLB
DIBROMOCHLOROMETHANE	<100	MG/KG		4/07/00	JLB
1,2-DIBROMOETHANE (EDB)	<100	MG/KG		4/07/00	JLB
TETRACHLOROETHYLENE	<100	MG/KG		4/07/00	JLB
4-ISOPROPYLTOLUENE	<100	MG/KG		4/07/00	JLB
1,1,1,2-TETRACHLOROETHANE	<100	MG/KG		4/07/00	JLB
CHLOROBENZENE	<100	MG/KG		4/07/00	JLB
ISOPROPYLBENZENE	<100	MG/KG		4/07/00	JLB
ETHYLBENZENE	<100	MG/KG		4/07/00	JLB
M-XYLENE / P-XYLENE	<100	MG/KG		4/07/00	JLB
O-XYLENE	<100	MG/KG		4/07/00	JLB
STYRENE	<100	MG/KG		4/07/00	JLB
BROMOFORM	<100	MG/KG		4/07/00	JLB
1,2,3-TRICHLOROPROPANE	<100	MG/KG		4/07/00	JLB
BROMOBENZENE	<100	MG/KG		4/07/00	JLB
N-PROPYLBENZENE	<100	MG/KG		4/07/00	JLB

*** Certificate Continues On Next Page ***

CERTIFICATE OF ANALYSIS # 9916-00053 Page 5

PAUL LEAR
INTERNATIONAL TECHNOLOGY CORP
304 DIRECTORS DRIVE
KNOXVILLE, TN 37923

Date Reported 0/00/00
Date Received 4/06/00
Customer No. I003
P.O. Number

Permit Number: Subject: 2-3 DAY RUSH

PARAMETERS	RESULTS	UNITS	METHOD	DATE	TECH
SAMPLE: 2 CL85002-D: FEED SOIL: 4/5/00					
1,1,2,2-TETRACHLOROETHANE	3100	MG/KG		4/07/00	JLB
2-CHLOROTOLUENE	<100	MG/KG		4/07/00	JLB
3-CHLOROTOLUENE	<100	MG/KG		4/07/00	JLB
4-CHLOROTOLUENE	<100	MG/KG		4/07/00	JLB
1,3,5-TRIMETHYLBENZENE	<100	MG/KG		4/07/00	JLB
TERT-BUTYLBENZENE	<100	MG/KG		4/07/00	JLB
1,2,4-TRIMETHYLBENZENE	<100	MG/KG		4/07/00	JLB
SEC-BUTYLBENZENE	<100	MG/KG		4/07/00	JLB
1,3-DICHLOROBENZENE	<100	MG/KG		4/07/00	JLB
1,4-DICHLOROBENZENE	<100	MG/KG		4/07/00	JLB
1,2-DICHLOROBENZENE	<100	MG/KG		4/07/00	JLB
N-BUTYLBENZENE	<100	MG/KG		4/07/00	JLB
1,2,4-TRICHLOROBENZENE	<100	MG/KG		4/07/00	JLB
NAPHTHALENE	<100	MG/KG		4/07/00	JLB
HEXACHLOROBUTADIENE	<100	MG/KG		4/07/00	JLB
1,2,3-TRICHLOROBENZENE	<100	MG/KG		4/07/00	JLB
DCA SURROGATE RECOVERY	86	%		4/07/00	JLB
TOL-D8 SURROGATE RECOVERY	99	%		4/07/00	JLB
BFB SURROGATE RECOVERY	98	%		4/07/00	JLB

PROJECT MANAGER: PAUL LEAR

*** Certificate Continues On Next Page ***

CERTIFICATE OF ANALYSIS # 9916-00053 Page 6

PAUL LEAR
INTERNATIONAL TECHNOLOGY CORP
304 DIRECTORS DRIVE
KNOXVILLE, TN 37923

Date Reported 0/00/00
Date Received 4/06/00
Customer No. I003
P.O. Number

Permit Number: Subject: 2-3 DAY RUSH

PARAMETERS	RESULTS	UNITS	METHOD	DATE	TECH

RESPECTFULLY SUBMITTED: _____.

MICROBAC LABORATORIES, INCORPORATED

APPENDIX B

PARTICLE SIZE ANALYSIS

PARTICLE-SIZE ANALYSIS
ASTM D 422

Project Name	Site 85 DRMO	Client Sample No.	TDL0855
Project No.	803011.01030140	IT Lab Sample No.	ETDC-8660

Specific Gravity = 2.65
assumed for calculations

Moisture Content = 14.1%
based on dry sample weight

SIEVE ANALYSIS

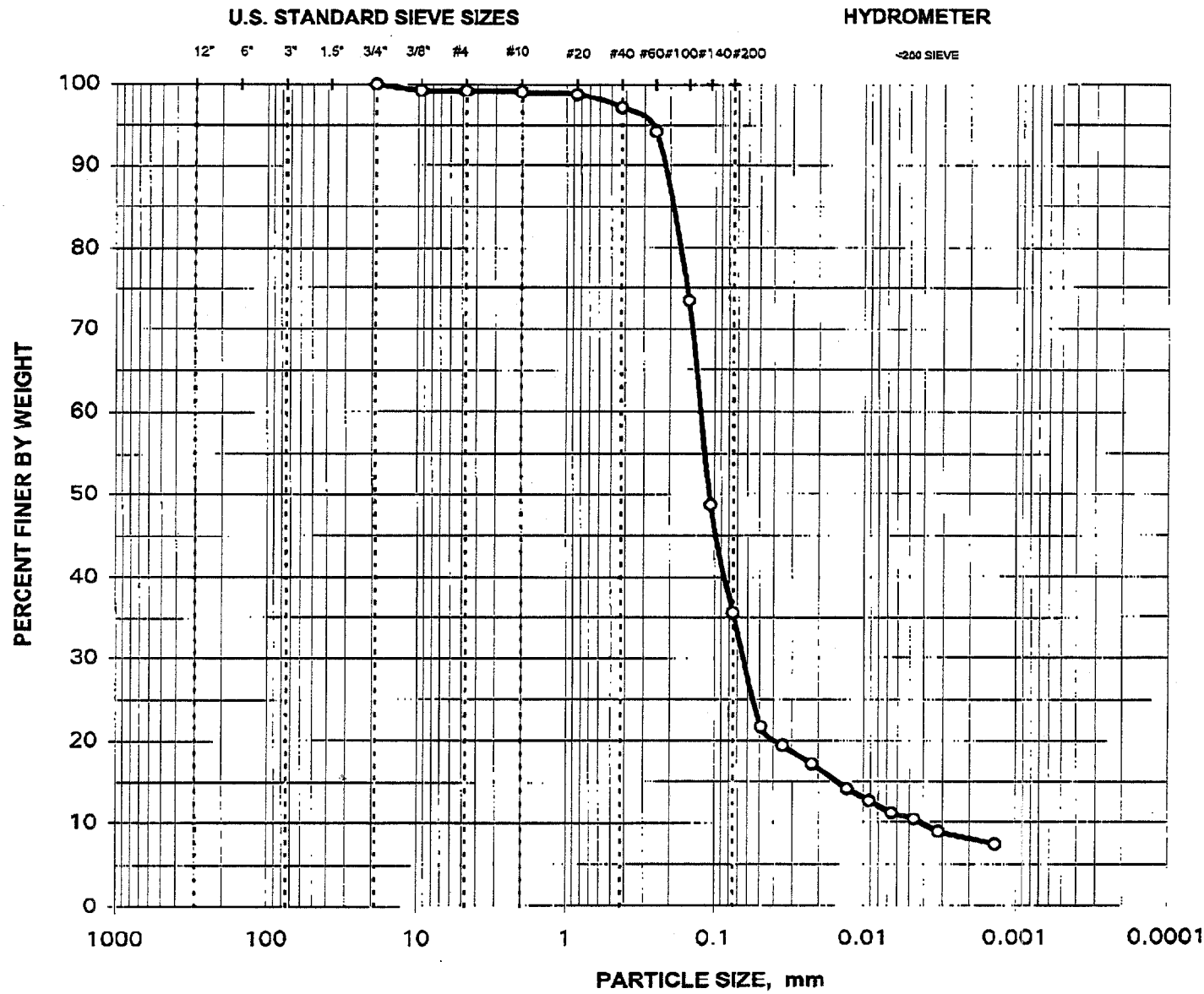
	Sieve No.	Diameter mm	Percent Finer
COARSE	3"	75.000	100.0%
	1.5"	37.500	100.0%
	0.75"	19.000	100.0%
	0.375"	9.500	99.3%
	#4	4.750	99.2%
	#10	2.000	99.1%

	Sieve No.	Diameter mm	Percent Finer
FINE	#20	0.850	98.8%
	#40	0.425	97.2%
	#60	0.250	94.2%
	#100	0.149	73.5%
	#140	0.106	48.7%
	#200	0.075	35.6%

HYDROMETER ANALYSIS

	Diameter mm	Percent Finer
HYDROMETER		
	0.04851	21.7%
	0.03463	19.4%
	0.02207	17.2%
	0.01291	14.2%
	0.00918	12.7%
	0.00653	11.2%
	0.00464	10.5%
	0.00319	9.0%
	0.00135	7.5%

Site 85 DRMO



CLIENT SAMPLE NO.: TDL0855

IT LAB SAMPLE NO.: ETDC-8660

BOULDERS	COBBLES	GRAVEL		SAND			
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT 2 - 75 microns CLAY <2 microns

APPENDIX C

SUMMARIZED TREATABILITY DATA TO DATE

RTA Test - Equipment and Materials

The RTA is a batch loaded, rotating tube thermal unit used to evaluate the effect of time, temperature, and atmosphere on the thermal treatment of solids and sludges. Treated residues from the tests provide adequate samples for thorough analytical characterization. The rotating tube portion of the system is 5 inches in diameter by 12 inches long, and is fabricated from Incoloy to resist oxidation during high temperature tests. The cylinder rotates at five revolutions per minute, and is externally heated with a custom-made 7000-watt Lindberg® furnace. The chain driven tube is suspended on both ends by brass rollers and sealed by graphite packing rings at the inlet and outlet distribution boxes.

The heat-up rate and operating temperature of the furnace are controlled with a Lindberg® 59554-B temperature controller. Temperatures of the soil bed and the gas in the rotating cylinder are measured with two type-K thermocouples calibrated against a National Institute of Standards and Technology (NIST) traceable standard. These temperatures, as well as the temperature of the oven and other off-gas system temperatures, were recorded on a multi-point recorder. Slight negative pressure in the RTA cylinder was maintained to ensure no external leakage from the system. Two rotameters measure the purge gas flow. For both RTA tests, the off-gas from the cylinder passed through a hot glass fiber filter and into a series of water impingers and was split into separate sample streams. The system was kept under slightly negative pressure by adjusting the intake pumps on the offgas sample trains

RTA Test Procedures

The main steps of the procedure are described below.

- The soil or waste for the test is sieved and homogenized. After homogenization, 1000 to 1500 grams of material is charged into the treatment cylinder which is then bolted into the RTA.

- The off gas sampling systems are connected to the RTA and the purge gas, a mixture of 90% nitrogen and 10% air, is set to the required rate of 3 liters per minute. The cylinder rotation is set at 5 rpm.

- The furnace is preheated to 200°C above the desired treatment temperature and is then raised and clamped around the treatment cylinder.

- The temperature of the soil is monitored and the set point of the furnace is adjusted. The furnace is usually opened to avoid overshooting the desired soil temperature.

- After the soil treatment time is reached, the furnace is turned off and removed from the treatment cylinder which is then cooled by a fan.

- Purge gas is shut down and the unit disassembled when soil reaches ambient conditions.

RTA Results

Summary of RTA Testing for Camp Lejeune Site 89 Soils

Treatment Temperature (°F)	PCA Concentration (mg/kg)
Untreated	2,660
250	11.5
325	26.8
400	<0.25
Untreated	2,540

SUMMARIZED TO DATE

Thermal Treatability Test Data
Site 89 Soils
Camp Lejeune

Tray Testing Results

Feed Sample	Treatment Temp (F)	Treatment Time (min)	Soil Concentration (mg/kg)				
			PCA	TCE	PCE	1,1/1,2 DCE	Trimethyl Benzenes
Treat-001	Initial Soil		310	<25	<25	<25	<25
	250	13	0.76	<.005	<.005	<.005	<.005
	300	11.5	<0.025	<0.025	<0.025	na	na
	350	11.1	<0.025	<0.025	<0.025	na	na
	300	11	<0.025	<0.025	<0.025	na	na
	227	7	<0.025	<0.025	<0.025	na	na
	221	9	1.43/2.9	<.005	<.005	<.005	<.005

na no analysis available
* Reading high due to thermocouple error in position or readout

Feed Sample	Treatment Temp (F)	Treatment Time (min)	Soil Concentration (mg/kg)				
			PCA	PCE	TCE	DCE/DCAs (1,1 and 1,2)	Trimethyl-benzenes
50-003 Initial Soil			2900	<10	27	<10	<10
	231	18	5.6	<0.25	<0.25	<0.25	8.44
	350	14.8	1.8	<0.25	<0.25	<0.25	7.83
50-004 Initial Soil			4.4	<1	17.5	<1	<1
	235	15	1.7	<0.25	<0.25	<0.25	8.93
	350	9.5	0.7	<0.25	<0.25	<0.25	7.69
50-005 Initial Soil			3600	<10	86	<10	<10
	229	17	28.1	<0.25	<0.25	<0.25	7.75
	350	16	3.3	<0.25	<0.25	<0.25	7.58
50-006 Initial Soil			14	<1	48.3	20.5	<1
	230	15.8	0.6	<0.25	<0.25	<0.25	8.08
	350	15	0.6	<0.25	<0.25	<0.25	6.76
50-007 Initial Soil			37.4	<1	47.5	11.3	<1
	237	13	0.6	<0.25	<0.25	<0.25	7.42
	350	15	0.6	<0.25	<0.25	<0.25	7.03
50-008 Initial Soil			62.5	<1	67.7	5.8	<1
	237	14	0.7	<0.25	<0.25	<0.25	7.5
	351	13.8	0.6	<0.25	<0.25	<0.25	7.03
50-009 Initial Soil			160	<1	21.7	<1	3.9
	250	12.3	0.9	<0.25	<0.25	<0.25	1.85
	350	13.2	0.7	<0.25	<0.25	<0.25	6.51

na no analysis available
* Reading high due to thermocouple error in position or readout

Feed Sample	Treatment Temp (F)	Treatment Time (min)	Soil Concentration (mg/kg)				
			PCA	TCE	PCE	1,1/1,2 DCE	Trimethyl Benzenes
Treat-001	Initial Soil		310	<25	<25	<25	<25
	250	13	0.76	<.005	<.005	<.005	<.005
	300	11.5	<0.025	<0.025	<0.025	na	na
	350	11.1	<0.025	<0.025	<0.025	na	na
	300	11	<0.025	<0.025	<0.025	na	na
	227	7	<0.025	<0.025	<0.025	na	na
	221	9	1.43/2.9	<.005	<.005	<.005	<.005
85-002A	Initial Soil		3405	92	21	na	na
	225	9	74.3	<5	<5	na	na
	250	9.7	21.4	<0.5	<0.5	na	na
	350	10.8	1.4	<0.25	<0.25	na	na
85-002 B	Initial Soil		12510	222	102	<100	<100
	221	10	11.6	<0.5	<0.5	na	na
	249	10.3	.64	<0.5	<0.5	na	na
	350	13	1.2	0.35	<0.25	na	na
85-002C	Initial Soil		2783	35	9	na	na
	286*	7	13.9	0.9	<0.5	na	na
	268*	7	14.8	<0.5	<0.5	na	na
	350	12.2	0.8	0.42	<0.25	na	na
85-002D	Initial Soil		3185	44	11	na	na
			5.23	<0.5	<0.5	na	na
			1.78	<0.5	<0.5	na	na
			0.42	0.64	<0.25	na	na
85-002E	Initial Soil		4739	186	23	na	na
	283*	7	23.3	<0.5	<0.5	na	na
	249	11	25.8	<0.5	<0.5	na	na
	350	11.75	1.33	0.63	<0.25	na	na
85-002F	Initial Soil		939	21	<5	na	na
	229	7	15.1	<0.5	<0.5	na	na
	249	9	2.73	<0.5	<0.5	na	na
	390*	12.5	1.35	0.63	<0.25	na	na
85-002A	Initial Soil		6,000	<5	<5	<5	<5
	415	15.5	1.1	<0.25	<0.25	<0.25	<0.25
	455	15.5	1.1	<0.25	<0.25	<0.25	5.85
85-002B	Initial Soil		3,000	<5	<5	<5	<5
	427	15.5	0.8	<0.25	<0.25	<0.25	1.07
	435	16	0.8	<0.25	<0.25	<0.25	6.59
85-002E	Initial Soil		2,100	<5	<5	<5	<5
	423	15.3	1.6	<0.25	<0.25	<0.25	5.13
	470	15	3.7	<0.25	<0.25	<0.25	8.14

na no analysis available

* Reading high due to thermocouple error in position or readout

Thermal Treatability Test Data
Site 89 Soils
Camp Lejeune

RTA Testing Results

Feed Sample	Treatment Temp (F)	Treatment Time (min)	Soil Concentration (mg/kg)				
			PCA	TCE	PCE	1,1/1,2 DCE	Trimethyl Benzenes
85-002 (A,B,D,E composite)	Initial Soil		2660/2540	<100	<100	<100	<100
	250	20	11.5	<0.25	<0.25	<0.25	5.87
	325	20	26.8	<0.25	<0.25	<0.25	3.50
	400	20	12.4	<0.25	<0.25	<0.25	7.33

na no analysis available

* Reading high due to thermocouple error in position or readout