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Site Specific
Health and Safety Plan
for
Soil and Groundwater Remediation
Operable Unit No. 2

Marine Corps Base
Camp Lejeune, North Carolina

Submitted to:

Department of the Navy
Atlantic Division
Naval Facilities Engineering Services Center
Norfolk, VA

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1.0 INTRODUCTION

OHM has developed this Site-Specific Health and Safety Plan (SHSP) specifically for soil and groundwater remediation at the MCB Camp Lejeune, Operable Unit No. 2, Sites 6 and 82. This SHSP establishes the policies and procedures which protect workers and the public from potential hazards posed by work at this site. The health and safety procedures contained in this SHSP are a part of OHM's Corporate Health and Safety Program, which complies with 29 CFR 1910.120(b)(1) through (b)(4). All project activities will be conducted in a manner that minimizes the probability of injury, accident or incident occurrence.

Although the plan focuses on the specific work activities planned for this site, it must remain flexible because of the nature of this work. Conditions may change and unforeseen situations may arise that require deviations from the original plan. This flexibility allows modification by the OHM supervisors and health and safety officials.

This SHSP has been prepared in accordance with OSHA's "Hazardous Waste Operations and Emergency Response" standard contained in 29 CFR 1910.120, the U.S. Army Corps of Engineer's "Safety and Health Requirements Manual," and the program health and safety plan developed for this contract.

1.1 SITE DESCRIPTION

Camp Lejeune is a training base for the U. S. Marine Corps, located in Onslow County, North Carolina. The base covers approximately 170 square miles and includes 14 miles of coast line. MCB Camp Lejeune is bound to the southeast by the Atlantic Ocean, to the northeast by State Route 24, and to the west by U. S. Route 17. The town of Jacksonville, North Carolina, is located north of the base. The remedial action area, Operable Unit No. 2 (O. U. No. 2) is one of 13 operable units within Camp Lejeune. O. U. No. 2 covers an area of approximately 210 acres and is comprised of three sites: Sites 6, 9 and 82. O. U. No. 2 is located approximately 2 miles east of the New River and 2 miles south of State Route 24. The Operable Unit is bordered to the north by Wallace Creek, to the west by Holcomb Boulevard, to the east by Piney Green Road, and to the south by Sneads Ferry Road.

Site 6

Within Site 6, there are four main areas of concern: Open Storage Lot 201; Open Storage Lot 203; the wooded areas which surround these storage lots; and a ravine. Open Storage Lot 201 is a fenced lot located in the southern central portion of Site 6. This lot is currently used to store military equipment and vehicles, lumber, hydraulic oils and lubricants, non-polychlorinated biphenyl (non-PCB) transformers, and other supplies. Lot 201 is approximately 25 acres in size.

Open Storage Lot 203 is a fenced lot situated in the north portion of Site 6, bordering Site 82 to the south. Based on a review of historical aerial photographs, it appears that the fenced boundaries of this lot have changed since the lot was in operation. Currently the fenced portion of Lot 203 is approximately 41 acres in size. In the past, the storage lot was reportedly used for the disposal of various chemicals including PCBs, cleaning solvents, electrolytes from used batteries, and waste oils. Storage Lot 203 is no longer used as an active storage area.

A ravine is located in the northwest section of Site 6 (along the northern boundary of Lot 203) and bisects Site 82. The upper portion of the ravine was, at one time, used as a disposal area. The presence of battery packs, drums, fencing, tires, wire cables, respirator cartridges, empty drums, commercial ovens, commodes, and other surficial debris is evidence of past disposal practices.

Woods and open fields surround both Storage Lots 201 and 203 and make up the remaining area of Site 6. these areas are randomly littered with debris including spent ammunition casings, empty or rusted drums.

Site 9

Site 9 is the "Fire Fighting Training Pit at Piney Green Road." The site covers an area of approximately 2.6 acres. No remediation activities are planned at Site 9 under this delivery order.

Site 82

Site 82, the Piney Green Road Volatile Organic Compound (VOC) Site, is located directly adjacent to Site 6 and encompasses approximately 30 acres. The site is predominantly covered by woodlands and is randomly littered with debris such as communication wire, spent ammunition casings, and empty or rusted drums.

1.2 SITE HISTORY

Site 6 has a history of various uses, including the disposal and storage of waste and supplies. Pesticides have reportedly been stored in the northeast and southeast portions of Lot 201. Open Storage Lot 203 previously served as a waste disposal and storage area from as early as the 1940s to the late 1980s. Reports detailing activities within Lot 203 are vague; there is little indication as to the types and quantities of material disposed of through the lot, with the exception of pesticides. Pesticides were reported to have been stored in a trailer on Lot 203 as well as in the southeast portion of the lot. Former employees at Lot 203 have reported disposal of various chemicals including PCBs, cleaning solvents, electrolytes from used batteries, and waste oils.

Site 9 has been used for fire fighting training exercises from the early 1960s to the present. Until 1981, training exercises were conducted in an unlined pit. The pit is currently asphalt-lined. Flammable liquids including used oil, solvents, and contaminated fuels (unleaded) were used as accelerant during training exercises. Approximately 30,000 to 40,000 gallons of JP-4 and JP-5 fuels were also burned in the fire training pit.

No organized disposal operations are documented for Site 82. It appears that the site area was used for disposal of miscellaneous debris from Lot 203, since similar items were identified at both sites. No known documentation of the quantity or the location of the disposal of VOCs is available.

1.3 SCOPE OF WORK

Upon completion of the Remedial Action Work Plan (RAWP), OHM will implement the plan through performance of the following major tasks:

- **Mobilization and Site Preparation** which will include construction and installation of an office facility; personnel and equipment decontamination facilities; utilities installation; access road construction and grading; establishment of erosion control and installation of berms; installation of fencing; and delineation of work zones.

- **Perform Site Survey** for layout of extraction and treatment systems, and to establish excavation limits; and perform additional investigations to further delineate soil contaminants (direct-push soil sampling from 0 to 10 feet at Site 82).

- **Contaminated Soil Excavation** will be initiated in the former storage area at Site 6. PCB and pesticide contaminated soils will be excavated from AOCs 3 through 6 and soil and debris will be removed from AOC 2. The soil will be directly loaded for transport, and the trucks decontaminated prior to departure. Each proposed excavation area will be handled in this manner.

- **Treatment Plant Building Construction** will be performed by a subcontractor. OHM will install the piping runs (estimated 1,300 feet) for potable water and sewer connections.

- **Installation of Phase I Groundwater Extraction System** will involve installing one deep (110 feet) and one shallow (35 feet) extraction well and installation of groundwater recovery piping

- **Installation of the Groundwater Treatment Plant Components** and various process equipment will be initiated near the completion of the plant building construction. The components will be plumbed and wired by certified pipe-fitters and licensed electricians. These components include process piping, pumps, vessels, carbons cells, sand filter and an air stripper tower.

- **Groundwater Treatment Plant System Start-up** will be supervised by an OHM Engineer and will be tested with potable water to simulate all failure modes.

- **Aquifer Testing and Additional Well Installations** will be performed to optimize location of Phase II wells.

- **Installation of Phase II Groundwater Extraction System** will involve installing two additional deep and two additional shallow extraction wells along with the associated groundwater recovery piping.

- **System Operation and Maintenance (O&M)** will be performed by OHM for approximately 90 days.

2.0 KEY PERSONNEL AND MANAGEMENT

OHM maintains a policy of providing its employees, subcontractors, and authorized visitors with information and procedures in order to protect them and the adjacent community from any adverse effects that might result from work at a job site involving potentially hazardous substances. All personnel involved with this project will follow the health and safety procedures set forth in this plan. Visitors will not be given entry unless they read and agree to comply with this plan. The site safety plan acknowledgement will be signed by all personnel required to enter contaminated work areas.

2.1 SITE SAFETY OFFICER

OHM designates a site safety officer (SSO) who defines, implements and enforces the project safety program and procedures. The SSO will conduct the daily safety meetings and will interface as required with other site representatives. The SSO takes the following action(s) when appropriate:

- Orders the immediate shut-down of site activities in the case of a medical emergency or unsafe practice.
- Ensures protective clothing and equipment are properly stored and maintained.
- Ensures that the environmental and personnel monitoring operations are on-going and in accordance with this SHSP.
- Restricts visitors from areas of potential exposure to harmful substances.

A safety log will be kept for all OHM activities. This log will include daily safety meeting topics, training given, air monitoring information, first aid administered, visits of all outside personnel and any incidents of a health and safety nature.

The SSO has responsibility for implementing and enforcing the site safety program and procedures. He will oversee any personnel monitoring and will decide when action levels have been reached which require more stringent personnel protection. The SSO establishes and enforces the use of protective equipment for various site activities. The SSO will maintain contact with OHM Regional and Corporate Certified Industrial Hygienists (CIH).

2.2 SITE SUPERVISOR

The site supervisor (SS) has responsibility for all field activities and enforces safe work practices by all crew members. He watches for any ill effects on any of the crew members, especially those symptoms caused by heat stress or chemical exposure. The SS oversees the safety of any visitors who enter the site. The SS maintains communication with the OHM project manager and client representative(s). The SS will ensure that the SSO establishes proper communications with local health care providers, the NOSC/NOSDR, the LEPC and other local agencies who may be required to provide emergency support on-site.

2.3 EQUIPMENT OPERATORS

Equipment operators will be responsible for the maintenance, inspection, and safe operation of their equipment. Operators are responsible for daily inspection of their equipment and assuring it is in safe operating condition.

2.4 EMPLOYEE SAFETY RESPONSIBILITY

Each employee is responsible for his own safety as well as the safety of those around him. The employee shall use all equipment provided in a safe and responsible manner as directed by his supervisor. All OHM personnel will follow the policies set forth in OHM's Health and Safety Procedures Manual which will be maintained in the site office trailer. Health and Safety Procedures relevant to site operations are attached to this SHSP.

2.5 RESPONSIBLE OHM HEALTH AND SAFETY PERSONNEL

The following personnel are responsible for health and safety on site:

Project Manager:	James Dunn (404) 729-3900
Site Supervisor:	Randy Smith (on-site)
Site Safety Officer:	Steve Grant (on-site)
Regional Health and Safety Director:	J. Angelo Liberatore, CIH, CSP (404-729-3900, Ext. 271)
Regional Manager:	Mike Szomjassy (404-729-3900)

3.0 JOB HAZARD ANALYSIS

This section discusses concerns to workers on the site.

3.1 CHEMICAL HAZARDS

Previous site investigations by others have identified soil and groundwater contamination at Sites 6 and 82. The types of VOCs and heavy metals potentially present at these sites are largely uncharacterized and are considered to be "unknown" chemical hazards.

Table 3.1 lists the types of contamination anticipated to be encountered during field activities.

Table 3.1
Potential Site Contaminants

Site 6	Site 82
Chlorinated Pesticides	VOCs:
(DDT, DDE, DDD)	1,1,1-Trichloroethane
Chlordane	1,1,2,2-Tetrachloroethane
Polychlorinated Biphenyls (PCBs)	1,2-Dichloroethene
Polynuclear Aromatic Hydrocarbons (PAHs)	1,4-Dichlorobenzene
Volatile Organic Compounds (VOCs)	Tetrachloroethene
Heavy Metals	Toluene
	Trichloroethene
	Vinyl Chloride
	Heavy Metals

Site 6

Chlorinated Pesticides (DDT, DDE and DDD) were identified in soils at the northeastern corner of Lot 201 (AOC 5). DDT has an OSHA Permissible Exposure Limit (PEL) of 0.5 mg/m^3. DDT is a poison by ingestion and is known to cause cancer in humans. It can also be absorbed through skin. Symptoms of overexposure include tremor, dizziness, confusion, headache, fatigue, and

convulsions. Liver and kidney damage may also occur as a result of overexposure

Chlordane has also been identified in soils and groundwater at AOC 5. Chlordane has an OSHA PEL of 0.5 mg/m^3. Chlordane is a suspected human carcinogen which is poisonous by ingestion, and by inhalation. It is readily absorbed through the skin on dermal contact, and overexposure may produce tremors, excitement, loss of muscle coordination (alexia), gastritis, convulsions, and anorexia. Lung, liver and kidney damage may result from chronic overexposure.

Polychlorinated Biphenyls (PCBs) have been identified in soils at the upper portion of the ravine at Site 6 (AOC 2), the north central portion of Lot 203 (AOC 3),the northwestern portion of Lot 203 (AOC 4) and in the wooded area east of Lot 201 (AOC 6). PCBs have a PEL of 0.5 mg/m^3 (54 percent chlorine). PCBs are potent liver toxins which may be readily absorbed through skin on dermal contact. A characteristic skin rash is evident after prolonged skin contact with PCBs. Potentially chronic or delayed toxicity is significant because PCBs accumulate in fatty tissues and may reasonably be anticipated to be carcinogenic. Overexposure may also cause chronic eye, nose, throat and upper respiratory irritation, as well as a variety of neurological effects.

Polynuclear Aromatic Hydrocarbons (PAHs) were detected in soils at AOCs 2 and 4. PAHs are referenced as coal tar pitch volatiles with an OSHA PEL of 0.2 mg/m^3. The polynuclear aromatic hydrocarbons are known to cause cancer. Chronic overexposure to PAHs is also associated with bladder, kidney, respiratory and skin diseases. Symptoms of overexposure include irritation, burning, redness, itching, pigment changes or burns. Systemic absorption may occur through inhalation, ingestion or dermal contact and may result in breathing difficulty, nausea, vomiting, abdominal pain, dizziness, headache and convulsions.

Site 82

Volatile Organic Compounds (VOCs) have been detected in soils and groundwater at Site 82 (AOC 1) and at Site 6 on the northeastern corner of Lot 201 (AOC 5). Health hazards associated with chronic exposure to VOCs include narcotic or anesthetic effects manifested by some of the ketones, as well as irritation to the eyes, nose, and throat, intoxication, and confusion. The following VOCs have been identified:

- **1,1,1-Trichloroethane** has an OSHA PEL of 350 ppm with a short term exposure limit (STEL) of 450 parts per million (ppm). symptoms of overexposure include headache, central nervous system (CNS) depression, irritation to the eyes, dermatitis and poor equilibrium. Inhalation of high concentrations may induce cardiac arrhythmias and arrest.

- **1,1,2,2-Tetrachloroethane** is a suspected carcinogen with an OSHA PEL of 1 ppm. It is readily absorbed through intact skin and is a strong irritant to the eyes and upper respiratory tract. Overexposure to vapors may be associated with lacrimation, salivation, and irritation of the nose and throat. Prolonged exposure may result in restlessness, dizziness, nausea and vomiting, and narcosis. Chronic overexposure can cause cirrhosis of the liver, kidney and heart damage, and pulmonary damage.

- **1,2-Dichloroethene** has an OSHA PEL of 200 ppm. It is irritating to the eyes and respiratory system. Overexposure may cause CNS depression.

- **1,4-Dichlorobenzene** is a suspected carcinogen with an OSHA PEL of 75 ppm. Symptoms of overexposure include headache, irritation to the eyes, anorexia, nausea, vomiting, and jaundice. Overexposure is suspected to cause liver cancer and kidney damage.

- **Tetrachloroethylene** is a suspected carcinogen with an OSHA PEL of 25 ppm. It is irritating to the skin and mucous membranes and overexposure causes symptoms of acute intoxication as a result of its effects on the CNS. Symptoms of overexposure include vomiting; nausea;

drowsiness; irritation to the eyes, nose, throat; and dermatitis. Chronic overexposure is associated with liver and kidney damage.

- **Toluene** has an OSHA PEL of 100 ppm with a STEL of 150 ppm. Symptoms of overexposure include fatigue, weakness, euphoria, dizziness, headache, dilated pupils, excessive tearing, and dermatitis. Chronic overexposure may be associated with liver and kidney damage. Toluene is also a flammable liquid with a flashpoint of 40 °F and an explosive range of 1.2 to 7.1 percent.

- **Trichloroethene** is a suspected carcinogen with an OSHA PEL of 50 ppm and an STEL of 200 ppm. NIOSH recommends a time-weighted average (TWA) exposure limit (TWA) of 25 ppm. Symptoms of overexposure include headache, vertigo, visual disturbances, tremors, nausea, vomiting, and irritation to the eyes and respiratory system. Prolonged or chronic exposure may cause cardiac arrythmia; liver, kidney, and heart damage. It is slightly flammable with a flashpoint of 90 °F and an explosive range of 8 to 10.5 percent.

Vinyl Chloride is a confirmed human carcinogen which may produce liver and blood tumors. It can cause some irritation to the skin, eyes, and mucous membranes. Dermal contact may cause burns. Exposure to high concentrations causes anesthetic effects. The 8-hour (TWA) PEL for vinyl chloride is 1.0 ppm. The ceiling limit (15 minutes) is 5.0 ppm. Vinyl chloride is also flammable with an explosive range from 3.6 to 33 percent.

Heavy Metals have also been detected in soils and groundwater at low parts per billion (ppb) levels throughout the site. Although concentrations are expected to be low, exposure to heavy metals present in soils can potentially occur through particulate emissions during excavation and load-out operations or when handling water treatment filtration media. Chronic overexposure may cause irritation of the respiratory system and skin. Certain heavy metals cause systemic health effects, which primarily effect the CNS. Material Safety Data Sheets (MSDSs) for the metals identified for cleanup goals are provided in Appendix A.

In addition to the chemical contaminants present in soil and groundwater at the site, fired and unfired ordnance have been reported at Sites 6 and 82. All identification and management of unexploded ordnance (UXO) will be controlled by the identified UXO contractor on-site. The UXO contractor will clear AOCs 1 through 6 prior to OHM initiating any operations in these areas. The UXO contractor will also present applicable standard operating procedures and safety guidelines to all personnel during the initial health and safety on-site training meeting. Should the UXO contractor be unable to clear each proposed work area prior to commencement of work, work will not be initiated in that area until an approved phased safety plan is developed for planned work in the uncleared area.

3.2 HAZARD COMMUNICATION

The purpose of hazard communication (Employee Right-to-Know) is to ensure that the hazards of all chemicals located at this field project site are transmitted (communicated) according to 29 CFR 1926.59 to all OHM personnel and OHM subcontractors. Hazard communication will include the following:

- **Container Labeling**
  OHM personnel will ensure that all drums and containers are labeled according to contents. These drums and containers will include those from manufacturers and those produced on site by operations. All incoming and outgoing labels shall be checked for identity, hazard warning, and name and address of responsible party.

- **MSDSs**
  There will be an MSDS located on site for each hazardous chemical known to be used or otherwise present on-site. All MSDSs are located in Appendix A of this SHSP. This SHSP will be maintained in the project office trailer for the duration of site activities.

- **Employee Information and Training**
  Training employees on chemical hazards is accomplished through an ongoing corporate training program. Additionally, chemical hazards are

communicated to employees through daily safety meetings held at OHM field projects and by an initial site orientation program.

At a minimum, OHM and related subcontractor employees will be instructed on the following:

- Chemicals and their hazards in the work area
- How to prevent exposure to these hazardous chemicals
- What the company has done to prevent workers' exposure to these chemicals
- Procedures to follow if they are exposed to these chemicals.
- How to read and interpret labels and MSDSs for hazardous substances found on OHM sites
- Emergency spill procedures
- Proper storage and labeling

Before any new hazardous chemical is introduced on site, each OHM and related subcontractor employee will be given information in the same manner as during the safety class. The site supervisor will be responsible for seeing that the MSDS on the new chemical is available for review by on site personnel. The information pertinent to the chemical hazards will be communicated to project personnel.

Morning safety meetings will be held and the hazardous materials used on site will be discussed. Attendance is mandatory for all on site employees.

Refer to Appendix A of this plan to find a list of hazardous chemicals anticipated to be brought to the site and the MSDSs for these chemicals.

3.3 PHYSICAL HAZARDS

There are numerous physical hazards associated with this project which, if not identified and addressed, could present operational problems as well as cause accidents and personal injury to the work force. Hazard identification and mitigation, training, adherence to work rules and careful housekeeping can prevent many problems or accidents arising from physical hazards. The following outlines the major physical hazards and the suggested preventative measures to be followed during this project:

- **Heavy and Bulky Loads**
  Intelligent thought shall be exercised before heavy and bulky loads are lifted or handled manually by personnel. Mechanical equipment such as fork-lifts, wheel barrows, hand-trucks, loaders, and cranes shall be utilized when possible and needed. **Note: Back injuries are real, debilitating, unproductive, and costly to both employees and employers, and sometime permanent. Back injury prevention must be given high priority on all project sites. If you think the load you are about to lift is too heavy or bulky, it probably is! Get help or utilize mechanical equipment.**

- **Explosion Hazard**
  Flammable materials in confined spaces (i.e., excavation areas) can produce an explosive atmosphere which can be triggered by a spark or other energy source. To prevent this type of accident, the concentration of flammable material in air will be carefully monitored and confined space entry procedures will be followed.

- **Hoisting Accidents**
  Employees can have suspended loads dropped on them, be pinned between a load and a stationary object, or be crushed or struck by the counterweight. All hoisting will be done by qualified personnel only after safety checks are made of chokes and cables. In addition, no hoisting will take place without a designated signal man present.

- **Heavy Equipment**
  Heavy construction equipment present construction safety hazards to operating and support personnel. OHM has standard operating procedures (SOPs) for the use of heavy construction equipment. Only trained and qualified operators are authorized to operate heavy construction equipment. The operator is responsible for performing daily equipment inspections on their equipment to identify, take out of service, and correct any equipment defects of non-functioning safety devices that would render the equipment unsafe to operate. Standard safety devices and equipment required to be inspected and functional during use includes:

  - Seat belts,
  - Safety glass in enclosed cab,
  - Braking system,
  - Back-up alarms,
  - Portable fire extinguisher,
  - Horn
  - Tires, and
  - Steering and hydraulic systems.

  Operators are required to wear seatbelts when operating equipment and are responsible for the location of ground personnel in their work area. The are within the turning radius of trackhoes is kept clear to prevent contact between the equipment counterweight and ground personnel.

- **Bulk Fuel Storage**
  A bulk fuel storage area will be designated for storage of bulk fuels and other flammable materials. The bulk fuel vessels will be grounded with bonding cables attached. The area will be prominently posted as a flammable fuels area and no smoking signs erected. At least one 20-pound dry chemical, ABC-type fire extinguisher will be positioned in this area.

- **Flame, Heat or Spark Producing Operations**
  Because of the possibilities of flammable materials being present at this site, flame, heat, or spark producing operations will be limited. If a case arises where hot work is necessary, OHM will follow the hot work procedures and permit detailed in Appendix B.

- **High Pressure Washing**
  Washing or cleaning certain pieces of equipment may require the use of high pressure washers referred to as lasers. These devices can be hazardous if not used properly. Refer to Appendix B for specific laser safety instructions.

- **Small Quantity Flammable Liquids**
  Small quantities of flammable liquids will be stored in "safety"cans and labeled according to contents.

- **Electrical Hazards**
  Overhead power lines, downed electrical wires, and buried cables all pose a danger of shock or electrocution if workers contact or sever them during site operations. Electrical equipment used on-site may also pose a hazard to workers. To help minimize this hazard, low-voltage equipment with ground-fault interrupters and water-tight, corrosion-resistant, connecting cables will be used on-site. In addition, lightning is a hazard during outdoor operations, particularly for workers handling metal containers or equipment. To eliminate this hazard, weather conditions will be monitored and work will be suspended during electrical storms. An additional electrical hazard involves capacitors that may retain a charge. All such items will be properly grounded before handling. OSHA's standard 29 CFR Part 1910.137 describes clothing and equipment for protection against electrical hazards.

  Electrical devices and equipment must be de-energized prior to working near them. All extension cords must be kept out of water, protected from crushing, and inspected regularly to ensure structural integrity. Temporary electrical circuits must be protected with ground fault

interrupters. Only qualified electricians are authorized to work on electrical circuits.

- **Slip/Trip/Fall Hazards**
  Some areas may have wet surfaces which will greatly increase the possibility of inadvertent slips. Caution must be exercised when using steps and stairs due to slippery surfaces in conjunction with fall hazards. Good housekeeping practices are essential to minimize trip hazards.

- **Confined Spaces**
  Some activities may require personnel to enter spaces which may be confined and have other associated physical and chemical hazards. Whenever confined space entry is necessary, a confined space permit shall be completed and confined space entry procedures must be followed before personnel begin work. See Appendix B for more information.

- **Ground Personnel**
  All ground personnel should be constantly aware of the possibility of slips, trips, and falls due to poor and possibly slippery footing in the work areas. Before crossing either in front of or behind a piece of heavy equipment, ground personnel will signal the equipment operator and receive confirmation before moving.

- **Stairs and Ladders**
  Access to high places will be provided by approved ladders and stairs in accordance with ANSI 14.1-3. Stairs and platforms will be constructed in compliance with OSHA regulations.

- **Excavations and Trenching**
  Excavations and trenching present a special risk to workers due to the hazard of trench wall collapse. If any OHM personnel must enter excavations 5 feet in depth or greater, the sides of the excavation will be sloped 1:1/2:1 (horizontal:vertical) or shored in accordance with 29 CFR 1926.650 through 652. Excavation or trench entries performed in

excavations greater than 4 feet deep will be performed in accordance with OHM's Confined Space Entry procedures. See Appendix B for more information.

- **Pumping Equipment**
  Various types of pumps may be used for the removal of materials from ditches, ponds, lagoons, etc. The handling of pressurized hoses that could rupture and violently release liquid materials to the work will be controlled by inspecting all hose fittings for secure connections [all OPW (camlock) and fittings must be secured with the wire]. All employees must wear splash gear including splash shields when moving or disconnecting pumps and hoses.

- **Noise**
  Work around large equipment often creates excessive noise. The effects of noise can include:

  - Workers being startled, annoyed, or distracted.

  - Physical damage to the ear, pain of the ear, or temporary and/or permanent hearing loss.

  - Communication interference that may increase potential hazards due to the inability to warn of danger and the proper safety precautions to be taken.

  If employees are not able to hear normal conversation without shouting, noise levels exceeding 85 dBA are likely and hearing protection is required to be worn. The use of portable power tools and the operation of certain heavy construction equipment (i.e. bulldozers), requires mandatory use of hearing protection. OHM maintains an effective hearing conservation program as described in OSHA Regulation 29 CFR Part 1910.95.

All OHM personnel are familiar with the field activities which will be conducted at the site. They are trained to work safely under various field conditions. In addition, the AS will observe the general work practices of each crew member and equipment operator, and enforce safe procedures to minimize physical hazards. Also, hard hats, safety glasses, and safety boots will be required in all areas of the site. Specific health and SOPs that apply to site remedial operations procedures are included in Appendix B.

3.4 ENVIRONMENTAL HAZARDS

Cold stress is not an environmental hazard during site operations due to the warm weather anticipated at the site. However, due to the combination of warm ambient temperature and use of protective clothing anticipated during site operations makes the potential for heat stress a concern. The potential exists for:

- Heat rash
- Heat cramps
- Heat exhaustion
- Heat stroke

Heat stroke, heat cramps, and heat exhaustion are covered in detail during OHM's 40-hour OSHA 29 CFR 1910. 120 approved pre-employment course. In addition, this information is discussed during a safety "tailgate" meeting before each work day. Workers are encouraged to increase consumption of water and electrolyte-containing beverages such as Gatorade during warm weather. Water and electrolyte-containing beverages will be provided on-site and will be available for consumption during work breaks.

An action level for heat stress has been established at 75°F ambient temperature when site personnel are wearing chemical protective clothing during the performance of field activities. The following work/rest schedule is recommended, with personnel drinking fluids (tepid water and/or electrolyte) at rest periods consistent with their fluid loss:

Ambient Temperature (degrees F)	Work Period (minutes)	Rest Period (minutes)
75 - 80 F	120	15
80 - 85 F	90	15
85 - 90 F	60	15
90 - 95 F	30	15
95 - 100 F	15	15

The above work/rest schedule is only a guideline for use during field activities when personnel are wearing protective clothing. The actual work/rest schedule will be determined by conducting pulse monitoring before and after the work period and by performing daily pre/post work shift body weights. The action level for adjusting the work/rest schedule would be 110 beats per minute (bpm), obtained immediately after the work period in a seated, shaded position. When a person's pulse exceeds 110 bpm, that person is undergoing heat stress, which will require the work period to be reduced in 15 minute intervals, while maintaining the same rest period, until post work period pulse monitoring is maintained below 110 bpm. In addition, should a person's body weight change at the end of the work day by more than 1.5%, the work period must be reduced in 15 minute intervals, while maintaining the same rest period, until no daily body weight changes greater than 1.5% are observed.

Field activities, in which site personnel are required to wear chemical protective clothing at ambient temperatures higher than 95 degrees F, will be avoided, whenever feasible, by scheduling these activities during the work day to avoid peak ambient temperatures (10 a.m. -- 2 p.m.). Site personnel who have experienced a heat-related illness (heat cramps, heat exhaustion) will be restricted to Level D tasks for a minimum of one day after illness occurrence and will return to tasks requiring chemical protective clothing only with the concurrence of the attending physician. Site personnel will follow OHM's SOPs for heat stress prevention.

3.5 TASK SPECIFIC RISK ASSESSMENT

Task No. 1:	Mobilization/Site Preparation
Hazards:	Slip, trip, fall; Material handling; Manual lifting; and Vehicle/equipment operation; Electrical hazards; Excavation, grading; Construction operation hazards
Control Procedures:	Ensure personnel awareness of secure footing; Follow safe material handling and manual lifting procedures; Comply with OHM SOP for vehicle and equipment operation; Electrical connections and power distribution to be performed only by a licensed electrician; Follow safe construction practices; Locate all overhead and underground utilities prior to initiating excavation/ grading operations; Maintain a 15-feet buffer (boom swing radius) from all energized overhead lines when operating heavy equipment or de-energize all lines within 15 feet of operations
Task No. 2:	Access Clearance, Utility Verification and Site Survey Operations
Hazards:	Slip, trip, and fall; Manual lifting; Material handling; Chain saws/clearing activities; Noise, Flying debris; Contact with overhead/buried utilities or pipelines; Electrical hazards
Control Procedures:	Ensure personnel awareness of secure footing; Follow safe material handling and manual lifting procedures; Wear chain saw chaps, hard hats, face shield, leather gloves, and hearing protection while conducting manual clearing activities; Locate and mark all utilities prior to any boring activities; Maintain a 15-foot buffer from derrick of drill rig or de-energize lines if unable to maintain the 15-foot buffer; Only qualified electricians are to connect/disconnect electrical service

Task No. 3:	Multi-Media Sampling
Hazards:	Slip, trip, fall; Material handling; Manual lifting; Hand augering; Drilling operation hazards; Inhalation, dermal contact with on-site contaminants (spill and splash), when bailing wells, handling soils, or collecting surface water samples; Back strain when performing direct push or hand auger sampling operations
Control Procedures:	Ensure personnel awareness of secure footing; Follow safe material handling and manual lifting procedures; Comply with OHM SOP for vehicle safety and drilling operations; Utilize real-time air monitoring instruments and personal protective equipment to prevent contact with contaminants; Wear splash shields and saranex coveralls if wet conditions are encountered
Task No. 4:	Debris and Soil Excavation at AOCs 3, 4, 5 and 6
Hazards:	Inhalation, dermal contact; Heavy equipment operation; Excavation, cave-in hazards; Material handling hazards; Dust emissions
Control Procedures:	Wear task-specific level of protection (Section 5.2); Stage fire protection equipment on excavator; Perform real-time air monitoring as stated in air monitoring requirements (Section 7.0); Follow OHM SOP for heavy equipment and excavation operations; Practice safe material handling procedures; Do not suspend loads over ground personnel; Maintain track a minimum 15-foot buffer between the trackhoe stick and overhead electrical lines; Keep excavator a minimum of 2 feet from edge of bank or bench during excavation; No personnel entry into excavations deeper than 5 feet unless sloped/shored 1-1/2:1 (horizontal to vertical); Excavation operations must be supervised by trained OHM personnel

Task No. 5:	Direct Soil Load-out and Transportation Procedures
Hazards:	Material handling; Heavy equipment operation; Dust emissions/inhalation hazards; Fuel storage, dispensing hazards; Vehicular traffic; Pressure washer operation and splash hazards if decontaminating trucks prior to departure
Control Procedures:	Wear task-specific level of protection (Section 5.2); Practice safe material handling; Follow OHM SOP for operation of heavy construction equipment; Follow OHM SOP for dispensing/storage of flammable materials; Institute traffic control measures and follow posted speed limits; Ground personnel in vicinity of vehicular traffic must wear high visibility vests; Wear splash shield over respirator face piece when operating pressure washer or working near splash, spill hazards; Follow OHM SOP for operation of high pressure washer
Task No. 6:	Unload Equipment/Gravel Placement
Hazards:	Slip, trip, fall; Vehicular traffic; Material handling, manual lifting; Heavy equipment operation; Excavation, trenching; Contact with overhead/buried utilities or pipelines; Construction hazards
Control Procedures:	Institute traffic control procedures and post directional and speed limit signs; Follow safe material handling and manual lifting procedures; Follow OHM SOP for vehicle and equipment operation; Maintain a 15-foot buffer (bucket swing radius) from all energized overhead lines or de-energize lines within 15 feet of heavy equipment operations; Locate all underground utilities and pipelines prior to initiating excavation or grading operations

Task No. 7:	Horizontal Well Installation
Hazards:	Inhalation, dermal contact; Heavy equipment operation; Excavation, cave-in hazards; Material handling hazards; Dust emissions
Control Procedures:	Wear task-specific level of protection; Stage fire protection equipment on excavator; Perform real-time air monitoring as stated in air monitoring requirements; Follow OHM SOP for heavy equipment and excavation operations; Practice safe material handling procedures; Do not suspend loads over ground personnel; Maintain track a minimum 15-foot buffer between the trackhoe stick and overhead electrical lines; Keep excavator a minimum of 2 feet from edge of bank or bench during excavation; No personnel entry into excavations deeper than 5 feet unless sloped/shored 1-1/2:1 (horizontal to vertical); Excavation operations must be supervised by trained OHM competent person
Task No. 8:	PVC Piping Installation (aboveground)
Hazards:	Material handling/manual lifting; Slips, trips, falls; Dermal contact or splash when applying adhesives to join piping
Control Procedures:	Practice safe material handling/manual lifting procedures; Ensure employees aware of slip, trip, fall hazards and maintain stable footing; Practice good housekeeping; Wear chemical resistant goggles and splash shield when applying adhesive to join piping
Task No. 9:	Consolidate Drill Cuttings
Hazards:	Heavy equipment operation; Material handling; Overhead hazards to ground personnel; Dust emissions
Control Procedures:	Follow OHM SOP for Heavy Equipment Operation; Empty drums into roll-offs using heavy equipment with a drum tilt attachment to bucket; Monitor visible dust emissions

	with miniram and apply water spray as necessary to suppress dust
Task No. 10:	Groundwater Extraction Well Installation
Hazards:	Back strain when handling augers; Drilling hazards; Contact with buried utilities; Inhalation, dermal contact hazards, Fire/explosion of flammables present at or above LEL
Control Procedures:	Practice safe material handling, manual digging, manual lifting procedures; Follow OHM SOP for drilling safety; Locate all buried utilities prior to drilling; Hand dig to a depth of 5 feet in those general areas to confirm the absence of utilities at the proposed well location; Wear task-specific level of protection; Wear splash shield if wet conditions are encountered; Maintain at least 15 feet clearance between drill rig mast and overhead electrical lines; Monitor with LEL/O2 and PID meter as specified in Section 7.0 during drilling operations; Stage fire protection equipment on drill rig
Task No. 11:	Installation of Groundwater Recovery Piping (Trenching and Piping)
Hazards:	Excavation/cave-in; Heavy equipment operation; Inhalation, dermal contact with contaminated soils; Material handling/manual lifting; Noise if saw-cutting of concrete required; Slips, trips, falls; Confined space entry hazards
Control Procedures:	Follow OHM SOP for excavation/trenching, no personnel entry into trench over 5 feet deep unless sloped/shored 1-1-1/2:1 (horizontal/vertical); Heavy equipment operation; Monitor concrete cutting and soil excavation with PID/FID and LEL/O2 to confirm area is not contaminated with petroleum hydrocarbons; Practice safe material handling/manual lifting procedures; Wear hearing protection when saw-cutting concrete; Station standby fire

	protection in the immediate area during saw-cutting operations; Ensure employees are aware of slip, trip, fall hazards and proper lifting techniques to prevent back strains; Follow OHM SOP for confined space entry if trenches deeper than 4 feet are entered by personnel to install piping
Task No. 12:	Installation of Well Head Enclosures, Well Pumping Equipment and Power and Control Wiring
Hazards:	Same as Task No. 7 and electrical hazards
Control Procedures:	Same as Task No. 7 and extraction well power and control wiring to be installed by a licensed electrician only
Task No. 13:	Construction of Treatment Plant Building (to be performed by a qualified subcontractor)
Hazards:	Construction operations hazards
Control Procedures:	Follow safe construction practices and ensure compliance with 29 CFR 1926 (Construction Industry Standards) and other applicable OSHA regulations
Task No. 14:	Water Treatment Process Piping, Pumping and Electrical Equipment Installation
Hazards:	Same as Task No. 9 and hot work; Heavy equipment and hoisting hazards; Electrical hazards; Material handling/manual lifting
Control Procedures:	Follow OHM SOPs for hot work, electrical lockout, cranes and hoisting. Utilize certified welders/pipe-fitters and licensed electricians for piping, plumbing and wiring of all equipment; Follow OHM SOP for hot work; Provide a registered engineer for oversight of installation operations to ensure compliance with final design plans; Do not exceed mechanical equipment/crane load specifications; Do not suspend loads over ground personnel; Practice safe material handling/manual lifting procedures

Task No. 15:	Installation of Air Stripper, Carbon Filter Systems and Large Process Tanks
Hazards:	Heavy equipment operation; Hot work; Confined space entry; Hoisting hazards; Material handling/manual lifting; Electrical hazards and high voltage equipment; Construction hazards; Pumping equipment installation/operations
Control Procedures:	Follow OHM SOP for heavy equipment operation, hot work, confined space entry, and electrical lockout; Follow OHM SOP for cranes and hoisting; Prepare lift plan prior to employing crane for hoisting of equipment; Utilize a qualified electrician for power distribution and electrical connections; Clearly mark all high voltage equipment; Use explosion-proof pumps and motors; Follow safe construction practices; Wear Level C with splash shield when testing pumping equipment (system open); Locate all buried and overhead utilities; Maintain a 15-foot buffer between equipment/crane boom or de-energize all overhead lines
Task No. 16:	Water Treatment System Start-up/Operation
Hazards:	Slip, trip, fall; Material handling; Manual lifting; Inhalation and dermal exposure to contaminants; Splash and spill
Control Procedures:	Ensure personnel awareness of unobstructed and secure footing; Follow safe material handling and manual lifting procedures; Utilize real-time air monitoring instruments and personal protective equipment to prevent contact with contaminants when system is open; Wear splash shields and saranex coveralls if wet conditions are suspected; Clearly label all high voltage equipment; System start-up and final checks to be performed by a licensed electrician and registered engineer

Task No. 17:	Pump Testing
Hazards:	Slip, trip, fall; Material handling; Manual lifting; Contact with overhead/buried utilities; Inhalation and dermal exposure to contaminants; Fire/explosion; Drilling hazards; Splash and spill if wet conditions are encountered
Control Procedures:	Ensure personnel awareness of unobstructed and secure footing; Follow safe material handling and manual lifting procedures. Clearly delineate all sub-surface utilities and use appropriate measures to avoid contact with active utilities; Utilize real-time air monitoring instruments and personal protective equipment to prevent contact with contaminants; Follow OHM SOP for well installation and to identify potential LEL concentrations; Stage standby fire extinguisher at drill rig; Wear splash shields and saranex coveralls if wet conditions are encountered
Task No. 18:	Multi-Media Sampling/Well Testing and Bailing
Hazards:	Slip, trip, fall; Material handling; Manual lifting; Drilling operation hazards; Inhalation, dermal contact with on-site contaminants (spill and splash), when bailing wells, handling soils or collecting surface water samples
Control Procedures:	Ensure personnel awareness of secure footing; Follow safe material handling and manual lifting procedures; Comply with OHM SOP for vehicle safety and drilling operations; Utilize real-time air monitoring instruments and personal protective equipment to prevent contact with contaminants; Wear task-specific level of protection; Wear splash shields and saranex coveralls if wet conditions are encountered
Task No. 19:	Water Treatment System Operation and Maintenance
Hazards:	Inhalation, dermal contact with process water and chemical additives; Material handling (carbon change-

	out); confined space entry; Electrical and line entry hazards; Spill, splash, leaks
Control Procedures:	Wear task-specific level of protection during normal operations (system closed) and when handling treatment chemicals and spent carbon; Wear splash protection when maintenance of pumping equipment and lines; Practice safe material handling procedures; Follow hazard communication guidelines when handling chemical additives; Follow OHM SOP for line entry if lines must be broken; follow OHM confined space entry SOP when process tanks require personnel entry; Follow OHM SOP for lockout/tagout of electrical equipment prior to opening of system components; Do not use compressed air in excess of 15 psi for cleaning of non-pressure vessels; Ensure pressure system (and components) are in compliance with ASME fabrication and operation standards; Follow OHM hazard communications procedures for handling of treatment chemicals and spent carbon
Task No. 20:	Heavy Equipment Decontamination
Hazards:	Operation of high pressure washer; Slip, trip, fall hazards; Splash hazards; Inhalation, dermal contact hazards; Noise exposure
Control Procedures:	Follow OHM SOP for high pressure washing; Wear task-specific level of protection and hearing protection
Task No. 21:	Final Site Cleanup
Hazards:	Same as Task No. 1
Control Procedures:	Same as Task No. 1
Task No. 22:	Demobilization
Hazards:	Slips, trips and falls; Material handling and manual lifting hazards; Electrical hazard when disconnecting electrical service

Control Procedures: Instituting safe lifting and material handling practices; Ensuring personnel awareness of footing; Good housekeeping practices; Compliance with applicable electrical safety regulations during electrical disconnection operations (to be performed only by a qualified electrician)

4.0 WORK AND SUPPORT AREAS

To prevent migration of contamination caused through tracking by personnel or equipment, work areas and personal protective equipment are clearly specified prior to beginning operations. OHM has designated work areas or zones as suggested by the NIOSH/OSHA/USCG/EPA'S document titled, "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities". Each work area will be divided into three zones: an exclusion or "hot" zone, a contamination reduction zone (CRZ), and a support zone.

4.1 EXCLUSION ZONE

The exclusion zone will consist of areas where inhalation, oral contact, or dermal contact with contaminants will be possible. The boundaries of the site exclusion will be marked with flagging, tape, and/or fencing before site operations commence.

4.2 CONTAMINATION-REDUCTION ZONE

The CRZ or transition zone will be established between the exclusion zone and support zone. In this area, personnel will begin the sequential decontamination process required to exit the exclusion zone. To prevent off-site migration of contamination and for personnel accountability, all personnel will enter and exit the exclusion zone through the CRZ. Personnel and equipment decontamination facilities will be located in the CRZ.

4.3 SUPPORT ZONE

The support zone will consist of a clearly marked area where the office and decontamination trailer are located. Smoking and drinking will be allowed only in designated areas. Eating will be allowed in the breakroom only.

4.4 ACCESS CONTROLS

The SSO and the SS will establish the physical boundaries of each zone and will instruct all workers and visitors on the limits of the restricted areas. No one will be allowed to enter the restricted area without the required protective equipment for that area. The SS will ensure compliance with all restricted area entry and exit procedures.

The SS will also designate a decontamination point for personnel to exit from the contaminated area and enter into the clean area where personnel may rest and drink.

Visitors will be required to check in immediately upon arrival. Only authorized visitors will be allowed access to the contaminated areas. Each visitor will be required to provide the necessary protective equipment for use during the visits and shall be escorted by the SS while on site. Two full sets of personal protective equipment will be maintained on-site for use by LANTDIV representatives. All visitors who seek access to the exclusion zone and/or contamination reduction zone, will be required to show proof of completion, as a minimum, the 24-hour training required by OSHA for occasional visits to hazardous waste sites. 24-hour OSHA training is only applicable when visitors are unlikely to be exposed over the permissible exposure limit and published exposure limits and are not required to wear respirators, otherwise 40-hour OSHA training will be required prior to granting access to these site zones.

All visitors, subcontractors and personnel will be required to sign a safety plan acknowledgement sheet to certify that they have read and will comply with the site health and safety plan. Failure to comply with this site entry procedure will result in expulsion from the site.

5.0 PROTECTIVE EQUIPMENT

This section details the personal protective equipment (PPE) that will be provided and worn by site personnel to protect them against dermal contact and inhalation exposure to hazardous chemicals present on site.

5.1 LEVELS OF PROTECTION

The following levels of protection and accompanying PPE will be used during site operations.

Level C Protection

- Full facepiece air-purifying respirator with combination organic vapor/HEPA cartridges
- Tyvek or saran-coated tyvek coveralls
- Inner latex and outer nitrile/butyl gloves
- Steel toe/shank boots with latex overboots
- Tape overboots and outer gloves to Tyvek
- Hard hat
- Splash protection - as required by task
- Hearing protection - as required by task

Modified Level D Protection

- Tyvek or saran-coated tyvek
- Inner latex and outer nitrile/butyl gloves
- Steel toe/shank boots with latex overboots

- Tape overboots outer gloves to Tyvek
- Hard hat
- Safety glasses with side shields
- Splash protection - as required by task
- Hearing protection - as required by task

Level D Protection

- Long pants and long sleeved shirt or coveralls
- Steel toe/shank boots
- Safety glasses with side shield
- Work gloves - as required by task
- Splash protection - as required by task
- Hearing protection - as required by task

5.2 TASK-SPECIFIC LEVELS OF PROTECTION

The following minimum levels of protection are specified for tasks performed during site operations. Upgrades or downgrades in levels of protection will be based on air monitoring results when compared to the appropriate action level or by the Regional Health and Safety Director, as detailed in Section 7.0 Air Monitoring.

Task No. 1: Mobilization/Site Preparation
Level of Protection: Level D

Task No. 2:	Access Clearance and Utility Verification/Site Survey (non-contaminated areas)
Level of Protection:	Level D
Task No. 2a:	Access Clearance/Site Survey (contaminated areas)
Level of Protection:	Level C with tyvek
Task No. 2b:	Chain-saw/manual clearing activities
Level of Protection:	Level D with chain-saw chaps, faceshield, leather gloves, and hearing protection
Task No. 3:	Multi-Media Sampling
Level of Protection:	Level C/Modified Level D with tyvek and GMC-H cartridges for dry conditions; Level C/Modified D, with Saranex and GMC-H cartridges for wet conditions
Task No. 3a:	Decontamination of Sampling Equipment
Level of Protection:	Level C/Modified D with sarans
Task No. 4:	Debris and Soil Excavation
Level of Protection:	Level C with tyvek
Task No. 4a:	Excavation Confirmation Sampling
Level of Protection:	Level C/Modified D with tyvek
Task No. 5:	Load-out of Excavated Soil/Debris
Level of Protection:	Level C with tyvek
Task No. 6:	Unload Equipment/Gravel Placement
Level of Protection:	Level D

Task No. 7:	Horizontal Well Installation
Level of Protection:	Level C with tyvek for dry conditions (contamianted soil) Level C with sarans for wet conditions (non-contaminated soils) Modified Level D with tyvek or sarans (non-contaminated soil)
Task No. 8:	PVC Piping Installation (Aboveground)
Level of Protection:	Modified Level D with chemical resistant goggles and splash shield
Task No. 9:	Consolidate Drill Cuttings
Level of Protection:	Level C with tyvek
Task No. 10:	Well Installation
Level of Protection:	Level C with tyvek, or sarans
Task No. 11:	Trenching and Piping
Level of Protection:	Level C/Modified Level D with tyvek for dry conditions; Level C, with sarans for wet conditions
Task No. 12:	Installation of Well Head Enclosures, Pumping Equipment and Power/Control Wiring
Level of Protection:	Level C/Level D with tyvek
Task No. 13:	Treatment Plant Building Construction
Level of Protection:	Level D
Task No. 14:	Water Treatment Process Piping, Pumping, and Electrical Equipment Installations
Level of Protection:	Level D
Task No. 15:	Installation of Air Striper, Carbon Filter and Process Tanks
Level of Protection:	Level D

Task No. 16:	System Start-up/Operational Check-out
Level of Protection:	Modified Level D with tyveks/Level D (system closed) Level C with sarans (system open)
Task No. 17:	Perform Pump Test/Water Level Measurement
Level of Protection:	Modified Level D/Level C, with tyvek for dry conditions; Level C, with saranex for wet conditions
Task No. 18:	Well Sampling/Bailing/Testing
Level of Protection:	Modified Level D/Level C with sarans and face shield
Task No. 19:	Closed System Operation and Maintenance
Level of Protection:	Level D/Modified Level D with tyveks
Task No. 19a:	Open System Operation and Maintenance
Level of Protection:	Modified Level D with tyveks or sarans if wet conditions warrant
Task No. 20:	Heavy Equipment Decontamination
Level of Protection:	Level C with sarans, GMC-H cartridges
Task No. 21:	Final Site Cleanup
Level of Protection:	Level D
Task No. 22:	Demobilization
Level of Protection:	Level D

5.3 RESPIRATOR CARTRIDGES

The crew members working in Level C will wear respirators equipped with Mine Safety Appliance (MSA) GMC-H air purifying cartridges. The GMC-H cartridge holds approval for:

- Organic vapors <1,000 ppm
- Chlorine gas <10 ppm

- Hydrogen chloride <50 ppm
- Sulfur dioxide <50 ppm
- Dusts, fumes and mists with a TWA <0.05 mg/m3
- Asbestos-containing dusts and mists
- Radon daughters
- Radionuclides
- Pesticides

5.4 AIR-PURIFYING RESPIRATORS

OHM's air-purifying respirators for this project will be MSA's ultratwin full facepiece respirator with nose cups. OHM's Respirator Protection Program for air purifying respirators is adhered to on site.

5.5 CARTRIDGE CHANGES

All cartridges will be changed a minimum of once daily. However, water saturation of the HEPA filter or dusty conditions may necessitate more frequent changes. Changes will occur when personnel begin to experience increased inhalation resistance, or breakthrough of a chemical warning property.

5.6 INSPECTION AND CLEANING

Respirators are checked periodically by a qualified individual and inspected before each use by the wearer. All respirators and associated equipment will be decontaminated and hygienically cleaned after use.

5.7 FIT TESTING

All personnel are fit tested at the time of initial employment. Annual respirator fit tests are required of all personnel wearing negative pressure respirators. The test will utilize isoamyl acetate or irritant smoke. The fit test must be for the style and size of the respirator to be used.

5.8 FACIAL HAIR

No personnel who have facial hair which interferes with the respirator's sealing surface will be permitted to wear a respirator.

5.9 CORRECTIVE LENSES

Normal eyeglasses cannot be worn under full-face respirators because the temple bars interfere with the respirator's sealing surfaces. For workers requiring corrective lenses, special spectacles designed for use with respirators will be provided.

5.10 CONTACT LENSES

Contact lenses shall not be worn with any type of respirator.

5.11 MEDICAL CERTIFICATION

Only workers who have been certified by a physician as being physically capable of respirator usage will be issued a respirator.

6.0 DECONTAMINATION PROCEDURES

This section describes the procedures necessary to ensure that both personnel and equipment are free from contamination when they leave the work site.

6.1 PERSONNEL DECONTAMINATION

Decontamination of personnel shall be accomplished to ensure that any material, which personnel may have contacted in the hot zone, is removed in the contamination-reduction zone. Decontamination of personnel exiting the exclusion zone will utilize the following steps for Level C/Modified Level D personnel decontamination:

- Step 1: Equipment/backpack/egress system drop
- Step 2: Scrub outer boots and gloves with a detergent-water solution.
- Step 3: Remove tape and discard.
- Step 4: Remove and discard outer boots and gloves.
- Step 5: Remove hard hat and wipe clean.
- Step 6: Remove chemical protective clothing (Tyvek/sarans) and discard.
- Step 7: Remove respirator/facepiece (Levels B/C only) and suitably store while on breaks and during lunch. At the end of shift, discard the cartridges, then clean, disinfect, rinse and air dry the respirator.
- Step 8: Discard inner gloves.
- Step 9: Depart transition zone in work clothes and boots.
- Step 10: Wash hands, face and neck before breaks and lunch.

6.2 SUSPECTED CONTAMINATION

Any employee suspected of sustaining skin contact with chemical materials will first use the emergency shower. Following a thorough drenching, the worker will proceed to the decontamination facility. Here the worker will remove clothing, shower, don clean clothing, and immediately be taken to the First Aid Station.

6.3 PERSONAL HYGIENE

Before any eating, smoking, or drinking, personnel will wash hands, arms, neck and face. To promote personal hygiene and to control personnel exposure to contaminants, project-issued work coveralls worn under chemical protective clothing will remain at the job site and will be laundered at regular intervals during the course of the project.

6.4 OTHER DECONTAMINATION PROCEDURES

All disposable items (i.e., protective clothing) or other items which cannot be adequately decontaminated (i.e., miscellaneous sampling equipment) will be disposed of in accordance with EPA requirements.

6.5 HEAVY EQUIPMENT DECONTAMINATION

Gross contamination (soil, mud) of heavy equipment will be removed from the equipment with a high pressure washer prior to exiting the exclusion zone. Those parts of the equipment that come into direct contact with contaminated materials (i.e., buckets, tires, tracks) will receive special attention.

Decontamination solutions, soil, mud, etc., removed with the high pressure washer will be collected, placed into containers and disposed of according to EPA requirements.

7.0 AIR MONITORING

Air monitoring will be conducted in order to determine airborne contamination levels. This ensures that respiratory protection is adequate to protect personnel against the chemicals that are encountered.

Table 7.1 describes the air monitoring required and appropriate action levels. Additional air monitoring may be conducted at the discretion of the SSO.

Table 7.1
Required Action Levels

Monitoring Device	Monitoring Frequency	Action Level	Action
LEL	At start-up and periodic daily during drilling/ well installation	>10% LEL <20.8% 02	Stop operations; allow vapors to vent to <10% LEL before continuing
PID/OVA (Breathing Zone)	At start-up and periodic daily during trenching/ drilling, well installation, well sampling/bailing	>1 ppm for 5 min. >5 ppm for 5 min. >50 ppm for 5 min.	Upgrade to Level C Monitor with vinyl chloride detection tubes Shut-down operations, allow vapors to dissipate to <50 ppm before continuing
Miniram (Breathing Zone)	At start-up and periodic daily during excavation and load-out operations	>.1 mg/m3 >.50 mg/m3	Upgrade to Level C Institute dust control measures
Drager Tube Monitoring (Vinyl Chloride)	When PID readings exceed 1 ppm	>.5 ppm	Stop operations and allow vapors to dissipate below .5 ppm

The LEL action levels noted above only apply to LEL readings obtained in an area where flammable/explosive vapors may be present. Personnel entry into the area will not occur. The confined space entry LEL and oxygen action levels for personnel entry into a confined space are 0% LEL and 20.9% oxygen, with LEL/oxygen readings taken at representative locations inside the space. The hot work LEL and oxygen levels for UST cold-cutting operations and any related hot work are less than 10% LEL and less than 8% oxygen.

7.1 LOWER EXPLOSIVE LIMIT/OXYGEN (LEL/O2) METER

Prior to entering a confined space area or hot work involving welding, cutting, or other high heat-producing operations where flammable or combustible vapors may be present, LEL/O2 measurements must be obtained. LEL monitoring will be conducted at each borehole when drilling in suspected contaminated areas on site.

7.2 PHOTOIONIZATION DETECTOR (PID)/ ORGANIC VAPOR ANALYZER (OVA)

A 10.2eV PID or OVA will be used to monitor total organic contaminants in ambient air. A PID/OVA will prove useful as a direct reading instrument which will aid in determining if respiratory protection needs to be worn (Level C) and to indicate if the exclusion zone encompasses the required areas. PID/OVA monitoring will be performed in personnel breathing zone during site operations to document that the proper level of protection is worn by site personnel.

The SSO will take measurements before operations begin in an area to determine the amount of volatile organic compounds (VOCs) naturally occurring in the air. This is referred to as a background level. The PID/OVA breathing zone action level only applies to PID/OVA readings above background (i.e. 1 ppm for 5 minutes above background).

7.3 REAL-TIME AEROSOL MONITOR (MINIRAM)

A real-time aerosol monitor (miniram) will be used to measure airborne particulate in personnel breathing zones and site work area locations. A breathing zone action level has been specified that requires upgrading to Level C protection based on sustained (5-minute average) miniram results. The miniram will be used to monitor personnel breathing zones when wearing Modified Level D protection and to determine when an upgrade to Level C is warranted.

7.4 VINYL CHLORIDE (VC) DETECTOR TUBE PUMP

Detector tube monitoring will be performed during drilling, well installation, and well sampling operations to confirm that personnel are not exposed to vinyl chloride exceeding the PEL of 1.0 ppm. The monitoring will be performed utilizing a drager pump with VC detector tubes when PID readings exceed 1.0 ppm above the borehole or in the breathing zone for any of the operations listed.

7.5 AIR SAMPLING AND ANALYSIS

Personal air samples will be collected in personnel breathing zones to document that the appropriate level of protection was worn during remedial actions. Air samples will be collected on personnel with the greatest potential for exposure during each major project phase. Air samples will be analyzed by an AIHA accredited laboratory. Air samples will be collected and analyzed for chlorinated pesticides during excavation and load-out operations.

Personal air samples will be collected in accordance with NIOSH Method 5503 for ChloroDiphenyls and analyzed in accordance with EPA Method 8080 for chlorinated pesticides.

7.6 AIR MONITORING LOG

The SSO will ensure that all air-monitoring data are logged into a monitoring notebook. Data will include instrument used, instrument reading, location, type of reading (breathing zone or work area) and site operations being performed. The Regional and Corporate OHM CIH will periodically review this data.

7.7 CALIBRATION REQUIREMENTS

The PID/OVA, LEL/O2 meter, miniram and air sampling pumps will be calibrated daily prior to use, and after each use, in accordance with the manufacturer's procedures. A separate log will be kept detailing date, time, span, gas, or other standard, and name of person performing the calibration.

7.8 AIR MONITORING RESULTS

Air monitoring results will be posted for personnel inspection, and will be discussed during morning safety meetings.

8.0 EMERGENCY RESPONSE

Prior to field activities, the SS will plan emergency egress routes and discuss them with all personnel who will be conducting the field work. Initial planning includes establishing emergency warning signals and evacuation routes in case of an emergency. Communications and coordination of this plan will be made with the NOSC/NOSCDR prior to commencement of work.

8.1 EMERGENCY SERVICES

A tested system will exist for rapid and clear distress communication. All personnel will be provided concise and clear directions and accessible transportation to local emergency services. A map outlining directions to the nearest hospital will be posted on site.

The following emergency equipment will be present on the site:

- Fire extinguishers
- Industrial first aid kit
- Portable eye wash/emergency shower in conformance with ANSI 2358.1-1990

8.2 EMERGENCY EVACUATION FROM EXCLUSION AND CONTAMINATION-REDUCTION ZONES

Any personnel requiring emergency medical attention will be evacuated immediately from exclusion and contamination-reduction zones. Personnel will not enter the area to attempt a rescue if their own lives would be threatened. The decision whether or not to decontaminate a victim prior to evacuation is based on the type and severity of the illness or injury and the nature of the contaminant. For some emergency victims, immediate decontamination may be an essential part of life saving first aid. For others, decontamination may aggravate the injury or delay life saving treatment. If decontamination does not interfere with essential treatment, it should be performed.

If decontamination can be performed:

- Wash external clothing and cut it away.

If decontamination cannot be performed:

- Wrap the victim in blankets or plastic to reduce contamination of other personnel.
- Alert emergency and off-site medical personnel to potential contamination; instruct them about specific decontamination procedures.
- Send along site personnel familiar with the incident.

8.3 FIRST AID

Only qualified personnel will provide first aid and stabilize an individual needing assistance. At least two persons trained and certified in First Aid/CPR will be present on-site at all times during remedial actions. All OHM personnel certified in FA and CPR are trained in the bloodborne pathogen standard as required by 29 CFR 1910.1030. Life support techniques such as CPR and treatment of life threatening problems, such as airway obstruction and shock, will be given top priority. Professional medical assistance will be obtained at the earliest possible opportunity.

To provide first-line assistance to field personnel in the case of sickness or injury, the following items will be immediately available:

- First aid kit
- Portable emergency eye wash
- Supply of clean water

8.4 EMERGENCY ACTIONS

If actual or suspected serious injury occurs, these steps shall be followed:

- Remove the exposed or injured person(s) from immediate danger.

- Render first aid if necessary. Decontaminate affected personnel after critical first aid given.

- Obtain paramedic services or ambulance transport to local hospital. This procedure will be followed even if there is no visible injury.

- Other personnel in the work area will be evacuated to a safe distance until the site supervisor determines that it is safe for work to resume. If there is any doubt regarding the condition of the area, work shall not commence until all hazard control issues are resolved.

- Notify NOSC/NOSCDR

- Notify MCB Camp Lejeune ROICC Office (Lt. Steve Challeen: (910) 451-2583) and LANTDIV Ms. Linda Saksvig (804) 322-4793) of incident.

- Follow up each incident with a post incident critique and submit a written report to the Regional Health and Safety Director within 30 days of incident closure.

8.5 GENERAL EVACUATION PLAN

In the general case of a large fire, explosion, or toxic vapor release, a site evacuation shall be ordered and shall follow these steps:

- Sound the applicable alarm and advise client representative.

- Evaluate the immediate situation and downwind direction. All personnel will evacuate in the upwind direction.

- All personnel will assemble in an upwind area when the situation permits, a head count will be taken.

- Determine the extent of the problem. Dispatch a response team in protective clothing and self-contained breathing apparatus on site to evacuate any missing personnel or to correct the problem.

- Notify MCB Camp Lejeune ROICC Office (Lt. Steve Challeen: (910) 451-2583) and LANTDIV Ms. Linda Saksvig (804) 322-4793) of incident.

8.6 SPILL CONTROL

Spill control throughout the project will be achieved on an ongoing basis in all areas of operations. OHM personnel are trained on spill control/response in their initial 40-hour training, at 8-hour annual refresher training and for site specific training prior to conducting site work.

Primary spill control operations will include a system of temporary dikes and sand bag berms in all areas of operation. The containment dikes will be erected around those operations where a spill potential exists. The containment dikes will be set up to avert run-on from work areas as well as contain any materials released inside the work area.

Gasoline and diesel fuels, bulk lubricants, and waste oils will be stored in clearly marked areas dedicated for this purpose. Storage will be skid-mounted above-ground steel tanks or 55-gallon drums as appropriate. Storage units will be located in areas away from routine traffic patterns to prevent accidental damage. Each storage area will be constructed with an impermeable liner and surrounded by a containment berm.

Table 8.1
Emergency Contacts

(Completed on site during project start-up)

Ambulance Phone Number: 911 (on-base)
(910) 455-9119 (off-base)

Hospital: USMC Base Hospital (on-base)/Onslow County Hospital (off-base)

Hospital Phone Number: (910) 451-4840 (on-base)/(910) 577-2240 (off-base)

Fire Department: 911 (on-base)

Police: 911 (on-base)/(910) 451-3855 (off-base)

Poison Control: 800-382-9097

Insert route to hospital below:

On-Base

1. Proceed north on Holcomb Boulevard and turn left
2. Base hospital is approximately 1/2 mile ahead on right
3. Follow signs to the emergency room entrance

Off-Base

1. Proceed north on Holcomb Boulevard and exit MCB Camp Lejeune through the main gate.
2. Follow Highway 24 West (approximately 2.5 miles) to Western Boulevard and turn right (north).
3. Continue on Western Boulevard (approximately 1.5 miles) to the fifth stoplight and the hospital is on the left side of the street.
4. Follow signs to the emergency room entrance.

A map depicting the route to the Onslow County Memorial Hospital and the Base Naval Hospital will be posted in each trailer.

9.0 TRAINING REQUIREMENTS

As a prerequisite to employment at OHM, all field employees are required to take a 40-hour training class and pass a written examination. This training is comprehensive and covers all forms of personal protective equipment. In addition, this course covers the toxicological effects of various chemicals including nerve agents, handling of unknown tanks and drums, confined space entering procedures and electrical safety. In addition to this training, all personnel receive 3-day supervised on-site training with a qualified supervisor. This course is in full compliance with OSHA requirements as set forth in 29 CFR 1910.120(e). Training certificates will be maintained on-site by the SSO for all project assigned personnel.

In addition, all personnel will be required to have certification for updated 8-hour refresher training. Supervisory personnel will have documentation of 8-hour supervisory training.

All personnel entering the exclusion zone will be trained in the provisions of this site safety plan and will be required to sign the SHSP acknowledgement (Appendix C). OHM has a full-time training department which, in addition to providing in-house training, has assisted Federal OSHA and USEPA in developing training program requirements.

OHM subcontractors, who will be working in the site exclusion zone, will be required to certify, in writing, that their employees have been trained in accordance with 29 CFR 1910.120(e).

10.0 MEDICAL SURVEILLANCE PROGRAM

All OHM personnel participate in a medical and health monitoring program that meets the requirements of 29CFR1910.120 and ANSI Z-88.2. This program is initiated when the employee starts work with a complete physical and medical history and is continued on a regular basis. A listing of OHM's worker medical profile is shown below. There is no additional medical testing scheduled to be performed on project personnel. This program was developed in conjunction with a licensed physician who is certified in occupational medicine by the American Board of Preventive Medicine and a toxicologist. Examining physicians follow the medical protocols defined by OHM's consultant occupational physicians. OHM's occupational physician is available for direct consultation with the examining physician. Other medical consultants are retained when additional expertise is required. Medical certification for all personnel will be maintained on-site by the SSO.

OHM subcontractors, who will be working in the site exclusion zone, will be required to certify, in writing, that their employees have been medically qualified to perform hazardous waste operations in accordance with 29CFR1910.120(f).

Table 10.1
Worker Medical Profile

Item	Initial	Annual
Medical History	√	√
Work History	√	√
Visual Acuity and Tonometry	√	√
Pulmonary Function Tests	√	√
Physical Examination	√	√
Audiometry Tests	√	√
Chest X-ray	√	√
Electrocardiogram/Stress Test (based on age)	√	√
Complete Blood Counts	√	√
Blood Chemistry (SMAC-23)	√	√
Complete Urinalysis	√	√
Dermatology Exam	√	√