

**FINAL**

# **ACCIDENT PREVENTION PLAN**

**Remedial Investigation at UXO 3 – Dredge Pond 3E  
and Northern Marine Corps Firing Range  
Former Mare Island Naval Shipyard Vallejo,  
California**

**December 2015**

Prepared for:



**U.S. Department of the Navy  
Base Realignment and Closure  
Program Management Office West San  
Diego, California**

Prepared under:

**Contract Number: N62473-11-D-2228**

**Task Order Number: 0006**

**DCN: BATL-2228-0006-0005**

Prepared by:

**Battelle**

*The Business of Innovation*

**505 King Avenue**

**Columbus, OH 43201**

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***REVIEW AND APPROVAL***

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- Attachment 2. Battelle Health and Safety Forms
- Attachment 3. Health and Safety Credentials
- Attachment 4: Explosive Safety Submission Determination Form

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## ACRONYMS AND ABBREVIATIONS

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AHA	Activity Hazard Analysis
APP	Accident Prevention Plan
CCR	California Code of Regulations
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	<i>Code of Federal Regulations</i>
CIH	certified industrial hygienist
CPR	cardiopulmonary resuscitation
DGM	digital geophysical mapping
ESS	Explosives Safety Submission
GPS	global positioning system
HAZWOPER	hazardous waste operations and emergency response
IDW	investigation-derived waste
MCFR	Marine Corps Firing Range
MEC	munitions and explosives of concern
MINS	Mare Island Naval Shipyard
MPPEH	materials potentially presenting an explosive hazard
NAVFAC SW	Naval Facilities Engineering Command Southwest
Navy	U.S. Department of the Navy
NIOSH	National Institute of Occupational Safety and Health
NRC	Nuclear Regulatory Commission
OHS	occupational health and safety
OSHA	Occupational Safety and Health Administration
PM	project manager
PPE	personal protective equipment
PRC	PRC Environmental Management, Inc.
RI	remedial investigation
ROICC	Resident Officer in Charge of Construction
RPM	remedial project manager
SHM	safety and health manager
SSPORTS	Supervisor of Shipbuilding, Conversion, and Repair, Portsmouth, Virginia, Environmental Detachment
SSHO	site safety and health officer

## **ACRONYMS AND ABBREVIATIONS (CONTINUED)**

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SSHP	site safety and health plan
USACE	United States Army Corps of Engineers
UXO	unexploded ordnance
Weston	Roy F. Weston, Inc.

## Section 1 Background Information

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This Accident Prevention Plan (APP), in conjunction with the Site Safety and Health Plan (SSHP) included as Attachment 1, describes the health and safety guidelines developed to protect on-site personnel, visitors, and the public from hazards encountered during the remedial investigation (RI) at Unexploded Ordnance (UXO) Site 3, which consists of Dredge Pond 3E (only the portion located east of the Joy Survey Line) and Northern Marine Corps Firing Range (MCFR) at the former Mare Island Naval Shipyard (MINS), Vallejo, California.

This APP has been prepared by Battelle on behalf of Naval Facilities Engineering Command Southwest (NAVFAC SW). RI and soil sampling activities are being conducted by Battelle under the U.S. Department of the Navy (Navy) Contract No. N62473-11-D-2228, Task Order No. 0006.

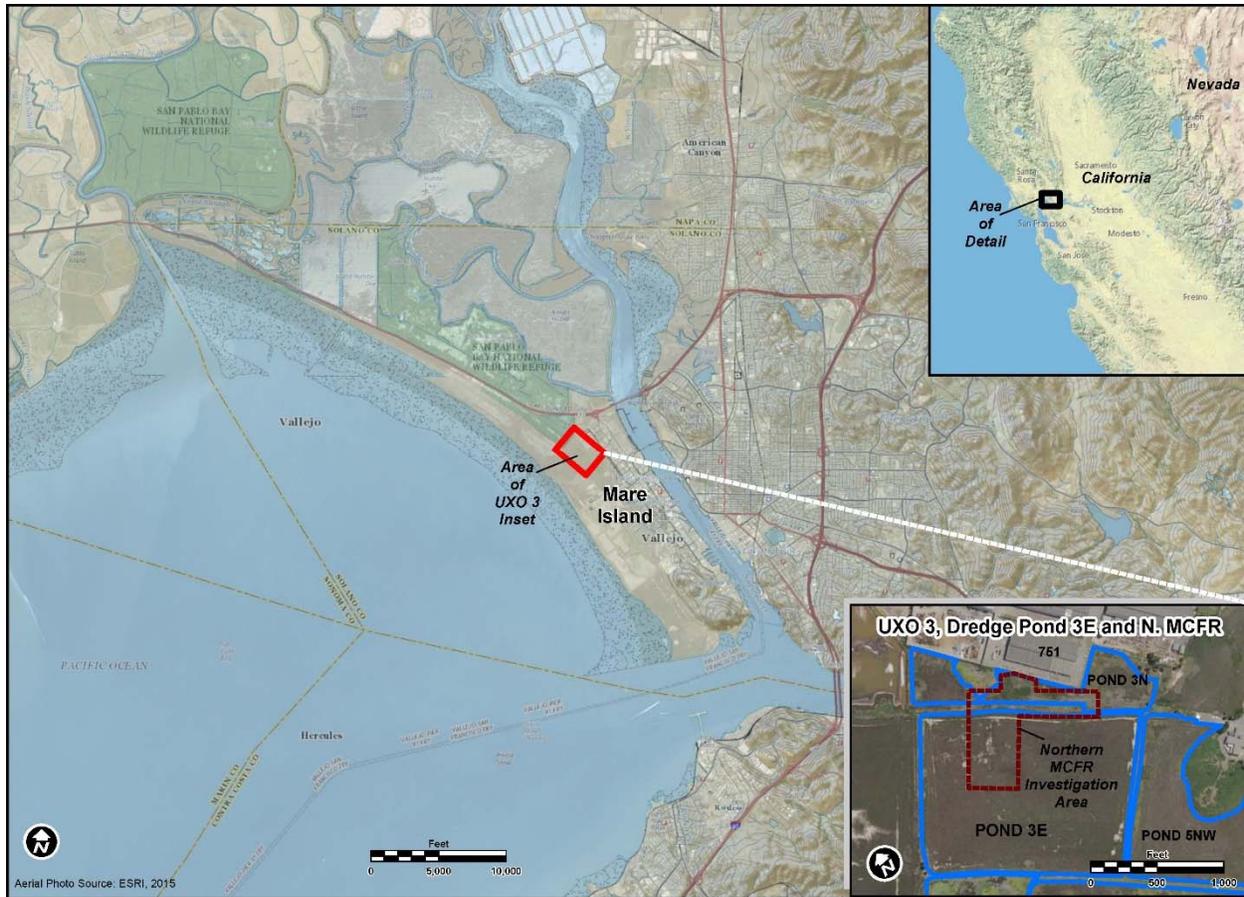
This APP was prepared in accordance with the requirements of United States Army Corps of Engineers (USACE) Safety and Health Requirements Manual, EM-385-1-1, for conducting construction work (USACE, 2014). Because the field activities for this project will involve sampling and handling potentially hazardous wastes, a project-specific SSHP, including applicable activity hazard analyses (AHAs), were prepared to provide job-specific project information and to meet the following regulatory requirements:

- United States Department of Labor, Occupational Safety and Health Administration (OSHA) – Title 29 of the *Code of Federal Regulations*, Parts 1910 and 1926 (29 Code of Federal Regulation [CFR] 1910 and 1926)
- Title 8, Chapter 4, Subchapter 7 of the California Code of Regulations (CCR), General Industry Safety Orders, with special attention to 8 CCR §5192
- The National Institute of Occupational Safety and Health’s (NIOSH, 1985) *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*
- Navy Environmental Restoration Program Manual, August 2006
- Naval Facilities Engineering Command Safety and Health Program Manual 5100.11J (January 2000), and
- California Health and Safety Code, Division 104, Part 9.

### 1.1 Site Location and Description

Former MINS occupies approximately 5,600 acres on a peninsula bounded on the south by Carquinez Strait, on the west by San Pablo Bay, and on the east by Mare Island Strait (Napa River), which separates it from the city of Vallejo, California (Figure 1-1). The approximate 519-acre dredge pond system consists of 12 dredge spoils ponds that were established along the western half of Mare Island in several stages between 1914 and 1965 (Supervisor of Shipbuilding, Conversion, and Repair, Portsmouth, Virginia, Environmental Detachment [SSPORTS], 1997).

Dredge Pond 3E was constructed in 1931 and used until a second pond group was constructed in 1948 (PRC Environmental Management, Inc. [PRC], 1995; Weston, 2002). The dredge ponds are made up of maintenance dredging material that was removed from the waterways and ship berths along the east side of Mare Island and transported across the island as slurry through the piping system to the ponds (SSPORTS, 1997).



**Figure 1-1. Regional Map**

In addition to sediment, the dredge slurry contained materials discarded into Mare Island Strait, including scrap metal and, in some locations, materials potentially presenting an explosive hazard (MPPEH) and radiological items. A wide variety of MPPEH items were hypothesized to be present in dredge ponds (e.g., propellants, high explosive loaded items, small arms ammunition, fuses, primers, and minor-to-medium-caliber gun ammunition) since unwanted materials were commonly discarded by throwing them overboard from a vessel, pier, or sea wall. SSPORTS conducted a UXO Site Investigation in 1997 followed by an UXO Intrusive Investigation from 1998 to 2001. During the UXO Site Investigation, SSPORTS identified 390 metallic anomalies in the dredge ponds, including 31 anomalies identified in Dredge Pond 3E (SSPORTS, 1997). Only one inert ordnance item was identified in Dredge Pond 3E. During the UXO Intrusive Investigation, SSPORTS/Weston investigated the 390 metallic anomalies and identified 58,803 live ordnance items including 3,425 that contained high explosive material (Weston, 2002). No UXO has been found at former MINS and all munitions and explosives of concern (MEC) has been categorized as discarded military munitions.

The Northern MCFR operated from 1917 through 1940. It was originally built in marshlands and extended south from what is now Walnut Avenue across Cedar Avenue and into Dredge Pond 3E near what is now Building 751. The MCFR consisted of one 1000-yard rifle range and two 600-yard rifle and pistol ranges. The impact berm for the 1000-yard range was located within Dredge Pond 3E but has been leveled. PRC reported that pieces of wood, concrete, large bolts, and other debris were found in the approximate location of the former berm (PRC, 1995). SSPORTS reported that the 1000-yard range impact berm could be observed as a visible discoloration of the soil in Dredge Pond 3E in 1997. The 600-yard rifle and pistol range was located southeast of the 1000-yard rifle range and had two

impacted areas just east of the Dredge Pond 3E berm (PRC, 1995). The 600-yard impacted berm was determined (by recovered bullet fragments and observed remnants of the target butt structure) to be approximately 25 feet farther east than predicted during the UXO Site Investigation in November 1995 (SSPORTS, 1997).

Additional investigation is necessary at Dredge Pond 3E east of the Joy Survey Line and at the Northern MCFR within the vicinity of the 1000-yard and 600-yard impact berms within and adjacent to Dredge Pond 3E (Figure 1-2) for the purposes of characterizing MEC, radiological items, and chemical contaminants that may remain in place.

## 1.2 Scope of Work

Battelle is scheduled to perform an RI for Dredge Pond 3E and the Northern MCFR at the former MINS. The RI will include the following tasks:

- **Site Preparation.** Site preparation activities for the RI at the Dredge Pond 3E and the Northern MCFR include installation of mouse fencing, vegetation clearance, removal of debris that could impede field work progress and a surface sweep in the presence of a Radiation Safety Officer and UXO Tech II escort for MPPEH and radiological items.
- **Vehicle and Equipment Pilot Study.** A test plot will be identified onsite where vegetation clearance methods, drilling equipment, trucks, excavating equipment and geophysical equipment will be tested to determine the viability for the RI field work.
- **Establishment of Radiological Background.** A radiological background reference area (reference area) will be selected that is considered non-impacted and suitable for use as a “reference area”. Measurements will be performed to establish a reference area response value for the handheld and towed detectors.
- **Surface Radiological and DGM Survey.** Surface radiological scans will be performed over the entire site (100%) using towed radiological survey equipment. In addition to the surface and near-surface radiological scans, sampling will be performed to evaluate the conditions to 4 feet below ground surface. Test pits will be excavated to a depth of 4 feet and radiological scans performed. Volumetric soil samples will be collected from the test pits for radiological analyses.

Digital geophysical mapping (DGM) will be performed in stages throughout the Dredge Pond 3E area. These stages include the geophysical system verification quality control protocols, total coverage DGM of the pond berms, total coverage DGM of the outfall area, and transect-based mapping of specified areas of the pond bottom. The purpose of the DGM is to determine the number and location of potential subsurface munitions-like items throughout the site to determine the nature and extent of potential MPPEH requiring removal. The primary geophysical equipment used during this investigation consists of the Geonics EM61-MK2A (EM61) high-sensitivity metal detector.

- **Anomaly Investigation.** Radiological anomaly investigation and removal will be performed where radiological surface surveys identify an anomaly present (i.e., greater than three sigma investigation level value). The surveys will be performed using a handheld 2-inch by 2-inch sodium iodide detector crystal. As anomaly material is excavated from the anomaly site, the 2-inch by 2-inch detector will be used to survey the excavation surface. The excavation will be stopped at 4 feet below ground surface if the anomalies cannot be fully removed. Additionally, volumetric soil samples will be collected after the

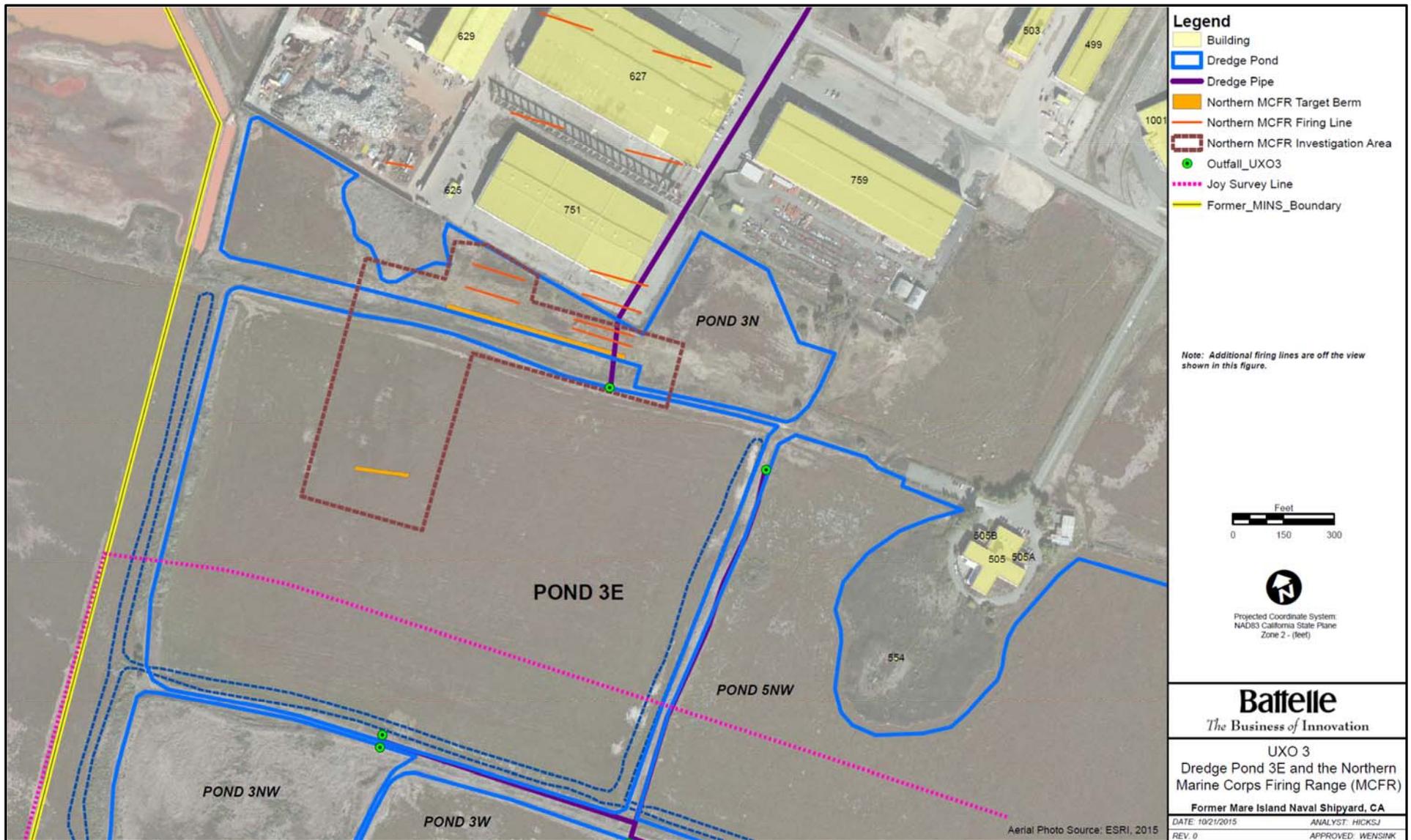


Figure 1-2. Site Location Map

anomaly removal actions are completed and sent to an off-site laboratory for analysis by gamma spectroscopy.

UXO subsurface investigations will be performed within the surveyed area on all anomalies. A senior UXO Supervisor and a UXO Safety Officer/Quality Control Specialist will be on site full time during the UXO intrusive investigation. Intrusive investigation will be conducted with a mini excavator, global positioning system (GPS) field data logger, and hand digging implements. The intrusive investigation will be performed in an area of 4 feet by 4 feet to either depth of detection or a maximum of 4 feet depth, and completion will be verified using an all-metals, handheld metal detector within the radius of investigation. If an outfall mass is encountered, it will be excavated and removed as a single large item and transported intact to a location suitable for safe disassembly and inspection. A tracked excavator with the appropriate shielding will be used to excavate, transport, and handle the outfall mass. Once in place at the designated processing location, any exposed ordnance will be manually removed. Radiological screening of all excavated soil and debris will also be conducted throughout the disassembly process to ensure detection and proper handling of radiological material. During the UXO anomaly investigation or removal, soil samples will be collected and analyzed for munitions constituents or munitions debris if breached munitions items are observed. Samples will be analyzed for explosives and for CCR Title 22 metals.

- **Soil Borings, Excavation, and Sampling (for Comprehensive Environmental Response, Compensation and Liability Act [CERCLA] Contaminant Investigation).** The CERCLA contaminant investigation for the remedial investigation includes investigation of the Northern MCFR, the pond berms, the dredge pond bottom, and groundwater. These investigations are explained in detail in the RI Work Plan.
- **MPPEH Management and Disposal.** Battelle will ensure that scrap metal generated from the intrusive investigation activities is properly inspected in accordance with the procedures outlined in the RI Work Plan and Explosive Safety Submission (ESS). Only qualified UXO personnel will perform the inspection. MPPEH items requiring disposal by detonation will be stored in the Mare Island authorized storage location (Building A180) until all field investigations are completed. The MPPEH items requiring disposal will be transported to the authorized disposal range and prepared for demolition. Demolition of the MPPEH items will only be accomplished after the senior UXO Supervisor and the UXO Safety Officer have verified that all notifications have been made and all access to the disposal range has been secured.
- **Investigation-Derived Waste (IDW) Management and Disposal.** IDW management and disposal will follow the procedures outlined in Section 5 of the RI Work Plan (Waste Management Plan).
- **Site Restoration and Demolition.** Upon completion of field activities, the site and staging area will be cleaned up and restored back to the original grade condition.

## **Section 2 Statement of Safety and Health Policy**

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Project team personnel are Battelle's most important asset. Therefore, the prevention of job-related injuries and illnesses takes precedence over all other considerations. The objectives of Battelle's Health and Safety Program are to provide and maintain a safe and healthy working environment and to follow practices that will safeguard employees and result in improved efficiency.

- Battelle management is responsible for providing the resources necessary to maintain a safe working environment, establishing health and safety policies, and ensuring policy implementation.
- Battelle supervisors are responsible for implementing health and safety policies and ensuring that day-to-day activities are conducted in a safe and healthy manner.
- Battelle employees are responsible for adhering to established health and safety policies and for performing their tasks in a manner that does not endanger themselves, others, or property.
- Battelle subcontractors are responsible for adhering to established health and safety policies and for performing their tasks in a manner that does not endanger themselves, others, or property.

The goals of the Health and Safety Program are no accidents, injuries, or illnesses. Described below are Battelle's policies to achieve these goals:

- Create a safe and healthy workplace and to ensure the health and safety of personnel involved in field, office, and other activities;
- Build respect for the environment;
- Continually improve occupational health and safety (OHS) performance;
- Integrate OHS considerations into business decision making;
- Represent best practices for health and safety management;
- Provide resources and training to carry out OHS policy;
- Support each Battelle field team in implementing APPs;
- Communicate Battelle OHS policy to the community, employees, and affected parties;
- Conform to the spirit of all applicable laws and regulations and ensure compliance with applicable federal, state, and local regulations regarding OHS;
- Provide procedures for identifying hazards and eliminating the risk of injury, illness, or death;
- Affirm Battelle culture and commitment to best practice and individual responsibility; and
- Integrate safety and health across management systems for sustained, overall improvement and business excellence.

### Section 3 Responsibilities and Lines of Authority

The Project Manager (PM), Safety and Health Manager (SHM) and Certified Industrial Hygienist (CIH), and Site Safety and Health Officer (SSHO) are responsible for formulating and enforcing health and safety requirements and for implementing the SSHP.

The lines of authority related to health and safety considerations for this project are outlined below. Figure 3-1 provides an organizational chart designating lines of authority.

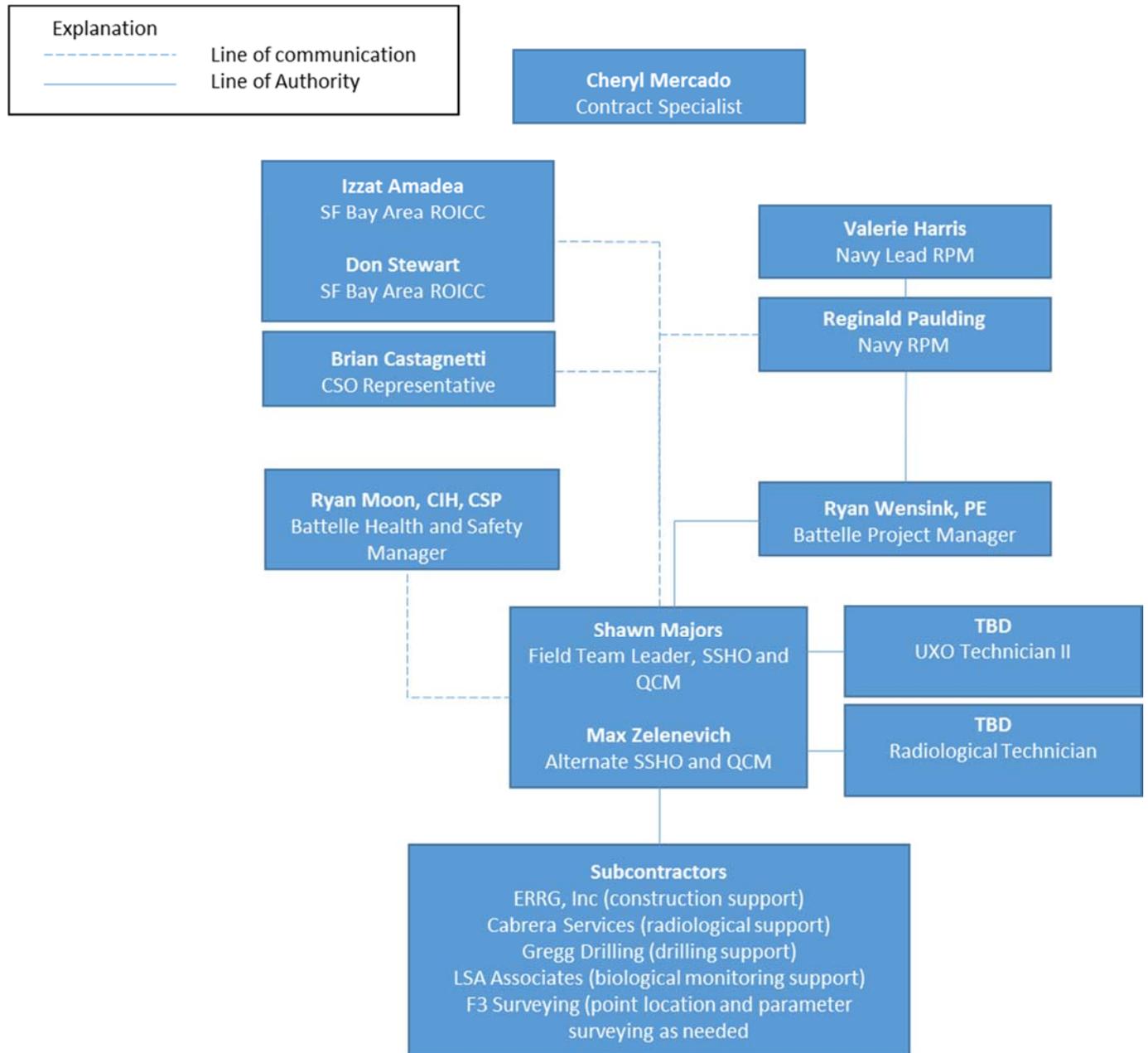


Figure 3-1. Project Organizational Chart

**PM.** Mr. Ryan Wensink is responsible for all aspects of the project and ensures development and implementation of the APP and SSHP.

**Project SHM and CIH.** Ryan Moon, CIH, is responsible for developing the APP/SSHP policies and procedures in accordance with applicable regulations. He is responsible for reviewing the SSHP. He will coordinate with the PM and SSHO to ensure that the APP/SSHP policies are implemented in the field. He has the authority to suspend or modify work practices for safety reasons and to dismiss individuals whose conduct endangers the health and safety of others.

**SSHO.** Mr. Shawn Majors has a direct line of communication and authority from the SHM to implement site-specific health and safety requirements for this project. He is responsible for daily site safety meetings; evaluating working conditions and making recommendations to the PM and SHM to modify health and safety procedures; enforcing all site-specific health and safety procedures; and observing field team members for signs of exposure, stress, or other conditions related to pre-existing physical conditions and site work activities. In addition, the SSHO will inspect all personal protective equipment (PPE) used onsite; PPE is discussed in detail in the SSHP (Attachment 1).

**Competent and Qualified Persons.** When the task or activity requires a competent or qualified person, no work will be performed unless the competent or qualified person is present. A competent and qualified person is defined as a person with the proper training, certifications and appropriate level of experience to perform the task effectively, efficiently and safely. All required certifications for competent and qualified persons will be maintained onsite and available for review during on-site work hours. Tasks that require a competent and qualified person include UXO support, DGM and radiological surveys, and land survey work.

**Field Team Members.** Field team members are responsible for reviewing and following the APP/SSHP and reporting unsafe practices to the SSHO, SHM, and/or PM.

**Navy Health and Safety Officer/Resident Officer in Charge of Construction (ROICC).** The Navy Health and Safety Officer/ROICC is responsible for reviewing the APP/SSHP and for making recommendations concerning the document to the Navy Remedial Project Manager (RPM). He or she is also responsible for investigating accidents to determine their cause(s) and to identify corrective actions.

### **3.1 Employee Health and Safety Rules Non-Compliance**

Battelle has a zero tolerance policy. Employees who violate the APP or SSHP will be issued a Notice of Safety Infraction and Warning. Employees who knowingly or willfully violate APP or SSHP rules shall be subject to discharge without prior warning.

When a Notice of Safety Infraction and Warning is issued to an employee, a copy will be forwarded to their employer. A Notice of Safety Infraction and Warning may be issued to the subcontractor supervisor for not enforcing the APP or the SSHP rules with the employees under their supervision. Employees terminated for violation of project health and safety rules shall not be eligible for rehire for the duration of the project.

- Discipline for each violation will result in an incremental discipline process per employee as follows:
  - First violation will result in a written warning followed by mandatory AHA retraining for the individual and the field lead; however, any flagrant violation will result in immediate removal from the site.

- Second violation (of any kind) within a 4-month period will result in a 2-day suspension from site (without pay) followed by mandatory AHA retraining for the employee and the field lead.
- Second violation within 2 weeks or third violation (of any kind) within a 6-month period will result in the employee’s permanent removal from the site (and from Battelle) and a written warning to the field lead.
- A second employee (for a particular field lead) permanently removed from the site will result in a 2-day suspension (without pay) for that field lead.
- A third employee (for a particular field lead) permanently removed from the site will result in that field lead’s permanent removal from the site (and from Battelle).

### **3.2 Corporate Policy**

According to the Battelle Health and Safety Program, the PM and SSHO are responsible for distributing the APP and SSHP to all field personnel prior to the start of work. The PM and SSHO are responsible for ensuring that the provisions of the SSHP are carried out. This includes ensuring that:

- All field personnel have received adequate training in accordance with OSHA regulations under 29 CFR 1910.120, and
- An adequate supply of safety equipment or resource is available and that the employee is familiar with its proper use.

The PM and SSHO have the authority to suspend or to modify work practices for safety reasons and to dismiss individuals whose conduct endangers the health and safety of others.

### **3.3 Pre-Task Safety and Health Meetings**

Prior to the commencement of field work the Battelle PM or SSHO will communicate with local emergency response and medical personnel so that they are aware of the nature and extent of the field work being conducted on site. Once field work operations have begun, at the beginning of each task, a competent individual such as the PM or SSHO will conduct regular, pre-work safety meetings and tailgate safety meetings. Additionally, the SSHO will perform a job-site safety audit using the Field Audit Checklist provided in Attachment 2.

Other health-and-safety-related issues that may arise before on-site activities begin will also be discussed during the pre-work briefing. Personnel and visitors entering the site with the purpose of working on the tasks described in this APP will be required to review this APP, attend pre-work safety indoctrination meetings and tailgate safety meetings, and sign the APP. The Acknowledgement Agreement and the daily Tailgate Safety Meeting forms are provided in Attachment 2.

### **3.4 Safety and Health Expectations**

All employees share the following responsibilities and expectations to implement the Health and Safety Program effectively and to prevent injuries:

- Learning and understanding the hazards of the tasks
- Following the guidelines presented in the SSHP, the procedures discussed at the daily tailgate safety meeting and safety training courses, and the instruction of supervisors
- Reporting unsafe conditions or practices and offering suggestions to maintain a safe work site

- Inspecting equipment, tools, and work areas and maintaining safe working conditions by repairing and reporting deficiencies
- Reporting all injuries, illnesses, falls, and near misses to the PM and SSHO immediately
- Maintaining proper and positive health and safety attitudes during the performance of all tasks associated with project activities
- Advising the PM and SSHO of any required medication to be taken during the performance of any site activity

Each employee and subcontractor must successfully implement the guidelines and procedures discussed in the APP.

## **Section 4 Subcontractors and Suppliers**

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At a minimum, each subcontractor working on the project site will be required to adhere to the APP, SSHP, and the requirements presented below. More stringent requirements may be implemented based on field conditions.

### **4.1 Subcontractor/Supplier Coordination and Control**

All subcontractors will be screened for safety performance and compliance with federal alcohol and drug testing requirements prior to being issued any contract for site work. Subcontractors will comply with requirements for site safety. The PM will be responsible for the conduct and control of Battelle subcontractors, who are expected to be used for the following activities:

- Vegetation removal and silt fence installation
- Land surveying
- DGM surveys
- Heavy equipment operation for anomaly investigation
- Direct push technology and/or hollow stem auger drilling soil boring sampling
- Hydro-punch groundwater sampling
- IDW transport and off-site disposal

### **4.2 Subcontractor/Supplier Safety Responsibilities**

If applicable, all subcontractor employees are subject to the same training and medical surveillance requirements as Battelle personnel, based on job activity. All activities involving the potential for exposure to hazardous waste will require medical and training certification as mandated by 29 CFR 1910.120 and 1926.65. All subcontractor personnel will be required to sign in daily and to attend a daily tailgate meeting to discuss operations and safety issues.

The subcontractor will report directly to the PM and the field lead while on site. Subcontractors will submit AHAs for their work activities to the PM. All incidents involving subcontractor employees shall be reported to the PM and a copy of the subcontractor's injury/illness report shall be submitted to the SHM within 24 hours.

Subcontractors are required to read and sign the SSHP and comply with all requirements of this APP. Subcontractors not in compliance will be immediately dismissed from the site.

Suppliers delivering various materials to the project site or providing equipment or equipment maintenance will comply with all Battelle rules and regulations. Supplier personnel will not be permitted into contaminated areas or exclusion zones unless training and medical surveillance is in accordance with 29 CFR 1910.120 and 1926.65, if applicable. Contractors will not ride on tractors, forklifts, or similar vehicles unless seats and seat belts are provided. Trucks will be loaded and unloaded in a safe and effective manner and materials will be stored safely in designated locations only. Associated packaging will be properly disposed of and litter will not be permitted to be scattered or blown from truck beds. Mobile equipment operators must observe all traffic rules (e.g., speed limits and pedestrian right-of-way) while on site. Subcontractors shall not operate Battelle vehicles.

## **Section 5 Training**

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### **5.1 Safety Training**

All Battelle or subcontractor employees performing on-site work under this contract shall receive initial safety training prior to commencement of actual field work. This training will be performed by the SSHO or PM. This initial training shall include, but not be limited to, the following:

- Site location and description including emergency routes and hospital location
- Statement of Battelle Health and Safety Policy
- Project organization, key personnel, and responsibilities
- Chemical, physical, radiological, and biological hazards
- AHAs
- Hazard control program
- Thermal stress
- Hearing conservation
- Sanitation
- Buddy system requirements
- PPE
- Site control measures
- Exposure monitoring
- Emergency response and contingency plan
- Record keeping and data management
- Accident reporting
- Site-specific hazard communication
- Emergency equipment locations (first aid kit, fire extinguisher, eyewash kits)
- Heavy equipment safety
- Munitions

### **5.2 Mandatory Training and Certifications**

In accordance with hazardous waste operations and emergency response (HAZWOPER), USACE (2014) Safety and Health Requirements Manual EM 385-1-1 Section 28, and OSHA regulations, all persons working on this project shall have completed the minimum mandatory training specified below:

- APP/SSHP training
- HAZWOPER 40-hour training
- 8-hour HAZWOPER refresher training
- Cardiopulmonary resuscitation (CPR), first aid, and bloodborne pathogen training

The re-certification or refresher training schedule for the above-listed, mandatory training is as follows:

- HAZWOPER 8-hour refresher training is required annually.
- CPR and first aid training shall be renewed every 2 years.
- Bloodborne pathogen training is required annually for Battelle employees who are designated first aid and CPR responders.

The SSHO and the alternate shall have completed the OSHA 30-hour Construction Safety course prior to the beginning of field work.

The health and safety credentials of key personnel involved in field work activities are provided in Attachment 3.

### **5.3 Emergency Response Training**

All Battelle personnel who have completed the 40-hour HAZWOPER training are qualified as emergency first responders awareness level per 29 CFR 1910.120(1) and 1910.38. Site-specific emergency response procedures will be reviewed with all site personnel. The Emergency Action Plan and Contingency Plans are provided in the SSHP (Attachment 1).

### **5.4 Supervisory and Employee Safety Meetings**

The SSHO will conduct daily safety meetings at the start of each work shift for all on-site personnel and will require any subcontractors to follow similar meeting procedures and participate in daily safety meetings. Daily safety meetings will comply with Battelle Tailgate Safety Meeting requirements. Additional information on training requirements is presented in Section 10 of the SSHP (Attachment 1).

## Section 6 Safety and Health Inspections

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### 6.1 Inspections

Shawn Majors has been appointed as SSHO by Battelle's SHM. The SSHO will conduct daily safety inspections to determine if operations are being performed in accordance with the SSHP and with applicable requirements and regulations. Mr. Shawn Majors has over 5 years of experience in conducting similar investigations for NAVFAC SW and is current with the following training:

- OSHA 40-hour HAZWOPER with 8-hour refresher (in accordance with 29 CFR 1910.120 and 40 CFR 265.16)
- OSHA 30-hour Construction Safety Training
- 10-hour OSHA Construction Safety and Health Training
- CPR, first aid, and bloodborne pathogens

Mr. Ryan Moon, CIH, is the designated SHM who will conduct periodic safety inspections. All appropriate training records and certifications are maintained in the field notebook and will be available during field activities. Inspection findings will be recorded on the field-activity daily log or in a project notebook.

The SSHO and PM are responsible for conducting and preparing reports of daily safety inspections of work processes and of site and equipment conditions. The reports will be submitted to the SHM. The SSHO, PM, and SHM will discuss any corrective actions and review new procedures. Copies of these reports will be maintained at the project location.

The Battelle SHM may periodically conduct site visits and perform site safety assessments. These reports will be kept on file at the Battelle Columbus, Ohio office and will be tracked in a deficiency-tracking log for each Battelle project, including the number of action items noted during the visit and written confirmation of the corrective actions for each item. These responses will be compiled and provided to the PM for review. The deficiency-tracking log will be posted on the safety and health bulletin board in areas commonly used by employees. For sites where a fixed support area is not available, the log will be maintained by the SSHO and be readily available to all on-site personnel.

## **Section 7 Accident Reporting**

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### **7.1 Exposure Data (Man-Hours Worked)**

Battelle's SHM tracks and maintains incident records for federal reporting requirements. Incident rates and workers' compensation losses are tracked for each business line. Incident rates will be reported monthly by the SHM.

### **7.2 Accident Investigations, Reports, and Logs**

The PM and SSHO will conduct accident/incident investigations. A report will be completed by the PM and submitted within 24 hours of the accident/incident to the Battelle Safety Department in Columbus, OH. All accident- and incident-reporting forms are provided in Attachment 2.

### **7.3 Immediate Notification of Major Accidents**

Battelle will immediately notify the Navy ROICC San Francisco Bay of any major accident (e.g., injury, fire, equipment/ property damage, and environmental incident). Immediate notification and investigation of accidents is an important component of Battelle's Accident Prevention Program. Battelle will notify the ROICC (the first point of contact) in the event of injuries requiring more than first aid or exceeding \$5,000 in property damage. A full report will be provided within 24 hours. Accidents involving personal injury or illness resulting in lost time or property damage exceeding \$10,000 shall be immediately reported to the NAVFAC SW RPM or authorized representative.

In compliance with OSHA recordkeeping regulation, any work-related fatalities will be reported within 8 hours and all work-related in-patient hospitalizations, amputations and loss of an eye be reported within 24 hours.

### **7.4 Accident Response**

The nearest workers will immediately assist a person who shows signs of medical distress or who is involved in an accident, as long as the accident scene is safe. The field lead will be summoned. The field lead will immediately contact the SSHO to alert him of the medical emergency and provide the following information:

- Nature of the emergency
- Location of the victim at the work site
- Whether the victim is conscious
- Specific conditions contributing to the injury, if known

## **Section 8 Plans and Procedures Required by EM 385-1-1**

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Details of activities and required procedures for this project are discussed in the RI Work Plan. The following sections present a general description of plans required by the *Safety and Health Requirements Manual* (EM 385-1-1; USACE, 2014).

### **8.1 Layout Plan**

A layout plan is not required based on the planned field work and existing site conditions.

### **8.2 Emergency Response Plans**

The emergency response plan is contained in Section 11 of the SSHP.

#### **8.2.1 Procedures and Tests**

Specific procedures and tests are discussed in detail in Section 11 of the SSHP.

#### **8.2.2 Spill Plan**

The spill plan is discussed in detail in Section 12 of the SSHP.

#### **8.2.3 Firefighting Plan**

The firefighting plan is discussed in detail in Section 11 of the SSHP.

#### **8.2.4 Posting of Emergency Telephone Numbers**

Emergency telephone numbers are listed in Section 11 of the SSHP.

#### **8.2.5 Man Overboard/Abandon Ship**

Man overboard/abandon ship is not applicable to the planned field work.

#### **8.2.6 Medical Support**

Medical support will be provided on site by first-aid and CPR-qualified first responders. The SSHO is designated as the first responder for medical emergencies and minor injuries. At least two on-site employees as well as Battelle field personnel will be qualified in CPR, first aid, and bloodborne pathogen training. Certificates of qualification will be maintained in the field at all times. The PM and the SSHO shall be qualified as first responders. Off-site medical support will be provided by the local emergency medical and management agency. The nearest facility for medical treatment is the Kaiser Permanente Medical Center located on 975 Sereno Drive, Vallejo, California. Directions and a map to the hospital are included in the SSHP (Attachment 1).

### **8.3 Plan for Prevention of Alcohol and Drug Abuse**

The following plan for the prevention of alcohol and drug abuse will be implemented.

- In accordance with the applicable company's Substance Abuse Policy, employees are not allowed to be under the influence of alcohol or drugs during site activities. If an

employee is suspected of being under the influence of drugs or alcohol, they will be removed from the job site, and a mandatory drug test will be administered.

- Employees are required to submit to testing under the circumstances described below:
  - Whenever there is reasonable suspicion that the employee has or may have used drugs or alcohol in violation of established policy. “Reasonable suspicion” determinations will be made by personnel who have received training on the signs and symptoms of alcohol misuse and drug use.
  - Whenever an employee causes or contributes to a work-related incident.
- Random drug and alcohol tests may be conducted on employees in safety-sensitive positions and other positions as state or local law permits.
- The refusal to submit to any drug or alcohol test that is required under established policy will result in the employee’s immediate termination of employment.
- The following conduct by employees is prohibited:
  - Reporting for work or remaining on duty after the employee has consumed alcohol in any amount.
  - Consuming alcohol at any time during an employee’s workday. This includes, but is not limited to, while an employee is on or off the premises of the company, as well as during the employee’s meal and other break periods. This prohibition does not include the authorized and reasonable consumption of alcohol by an employee of legal drinking age at business functions or activities sponsored by the company or a client. However, an employee who is requested to submit to a “reasonable suspicion” alcohol test as a result of such drinking and whose breath alcohol test result is 0.04% or greater will be considered to have consumed more than a reasonable amount and will be in violation of this policy.
  - Engaging in any illegal or unauthorized use of drugs at any time while on or off duty.
  - Engaging in the unlawful or unauthorized manufacture, distribution, dispensation, solicitation, sale, purchase, transfer, or possession of drugs or alcohol while on employer-paid time, on the employer’s premises, in the employer’s vehicles, or while otherwise engaged in activities for or on behalf of the employer.
- Employees who voluntarily self-identify themselves as having a drug or alcohol problem and who voluntarily request assistance for such problem will be referred to a substance abuse professional for an evaluation and for an appropriate counseling, treatment, or rehabilitation program, if recommended.
- An Employee Assistance Program will be provided and will include information concerning the effects and consequences of alcohol and drug use on an individual’s health, work, and personal life, and the signs and symptoms of an alcohol or drug problem. In addition, the Employee Assistance Program will provide referral services to employees and their families seeking help with problems resulting from alcohol misuse and drug use.

## **8.4 Site Sanitation Plan**

The following plan for site sanitation will be implemented.

### **8.4.1 Housekeeping**

During site activities, work areas will be continuously monitored for identification, collection, and removal of trash and debris. Excess debris and trash will be collected and stored in an appropriate container (e.g., plastic trash bags, garbage can, roll-off bin) prior to disposal. Regular cleaning will be conducted to maintain safe and sanitary conditions in the workplace.

### **8.4.2 Potable Water**

An adequate supply of potable water will be available for field personnel consumption. Cool drinking water shall be provided during hot weather. Potable water will be provided in the form of bottled water. Potable water containers will be carried by each field crew member and properly identified in order to distinguish them from non-potable water sources. A minimum water ration of 1.5 gallons per person per day will be available during field activities, and crew members will be encouraged to drink plenty of fluids.

### **8.4.3 Non-Potable Water**

Non-potable water may be used for cleaning work areas and personal service rooms; it is not to be used for drinking purposes. Outlets dispensing non-potable water will be conspicuously marked “CAUTION - WATER UNFIT FOR DRINKING, WASHING, OR COOKING.”

### **8.4.4 Toilet Facilities**

In accordance with EM 385-1-1, a minimum of one toilet facility will be provided for each sex in a group of 20 or fewer employees. Where toilet rooms may be occupied by no more than one person at a time, can be locked from the inside, and contain at least one toilet seat, separate toilet rooms for each gender need not be designated. Toilets will be provided at or near the site of project field personnel at the rally point location (i.e., laydown area parking lot).

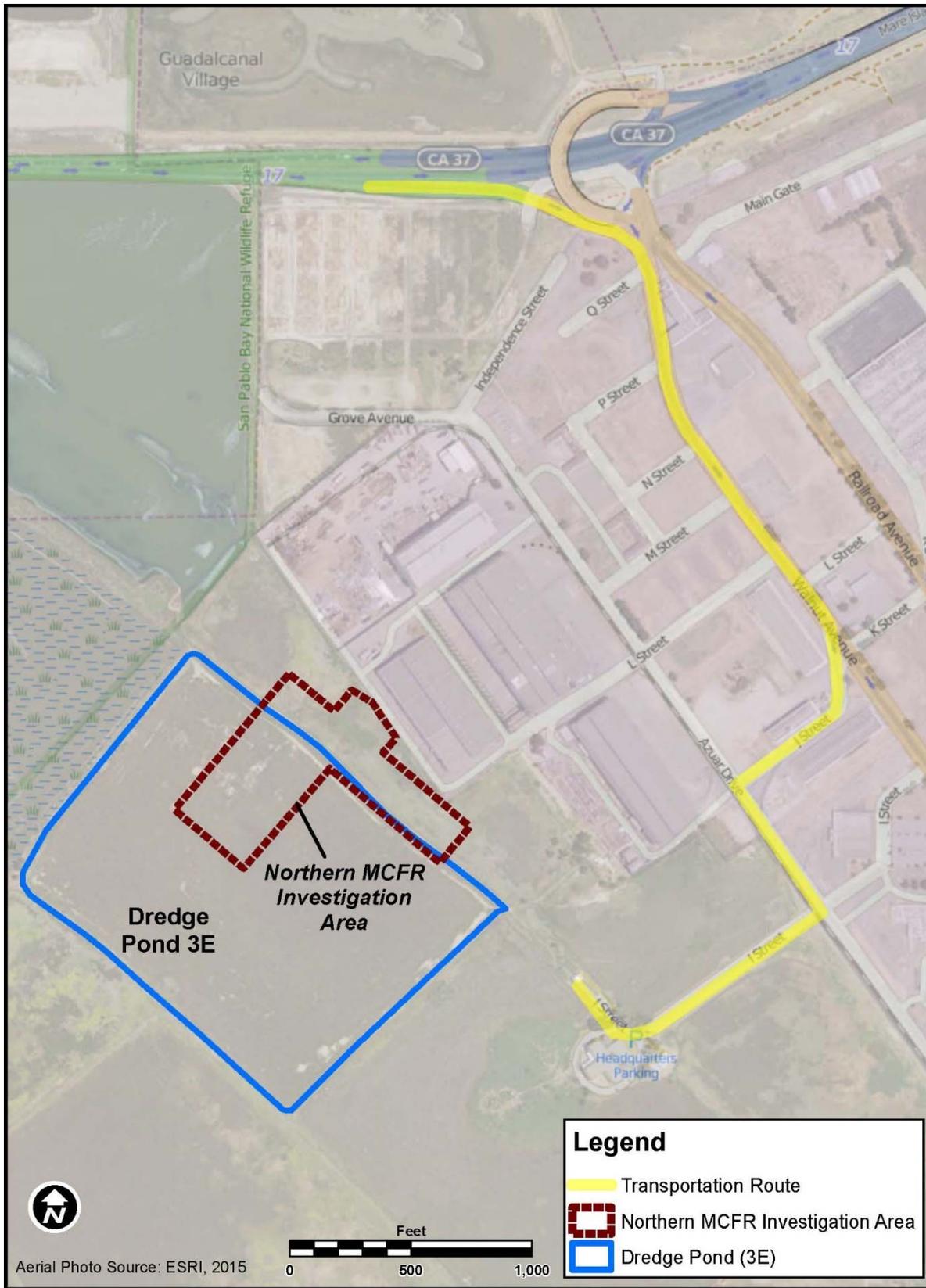
## **8.5 Access and Haul-Road Plan**

An access and haul-road plan is not required based on the location of the planned field work. (Figure 2-1). Site access can be accomplished via existing paved roadways on Mare Island (Figure 8-1)

## **8.6 Respiratory Protection Plan**

The primary objective of respiratory protection is to prevent employee exposure to atmospheric contamination. Personal respiratory protective devices will be used when engineering measures to control contamination and respirable hazards are not feasible.

The criteria for determining respirator need have been evaluated based on the planned field work and potential contamination. Respiratory protection is not anticipated; however, in the event that conditions change, air monitoring will be conducted to confirm that respiratory protection levels meet safety standards. All respirator users will be OSHA-trained in proper respirator use and maintenance. The PM and SSHO will observe workers during respirator use for signs of stress. The PM, SSHO, and SHM will periodically evaluate the implementation of the SSHP to determine its continued effectiveness with regard to respiratory protection. All persons assigned to use respirators will have medical clearance to do so.



**Figure 8-1. Site Access Route**

## **8.7 Health Hazard Control Program**

The AHAs presented in Appendix C of the SSHP address the hazards for the proposed field activities. The AHAs shall serve as the initial certification of hazard assessment. The AHAs are an ongoing process from initiation of the SSHP to implementation and completion of field work.

## **8.8 Hazard Communication Program**

Battelle's Hazard Communication Program shall be implemented on site. Hazardous materials are not anticipated to be brought on site. Employee records shall be maintained on site by the SSO. Employee records are also available through the Battelle employee database. The Hazard Communication Program is discussed in detail in Section 9 of the SSHP.

## **8.9 Process Safety Management Plan**

A process safety management plan is not required based on the planned field work.

## **8.10 Lead Abatement Plan**

A lead abatement plan is not required based on the planned field work, which does not include abatement. While lead is a potential site contaminant from expended munitions, the concentrations are anticipated to be very low and not widespread. Historic lead concentrations do not exceed the OSHA 1910.1025 action level of 30  $\mu\text{g}/\text{m}^3$ . However, due to potential dermal contact concerns, lead awareness training and proper precautions relating to lead will be provided for all onsite personnel.

## **8.11 Asbestos Abatement Plan**

An asbestos abatement plan is not required based on the planned field work.

## **8.12 Radiation Safety Program**

Work involving potential exposure to radiation will be performed in accordance with the Radiation Safety Program of Cabrera. This program conforms to the requirements of 10 CFR 20, "Standards for Radiation Protection," and has been approved by the Nuclear Regulatory Commission (NRC). An overview of the program is included with the Radiological Handling Plan provided as Appendix C to the RI Work Plan.

Cabrera will implement its NRC-license approved Radiation Protection Program in accordance with its associated procedures during the remedial investigation for Dredge Pond 3E and the Northern MCFR at the former MINS. The program will support (radiologically) the safe RI project activities including the characterization of a radiological reference background area, surface radiological and DGM survey, anomaly investigation, soil borings, well installation, non-radiological sampling, MPPEH management and disposal, IDW management and disposal, and site restoration. Cabrera will establish a radiologically controlled area at the MINS in order to properly control access of personnel and equipment to/from the site. Radiological support activities will be performed by appropriately trained workers and overseen by trained and qualified personnel who are authorized and responsible to apply the radiological management and control measures specified in the Radiation Protection Program and project plans, as appropriate. A qualified Cabrera representative will delegate the daily radiological operating responsibilities for related activities with the use of guidance, directives, and Standard Operating Procedures such that the work performed will comply with Cabrera's NRC radioactive materials license. In addition to site-specific radiological worker training, Cabrera's program will include monitoring and control of radiological hazards. Key measures will include control of equipment, materials, and

personnel entering or exiting the controlled area, and personnel protective equipment, as appropriate, to prevent the contamination of personnel or their clothing.

Additional radiation hazards and safety are discussed in Section 4.3 of the SSHP.

### **8.13 Abrasive Blasting Plan**

An abrasive blasting plan is not required based on the planned field work.

### **8.14 Heat/Cold Stress Monitoring Plan**

Heat/cold stress monitoring is discussed in the SSHP.

### **8.15 Crystalline Silica Monitoring Plan (Assessment)**

A crystalline silica monitoring plan (assessment) is not required based on the planned field work.

### **8.16 Night Operations Lighting Plan**

Battelle will not perform work during hours of low lighting. A night operations lighting plan is not required based on the planned field work.

### **8.17 Fire Prevention Plan**

Fire prevention is critical, especially in heavily vegetated areas. Fire prevention is everybody's responsibility.

- This Fire Prevention Plan is overseen by the SSHO.
- Fire suppression materials and equipment, including fire extinguishers, are maintained accessible, clearly marked and ready to use near all work areas.
- Flammable materials are stored away from all sources of ignition.
- Good housekeeping is enforced in all work, storage, and staging areas. These areas are maintained neat and clean. Trash and debris are not allowed to accumulate.
- Smoking is never permitted on the project site except in designated areas.
- All Battelle vehicles carry at least one fire extinguisher.
- A "Hot Work Permit" is required for each activity where an arc, spark, or open flame is involved, including welding and soldering.
- Before issuing a Hot Work Permit, the SSHO inspects the area where work is to be performed, determines the type and location of combustible materials around or near the work site, and ensures that the combustible materials are removed or protected during the hot work.
- Establish fire watches, if hazards warrant. A fire watch should stay on duty (the work area) for 30 minutes, or longer, after all spark-producing equipment has been shut down.
- Provide the applicable fire extinguishing media and devices. A standby employee (separate from the employees working the permit) usually operate the device.
- Communicate with and coordinate the activities of all departments or groups concerned with fire protection.

- Remove or isolate all combustibles from sources of ignition.
- Use only authorized flame or spark producing equipment. Ensure that all guards and safety devices are present and operating on any of this equipment.
- All subcontractors, visitors, and vendors shall conform to this Fire Prevention Plan.
- Any unplanned or uncontrolled fire shall be reported to the SSHO. Any fire resulting in damage to equipment or lost time against the production schedule shall be reported to the PM.
- All site workers are briefed on the Fire Prevention Plan at time of orientation and given their assignments for its implementation.

### **8.18 Wild Land Fire Management Plan**

A wild land fire management plan is not required based on the planned field work.

### **8.19 Hazardous Energy Control Plan**

A hazardous energy control plan is not required based on the planned field work.

### **8.20 Critical Lift Procedures**

Critical lift plans are not required based on the planned field work.

### **8.21 Contingency Plan for Severe Weather**

Sudden changes in the weather, extreme weather conditions, and natural disasters can create a number of subsequent hazards. Natural disasters can create many secondary hazards such as the release of hazardous materials to the environment, structure failure, and fires.

Routinely monitoring weather conditions and reports may help reduce the impact of severe weather and natural disasters. It may be necessary to halt certain hazardous operations or stop work altogether to allow the situation to pass. The PM must decide what operations, if any, are safe to perform based on existing conditions and anticipated conditions.

The best protection against most severe weather episodes and natural disasters is to avoid them. This includes seeking shelter before a storm arrives, staying away from pipes and electrical equipment if lightning is a threat, and watching for damage caused by nearby lightning strikes. Additionally, slip, trip, and fall hazards may become more prevalent.

### **8.22 Float Plan**

A float plan is not required based on the planned field work.

### **8.23 Site-Specific Fall Protection and Prevention Plan**

A site-specific fall protection and prevention plan is not required based on the planned field work.

### **8.24 Demolition Plan**

A demolition plan, including engineering evaluation and lead-based paint and asbestos surveys, is not required based on the planned field work.

### **8.25 Excavation/Trenching Plan**

An excavation/trenching plan is not required based on the planned field work.

### **8.26 Emergency Rescue (Tunneling)**

Tunneling is not anticipated based on the planned field work.

### **8.27 Underground Construction Fire Prevention and Protection Plan**

An underground construction fire prevention and protection plan is not required based on the planned field work.

### **8.28 Compressed Air Plan**

A compressed air plan is not required based on the planned field work.

### **8.29 Formwork and Shoring Erection and Removal Plans**

Formwork and shoring erection and removal plans are not required based on the planned field work.

### **8.30 Pre-Cast Concrete Plan**

A pre-cast concrete plan is not required based on the planned field work.

### **8.31 Lift Slab Plans**

A lift slab plan is not required based on the planned field work.

### **8.32 Steel Erection Plan**

A steel erection plan is not required based on the planned field work.

### **8.33 Site-Safety and Health Plan for Hazardous, Toxic, Radioactive Waste Work**

The SSHP for hazardous and toxic waste work is included as Attachment 1. The Radiological Handling Plan, included as Appendix C to the RI Work Plan, provides additional site safety and health requirements for radioactive waste work. Basic responses in the event that hazardous, toxic, or radioactive material is encountered are discussed in these documents.

### **8.34 Blasting Plan**

A blasting plan is provided in the ESS.

### **8.35 Diving Plan**

A diving plan is not required based on the planned field work.

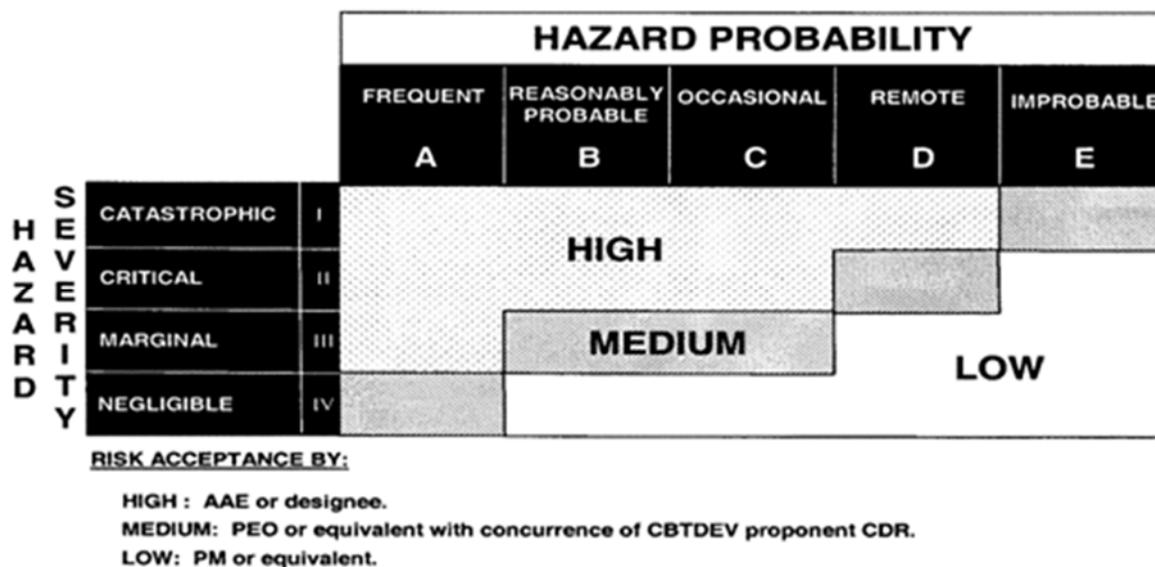
### **8.36 Confined Space**

Confined space entry is not anticipated based on the planned field work.

## Section 9 Risk Management Processes

The AHAs attempt to anticipate chemical, physical, and biological hazards, and to prescribe controls for all field work at former MINS.

Figure 9-1 provides the definitions of risk assessment codes used for AHAs. Hazard severity is specified in Table 9-1 and hazard probability is specified in Table 9-2. AHAs for individual activities are presented in Appendix C of the SSHP.



**Figure 9-1. Definition of Risk Assessment Code**

Source: Army Regulation 70-1, Risk Decision Matrix (United States Department of the Army, 2003)

**Table 9-1. Incident Severity Categories**

Severity of Incident	Category	Definition of Severity
Catastrophic	I	Could result in death or permanent, total disability, and loss exceeding \$1 million.
Critical	II	Could result in permanent, partial disability, injuries, or occupational illness that may result in hospitalization of at least three personnel, loss exceeding \$200,000 but less than \$1 million, and major system or subsystem loss.
Marginal	III	Could result in injury or occupational illness resulting in one or more lost work day(s) and loss exceeding \$20,000 but less than \$200,000.
Negligible	IV	Could result in injury or illness not resulting in a lost workday and loss exceeding \$2,000 but less than \$20,000.

Source: Adapted from Military Standard 882D (MIL-STD-882D) (United States Department of Defense, 2000)

**Table 9-2. Incident Probability Levels**

<b>Probability Level of Incident</b>	<b>Category</b>	<b>Definition of Probability Level</b>
Frequent	A	Continuously experienced
Probable	B	Will occur frequently
Occasional	C	Will occur several times
Remote	D	Unlikely, but can reasonably be expected to occur
Improbable	E	Unlikely to occur, but possible

Source: Adapted from Military Standard 882D (MIL-STD-882D) (United States Department of Defense, 2000)

## Section 10 References

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**Attachment 1**  
**Site Safety and Health Plan**

**Final**

# Site Safety and Health Plan

Remedial Investigation at UXO 3 – Dredge Pond 3E  
and Northern Marine Corps Firing Range  
Former Mare Island Naval Shipyard  
Vallejo, California

December 2015

Prepared for:



U.S. Department of the Navy  
Base Realignment and Closure  
Program Management Office West  
San Diego, California

Prepared under:

**Contract Number: N62473-11-D-2228**  
**Task Order Number: 0006**  
**DCN: BATL-2228-0006-0005**

Prepared by:

## **Battelle**

*The Business of Innovation*

**505 King Avenue**  
**Columbus, OH 43201**

**Final**

**Site Safety and Health Plan  
Remedial Investigation at UXO 3 – Dredge Pond 3E  
and Northern Marine Corps Firing Range  
Former Mare Island Naval Shipyard  
Vallejo, California**

**December 2015**

**Contract Number N62473-11-D-2228  
Task Order Number 0006  
DCN BATL-2228-0006-0005**

**Prepared for:  
U.S. Department of the Navy**

***REVIEW AND APPROVAL***

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12/11/2015

Date

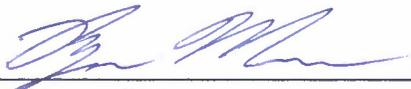


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Plan Concurrence  
Battelle Project Manager

12/11/2015

Date



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Ryan Moon, CIH  
Plan Approver  
Battelle Corporate Health and  
Safety Representative

12/4/2015

Date

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## ACRONYMS AND ABBREVIATIONS

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°C	degrees Celsius
°F	degrees Fahrenheit
ACGIH	American Conference of Governmental Industrial Hygienists
AHA	Activity Hazard Analysis
ALARA	as low as reasonably achievable
ANSI	American National Standards Institute
APP	Accident Prevention Plan
BRAC	Base Realignment and Closure
CCR	<i>California Code of Regulations</i>
CDC	Centers for Disease Control and Prevention
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	<i>Code of Federal Regulations</i>
CIH	Certified Industrial Hygienist
CPR	cardiopulmonary resuscitation
CRZ	Contamination Reduction Zone
dB(A)	decibels on the A-weighted scale
DEET	diethyltoluamide
DFOW	definable feature of work
DGM	digital geophysical mapping
DMM	discarded military munition
ERT	emergency response team
ESS	Explosive Safety Submission
EZ	Exclusion Zone
FID	flame ionization detector
GPS	global positioning system
HAZMAT	hazardous materials
HAZWOPER	Hazardous Waste Operations and Emergency Response
IDW	investigation-derived waste
MCFR	Marine Corps Firing Range
MEC	munitions and explosives of concern
mg/m <sup>3</sup>	milligrams per cubic meter
MINS	Mare Island Naval Shipyard
MPPEH	materials potentially presenting an explosive hazard
NAVFAC SW	Naval Facilities Engineering Command Southwest
Navy	United States Department of the Navy

## ACRONYMS AND ABBREVIATIONS (Continued)

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NIOSH	National Institute for Occupational Safety and Health
NRC	Nuclear Regulatory Commission
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyl
PID	photoionization detector
PM	Project Manager
PMO	Program Management Office
PPE	personal protective equipment
ppm	parts per million
PRC	PRC Environmental Management, Inc.
RCA	radiological control area
RI	remedial investigation
ROICC	Resident Officer in Charge of Construction
RPM	Remedial Project Manager
RSO	Radiological Safety Officer
SHM	Safety and Health Manager SOP standard operating procedure S
SHP	Site Safety and Health Plan
SSHO	Site Safety and Health Officer
SSPORTS	Supervisor of Shipbuilding, Conversion, and Repair, Portsmouth, Virginia, Environmental Detachment
UN	United Nations
USA	Underground Service Alert
USACE	United States Army Corps of Engineers
U.S. EPA	United States Environmental Protection Agency
UXO	unexploded ordnance
VOC	volatile organic compound
Weston	Roy F. Weston, Inc.

## **Section 1 Introduction**

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This Site Safety and Health Plan (SSHP), which is Attachment 1 to the Accident Prevention Plan (APP), describes the health and safety guidelines developed to protect on-site personnel, visitors, and the public from hazards encountered during the remedial investigation (RI) at Unexploded Ordnance (UXO) Site 3, which consists of Dredge Pond 3E (only the portion located east of the Joy Survey Line) and the Northern Marine Corps Firing Range (MCFR) at former Mare Island Naval Shipyard (MINS), Vallejo, California.

This SSHP has been prepared by Battelle on behalf of Naval Facilities Engineering Command Southwest (NAVFAC SW). Confirmation soil sampling and subsurface geophysical survey activities are being conducted by Battelle under the United States Department of the Navy (Navy) Contract No. N62473-11-D-2228, Task Order No. 0006.

This SSHP also presents information designated to comply with applicable provisions of Title 29 of the *Code of Federal Regulations* (CFR), Part 1910.120 (29 CFR 1910.120) and other applicable Occupational Safety and Health Administration (OSHA) regulations.

### **1.1 Purpose of the Site Safety and Health Plan**

The purpose of this SSHP is to define requirements and designate protocols to be followed during field activities associated with this project. All personnel on site, including Battelle and subcontractor employees and site visitors, will be informed of site emergency response procedures and potential fire, explosion, health, or safety hazards associated with on-site activities. This SSHP will be kept in the field support vehicle at all times during field activities. The location and use of this plan will be discussed with the field team at the beginning of field activities and periodically reviewed throughout the duration of the field activities. All visitors to the project work area will be briefed on this SSHP, its location, and use. This SSHP is intended solely for use during proposed activities described herein.

This document addresses safety and health concerns related to RI field activities, as well as personal protection requirements and safe working practices, monitoring and site control procedures, and emergency contingency plans. The Hazard Identification in Section 3 of the SSHP and the Activity Hazard Analysis (AHA) sheets in Appendix C provide an assessment of the hazards associated with each definable feature of work (DFOW). The AHAs define the activities being performed and identify the specific hazards anticipated, site conditions, equipment, materials, and control measures to be implemented to eliminate or reduce each hazard to an acceptable risk level. Fifteen days prior to the start of each DFOW, the AHA for that specific DFOW will be submitted to the Navy for review.

### **1.2 Reference Documents**

This SSHP has been prepared for use in conjunction with the following safety and health documents:

- 29 CFR 1910 – Subpart T
- 29 CFR 1910.120 – Hazardous Waste Operations and Emergency Response (HAZWOPER)
- 29 CFR 1910.132 – OSHA Personal Protective Equipment (PPE)
- 29 CFR 1910.134 – Respiratory Protection
- 29 CFR 1910.165 – Employee Alarm Systems
- 20 CFR 1910.402 – Applicable Scientific Diving Standards

- 29 CFR 1910.1030 – Bloodborne Pathogens
- 29 CFR 1910.1200 – Hazard Communication
- *California Code of Regulations (CCR), Title 8, Section 5192 (8 CCR 5192)*
- National Institute for Occupational Safety and Health(NIOSH)/OSHA/United States Coast Guard/United States Environmental Protection Agency (U.S. EPA), *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, October 1985
- Navy Diving Manual, Revision 6, March 2009
- Navy Environmental Restoration Program Manual, August 2006 Update
- United States Army Corps of Engineers (USACE), *Safety and Health Requirements Manual (EM 385-1-1)*, September 15, 2014

### 1.3 Site Location and Description

Former MINS occupies approximately 5,600 acres on a peninsula bounded on the south by Carquinez Strait, on the west by San Pablo Bay, and on the east by Mare Island Strait (Napa River) which separates it from the city of Vallejo, California (Figure 1-1). The approximate 519-acre dredge pond system consists of 12 dredge spoils ponds that were established along the western half of Mare Island in several stages between 1914 and 1965 (Supervisor of Shipbuilding, Conversion, and Repair, Portsmouth, Virginia Environmental Detachment [SSPORTS], 1997).

Dredge Pond 3E was constructed in 1931 and used until a second pond group was constructed in 1948 (PRC Environmental Management, Inc. [PRC], 1995 and Roy F. Weston [Weston], 2002). The dredge ponds are made up of maintenance dredging material that was removed from the waterways and ship berths along the east side of Mare Island and transported across the island as slurry through the piping system to the ponds (SSPORTS, 1997).

In addition to sediment, the dredge slurry contained discarded materials including scrap metal and, in some locations, materials potentially presenting an explosive hazard (MPPEH) and radiological items. A wide variety of MPPEH items were hypothesized to be present in dredge ponds (e.g., propellants, high explosive loaded items, small arms ammunition, fuses, primers, and minor-to-medium-caliber gun ammunition) since unwanted materials were commonly discarded by throwing them overboard from a vessel, pier, or sea wall. SSSPORTS conducted a UXO Site Investigation in 1997 followed by an UXO Intrusive Investigation from 1998 to 2001. During the UXO Site Investigation, SSSPORTS identified 390 metallic anomalies in the dredge ponds including 31 anomalies identified in Dredge Pond 3E (SSSPORTS, 1997). During the UXO Intrusive Investigation, SSSPORTS/Weston investigated the 390 metallic anomalies and identified 58,803 live ordnance items including 3,425 that contained high explosive material (Weston, 2002). No UXO has been found at former MINS and all munitions and explosives of concern (MEC) has been categorized as discarded military munitions (DMM).

The Northern MCFR operated from 1917 through 1940. It was originally built in marshlands and extended south from what is now Walnut Avenue across Cedar Avenue and into Dredge Pond 3E near what is now Building 751. The MCFR consisted of one 1000-yard rifle range and two 600-yard rifle and pistol ranges. The impact berm for the 1000-yard range was located within Dredge Pond 3E but has been leveled. PRC (1995) reported that pieces of wood, concrete, large bolts, and other debris were found in the approximate location of the former berm. SSSPORTS reported that the 1000-yard range impact berm

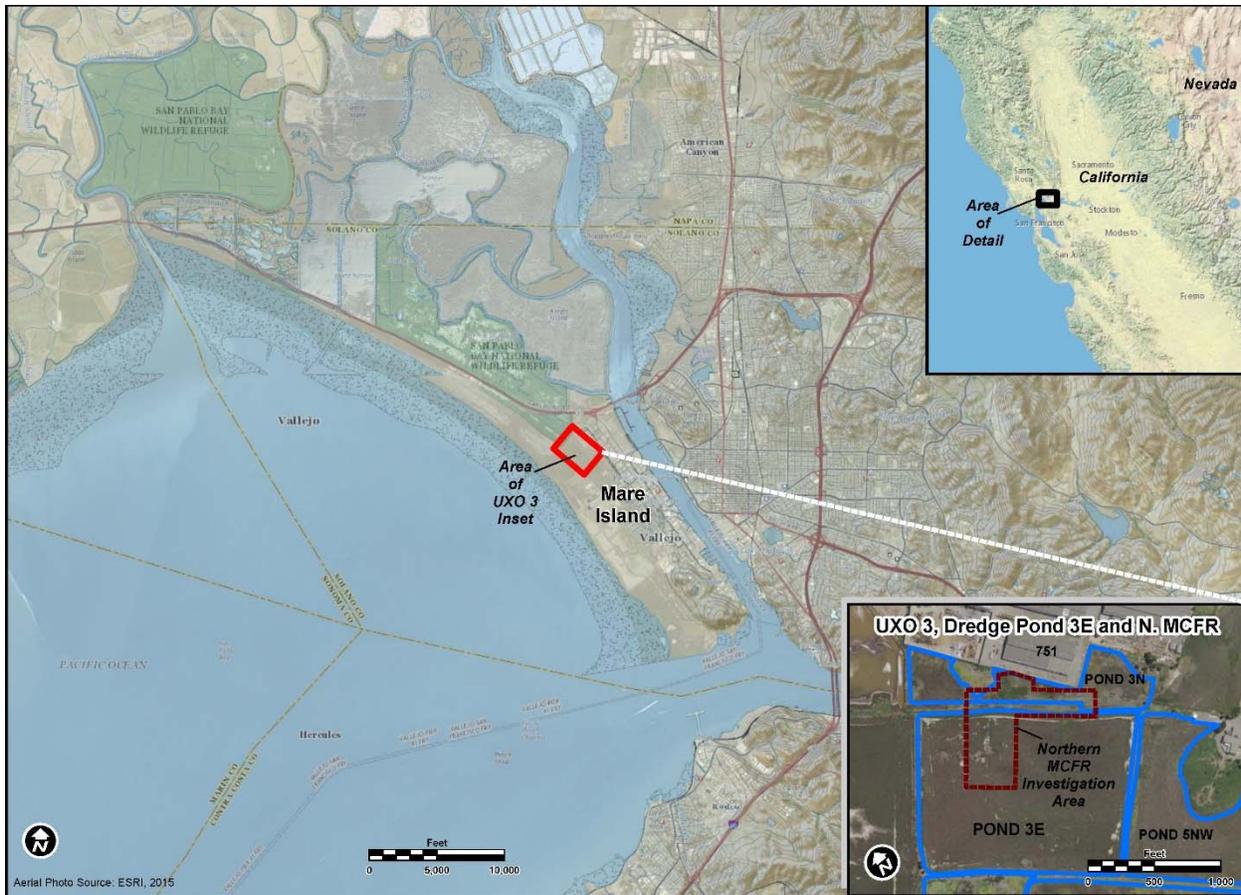


Figure 1-1. Regional Map

could be observed as a visible discoloration of the soil in Dredge Pond 3E in 1997. The 600-yard rifle and pistol range was located southeast of the 1000-yard rifle range and had two impacted areas just east of the Dredge Pond 3E berm (PRC, 1995). The 600-yard impacted berm was determined (by recovered bullet fragments and observed remnants of the target butt structure) to be approximately 25 feet farther east than predicted during the UXO Site Investigation in November 1995 (SSPORTS, 1997).

Additional investigation is necessary at Dredge Pond 3E east of the Joy Survey Line and at the Northern MCFR within the vicinity of the 1000-yard and 600-yard impact berms within and adjacent to Dredge Pond 3E (Figure 1-2) for the purposes of characterizing MEC, radiological items, and chemical contaminants that may remain in place.

## 1.4 Scope of Work

Battelle is scheduled to perform an RI for Dredge Pond 3E and the Northern MCFR at the former MINS. The RI will include the following tasks:

- **Site Preparation.** Site preparation activities for the RI at the Dredge Pond 3E and the Northern MCFR include installation of mouse fencing, vegetation clearance, removal of debris that could impede fieldwork progress and a surface sweep in the presence of a Radiation Safety Officer and UXO Tech II escort for MPPEH and radiological items.

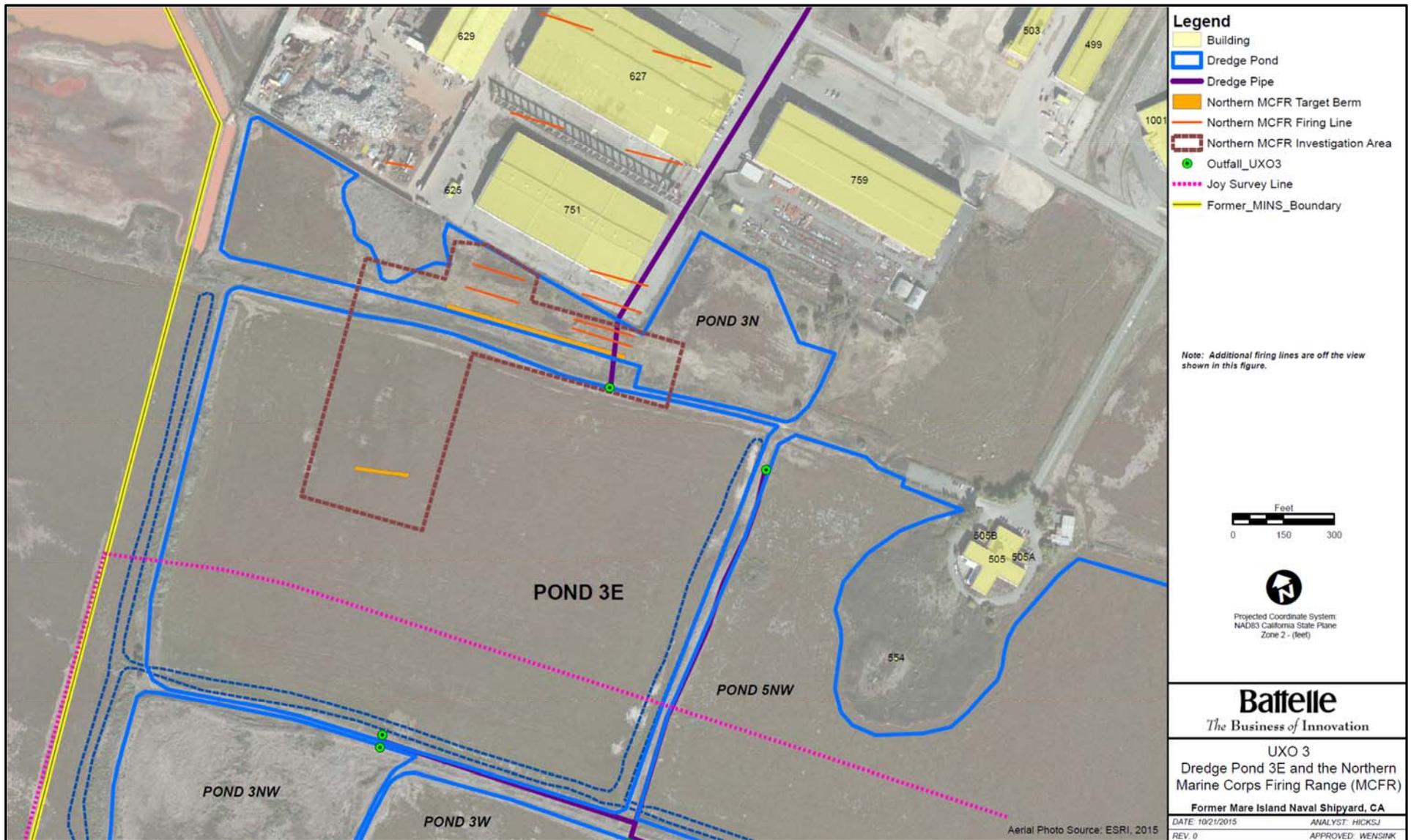


Figure 1-2. Site Location Map

- **Vehicle and Equipment Pilot Study.** A test plot will be identified onsite where vegetation clearance methods, drilling equipment, trucks, excavating equipment and geophysical equipment will be tested to determine the viability for the RI field work.
- **Establishment of Radiological Background.** A radiological background reference area (reference area) will be selected that is considered non-impacted and suitable for use as a “reference area”. Measurements will be performed to establish a reference area response value for the handheld and towed detectors.
- **Surface Radiological and DGM Survey.** Surface radiological scans will be performed over the entire site (100%) using towed radiological survey equipment. In addition to the surface and near-surface radiological scans, sampling will be performed to evaluate the conditions to 4 feet below ground surface. Test pits will be excavated to a depth of 4 feet and radiological scans performed. Volumetric soil samples will be collected from the test pits for radiological analyses.

Digital geophysical mapping (DGM) will be performed in stages throughout the Dredge Pond 3E area. These stages include the geophysical system verification quality control protocols, total coverage DGM of the pond berms, total coverage DGM of the outfall area, and transect-based mapping of specified areas of the pond bottom. The purpose of the DGM is to determine the number and location of potential subsurface munitions-like items throughout the site sufficient to determine the nature and extent of potential MPPEH requiring removal. The primary geophysical equipment used during this investigation consists of the Geonics EM61-MK2A (EM61) high-sensitivity metal detector.

- **Anomaly Investigation.** Radiological anomaly investigation and removal will be performed where radiological surface surveys identify an anomaly present (i.e., greater than three sigma investigation level value). The surveys will be performed using a hand-held 2-inch by 2-inch sodium iodide detector crystal. As anomaly material is excavated from the anomaly site, the 2-inch by 2-inch detector will be used to survey the excavation surface. The excavation will be stopped at 4 feet below ground surface if the anomalies cannot be fully removed. Additionally, volumetric soil samples will be collected after the anomaly removal actions are completed and sent to an off-site laboratory for analysis by gamma spectroscopy.

UXO subsurface investigations will be performed within the surveyed area on all anomalies. A senior UXO Supervisor and a UXO Safety Officer/Quality Control Specialist will be on site full time during the UXO intrusive investigation. Intrusive investigation will be conducted with a mini excavator, global positioning system (GPS) field data logger, and hand digging implements. The intrusive investigation will be performed in an area of 4 feet by 4 feet to either depth of detection or a maximum of 4 feet depth, and completion will be verified using an all-metals, handheld metal detector within the radius of investigation. If an outfall mass is encountered, it will be excavated and removed as a single large item and transported intact to a location suitable for safe disassembly and inspection. A tracked excavator with the appropriate shielding will be used to excavate, transport, and handle the outfall mass. Once in place at the designated processing location, any exposed ordnance will be manually removed. Radiological screening of all excavated soil and debris will also be conducted throughout the disassembly process to ensure detection and proper handling of radiological material. During the UXO anomaly investigation or removal, soil samples will be collected and analyzed for munitions constituents or munitions debris if breached munitions items are observed. Samples will be analyzed for explosives and for CCR Title 22 metals.

- **Soil Borings, Excavation, and Sampling (for Comprehensive Environmental Response, Compensation and Liability Act [CERCLA] Contaminant Investigation).** The CERCLA

contaminant investigation for the remedial investigation includes investigation of the Northern MCFR, the pond berms, the dredge pond bottom, and groundwater. These investigations are explained in detail in the RI Work Plan.

- **MPPEH Management and Disposal.** Battelle will ensure that scrap metal generated from the intrusive investigation activities is properly inspected in accordance with the procedures outlined in the RI Work Plan and Explosive Safety Submission (ESS). Only qualified UXO personnel will perform the inspection. MPPEH items requiring disposal by detonation will be stored in the Mare Island authorized storage location (Building A180) until all field investigations are completed. The MPPEH items requiring disposal will be transported to the authorized disposal range and prepared for demolition. Demolition of the MPPEH items will only be accomplished after the senior UXO Supervisor and the UXO Safety Officer have verified that all notifications have been made and all access to the disposal range has been secured.
- **Investigation-Derived Waste (IDW) Management and Disposal.** IDW management and disposal will follow the procedures outlined in Section 5 of the RI Work Plan (Waste Management Plan).
- **Site Restoration and Demolition.** Upon completion of field activities, the site and staging area will be cleaned up and restored back to the original grade condition.

## Section 2 Organization and Responsibilities

The Project Manager (PM), Safety and Health Manager (SHM) and Certified Industrial Hygienist (CIH), and Site Safety and Health Officer (SSHO) are responsible for formulating and enforcing health and safety requirements and implementing the SSHP. Refer to Section 3 of the APP and Section 11.2 of this SSHP for information on the roles and responsibilities of these personnel. The SSHO will be responsible for establishing communication with all potential emergency response organizations before fieldwork commences.

Table 2-1 identifies personnel responsible for fieldwork. Table 2-2 provides additional contact information.

**Table 2-1. Responsible Personnel for the Fieldwork**

Title	Name	Daytime	After Hours
Battelle PM	Ryan Wensink, PE	614-424-3801	614-203-6365
Battelle SHM and CIH	Ryan Moon, CIH, CSP	614-424-3014	740-607-1071
Battelle SSHO/Field Lead	Shawn Majors	619-550-7553	619-550-7553

**Table 2-2. Additional Contact Information**

Entity	Address	Main Telephone	Contact/ Project Manager
BRAC PMO Remedial Project Manager (RPM)	Navy BRAC Program Management Office West 33000 Nixie Way, Bldg. 50 2nd Floor San Diego, CA 92147	619-524-5259	Reginald Paulding, PE
BRAC Caretaker Site Office	Navy SWDIV Detachment 410 Palm Ave, Bldg. 1, Suite 161 San Francisco, CA 94130	415-743-4720	Patricia McFadden
Resident Officer in Charge of Construction (ROICC)	ROICC SF Bay Area 2450 Saratoga St., Suite 200 Alameda, CA 94501	510-333-3889 510-755-5876 (mobile)	Izzat Amadea

## Section 3 Hazard Identification

This section presents hazard assessment and significant hazards associated with the work at Dredge Pond 3E and the Northern MCFR at the former MINS, Vallejo, California.

### 3.1 Hazard Assessment

Table 3-1 shows potential job hazards at the Dredge Pond 3E and the Northern MCFR based on field conditions and activities. See Section 4 for the detailed job hazard analysis and hazard assessment. Significant hazards identified during the job hazard analysis are listed below.

### 3.2 Significant Hazards

Table 3-1 lists a variety of potential hazards associated at Dredge Pond 3E and the Northern MCFR. Section 4 provides additional detail regarding potential site hazards. The most significant hazards identified during the job hazard analysis are:

- heat stress
- manual material handling
- vehicle and air traffic
- heavy equipment

**Table 3-1. Job Hazard Identification**

<b>Risk or Hazard</b>	<b>Evaluation</b>	<b>General Compensatory Measures</b>
Substances identified with and substances without OSHA, American Conference of Governmental Industrial Hygienists (ACGIH), NIOSH, or other recognized exposure limits	Most substances identified have exposure limits.	Frequent exposure monitoring will be conducted as needed. Respiratory protection will be readily available on site.
Substances that may be skin-absorbed	Some organics may be skin-absorbed.	Skin protection will be utilized during soil sampling and subsurface geophysical survey activities.
Substances for which skin is the principal target organ	Polychlorinated biphenyls (PCBs) may be present at the sampling locations.	Skin protection will be utilized during soil sampling and subsurface geophysical survey activities.
Fire hazard and explosion potential	A slight risk of fire and explosion is present.	Fire extinguishers will be present on all site vehicles and heavy equipment. Dry brush will be cleared from site operations. For explosion potential, monitoring will be performed and ventilation will be provided, if needed.
Carcinogens	Regulated and unregulated carcinogens are potentially present.	Monitoring with direct-read instrumentation and screening devices; respiratory protection.

**Table 3-1. Job Hazard Identification (Continued)**

<b>Risk or Hazard</b>	<b>Evaluation</b>	<b>General Compensatory Measures</b>
Volatile organic compounds (VOCs) and semivolatile organic compounds	Organic compounds may be present at the sampling locations.	Air monitoring during intrusive operations. Skin protection will be utilized during soil sampling. Respiratory protection will be readily available on site.
Heat stress	This hazard will be present, particularly if wearing Level C and above PPE.	Heat-related illness prevention program; increase fluid intake; implement work rest regimen; monitor worker physiological parameters.
Solar radiation	Outdoor work presents this hazard.	Use sunscreen and cover up exposed skin with clothing.
Excessive noise	This hazard may be present during work conducted near operation of heavy equipment.	Hearing conservation program; hearing protection.
Nip-and-pinch points	This hazard is expected with heavy equipment and hand tools.	Use guards when possible and required; have operators identify these points prior to work. All power hand tools and geophysical equipment will be inspected daily per manufacturer recommendations
Manual material handling	This hazard is possible when moving sample coolers, IDW drums, or items on the ground.	Proper lifting techniques; mechanical lifting devices; use a helper; training.
Slip, trips, and falls	This hazard is possible with equipment or materials placed on the ground.	Good housekeeping practices.
Traffic	This hazard may be present.	Traffic control is required on or at the edge of roadways.
Heavy Equipment	This hazard will be present during soil sampling activities.	Be aware of surroundings. Wear proper PPE. Only trained and competent operators can use the heavy equipment.

**Table 3-2. Chemicals Suspected or Identified at UXO 3 Exceeding Screening Criteria**

<b>Chemical Class</b>	<b>Analytes</b>
Metals	Arsenic, Lead
PCBs	Total PCBs
Pesticides	4,4'-DDD, 4,4'-DDE, and 4,4'-DDT
Petroleum Hydrocarbons	Total Petroleum Hydrocarbons as motor oil

## Section 4 Hazard Analysis

---

This section presents a hazard analysis and details the physical, industrial, and chemical hazards identified or potentially present at the former MINS UXO 3 site during field activities. This section also provides a task-specific analysis of hazards encountered and/or associated with work at this site. AHAs, presented in Appendix C, provide an analysis of job hazards by task.

### 4.1 Risk Analysis

Field activities will produce potential hazards to the field crew. Potential hazards can be encountered during the soil sample collection, subsurface geophysical survey, heavy equipment operation, IDW disposal, and land survey of soil sample locations.

### 4.2 Physical Hazards

Physical hazards associated with field activities include noise; slips, trips, and falls; manual lifting; heat stress; fire and/or explosion; and vehicle traffic. The following subsections address categories of physical hazards specific to the proposed field activities at the Dredge Pond 3E and the Northern MCFR.

#### 4.2.1 Construction Noise

The use of heavy equipment and/or work near heavy equipment can present a high level of noise exposure to personnel within the immediate area. Excess noise levels are not expected during field activities at the site. However, personnel may periodically encounter elevated noise levels from heavy equipment. Personnel are provided with hearing protective devices, including ear plugs with a noise reduction rating of 20 or better, when exposed to noise of 85 decibels on the A-weighted scale (dB[A]) or greater. Battelle does not anticipate noise levels will equal or exceed an 8-hour, time-weighted average of 85 dB(A) in slow-response mode. Site personnel will be notified prior to commencing any field activity that may pose a noise hazard to don hearing protection. Noise monitoring will be performed during any activity that may pose a noise hazard. Based on the monitoring, if hearing protection with a noise reduction rating greater than 20 is required, then the activity will be suspended until the required noise level protection is provided to site personnel. Practical engineering or administrative controls shall be considered and used when personnel are subjected to sound pressure levels exceeding the limits specified in Table 4-1.

**Table 4-1. Permissible Non-DoD Noise Exposure (Contractor)**

Duration/Day (Hour)	Sound-Pressure Level dB(A) Slow Response
8	90
6	92
4	95
3	97
2	100
1½	102
1	105
½	110
¼	115

## 4.2.2 Heat Stress

Vallejo has a mild Mediterranean climate year round with a gentle breeze off the waterfront. The average temperature ranges from a low in the high 40s to a high in the low 70s (°F). During the months of July and August, the average temperatures are typically 89°F accompanied by 80% humidity for a heat index measure of approximately 110°F. In accordance with OSHA guidance this measure of heat index indicates a potential for heat stress related illnesses among outdoor workers. This potential for heat stress related illnesses is increased by the occasional wearing of semi-permeable PPE and the possible use of respiratory protection.

Accordingly the following actions to mitigate health stress related illnesses will be implemented for the Dredge Pond 3-E project:

- Workers receive training on heat-related illness, including the recognition of signs of heat stress, the importance of acclimatization, and standard measures to prevent heat-related illness, including work breaks in a shaded/cooled rest area, taking frequent rest breaks, limiting intakes of caffeine, alcohol and sugar and wearing of light reflective clothing when practical.
- If the heat index rises to greater than 100°F, then acclimatization will be implemented for the first four days of on-site field work for any individual worker. The initial work-rest cycle will be approximated by 30 minutes work and then 30 minutes rest. The SSHO using the results of the physiological and observational monitoring described below will determine the need to increase or decrease work-rest cycle times.
- Increased consumption of liquids, such as water and fluids containing electrolytes, is encouraged and will be available at the work site to replenish body fluids.
- The SSHO will observe workers for heat stress symptoms and record observations. Symptoms of heat stress include muscle cramps, fatigue, profuse sweating, headache, skin flushing, dizziness, confusion, and rapid heart rate.
- Physiological monitoring of heat stress parameters will be employed. These measures will be implemented when the heat index is greater than 100°F. They include tympanic membrane/ear canal temperature, and /or pulse rate monitoring.

Workers will receive instructions that regardless of the physiological monitoring results they are authorized to stop work, notify their supervisor and seek rest in a shaded/cooled location if they feel distressed by a high heat environment. Instructions will also include emergency response to a heat stress illness with actions to be taken as follows:

If a worker exhibits heat stroke symptoms such as confusion, fainting, seizures, excessive sweating or red, hot, dry skin, and/or very high (>104 °F) body temperature a call to 911 will be made immediately to obtain medical assistance. If the worker is unconscious a determination will be made to ensure the worker has no head, neck or other injuries where movement will exacerbate the injury. Workers that can be moved will be taken to a shaded or cooled location, outer clothing removed, clothing loosened, cooled water provided, and ice packs placed on the neck, underarms and groin area. For workers who cannot be moved shade should be provided to the workers location and icepacks and cooling provided applied as stated previously.

If a worker exhibits heat exhaustion symptoms such as a cool/moist skin, heavy sweating, headache, nausea or vomiting, dizziness, light headedness, weakness, thirst, irritability and/or fast heart beat will be

removed from the work area, placed in a shaded or cooled location, and treated as previously noted for heat stroke victims. If the signs or symptoms worsen or do not improve within 60 minutes then immediate medical attention will be obtained.

### **4.2.3 Cold Stress**

Cold weather conditions might be encountered during the winter months, but fieldwork is generally not expected to take place during cold conditions. Critical factors in preventing cold stress disorders are adequate clothing and staying dry.

The following steps will be taken (adapted from ACGIH Threshold Limit Values handbook [ACGIH, 2011]) to prevent cold stress injuries:

- If ambient temperatures are less than 40°F, site training will include prevention of cold injury, cold injury symptoms, and cold injury first aid.
- A heated break area will be provided if ambient temperatures are less than 32°F.
- At a minimum, breaks will be taken in a warm area every 120 minutes if ambient temperatures are less than 32°F.
- Workers will be allowed to take unscheduled breaks, if needed, in a warm area.
- No outdoor work will be conducted if the equivalent chill temperature (temperature combined with the effect of wind) is less than -29°F.

### **4.2.4 Discarded Military Munitions**

While not previously found at UXO 3, it is possible that DMM may be encountered during work activities at the site. In the event DMM is found, the procedure below will be followed:

1. Stop work activities immediately upon discovering potential DMM.
2. Battelle personnel and subcontractors will not handle any ordnance item. Only trained, explosive ordnance disposal personnel will handle DMM. A senior UXO Supervisor and a UXO Safety Officer/Quality Control Specialist will be present full time on site while intrusive investigation activities are ongoing.
3. Do not touch, disturb, or move the potential DMM.
4. Mark the general location of the potential DMM with tape, colored cloth, or colored ribbon. Do not drive stake into the ground or otherwise disturb the surface.
5. Terminate use of all equipment that may generate electromagnetic waves (i.e., cellular phones, radios, lasers, generators, and alternators) for a distance of 200 yards.
6. Vacate employees from the area and move to a minimum distance of 200 yards from the DMM. Leave by the same route you entered if possible.
7. Immediately notify supervisor, Government Designated Authority, PM, and installation point of contact.

Work will resume upon clearance of the area by qualified UXO personnel.

#### **4.2.5 Heavy Equipment**

Excavation operations using a backhoe and direct push for soil and groundwater sampling provide the potential for serious injury and death due to the impracticality of guards enclosing rotating equipment. The swing radius on cranes and backhoes is a zone that has the potential for serious injury and death. Improper placement of heavy equipment on uneven surfaces provides the potential for tipping, which can lead to serious injury and death.

Personal articles that could be entangled in rotating equipment such as loose clothing, excessively loose-fitting PPE, jewelry, or long or loose hair will not be permitted near operating equipment. Proper eye contact with the operators of cranes and backhoes is necessary when operating near heavy equipment. Activities to be conducted within the swing radius of such equipment are not permitted unless the equipment is turned off and the operator acknowledges the workers' presence. Proper placement of heavy equipment on flat surfaces prior to operations is critical to prevent tipping.

#### **4.2.6 Lifting/Material Handling**

Lifting and manual materials handling may cause blisters, sore muscles, and joint and skeletal injuries and may present eye, contusion, and laceration hazards. The most common type of accident that occurs in material handling operations is the "caught between" situation when a load is being handled and a finger or toe gets caught between two objects.

Control - Using proper lifting techniques may prevent back strain or other injury. The fundamentals of proper lifting include:

- Consider the size, shape, and weight of the object to be lifted. A mechanical lifting device or additional persons must be used to lift an object if it cannot be lifted safely alone.
- The hands and the object should be free of dirt or grease that could prevent a firm grip.
- Gloves must be used and the object inspected for metal slivers, jagged edges, burrs, or rough or slippery surfaces.
- Fingers must be kept away from points that could crush or pinch them, especially when putting an object down.
- Feet must be placed far enough apart for balance. The footing should be solid and the intended pathway should be clear.
- The load should be kept as low as possible, close to the body with the knees bent.
- To lift the load, grip firmly and lift with the legs, keeping the back as straight as possible.
- A worker should not carry a load that he or she cannot see around or over.
- When putting an object down, the stance and position are identical to that for lifting; the legs are bent at the knees, and the back is straight as the object is lowered.

#### **4.2.7 Slips, Trips, and Falls**

Slips, trips, and falls are possible when any equipment or other materials are placed on the ground or when irregular or unstable walking surfaces are present. Hazardous work areas can increase the likelihood of back strains, overexertion injuries, and cuts and contusions.

To minimize the potential for slips, trips, and falls, work areas will be kept clear, and proper housekeeping will be maintained. Slip, trip, and fall hazards will be marked, barricaded, or eliminated, and unloaded equipment and materials will be stored appropriately. In addition, personnel are prohibited from jumping from equipment or elevated surfaces.

### **4.3 Radiation Hazards**

On-site workers may be exposed to radiation hazards when working on a military site. Radiation hazards that may be associated with fieldwork at former MINS are discussed in the following sections.

#### **4.3.1 Ionizing Radiation**

During the RI, on-site workers may be exposed to low-levels of ionizing radiation. Ionizing radiation is ubiquitous in the environment and comes from radioactive materials. Prolonged exposure to high levels of radiation can cause damage to living tissue and can result in radiation sickness, cancer, and even death.

Due to the potential of exposure and the requirement to perform work under a Nuclear Regulatory Commission (NRC) license, RI workers will follow Cabrera's Radiation Protection Program. Cabrera will implement its NRC license to radiologically support the safe RI project activities. Battelle subscribes to the underlying philosophy of as low as reasonably achievable (ALARA) that there should be no contact with radioactive material or exposure to ionizing radiation unless there is an expected benefit to be realized. Contact with radioactive materials and exposures to ionizing radiation will be maintained ALARA and consistent with technology, cost, and operational requirements.

Radioactive material will be controlled such that only those individuals that are qualified, authorized, and have a need to access the radioactive material to accomplish their work scope, will be permitted access to the radioactive material. Radioactive material management policies require the implementation of an inventory control and accountability process for discrete radioactive materials that are in the possession of Cabrera or its subcontractors. Clearly defined radiological safety requirements have been established for (1) operating, changing, and repairing systems containing, or designed to operate with radioactive material; and (2) control of waste materials resulting from characterization, investigations, and removal actions.

Work involving the handling and storage of radioactive materials at MINS will be performed under the specifications of the appropriate standard operating procedures (SOPs), and with authorization for such work from the Radiological Safety Officer (RSO). Additionally, field workers will be required to attend and pass the Radiation Worker Training course that will be provided by Cabrera.

**Radioactive Material Control.** In order to minimize unauthorized access to radioactive material(s) or its unintended removal from the site, appropriate security-protection measures will be exercised. Discrete radioactive materials (e.g., radioactive check sources) will be secured in designated and locked storage facilities (e.g., a lockable cabinet for check sources, a lockable storage container for sample storage, etc.). Keys to lockable storage facilities, designated for radioactive materials storage, will be controlled by the RSO and be made available only to authorized users.

Radioactive sources and devices used at the project, as well as radioactive materials obtained during project activities, will be inventoried and documented as required by Cabrera SOPs. Identification of radioactive material storage locations will be accomplished with the use of conspicuous posting compliant with Cabrera SOP requirements. Only designated areas will be used to store radioactive materials at MINS. These areas will be selected with concurrence of the Navy's RPM.

Radioactive material handling activities will be performed in a manner that ensures:

- Access to areas and/or rooms where radioactive materials are known to be present is appropriately restricted
- Surveys of areas where sealed radioactive sources are stored are performed in accordance with Cabrera SOPs
- Surveys of areas where radioactive materials are stored are performed in accordance with
- Cabrera SOPs.

#### **4.3.2 Solar Radiation**

Solar radiation may be associated with the site fieldwork.

During summer, especially where a shaded area is not readily available, workers must wear protective clothing and sunblock to minimize the harmful effects of the sun's ultraviolet rays on skin.

### **4.4 Industrial Hazards**

Program activities at former MINS may expose personnel to various industrial hazards. The following subsections present a summary of the expected common industrial hazards.

#### **4.4.1 Underground Utilities**

Underground utilities pose hazards to workers involved in drilling, excavation, and other invasive operations. These hazards include electrical hazards, explosion, chemical exposure, asbestos exposure and asphyxiation, as well as costly and annoying hazards associated with damaging communication, sewer, water, and/or irrigation lines.

The estimated location of underground installations, including sewer, telephone, fuel, electric, water lines, or other underground installations that reasonable may be expected to be encountered during invasive work shall be determined prior to the start of any invasive work. This may be determined by contacting appropriate utilities, contacting a utility clearance service, using site maps and prominent site features, using a pipe and cable locator, etc. If determined to be present, utility lines will be marked with color-coded surveyor paint and American Public Works Association approved colors. Buried utilities encountered during invasive operations must be protected while digging to prevent risks to site personnel and damage to the utilities.

At a minimum, Battelle will notify Underground Service Alert (USA) North at 811/1-800-227-2600/[www.usanorth.org](http://www.usanorth.org) at least two working days and up to 14 calendar days before the planned digging date and obtain a ticket number. If excavation continues past the 28-day active period, USA North will be called back to extend the ticket before it expires. Facilities that are in conflict with any excavation will be located with hand tools and protected before any power equipment is used.

In addition to the procedures described above, all borings should be cleared using a hand auger to a minimum of 5 feet below ground surface prior to initiating direct-push drilling activities. In the event that

underground utilities are encountered during field activities, the field crew should stop work and notify the ROICC immediately. Work shall resume only after concurrence is given by the ROICC.

#### **4.4.2 Confined-Space Entry**

No field activities will involve confined-space entry.

### **4.5 Chemical Hazards**

This section describes the toxicological (health) hazards associated with exposure to organic and inorganic chemicals and metals during site field investigations. The nature of the anticipated activities and the relatively low concentrations of site contaminants are such that the potential for hazardous exposure to site workers is low.

In the event that chemical contaminants come in contact with the eye, an eyewash station will be used. The eyewash station will meet the American National Standard Institute (ANSI) Standard Z358.1-2009 and Section 06.B.02.b of USACE (2014). It will be capable of supplying hands-free irrigation for both eyes for at least 15 minutes at a flow rate of at least 0.4 gallon per minute. The eyewash station will be available on site in the support vehicle.

See Table 3-2 for a list of contaminants detected or suspected to be present in soil and groundwater. Safety data sheets for these chemicals are presented in Appendix A.

### **4.6 Biological Hazards**

The SSHO will screen the area for biological hazards during the initial site visit and will discuss any problems with installation representatives. Multiple biological hazards are present at the site. The most common hazards anticipated are provided below.

#### **4.6.1 Poisonous Plants**

Poisonous or other dangerous plants may be present in the work area. Personnel should be alerted to its presence and instructed on methods to prevent exposure.

Poison Oak Control – The main control is to avoid contact with the plant, cover arms and hands, and frequently wash potentially exposed skin. Particular attention must be given to avoiding skin contact with objects or protective clothing that have touched the plants. Treat every surface that may have touched the plant as contaminated, and practice contamination avoidance. If skin contact is made, the area should be washed immediately with soap and water and observed for signs of reddening.

## **4.6.2 Ticks**

Ticks are likely to be present in the work area. Infected ticks have the potential to transmit several diseases including Lyme disease, erlichiosis, and Rocky Mountain spotted fever.

Lyme disease – The disease commonly occurs in summer and is transmitted by the bite of infected ticks. “Hot spots” in the United States include New York, New Jersey, Pennsylvania, Massachusetts, Connecticut, Rhode Island, Minnesota, and Wisconsin. Symptoms of Lyme disease include a rash or a peculiar red spot, like a bull’s eye, which expands outward in a circular manner. The victim may have a headache, weakness, fever, a stiff neck, and swelling and pain in the joints, and eventually, arthritis.

Erlichiosis – The disease also commonly occurs in summer and is transmitted by the bite of infected ticks. “Hot spots” in the United States include New York, Massachusetts, Connecticut, Rhode Island, Minnesota, and Wisconsin. Symptoms of erlichiosis include muscle and joint aches and flu-like symptoms, but there is typically no skin rash. These diseases are transmitted primarily by the deer tick, which is smaller and redder than the common wood tick. The disease may be transmitted by immature ticks, which are small and hard to see. The tick may be as small as a period on this page.

Rocky Mountain spotted fever – This disease is transmitted via the bite of an infected tick. The tick must be attached 4 to 6 hours before the disease-causing organism (*Rickettsia rickettsii*) becomes reactivated and can infect humans. The primary symptom of Rocky Mountain spotted fever is the sudden appearance of a moderate-to-high fever. The fever may persist for two to three weeks. The victim may also have a headache, deep muscle pain, and chills. A rash appears on the hands and feet on about the third day and eventually spreads to all parts of the body. For this reason, Rocky Mountain spotted fever may be confused with measles or meningitis. The disease may cause death if untreated, but if identified and treated promptly, death is uncommon.

Tick repellent containing diethyltoluamide (DEET) should be used when working in tick-infested areas, and pant legs should be tucked into boots. In addition, workers should search the entire body every three or four hours for attached ticks. Ticks should be removed promptly and carefully without crushing, since crushing can squeeze the disease-causing organism into the skin. A gentle and steady pulling action should be used to avoid leaving the head or mouth parts in the skin. Hands should be protected with surgical gloves when removing ticks.

## **4.6.3 Ants**

Personnel may encounter ants or ant nests during work activities. Stinging ants, such as fire ants, have the ability to cause localized skin or whole body reactions with their venom.

Be aware of fire ants and take care not to stand on ant nests. Insect repellent containing DEET should be used when working in ant-infested areas, and pant legs should be tucked into boots.

## **4.6.4 Bees and Wasps**

Personnel may encounter bees and/or wasps, including ground nests, during work activities. Actions should be taken to avoid attracting bees or wasps. The wearing of scented hair or skin products should be avoided, and leaving food or refreshments out in open containers in or near the work zone is not permitted. To minimize the threat of potential ground nests, a preliminary reconnaissance of proposed routes of off road travel to the sampling locations should be performed beforehand to identify the

presence of a ground nest. An alternative route can be proposed if necessary, and a reconnaissance of that route can be taken as well.

#### **4.6.5 Mosquitoes**

In damp and moist locations, field personnel may be exposed to mosquitoes during fieldwork activities. Typical exposure to mosquitoes does not present a significant hazard. However, if West Nile virus is prevalent in the area, exposure to this virus is increased. West Nile virus results in flu-like symptoms and can be serious if not treated or in immune-compromised individuals. There have been confirmed cases of West Nile virus in California.

To minimize the threat of mosquito bites, all personnel working outside must be aware of the potential for encountering mosquitoes and implement the basic precautions listed below:

- Avoid working at dawn or dusk when mosquitoes are most active;
- Prevent accumulation of standing water at the work site;
- Apply an insect repellent that contains DEET to exposed skin and to clothing;
- Wear light-colored clothes, preferably with long sleeves, and full-length pants; and
- Do not touch any dead birds or animals that you encounter.

If dead birds are detected near the site, report them to the local County Health Department. If flu-like symptoms are present, contact your doctor or the SSHO for more information.

#### **4.6.6 Spiders**

Personnel may encounter spiders during work activities. Two spiders are of concern, the black widow and the brown recluse. Both prefer dark sheltered areas such as basements, equipment sheds, and enclosures and around woodpiles or other scattered debris. The black widow is shiny black, approximately 1-inch long, and found throughout the United States. There is a distinctive red hourglass marking on the underside of the black widow's body. The bite of a black widow is seldom fatal to healthy adults, but effects include respiratory distress, nausea, vomiting, and muscle spasms. The brown recluse is smaller than the black widow and gets its name from its brown coloring and behavior. The brown recluse is more prevalent in the southern United States. The brown recluse has a distinctive violin shape on the top of its body. The bite of the brown recluse is painful, and the bite site ulcerates and takes many weeks to heal completely.

To minimize the threat of spider bites, all personnel walking through vegetated areas must be aware of the potential for encountering these arachnids. Personnel need to avoid actions that may result in encounters, such as turning over logs and placing hands in dark places such as behind equipment or in corners of equipment sheds or enclosures. If a spider bite occurs, the victim must be transported to the nearest hospital as soon as possible. First aid consists of applying ice packs and washing the area around the wound to remove any unabsorbed venom.

#### **4.6.7 Hantavirus**

According to the National Center for Biotechnology Information, Hantavirus is a deadly disease carried by rodents, especially deer mice. The disease is not passed between humans but is spread through contact

with rodent saliva, urine, and feces, and can become airborne. Humans are thought to become infected when they are exposed to contaminated dust from mice nests or droppings.

The early symptoms of hantavirus disease are flu-like (fever, chills, muscle aches). For a very short period of time, the infected person starts to feel better. Then, within 1–2 days, the person may develop shortness of breath. The disease gets worse quickly and leads to respiratory failure. According to the National Center for Biotechnology Information, an effective treatment for hantavirus infection involving the lungs is not yet available. Hantavirus is a serious infection. Even with aggressive treatment, more than half of the cases are fatal.

To reduce risk of infection, the Centers for Disease Control and Prevention (CDC) recommends avoiding exposure to rodent urine and feces and avoiding contact with mice and mouse burrows. The field crew at former MINS should be especially cautious in the following areas:

- old buildings/structures,
- opened (i.e., neglected) well vaults, and
- on-site debris piles and burrows.

If you must work in an area where contact with rodent urine and feces is possible, follow these recommendations from the CDC:

- When opening an unused cabin, shed, or other building, open all the doors and windows, leave the building, and allow the space to air out for 30 minutes.
- Return to the building and spray the surfaces, carpet, and other areas with a disinfectant. Leave the building for another 30 minutes.
- Spray mouse nests and droppings with a 10% solution of chlorine bleach or similar disinfectant. Allow it to sit for 30 minutes. Using rubber gloves, place the materials in plastic bags. Seal the bags and throw them in the trash or an incinerator. Dispose of gloves and cleaning materials in the same way.
- Wash all potentially contaminated hard surfaces with a bleach or disinfectant solution. Avoid vacuuming until the area has been thoroughly decontaminated. Then, vacuum the first few times with enough ventilation. N-95 respirators may provide some protection.

More information on the hantavirus is available from the CDC (2002a).

#### **4.6.8 *Arenaviruses***

Arenaviruses are a new group of viruses reportedly transmitted by rodent fecal particles and bodily fluids. Precautions used to minimize exposure to the hantavirus should be used to protect personnel from the arenaviruses. See the CDC (2002b) website for details.

## **Section 5 Site Control**

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For work conducted at the Dredge Pond 3E and the Northern MCFR, a site control program will be established based on site-specific characteristics. Site control zones will be established in order to contain contamination within the smallest area possible. The SSHO will ensure that only authorized personnel with the proper training and PPE enter work areas associated with the potential for exposure to hazardous conditions and/or materials.

### **5.1 Controlled Area Designation**

Only authorized persons will be permitted access to the Exclusion Zone (EZ) and Contamination Reduction Zone (CRZ), shown on Figure 5-1. All persons will log in when entering the CRZ/EZ and log out when exiting the CRZ/EZ. All entrance to these areas will be restricted by means of regulated personnel flow and access will be controlled with “caution” tape and/or barricades. Access to the EZ or CRZ is restricted to on-site Battelle and authorized subcontractor personnel who are wearing the proper PPE and who have received the required site training and medical clearance.

Work zone delineations, site communication, and site access control measures to be employed are described below.

#### Exclusion Zone (EZ)

The EZ, commonly referred to as the Hot Line, is the area(s) where soil and/or groundwater contamination may exist. For this project, the EZ includes and encompasses all areas designated for soil excavation and groundwater sampling. The designated entry/exit point for the EZ is shown on Figure 5-1. All workers will sign in the log book in the Support Zone prior to entering the EZ.

#### Contamination Reduction Zone (CRZ)

The CRZ is a buffer zone between the EZ and the Support Zone, and is located at the interface of the two zones along I Street. Personnel, equipment, and vehicle decontamination stations such as washing stations will be located in this area and will be marked by barrier tape or similar means. The CRZ serves as an area to decontaminate personnel, equipment, and vehicles prior to entering the Support Zone. If necessary, clothing change facilities for reusable PPE shall be located in the CRZ. All access to the EZ shall be through the CRZ.

#### Support Zone (Non-Contaminated)

This is the area outside of the CRZ, where there is no potential for contact with contaminants. The Support Zone contains the following: work rest area, support operations, radio communications, transportation, and storage facilities. The Support Zone is located outside the limits of the designated EZs and away from areas designated as contaminated soil handling. Eating and drinking of fluids are permitted only in this area and only after site workers have properly decontaminated themselves.

### **5.2 Installation Access**

All fieldwork will be coordinated with the ROICC by obtaining site approval for work at the Dredge Pond 3E and the Northern MCFR. Any applicable facility-specific safety standards will be implemented to ensure the safety of project personnel and authorized subcontractors during the fieldwork activities.



**Figure 5-1. Site Control Areas**

## **Section 6 Decontamination and Sanitation**

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The primary focus of any decontamination program is to minimize the spread of contaminated material beyond a given site and/or between individual sampling points. Each field location will have a decontamination station based on the level of exposure established by the SSHO, SHM, and the hazardous work permit if applicable.

### **6.1 Personnel Decontamination**

Battelle anticipates that Level D PPE will be used for all activities. A minimal decontamination procedure (i.e., washing exposed skin with soap and water) will be required for field personnel.

### **6.2 Vehicle and Equipment Decontamination**

The primary focus of any decontamination program is to minimize the spread of contaminated material beyond a given site. During field activities, the use of a variety of vehicles, small equipment, and heavy equipment is anticipated. The level of potential contamination for vehicles and small equipment at the site is considered “low”.

### **6.3 Apparel Decontamination**

Single-use PPE clothing will be disposed in accordance with the Waste Management Plan (Section 5.0 of the RI Work Plan; AM8AJV, 2013).

### **6.4 Hazardous Waste Minimization Practices**

Personnel working in controlled areas will minimize generation of hazardous waste. To minimize cross-contamination, disposal materials, wrapping, and packaging will not be brought into controlled areas unless required. Separate waste containers will be set up for trash, nonhazardous waste, and potentially hazardous waste.

### **6.5 Testing Requirements following Decontamination**

The SSHO will visually inspect all items and equipment after decontamination and before being transported from the controlled area. Generally, visual inspection of items is sufficient, eliminating the need to test for chemical contamination.

### **6.6 Subcontractor Requirements**

Subcontractors will notify the SSHO before removing equipment from controlled areas. Subcontractors will also be responsible for ensuring all equipment is decontaminated prior to being moved off site.

### **6.7 Decontamination Area Arrangements**

Specific areas will be designated for waste storage, vehicle and equipment decontamination, emergency supplies, and other necessary equipment. A waste storage area will be established at the base for temporary storage of IDW (see the RI Work Plan for specifics of IDW storage and location). This area is

limited to waste storage activities only. Any fieldwork that may cause the spread of contaminated IDW outside the waste storage area is prohibited.

## **6.8 Sanitation**

Restroom facilities are located at former MINS near the project site. Since all field personnel will have appropriate NAVFAC SW contractor identification badges, most of the restroom facilities will be open to them. Should restroom facilities not exist in certain areas, adequate breaks will be given to field personnel to use restroom facilities at areas immediately adjacent to the work areas.

## Section 7 Hazard Monitoring

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During fieldwork at the Dredge Pond 3E and the Northern MCFR, any potentially toxic air contaminants, explosive gas mixtures, and/or potentially hazardous noise levels will be monitored, as necessary. All monitoring will be conducted by a qualified Battelle health and safety representative (i.e., Shawn Majors or his designee) and monitored readings will be recorded in a logbook.

Monitoring instruments used during site activities may include a photoionization detector (PID) or flame ionization detector (FID), 2 inch x 2 inch sodium iodide detector crystal, respirable dust meter, and a sound-level meter or a noise dosimeter. Table 7-1 summarizes instrument calibration and maintenance procedures.

**Table 7-1. Instrument Calibration and Maintenance Information**

<b>Instrument</b>	<b>Calibration Data</b>
Respirable dust meter	Daily, per user manual.
PID	Each day zero and span with ambient air and isobutylene standards. Adjust zero and span after lunch break, or whenever zero appears to drift.
FID	Each day zero and span with ambient air and methane standards. Calibrate with a low-range and mid-range standard or calibrate at 10 parts per million (ppm) on both scales. Adjust zero and span hourly or whenever zero appears to drift.
Low-volume air sample pump	Calibrate with burette or auto calibrator both before and after sampling. Check flow during shift at break.

Note:

All direct-read air monitoring equipment will be calibrated daily, in accordance with manufacturer's recommendations and standard industrial hygiene practice.

### 7.1 Chemical Monitoring

Chemical monitoring will be conducted during all intrusive operations near worker breathing zones, as needed. Table 7-2 summarizes the action levels for compounds.

### 7.2 Environmental Monitoring

If contaminant exposures reach action levels in worker breathing zones and work requires Level C protection, perimeter monitoring will be conducted at the outer edge of the controlled area. If contaminants reach action levels in any perimeter area, work will be suspended until engineering controls or natural ventilation allows ambient area contaminant concentrations to fall below acceptable (action) levels.

### 7.3 Area Monitoring

Where intrusive activities are performed, monitoring will be conducted in areas suspected to be contaminated with VOCs or any combination of contaminants. Direct-read monitoring will be performed for detection of VOCs in air (see Table 7-2 for action levels). Area monitoring will be performed near the breathing zone of workers.

**Table 7-2. Monitoring Methods and Action Levels for Characterized Mixtures Using Screening Survey Instruments**

Hazard	Locations	Method	Action Level <sup>a</sup>	Protection Action
Total organic vapor	Former MINS	PID or FID	Background to 10 ppm	No action required
			>10 ppm	Engineering controls such as mechanical ventilation to dilute vapors will be used as a first line of defense, and then Level C PPE will be used if necessary.
			>50 ppm	Engineering controls and supplied air protection, Level B
			>100 ppm	<b>STOP WORK</b>
Combustible gas	Former MINS	Explosimeter or FID	<10% LEL	No action required
			10 to 20% LEL	Start continuous monitoring; permit only classified electrical equipment and non-sparking tools
			>20% LEL	<b>STOP WORK;</b> ascertain source of gas

Notes:

This table is to be used for characterized mixtures where carcinogenic and highly toxic materials have been verified absent from the atmosphere.

(a) All action levels are sustained readings observed above background. LEL = lower explosive limit

The area monitoring for VOCs will be conducted during the initial ground disturbance for any open work area and at least once per week thereafter when soil are is being disturbed.

Monitoring will also be conducted when unusual odors or soil staining not previously present are encountered during work.

Monitoring for particulates will be performed at the same frequency as the VOC monitoring and that data will be used to estimate potential metal concentrations in the air by assuming the ratio of metal mass in the soil is the same as metal mass in an air particulate sample.

Radiological area monitoring is detailed in the project Radiological Work Plan and its associated operating procedures. The following summarizes the monitoring to be performed:

- Prior to any ground disturbance a radiation dose rate survey of the work area will be performed
- Prior to ground disturbance a gross gamma count rate survey of the surface will be conducted to identify any potential elevated concentrations or sources of radioactivity within the area to be disturbed.
- During disturbance of soil containing radiological contaminants continuous work area air samples will be collected and analyzed at the end of the day. If the samples indicate that the respective radionuclide's derived air concentration levels are less than 10% then the RSO has the authority to terminate sampling.
- Equipment contamination surveys are performed prior to release of the material from the radiological control area (RCA) and spot checks of equipment are made at least weekly when equipment is left within the RCA.

## 7.4 Personnel Monitoring

Personnel monitoring will be initiated if VOC action levels are equal or exceeded (see Table 7-2) and/or if personnel are required to work using respiratory protection for periods of more than 1 hour.

Tables 7-3 and 7-4 present action levels for heat stress and frequency of monitoring. Personnel exhibiting heat-stress symptoms will stop work as stated in Section 4.2.2. Ear drum/ear canal temperature will be monitored when conditions warrant.

**Table 7-3. Action Levels for Heat Stress**

Type of Measurement	Action Level	Action
Ear drum/ear canal temperature	1°C (1.8°F) rise above baseline	Remove from work
Ear drum/ear canal temperature	<0.1°C (0.2°F) above baseline	Return to work
Pulse Monitoring	Pulse bpm taken 0.5 minutes after start of rest break exceeds 110 bpm	Increase rest period by 1/3
Pulse Monitoring	Pulse bpm taken 2.5 minutes after start of rest break exceeds 90 bpm and the rate of decrease between the bpm taken at 0.5 minutes and 2.5 minutes is less than 10	Increase rest period by 1/3
Pulse Monitoring	2.5 minute bpm <90 bpm or Difference between .5 and 2.5 bpm is $\geq$ 10 bpm and initial 0.5 pulse rate was less than 110 bpm	Return to work with current work-rest cycles

**Table 7-4. Frequency of Physiological Monitoring for Fit and Acclimated Workers**

Adjusted Temperature <sup>a</sup>	Normal Work Ensemble <sup>b</sup>	Impermeable Ensemble
90°F (32.2°C) or above	after each 45 minutes of work	after each 15 minutes of work
86.5°F–90°F (30.8°C–32.2°C)	after each 60 minutes of work	after each 30 minutes of work
82.5°F–86.5°F (28.1°C–30.8°C)	after each 90 minutes of work	after each 60 minutes of work
76.5°F–82.5°F (25.3°C–28.1°C)	after each 120 minutes of work	after each 90 minutes of work
72.5°F–76.5°F (22.5°C–25.3°C)	after each 150 minutes of work	after each 120 minutes of work

Notes:

- (a) Calculate the adjusted air temperature (Ta adj.) with the following equation:  $Ta \text{ adj. } (^\circ F) = Ta (^\circ F) + (13 \times \% \text{sunshine} / 100)$  Measure air temperature (Ta) with a standard mercury-in-glass thermometer with the bulb shielded from radiant heat. Estimate %sunshine by judging what percent of time the sun is not covered by clouds that are thick enough to attenuate shadow (e.g., 100% sunshine = no cloud cover and a sharp, distinct shadow; 0% sunshine = no shadow).
- (b) A normal work ensemble consists of coveralls or other clothing with long pants.

Acronyms/Abbreviations:

°C – degrees Celsius

°F – degrees Fahrenheit

## 7.5 Dust Monitoring

It is not anticipated that dust monitoring will be required on this project because excavation activities will be limited to discrete (4 ft x 4 ft) investigation locations. In the unlikely event that dust exposure becomes a concern (i.e., significant suspended particulates are observed in the atmosphere and are sustained for more than one hour), dust monitoring (by the SSHO or the designee) and subsequent dust mitigation measures will be implemented.. Dust exposure is monitored with a forward-scattering, pulsed-light-emitting-diode sensing configuration. This system measures total dust or respirable dust; however, individual toxic constituents are not determined. Action levels for toxic dust are established based upon assumed or estimated airborne concentrations of various constituents. Actions levels may be modified as detailed analytical information becomes available. Table 7-5 provides baseline action levels for total dust. For this investigation, actions levels for toxic respirable dust will be 0.5 milligrams per cubic meter ( $\text{mg}/\text{m}^3$ ).

**Table 7-5. Action Levels for Dusts**

Hazard	Method	Action Level <sup>a</sup>	Protection Action
<b>Heavy Metals</b>			
as Total Dust (no toxic constituents)	Dust-monitoring Mini-RAM	<1 $\text{mg}/\text{m}^3$ $\geq 1 \text{ mg}/\text{m}^3$ Sustained for greater than one hour	No action required Dust Controls and if dust controls do not reduce concentrations below action levels then N95 Air-purifying respirator
as Total Dust (toxic constituents present)	Dust-monitoring Mini-RAM	>0.5 $\text{mg}/\text{m}^3$ Sustained for greater than one hour	Dust Controls and if dust controls do not reduce concentrations below action levels then P100 Air-purifying respirator

Notes:

(a) above background

$\text{mg}/\text{m}^3$  = milligrams per cubic meter

## **Section 8 Personal Protective Equipment**

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PPE for site workers is selected and used based upon the existing and potential hazards anticipated, and the requirements of 29 CFR 1910.120 (8 CCR 5192). Different levels of personal protection will be provided to workers depending on specific work tasks performed. The selection of PPE requires an evaluation of chemical contaminants, concentrations of these chemical contaminants, and physical hazards that may be encountered.

This SSHP complies with 29 CFR 1910.132 (8 CCR 3380–3390), which states that all PPE for eyes, face, head, and extremities (protective clothing, respiratory protection devices, and protective shields and barriers) will be provided, used, and maintained in a sanitary and reliable condition. PPE is required wherever hazards are posed by the work processes, environment, or chemicals or mechanical irritants that may cause injury or impairment in the function of any part of the body through absorption, inhalation, or physical contact. The use of appropriate PPE on site will be determined by the SSHO.

The U.S. EPA Level categories are as follows:

- Level A: Used when the greatest level of skin, eye, and respiratory protection is needed and consists of a totally encapsulated suit with supplied breathing air.
- Level B: Used when the highest level of respiratory protection is needed, but a lesser level of skin protection is required.
- Level C: Used when criteria for using air-purifying respirators are met, and a lesser level of skin protection is required.
- Level D: Used only as a work uniform and in an area without respiratory hazards.

### **8.1 Level D PPE**

It is anticipated that Level D PPE will be used during field activities. PPE for Level D includes:

- Coveralls (cotton and/or disposable) or long-sleeve shirt with work pants
- Boots (leather or rubber) with safety toe, non-slip soles
- Rubber over boots or disposable booties (as required)
- Safety glasses or goggles, face shield when handling liquids
- Hard hat
- High visibility safety vest
- Gloves as required by task (leather work gloves with inner nitrile gloves)
- Hearing protection (as required)
- N95 dust masks (as required)

### **8.2 Level C and Higher PPE**

Level C and higher PPE are not anticipated for this project. If the site conditions change to require a potential upgrade in PPE prior to updating the SSHP, all work will be stopped immediately until the situation is fully evaluated and the site workers have been advised of any new PPE requirements.

## **Section 9 Hazard Communication Program**

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An OSHA-compliant hazard-communication program will be implemented at the site in accordance with the Battelle Program Safety and Health Program. Soil samples from the site covered by this SSHP are not expected to meet contamination criteria that would require implementation of special training, packaging, and shipment in accordance with U.S. Department of Transportation requirements. In the unlikely event that sample results indicate levels of contaminants meeting these criteria, shipment of further samples will be discontinued until the appropriate training is conducted and special shipping arrangements are made.

The purpose of a Hazard Communication or the Employee Right-To-Know program is to ensure that the hazards of all chemicals located at the project site are communicated (per 29 CFR 1926.59, and/or 8 CCR 5194) to all Battelle personnel and subcontractors. This program requires:

- List of Hazardous Chemicals – This project does not involve the storage of hazardous chemicals onsite. However, hazardous chemicals may be present in environmental media. The SSHO will maintain a list of chemicals of concern potentially present at the site.
- Container Labeling – The SSHO will ensure that all drums and containers are labeled according to contents and include those from manufacturers and those produced on site by operations. All incoming and outgoing labels will be checked for identification, hazard warning, and name and address of responsible party.
- Employee Information and Training – Training employees on chemical hazards will be accomplished through formal safety training conducted annually and informal safety meetings. Project-specific chemical hazards are communicated to employees through an initial site orientation meeting and during daily safety meetings held at field project sites.

## Section 10 Training Assignments

### 10.1 Basic Training Required

All Battelle employees involved with intrusive field activities shall have completed a 40-hour HAZWOPER course or be trained in accordance with the hazardous waste training requirements specified in 29 CFR 1910.120 and 8 CCR 5192. Additionally, the SSHO and alternate will have completed the 30-hour OSHA Construction Safety training prior to beginning fieldwork and all Battelle employees will have at least 24 hours of supervised field experience. At least two personnel trained and certified in adult first aid/cardiopulmonary resuscitation (CPR) and the bloodborne pathogens standard will be on site at all times work is being performed in accordance with 29 CFR 1910.1030. Personnel directly supervising employees in the EZ or CRZ shall have received the 8-hour Supervisor Training for hazardous waste operations. All personnel who must meet the above requirements shall be current with the 8-hour refresher requirements of 29 CFR 1910.120 and 8 CCR 5192. Table 10-1 provides a training assignment matrix.

**Table 10-1. Training Assignment Matrix**

Category	40-Hour HAZWOPER	8-Hour Refresher, Adult First Aid, and Bloodborne Pathogens	24-Hour Supervised Experience	8-Hour Supervisor/Supervisor Refresher	Site Specific <sup>a</sup>	Special Equipment Use
Battelle Employee	X	X			X	
SHM/SSHO	X	X	X	X	X	
Visitor <sup>b</sup>	b	b	b		b	b
Subcontractor <sup>b</sup>	b	b	b		b	b

Notes:

- (a) Site-specific and Battelle Program orientation may be combined for visitors, subcontractors, temporary team personnel, and vendors.
- (b) To be determined on a case-by-case basis.

### 10.2 Training

All personnel entering controlled areas or performing specified field-support activities will attend a project safety and health orientation presented by the health and safety representative prior to beginning fieldwork on the project, which will be incorporated into the initial tailgate health and safety meeting. This is a one-time training session that may be combined with site-specific training. This training shall address general project policies, rules, and regulations as well as other matters that are common between project sites (if more than one).

### **10.3 Site-Specific Training**

Prior to commencing work activities, all personnel will be required to attend a safety orientation given by the SSHO. Attendance at the meeting is mandatory for all project personnel and supervisors. A NAVFAC SW representative or base representative may also be present to answer any questions and review the site requirements. New employees reporting to work after the job starts are also required to attend a safety orientation prior to engaging in any work activities. Documentation of this orientation shall be maintained by Battelle.

During site orientation for each employee the following information and interventions will be stressed to ensure employees are protected from potential chemical contaminants in the soil of which lead is one such contaminant.

- Employees will be informed of the soil contaminants and their respective concentrations as well the pathways and risks associated with exposure to those contaminants.
- Direct skin contact with soil will be avoided by the wearing of disposable gloves when intrusive activities occur.
- Employees will be instructed to wash their hands after exiting the Radiological Controlled Area.
- Where muddy conditions exist and clothing and safety shoes could become excessively covered with soil from the site, disposable PPE (coveralls) will be issued and overshoes worn to protect against contamination of the clothes and shoes, respectively. In any case a shoe brush station will be established at the exit to the RCA to limit any potential soil contaminants from being transferred off-site.

### **10.4 Safety Briefings**

Battelle shall conduct tailgate safety meetings on a daily basis to ensure that new or important existing information regarding site safety and health is given to all personnel. The SSHO will provide a suggested topic for the meeting and will provide periodic information to be presented to all workers at these meetings.

### **10.5 Exceptions**

Exceptions to training requirements shall be specified by the SSHO.

### **10.6 Training Records**

The SHM will administer the training-records management program. The SHM will also maintain a system to track field employee training. Copies of training certifications for all Battelle employees will be maintained by the PM.

## **Section 11 Emergency Action Plan**

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This section describes emergency action planning procedures to be implemented for the RI at Dredge Pond 3E and the Northern MCFR. It is consistent with local, state, and federal disaster and emergency management plans and is designed to comply with applicable provisions of 29 CFR 1910.38 and 29 CFR 1910.120(l). The following sections discuss pre-emergency planning, personnel roles and lines of authority, emergency recognition and prevention, evacuation routes and procedures, emergency contacts and notifications, hospital route directions, emergency medical treatment procedures, protective equipment failure, fire or explosion, weather-related emergencies, spills or leaks, emergency equipment and facilities, and reporting. The emergency action procedures noted in the following sections will be continually exercised, and lessons learned from the exercises will be critiqued.

### **11.1 Pre-Emergency Planning**

Prior to the start of field activities, an emergency action drill will be conducted, documented, and subsequent lessons learned will be discussed with site workers. The emergency action drill will include a mock evacuation to the rally point (see Section 11.4 below), and a trip to Kaiser Permanente Medical Center in Vallejo, California.

During the pre-work briefing and daily tailgate safety meetings, all on-site employees will be trained in the site communication systems and site evacuation routes. The emergency response provisions will be reviewed on a regular basis by the Battelle SHM and SSHO and will be revised, if necessary, to ensure that they are adequate and consistent with prevailing site conditions.

In the event of a medical emergency or fire during fieldwork at the former MINS site, call 911 from a mobile phone. Emergency contacts are listed in Appendix B.

If emergency workers respond to the site, the on-site health and safety representative will brief the emergency workers on the potential chemical hazards of the site, exposure routes and personal protection recommendations. The Battelle emergency response designee will be Mr. Shawn Majors. A mobile telephone will be available during all field activities. On a daily basis and at each work location, the SSHO and/or field lead will verify that mobile phones are operational.

### **11.2 Personnel Roles and Lines of Authority**

The Battelle SSHO has the primary responsibility for responding to emergency situations and for responding appropriately to ensure the safety of site personnel and the public. Possible actions may include evacuation of personnel from the site area. The SSHO is also responsible for ensuring that corrective measures have been implemented, appropriate authorities have been notified, and follow-up reports have been completed.

In the event of an emergency during fieldwork, the Battelle SSHO shall communicate directly with the Battelle PM who will then communicate with the Navy RPM.

Personnel are required to report all injuries, illnesses, spills, fires, and property damage to the SSHO. The SSHO must be notified of any on-site emergencies and is responsible for ensuring that the appropriate emergency procedures described in this section are followed.

### 11.3 Emergency Recognition and Prevention

Tables 3-1 and 3-2 list potential on-site physical and chemical hazards. On-site personnel will be made familiar with this information and with techniques of hazard recognition through pre-work training and site-specific briefings.

### 11.4 Evacuation Routes and Procedures

In the event of an emergency that necessitates evacuation of a work area or the site, the Battelle SSHO shall contact all nearby personnel using on-site communications to advise personnel of the emergency. Personnel will proceed along site roads to a safe distance upwind from the hazard source. Personnel will remain in that area until the SSHO or an authorized individual provides further instructions.

In the event of a major catastrophe where communication is not available, Battelle and its subcontractors will meet at a designated rally point. The designated rally point for the site is the parking lot at the south end of I Street. A roll call will be conducted to ensure that all field personnel are accounted for. A map showing the emergency rally point is included in Appendix B.

### 11.5 Emergency Contacts and Notifications

In the event of a medical emergency, personnel will notify the appropriate emergency organization and will take direction from the Battelle SSHO. In the event of a fire, explosion, or spill at the site, the SSHO will notify the Navy RPM and will follow procedures discussed in this SSHP.

The emergency contact information and the hospital route map are presented in Appendix B. Table 11-1 lists the emergency equipment to be used in the field and their locations. All project vehicles will maintain a copy of this section (Section 11) together with Appendix B at all times, in a readily accessible location.

**Table 11-1. Emergency Equipment Locations**

<b>Equipment</b>	<b>Nearest Location</b>	<b>Alternative Location</b>
Safety Shower	Not required	Not applicable
Portable Deluge	Not required	Not applicable
Decontamination Area	Each group of work areas, to be determined	Support vehicle
Eyewash Station	Support vehicle	Not applicable
First Aid Kit	Each work area	Support vehicle
Other Emergency Supplies	Not required	Not applicable
Emergency Oxygen	Not required	Not applicable
Fire Extinguishers	Support vehicle	Not applicable

## Reporting an Emergency:

When calling for assistance in an emergency situation, the following information should be provided:

- name of the person making the call,
- telephone number at the location of the person making the call,
- name of the injured person (if known),
- nature of incident,
- actions already taken,
- location of the incident, and
- type of assistance needed.

### ***IMPORTANT!***

***DO NOT HANG UP UNTIL THE OPERATOR HAS ALL NEEDED INFORMATION.***

## 11.6 Hospital Route Directions

Kaiser Permanente Medical Center is the closest emergency facility to former MINS. The medical center is located on 975 Sereno Drive, Vallejo, California. The emergency contact information is:

General Information: (707) 651-1000

TTY: (800) 735-2922

Appt./Advice: (707) 651-1025

The hospital route map and directions are presented in Appendix B.

## 11.7 Emergency Medical Treatment Procedures

A person who becomes ill or injured during work may require decontamination. If the illness or injury is minor, any decontamination necessary will be completed and first aid should be administered prior to patient transport. If the patient's condition is serious, partial decontamination will be completed (such as complete disrobing of the person and redressing in the person in clean coveralls or wrapping in a blanket). First aid should be administered until an ambulance or paramedics arrive. At least two personnel trained and certified in emergency first aid, CPR, and bloodborne pathogens will be on site at all times while work is being performed. All injuries and illnesses must be reported immediately to the Battelle PM and SSHO.

Persons transported to a clinic or hospital for chemical exposure treatment will be accompanied by information on the chemical they have been exposed to at the site, if possible.

## 11.8 Protective Equipment Failure

If any worker in the EZ experiences a failure of protective equipment (either engineering controls or PPE) that affects his or her personal protection, the worker and all coworkers will immediately leave the EZ. Re-entry to the EZ will not be permitted until:

- (1) The protective equipment has been repaired or replaced,

- (2) The cause of the equipment failure has been determined, and
- (3) The equipment failure is no longer considered a threat.

## **11.9 Fire or Explosion**

In the event of a fire or explosion on site, the local fire department will be immediately summoned. The Battelle SSHO or a site representative will advise the fire department of the location and nature of any hazardous materials involved.

## **11.10 Weather-Related Emergencies**

Site work shall not be conducted during severe weather conditions, including high-speed winds or lightning. In the event of severe weather, field personnel will stop work, secure and lower all equipment (e.g., drilling masts), and leave the site. Thermal stress caused by excessive heat or cold may occur as a result of extreme temperatures, workload, or the PPE used. Heat/cold stress treatment will be administered as described in Section 4.

## **11.11 Spills or Leaks**

In the event of a severe spill or a leak, site personnel will follow the procedures listed below:

- Evacuate the affected area and relocate personnel to an upwind location.
- Inform the Battelle SSHO and Navy RPM immediately.
- Locate the source of the spill or leak, and stop the flow if it is safe to do so.
- Begin containment and recovery of spilled or leaked materials.
- Notify appropriate local, state, and federal agencies.

Battelle personnel will conduct soil sampling and subsurface geophysical surveying. Spills or leaks occurring from these activities are not likely. Spill prevention and control measures are discussed in detail in Section 12.

## **11.12 Emergency Equipment and Facilities**

The following emergency equipment will be available on site:

- First aid kit
- Eyewash station
- Fire extinguisher
- Mobile telephone

The eyewash station must meet the latest requirements of ANSI Standard Z358.1-2009 and Section 06.B.02.b of USACE (2014). It will be capable of supplying hands-free irrigation for both eyes for at least 15 minutes at a flow rate of at least 0.4 gallon per minute.

### **11.13 Reporting**

All emergency situations require follow-up and reporting. An employee involved in an incident shall immediately report the incident to the Battelle SHM. An Incident Report Form (see Attachment 2 of the APP) must be completed by the Battelle PM and submitted to the Battelle SHM within 24 hours of an emergency situation. The report must include proposed actions to prevent similar incidents from occurring. The SSHO must be fully informed of the corrective action process so that he may implement applicable elements of the process at other sites.

In compliance with OSHA recordkeeping regulation, any work-related fatalities will be reported within 8 hours and all work-related in-patient hospitalizations, amputations and loss of an eye be reported within 24 hours.

## **Section 12 Spill Prevention and Control Measures**

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This section presents spill prevention, control, containment, and emergency response in the event of a spill. Battelle personnel will conduct soil sampling and subsurface geophysical surveying at Dredge Pond 3E and Northern MCFR. Spills or leaks occurring from these activities are not likely.

### **12.1 Spill Prevention, Control, and Containment**

Chemicals or hazardous substances could be spilled during site tasks as a result of:

- transportation accidents;
- leaks from heavy equipment;
- improper packaging practices;
- rupturing of drums or other storage containers; or
- improper handling of hazardous materials during off-loading.

The Emergency Action Plan (Section 11) will be activated in the event of unplanned spills of hazardous or unknown substances. In the event of any spill at the site, the field lead and SSHO are to be notified immediately by whomever first witnesses the emergency event.

#### **12.1.1 Facility and General Prevention/Control Measures**

The following specific spill prevention and control measures include procedures to be implemented in the field by project field personnel to reduce the possibility of liquid waste spillage, as well as actions to be taken if a spill occurs.

**Preventive Measures.** Preventive measures include the following activities.

- Inspect all United Nations (UN)–approved, 55-gallon drums upon delivery to the site to ensure that each drum includes a resealable lid or a resealable lid with a small resealable sampling port (bung) near the top, on the side, or on the lid, and that the closure is not deformed or distorted.
- Do not fill drums completely to allow for possible expansion of liquid.
- Set the UN-approved, 55-gallon drums on pallets to facilitate transport via forklift (if necessary).
- Perform inspections of the storage area including UN-approved, 55-gallon drums while they are being filled and immediately after they are relocated to a temporary on-site storage area to check for possible leaks.
- Select flat areas for temporary storage away from high-traffic zones and storm or sewer drains.
- Perform daily inspections of heavy equipment to ensure that there are no leaks.
- Perform daily inspection of all support vehicles to ensure that there are no leaks.

**Spill Containment and Control.** The following actions will be taken by project field personnel assigned to field activities in the event of a spill.

- The field lead and SSHO are to be notified immediately.

- Workers not involved in spill containment and/or cleanup shall evacuate the immediate area to reduce the likelihood of spreading contamination or being exposed to contamination.
- Designated emergency response personnel attired in coveralls and Level C PPE (if applicable) shall proceed to the spill area with a spill cleanup and control kit that includes absorbent materials.
- If appropriate and safe, attempts shall be made to stop the source(s) of spillage immediately.
- The SSHO shall monitor for exposure to chemicals or hazardous substances during spill-cleanup work.
- The SSHO shall stay at the spill area until the area has been cleared, inspected, and readied for reentry.
- A spill incident report (Attachment 2 of the APP) shall be prepared by the SSHO.
- If the spill is of known or potential hazardous waste and is stored under the 90-day accumulation rule, additional reports required by state law will be prepared.

### **12.1.2 Spill Prevention**

The purpose of this section is to provide planning instructions for response to spills of IDW or other hazardous materials stored at the former MINS waste storage location. IDW will be stored in the designated project IDW storage area specified in the IDW management procedures (see Section 5, Waste Management Plan, in the RI Work Plan; AM8AJV, 2013). The field lead, waste storage area supervisor, and any other designated individuals must identify situations having potential for hazardous material releases. Inspections of the IDW storage area and emergency response supplies are to be performed by the SSHO during operations phase.

### **12.1.3 Spill Containment**

Each IDW spill, leak, or incident will be assessed by the waste-area storage supervisor or other qualified individual promptly upon discovery. This assessment will be conducted to characterize the degree of hazard to personnel, the environment, and to implement effective control procedures. The responsible individual should attempt to determine the following information:

- type of materials released, container types, and storage location,
- amount of materials released or at risk of being released,
- location and direction of flow of the release,
- hazardous characteristics of the released material, and
- occurrences due to spill (e.g., fire, injury, illnesses, damage to environment).

The assessment will include possible environmental and human-health hazards from the release including inhalation exposure, water runoff, and chemical agents used to control the emergency.

Table 12-1 lists suggested site-specific spill control equipment to choose from, location, and capabilities to be maintained for each IDW storage area.

**Table 12-1. Suggested Containment Equipment**

<b>Item</b>	<b>Capability</b>	<b>Location</b>
Absorbent 10-pound bag (minimum) or sufficient material to contain a 55-gallon drum spill (sorbent packs/pillows) compatible with the stored wastes	Absorb contents of a single drum of liquid or leakage from larger containers of solids or semisolids	Emergency supply bin within storage area
Shovel, polyethylene (non-sparking material), long-handled	Collect spilled material	Emergency supply bin within storage area
Scoop, short-handled	Collect spilled material	Emergency supply bin within storage area
Two extra drums or overpacks for material storage and disposal	Overpack for damaged drum or container to collect used absorbent material	Emergency supply bin within storage area
Pump, noncorrosive hand-operated for liquid transfer with appurtenances	Transfer liquid from damaged drum at 2 gallons per minute	Emergency supply bin within storage area
Duct tape	Seal or join plastic sheet, temporary patch of drums	Emergency supply bin within storage area
Emergency barrier warning tape or traffic cones	Control access to site, warn unauthorized personnel	Emergency supply bin within storage area
Heavy-duty plastic bags	Collect contaminated trash, personal protective equipment	Emergency supply bin within storage area
Labels for drums	Label all generated waste	Emergency supply bin within storage area
Sheet plastic, 6-mil polyethylene or herculite (400 square feet)	Cover ground, cover waste piles	Emergency supply bin within storage area
Warning signs	Warn unauthorized personnel	Posted
Spill kit inventory list	Ensure kit content complete	Emergency supply bin within storage area
Fire extinguisher	Size 3A:40BC	Emergency supply bin within storage area

#### **12.1.4 Monitoring**

While the emergency response team (ERT) is cleaning the spill, the SSHO will monitor for chemical exposures as necessary. During the cleanup, instrumentation such as a PID and/or an FID may be used. Personnel monitoring using sampling pumps and collection media may also be employed, depending on the SSHO assessment.

#### **12.1.5 Record Keeping**

The SSHO and PM will document the spill in an Incident Report Form (Attachment 2 to the APP). The Incident Report will be forwarded to the Battelle SHM. Records of all hazardous materials releases will be maintained with the project files and the facility operating record. Information will include:

- time and date of incident,
- location of incident,

- size of release,
- chemicals involved,
- names of SSHO and ERT,
- cleanup procedures,
- unusual or pertinent incidents during the cleanup,
- disposition of cleanup waste,
- follow-up actions, and
- government agencies contacted.

In addition to the above information, the final release report will be maintained in the project files.

### **12.1.6 Waste Management**

All cleanup material resulting from an incident will be managed as the initial waste material.

## **12.2 Emergency Response Callout**

### **12.2.1 Response Implementation**

In the event of an unplanned spill or release of unknown or hazardous substances, the SSHO will notify base-designated personnel who may implement the base site spill control plan. The base will request outside or off-site assistance if required. Once at the site, the SSHO will designate the spill as a restricted area and only authorized personnel, such as the ERT, will be permitted within the spill confines. ERT members and base personnel will be trained to contain and clean up spills from typical materials and quantities used on the project location. The SSHO will set up physical barriers warning unauthorized personnel to stay clear of the site and provide technical guidance to the ERT as needed.

Once barriers have been established, the SSHO will assess the spill conditions and determine whether the spill is small or large. This determination is based on the following criteria.

- Small spills involve a maximum volume of 55 gallons of a liquid or 100 pounds of a solid.
- Large spills involve liquids greater than 55 gallons or solids greater than 100 pounds.

Small spills may be remediated using absorbent materials. This task will be conducted by on-site workers and supervised by the SSHO. The SSHO will direct spill response operations and stay at the spill area until the area has been cleaned, surveyed, and prepared for release.

Action plans for large spills or small spills of highly toxic material should be developed quickly due to the potential for catastrophic events and off-site environmental contamination to the groundwater or neighboring facilities.

In the event of large spills, proper safety and health procedures will be established and communicated to the ERT prior to any control activity. The SSHO will transfer response to the Hazardous Materials (HAZMAT) Team.

Until the HAZMAT Team can respond, ERT responsibilities consist of containing the spill to prevent contamination from spreading to outside areas and keeping unauthorized personnel from entering the

restricted area. The base HAZMAT Team is responsible for actual spill containment and materials-release termination in accordance with the base spill containment and emergency response plans.

The SSHO and ERT will assist the HAZMAT Team upon request and will stay at the spill area until released, or until the area has been cleaned, surveyed, and authorized for reentry.

The PM and SHM will approve reentry to the site for routine use and will issue a final release report pertaining to cleanup of the area.

### **12.2.2 Notification**

If, in the SSHO's assessment, off-site impacts are possible, the SSHO will immediately notify the Naval On-Scene Commander or other designated individual. If spillage to bay water occurs, the United States Coast Guard must be notified. The base representative will notify off-site authorities. Additionally, they will provide a report for immediate transmission to the State Office of Emergency Services (or other state-designated agency) containing the following:

- name and telephone number of reporter,
- name and address of facility,
- time and type of incident,
- name and quantity of materials involved,
- extent of injuries, and
- possible off-site hazards to human health and/or the environment.

The types and quantities of hazardous material spills/releases that could be anticipated at this site are within the capabilities of control by on-site personnel. However, should an incident involve a situation that represents potential life-threatening situations or damage to the environment, the SSHO will contact the designated base environmental contacts for emergency response support. It is the SSHO's responsibility to notify the Naval On-Scene Commander and relate pertinent information for response purposes. It may also be necessary to contact federal, state, or local agencies for compliance with environmental and safety and health regulations. Agency notification is the responsibility of the PM for the affected site(s) in coordination with the base representative.

Prior to reactivation of the facility, the California Environmental Protection Agency/Department of Toxic Substances Control and other appropriate state and local authorities will be notified that the facility is in compliance with 22 CCR 66265.56(h).

## **Section 13 Medical Surveillance**

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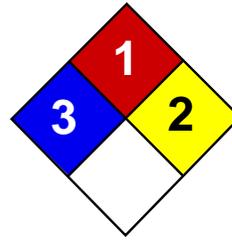
A medical surveillance program will not be instituted by Battelle because its employees do not meet the minimum requirements to necessitate such a program. According to 29 CFR 1910.120(f)(2)(i), Battelle employees are not expected to be exposed to hazardous substances or health hazards at or above the established permissible exposure limit, above the published exposure levels for these substances, without regard to the use of respirators, for more than 30 days per year. Additionally, per 29 CFR 1910.120(f)(2)(ii), Battelle employees are not expected to wear a respirator for more than 30 days per year.

## Section 14 References

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**Appendix A**  
**Material Safety Data Sheets**



Health	3
Fire	1
Reactivity	2
Personal Protection	E

# Material Safety Data Sheet

## Arsenic MSDS

### Section 1: Chemical Product and Company Identification

**Product Name:** Arsenic

**Catalog Codes:** SLA1006

**CAS#:** 7440-38-2

**RTECS:** CG0525000

**TSCA:** TSCA 8(b) inventory: Arsenic

**CI#:** Not applicable.

**Synonym:**

**Chemical Name:** Arsenic

**Chemical Formula:** As

**Contact Information:**

**Sciencelab.com, Inc.**

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: [ScienceLab.com](http://ScienceLab.com)

**CHEMTREC (24HR Emergency Telephone), call:**

1-800-424-9300

**International CHEMTREC, call:** 1-703-527-3887

**For non-emergency assistance, call:** 1-281-441-4400

### Section 2: Composition and Information on Ingredients

**Composition:**

Name	CAS #	% by Weight
Arsenic	7440-38-2	100

**Toxicological Data on Ingredients:** Arsenic: ORAL (LD50): Acute: 763 mg/kg [Rat]. 145 mg/kg [Mouse].

### Section 3: Hazards Identification

**Potential Acute Health Effects:**

Very hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant), of eye contact (irritant).

**Potential Chronic Health Effects:**

**CARCINOGENIC EFFECTS:** Classified A1 (Confirmed for human.) by ACGIH. **MUTAGENIC EFFECTS:** Not available.

**TERATOGENIC EFFECTS:** Not available. **DEVELOPMENTAL TOXICITY:** Not available. The substance is toxic to kidneys, lungs, the nervous system, mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage.

### Section 4: First Aid Measures

**Eye Contact:**

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

**Skin Contact:** Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

**Serious Skin Contact:** Not available.

**Inhalation:**

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

**Serious Inhalation:**

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

**Ingestion:**

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

**Serious Ingestion:** Not available.

### Section 5: Fire and Explosion Data

**Flammability of the Product:** May be combustible at high temperature.

**Auto-Ignition Temperature:** Not available.

**Flash Points:** Not available.

**Flammable Limits:** Not available.

**Products of Combustion:** Some metallic oxides.

**Fire Hazards in Presence of Various Substances:** Flammable in presence of open flames and sparks, of heat, of oxidizing materials.

**Explosion Hazards in Presence of Various Substances:**

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

**Fire Fighting Media and Instructions:**

SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

**Special Remarks on Fire Hazards:**

Material in powder form, capable of creating a dust explosion. When heated to decomposition it emits highly toxic fumes.

**Special Remarks on Explosion Hazards:** Not available.

### Section 6: Accidental Release Measures

**Small Spill:** Use appropriate tools to put the spilled solid in a convenient waste disposal container.

**Large Spill:**

Use a shovel to put the material into a convenient waste disposal container. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

### Section 7: Handling and Storage

**Precautions:**

Keep locked up.. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable

protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents, acids, moisture.

**Storage:** Keep container tightly closed. Keep container in a cool, well-ventilated area.

## Section 8: Exposure Controls/Personal Protection

### Engineering Controls:

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

**Personal Protection:** Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

### Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

### Exposure Limits:

TWA: 0.01 from ACGIH (TLV) [United States] [1995] Consult local authorities for acceptable exposure limits.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Solid. (Lustrous solid.)

**Odor:** Not available.

**Taste:** Not available.

**Molecular Weight:** 74.92 g/mole

**Color:** Silvery.

**pH (1% soln/water):** Not applicable.

**Boiling Point:** Not available.

**Melting Point:** Sublimation temperature: 615°C (1139°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 5.72 (Water = 1)

**Vapor Pressure:** Not applicable.

**Vapor Density:** Not available.

**Volatility:** Not available.

**Odor Threshold:** Not available.

**Water/Oil Dist. Coeff.:** Not available.

**Ionicity (in Water):** Not available.

**Dispersion Properties:** Not available.

**Solubility:** Insoluble in cold water, hot water.

## Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Not available.

**Incompatibility with various substances:** Reactive with oxidizing agents, acids, moisture.

**Corrosivity:** Non-corrosive in presence of glass.

**Special Remarks on Reactivity:** Not available.

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** Will not occur.

## Section 11: Toxicological Information

**Routes of Entry:** Inhalation. Ingestion.

**Toxicity to Animals:** Acute oral toxicity (LD50): 145 mg/kg [Mouse].

**Chronic Effects on Humans:**

**CARCINOGENIC EFFECTS:** Classified A1 (Confirmed for human.) by ACGIH. Causes damage to the following organs: kidneys, lungs, the nervous system, mucous membranes.

**Other Toxic Effects on Humans:**

Very hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant).

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:** Not available.

**Special Remarks on other Toxic Effects on Humans:** Not available.

## Section 12: Ecological Information

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

**Toxicity of the Products of Biodegradation:** The products of degradation are as toxic as the original product.

**Special Remarks on the Products of Biodegradation:** Not available.

## Section 13: Disposal Considerations

**Waste Disposal:**

## Section 14: Transport Information

**DOT Classification:** CLASS 6.1: Poisonous material.

**Identification:** : Arsenic UNNA: UN1558 PG: II

**Special Provisions for Transport:** Not available.

## Section 15: Other Regulatory Information

**Federal and State Regulations:**

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Arsenic California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Arsenic Pennsylvania RTK: Arsenic Massachusetts RTK: Arsenic TSCA 8(b) inventory: Arsenic

**Other Regulations:** OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

**Other Classifications:****WHMIS (Canada):**

CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

**DSCL (EEC):**

R22- Harmful if swallowed. R45- May cause cancer.

**HMIS (U.S.A.):**

**Health Hazard:** 3

**Fire Hazard:** 1

**Reactivity:** 2

**Personal Protection:** E

**National Fire Protection Association (U.S.A.):**

**Health:** 3

**Flammability:** 1

**Reactivity:** 2

**Specific hazard:**

**Protective Equipment:**

Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

**Section 16: Other Information****References:**

-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. -Liste des produits purs tératogènes, mutagènes, cancérogènes. Répertoire toxicologique de la Commission de la Santé et de la Sécurité du Travail du Québec. -Material safety data sheet emitted by: la Commission de la Santé et de la Sécurité du Travail du Québec. -SAX, N.I. Dangerous Properties of Industrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984. -The Sigma-Aldrich Library of Chemical Safety Data, Edition II. -Guide de la loi et du règlement sur le transport des marchandises dangereuses au Canada. Centre de conformité international Ltée. 1986.

**Other Special Considerations:** Not available.

**Created:** 10/09/2005 04:16 PM

**Last Updated:** 11/01/2010 12:00 PM

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# Monsanto

## Material Safety Data

### POLYCHLORINATED BIPHENYLS (PCBs)

Emergency Phone No.  
(Call Collect)  
314-694-1000

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#### 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

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PRODUCT NAME: POLYCHLORINATED BIPHENYLS (PCBs)  
Aroclor® Series 1016, 1221, 1232, 1242, 1248, 1254, 1260, 1262, 1268  
Therminol® FR Series

MSDS Number: M00018515

Date: 12/95

Chemical Family: Chlorinated Hydrocarbons  
Chemical Name: Polychlorinated biphenyls  
Synonyms: PCBs, Chlorodiphenyls, Chlorinated biphenyls

Trade Names/Common Names:

PYRANOL® and INERTEEN® are trade names for commonly used dielectric fluids that may have contained varying amounts of PCBs as well as other components including chlorinated benzenes.

ASKAREL is the generic name for a broad class of fire resistant synthetic chlorinated hydrocarbons and mixtures used as dielectric fluids that commonly contained about 30 - 70% PCBs. Some ASKAREL fluids contained 99% or greater PCBs and some contained no PCBs.

PYDRAUL® is the trade name for hydraulic fluids that, prior to 1972, may have contained varying amounts of PCBs and other components including phosphate esters.

The product names/trade names are representative of several commonly used Monsanto products (or products formulated with Monsanto products). Other trademarked PCB products were marketed by Monsanto and other manufacturers. PCBs were also manufactured and sold by several European and Japanese companies. Contact the manufacturer of the trademarked product, if not in this listing, to determine if the formulation contained PCBs.

In 1972, Monsanto restricted sales of PCBs to applications involving only closed electrical systems, (transformers and capacitors). In 1977, all manufacturing and sales were voluntarily terminated. In 1979, EPA restricted the manufacture, processing, use, and distribution of PCBs to specifically exempted and authorized activities.

MONSANTO COMPANY, 800 N. LINDBERGH BLVD., ST. LOUIS, MO 63167

FOR CHEMICAL EMERGENCY, SPILL, LEAK, FIRE, EXPOSURE, OR ACCIDENT  
Call CHEMTREC - Day or Night - 1-800-424-9300 Toll free in the continental U.S., Hawaii, Puerto Rico, Canada, Alaska, or Virgin Islands. For calls originating elsewhere: 202-483-7616 (collect calls accepted)

For additional nonemergency information, call: 314-694-3344.

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## 2. COMPOSITION/INFORMATION ON INGREDIENTS

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Chemically, commercial PCBs are defined as a series of technical mixtures, consisting of many isomers and compounds that vary from mobile, oily liquids to white crystalline solids and hard noncrystalline resins. Technical products vary in composition, in the degree of chlorination, and possibly according to batch.

The mixtures generally used contain an average of 3 atoms of chlorine per molecule (42% chlorine) to 5 atoms of chlorine per molecule (54% chlorine). They were used as components of dielectric fluids in transformers and capacitors. Prior to 1972, PCB applications included heat transfer media, hydraulic, and other industrial fluids, plasticizers, carbonless copy paper, paints, inks, and adhesives.

<u>Component</u>	<u>CAS No.</u>
chlorinated biphenyl	1336-36-3
Aroclor 1016	12674-11-2
Aroclor 1221	11104-28-2
Aroclor 1232	11141-16-5
Aroclor 1242	53469-21-9
Aroclor 1248	12672-29-6
Aroclor 1254	11097-69-1
Aroclor 1260	11096-82-5
Aroclor 1262	37324-23-5
Aroclor 1268	11100-14-4

There are also CAS Numbers for individual PCB congeners and for mixtures of Aroclor® products.

PCBs are identified as hazardous chemicals under criteria of the OSHA Hazard Communication Standard (29 CFR Part 1910.1200). PCBs have been listed in the International Agency for Research on Cancer (IARC) Monographs (1987)-Group 2A and in the National Toxicology Program (NTP) Annual Report on Carcinogens (Seventh).

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## 3. HAZARDS IDENTIFICATION

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### EMERGENCY OVERVIEW

Appearance and Odor: PCB mixtures range in form and color from clear to amber liquids to white crystalline solids. They have a mild, distinctive odor and are not volatile at room temperature. Refer to Section 9 for details.

**WARNING!**  
**CAUSES EYE IRRITATION**  
**MAY CAUSE SKIN IRRITATION**

**PROCESSING AT ELEVATED TEMPERATURES MAY RELEASE VAPORS OR FUMES WHICH MAY CAUSE RESPIRATORY TRACT IRRITATION**

### POTENTIAL HEALTH EFFECTS

- Likely Routes of Exposure: Skin contact and inhalation of heated vapors
- Eye Contact: Causes moderate irritation based on worker experience.
- Skin Contact: Prolonged or repeated contact may result in redness, dry skin and defatting based on human experience. A potential exists for developing chloracne. PCBs can be absorbed through intact skin.
- Inhalation: Due to the low volatility of PCBs, exposure to this material in ambient conditions is not expected to produce adverse health effects. However, at elevated processing temperatures, PCBs may produce a vapor that may cause respiratory tract irritation if inhaled based on human experience.
- Ingestion: No more than slightly toxic based on acute animal toxicity studies. Coughing, choking and shortness of breath may occur if liquid material is accidentally drawn into the lungs during swallowing or vomiting.

MSDS #: M00018515

Other: Numerous epidemiological studies of humans, both occupationally exposed and nonworker environmentally exposed populations, have not demonstrated any causal relationship between PCB exposure and chronic human illnesses such as cancer or neurological or cardiovascular effects. PCBs at high dosage can cause skin symptoms; however, these subside upon removal of the exposure source.

Refer to Section 11 for toxicological information.

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#### 4. FIRST AID MEASURES

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IF IN EYES, immediately flush with plenty of water for at least 15 minutes. If easy to do, remove any contact lenses. Get medical attention. Remove material from skin and clothing.

IF ON SKIN, immediately flush the area with plenty of water. Wash skin gently with soap as soon as it is available. Get medical attention if irritation persists.

IF INHALED, remove person to fresh air. If breathing is difficult, get medical attention.

IF SWALLOWED, do NOT induce vomiting. Rinse mouth with water. Get medical attention. Contact a Poison Control Center. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.

NOTE TO PHYSICIANS: Hot PCBs may cause thermal burn. If electrical equipment arcs between conductors, PCBs or other chlorinated hydrocarbon dielectric fluids may decompose to produce hydrochloric acid (HCl), a respiratory irritant. If large amounts are swallowed, gastric lavage may be considered.

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#### 5. FIRE FIGHTING MEASURES

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Flash Point: 284 degrees F (140 degrees C) or higher depending on the chlorination level of the Aroclor product

Fire Point: 349 degrees F (176 degrees C) or higher depending on the chlorination level of the Aroclor product

NOTE: Refer to Section 9 for individual flash points and fire points.

##### Extinguishing

Media: Extinguish fire using agent suitable for surrounding fire. Use dry chemical, foam, carbon dioxide or water spray. Water may be ineffective. Use water spray to keep fire-exposed containers or transformer cool.

PCBs are fire-resistant compounds. They may decompose to form CO, CO<sub>2</sub>, HCl, phenolics, aldehydes, and other toxic combustion products under severe conditions such as exposure to flame or hot surfaces.

Dielectric fluids having PCBs and chlorinated benzenes as components have been reported to produce polychlorinated dibenzo-p-dioxins (PCDDs) and furans (PCDFs) during fire situations involving electrical equipment. At temperatures in the range of 600-650 degrees C in the presence of excess oxygen, PCBs may form polychlorinated dibenzofurans (PCDFs). Laboratory studies under similar conditions have demonstrated that PCBs do not produce polychlorinated dibenzo-p-dioxins (PCDDs).

Federal regulations require all PCB transformers to be registered with fire response personnel.

If a PCB transformer is involved in a fire-related incident, the owner of the transformer may be required to report the incident. Consult and follow appropriate federal, state and local regulations.

Fire Fighting Equipment: Fire fighters and others exposed to products of combustion should wear self-contained breathing apparatus. Equipment should be thoroughly decontaminated after use.

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## 6. ACCIDENTAL RELEASE MEASURES

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Cleanup and disposal of liquid PCBs and other PCB items are strictly regulated by the federal government. The regulations are found at 40 CFR Part 761. Consult these regulations as well as applicable state and local regulations prior to any cleanup or disposal of PCBs, PCB items, or PCB contaminated items.

If PCBs leak or are spilled, the following steps should be taken immediately:

All nonessential personnel should leave the leak or spill area.

The area should be adequately ventilated to prevent the accumulation of vapors.

The spill/leak should be contained. Loss to sewer systems, navigable waterways, and streams should be prevented. Spills/leaks should be removed promptly by means of absorptive material, such as sawdust, vermiculite, dry sand, clay, dirt or other similar materials, or trapped and removed by pumping or other suitable means (traps, drip-pans, trays, etc.).

Personnel entering the spill or leak area should be furnished with appropriate personal protective equipment and clothing as needed. Refer to Section 8 for personal protection equipment and clothing.

Personnel trained in emergency procedures and protected against attendant hazards should shut off sources of PCBs, clean up spills, control and repair leaks, and fight fires in PCB areas.

Refer to Section 13 for disposal information and Sections 14 and 15 for information regarding reportable quantity, and Section 7 for marking information.

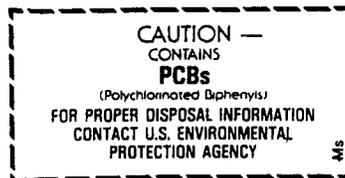
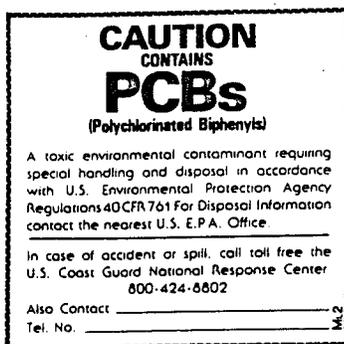
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## 7. HANDLING AND STORAGE

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Care should be taken to prevent entry into the environment through spills, leakage, use vaporization, or disposal of liquid or containers. Avoid prolonged breathing of vapors or mists. Avoid contact with eyes or prolonged contact with skin. If skin contact occurs, remove by washing with soap and water. Following eye contact, flush with water. In case of spillage onto clothing, the clothing should be removed as soon as practical, skin washed, and clothing laundered. Comply with all federal, state, and local regulations.

Federal regulations under the Toxic Substances Control Act require PCBs, PCB items, storage areas, transformer vaults, and transport vehicles to be marked (check regulations, 40 CFR 761, for details).



**Storage:** The storage of PCB items or equipment (those containing 50 ppm or greater PCBs) and PCB waste is strictly regulated by 40 CFR Part 761. The storage time is limited, the storage area must meet physical requirements, and the area must be labeled.

**Avoid contact with eyes.**  
**Wash thoroughly after handling.**  
**Avoid breathing processing fumes or vapors.**  
**Process using adequate ventilation.**

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**8. EXPOSURE CONTROLS/PERSONAL PROTECTION**

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**Eye Protection:** Wear chemical splash goggles and have eye baths available where there is significant potential for eye contact.

**Skin Protection:** Wear appropriate protective clothing and chemical resistant gloves to prevent skin contact. Consult glove manufacturer to determine the appropriate type glove for a given application. Wear chemical goggles, face shield, and chemical resistant clothing such as a rubber apron when splashing is likely. Wash immediately if skin is contacted. Remove contaminated clothing promptly and launder before reuse. Clean protective equipment before reuse. Provide a safety shower at any location where skin contact can occur. Wash thoroughly after handling.

ATTENTION! Repeated or prolonged skin contact may cause chloracne in some people.

**Respiratory Protection:** Avoid breathing vapor, mist, or dust. Use NIOSH/MSHA approved equipment when airborne exposure limits are exceeded. Full facepiece equipment is recommended when airborne exposure limits are exceeded and, if used, replaces the need for face shield and/or chemical splash goggles. Consult respirator manufacturer to determine the type of equipment for a given application. The respirator use limitations specified by NIOSH/MSHA or the manufacturer must be observed. High airborne concentrations may require use of self-contained breathing apparatus or supplied air respirator. Respiratory protection programs must be in compliance with 29 CFR Part 1910.134.

ATTENTION! Repeated or prolonged inhalation may cause chloracne in some people.

**Ventilation:** Provide natural or mechanical ventilation to control exposure levels below airborne exposure limits (see below). If practical, use local mechanical exhaust ventilation at sources of vapor or mist, such as open process equipment.

**Airborne Exposure Limits:**

**Product:** Chlorodiphenyl (42% chlorine)

OSHA PEL: 1 mg/m<sup>3</sup> 8-hour time-weighted average - Skin\*  
ACGIH TLV: 1 mg/m<sup>3</sup> 8-hour time-weighted average - Skin\*

**Product:** Chlorodiphenyl (54% chlorine)

OSHA PEL: 0.5 mg/m<sup>3</sup> 8-hour time-weighted average - Skin\*  
ACGIH TLV: 0.5 mg/m<sup>3</sup> 8-hour time-weighted average - Skin\*

\*For Skin notation see Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Government Industrial Hygienists, 1995-1996.

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**9. PHYSICAL AND CHEMICAL PROPERTIES**


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PROPERTIES OF SELECTED AROCLORS <sup>®</sup>							
PROPERTY	1016	1221	1232	1242	1248	1254	1260
Color (APHA)	40	100	100	100	100	100	150
Physical state	mobile oil	mobile oil	mobile oil	mobile oil	mobile oil	viscous liquid	sticky resin
Stability	inert	inert	inert	inert	inert	inert	inert
Density (lb/gal 25°C)	11.40	9.85	10.55	11.50	12.04	12.82	13.50
Specific gravity x/15.5°C	1.36-1.37 x-25°	1.18-1.19 x-25°	1.27-1.28 x-25°	1.30-1.39 x-25°	1.40-1.41 x-65°	1.49-1.50 x-65°	1.55-1.56 x-90°
Distillation range (°C)	323-356	275-320	290-325	325-366	340-375	365-390	385-420
Acidity mg KOH/g, maximum	.010	.014	.014	.015	.010	.010	.014
Fire point (°C)	none to boiling point	176	238	none to boiling point			
Flash point (°C)	170	141-150	152-154	176-180	193-196	none	none
Vapor pressure (mm Hg @ 100°F)	NA	NA	0.005	0.001	0.00037	0.00006	NA
Viscosity (Saybolt Univ. Sec. @ 100°F) (centistokes)	71-81 13-16	38-41 3.6-4.6	44-51 5.5-7.7	82-92 16-19	185-240 42-52	1800-2500 390-540	— —

NA—Not Available

NOTE: These physical data are typical values based on material tested but may vary from sample to sample. Typical values should not be construed as a guaranteed analysis of any specific lot or as specifications for the product.

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**10. STABILITY AND REACTIVITY**


---

Stability: PCBs are very stable, fire-resistant compounds.

Materials to Avoid: None

Hazardous Decomposition

Products: PCBs may decompose to form CO, CO<sub>2</sub>, HCl, phenolics, aldehydes, and other toxic combustion products under severe conditions such as exposure to flame or hot surface.

Hazardous Polymerization: Does not occur.

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**11. TOXICOLOGICAL INFORMATION**


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Data from laboratory studies conducted by Monsanto and from the available scientific literature are summarized below.

Single exposure (acute) studies indicate:

Oral - Slightly Toxic (Rat LD50 - 8.65 g/kg for 42% chlorinated; 11.9 g/kg for 54% chlorinated)

The liquid products and their vapors are moderately irritating to eye tissues. Animal experiments of varying duration and at different air concentrations show that for similar exposure conditions, the 54% chlorinated material produces more liver injury than the 42% chlorinated material.

There are literature reports that PCBs can impair reproductive functions in monkeys. The National Cancer Institute (NCI) performed a study in 1977 using Aroclor 1254 with both sexes of rats. NCI stated that the PCB, Aroclor 1254, was not carcinogenic under the conditions of their bioassay. There is sufficient evidence in the scientific literature to conclude that Aroclor 1260 can cause liver cancer when fed to rodents at high doses. Similar experiments with less chlorinated PCB products have produced negative or equivocal results.

The consistent finding in animal studies is that PCBs produce liver injury following prolonged and repeated exposure by any route, if the exposure is of sufficient degree and duration. Liver injury is produced first, and by exposures that are less than those reported to cause cancer in rodents. Therefore, exposure by all routes should be kept sufficiently low to prevent liver injury.

Numerous epidemiological studies of humans, both occupationally exposed and nonworker environmentally exposed population, have not demonstrated any causal relationship between PCB exposure and chronic human illnesses such as cancer or neurological or cardiovascular effects. PCBs at high dosage can cause skin symptoms; however, these subside upon removal of the exposure source.

PCBs have been listed in the International Agency for Research on Cancer (IARC) Monographs (1987)-Group 2A and in the National Toxicology Program (NTP) Seventh Annual Report on Carcinogens.

## 12. ECOLOGICAL INFORMATION

Care should be taken to prevent entry of PCBs into the environment through spills, leakage, use, vaporization or disposal of liquid or solids. PCBs can accumulate in the environment and can adversely affect some animals and aquatic life. In general, PCBs have low solubility in water, are strongly bound to soils and sediments, and are slowly degraded by natural processes in the environment.

## 13. DISPOSAL CONSIDERATIONS

The disposal of PCB items or equipment (those containing 50 ppm or greater PCBs) and PCB wastes is strictly regulated by 40 CFR Part 761. For example, all wastes and residues containing PCBs (wiping cloths, absorbent material, used disposable protective gloves and clothing, etc.) should be collected, placed in proper containers, marked and disposed of in the manner prescribed by EPA regulations (40 CFR Part 761) and applicable state and local regulations.

## 14. TRANSPORT INFORMATION

The data provided in this section are for information only. Please apply the appropriate regulations to properly classify a shipment for transportation.

DOT Classification:	IF WEIGHT OF PCBs TO BE SHIPPED IS OVER ONE POUND, THE FOLLOWING CLASSIFICATION AND LABEL APPLY.
DOT Label:	LIQUID: Environmentally Hazardous Substance, liquid, n.o.s. (Contains PCB), 9, UN 3082, III
	SOLID: Environmentally Hazardous Substance, solid, n.o.s. (Contains PCB), 9, UN 3077, III
DOT Label:	Class: 9
DOT Reportable Quantity:	One Pound
IMO Classification:	Polychlorinated Biphenyls, IMO Class 9, UN 2315, II IMO Page 9034, EMS 6.1-02
IATA/ICAO Classification:	Polychlorinated Biphenyls, 9, UN2315, II

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**15. REGULATORY INFORMATION**

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For regulatory purposes, under the Toxic Substances Control Act, the term "PCBs" refers to a chemical substance limited to the biphenyl molecule that has been chlorinated to varying degrees or any combination of substances which contain such a substance (40 CFR Part 761).

TSCA Inventory: not listed.

Hazard Categories Under Criteria of SARA Title III Rules (40 CFR Part 370): Immediate, Delayed.  
SARA Section 313 Toxic Chemical(s): Listed-1993 (De Minimis concentration 0.1%.)

Reportable Quantity (RQ) under DOT (49 CFR) and CERCLA Regulations: 1 lb. (polychlorinated biphenyls) PCBs.

Release of more than 1 (one) pound of PCBs to the environment requires notification to the National Response Center (800-424-8802 or 202-426-2675).

Various state and local regulations may require immediate reporting of PCB spills and may also define spill cleanup levels. Consult your attorney or appropriate regulatory officials for information relating to spill reporting and spill cleanup.

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**16. OTHER INFORMATION**

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Reason for revision: Conversion to the 16 section format. Supersedes MSDS dated 10/88.

Therminol® , Aroclor® and Pydraul® are registered trademarks of Monsanto Company  
Pyranol® is a registered trademark of General Electric Company  
Inerteen® is a registered trademark of Westinghouse Electric Corporation

FOR ADDITIONAL NONEMERGENCY INFORMATION, CONTACT:

Gary W. Mappes  
Manager, Product & Environmental Safety

Robert G. Kaley, II  
Director, Environmental Affairs

Monsanto Company  
800 North Lindbergh Boulevard  
St. Louis, MO 63167  
(314) 694-3344

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SIGMA-ALDRICH

MATERIAL SAFETY DATA SHEET

Date Printed: 09-21-2009

Date Updated: 02-04-2006

Version 1.3

Section 1 - Product and Company Information

Product Name 4,4'-DDD-RING-UL-14C (TOLUENE SOLUTION)  
Product Number 312533  
Brand SIGMA

Company Sigma-Aldrich  
Address 3050 Spruce Street  
SAINT LOUIS, MO 63103  
USA

Technical Phone: +1 800-325-5832  
Fax: +1 800-325-5052  
Emergency Phone: (314) 776-6555

Section 2 - Composition/Information on Ingredient

Substance Name	CAS #	SARA 313
4,4'-DDD-RING-UL-14C	None	No

Chemical Family Radioactive material.

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Flammable (USA) Highly Flammable (EU). Toxic.  
May cause cancer. May cause heritable genetic damage. Toxic by inhalation, in contact with skin and if swallowed. Possible risk of impaired fertility.  
Causes severe irritation. Calif. Prop. 65 carcinogen & reproductive hazard. Target organ(s): Kidneys. Brain.

For additional information on toxicity, please refer to Section 11.

Section 4 - First Aid Measures

ORAL EXPOSURE

If swallowed, wash out mouth with water provided person is conscious. Call a physician.

INHALATION EXPOSURE

If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

Section 5 - Fire Fighting Measures

FLASH POINT

N/A

AUTOIGNITION TEMP

N/A

FLAMMABILITY

N/A

SIGMA - 312533

Page 1

EXTINGUISHING MEDIA

Suitable: Water spray. Carbon dioxide, dry chemical powder, or appropriate foam.

FIREFIGHTING

Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.  
Specific Hazard(s): Emits toxic fumes under fire conditions.

EXPOSURE HAZARD(S)

Material: Toxic.

-----  
Section 6 - Accidental Release Measures  
-----

PROCEDURE TO BE FOLLOWED IN CASE OF LEAK OR SPILL

Evacuate area. Handle as a radioactive spill.

PROCEDURE(S) OF PERSONAL PRECAUTION(S)

Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves. Wear disposable coveralls and discard them after use.

METHODS FOR CLEANING UP

Absorb on sand or vermiculite and place in closed containers for disposal. Ventilate area and wash spill site after material pickup is complete.

-----  
Section 7 - Handling and Storage  
-----

HANDLING

User Exposure: Do not breathe vapor. Do not get in eyes, on skin, on clothing. Avoid prolonged or repeated exposure.

STORAGE

Suitable: Keep tightly closed. Store in a cool dry place.  
Store at 2-8°C

SPECIAL REQUIREMENTS

Radioactive material.

-----  
Section 8 - Exposure Controls / PPE  
-----

ENGINEERING CONTROLS

Use only in a chemical fume hood. Safety shower and eye bath.

PERSONAL PROTECTIVE EQUIPMENT

Other: Wear appropriate government approved respirator, chemical-resistant gloves, safety goggles, other protective clothing.

GENERAL HYGIENE MEASURES

Wash thoroughly after handling. Wash contaminated clothing before reuse.

-----  
Section 9 - Physical/Chemical Properties  
-----

Appearance	Physical State: Liquid	
Property	Value	At Temperature or Pressure
pH	N/A	
BP/BP Range	N/A	
MP/MP Range	N/A	

Freezing Point	N/A
Vapor Pressure	N/A
Vapor Density	N/A
Saturated Vapor Conc.	N/A
SG/Density	N/A
Bulk Density	N/A
Odor Threshold	N/A
Volatile%	N/A
VOC Content	N/A
Water Content	N/A
Solvent Content	N/A
Evaporation Rate	N/A
Viscosity	N/A
Surface Tension	N/A
Partition Coefficient	N/A
Decomposition Temp.	N/A
Flash Point	N/A
Explosion Limits	N/A
Flammability	N/A
Autoignition Temp	N/A
Refractive Index	N/A
Optical Rotation	N/A
Miscellaneous Data	N/A
Solubility	N/A

N/A = not available

-----  
Section 10 - Stability and Reactivity  
-----

STABILITY

Materials to Avoid: Strong oxidizing agents.

HAZARDOUS DECOMPOSITION PRODUCTS

Hazardous Decomposition Products: Carbon monoxide, Carbon dioxide,  
Hydrogen chloride gas.

-----  
Section 11 - Toxicological Information  
-----

ROUTE OF EXPOSURE

Multiple Routes: May cause irritation. Harmful if swallowed,  
inhaled, or absorbed through skin.

TARGET ORGAN(S) OR SYSTEM(S)

Nerves. Eyes. Liver. Adrenal cortex.

CHRONIC EXPOSURE - CARCINOGEN

Result: Carcinogen. Contains a radioactive isotope which may  
produce cancer and genetic mutation.

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD

Result: May cause reproductive disorders.

-----  
Section 12 - Ecological Information  
-----

No data available.

-----  
Section 13 - Disposal Considerations  
-----

APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION

Dispose of spilled material as radioactive waste. Consult local,  
state, and federal regulations on the disposal of radioactive  
waste. Observe all federal, state, and local environmental  
regulations.

Section 14 - Transport Information

---

DOT

Proper Shipping Name: None  
Non-Hazardous for Transport: This substance is considered to be non-hazardous for transport.

IATA

Non-Hazardous for Air Transport: Non-hazardous for air transport.

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Section 15 - Regulatory Information

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EU ADDITIONAL CLASSIFICATION

Symbol of Danger: F-T  
Indication of Danger: Highly Flammable. Toxic.  
R: 45-46-11-23/24/25-62  
Risk Statements: May cause cancer. May cause heritable genetic damage. Highly flammable. Toxic by inhalation, in contact with skin and if swallowed. Possible risk of impaired fertility.  
S: 53-16-26-36/37/39-45  
Safety Statements: Avoid exposure - obtain special instructions before use. Keep away from sources of ignition - no smoking. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable protective clothing, gloves, and eye/face protection. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

US CLASSIFICATION AND LABEL TEXT

Indication of Danger: Flammable (USA) Highly Flammable (EU). Toxic.  
Risk Statements: May cause cancer. May cause heritable genetic damage. Toxic by inhalation, in contact with skin and if swallowed. Possible risk of impaired fertility.  
Safety Statements: Avoid exposure - obtain special instructions before use. Keep away from sources of ignition - no smoking. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable protective clothing, gloves, and eye/face protection. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).  
US Statements: Causes severe irritation. Calif. Prop. 65 carcinogen & reproductive hazard. Target organ(s): Kidneys. Brain.

UNITED STATES REGULATORY INFORMATION

SARA LISTED: No

UNITED STATES - STATE REGULATORY INFORMATION

CALIFORNIA PROP - 65

California Prop - 65: California Proposition 65: This product is or contains chemical(s) known to the state of California to cause cancer. This product is or contains chemical(s) known to the state of California to cause developmental toxicity.  
California Proposition 65: This product is or contains chemical(s) known to the state of California to cause cancer. This product is or contains chemical(s) known to the state of California to cause developmental toxicity.

CANADA REGULATORY INFORMATION

WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS

contains all the information required by the CPR.

DSL: No

NDSL: No

---

Section 16 - Other Information

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DISCLAIMER

For R&D use only. Not for drug, household or other uses.

WARRANTY

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale. Copyright 2006 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.

## Material Safety Data Sheet

Version 5.2  
Revision Date 01/05/2011  
Print Date 10/17/2011

### 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	4,4'-DDE	
Product Number	:	49017	
Brand	:	Supelco	
Product Use	:	For laboratory research purposes.	
Supplier	:	Sigma-Aldrich	Manufacturer : Sigma-Aldrich Corporation
		3050 Spruce Street	3050 Spruce St.
		SAINT LOUIS MO 63103	St. Louis, Missouri 63103
		USA	USA
Telephone	:	+1 800-325-5832	
Fax	:	+1 800-325-5052	
Emergency Phone # (For both supplier and manufacturer)	:	(314) 776-6555	
Preparation Information	:	Sigma-Aldrich Corporation	
		Product Safety - Americas Region	
		1-800-521-8956	

### 2. HAZARDS IDENTIFICATION

#### Emergency Overview

#### OSHA Hazards

Harmful by ingestion., Carcinogen

#### GHS Classification

Acute toxicity, Oral (Category 4)

Carcinogenicity (Category 2)

Acute aquatic toxicity (Category 1)

Chronic aquatic toxicity (Category 4)

#### GHS Label elements, including precautionary statements

Pictogram



Signal word

Warning

Hazard statement(s)

H302

Harmful if swallowed.

H351

Suspected of causing cancer.

H400

Very toxic to aquatic life.

H413

May cause long lasting harmful effects to aquatic life.

Precautionary statement(s)

P273

Avoid release to the environment.

P281

Use personal protective equipment as required.

#### HMIS Classification

Health hazard: 1

Chronic Health Hazard: \*

Flammability: 0

Physical hazards: 0

#### NFPA Rating

Health hazard: 1

**Fire:** 0  
**Reactivity Hazard:** 0

**Health hazard:** 1  
**Fire:** 0  
**Reactivity Hazard:** 0

#### Potential Health Effects

**Inhalation** May be harmful if inhaled. May cause respiratory tract irritation.  
**Skin** Harmful if absorbed through skin. May cause skin irritation.  
**Eyes** May cause eye irritation.  
**Ingestion** Harmful if swallowed.

---

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms : 1,1-Dichloro-2,2-bis(4-chlorophenyl)ethene

Formula : C<sub>14</sub>H<sub>8</sub>Cl<sub>4</sub>

Molecular Weight : 318.03 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
<b>2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene</b>			
72-55-9	200-784-6	-	-

---

### 4. FIRST AID MEASURES

#### General advice

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

#### If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

#### In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

#### In case of eye contact

Flush eyes with water as a precaution.

#### If swallowed

Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

---

### 5. FIRE-FIGHTING MEASURES

#### Suitable extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

#### Special protective equipment for fire-fighters

Wear self contained breathing apparatus for fire fighting if necessary.

#### Hazardous combustion products

Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

---

### 6. ACCIDENTAL RELEASE MEASURES

#### Personal precautions

Use personal protective equipment. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

#### Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

### Methods and materials for containment and cleaning up

Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

---

## 7. HANDLING AND STORAGE

### Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols.

Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

### Conditions for safe storage

Keep container tightly closed in a dry and well-ventilated place.

---

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

### Personal protective equipment

#### Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

#### Hand protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

#### Eye protection

Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

#### Skin and body protection

Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

#### Hygiene measures

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

---

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### Appearance

Form	solid
Colour	no data available

### Safety data

pH	no data available
Melting/freezing point	Melting point/range: 88.0 - 90.0 °C (190.4 - 194.0 °F)
Boiling point	no data available
Flash point	no data available
Ignition temperature	no data available
Autoignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	< 0.00001 hPa (< 0.00001 mmHg)

Density	no data available
Water solubility	no data available
Partition coefficient: n-octanol/water	log Pow: 6.51
Relative vapour density	no data available
Odour	no data available
Odour Threshold	no data available
Evaporation rate	no data available

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## 10. STABILITY AND REACTIVITY

### Chemical stability

Stable under recommended storage conditions.

### Possibility of hazardous reactions

no data available

### Conditions to avoid

no data available

### Materials to avoid

Strong oxidizing agents, Strong bases

### Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas  
Other decomposition products - no data available

---

## 11. TOXICOLOGICAL INFORMATION

### Acute toxicity

#### Oral LD50

LD50 Oral - rat - 880.0 mg/kg

#### Inhalation LC50

no data available

#### Dermal LD50

no data available

#### Other information on acute toxicity

no data available

### Skin corrosion/irritation

no data available

### Serious eye damage/eye irritation

no data available

### Respiratory or skin sensitization

no data available

### Germ cell mutagenicity

no data available

### Carcinogenicity

This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or EPA classification.

Limited evidence of carcinogenicity in animal studies

- IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
- ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
- NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
- OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

**Reproductive toxicity**

no data available

**Teratogenicity**

no data available

**Specific target organ toxicity - single exposure (Globally Harmonized System)**

no data available

**Specific target organ toxicity - repeated exposure (Globally Harmonized System)**

no data available

**Aspiration hazard**

no data available

**Potential health effects**

- Inhalation** May be harmful if inhaled. May cause respiratory tract irritation.
- Ingestion** Harmful if swallowed.
- Skin** Harmful if absorbed through skin. May cause skin irritation.
- Eyes** May cause eye irritation.

**Signs and Symptoms of Exposure**

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

**Synergistic effects**

no data available

**Additional Information**

RTECS: KV9450000

---

**12. ECOLOGICAL INFORMATION**

**Toxicity**

- Toxicity to fish LC50 - Lepomis macrochirus (Bluegill) - 0.2 - 0.3 mg/l - 96.0 h
- LC50 - Oncorhynchus mykiss (rainbow trout) - 0.03 - 0.04 mg/l - 96.0 h
- LC50 - Salmo salar (Atlantic salmon) - 0.05 - 0.18 mg/l - 96.0 h

**Persistence and degradability**

no data available

**Bioaccumulative potential**



**SARA 311/312 Hazards**

Acute Health Hazard, Chronic Health Hazard

**Massachusetts Right To Know Components**

No components are subject to the Massachusetts Right to Know Act.

**Pennsylvania Right To Know Components**

	CAS-No.	Revision Date
2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene	72-55-9	

**New Jersey Right To Know Components**

	CAS-No.	Revision Date
2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene	72-55-9	

**California Prop. 65 Components**

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

---

**16. OTHER INFORMATION****Further information**

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

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# 4,4'-DDT

sc-238975



The Power is Question

## Material Safety Data Sheet

Hazard Alert Code  
Key:

EXTREME

HIGH

MODERATE

LOW

## Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

### PRODUCT NAME

4,4'-DDT

### STATEMENT OF HAZARDOUS NATURE

CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

### NFPA



### SUPPLIER

Company: Santa Cruz Biotechnology, Inc.

Address:

2145 Delaware Ave

Santa Cruz, CA 95060

Telephone: 800.457.3801 or 831.457.3800

Emergency Tel: CHEMWATCH: From within the US and  
Canada: 877-715-9305

Emergency Tel: From outside the US and Canada: +800 2436  
2255 (1-800-CHEMCALL) or call +613 9573 3112

### PRODUCT USE

Insecticide for tobacco and cotton, pesticide (tussock moth). Intermediate

### SYNONYMS

C<sub>14</sub>H<sub>9</sub>Cl<sub>5</sub>, "1, 1' -(2, 2, 2-trichloroethylidene) bis [4-chlorobenzene]", "1, 1' -(2, 2, 2-trichloroethylidene) bis [4-chlorobenzene]", "1, 1, 1-trichloro-2, 2-bis(p-chlorophenyl)ethane", "1, 1, 1-trichloro-2, 2-bis(p-chlorophenyl)ethane", "ethane, 1, 1, 1-trichloro-2, 2-bis(p-chlorophenyl)", "ethane, 1, 1, 1-trichloro-2, 2-bis(p-chlorophenyl)", "benzene, 1, 1' -(, 2, 2-trichloroethylidene)bis(4-chloro)-", "benzene, 1, 1' -(, 2, 2-trichloroethylidene)bis(4-chloro)-", "alpha, alpha-bis(p-chlorophenyl)-beta, beta, beta-trichloroethane", "1, 1-bis-(p-chlorophenyl)-2, 2, 2-trichloroethane", "1, 1-bis-(p-chlorophenyl)-2, 2, 2-trichloroethane", "2, 2-bis(p-chlorophenyl)-1, 1, 1-trichloroethane", "2, 2-bis(p-chlorophenyl)-1, 1, 1-trichloroethane", "p, p' -DDT", "p, p' -DDT", "diphenyl trichloroethane", "dichlorodiphenyltrichloroethane", "p, p-dichlorodiphenyltrichloroethane", "p, p-dichlorodiphenyltrichloroethane", "4, 4' -dichlorodiphenyltrichloroethane", "4, 4' -dichlorodiphenyltrichloroethane", Agritan, Anofex, Arkotine, Azotox, "Bosan supra", Bovidermal, Chlorophenothane, Chlorophenotoxum, Citox, Clofenotane, Dedelo, Deoval, Ditoxan, Dibovan, Dicophane, Didigam, Didimac, Dodat, Dykol, Estonate, Genitox, Gesafid, Gesapon, Gesarex, Gesarol, Guesapon, Guesarol, Gyron, Havero-extra, Hildit, Ivoran, Ixodex, Kopsal, Mutoxin, Neocid, OMS-16, Parachlorodicum, Peb1, Pentachlorin, Zeidane, Zerdane, insecticide

## Section 2 - HAZARDS IDENTIFICATION

### CANADIAN WHMIS SYMBOLS



### EMERGENCY OVERVIEW

#### RISK

Limited evidence of a carcinogenic effect.

Toxic: danger of serious damage to health by prolonged exposure if swallowed.  
Toxic in contact with skin and if swallowed.  
Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

## POTENTIAL HEALTH EFFECTS

### ACUTE HEALTH EFFECTS

#### SWALLOWED

- Toxic effects may result from the accidental ingestion of the material; animal experiments indicate that ingestion of less than 40 gram may be fatal or may produce serious damage to the health of the individual.
- Organochlorine pesticides excite the central nervous system, causing shortness of breath, cough, narrowing of airways and throat spasms. In the muscles it can cause twitches, spastic movements and seizures. Headache, dizziness and confusion may result as well as a feeling of warmth. Other symptoms include nausea, vomiting, diarrhea and difficulty in urination. There may be alterations in blood pressure or irregularities in heart rhythm. Delayed poisoning may occur after 30 minutes to several hours. Symptoms may include diarrhea, stomach pain, headache, dizziness, inco-ordination, "pins and needles", restlessness, irritability, confusion and tremors, progressing to stupor, coma and epilepsy-like or spastic seizures with frothing at the mouth, a contorted face, violent convulsions and limb stiffness. Tremors may spread from the face to the torso and limbs. Severe poisoning may cause continuous convulsion, fever, unconsciousness, labored breathing, rapid heartbeat and general depression; this is followed by lack of oxygen, collapse of breathing, and death. Kidney damage and inflammation and anemia has also been reported.
- Earliest symptom of exposure to DDT is a prickling or tingling sensation in the mouth, tongue and lower face. This is followed by dizziness, abdominal pain, headache, nausea, vomiting, diarrhoea, mental confusion, a sense of apprehension, weakness, loss of muscle control and tremors. Higher exposures can cause severe convulsions followed by death. Symptoms may occur within 30 minutes to 6 hours after exposure, depending upon the severity of the exposure. DDT and its analogues may cause gastrointestinal effects.

#### EYE

- Although the material is not thought to be an irritant, direct contact with the eye may cause transient discomfort characterized by tearing or conjunctival redness (as with windburn). Slight abrasive damage may also result. The material may produce foreign body irritation in certain individuals.

#### SKIN

- Skin contact with the material may produce toxic effects; systemic effects may result following absorption.
- The material is not thought to be a skin irritant (as classified using animal models). Abrasive damage however, may result from prolonged exposures. Good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting.
- Open cuts, abraded or irritated skin should not be exposed to this material.
- Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

#### INHALED

- The material is not thought to produce respiratory irritation (as classified using animal models). Nevertheless inhalation of dusts, or fume, especially for prolonged periods, may produce respiratory discomfort and occasionally, distress.
- Inhalation of dusts, generated by the material during the course of normal handling, may be damaging to the health of the individual.
- Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled.

### CHRONIC HEALTH EFFECTS

- There has been concern that this material can cause cancer or mutations, but there is not enough data to make an assessment.

There is some evidence to provide a presumption that human exposure to the material may result in impaired fertility on the basis of: some evidence in animal studies of impaired fertility in the absence of toxic effects, or evidence of impaired fertility occurring at around the same dose levels as other toxic effects but which is not a secondary non-specific consequence of other toxic effects.

The following chronic health effects can occur some time after exposure to DDT and can last for months or years. There is some evidence that it causes cancer in humans and it has been shown to cause liver cancer in animals.

DDT may damage the liver and kidneys, damage the developing fetus and decrease fertility in males and females, and cause central nervous system degeneration.

High doses of o,p'-DDT fed to immature female rats exert clear oestrogenic effects. Males fed 1 ppm o,p'-DDT from birth had significantly heavier bodies, testes and seminal vesicles at day 112. In a another study adult male rats treated with o,p'-DDT showed decreased corticosterone formed from progesterone in the adrenals and lowered unchanged progesterone. In brain metabolism, treatment with o,p'-DDT increased dihydrotestosterone from testosterone while androstenediol decreased. The authors concluded that the effects of o,p'-DDT administration are a decrease in plasma testosterone and in androgen biosynthesis, and an increase in plasma oestradiol.

Exposure to organochlorine pesticides for long periods can cause multiple nervous system infections and disorders involving the brain and autonomic nerves with headache, dizziness, "pins and needles", tremor in the limbs, disturbances in nerves supplying blood vessels, pain in the bowel and stiffening of the bile duct, rapid heartbeat, hollow heart sounds and a tight pain in the chest. There can be blood problems with loss of platelets and white blood cells, change in blood cell distribution, anemia, loss of appetite and weight. There may be disturbed behavior. Some organochlorines may have female sex hormone-like effects, causing withering of the testicles, reduced fertility and disturbed sexual activity.

## Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

### HAZARD RATINGS

Flammability: 1  Min Max

Toxicity:	3	
Body Contact:	3	
Reactivity:	1	
Chronic:	3	

Min/Nil=0  
Low=1  
Moderate=2  
High=3  
Extreme=4



NAME	CAS RN	%
DDT (dichlorodiphenyltrichloroethane)	50-29-3	>99

## Section 4 - FIRST AID MEASURES

### SWALLOWED

- Give a slurry of activated charcoal in water to drink. NEVER GIVE AN UNCONSCIOUS PATIENT WATER TO DRINK.
- At least 3 tablespoons in a glass of water should be given.
- Although induction of vomiting may be recommended (IN CONSCIOUS PERSONS ONLY), such a first aid measure is dissuaded because to the risk of aspiration of stomach contents. (i) It is better to take the patient to a doctor who can decide on the necessity and method of emptying the stomach. (ii) Special circumstances may however exist; these include non-availability of charcoal and the ready availability of the doctor.

NOTE: If vomiting is induced, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration. NOTE: Wear protective gloves when inducing vomiting.

- REFER FOR MEDICAL ATTENTION WITHOUT DELAY.
- In the mean time, qualified first-aid personnel should treat the patient following observation and employing supportive measures as indicated by the patient's condition.
- If the services of a medical officer or medical doctor are readily available, the patient should be placed in his/her care and a copy of the MSDS should be provided. Further action will be the responsibility of the medical specialist.
- If medical attention is not available on the worksite or surroundings send the patient to a hospital together with a copy of the MSDS.

(ICSC20305/20307).

### EYE

- If this product comes in contact with the eyes:
  - Immediately hold eyelids apart and flush the eye continuously with running water.
  - Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
  - Continue flushing until advised to stop by the Poisons Information Center or a doctor, or for at least 15 minutes.
  - Transport to hospital or doctor without delay.
  - Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

### SKIN

- If skin or hair contact occurs:
  - Quickly but gently, wipe material off skin with a dry, clean cloth.
  - Immediately remove all contaminated clothing, including footwear.
  - Wash skin and hair with running water. Continue flushing with water until advised to stop by the Poisons Information Center.
  - Transport to hospital, or doctor.

### INHALED

- If fumes or combustion products are inhaled remove from contaminated area.
- Lay patient down. Keep warm and rested.
- Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.
- Transport to hospital, or doctor.

### NOTES TO PHYSICIAN

- Organochlorines are well absorbed from the lungs, gastrointestinal tract and skin.
- Intoxication from acute oral exposures generally begins within 45 minutes to several hours.
- Diazepam is the anticonvulsant of choice. [Phenobarbitone, sodium phenobarbitone or in repeated convulsions sodium pentothal (2.5% solution) may also be given - calcium gluconate may also be helpful] (Manufacturers; David Gray and Hoechst)
- Usual methods of decontamination (Ipecac / lavage / charcoal / cathartics) are recommended within the first several hours following exposure.
- Dialysis, diuresis and hemoperfusion are ineffective because of extensive tissue binding and large volumes of distribution.
- There is no antidote.

[Ellenhorn and Barceloux: Medical Toxicology].

## Section 5 - FIRE FIGHTING MEASURES

Vapour Pressure (mmHG):	Not applicable
Upper Explosive Limit (%):	Not Available
Specific Gravity (water=1):	Not available
Lower Explosive Limit (%):	Not Available

## EXTINGUISHING MEDIA

- 
- Foam.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.
- Water spray or fog - Large fires only.

## FIRE FIGHTING

- 
- Alert Emergency Responders and tell them location and nature of hazard.
- Wear full body protective clothing with breathing apparatus.
- Prevent, by any means available, spillage from entering drains or water course.
- Use fire fighting procedures suitable for surrounding area.
- DO NOT approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.
- Equipment should be thoroughly decontaminated after use.

## GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS

- 
- Combustible solid which burns but propagates flame with difficulty.
- Avoid generating dust, particularly clouds of dust in a confined or unventilated space as dusts may form an explosive mixture with air, and any source of ignition, i.e. flame or spark, will cause fire or explosion. Dust clouds generated by the fine grinding of the solid are a particular hazard; accumulations of fine dust may burn rapidly and fiercely if ignited.
- Dry dust can be charged electrostatically by turbulence, pneumatic transport, pouring, in exhaust ducts and during transport.
- Build-up of electrostatic charge may be prevented by bonding and grounding.
- Powder handling equipment such as dust collectors, dryers and mills may require additional protection measures such as explosion venting.

Combustion products include: carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>), hydrogen chloride, phosgene, other pyrolysis products typical of burning organic material.

May emit poisonous fumes.

## FIRE INCOMPATIBILITY

- 
- Avoid contamination with oxidizing agents i.e. nitrates, oxidizing acids, chlorine bleaches, pool chlorine etc. as ignition may result.

## PERSONAL PROTECTION

Glasses:

Chemical goggles.

Gloves:

Respirator:

Particulate

## Section 6 - ACCIDENTAL RELEASE MEASURES

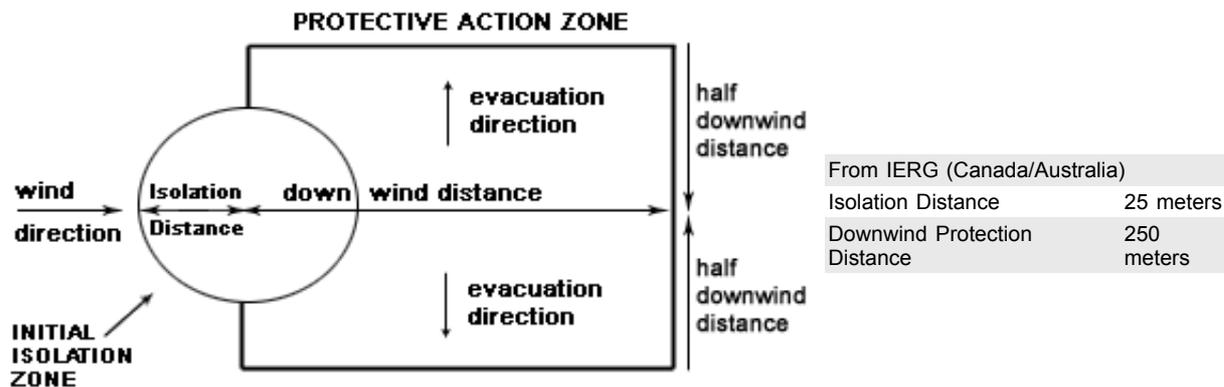
### MINOR SPILLS

- 
- Clean up waste regularly and abnormal spills immediately.
- Avoid breathing dust and contact with skin and eyes.
- Wear protective clothing, gloves, safety glasses and dust respirator.
- Use dry clean up procedures and avoid generating dust.
- Vacuum up or sweep up. NOTE: Vacuum cleaner must be fitted with an exhaust micro filter (HEPA type) (consider explosion-proof machines designed to be grounded during storage and use).
- Dampen with water to prevent dusting before sweeping.
- Place in suitable containers for disposal.

### MAJOR SPILLS

- 
- Clear area of personnel and move upwind.
- Alert Emergency Responders and tell them location and nature of hazard.
- Wear full body protective clothing with breathing apparatus.
- Prevent, by any means available, spillage from entering drains or water course.
- Stop leak if safe to do so.
- Contain spill with sand, earth or vermiculite.
- Collect recoverable product into labeled containers for recycling.
- Neutralize/decontaminate residue.
- Collect solid residues and seal in labeled drums for disposal.
- Wash area and prevent runoff into drains.
- After clean up operations, decontaminate and launder all protective clothing and equipment before storing and re-using.
- If contamination of drains or waterways occurs, advise emergency services.

## PROTECTIVE ACTIONS FOR SPILL



## FOOTNOTES

1 PROTECTIVE ACTION ZONE is defined as the area in which people are at risk of harmful exposure. This zone assumes that random changes in wind direction confines the vapour plume to an area within 30 degrees on either side of the predominant wind direction, resulting in a crosswind protective action distance equal to the downwind protective action distance.

2 PROTECTIVE ACTIONS should be initiated to the extent possible, beginning with those closest to the spill and working away from the site in the downwind direction. Within the protective action zone a level of vapour concentration may exist resulting in nearly all unprotected persons becoming incapacitated and unable to take protective action and/or incurring serious or irreversible health effects.

3 INITIAL ISOLATION ZONE is determined as an area, including upwind of the incident, within which a high probability of localised wind reversal may expose nearly all persons without appropriate protection to life-threatening concentrations of the material.

4 SMALL SPILLS involve a leaking package of 200 litres (55 US gallons) or less, such as a drum (jerrican or box with inner containers). Larger packages leaking less than 200 litres and compressed gas leaking from a small cylinder are also considered "small spills". LARGE SPILLS involve many small leaking packages or a leaking package of greater than 200 litres, such as a cargo tank, portable tank or a "one-tonne" compressed gas cylinder.

5 Guide 151 is taken from the US DOT emergency response guide book.

6 IERG information is derived from CANUTEC - Transport Canada.

## ACUTE EXPOSURE GUIDELINE LEVELS (AEGL) (in ppm)

AEGL 1: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic nonsensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure.

AEGL 2: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.

AEGL 3: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience life-threatening health effects or death.

## Section 7 - HANDLING AND STORAGE

### PROCEDURE FOR HANDLING

- 
- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- Prevent concentration in hollows and sumps.
- DO NOT enter confined spaces until atmosphere has been checked.
- DO NOT allow material to contact humans, exposed food or food utensils.
- Avoid contact with incompatible materials.
- When handling, DO NOT eat, drink or smoke.
- Keep containers securely sealed when not in use.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately.
- Launder contaminated clothing before re-use.
- Use good occupational work practice.
- Observe manufacturer's storing and handling recommendations.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

Empty containers may contain residual dust which has the potential to accumulate following settling. Such dusts may explode in the presence of an appropriate ignition source.

- Do NOT cut, drill, grind or weld such containers
- In addition ensure such activity is not performed near full, partially empty or empty containers without appropriate workplace safety authorisation or permit.

### RECOMMENDED STORAGE METHODS

- 
- Lined metal can, Lined metal pail/drum
- Plastic pail
- Polyliner drum
- Packing as recommended by manufacturer.
- Check all containers are clearly labeled and free from leaks.

For low viscosity materials

- Drums and jerricans must be of the non-removable head type.
- Where a can is to be used as an inner package, the can must have a screwed enclosure.

For materials with a viscosity of at least 2680 cSt. (23 deg. C) and solids (between 15 C deg. and 40 deg C.):

- Removable head packaging;
- Cans with friction closures and
- low pressure tubes and cartridges may be used.

- Where combination packages are used, and the inner packages are of glass, there must be sufficient inert cushioning material in contact with inner and outer packages \* . - In addition, where inner packagings are glass and contain liquids of packing group I and II there must be sufficient inert absorbent to absorb any spillage \*. - \* unless the outer packaging is a close fitting molded plastic box and the substances are not incompatible with the plastic.

### STORAGE REQUIREMENTS

- Store in original containers.
- Keep containers securely sealed.
- Store in a cool, dry, well-ventilated area.
- Store away from incompatible materials and foodstuff containers.
- Protect containers against physical damage and check regularly for leaks.
- Observe manufacturer's storing and handling recommendations.

### SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS



X: Must not be stored together

O: May be stored together with specific preventions

+: May be stored together

## Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

### EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m <sup>3</sup>	STEL ppm	STEL mg/m <sup>3</sup>	Peak ppm	Peak mg/m <sup>3</sup>	TWA F/CC	Notes
US - California Permissible Exposure Limits for Chemical Contaminants	DDT (DDT; 1,1,1-trichloro-2,2-bis-(p-chlorophenyl)ethane)		1						
Canada - Ontario Occupational Exposure Limits	DDT (1,1,1-Trichloro-2,2-bis-(p-chlorophenyl)ethane)		1						
US - Minnesota Permissible Exposure Limits (PELs)	DDT (Dichlorodiphenyltrichloroethane (DDT))		1						
US - Idaho - Limits for Air Contaminants	DDT (Dichlorodiphenyltrichloroethane (DDT))		1						
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	DDT (Dichlorodiphenyltrichloroethane (DDT))		1						
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	DDT (Dichlorodiphenyltrichloroethane (DDT))		1						
US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	DDT (Dichlorodiphenyltrichloroethane (DDT))		1						
US - Alaska Limits for Air Contaminants	DDT (Dichlorodiphenyltrichloroethane (DDT))		1						
US - Michigan Exposure Limits for Air Contaminants	DDT (Dichlorodiphenyltrichloroethane(DDT))		1						
US - Hawaii Air Contaminant Limits	DDT (DDT (Dichlorodiphenyltrichloroethane))		1		3				
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	DDT (DDT (Dichlorodiphenyltrichloroethane))	-	1	-	3				
US - Washington Permissible exposure limits of air contaminants	DDT (DDT (Dichlorodiphenyltrichloroethane))		1		3				

Canada - Northwest Territories

Canada - Northwest Territories Occupational Exposure Limits (English)	DDT (DDT (Dichlorodiphenyltrichloroethane))	1	3	
US ACGIH Threshold Limit Values (TLV)	DDT (DDT [Dichlorodiphenyltrichloroethane])	1		TLV Basis: liver damage
US NIOSH Recommended Exposure Limits (RELs)	DDT	0.5		
US OSHA Permissible Exposure Levels (PELs) - Table Z1	DDT (Dichlorodiphenyltrichloroethane (DDT))	1		
Canada - Nova Scotia Occupational Exposure Limits	DDT (DDT [Dichlorodiphenyltrichloroethane])	1		TLV Basis: liver damage
Canada - Prince Edward Island Occupational Exposure Limits	DDT (DDT [Dichlorodiphenyltrichloroethane])	1		TLV Basis: liver damage
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	DDT (Diesel fuel as total hydrocarbons, (vapour))	100	150	Skin
Canada - Alberta Occupational Exposure Limits	DDT (Diesel fuel, as total hydrocarbons)	100		
Canada - Alberta Occupational Exposure Limits	DDT (Kerosene/Jet fuels, as total hydrocarbon vapour)	200		
Canada - Alberta Occupational Exposure Limits	DDT (DDT (Dichlorodiphenyl trichloroethane))	1		
Canada - British Columbia Occupational Exposure Limits	DDT (DDT (Dichloro-diphenyltrichloroethane))	1		2B
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	DDT (DDT (Dichlorodiphenyltrichloroethane))	1	3	T20
US - Oregon Permissible Exposure Limits (Z1)	DDT (Dichlorodiphenyltrichloroethane (DDT))	1		
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	DDT (DDT (Dichlorodiphenyltrichloroethane))	1		
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	DDT (Dichlorodiphenyltrichloroethane (DDT))	1		
Canada - British Columbia Occupational Exposure Limits	DDT (Diesel fuel, as total hydrocarbons, Inhalable)	100 (V)		Skin

#### EMERGENCY EXPOSURE LIMITS

Material	Revised IDLH Value (mg/m3)	Revised IDLH Value (ppm)
DDT	500	

#### MATERIAL DATA

DDT:

■ for DDT:

The TLV-TWA is thought to provide a wide margin of safety in the prevention of acute poisoning and also is thought to be protective against the significant risk of accumulation in body stores.

Established occupational exposure limits frequently do not take into consideration reproductive end points that are clearly below the thresholds for other toxic effects. Occupational reproductive guidelines (ORGs) have been suggested as an additional standard. These have been established after a literature search for reproductive no-observed-adverse effect-level (NOAEL) and the lowest-observed-adverse-effect-level (LOAEL). In addition the US EPA's procedures for risk assessment for hazard identification and dose-response assessment as applied by NIOSH were used in the creation of such limits. Uncertainty factors (UFs) have also been incorporated.

#### PERSONAL PROTECTION



Consult your EHS staff for recommendations

#### EYE

- 
- Safety glasses with side shields
- Chemical goggles.
- Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them.

## HANDS/FEET

- Wear chemical protective gloves, eg. PVC.

Wear safety footwear or safety gumboots, eg. Rubber.

Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include: such as:

- frequency and duration of contact,
- chemical resistance of glove material,
- glove thickness and
- dexterity

Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739).

- When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374) is recommended.
- When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374) is recommended.
- Contaminated gloves should be replaced.

Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.

## OTHER

- 
- Overalls.
- Eyewash unit.
- Barrier cream.
- Skin cleansing cream.
- 
- Respirators may be necessary when engineering and administrative controls do not adequately prevent exposures.
- The decision to use respiratory protection should be based on professional judgment that takes into account toxicity information, exposure measurement data, and frequency and likelihood of the worker's exposure - ensure users are not subject to high thermal loads which may result in heat stress or distress due to personal protective equipment (powered, positive flow, full face apparatus may be an option).
- Published occupational exposure limits, where they exist, will assist in determining the adequacy of the selected respiratory. These may be government mandated or vendor recommended.
- Certified respirators will be useful for protecting workers from inhalation of particulates when properly selected and fit tested as part of a complete respiratory protection program.
- Use approved positive flow mask if significant quantities of dust becomes airborne.
- Try to avoid creating dust conditions.

## RESPIRATOR

Protection Factor	Half-Face Respirator	Full-Face Respirator	Powered Air Respirator
10 x PEL	P1 Air-line*	-	PAPR-P1
50 x PEL	Air-line**	P2	PAPR-P2
100 x PEL	-	P3 Air-line*	-
100+ x PEL	-	Air-line**	PAPR-P3

\* - Negative pressure demand \*\* - Continuous flow

Explanation of Respirator Codes:

Class 1 low to medium absorption capacity filters.

Class 2 medium absorption capacity filters.

Class 3 high absorption capacity filters.

PAPR Powered Air Purifying Respirator (positive pressure) cartridge.

Type A for use against certain organic gases and vapors.

Type AX for use against low boiling point organic compounds (less than 65°C).

Type B for use against certain inorganic gases and other acid gases and vapors.

Type E for use against sulfur dioxide and other acid gases and vapors.

Type K for use against ammonia and organic ammonia derivatives

Class P1 intended for use against mechanically generated particulates of sizes most commonly encountered in industry, e.g. asbestos, silica.

Class P2 intended for use against both mechanically and thermally generated particulates, e.g. metal fume.

Class P3 intended for use against all particulates containing highly toxic materials, e.g. beryllium.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required.

Use appropriate NIOSH-certified respirator based on informed professional judgement. In conditions where no reasonable estimate of exposure can be made, assume the exposure is in a concentration IDLH and use NIOSH-certified full face pressure demand SCBA with a minimum service life of 30 minutes, or a combination full facepiece pressure demand SAR with auxiliary self-contained air supply. Respirators provided only for escape from IDLH atmospheres shall be NIOSH-certified for escape from the atmosphere in which they will be used.

## ENGINEERING CONTROLS

- 
- Local exhaust ventilation is required where solids are handled as powders or crystals; even when particulates are relatively large, a certain proportion will be powdered by mutual friction.
- Exhaust ventilation should be designed to prevent accumulation and recirculation of particulates in the workplace.
- If in spite of local exhaust an adverse concentration of the substance in air could occur, respiratory protection should be considered. Such protection might consist of:
  - (a): particle dust respirators, if necessary, combined with an absorption cartridge;
  - (b): filter respirators with absorption cartridge or canister of the right type;
  - (c): fresh-air hoods or masks
- Build-up of electrostatic charge on the dust particle, may be prevented by bonding and grounding.

- Powder handling equipment such as dust collectors, dryers and mills may require additional protection measures such as explosion venting.

Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to efficiently remove the contaminant.

Type of Contaminant:	Air Speed:
direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)	1-2.5 m/s (200-500 f/min.)

grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).	2.5-10 m/s (500-2000 f/min.)
--	------------------------------

Within each range the appropriate value depends on:

Lower end of the range	Upper end of the range
1: Room air currents minimal or favorable to capture	1: Disturbing room air currents
2: Contaminants of low toxicity or of nuisance value only	2: Contaminants of high toxicity
3: Intermittent, low production.	3: High production, heavy use
4: Large hood or large air mass in motion	4: Small hood-local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 4-10 m/s (800-2000 f/min) for extraction of crusher dusts generated 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

## Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

### PHYSICAL PROPERTIES

Solid.

Does not mix with water.

State	Divided solid	Molecular Weight	354.48
Melting Range (°F)	227.3	Viscosity	Not Applicable
Boiling Range (°F)	Not available	Solubility in water (g/L)	Immiscible
Flash Point (°F)	Not Available	pH (1% solution)	Not applicable
Decomposition Temp (°F)	Not Available	pH (as supplied)	Not applicable
Autoignition Temp (°F)	Not available	Vapour Pressure (mmHG)	Not applicable
Upper Explosive Limit (%)	Not Available	Specific Gravity (water=1)	Not available
Lower Explosive Limit (%)	Not Available	Relative Vapor Density (air=1)	Not Applicable
Volatile Component (%vol)	Not applicable	Evaporation Rate	Not applicable
Gas group	IIA		

### APPEARANCE

Colourless crystals or white to slightly off-white powder. Odourless or with slight aromatic odour. Insoluble in water; soluble in acetone, benzene, carbon tetrachloride, ether, kerosene, dioxane and pyridine. Since DDT is not biodegradable and is ecologically damaging, its agricultural use in the USA was prohibited in 1973.

## Section 10 - CHEMICAL STABILITY

### CONDITIONS CONTRIBUTING TO INSTABILITY

- 
- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerization will not occur.

### STORAGE INCOMPATIBILITY

- - Avoid strong bases.
- Avoid reaction with oxidizing agents.

For incompatible materials - refer to Section 7 - Handling and Storage.

## Section 11 - TOXICOLOGICAL INFORMATION

DDT

### TOXICITY AND IRRITATION

- unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

TOXICITY	IRRITATION
Oral (rat) LD50: 87 mg/kg	Nil Reported

Oral (human infant) LDLo: 150 mg/kg

Oral (man) TDLo: 6 mg/kg

Oral (human) TDLo: 16 mg/kg

Oral (human) LDLo: 500 mg/kg

Oral (human) TDLo: 5 mg/kg

Dermal (rat) LD50: 1931 mg/kg

Dermal (rabbit) LD50: 300 mg/kg

#### ■ For DDT:

DDT is moderately to slightly toxic to studied mammalian species via the oral route. Toxicity will vary according to formulation. DDT is readily absorbed through the gastrointestinal tract, with increased absorption in the presence of fats.

One-time administration of DDT to rats at doses of 50 mg/kg led to decreased thyroid function and a single dose of 150 mg/kg led to increased blood levels of liver-produced enzymes and changes in the cellular chemistry in the central nervous system of monkeys. Single doses of 50-160 mg/kg produced tremors in rats, and single doses of 160 mg/kg produced hind leg paralysis in guinea pigs. Mice suffered convulsions following a one-time oral dose of 200 mg/kg. Single administrations of low doses to developing 10-day old mice are reported to have caused subtle effects on their neurological development.

DDT is slightly to practically non-toxic to test animals via the dermal route. It is not readily absorbed through the skin unless it is in solution.

It is thought that inhalation exposure to DDT will not result in significant absorption through the lung alveoli (tiny gas-exchange sacs) but rather that it is probably trapped in mucous secretions and swallowed by exposed individuals following the tracheo-bronchial clearance of secretions by the cilia.

Acute effects likely in humans due to low to moderate exposure may include nausea, diarrhoea, increased liver enzyme activity, irritation (of the eyes, nose or throat), disturbed gait, malaise and excitability; at higher doses, tremors and convulsions are possible. While adults appear to tolerate moderate to high ingested doses of up to 280 mg/kg, a case of fatal poisoning was seen in a child who ingested one ounce of a 5% DDT:kerosene solution.

Chronic toxicity: DDT has caused chronic effects on the nervous system, liver, kidneys, and immune systems in experimental animals. Effects on the nervous system observed in test animals include: tremors in rats at doses of 16-32 mg/kg/day over 26 weeks; tremors in mice at doses of 6.5-13 mg/kg/day over 80-140 weeks; changes in cellular chemistry in the central nervous system of monkeys at doses of 10 mg/kg/day over 100 days, and loss of equilibrium in monkeys at doses of 50 mg/kg/day for up to 6 months.

The main effect on the liver seen in animal studies was localized liver damage. This effect was seen in rats given 3.75 mg/kg/day over 36 weeks, rats exposed to 5 mg/kg/day over 2 years and dogs at doses of 80 mg/kg/day over the course of 39 months. In many cases lower doses produced subtle changes in liver cell physiology, and in some cases higher doses produced more severe effects. In mice doses of 8.33 mg/kg/day over 28 days caused increased liver weight and increased liver enzyme activity. Liver enzymes are commonly involved in detoxification of foreign compounds, so it is unclear whether increased liver enzyme activity in itself would constitute an adverse effect. In some species (monkeys and hamsters), doses as high as 8-20 mg/kg/day caused no observed adverse effects over exposure periods as long as 3.5-7 years.

Kidney effects observed in animal studies include adrenal gland hemorrhage in dogs at doses of 138.5 mg/kg/day over 10 days and adrenal gland damage at 50 mg/kg/day over 150 days in dogs. Kidney damage was also seen in rats at doses of 10 mg/kg/day over 27 months.

Immunological effects observed in test animals include: reduced antibody formation in mice following administration of 13 mg/kg/day for 3-12 weeks and reduced levels of immune cells in rats at doses of 1 mg/kg/day. No immune system effects were observed in mice at doses of 6.5 mg/kg/day for 3-12 weeks.

Dose levels at which effects were observed in test animals are very much higher than those which may be typically encountered by humans. Due to the persistence of DDT and its metabolites in the environment, very low levels may continue to be detected in foodstuffs grown in some areas of prior use. It has been suggested that, depending on patterns of international DDT use and trade, it is possible that dietary exposure levels may actually increase over time. Persons eating fish contaminated with DDT or metabolites may also be exposed via bioaccumulation of the compound in fish.

Even though current dietary levels are quite low, past and current exposures may result in measurable body burdens due to its persistence in the body. More information on the metabolism and storage of DDT and its metabolites in mammalian systems is provided below (Fate in Humans and Animals).

Adverse effects on the liver, kidney and immune system due to DDT exposure have not been demonstrated in humans in any of the studies which have been conducted to date.

Reproductive Effects: There is evidence that DDT causes reproductive effects in test animals. No reproductive effects were observed in rats at doses of 38 mg/kg/day administered at days 15-19 of gestation. In another study in rats, oral doses of 7.5 mg/kg/day for 36 weeks resulted in sterility. In rabbits, doses of 1 mg/kg/day administered on gestation days 4-7 resulted in decreased fetal weights and 10 mg/kg/day on days 7-9 of gestation resulted in increased resorptions. In mice, doses of 1.67 mg/kg/day resulted in decreased embryo implantation and irregularities in the estrus cycle over 28 weeks. It is thought that many of these observed effects may be the result of disruptions in the endocrine (hormonal) system.

Available epidemiological evidence from two studies does not indicate that reproductive effects have occurred in humans as a result of DDT exposure. No associations between maternal blood levels of DDT and miscarriage nor premature rupture of fetal membranes were observed in two separate studies. One study did report a significant association between maternal DDT blood levels and miscarriage, but the presence of other organochlorine chemicals (e.g., PCBs) in maternal blood which may have accounted for the effect make it impossible to attribute the effect to DDT and its metabolites.

Teratogenic Effects: There is evidence that DDT causes teratogenic effects in test animals as well. In mice, maternal doses of 26 mg/kg/day DDT from gestation through lactation resulted in impaired learning performance in maze tests. In a two-generational study of rats, 10 mg/kg/day resulted in abnormal tail development. Epidemiological evidence regarding the occurrence of teratogenic effects as a result of DDT exposure are unavailable. It seems unlikely that teratogenic effects will occur in humans due to DDT at likely exposure levels.

Mutagenic Effects: The evidence for mutagenicity and genotoxicity is contradictory. In only 1 out of 11 mutagenicity assays in various cell cultures and organisms did DDT show positive results. Results of in vitro and in vivo genotoxicity assays for chromosomal aberrations indicated that DDT was genotoxic in 8 out of 12 cases, and weakly genotoxic in 1 case.

In humans, blood cell cultures of men occupationally exposed to DDT showed an increase in chromosomal damage. In a separate study, significant increases in chromosomal damage were reported in workers who had direct and indirect occupational exposure to DDT. Thus it appears that DDT may have the potential to cause genotoxic effects in humans, but does not appear to be strongly mutagenic. It is unclear whether these effects may occur at exposure levels likely to be encountered by most people.

Carcinogenic Effects: The evidence regarding the carcinogenicity of DDT is equivocal. It has been shown to cause increased tumor production (mainly in the liver and lung) in test animals such as rats, mice and hamsters in some studies but not in others. In rats, liver tumors were induced in three separate studies at doses of 12.5 mg/kg/day over periods of 78 weeks to life, and thyroid tumors were induced at doses of 85 mg/kg/day over 78 weeks. In mice, lifetime doses of 0.4 mg/kg/day resulted in lung tumors in the second generation and leukemia in the third generation; liver tumors were induced at oral doses of 0.26 mg/kg/day in two separate studies over several generations. In hamsters, significant increases in adrenal gland tumors were

seen at doses of 83 mg/kg/day in females (but not males) , and in males (but not females) at doses of 40 mg/kg/day. In other studies, however, no carcinogenic activity was observed in rats at doses less than 25 mg/kg/day; no carcinogenic activity was seen in mice with at doses of 3-23 mg/kg/day over an unspecified period, and in other hamster studies there have been no indications of carcinogenic effects.

The available epidemiological evidence regarding DDT's carcinogenicity in humans, when taken as a whole, does not suggest that DDT and its metabolites are carcinogenic in humans at likely dose levels. In several epidemiological studies, no significant associations were seen between DDT exposure and disease, but in one other study, a weak association was observed. In this latter study, which found a significant association between long-term, high DDT exposures and pancreatic cancers in chemical workers, there were questions raised as to the reliability of the medical records of a large proportion of the cancer cases.

Organ Toxicity: Acute human exposure data and animal studies reveal that DDT can affect the nervous system, liver, kidney. Increased tumor production in the liver and lung has been observed in test animals. An association with pancreatic cancer was suggested in humans in one study.

Fate in Humans & Animals: DDT is very slowly transformed in animal systems. Initial degradates in mammalian systems are 1,1-dichloro-2,2-bis(p-dichlorodiphenyl)ethylene (DDE) and 1,1-dichloro-2,2-bis(p-chlorophenyl)ethane (DDD), which are very readily stored in fatty tissues. These compounds in turn are ultimately transformed into bis(dichlorodiphenyl) acetic acid (DDA) via other metabolites at a very slow rate. DDA, or conjugates of DDA, are readily excreted via the urine.

Levels of DDT or metabolites may occur in fatty tissues (e.g. fat cells, the brain, etc.) at levels of up to several hundred times that seen in the blood. DDT or metabolites may also be eliminated via mother's milk by lactating women.

WARNING: This substance has been classified by the IARC as Group 2B: Possibly Carcinogenic to Humans.

ADI: 0.002 mg/kg/day

NOEL: 0.25 mg/kg/day

## CARCINOGEN

DDT [p,p'-DDT]	International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs	Group	2B
Non-arsenical insecticides (occupational exposures in spraying and application of)	International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs	Group	2A
p,p'-Dichlorodiphenyltrichloroethane (DDT)	US EPA Carcinogens Listing	Carcinogenicity	B2
p,p'-Dichlorodiphenyltrichloroethane (DDT)	US ACGIH Threshold Limit Values (TLV) - Carcinogens	Carcinogen Category	B2
DDT [Dichlorodiphenyltrichloroethane]	US ACGIH Threshold Limit Values (TLV) - Carcinogens	Carcinogen Category	A3
DDT	US Environmental Defense Scorecard Recognized Carcinogens	Reference(s)	P65
DDT (TOTAL)	US Environmental Defense Scorecard Recognized Carcinogens	Reference(s)	P65-MC
DDT	US Environmental Defense Scorecard Suspected Carcinogens	Reference(s)	P65
DDT (TOTAL)	US Environmental Defense Scorecard Suspected Carcinogens	Reference(s)	P65-MC
DDT [Dichlorodiphenyltrichloroethane]	US NIOSH Recommended Exposure Limits (RELs) - Carcinogens	Carcinogen	Ca

## SKIN

DDT Canada - Ontario Occupational Exposure Limits - Skin	Notes	Skin
DDT US AIHA Workplace Environmental Exposure Levels (WEELs) - Skin	Notes	Skin
DDT Canada - Quebec Permissible Exposure Values for Airborne Contaminants - Skin (French)	Notes	Skin
DDT US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants - Skin	Skin Designation	X
DDT US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants - Skin	Skin Designation	X
DDT US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants - Skin	Skin Designation	X
DDT US - Washington Permissible exposure limits of air contaminants - Skin	Skin	X
DDT Canada - British Columbia Occupational Exposure Limits - Skin	Notation	Skin
DDT US - Minnesota Permissible Exposure Limits (PELs) - Skin	Skin Designation	X
DDT US - Hawaii Air Contaminant Limits - Skin Designation	Skin Designation	X
DDT ND	Skin Designation	X
DDT US OSHA Permissible Exposure Levels (PELs) - Skin	Skin Designation	X
DDT US - California Permissible Exposure Limits for Chemical Contaminants - Skin	Skin	X
DDT US - California Permissible Exposure Limits for Chemical Contaminants - Skin	Skin	S
DDT Canada - Alberta Occupational Exposure Limits - Skin	Substance Interaction	1

## Section 12 - ECOLOGICAL INFORMATION

Refer to data for ingredients, which follows:

DDT:

■ Daphnia magna EC50 (48hr.) (mg/l):	0.002- 0.00
■ Half- life Soil - High (hours):	1.40E+05
■ Half- life Soil - Low (hours):	17520

■ Half- life Air - High (hours):	177
■ Half- life Air - Low (hours):	17.7
■ Half- life Surface water - High (hours):	8400
■ Half- life Surface water - Low (hours):	168
■ Half- life Ground water - High (hours):	2.70E+05
■ Half- life Ground water - Low (hours):	384
■ Aqueous biodegradation - Aerobic - High (hours):	1.37E+05
■ Aqueous biodegradation - Aerobic - Low (hours):	17520
■ Aqueous biodegradation - Anaerobic - High (hours):	2400
■ Aqueous biodegradation - Anaerobic - Low (hours):	384
■ Aqueous biodegradation - Removal secondary treatment - High (hours):	100%
■ Photolysis maximum light absorption - High (nano- m):	<282
■ Photooxidation half- life water - High (hours):	8400
■ Photooxidation half- life water - Low (hours):	168
■ Photooxidation half- life air - High (hours):	177
■ Photooxidation half- life air - Low (hours):	17.7
■ First order hydrolysis half- life (hours):	1.94E+05

■ Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

■ Do NOT allow product to come in contact with surface waters or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment wash-waters.

Wastes resulting from use of the product must be disposed of on site or at approved waste sites.

■ For DDT

log Kow : 6.19

Half-life (hr) air: 170

Half-life (hr) H<sub>2</sub>O surface water: 5500

Half-life (hr) soil: 17000

BCF : 12000-40000

Environmental fate:

Breakdown in Soil and Groundwater: DDT is very highly persistent in the environment, with a reported half life of between 2-15 years and is immobile in most soils. Routes of loss and degradation include runoff, volatilization, photolysis and biodegradation (aerobic and anaerobic). These processes generally occur only very slowly. Breakdown products in the soil environment are DDE and DDD, which are also highly persistent and have similar chemical and physical properties.

Due to its extremely low solubility in water, DDT will be retained to a greater degree by soils and soil fractions with higher proportions of soil organic matter. It may accumulate in the top soil layer in situations where heavy applications are (or were) made annually; e.g., for apples. Generally DDT is tightly sorbed by soil organic matter, but it (along with its metabolites) has been detected in many locations in soil and groundwater where it may be available to organisms. This is probably due to its high persistence; although it is immobile or only very slightly mobile, over very long periods of time it may be able to eventually leach into groundwater, especially in soils with little soil organic matter.

Residues at the surface of the soil are much more likely to be broken down or otherwise dissipated than those below several inches. Studies in Arizona have shown that volatilization losses may be significant and rapid in soils with very low organic matter content (desert soils) and high irradiance of sunlight, with volatilization losses reported as high as 50% in 5 months. In other soils (Hood River and Medford) this rate may be as low as 17- 18% over 5 years. Volatilisation loss will vary with the amount of DDT applied, proportion of soil organic matter, proximity to soil-air interface and the amount of sunlight.

Breakdown of Chemical in Surface Water: DDT may reach surface waters primarily by runoff, atmospheric transport, drift, or by direct application (e.g. to control mosquito-borne malaria). The reported half-life for DDT in the water environment is 56 days in lake water and approximately 28 days in river water. The main pathways for loss are volatilization, photodegradation, adsorption to water-borne particulates and sedimentation. Aquatic organisms, as noted above, also readily take up and store DDT and its metabolites. Field and laboratory studies in the United Kingdom demonstrated that very little breakdown of DDT occurred in estuary sediments over the course of 46 days.

Breakdown of Chemical in Vegetation: DDT does not appear to be taken up or stored by plants to a great extent. It was not translocated into alfalfa or soybean plants, and only trace amounts of DDT or its metabolites were observed in carrots, radishes and turnips all grown in DDT-treated soils. Some accumulation was reported in grain, maize and rice-plants, but little translocation occurred and residues were located primarily in the roots.

Ecotoxicity:

Effects on Birds:

Bird dietary LD<sub>50</sub>: mallard duck 2240 mg/kg, Japanese quail 841 mg/kg, pheasant 1334 mg/kg

Reported dietary LD<sub>50</sub>s in such species as bobwhite quail, California quail, red-winged blackbird, cardinal, house sparrow, blue jay, sandhill crane and clapper rail also indicate slight toxicity both in acute 5-day trials and over longer periods of up to 100 days. In birds, exposure to DDT occurs mainly through the food web through predation on aquatic and/or terrestrial species having body burdens of DDT, such as fish, earthworms and other birds.

There has been much concern over chronic exposure of bird species to DDT and effects on reproduction, especially eggshell thinning and embryo deaths. The mechanisms of eggshell thinning are not fully understood. It is thought that this may occur from the major metabolite, DDE, and that predator species of birds are the most sensitive to these effects. Laboratory studies on bird reproduction have demonstrated the potential of DDT and DDE to cause subtle effects on courtship behavior, delays in pairing and egg laying and decreases in egg weight in ring doves and Bengalese finches. The implications of these for long-term survival and reproduction of wild bird species is unclear.

There is evidence that synergism may be possible between DDT's metabolites and organophosphate (cholinesterase-inhibiting) pesticides to produce greater toxicity to the nervous system and higher mortality. Aroclor (polychlorinated biphenyls, or PCBs) may result in additive effects on eggshell thinning.

Effects on Aquatic Species

Fish LC<sub>50</sub> (96 h): coho salmon 4 ug/l, rainbow trout 8.7 ug/l, northern pike 2.7 ug/l, black bullhead 4.8 ug/l, bluegill sunfish 8.6 ug/l, largemouth bass 1.5 ug/l, walleye 2.9 ug/l, fathead minnow 21.5 ug/l, channel catfish 12.2 ug/l, largemouth bass 1.5 ug/l, guppy 56 ug/l

DDT is very highly toxic to many aquatic invertebrate species. Reported 96-hour LC<sub>50</sub>s in various aquatic invertebrates (e.g., stoneflies, midges, crayfish, sow bugs) range from 0.18 ug/L to 7.0 ug/L, and 48-hour LC<sub>50</sub>s are 4.7 ug/L for daphnids and 15 ug/L for sea shrimp. Other reported 96-hour LC<sub>50</sub>s for various aquatic invertebrate species are from 1.8 ug/L to 54 ug/L. Early developmental stages are more susceptible than adults to DDT's effects. The reversibility of some effects, as well as the

development of some resistance, may be possible in some aquatic invertebrates . DDT is very highly toxic to fish species as well. . Observed toxicity in coho and chinook salmon was greater in smaller fish than in larger . It is reported that DDT levels of 1 ng/L were sufficient to affect the hatching of coho salmon eggs DDT may be moderately toxic to some amphibian species and larval stages are probably more susceptible than adults In addition to acute toxic effects, DDT may bioaccumulate significantly in fish and other aquatic species, leading to long-term exposure. This occurs mainly through uptake from sediment and water into aquatic flora and fauna, and also fish . Fish uptake of DDT from the water will be size-dependent with smaller fish taking up relatively more than larger fish . A half- time for elimination of DDT from rainbow trout was estimated to be 160 days .

The reported bioconcentration factor for DDT is 1,000 to 1,000,000 in various aquatic species, and bioaccumulation may occur in some species at very low environmental concentrations . Bioaccumulation may also result in exposure to species which prey on fish or other aquatic organisms (e.g., birds of prey).

Effects on Other Animals (Nontarget species)

Earthworms are not susceptible to acute effects of DDT and its metabolites at levels higher than those likely to be found in the environment, but they may serve as an exposure source to species that feed on them. DDT is non-toxic to bees; the reported topical LD50 for DDT in honeybees is 27 ug/bee . Laboratory studies indicate that bats may be affected by DDT released from stored body fat during long migratory periods.

■ Outbreaks of poisoning from food contaminated with organochlorines are characterized by headache, nausea, vomiting, restlessness, irritability, vertigo, muscle twitching, confusion, stupor, coma and convulsions.

The organochlorine pesticides are highly soluble in lipids and most organic solvents but have low water solubilities and low vapor pressure.

Adsorption in various soils depends strongly on the presence of soil organic matter. Once adsorbed they do not readily desorb. Such compounds do not as a consequence leach or diffuse in soils and transport to the hydrosphere from contaminated soils will be largely as a result of the erosion of soil particles or sediments, rather than by desorption and dissolution.

When organochlorines are poorly adsorbed, as in sandy soils, vaporization losses are significant. Volatilization from water or soil may also occur.

The actual evaporation rate depends on factors such as temperature, soil properties, soil water content and other physicochemical properties such as water solubility and degree of adsorption. The importance of soil moisture in volatilization led to the use of the term "co-distillation".

The effect observed in soil however is more accurately described as displacement of the sorbed pesticides by water molecules. As a result compounds which otherwise possess low water solubility are quite volatile from water.

Degradation of the organochlorines is slow compared to other classes of insecticide and in soil and water is due mainly to the action of micro- organisms. Pathways include dechlorination and dehydrochlorination. Oxidation is only moderately important. Epoxidations and rearrangements are common amongst the cyclodiene pesticides. These rearrangement reactions produce complicated "cage-like" structures that are toxic.

Bioaccumulation of the some organochlorines (notably DDT and dieldrin) are higher in aquatic ecosystems than in terrestrial ecosystems. Physicochemical properties such as high lipid solubility, low water solubility and chemical stability are the most significant factors behind such bioaccumulation.

The effects of bioaccumulation are manifest at the top of the food chain where, for example, predatory fish and birds, suffer from acute and chronic toxicity and reproductive failures. Effects may range from obvious toxicity to subtle behavioral changes. Evidence exists that the population effects are reversible with time.

■ DO NOT discharge into sewer or waterways.

■ The material is classified as an ecotoxin\* because the Fish LC50 (96 hours) is less than or equal to 0.1 mg/l

\* Classification of Substances as Ecotoxic (Dangerous to the Environment)

Appendix 8, Table 1

Compiler's Guide for the Preparation of International Chemical Safety Cards: 1993 Commission of the European Communities.

### Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
DDT	HIGH	HIGH	HIGH	LOW

## Section 13 - DISPOSAL CONSIDERATIONS

### US EPA Waste Number & Descriptions

#### B. Component Waste Numbers

When DDT is present as a solid waste as a discarded commercial chemical product, off-specification species, as a container residue, or a spill residue, use EPA waste number U061 (waste code T).

#### Disposal Instructions

All waste must be handled in accordance with local, state and federal regulations.

! Puncture containers to prevent re-use and bury at an authorized landfill.

Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.

A Hierarchy of Controls seems to be common - the user should investigate:

- Reduction
- Reuse
- Recycling
- Disposal (if all else fails)

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.

DO NOT allow wash water from cleaning equipment to enter drains. Collect all wash water for treatment before disposal.

- Recycle wherever possible.
- Consult manufacturer for recycling options or consult Waste Management Authority for disposal if no suitable treatment or disposal facility can be identified.
- Dispose of by: Burial in a licensed land-fill or Incineration in a licensed apparatus (after admixture with suitable combustible material)
- Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.

## Section 14 - TRANSPORTATION INFORMATION



DOT:

Symbols:	None	Hazard class or Division:	6.1
Identification Numbers:	UN2761	PG:	III
Label Codes:	6.1	Special provisions:	IB8, IP3, T1, TP33
Packaging: Exceptions:	153	Packaging: Non-bulk:	213
Packaging: Exceptions:	153	Quantity limitations: Passenger aircraft/rail:	100 kg
Quantity Limitations: Cargo aircraft only:	200 kg	Vessel stowage: Location:	A
Vessel stowage: Other:	40	S.M.P.:	Severe

Hazardous materials descriptions and proper shipping names:

Organochlorine pesticides, solid, toxic

#### Air Transport IATA:

ICAO/IATA Class:	6.1	ICAO/IATA Subrisk:	None
UN/ID Number:	2761	Packing Group:	III
Special provisions:	A3		

Shipping Name: ORGANOCHLORINE PESTICIDE, SOLID, TOXIC \*(CONTAINS DDT)

#### Maritime Transport IMDG:

IMDG Class:	6.1	IMDG Subrisk:	None
UN Number:	2761	Packing Group:	III
EMS Number:	F-A,S-A	Special provisions:	61 223 274 944

Limited Quantities: 5 kg

Shipping Name: ORGANOCHLORINE PESTICIDE, SOLID, TOXIC(contains DDT)

## Section 15 - REGULATORY INFORMATION

### DDT (CAS: 50-29-3) is found on the following regulatory lists;

"Canada - Northwest Territories Occupational Exposure Limits (English)", "Canada - Nova Scotia Occupational Exposure Limits", "Canada - Ontario Occupational Exposure Limits", "Canada - Prince Edward Island Occupational Exposure Limits", "Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances", "Canada Domestic Substances List (DSL)", "Canada Environmental Protection Act (CEPA) 1999 - Schedule 1 Toxic Substances List", "Canada Environmental Protection Act (CEPA) 1999 - Schedule 3 Export Control List - Part 2 Substances Subject to Notification or Consent", "Canada Environmental Quality Guidelines (EQGs) Water: Aquatic life", "Canada Prohibited Toxic Substances (English)", "International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs", "OECD Representative List of High Production Volume (HPV) Chemicals", "OSPAR List of Substances of Possible Concern", "United Nations List of Prior Informed Consent Chemicals - French", "United Nations List of Prior Informed Consent Chemicals - Spanish", "United Nations List of Prior Informed Consent Chemicals (English)", "US - Alaska Limits for Air Contaminants", "US - California Air Toxics ""Hot Spots"" List (Assembly Bill 2588) Substances for which production, use or other presence must be reported", "US - California Environmental Health Standards for the Management of Hazardous Waste - List of Organic Persistent and Bioaccumulative Toxic Substances and Their STLC & TTLC Values", "US - California Occupational Safety and Health Regulations (CAL/OSHA) - Hazardous Substances List", "US - California Permissible Exposure Limits for Chemical Contaminants", "US - California Proposition 65 - Priority List for the Development of MADLs for Chemicals Causing Reproductive Toxicity", "US - California Proposition 65 - Reproductive Toxicity", "US - Connecticut Hazardous Air Pollutants", "US - Hawaii Air Contaminant Limits", "US - Idaho - Limits for Air Contaminants", "US - Massachusetts Oil & Hazardous Material List", "US - Michigan Exposure Limits for Air Contaminants", "US - Minnesota Hazardous Substance List", "US - Minnesota Permissible Exposure Limits (PELs)", "US - New Jersey Right to Know Hazardous Substances", "US - Pennsylvania - Hazardous Substance List", "US - Rhode Island Hazardous Substance List", "US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants", "US - Vermont Hazardous Constituents", "US - Vermont Hazardous wastes which are Discarded Commercial Chemical Products or Off-Specification Batches of Commercial Chemical Products or Spill Residues of Either", "US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants", "US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants", "US - Washington Class A toxic air pollutants: Known and Probable Carcinogens", "US - Washington Dangerous waste constituents list", "US - Washington Discarded Chemical Products List - ""U"" Chemical Products", "US - Washington Permissible exposure limits of air contaminants", "US ACGIH Threshold Limit Values (TLV)", "US ACGIH Threshold Limit Values (TLV) - Carcinogens", "US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)", "US CERCLA Priority List of Hazardous Substances", "US CERCLA Top 20 Priority List of Hazardous Substances", "US CWA (Clean Water Act) - List of Hazardous Substances", "US CWA (Clean Water Act) - Priority Pollutants", "US CWA (Clean Water Act) - Reportable Quantities of Designated Hazardous Substances", "US Department of Transportation (DOT) List of Hazardous Substances and Reportable Quantities - Hazardous Substances Other Than Radionuclides", "US DOE Temporary Emergency Exposure Limits (TEELs)", "US EPA Carcinogens Listing", "US EPA National Priorities List - Superfund Chemical Data Matrix (SCDM) - Hazard Ranking System - Hazardous Substance Benchmarks", "US National Toxicology Program (NTP) 11th Report Part B. Reasonably Anticipated to be a Human Carcinogen", "US NIOSH Recommended Exposure Limits (RELs)", "US OSHA Permissible Exposure Limits (PELs) - Table Z1", "US RCRA (Resource Conservation & Recovery Act) - Appendix IX to Part 264 Ground-Water Monitoring List 1", "US RCRA (Resource Conservation & Recovery Act) - Hazardous Constituents - Appendix VIII to 40 CFR 261", "US RCRA (Resource Conservation & Recovery Act) - List of Hazardous Inorganic and Organic Constituents 1", "US RCRA (Resource Conservation & Recovery Act) - List of Hazardous Wastes", "US RCRA (Resource Conservation & Recovery Act) - Phase 4 LDR Rule - Universal Treatment Standards", "US Toxic Substances Control Act (TSCA) - Inventory", "US TSCA Section 12(b) - List of Chemical Substances Subject to Export Notification Requirements", "US

## Section 16 - OTHER INFORMATION

### LIMITED EVIDENCE

- Inhalation may produce health damage\*.
  - May affect fertility\*.
- \* (limited evidence).

### REPRODUCTIVE HEALTH GUIDELINES

■ Established occupational exposure limits frequently do not take into consideration reproductive end points that are clearly below the thresholds for other toxic effects. Occupational reproductive guidelines (ORGs) have been suggested as an additional standard. These have been established after a literature search for reproductive no-observed-adverse effect-level (NOAEL) and the lowest-observed-adverse-effect-level (LOAEL). In addition the US EPA's procedures for risk assessment for hazard identification and dose-response assessment as applied by NIOSH were used in the creation of such limits. Uncertainty factors (UFs) have also been incorporated.

Ingredient	ORG	UF	Endpoint	CR	Adeq TLV
DDT	0.01 mg/m <sup>3</sup>	1000	R	3	-

■ These exposure guidelines have been derived from a screening level of risk assessment and should not be construed as unequivocally safe limits. ORGS represent an 8-hour time-weighted average unless specified otherwise. CR = Cancer Risk/10000; UF = Uncertainty factor; TLV believed to be adequate to protect reproductive health; LOD: Limit of detection Toxic endpoints have also been identified as: D = Developmental; R = Reproductive; TC = Transplacental carcinogen Jankovic J., Drake F.: A Screening Method for Occupational Reproductive Health Risk: American Industrial Hygiene Association Journal 57: 641-649 (1996).

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■ Classification of the mixture and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

A list of reference resources used to assist the committee may be found at:  
[www.chemwatch.net/references](http://www.chemwatch.net/references).

■ The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

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# MATERIAL SAFETY DATA SHEET

QUAKER STATE® PEAK PERFORMANCE CONVENTIONAL MOTOR OIL - ALL GRADES

## 1. PRODUCT AND COMPANY IDENTIFICATION

MSDS Number: 14938

Version Date: 07/16/02

**Product Name:** QUAKER STATE® PEAK PERFORMANCE CONVENTIONAL MOTOR OIL - ALL GRADES

**Product Use:** Engine oil

**Synonyms:** 5W-30, 10W-30, 10W-40, 20W-50, 15W-40

### Company Information

SOPUS Products  
P.O. Box 4427  
Houston, TX 77210-4427  
USA

### Phone Numbers

**Medical Emergency:** 1-800-546-6040  
**Transportation Emergency (USA):** 1-800-424-9300  
**Transportation Emergency (International):**  
1-703-527-3887 (Call Collect)  
**MSDS Assistance:** 1-800-546-6227  
**Fax On Demand:** 1-800-546-6227  
**Technical Assistance:** 1-800-458-4998  
**Customer Service:** 1-800-468-8397  
**Fax Number:** 713-217-3181  
**Internet Address:** www.MSDS.PZLQS.com

## 2. COMPONENT INFORMATION

Component	CAS No.	Weight Percent Range	Hazardous in Blend
HYDROTREATED HEAVY PARAFFINIC PETROLEUM DISTILLATES	64742-54-7	< 70	No
SOLVENT-DEWAXED HEAVY PARAFFINIC DISTILLATE	64742-65-0	< 70	No
DETERGENT/DISPERSANT	MIXTURE	5 - 10	No
VISCOSITY MODIFIER	9003-29-6	< 10	No
POUR POINT DEPRESSANT	MIXTURE	< 2	No

Under normal conditions of use or in a foreseeable emergency, this product does not meet the definition of a hazardous chemical when evaluated according to the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

**Other:** No information available

## 3. HAZARDS IDENTIFICATION

### Emergency and Hazards Overview

**CAUTION:** Contains Petroleum Lubricant. Repeated skin contact can cause skin disorders.

**ATTENTION:** Used motor oil is a possible skin cancer hazard based on animal data. Repeated exposure to oil mist in excess of the OSHA limit (5mg/m<sup>3</sup>) can result in accumulation of oil droplets in pulmonary tissue.

**NFPA Ratings:** Health 1 Flammability 1 Reactivity 0

**Primary Route of Exposure:** Skin X Inhalation -- Eye X

### Health Effect Information

**Eye Contact:** This product is practically non-irritating to the eyes upon direct contact. Based on testing of similar products and/or components.

**MATERIAL SAFETY DATA SHEET****QUAKER STATE® PEAK PERFORMANCE CONVENTIONAL  
MOTOR OIL - ALL GRADES**

**Skin Contact:** Avoid skin contact. This product is minimally irritating to the skin upon direct contact. Based on testing of similar products and/or components. Prolonged or repeated contact may result in contact dermatitis which is characterized by dryness, chapping, and reddening. Prolonged or repeated contact may result in oil acne which is characterized by blackheads with possible secondary infection. Avoid prolonged and repeated skin contact with used motor oils. See Section 11 - Toxicological Information.

**Inhalation:** This product has a low vapor pressure and is not expected to present an inhalation hazard at ambient conditions. Caution should be taken to prevent aerosolization or misting of this product. On rare occasions, prolonged and repeated exposure to oil mist poses a risk of pulmonary disease such as chronic lung inflammation. Signs of respiratory effects vary with concentration and length of exposure and include nasal discharge, sore throat, coughing, bronchitis, pulmonary edema and difficulty breathing. Shortness of breath and cough are the most common symptoms.

**Ingestion:** Do not ingest. This product is relatively non-toxic by ingestion. This product has laxative properties and may result in abdominal cramps and diarrhea. Exposure to a large single dose, or repeated smaller doses, may lead to lung aspiration, which can lead to lipid pneumonia or chronic lung inflammation. These are low-grade, chronic localized tissue reactions.

**Medical Conditions Aggravated by Exposure:** Drying and chapping may make the skin more susceptible to other irritants, sensitizers and disease.

**Other:** No information available

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**4. FIRST AID INFORMATION**

**Eye Contact:** Immediately flush eyes with large amounts of water and continue flushing until irritation subsides. If material is hot, treat for thermal burns and seek immediate medical attention.

**Skin Contact:** No treatment is necessary under ordinary circumstances. Remove contaminated clothing. Wash contaminated area thoroughly with soap and water. If material is hot, submerge injured area in cold water. If victim is severely burned, remove to a hospital immediately.

**Inhalation:** This material has a low vapor pressure and is not expected to present an inhalation exposure at ambient conditions. If vapor or mist is generated when the material is heated, and the victim experiences signs of respiratory tract irritation, remove to fresh air.

**Ingestion:** No treatment is necessary under ordinary circumstances. Do not induce vomiting. If victim exhibits signs of lung aspiration such as coughing or choking, seek immediate medical assistance.

**Notes to Physician:** No information available

**Other:** No information available

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**5. FIRE AND EXPLOSION INFORMATION****Flammable Properties****Flash Point:** 415 F, 212.8 C**Test Method:** ASTM 3278 - Closed Cup**Flammable Limits in Air****Upper Percent:** No data available**Lower Percent:** No data available**Autoignition Temperature:** No data available**Test Method:** No information available

**NFPA Classification:** Class III-B combustible liquid

**Extinguishing Media:** Use dry chemical, foam, or carbon dioxide.

**MATERIAL SAFETY DATA SHEET**  
**QUAKER STATE® PEAK PERFORMANCE CONVENTIONAL**  
**MOTOR OIL - ALL GRADES**

**Fire Fighting Measures**

**Special Fire Fighting Procedures and Equipment:** Water may be ineffective but can be used to cool containers exposed to heat or flame to prevent vapor pressure buildup and possible container rupture. Caution should be exercised when using water or foam as frothing may occur, especially if sprayed into containers of hot, burning liquid.

**Unusual Fire and Explosion Conditions:** Dense smoke may be generated while burning. Carbon monoxide, carbon dioxide, and other oxides may be generated as products of combustion.

**Hazardous Combustion By-Products:** None

**Other:** No information available

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**6. ACCIDENTAL RELEASE MEASURES**

**Personnel Safeguards:** Consult Health Effect Information in Section 3, Personal Protection Information in Section 8, Fire and Explosion Information in Section 5, and Stability and Reactivity Information in Section 10.

**Regulatory Notifications:** Notify appropriate authorities of spill.

**Containment and Clean up:** Contain spill immediately. Do not allow spill to enter sewers or watercourses. Absorb with appropriate inert material such as sand, clay, etc. Large spills may be picked up using vacuum pumps, shovels, buckets, or other means and placed in drums or other suitable containers.

**Other:** No information available

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**7. HANDLING AND STORAGE INFORMATION**

**Handling:** Fire extinguishers should be kept readily available. See NFPA 30 and OSHA 1910.106-- Flammable and Combustible Liquids.

**Storage:** Do not transfer to unmarked containers. Store in closed containers away from heat, sparks, open flame, or oxidizing materials.

**Empty Container Warnings**

**Drums:** Empty drums should be completely drained, properly bunged and promptly returned to a drum reconditioner, or properly disposed.

**Plastic:** Empty container may retain product residues.

**Other:** No information available

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**8. EXPOSURE CONTROLS / PERSONAL PROTECTION INFORMATION****Exposure Limits and Guidelines**

This product does not contain any components with OSHA or ACGIH exposure limits.

**Personal Protective Equipment**

**Eye/Face Protection:** Eye protection is not required under conditions of normal use. If material is handled such that it could be splashed into eyes, wear plastic face shield or splash-proof safety goggles.

**MATERIAL SAFETY DATA SHEET**

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**Skin Protection:** No skin protection is required for single, short duration exposures. For prolonged or repeated exposures, use impervious clothing (boots, gloves, aprons, etc.) over parts of the body subject to exposure. If handling hot material, use insulated protective clothing (boots, gloves, aprons, etc.). Launder soiled clothes. Properly dispose of contaminated leather articles including shoes, which cannot be decontaminated.

**Respiratory Protection:** Respiratory protection is not required under conditions of normal use. If vapor or mist is generated when the material is heated or handled, use an organic vapor respirator with a dust and mist filter. All respirators must be NIOSH certified. Do not use compressed oxygen in hydrocarbon atmospheres.

**Personal Hygiene:** Consumption of food and beverage should be avoided in work areas where hydrocarbons are present. Always wash hands and face with soap and water before eating, drinking, or smoking.

**Engineering Controls / Work Practices**

**Ventilation:** If vapor or mist is generated when the material is heated or handled, adequate ventilation in accordance with good engineering practice must be provided to maintain concentrations below the specified exposure or flammable limits.

**Other:** The OSHA permissible exposure limit (PEL) and ACGIH threshold limit value (TLV) for oil mist is 5 mg/m<sup>3</sup>. The ACGIH short-term exposure limit (STEL) for oil mist is 10 mg/m<sup>3</sup>.

**9. PHYSICAL AND CHEMICAL PROPERTIES**

<b>Appearance:</b> Amber to dark amber	
<b>Odor:</b> Hydrocarbon - mild	<b>Vapor Pressure:</b> No data available
<b>Physical state:</b> Liquid	<b>Vapor Density (air=1):</b> No data available
<b>pH:</b> No data available	<b>Percent Volatile by Volume:</b> No data available
<b>Boiling Point:</b> No data available	<b>Volatile Organic Content:</b> No data available
<b>Melting Point:</b> No data available	<b>Molecular Weight:</b> No data available
<b>Specific Gravity:</b> 0.88 - 0.9 @ 16 C / 60 F	<b>Average Carbon Number:</b> No data available
<b>Pour Point:</b> -15 F, -26.1 C	<b>Viscosity @ 100 F:</b> No data available
	<b>Viscosity @ 40 C:</b> No data available
<b>Solubility in Water:</b> Negligible in water	
<b>Octanol / Water Coefficient: Log K<sub>ow</sub> =</b> No data available	

**10. STABILITY AND REACTIVITY INFORMATION**

**Chemical Stability:** Stable

**Conditions to Avoid:** High heat and open flames.

**Incompatible Materials to Avoid:** May react with strong oxidizing agents.

**Other:** No information available

**11. TOXICOLOGICAL INFORMATION**

**Primary Eye Irritation:** No information available

**Primary Skin Irritation:** No information available

**Acute Dermal Toxicity:** No information available

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**Subacute Dermal Toxicity:** No information available

**Dermal Sensitization:** No information available

**Inhalation Toxicity:** No information available

**Inhalation Sensitization:** No information available

**Oral Toxicity:** No information available

**Mutagenicity:** No information available

**Carcinogenicity:** The International Agency for Research on Cancer (IARC) has concluded that there is inadequate data to evaluate the carcinogenicity to experimental animals of this class of product. IARC has concluded there is sufficient evidence that used gasoline-engine motor oils produce skin tumors in experimental animals. Also, IARC has determined this class of products belongs to Group 3-"not classifiable as to its carcinogenicity to humans".

**Reproductive and Developmental Toxicity:** No information available

**Teratogenicity:** No information available

**Immunotoxicity:** No information available

**Neurotoxicity:** No information available

**Other:** No information available

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## 12. ECOLOGICAL INFORMATION

**Aquatic Toxicity:** No information available

**Terrestrial Toxicity:** No information available

**Chemical Fate and Transport:** No information available

**Other:** No information available

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## 13. DISPOSAL INFORMATION

**Regulatory Information:** All disposals must comply with federal, state, and local regulations. The material, if spilled or discarded, may be a regulated waste. Refer to state and local regulations. Caution! If regulated solvents are used to clean up spilled material, the resulting waste mixture may be regulated. Department of Transportation (DOT) regulations may apply for transporting this material when spilled.

**Waste Disposal Methods:** Waste material may be landfilled or incinerated at an approved facility. Materials should be recycled if possible.

**Other:** No information available

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**14. TRANSPORTATION INFORMATION****U.S. Department of Transportation (DOT)**

Highway / Rail (Bulk): Not Regulated

Highway / Rail (Non-Bulk): Not Regulated

For US shipments, US DOT law requires the shipper to determine the proper shipping description of the material that is being shipped. The shipping information and description contained in this section may not be suitable for all shipments of this material, but may help the shipper determine the proper shipping description for a particular shipment.

**International Information**

Vessel: IMDG Regulated: -- IMDG Not Regulated: X

Air: ICAO Regulated: -- ICAO Not Regulated: X

Other: No information available

**15. Regulatory Information**

**Regulatory Lists Searched:** The components listed in Section 2 of this MSDS were compared to substances that appear on the following regulatory lists. Each list is numerically identified. See Regulatory Search Results below.

**Health & Safety:** 10 - IARC carcinogen, 11 - NTP carcinogen, 12 - OSHA carcinogen, 15 - ACGIH TLV, 16 - OSHA PEL, 17 - NIOSH exposure limit, 20 - US DOT Appendix A, Hazardous substances, 22 - FDA 21 CFR Total food additives, 23 - NFPA 49 or 325

**Environmental:** 30 - CAA 1990 Hazardous air pollutants, 31 - CAA Ozone depleters, 33 - CAA HON rule, 34 - CAA Toxic substance for accidental release prevention, 35 - CAA Volatile organic compounds (VOC's) in SOCOMI, 41 - CERCLA / SARA Section 302 extremely hazardous substances, 42 - CERCLA / SARA Section 313 emissions reporting, 43 - CWA Hazardous substances, 44 - CWA Priority pollutants, 45 - CWA Toxic pollutants, 46 - EPA Proposed test rule for hazardous air pollutants, 47 - RCRA Basis for listing - Appendix VII, 48 - RCRA waste, 49 - SDWA - (S)MCLs

**International:** 50 - Canada - WHMIS Classification of substance, 54 - Mexico - Drinking water - ecological criteria, 55 - Mexico - Wastewater discharges, 56 - US - TSCA Section (12)(b) - export notification

**State Lists:** 60 - CA - Proposition 65, 61 - FL - Substances, 62 - MI - Critical materials, 63 - MA - RTK, 64 - MA - Extraordinarily hazardous substances, 65 - MN - Hazardous substances, 66 - PA - RTK, 67 - NJ - RTK, 68 - NJ - Environmental hazardous substances, 69 - NJ - Special hazardous substances

**Inventories:** 80 - Canada - Domestic substances, 81 - European - EINECS, 82 - Japan - ENCS, 83 - Korea - Existing and evaluated chemical substances, 84 - US - TSCA, 85 - China Inventory

**Regulatory Search Results:**

HYDROTREATED HEAVY PARAFFINIC PETROLEUM DISTILLATES: 80, 81, 83, 84, 85

SOLVENT-DEWAXED HEAVY PARAFFINIC DISTILLATE: 80, 81, 83, 84, 85

VISCOSITY MODIFIER: 35, 80, 83, 84, 85

**U.S. TSCA Inventory:** All components of this material are on the US TSCA Inventory.

**SARA Section 313:** This product is not known to contain any SARA, Title III, Section 313 Reportable Chemicals at or greater than 1.0% (0.1% for carcinogens).

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**IARC:** No information available

**SARA 311 / 312 Categories**

**Acute:** -- **Chronic:** -- **Fire:** -- **Pressure:** -- **Reactive:** --

**Not Regulated:** X

**Canadian WHMIS Classification**

Not a controlled substance under WHMIS

**European Union Classification**

**Hazard Symbols:**

No classification recommended

**Risk Phrases:**

No classification recommended

**Safety Phrases:**

No classification recommended

**Other:** No information available

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**16. OTHER INFORMATION**

**Health and Environmental Label Language**

**WARNING:** Continuous contact with used gasoline engine oils has caused skin cancer in animal tests.

**ATTENTION:** Prolonged or repeated skin contact may cause oil acne or dermatitis. Repeated exposure to oil mist in excess of the OSHA limit (5mg/m<sup>3</sup>) can result in accumulation of oil droplets in pulmonary tissue.

**Precautionary Measures:** Avoid prolonged or repeated contact with eyes, skin and clothing. Avoid generation and inhalation of oil mists.

**First Aid:** Skin Contact: Wash skin with soap and water. Launder soiled clothes and discard oil-soaked shoes. If irritation persists seek medical attention. Eye Contact: Flush with water. If irritation persists seek medical attention. Ingestion: Do not induce vomiting. In general, no treatment is necessary unless large quantities of product are ingested. If discomfort persists seek medical assistance.

**Instructions in Case of Fire or Spill:** In case of fire, use water fog, foam, dry chemical or carbon dioxide. Water spray may be ineffective, but can be used to cool containers. Do not use a direct stream of water. Material will float and can be reignited on surface of water.

**Spill or Leak:** Dike and contain spill. Do not use water; soak up with absorbent material such as clay, sand or other suitable material. Place in non-leaking container and seal tightly for proper disposal.

**Contains:** highly refined petroleum distillate, mixture; zinc compounds, mixture; polymer additives, mixture.

**KEEP OUT OF REACH OF CHILDREN.** (If intended for retail also)

**MSDS Revisions**

**Previous Version Date:** 06/01/01

**Previous Version Information**

Revised Section 1 - Product Name

**MATERIAL SAFETY DATA SHEET**  
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**MOTOR OIL - ALL GRADES**

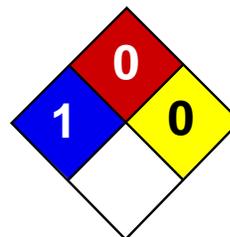
**Other**

No information available

**Prepared By:**

SOPUS Products  
P.O. Box 4427  
Houston, TX 77210-4453 USA

**Disclaimer of Warranty:** The information contained herein is based upon data and information available to us, and reflects our best professional judgment. This product may be formulated in part with components purchased from other companies. In many instances, especially when proprietary or trade secret materials are used, SOPUS Products must rely upon the hazard evaluation of such components submitted by that product's manufacturer or importer. No warranty of merchantability, fitness for any use, or any other warranty is expressed or implied regarding the accuracy of such data or information, the results to be obtained from the use thereof, or that any such use do not infringe any patent. Since the information contained herein may be applied under conditions of use beyond our control and with which we may be unfamiliar, we do not assume responsibility for the results of such application. This information is furnished upon the condition that the person receiving it shall make his own determination of the suitability of the material for his particular use.



Health	1
Fire	0
Reactivity	0
Personal Protection	E

## Material Safety Data Sheet

### Lead MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** Lead

**Catalog Codes:** SLL1291, SLL1669, SLL1081, SLL1459, SLL1834

**CAS#:** 7439-92-1

**RTECS:** OF7525000

**TSCA:** TSCA 8(b) inventory: Lead

**CI#:** Not available.

**Synonym:** Lead Metal, granular; Lead Metal, foil; Lead Metal, sheet; Lead Metal, shot

**Chemical Name:** Lead

**Chemical Formula:** Pb

**Contact Information:**

**Sciencelab.com, Inc.**

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: [ScienceLab.com](http://ScienceLab.com)

**CHEMTREC (24HR Emergency Telephone), call:**

1-800-424-9300

**International CHEMTREC, call:** 1-703-527-3887

**For non-emergency assistance, call:** 1-281-441-4400

#### Section 2: Composition and Information on Ingredients

**Composition:**

Name	CAS #	% by Weight
Lead	7439-92-1	100

**Toxicological Data on Ingredients:** Lead LD50: Not available. LC50: Not available.

#### Section 3: Hazards Identification

**Potential Acute Health Effects:** Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

**Potential Chronic Health Effects:**

Slightly hazardous in case of skin contact (permeator). CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, kidneys, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

#### Section 4: First Aid Measures

**Eye Contact:**

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

**Skin Contact:** Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

**Serious Skin Contact:** Not available.

**Inhalation:**

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

**Serious Inhalation:** Not available.

**Ingestion:**

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

**Serious Ingestion:** Not available.

## Section 5: Fire and Explosion Data

**Flammability of the Product:** May be combustible at high temperature.

**Auto-Ignition Temperature:** Not available.

**Flash Points:** Not available.

**Flammable Limits:** Not available.

**Products of Combustion:** Some metallic oxides.

**Fire Hazards in Presence of Various Substances:** Non-flammable in presence of open flames and sparks, of shocks, of heat.

**Explosion Hazards in Presence of Various Substances:**

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

**Fire Fighting Media and Instructions:**

SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

**Special Remarks on Fire Hazards:** When heated to decomposition it emits highly toxic fumes of lead.

**Special Remarks on Explosion Hazards:** Not available.

## Section 6: Accidental Release Measures

**Small Spill:**

Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

**Large Spill:**

Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

## Section 7: Handling and Storage

**Precautions:**

Keep locked up.. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable

protective clothing. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

**Storage:** Keep container tightly closed. Keep container in a cool, well-ventilated area.

## Section 8: Exposure Controls/Personal Protection

### Engineering Controls:

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

**Personal Protection:** Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

### Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

### Exposure Limits:

TWA: 0.05 (mg/m<sup>3</sup>) from ACGIH (TLV) [United States] TWA: 0.05 (mg/m<sup>3</sup>) from OSHA (PEL) [United States] TWA: 0.03 (mg/m<sup>3</sup>) from NIOSH [United States] TWA: 0.05 (mg/m<sup>3</sup>) [Canada] Consult local authorities for acceptable exposure limits.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Solid. (Metal solid.)

**Odor:** Not available.

**Taste:** Not available.

**Molecular Weight:** 207.21 g/mole

**Color:** Bluish-white. Silvery. Gray

**pH (1% soln/water):** Not applicable.

**Boiling Point:** 1740°C (3164°F)

**Melting Point:** 327.43°C (621.4°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 11.3 (Water = 1)

**Vapor Pressure:** Not applicable.

**Vapor Density:** Not available.

**Volatility:** Not available.

**Odor Threshold:** Not available.

**Water/Oil Dist. Coeff.:** Not available.

**Ionicity (in Water):** Not available.

**Dispersion Properties:** Not available.

**Solubility:** Insoluble in cold water.

## Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Incompatible materials, excess heat

**Incompatibility with various substances:** Reactive with oxidizing agents.

**Corrosivity:** Non-corrosive in presence of glass.

**Special Remarks on Reactivity:**

Can react vigorously with oxidizing materials. Incompatible with sodium carbide, chlorine trifluoride, trioxane + hydrogen peroxide, ammonium nitrate, sodium azide, disodium acetylide, sodium acetylide, hot concentrated nitric acid, hot concentrated hydrochloric acid, hot concentrated sulfuric acid, zirconium.

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** Will not occur.

## Section 11: Toxicological Information

**Routes of Entry:** Absorbed through skin. Inhalation. Ingestion.

**Toxicity to Animals:**

LD50: Not available. LC50: Not available.

**Chronic Effects on Humans:**

CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC. May cause damage to the following organs: blood, kidneys, central nervous system (CNS).

**Other Toxic Effects on Humans:** Slightly hazardous in case of skin contact (irritant), of ingestion, of inhalation.

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:** Not available.

**Special Remarks on other Toxic Effects on Humans:**

Acute Potential: Skin: Lead metal granules or dust: May cause skin irritation by mechanical action. Lead metal foil, shot or sheets: Not likely to cause skin irritation Eyes: Lead metal granules or dust: Can irritate eyes by mechanical action. Lead metal foil, shot or sheets: No hazard. Will not cause eye irritation. Inhalation: In an industrial setting, exposure to lead mainly occurs from inhalation of dust or fumes. Lead dust or fumes: Can irritate the upper respiratory tract (nose, throat) as well as the bronchi and lungs by mechanical action. Lead dust can be absorbed through the respiratory system. However, inhaled lead does not accumulate in the lungs. All of an inhaled dose is eventually absorbed or transferred to the gastrointestinal tract. Inhalation effects of exposure to fumes or dust of inorganic lead may not develop quickly. Symptoms may include metallic taste, chest pain, decreased physical fitness, fatigue, sleep disturbance, headache, irritability, reduces memory, mood and personality changes, aching bones and muscles, constipation, abdominal pains, decreasing appetite. Inhalation of large amounts may lead to ataxia, delirium, convulsions/seizures, coma, and death. Lead metal foil, shot, or sheets: Not an inhalation hazard unless metal is heated. If metal is heated, fumes will be released. Inhalation of these fumes may cause "fume metal fever", which is characterized by flu-like symptoms. Symptoms may include metallic taste, fever, nausea, vomiting, chills, cough, weakness, chest pain, generalized muscle pain/aches, and increased white blood cell count. Ingestion: Lead metal granules or dust: The symptoms of lead poisoning include abdominal pain or cramps (lead colic), spasms, nausea, vomiting, headache, muscle weakness, hallucinations, distorted perceptions, "lead line" on the gums, metallic taste, loss of appetite, insomnia, dizziness and other symptoms similar to that of inhalation. Acute poisoning may result in high lead levels in the blood and urine, shock, coma and death in extreme cases. Lead metal foil, shot or sheets: Not an ingestion hazard for usual industrial handling.

## Section 12: Ecological Information

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

**Toxicity of the Products of Biodegradation:** The products of degradation are less toxic than the product itself.

**Special Remarks on the Products of Biodegradation:** Not available.

**Section 13: Disposal Considerations****Waste Disposal:**

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

**Section 14: Transport Information**

**DOT Classification:** Not a DOT controlled material (United States).

**Identification:** Not applicable.

**Special Provisions for Transport:** Not applicable.

**Section 15: Other Regulatory Information****Federal and State Regulations:**

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Lead California prop. 65: This product contains the following ingredients for which the State of California has found to cause reproductive harm (female) which would require a warning under the statute: Lead California prop. 65: This product contains the following ingredients for which the State of California has found to cause reproductive harm (male) which would require a warning under the statute: Lead California prop. 65 (no significant risk level): Lead: 0.0005 mg/day (value) California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: Lead California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Lead Connecticut hazardous material survey.: Lead Illinois toxic substances disclosure to employee act: Lead Illinois chemical safety act: Lead New York release reporting list: Lead Rhode Island RTK hazardous substances: Lead Pennsylvania RTK: Lead

**Other Regulations:**

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

**Other Classifications:**

**WHMIS (Canada):** CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

**DSCL (EEC):**

R20/22- Harmful by inhalation and if swallowed. R33- Danger of cumulative effects. R61- May cause harm to the unborn child. R62- Possible risk of impaired fertility. S36/37- Wear suitable protective clothing and gloves. S44- If you feel unwell, seek medical advice (show the label when possible). S53- Avoid exposure - obtain special instructions before use.

**HMIS (U.S.A.):**

**Health Hazard:** 1

**Fire Hazard:** 0

**Reactivity:** 0

**Personal Protection:** E

**National Fire Protection Association (U.S.A.):**

**Health:** 1

**Flammability:** 0

**Reactivity:** 0

**Specific hazard:**

**Protective Equipment:**

Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

## Section 16: Other Information

**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/10/2005 08:21 PM

**Last Updated:** 05/21/2013 12:00 PM

*The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.*

## **Appendix B**

### **Emergency Contact and Route Map**

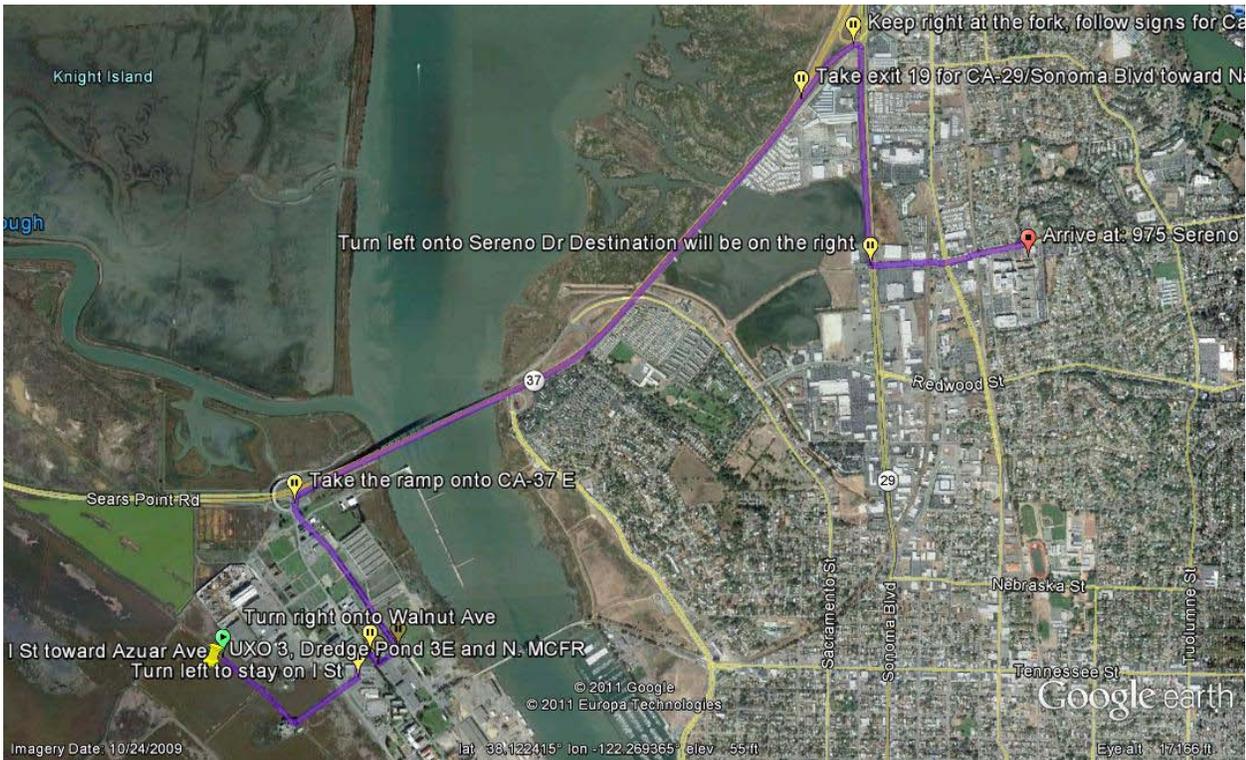
## EMERGENCY CONTACT INFORMATION

Emergency Contact	Telephone No.
InfoTrac Chemical Monitoring System	(800) 535-5053
National Poison Referral System	(800) 222-1222
Vallejo Fire Department	<b>911</b> or (707) 648-4526
Vallejo Police Department	<b>911</b> or (707) 648-4321
Medical Emergency	<b>911</b>
<b>Health and Safety Personnel:</b>	
Project Manager: <b>Ryan Wensink</b>	(614) 203-6365
Safety and Health Manager: <b>Ryan Moon</b>	(740) 607-1071
Site Safety and Health Officer: <b>Shawn Majors</b>	(619) 550-7553
<b>Client Contact:</b>	
BRAC PMO Remedial Project Manager: <b>Reginald Paulding</b>	(619) 524-5259
Resident Officer in Charge of Construction (ROICC): <b>Izzat Amadea</b>	(510) 333-3889
<b>Medical Emergency</b>	
Kaiser Permanente Medical Center, 975 Sereno Drive, Vallejo, California	(707) 651-1000
California Poison Control System	(800) 876-4766

Note: This sheet must be posted or made available on site.

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# KAISER PERMANENTE MEDICAL CENTER DIRECTIONS AND LOCATION MAP



## Driving directions to 975 Sereno Dr, Vallejo, CA 94589



### "UXO 3, Dredge Pond 3E and N. MCFR"

I St

- |   |        |
|---|--------|
| 1. Head <b>southeast</b> on <b>I St</b> toward <b>Azuar Ave</b>   | 0.5 mi |
| 2. Turn left to stay on <b>I St</b>   | 489 ft |
| 3. Turn right onto <b>Walnut Ave</b>  | 223 ft |
| 4. Take the 1st left onto <b>H St</b>   | 400 ft |
| 5. Turn left onto <b>Railroad Ave</b>   | 0.5 mi |
| 6. Take the ramp onto <b>CA-37 E</b>  | 2.0 mi |
| 7. Take exit <b>19</b> for <b>CA-29/Sonoma Blvd</b> toward <b>Napa</b>  | 0.2 mi |
| 8. Keep right at the fork, follow signs for <b>California 29/Downtown Vallejo</b> and merge onto <b>CA-29 S/Sonoma Blvd</b> | 0.7 mi |
| 9. Turn left onto <b>Sereno Dr</b><br>Destination will be on the right  | 0.5 mi |



**975 Sereno Dr**  
Vallejo, CA 94589

Kaiser Permanente Medical Center Phone Number: (707) 651-1000

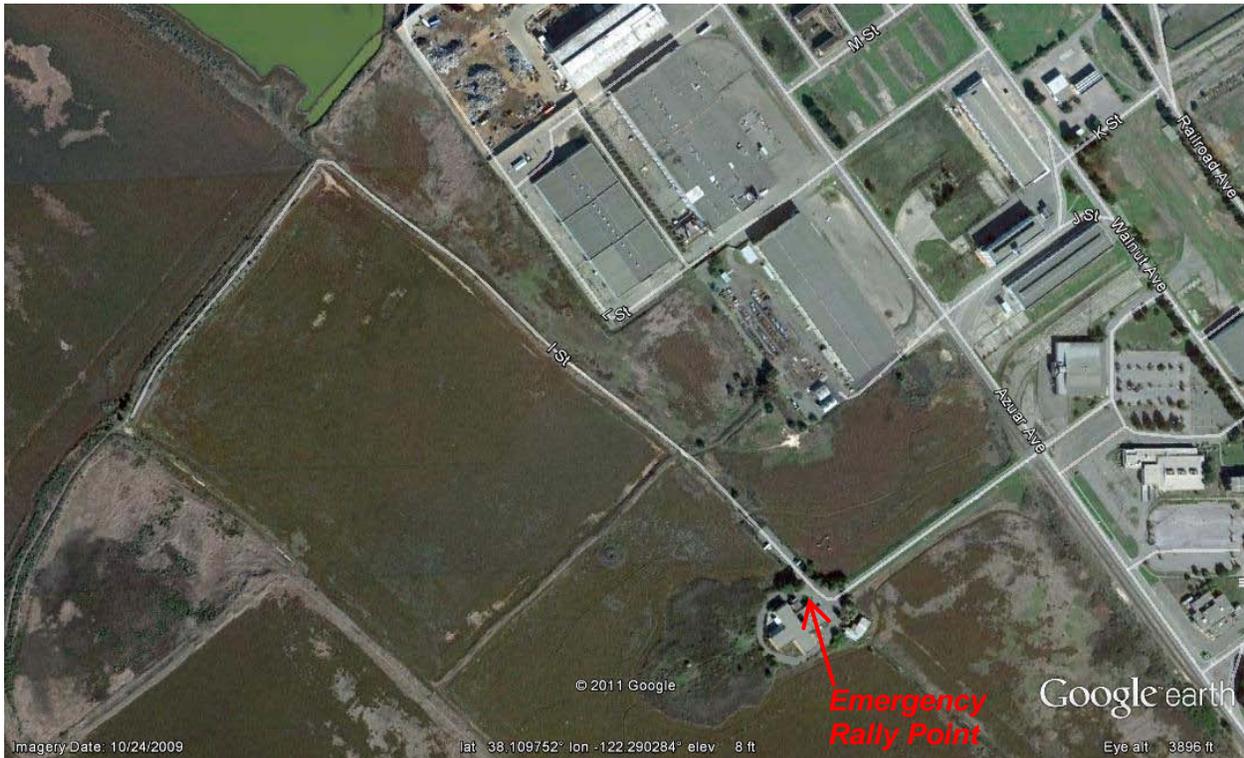
Note: This sheet must be posted or made available on site.

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## EMERGENCY RALLY POINT LOCATION MAP

### Emergency Rally Point

The designated rally point UXO 3 RI is shown below. A roll call will be conducted to ensure that all field personnel are accounted for.



Note: This sheet must be posted or made available on site.

**Appendix C**  
**Activity Hazard Analysis**

Activity/Work Task: <b>Decontamination of Heavy Equipment</b>		Overall Risk Assessment Code (RAC) (Use highest code)				<b>M</b>	
Project Location: <b>UXO 3, Dredge Pond 3E and Northern Marine Corps Firing Range, Former Mare Island Naval Shipyard, Vallejo, California</b>		<b>Risk Assessment Code (RAC) Matrix</b>					
Contract Number: N62473-11-D-2228 TO 0006		<b>Severity</b>	<b>Probability</b>				
Date Prepared: 10/09/2015			Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title): Max Zelenevich/Researcher		Catastrophic	<b>E</b>	<b>E</b>	<b>H</b>	<b>H</b>	<b>M</b>
		Critical	<b>E</b>	<b>H</b>	<b>H</b>	<b>M</b>	<b>L</b>
Reviewed by (Name/Title): Ryan Moon, CIH, CSP		Marginal	<b>H</b>	<b>M</b>	<b>M</b>	<b>L</b>	<b>L</b>
		Negligible	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>Notes:</b> (Field Notes, Review Comments, etc.)		Step 1: Review each <b>"Hazard"</b> with identified safety <b>"Controls"</b> and determine RAC (See above)					
		"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.				<b>RAC Chart</b>	
		"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible				<b>E = Extremely High Risk</b>	
						<b>H = High Risk</b>	
		Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.				<b>M = Moderate Risk</b>	
						<b>L = Low Risk</b>	
<b>Job Steps</b>		<b>Hazards</b>		<b>Controls</b>			<b>RAC</b>
1. Task Specific Mobilization/ Demobilization/Site Setup		Inspection of Decontamination Trailer and High-Pressure Steam Cleaner		<ul style="list-style-type: none"> <li>Make sure the trailer is properly parked when checking the undercarriage.</li> <li>Make sure there are no loose joints on the heavy equipment.</li> <li>Make sure there are no leaks in the high-pressure hose.</li> </ul>			<b>M</b>
		Staging of IDW Bins and Drums		<ul style="list-style-type: none"> <li>Use proper lifting techniques and use help when required.</li> <li>When using forklift, ensure the operator is qualified and properly trained.</li> <li>Do not block emergency exit points.</li> </ul>			<b>L</b>
		Auto Accident		<ul style="list-style-type: none"> <li>Establish safe speed limit on access roads.</li> <li>Stay alert and obey all traffic laws.</li> <li>Be aware of other traffic around you.</li> <li>Reduce speed during inclement weather.</li> <li>Wear seat belt.</li> </ul>			<b>M</b>
		Slip, Trip, Fall, Laceration, Cut, Abrasion to Skin		<ul style="list-style-type: none"> <li>Inspect work area and equipment for hazardous conditions and correct situation before continuing with other work.</li> <li>Create awareness though active monitoring of the site and field activities.</li> </ul>			<b>L</b>
		Pinching Fingers, Dropping		<ul style="list-style-type: none"> <li>Wear gloves and steel-toe boots.</li> </ul>			<b>L</b>

	Objects on Feet, Back Strain	<ul style="list-style-type: none"> <li>• Never lift more than 50 pounds without mechanical assistance.</li> <li>• Use proper lifting techniques.</li> </ul>	
	Insect Bites	<ul style="list-style-type: none"> <li>• Receive instruction in recognition and identification of hazardous insects.</li> <li>• Wear protective clothing.</li> <li>• Apply insect repellants.</li> <li>• If necessary, treat infested area with insecticides.</li> </ul>	L
	Poisonous Plants	<ul style="list-style-type: none"> <li>• Receive instruction in recognition and identification of poisonous plants.</li> <li>• Wear protective clothing.</li> <li>• When practical, remove and destroy plant.</li> <li>• Cleanse affected body area with soap and water.</li> </ul>	L
	Exposure to Severe Inclement Weather	<ul style="list-style-type: none"> <li>• Wear clothing suitable for weather and work conditions.</li> <li>• At a minimum, wear a short-sleeve shirt, long pants, and protective footwear during warm weather conditions.</li> <li>• Apply sunscreen.</li> <li>• During cold weather conditions, dress in layers for appropriate level of warmth.</li> </ul>	L
	Material in Eyes, Foot Injuries, Head Injuries	<ul style="list-style-type: none"> <li>• Wear clothing suitable for weather and work conditions.</li> <li>• At a minimum, wear a short-sleeve shirt, long pants, and protective footwear during warm weather conditions.</li> <li>• Apply sunscreen.</li> <li>• During cold weather conditions, dress in layers for appropriate level of warmth.</li> </ul>	L
2. Decontamination of Heavy Equipment	Exposure to Chemical Hazards	<ul style="list-style-type: none"> <li>• Wear appropriate levels of PPE.</li> <li>• When applicable, monitor for organic vapors in work zones and breathing zones.</li> <li>• Wash hands before eating and drinking.</li> <li>• Remove and properly store or dispose of contaminated clothing before leaving the work site (specifically, this should be performed in the Contamination Reduction Zone).</li> </ul>	L
	Heat Hazard from High-Pressure Steam	<ul style="list-style-type: none"> <li>• • Make sure the steam cleaning is done in a secured area to reduce splashing.</li> <li>• • Make sure field personnel are trained in the proper use of the steam cleaner.</li> <li>• • Do not point the hose of the steam cleaner in the direction of anyone.</li> </ul>	L
	Slip, Trip, Fall, Laceration, Cut, Abrasion to Skin	<ul style="list-style-type: none"> <li>• Inspect work area and equipment for hazardous conditions and correct situation before continuing with other work.</li> </ul>	L

		<ul style="list-style-type: none"> <li>• Create awareness through active monitoring of the site and field activities.</li> </ul>	
	Material in Eyes, Foot Injuries, Head Injuries	<ul style="list-style-type: none"> <li>• Wear clothing suitable for weather and work conditions.</li> <li>• At a minimum, wear a short-sleeve shirt, long pants, and protective footwear during warm weather conditions.</li> <li>• Apply sunscreen.</li> <li>• During cold weather conditions, dress in layers for appropriate level of warmth.</li> </ul>	L
	Exposure to Severe Inclement Weather	<ul style="list-style-type: none"> <li>• Wear clothing suitable for weather and work conditions.</li> <li>• At a minimum, wear a short-sleeve shirt, long pants, and protective footwear during warm weather conditions.</li> <li>• Apply sunscreen.</li> <li>• During cold weather conditions, dress in layers for appropriate level of warmth.</li> </ul>	M
	Pinching Fingers, Dropping Objects on Feet, Back Strain	<ul style="list-style-type: none"> <li>• Wear gloves and steel-toe boots.</li> <li>• Never lift more than 50 pounds without mechanical assistance.</li> <li>• Use proper lifting techniques.</li> </ul>	M

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
<ol style="list-style-type: none"> <li>1. Decontamination trailer</li> <li>2. Drum dolly</li> <li>3. High-pressure steam cleaner</li> <li>4. PID to monitor for VOCs</li> <li>5. 55-gallon drum or other suitable containers to collect potentially contaminated rinsates</li> <li>6. Level D: Hard hat, short-sleeve shirt, full-length pants, safety-toe boots, safety glasses, chemically protective gloves when collecting and handling samples (as necessary).</li> <li>7. Use standard cloth or leather gloves when handling equipment.</li> <li>8. Hearing protection</li> <li>9. Eyewash station meeting ANSI Standard Z358.1-2009</li> <li>10. Refer to Sections 14.8 of the Work Plan Sampling and Analysis Plan (Appendix A) and Section 8 of the SSHP (Attachment 1 to Appendix D) for additional</li> </ol>	<ul style="list-style-type: none"> <li>• Only competent and trained personnel (i.e., licensed heavy equipment operator [TBD]) should operate the equipment.</li> <li>• Make sure the work area is cleared before beginning operations.</li> <li>• All field personnel will have HAZWOPER 40-hour training and first aid and CPR training.</li> <li>• At least one field person will have HAZWOPER supervisor training.</li> <li>• Field personnel will be required to read and understand the Work Plan and Site Safety and Health Plan prior to start of field activities.</li> <li>• Battelle PM and SSHO will ensure that field personnel are specifically trained in the field tasks that they are required to perform.</li> <li>• Daily tailgate health and safety briefings will be conducted.</li> </ul>	<p>Three Phases: Pre/during/post</p> <ol style="list-style-type: none"> <li>1-3. Daily inspections.</li> <li>4. Ensure battery is charged and PID is calibrated on a daily basis</li> <li>5-10. Daily inspections.</li> <li>11. Ensure fire extinguisher is properly certified.</li> </ol>

<p>information on PPE requirements and other procedures for this task.</p> <p>11. First aid kit, fire extinguisher.</p>	<ul style="list-style-type: none"><li>• Follow procedures as stated in the Worksheet #14 of the Sampling and Analysis Plan, Appendix A of the Work Plan.</li><li>• Field personnel will also be instructed on sample preparation techniques.</li></ul>	
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Activity/Work Task: <b>Direct-Push and Hollow Stem Auger Drilling</b>		Overall Risk Assessment Code (RAC) (Use highest code)				<b>M</b>	
Project Location: <b>UXO 3, Dredge Pond 3E and Northern Marine Corps Firing Range, Former Mare Island Naval Shipyard, Vallejo, California</b>		<b>Risk Assessment Code (RAC) Matrix</b>					
Contract Number: N62473-11-D-2228 TO 0006		<b>Severity</b>	<b>Probability</b>				
Date Prepared: 10/09/2015			Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title): Max Zelenevich/Researcher		Catastrophic	<b>E</b>	<b>E</b>	<b>H</b>	<b>H</b>	<b>M</b>
		Critical	<b>E</b>	<b>H</b>	<b>H</b>	<b>M</b>	<b>L</b>
Reviewed by (Name/Title): Ryan Moon, CIH, CSP		Marginal	<b>H</b>	<b>M</b>	<b>M</b>	<b>L</b>	<b>L</b>
		Negligible	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>Notes:</b> (Field Notes, Review Comments, etc.)		Step 1: Review each <b>"Hazard"</b> with identified safety <b>"Controls"</b> and determine RAC (See above)					
		"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.				<b>RAC Chart</b>	
		"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible				<b>E = Extremely High Risk</b>	
		Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.				<b>H = High Risk</b>	
				<b>M = Moderate Risk</b>		<b>L = Low Risk</b>	
<b>Job Steps</b>		<b>Hazards</b>		<b>Controls</b>			<b>RAC</b>
1. Subsurface Utility Clearance		Electrical shock (low voltage [millivolts])		<ul style="list-style-type: none"> <li>When connecting surveying equipment, make sure connections are undamaged and clear of potential obstructions.</li> <li>Make sure the area around the equipment is dry.</li> </ul>			<b>L</b>
		Struck by Passing Vehicles.		<ul style="list-style-type: none"> <li>Park field-support vehicles as far from roads and public rights-of-way as possible.</li> <li>Establish safe speed limit on access roads</li> </ul>			<b>M</b>
		Slip, Trip, Fall, Laceration, Cut, Abrasion to Skin		<ul style="list-style-type: none"> <li>Inspect work area and equipment for hazardous conditions and correct situation before continuing with other work.</li> <li>Create awareness through active monitoring of the site and field activities.</li> <li>Wear proper clothing and safety equipment (gloves, boots, hard hats, eye protection, reflective safety vest [high-visibility orange or green]).</li> </ul>			<b>L</b>
		Pinching Fingers, Dropping Objects on Feet, Back Strain		<ul style="list-style-type: none"> <li>Wear gloves and steel-toe boots.</li> <li>Never lift more than 50 pounds without mechanical assistance.</li> <li>Use proper lifting techniques.</li> </ul>			<b>L</b>

	Material in Eyes, Foot Injuries, Head Injuries	<ul style="list-style-type: none"> <li>• Use protective eyewear.</li> <li>• Wear steel-toe boots.</li> <li>• If foot puncture hazard exists, employ the use of Rhino Tuff Insoles®.</li> <li>• Wear hard hat if overhead hazards exist.</li> <li>• Ensure eyewash station meeting ANSI Standard Z358.1-2009 is on site.</li> </ul>	L
	Insect Bites	<ul style="list-style-type: none"> <li>• Receive instruction in recognition and identification of hazardous insects.</li> <li>• Wear protective clothing.</li> <li>• Apply insect repellants.</li> <li>• If necessary, treat infested area with insecticides.</li> </ul>	L
	Poisonous Plants	<ul style="list-style-type: none"> <li>• Receive instruction in recognition and identification of poisonous plants.</li> <li>• Wear protective clothing.</li> <li>• When practical, remove and destroy plant.</li> <li>• Cleanse affected body area with soap and water.</li> </ul>	L
	Exposure to Severe Inclement Weather	<ul style="list-style-type: none"> <li>• Wear clothing suitable for weather and work conditions.</li> <li>• At a minimum, wear a short-sleeve shirt, long pants, and protective footwear during warm weather conditions.</li> <li>• Apply sunscreen.</li> <li>• During cold weather conditions, dress in layers for appropriate level of warmth.</li> </ul>	L
2. Task Specific Mobilization/ Demobilization/Site Setup	Inspection of Direct-Push Rig and Excavator	<ul style="list-style-type: none"> <li>• Initial inspection will be completed by competent person and daily inspections will be completed by operator using CESO Checklist 18-04, provided in Appendix H.</li> <li>• Make sure the vehicle is properly parked when checking the undercarriage.</li> <li>• Wear proper PPE and eye protection in case of spilling hydraulic fluid.</li> <li>• Make sure there are no loose joints on the heavy equipment.</li> </ul>	M
	Staging of IDW Bins and Drums	<ul style="list-style-type: none"> <li>• Use proper lifting techniques and use help when required.</li> <li>• When using forklift, ensure the operator is qualified and properly trained.</li> <li>• Do not block emergency exit points.</li> </ul>	L
	Auto Accident	<ul style="list-style-type: none"> <li>• Establish safe speed limit on access roads.</li> <li>• Stay alert and obey all traffic laws.</li> <li>• Be aware of other traffic around you.</li> <li>• Reduce speed during inclement weather.</li> <li>• Wear seat belt.</li> </ul>	M
	Slip, Trip, Fall, Laceration, Cut, Abrasion to Skin	<ul style="list-style-type: none"> <li>• Inspect work area and equipment for hazardous conditions and correct situation before continuing with other work.</li> </ul>	L

		<ul style="list-style-type: none"> <li>• Create awareness through active monitoring of the site and field activities.</li> </ul>	
	Pinching Fingers, Dropping Objects on Feet, Back Strain	<ul style="list-style-type: none"> <li>• Wear gloves and steel-toe boots.</li> <li>• Never lift more than 50 pounds without mechanical assistance.</li> <li>• Use proper lifting techniques.</li> </ul>	L
	Insect Bites	<ul style="list-style-type: none"> <li>• Receive instruction in recognition and identification of hazardous insects.</li> <li>• Wear protective clothing.</li> <li>• Apply insect repellants.</li> <li>• If necessary, treat infested area with insecticides.</li> </ul>	L
	Poisonous Plants	<ul style="list-style-type: none"> <li>• Receive instruction in recognition and identification of poisonous plants.</li> <li>• Wear protective clothing.</li> <li>• When practical, remove and destroy plant.</li> <li>• Cleanse affected body area with soap and water.</li> </ul>	L
	Exposure to Severe Inclement Weather	<ul style="list-style-type: none"> <li>• Wear clothing suitable for weather and work conditions.</li> <li>• At a minimum, wear a short-sleeve shirt, long pants, and protective footwear during warm weather conditions.</li> <li>• Apply sunscreen.</li> <li>• During cold weather conditions, dress in layers for appropriate level of warmth.</li> </ul>	L
	Material in Eyes, Foot Injuries, Head Injuries	<ul style="list-style-type: none"> <li>• Wear clothing suitable for weather and work conditions.</li> <li>• At a minimum, wear a short-sleeve shirt, long pants, and protective footwear during warm weather conditions.</li> <li>• Apply sunscreen.</li> <li>• During cold weather conditions, dress in layers for appropriate level of warmth.</li> </ul>	L
3. Setting up the Drill Rig	Being Struck by Heavy Equipment	<ul style="list-style-type: none"> <li>• Stay clear of rotating equipment.</li> <li>• Make sure there are no loose hair, jewelry, loose-fitting PPE, and loose clothing that might get caught in moving mechanical parts. NOTE: loose clothing is prohibited during the use of drilling equipment.</li> <li>• Only professionally trained personnel may operate heavy machinery. Direct-push rig operator will be provided by a subcontractor to be determined.</li> <li>• Follow the drilling procedures as stated in Worksheet #14 of the Sampling and Analysis Plan, Appendix A of the Work Plan.</li> </ul>	M
	Slip, Trip, Fall, Laceration, Cut, Abrasion to Skin	<ul style="list-style-type: none"> <li>• Inspect work area and equipment for hazardous conditions and correct situation before continuing with other work.</li> </ul>	L

		<ul style="list-style-type: none"> <li>• Create awareness through active monitoring of the site and field activities.</li> </ul>	
	Overhead Utilities	<ul style="list-style-type: none"> <li>• Drilling equipment shall be posted with signs warning the operator of electrical hazards.</li> <li>• Equipment operator shall ensure proper clearance before moving equipment.</li> <li>• Clearance shall be monitored by a spotter or by an electrical proximity warning device.</li> </ul>	<b>M</b>
	Tipping Over	<ul style="list-style-type: none"> <li>• Equipment shall not be transported with the mast up.</li> <li>• Prior to setup, survey for overhead and terrain hazards.</li> <li>• Inspect surface for stability and the absence of holes, other ground hazards, and electrical hazards.</li> </ul>	<b>M</b>
	Auto Accident	<ul style="list-style-type: none"> <li>• Establish safe speed limit on access roads.</li> <li>• Stay alert and obey all traffic laws.</li> <li>• Be aware of other traffic around you.</li> <li>• Reduce speed during inclement weather.</li> <li>• Wear seat belt.</li> </ul>	<b>M</b>
	Struck by Passing Vehicles.	<ul style="list-style-type: none"> <li>• Park field-support vehicles as far from roads and public rights-of-way as possible.</li> <li>• Establish safe speed limit on access roads.</li> </ul>	<b>M</b>
4. Drilling	Exposure to Chemical Hazards	<ul style="list-style-type: none"> <li>• Wear appropriate levels of PPE.</li> <li>• When applicable, monitor for organic vapors in work zones and breathing zones.</li> <li>• Wash hands before eating and drinking.</li> <li>• Remove and properly store or dispose of contaminated clothing before leaving the work site.</li> </ul>	<b>L</b>
	Elevated Noise Levels	<ul style="list-style-type: none"> <li>• Use hearing protection when necessary or above 85 dBA.</li> <li>• Establish an exclusion zone so that only essential personnel are close to noisy equipment.</li> </ul>	<b>L</b>
	Being Struck by Heavy Equipment	<ul style="list-style-type: none"> <li>• Use of auger guard is required when drilling with auger equipped drill rigs on site.</li> <li>• clear of rotating equipment.</li> <li>• Make sure there are no loose hair, jewelry, loose-fitting PPE, and loose clothing that might get caught in moving mechanical parts. NOTE: loose clothing is prohibited during the use of drilling equipment.</li> </ul>	<b>M</b>

		<ul style="list-style-type: none"> <li>• Only professionally trained personnel may operate heavy machinery. Drillrig operator will be provided by a subcontractor to be determined.</li> <li>• Follow the drilling procedures as stated in Worksheet #14 of the Sampling and Analysis Plan, Appendix A of the Work Plan.</li> </ul>	
	Auto Accident	<ul style="list-style-type: none"> <li>• Establish safe speed limit on access roads.</li> <li>• Stay alert and obey all traffic laws.</li> <li>• Be aware of other traffic around you.</li> <li>• Reduce speed during inclement weather.</li> <li>• Wear seat belt.</li> </ul>	<b>M</b>
	Struck by Passing Vehicles.	<ul style="list-style-type: none"> <li>• Park field-support vehicles as far from roads and public rights-of-way as possible.</li> <li>• Establish safe speed limit on access roads.</li> </ul>	<b>M</b>
	Slip, Trip, Fall, Laceration, Cut, Abrasion to Skin	<ul style="list-style-type: none"> <li>• Inspect work area and equipment for hazardous conditions and correct situation before continuing with other work.</li> <li>• Create awareness through active monitoring of the site and field activities.</li> </ul>	<b>L</b>
	Material in Eyes, Foot Injuries, Head Injuries	<ul style="list-style-type: none"> <li>• Wear clothing suitable for weather and work conditions.</li> <li>• At a minimum, wear a short-sleeve shirt, long pants, and protective footwear during warm weather conditions.</li> <li>• Apply sunscreen.</li> <li>• During cold weather conditions, dress in layers for appropriate level of warmth.</li> </ul>	<b>L</b>
	Exposure to Severe Inclement Weather	<ul style="list-style-type: none"> <li>• Wear clothing suitable for weather and work conditions.</li> <li>• At a minimum, wear a short-sleeve shirt, long pants, and protective footwear during warm weather conditions.</li> <li>• Apply sunscreen.</li> <li>• During cold weather conditions, dress in layers for appropriate level of warmth.</li> </ul>	<b>L</b>
<b>Equipment to be Used</b>	<b>Training Requirements/Competent or Qualified Personnel name(s)</b>		<b>Inspection Requirements</b>

<ol style="list-style-type: none"> <li>1. Drill Rig</li> <li>2. Excavator and hand digging tools</li> <li>3. Drum dolly</li> <li>4. Forklift</li> <li>5. PID to monitor for VOCs</li> <li>6. Level D: Hard hat, short-sleeve shirt, full-length pants, safety-toe boots, safety glasses, chemically protective gloves when collecting and handling samples (as necessary).</li> <li>7. Use standard cloth or leather gloves when handling equipment.</li> <li>8. Hearing protection</li> <li>9. Eyewash station meeting ANSI Standard Z358.1-2009</li> <li>10. First aid kit, fire extinguisher.</li> <li>11. Glass and plastic bottles</li> </ol>	<ul style="list-style-type: none"> <li>• Only competent and trained personnel (i.e. drill rig operator) should operate the equipment.</li> <li>• Make sure the work area is cleared before beginning operations.</li> <li>• All field personnel will have HAZWOPER 40-hour training and first aid and CPR training.</li> <li>• At least one field person will have HAZWOPER supervisor training.</li> <li>• Field personnel will be required to read and understand the Work Plan and Site Safety and Health Plan prior to start of field activities.</li> <li>• Battelle PM and SSHO will ensure that field personnel are specifically trained in the field tasks that they are required to perform.</li> <li>• Daily tailgate health and safety briefings will be conducted.</li> <li>• Follow procedures as stated in the Worksheet #14 of the Sampling and Analysis Plan, Appendix A of the Work Plan.</li> <li>• Field personnel will also be instructed on sample preparation techniques.</li> </ul>	<p>Three Phases: Pre/during/post</p> <p>1-4. Daily inspections.</p> <p>5. Ensure battery is charged and PID is calibrated on a daily basis</p> <p>6-19. Daily inspections.</p> <p>10. Ensure fire extinguisher is properly certified.</p> <p>11. All samples will be inspected prior to shipment or courier pickup by the field sampler. This inspection will be required to ensure a safe and secure sample environment for the transporter.</p>
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Activity/Work Task: <b>Establishment of Radiological Background</b>		Overall Risk Assessment Code (RAC) (Use highest code)				<b>M</b>	
Project Location: <b>UXO 3, Dredge Pond 3E and Northern Marine Corps Firing Range, Former Mare Island Naval Shipyard, Vallejo, California</b>		<b>Risk Assessment Code (RAC) Matrix</b>					
Contract Number: N62473-11-D-2228 TO 0006		<b>Severity</b>	<b>Probability</b>				
Date Prepared: 10/09/2015			Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title): Max Zelenevich/Researcher		Catastrophic	<b>E</b>	<b>E</b>	<b>H</b>	<b>H</b>	<b>M</b>
Reviewed by (Name/Title): Ryan Moon, CIH, CSP		Critical	<b>E</b>	<b>H</b>	<b>H</b>	<b>M</b>	<b>L</b>
		Marginal	<b>H</b>	<b>M</b>	<b>M</b>	<b>L</b>	<b>L</b>
<b>Notes:</b> (Field Notes, Review Comments, etc.)		Negligible	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
		Step 1: Review each <b>"Hazard"</b> with identified safety <b>"Controls"</b> and determine RAC (See above)					
		<b>"Probability"</b> is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.				<b>RAC Chart</b>	
		<b>"Severity"</b> is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible				<b>E = Extremely High Risk</b>	
		Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.				<b>H = High Risk</b>	
						<b>M = Moderate Risk</b>	
						<b>L = Low Risk</b>	
<b>Job Steps</b>	<b>Hazards</b>	<b>Controls</b>				<b>RAC</b>	
1. Select Reference Area	Struck by Passing Vehicles	<ul style="list-style-type: none"> <li>Park field-support vehicles as far from roads and public rights-of-way as possible</li> </ul>				<b>M</b>	
	Slip, Trip, Fall, Laceration, Cut, Abrasion to Skin	<ul style="list-style-type: none"> <li>Inspect work area and equipment for hazardous conditions and correct situation before continuing with other work.</li> <li>Create awareness though active monitoring of the site and field activities.</li> <li>Wear proper clothing and safety equipment (gloves, boots, hard hats, and eye protection, reflective safety vest [high-visibility orange or green]).</li> <li>Have certification in first aid treatment and procedures.</li> <li>Conduct daily health and safety briefings.</li> <li>Ensure all personnel are trained in a proper response in case of an emergency.</li> </ul>				<b>L</b>	
	Pinching Fingers, Dropping Objects on Feet, Back Strain	<ul style="list-style-type: none"> <li>Wear gloves and steel-toe boots.</li> <li>Never lift more than 50 pounds without mechanical assistance.</li> <li>Use proper lifting techniques.</li> </ul>				<b>L</b>	
	Material in Eyes, Foot Injuries, Head Injuries	<ul style="list-style-type: none"> <li>Use protective eyewear.</li> <li>Wear steel-toe boots.</li> <li>If foot puncture hazard exists, employ the use of Rhino Tuff Insoles®.</li> <li>Wear hard hat if overhead hazards exist.</li> </ul>				<b>L</b>	

		<ul style="list-style-type: none"> <li>• Ensure eyewash station meeting ANSI Standard Z358.1-2009 is on site.</li> </ul>	
	Insect Bites	<ul style="list-style-type: none"> <li>• Receive instruction in recognition and identification of hazardous insects.</li> <li>• Wear protective clothing.</li> <li>• Apply insect repellants.</li> <li>• If necessary, treat infested area with insecticides.</li> </ul>	L
	Poisonous Plants	<ul style="list-style-type: none"> <li>• Receive instruction in recognition and identification of poisonous plants.</li> <li>• Wear protective clothing.</li> <li>• When practical, remove and destroy plant.</li> <li>• Cleanse affected body area with soap and water.</li> </ul>	L
	Exposure to Severe Inclement Weather	<ul style="list-style-type: none"> <li>• Wear clothing suitable for weather and work conditions.</li> <li>• At a minimum, wear a short-sleeve shirt, long pants, and protective footwear during warm weather conditions.</li> <li>• Apply sunscreen.</li> <li>• During cold weather conditions, dress in layers for appropriate level of warmth.</li> </ul>	L
2. Radiological Background Soil Sampling	Exposure to Chemical Hazards	<ul style="list-style-type: none"> <li>• Wear appropriate levels of PPE.</li> <li>• When applicable, monitor for organic vapors in work zones and breathing zones.</li> <li>• Wash hands before eating and drinking.</li> <li>• Remove and properly store or dispose of contaminated clothing before leaving the work site.</li> <li>• Follow the soil sampling procedures as stated in Worksheet #14 of the Sampling and Analysis Plan, Appendix A of the Work Plan.</li> </ul>	L
	Slip, Trip, Fall, Laceration, Cut, Abrasion to Skin	<ul style="list-style-type: none"> <li>• Inspect work area and equipment for hazardous conditions and correct situation before continuing with other work.</li> <li>• Create awareness through active monitoring of the site and field activities.</li> </ul>	L
	Pinching Fingers, Dropping Objects on Feet, Back Strain	<ul style="list-style-type: none"> <li>• Wear gloves and steel-toe boots.</li> <li>• Never lift more than 50 pounds without mechanical assistance.</li> <li>• Use proper lifting techniques.</li> </ul>	L
	Insect Bites	<ul style="list-style-type: none"> <li>• Receive instruction in recognition and identification of hazardous insects.</li> <li>• Wear protective clothing.</li> <li>• Apply insect repellants.</li> <li>• If necessary, treat infested area with insecticides.</li> </ul>	L
	Poisonous Plants	<ul style="list-style-type: none"> <li>• Receive instruction in recognition and identification of poisonous plants.</li> </ul>	L

		<ul style="list-style-type: none"> <li>• Wear protective clothing.</li> <li>• When practical, remove and destroy plant.</li> <li>• Cleanse affected body area with soap and water.</li> </ul>	L
	Exposure to Severe Inclement Weather	<ul style="list-style-type: none"> <li>• Wear clothing suitable for weather and work conditions.</li> <li>• At a minimum, wear a short-sleeve shirt, long pants, and protective footwear during warm weather conditions.</li> <li>• Apply sunscreen.</li> <li>• During cold weather conditions, dress in layers for appropriate level of warmth.</li> </ul>	
Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)		Inspection Requirements
<ol style="list-style-type: none"> <li>2. Level D: Hard hat, short-sleeve shirt, full-length pants, safety-toe boots, safety glasses, chemically protective gloves when collecting and handling samples (as necessary).</li> <li>3. Use standard cloth or leather gloves when handling equipment.</li> <li>4. Hearing protection</li> <li>5. Eyewash station meeting ANSI Standard Z358.1-2009</li> <li>6. First aid kit, fire extinguisher.</li> </ol>	<ul style="list-style-type: none"> <li>• Only competent and trained personnel (i.e., properly trained and experienced radiological personnel) should operate the equipment.</li> <li>• Make sure the work area is cleared before beginning operations.</li> <li>• All field personnel will have HAZWOPER 40-hour training and first aid and CPR training.</li> <li>• At least one field person will have HAZWOPER supervisor training.</li> <li>• Field personnel will be required to read and understand the Work Plan and Site Safety and Health Plan prior to start of field activities.</li> <li>• Battelle PM and SSHO will ensure that field personnel are specifically trained in the field tasks that they are required to perform.</li> <li>• Daily tailgate health and safety briefings will be conducted.</li> <li>• Follow procedures as stated in the Worksheet #14 of the Sampling and Analysis Plan, Appendix A of the Work Plan.</li> <li>• Refer to Appendix C of the Work Plan (Radiological Handling Plan) for special training radiation training requirements for personnel.</li> </ul>		<p>Three Phases: Pre/during/post</p> <p>1-5. Daily inspections.</p> <p>6. Ensure fire extinguisher is properly certified.</p>

Activity/Work Task: <b>Investigation-Derived Waste Disposal</b>		Overall Risk Assessment Code (RAC) (Use highest code)				<b>M</b>	
Project Location: <b>UXO 3, Dredge Pond 3E and Northern Marine Corps Firing Range, Former Mare Island Naval Shipyard, Vallejo, California</b>		<b>Risk Assessment Code (RAC) Matrix</b>					
Contract Number: N62473-11-D-2228 TO 0006		<b>Severity</b>	<b>Probability</b>				
Date Prepared: 10/09/2015			Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title): Max Zelenevich/Researcher		Catastrophic	<b>E</b>	<b>E</b>	<b>H</b>	<b>H</b>	<b>M</b>
Reviewed by (Name/Title): Ryan Moon, CIH, CSP		Critical	<b>E</b>	<b>H</b>	<b>H</b>	<b>M</b>	<b>L</b>
		Marginal	<b>H</b>	<b>M</b>	<b>M</b>	<b>L</b>	<b>L</b>
Notes: (Field Notes, Review Comments, etc.)		Negligible	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
		Step 1: Review each <b>"Hazard"</b> with identified safety <b>"Controls"</b> and determine RAC (See above)					
		<b>"Probability"</b> is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.				<b>RAC Chart</b>	
		<b>"Severity"</b> is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible				<b>E = Extremely High Risk</b>	
		Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.				<b>H = High Risk</b>	
						<b>M = Moderate Risk</b>	
						<b>L = Low Risk</b>	
<b>Job Steps</b>	<b>Hazards</b>	<b>Controls</b>				<b>RAC</b>	
1. Staging of IDW Drums	Tripping Over	<ul style="list-style-type: none"> <li>• Make sure drums are properly secured on the drum dolly or forklift, if used.</li> <li>• Inspect and tighten the lid to prevent spills.</li> <li>• Use assistance if drum is too heavy to lift with just one person.</li> <li>• Store drum on flat and smooth surface.</li> </ul>				<b>L</b>	
	Exposure to Chemical Hazards	<ul style="list-style-type: none"> <li>• Wear appropriate levels of PPE.</li> <li>• When applicable, monitor for organic vapors in work zones and breathing zones.</li> <li>• Wash hands before eating and drinking.</li> <li>• Remove and properly store or dispose of contaminated clothing before leaving the work site (specifically, this should be performed in the Contamination Reduction Zone).</li> </ul>				<b>L</b>	
	Operating Forklift	<ul style="list-style-type: none"> <li>• When using forklift, ensure the operator is qualified and properly trained.</li> <li>• Look both ways before crossing a street.</li> <li>• Place traffic cones around field vehicles and support vehicles. If necessary, place cones in the road or public rights-of-way and/or post a flag person to alert and direct all traffic.</li> </ul>				<b>M</b>	

	Puncturing Drums	<ul style="list-style-type: none"> <li>When using dolly or forklift, make sure to use the proper angle so that it will not puncture the drums.</li> <li>Use help when loading drums onto drum dolly or forklift.</li> </ul>	L
	Struck by Passing Vehicles	<ul style="list-style-type: none"> <li>Park field-support vehicles as far from roads and public rights-of-way as possible.</li> <li>Establish safe speed limit on access roads.</li> </ul>	M
	Slip, Trip, Fall, Laceration, Cut, Abrasion to Skin	<ul style="list-style-type: none"> <li>Inspect work area and equipment for hazardous conditions and correct situation before continuing with other work.</li> <li>Create awareness through active monitoring of the site and field activities.</li> </ul>	L
	Material in Eyes, Foot Injuries, Head Injuries	<ul style="list-style-type: none"> <li>Wear clothing suitable for weather and work conditions.</li> <li>At a minimum, wear a short-sleeve shirt, long pants, and protective footwear during warm weather conditions.</li> <li>Apply sunscreen.</li> <li>During cold weather conditions, dress in layers for appropriate level of warmth.</li> </ul>	L
	Pinching Fingers, Dropping Objects on Feet, Back Strain	<ul style="list-style-type: none"> <li>Wear gloves and steel-toe boots.</li> <li>Never lift more than 50 pounds without mechanical assistance.</li> <li>Use proper lifting techniques.</li> </ul>	L
2. Disposal of IDW Generated During Fieldwork	Exposure to Chemical Hazards	<ul style="list-style-type: none"> <li>Wear appropriate levels of PPE.</li> <li>When applicable, monitor for organic vapors in work zones and breathing zones.</li> <li>Wash hands before eating and drinking.</li> <li>Remove and properly store or dispose of contaminated clothing before leaving the work site</li> </ul>	L
	Operating Forklift	<ul style="list-style-type: none"> <li>When using forklift, ensure the operator is qualified and properly trained.</li> <li>Look both ways before crossing a street.</li> <li>Place traffic cones around field vehicles and support vehicles. If necessary, place cones in the road or public rights-of-way and/or post a flag person to alert and direct all traffic.</li> </ul>	M
	Puncturing Drums	<ul style="list-style-type: none"> <li>When using dolly or forklift, make sure to use the proper angle so that it will not puncture the drums.</li> <li>Use help when loading drums onto drum dolly or forklift.</li> </ul>	L
	Struck by Passing Vehicles	<ul style="list-style-type: none"> <li>Park field-support vehicles as far from roads and public rights-of-way as possible.</li> </ul>	M

		<ul style="list-style-type: none"> <li>Establish safe speed limit on access roads.</li> </ul>	
	Slip, Trip, Fall, Laceration, Cut, Abrasion to Skin	<ul style="list-style-type: none"> <li>Inspect work area and equipment for hazardous conditions and correct situation before continuing with other work.</li> <li>Create awareness through active monitoring of the site and field activities.</li> </ul>	L
	Material in Eyes, Foot Injuries, Head Injuries	<ul style="list-style-type: none"> <li>Wear clothing suitable for weather and work conditions.</li> <li>At a minimum, wear a short-sleeve shirt, long pants, and protective footwear during warm weather conditions.</li> <li>Apply sunscreen.</li> <li>During cold weather conditions, dress in layers for appropriate level of warmth.</li> </ul>	L
	Pinching Fingers, Dropping Objects on Feet, Back Strain	<ul style="list-style-type: none"> <li>Wear gloves and steel-toe boots.</li> <li>Never lift more than 50 pounds without mechanical assistance.</li> <li>Use proper lifting techniques.</li> </ul>	L
Equipment to be Used		Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
<ol style="list-style-type: none"> <li>Drum dolly</li> <li>Forklift</li> <li>Level D: Hard hat, short-sleeve shirt, full-length pants, safety-toe boots, safety glasses, chemically protective gloves when collecting and handling samples (as necessary).</li> <li>Use standard cloth or leather gloves when handling equipment.</li> <li>Eyewash station meeting ANSI Standard Z358.1-2009</li> <li>First aid kit, fire extinguisher.</li> </ol>		<ul style="list-style-type: none"> <li>Only competent and trained personnel (i.e., heavy equipment operator and/or truck operator) should operate the equipment.</li> <li>Make sure the work area is cleared before beginning operations.</li> <li>All field personnel will have HAZWOPER 40-hour training and first aid and CPR training.</li> <li>At least one field person will have HAZWOPER supervisor training.</li> <li>Field personnel will be required to read and understand the Work Plan and Site Safety and Health Plan prior to start of field activities.</li> <li>Battelle PM and SSHO will ensure that field personnel are specifically trained in the field tasks that they are required to perform.</li> <li>Daily tailgate health and safety briefings will be conducted.</li> <li>Follow procedures as stated in the Worksheet #14 of the Sampling and Analysis Plan, Appendix A of the Work Plan.</li> </ul>	<p>Three Phases: Pre/during/post</p> <p>1-5. Daily inspections.</p> <p>6. Ensure fire extinguisher is properly certified.</p>

Activity/Work Task: <b>RAD and UXO Anomaly Investigation</b>		Overall Risk Assessment Code (RAC) (Use highest code)				<b>M</b>	
Project Location: <b>UXO 3, Dredge Pond 3E and Northern Marine Corps Firing Range, Former Mare Island Naval Shipyard, Vallejo, California</b>		<b>Risk Assessment Code (RAC) Matrix</b>					
Contract Number: N62473-11-D-2228 TO 0006		<b>Severity</b>	<b>Probability</b>				
Date Prepared: 10/09/2015			Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title): Max Zelenevich/Researcher		Catastrophic	<b>E</b>	<b>E</b>	<b>H</b>	<b>H</b>	<b>M</b>
Reviewed by (Name/Title): Ryan Moon, CIH, CSP		Critical	<b>E</b>	<b>H</b>	<b>H</b>	<b>M</b>	<b>L</b>
		Marginal	<b>H</b>	<b>M</b>	<b>M</b>	<b>L</b>	<b>L</b>
Notes: (Field Notes, Review Comments, etc.)		Negligible	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
		Step 1: Review each <b>"Hazard"</b> with identified safety <b>"Controls"</b> and determine RAC (See above)					
"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.					<b>RAC Chart</b>		
"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible					<b>E = Extremely High Risk</b>		
Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.					<b>H = High Risk</b>		
					<b>M = Moderate Risk</b>		
		<b>L = Low Risk</b>					
<b>Job Steps</b>	<b>Hazards</b>	<b>Controls</b>				<b>RAC</b>	
1. Subsurface Utility Clearance	Electrical shock (low voltage [millivolts])	<ul style="list-style-type: none"> <li>When connecting surveying equipment, make sure connections are undamaged and clear of potential obstructions.</li> <li>Make sure the area around the equipment is dry.</li> </ul>				<b>L</b>	
	Struck by Passing Vehicles.	<ul style="list-style-type: none"> <li>Park field-support vehicles as far from roads and public rights-of-way as possible.</li> <li>Establish safe speed limit on access roads</li> </ul>				<b>M</b>	
	Slip, Trip, Fall, Laceration, Cut, Abrasion to Skin	<ul style="list-style-type: none"> <li>Inspect work area and equipment for hazardous conditions and correct situation before continuing with other work.</li> <li>Create awareness though active monitoring of the site and field activities.</li> <li>Wear proper clothing and safety equipment (gloves, boots, hard hats, and eye protection, reflective safety vest [high-visibility orange or green]).</li> </ul>				<b>L</b>	
	Pinching Fingers, Dropping Objects on Feet, Back Strain	<ul style="list-style-type: none"> <li>Wear gloves and steel-toe boots.</li> <li>Never lift more than 50 pounds without mechanical assistance.</li> <li>Use proper lifting techniques.</li> </ul>				<b>L</b>	

	Material in Eyes, Foot Injuries, Head Injuries	<ul style="list-style-type: none"> <li>• Use protective eyewear.</li> <li>• Wear steel-toe boots.</li> <li>• If foot puncture hazard exists, employ the use of Rhino Tuff Insoles®.</li> <li>• Wear hard hat if overhead hazards exist.</li> <li>• Ensure eyewash station meeting ANSI Standard Z358.1-2009 is on site.</li> </ul>	L
	Insect Bites	<ul style="list-style-type: none"> <li>• Receive instruction in recognition and identification of hazardous insects.</li> <li>• Wear protective clothing.</li> <li>• Apply insect repellants.</li> <li>• If necessary, treat infested area with insecticides.</li> </ul>	L
	Poisonous Plants	<ul style="list-style-type: none"> <li>• Receive instruction in recognition and identification of poisonous plants.</li> <li>• Wear protective clothing.</li> <li>• When practical, remove and destroy plant.</li> <li>• Cleanse affected body area with soap and water.</li> </ul>	L
	Exposure to Severe Inclement Weather	<ul style="list-style-type: none"> <li>• Wear clothing suitable for weather and work conditions.</li> <li>• At a minimum, wear a short-sleeve shirt, long pants, and protective footwear during warm weather conditions.</li> <li>• Apply sunscreen.</li> <li>• During cold weather conditions, dress in layers for appropriate level of warmth.</li> </ul>	L
2. Task Specific Mobilization/ Demobilization/Site Setup	Inspection of Excavator	<ul style="list-style-type: none"> <li>• Make sure the vehicle is properly parked when checking the undercarriage.</li> <li>• Wear proper PPE and eye protection in case of spilling hydraulic fluid.</li> <li>• Make sure there are no loose joints on the heavy equipment.</li> </ul>	M
	Staging of IDW Bins and Drums	<ul style="list-style-type: none"> <li>• Use proper lifting techniques and use help when required.</li> <li>• When using forklift, ensure the operator is qualified and properly trained.</li> <li>• Do not block emergency exit points.</li> </ul>	L
	Auto Accident	<ul style="list-style-type: none"> <li>• Establish safe speed limit on access roads.</li> <li>• Stay alert and obey all traffic laws.</li> <li>• Be aware of other traffic around you.</li> <li>• Reduce speed during inclement weather.</li> <li>• Wear seat belt.</li> </ul>	M
	Slip, Trip, Fall, Laceration, Cut, Abrasion to Skin	<ul style="list-style-type: none"> <li>• Inspect work area and equipment for hazardous conditions and correct situation before continuing with other work.</li> <li>• Create awareness through active monitoring of the site and field activities.</li> </ul>	L
	Pinching Fingers, Dropping Objects on Feet, Back Strain	<ul style="list-style-type: none"> <li>• Wear gloves and steel-toe boots.</li> </ul>	L

		<ul style="list-style-type: none"> <li>• Never lift more than 50 pounds without mechanical assistance.</li> <li>• Use proper lifting techniques.</li> </ul>	
	Insect Bites	<ul style="list-style-type: none"> <li>• Receive instruction in recognition and identification of hazardous insects.</li> <li>• Wear protective clothing.</li> <li>• Apply insect repellants.</li> <li>• If necessary, treat infested area with insecticides.</li> </ul>	L
	Poisonous Plants	<ul style="list-style-type: none"> <li>• Receive instruction in recognition and identification of poisonous plants.</li> <li>• Wear protective clothing.</li> <li>• When practical, remove and destroy plant.</li> <li>• Cleanse affected body area with soap and water.</li> </ul>	L
	Exposure to Severe Inclement Weather	<ul style="list-style-type: none"> <li>• Wear clothing suitable for weather and work conditions.</li> <li>• At a minimum, wear a short-sleeve shirt, long pants, and protective footwear during warm weather conditions.</li> <li>• Apply sunscreen.</li> <li>• During cold weather conditions, dress in layers for appropriate level of warmth.</li> </ul>	L
	Material in Eyes, Foot Injuries, Head Injuries	<ul style="list-style-type: none"> <li>• Wear clothing suitable for weather and work conditions.</li> <li>• At a minimum, wear a short-sleeve shirt, long pants, and protective footwear during warm weather conditions.</li> <li>• Apply sunscreen.</li> <li>• During cold weather conditions, dress in layers for appropriate level of warmth.</li> </ul>	L
3. Excavation	Exposure to Chemical Hazards	<ul style="list-style-type: none"> <li>• Wear appropriate levels of PPE.</li> <li>• When applicable, monitor for organic vapors in work zones and breathing zones.</li> <li>• Wash hands before eating and drinking.</li> <li>• Remove and properly store or dispose of contaminated clothing before leaving the work site.</li> </ul>	L
	Elevated Noise Levels	<ul style="list-style-type: none"> <li>• Use hearing protection when necessary or above 85 dBA.</li> <li>• Establish an exclusion zone so that only essential personnel are close to noisy equipment.</li> </ul>	L
	Being Struck by Heavy Equipment	<ul style="list-style-type: none"> <li>• Stay clear of rotating equipment.</li> <li>• Make sure there are no loose hair, jewelry, loose-fitting PPE, and loose clothing that might get caught in moving mechanical parts.</li> </ul>	M

		<ul style="list-style-type: none"> <li>• Only professionally trained personnel may operate heavy machinery. Direct-push rig operator will be provided by a subcontractor to be determined.</li> <li>• Follow the drilling procedures as stated in Worksheet #14 of the Sampling and Analysis Plan, Appendix A of the Work Plan.</li> </ul>	
	Slip, Trip, Fall, Laceration, Cut, Abrasion to Skin	<ul style="list-style-type: none"> <li>• Inspect work area and equipment for hazardous conditions and correct situation before continuing with other work.</li> <li>• Create awareness through active monitoring of the site and field activities.</li> </ul>	L
	Material in Eyes, Foot Injuries, Head Injuries	<ul style="list-style-type: none"> <li>• Wear clothing suitable for weather and work conditions.</li> <li>• At a minimum, wear a short-sleeve shirt, long pants, and protective footwear during warm weather conditions.</li> <li>• Apply sunscreen.</li> <li>• During cold weather conditions, dress in layers for appropriate level of warmth.</li> </ul>	L
	Exposure to Severe Inclement Weather	<ul style="list-style-type: none"> <li>• Wear clothing suitable for weather and work conditions.</li> <li>• At a minimum, wear a short-sleeve shirt, long pants, and protective footwear during warm weather conditions.</li> <li>• Apply sunscreen.</li> <li>• During cold weather conditions, dress in layers for appropriate level of warmth.</li> </ul>	L
	Pinching Fingers, Dropping Objects on Feet, Back Strain	<ul style="list-style-type: none"> <li>• Wear gloves and steel-toe boots.</li> <li>• Never lift more than 50 pounds without mechanical assistance.</li> <li>• Use proper lifting techniques.</li> </ul>	L
	MEC/MDEH	<ul style="list-style-type: none"> <li>• Ensure Exclusion Zones are established at authorized Minimum Separation Distances for Non-Project Personnel and Team Separation Distances for Project Personnel.</li> <li>• Use the minimum number of personnel (not less than two) to conduct the operation and minimize their exposure time to MEC.</li> <li>• Ensure all personnel are qualified UXO Technicians IAW TP-18 for the position filled.</li> <li>• Observe and follow team separation distances as established by the ESS.</li> <li>• UXO Technicians shall review any archival information available regarding the area where operations will be conducted, and determine the level of risk associated with traversing the area and any additional specific safety considerations.</li> <li>• Observe general MEC hazards and safety precautions.</li> <li>• Ensure compliance with the APP and relevant SOPs.</li> </ul>	M

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
<ol style="list-style-type: none"> <li>1. Direct-Push Rig</li> <li>2. Excavator and hand digging tools</li> <li>3. Drum dolly</li> <li>4. Forklift</li> <li>5. PID to monitor for VOCs</li> <li>6. Level D: Hard hat, short-sleeve shirt, full-length pants, safety-toe boots, safety glasses, chemically protective gloves when collecting and handling samples (as necessary).</li> <li>7. Use standard cloth or leather gloves when handling equipment.</li> <li>8. Hearing protection</li> <li>9. Eyewash station meeting ANSI Standard Z358.1-2009</li> <li>10. First aid kit, fire extinguisher.</li> <li>11. Glass and plastic bottles</li> </ol>	<ul style="list-style-type: none"> <li>• Qualified heavy equipment personnel</li> <li>• Nores, James</li> <li>• Documented training and experience or site documented review and acceptance of qualification to operate assigned equipment</li> <li>• Equipment operator certifications available certifications are attached. For any heavy equipment certifications not included site specific heavy equipment certifications will be conducted prior to the start of field excavations. Make sure the work area is cleared before beginning operations.</li> <li>• All field personnel will have HAZWOPER 40-hour training and first aid and CPR training.</li> <li>• At least one field person will have HAZWOPER supervisor training.</li> <li>• Field personnel will be required to read and understand the Work Plan and Site Safety and Health Plan prior to start of field activities.</li> <li>• Battelle PM and SSHO will ensure that field personnel are specifically trained in the field tasks that they are required to perform.</li> <li>• Daily tailgate health and safety briefings will be conducted.</li> <li>• Follow procedures as stated in the Worksheet #14 of the Sampling and Analysis Plan, Appendix A of the Work Plan.</li> <li>• Field personnel will also be instructed on sample preparation techniques.</li> </ul>	<p>Three Phases: Pre/during/post</p> <ol style="list-style-type: none"> <li>1-4. Daily inspections.</li> <li>5. Ensure battery is charged and PID is calibrated on a daily basis</li> <li>6-19. Daily inspections.</li> <li>10. Ensure fire extinguisher is properly certified.</li> <li>11. All samples will be inspected prior to shipment or courier pickup by the field sampler. This inspection will be required to ensure a safe and secure sample environment for the transporter.</li> </ol>

Activity/Work Task: <b>Silt Fence Installation</b>		Overall Risk Assessment Code (RAC) (Use highest code)				<b>M</b>	
Project Location: <b>UXO 3, Dredge Pond 3E and Northern Marine Corps Firing Range, Former Mare Island Naval Shipyard, Vallejo, California</b>		<b>Risk Assessment Code (RAC) Matrix</b>					
Contract Number: N62473-11-D-2228 TO 0006		<b>Severity</b>	<b>Probability</b>				
Date Prepared: 10/09/2015			Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title): Max Zelenevich/Researcher		Catastrophic	E	E	H	H	M
Reviewed by (Name/Title): Ryan Moon, CIH, CSP		Critical	E	H	H	M	L
		Marginal	H	M	M	L	L
<b>Notes:</b> (Field Notes, Review Comments, etc.)		Negligible	M	L	L	L	L
		Step 1: Review each <b>"Hazard"</b> with identified safety <b>"Controls"</b> and determine RAC (See above)					
		"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.				<b>RAC Chart</b>	
		"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible				E = Extremely High Risk	
		Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.				H = High Risk	
						M = Moderate Risk	
						L = Low Risk	
<b>Job Steps</b>		<b>Hazards</b>		<b>Controls</b>			<b>RAC</b>
1. Silt Fence Installation		Slip, Trip, Fall, Laceration, Cut, Abrasion to Skin		<ul style="list-style-type: none"> <li>Inspect work area and equipment for hazardous conditions and correct situation before continuing with other work.</li> <li>Create awareness through active monitoring of the site and field activities.</li> <li>Wear proper clothing and safety equipment (gloves, boots, hard hats, eye protection, reflective safety vest [high-visibility orange or green]).</li> <li>Have certification in first aid treatment and procedures.</li> <li>Conduct daily health and safety briefings.</li> <li>Ensure all personnel are trained in a proper response in case of an emergency.</li> </ul>			<b>M</b>
		Pinching Fingers, Dropping Objects on Feet, Back Strain		<ul style="list-style-type: none"> <li>Wear gloves and steel-toe boots.</li> <li>Never lift more than 50 pounds without mechanical assistance.</li> <li>Use proper lifting techniques.</li> </ul>			<b>L</b>
		Material in Eyes, Foot Injuries, Head Injuries		<ul style="list-style-type: none"> <li>Use protective eyewear.</li> <li>Wear steel-toe boots.</li> <li>If foot puncture hazard exists, employ the use of Rhino Tuff Insoles®.</li> <li>Wear hard hat if overhead hazards exist.</li> <li>Ensure eyewash station meeting ANSI Standard Z358.1-2009 is on site.</li> </ul>			<b>L</b>
		Insect Bites		<ul style="list-style-type: none"> <li>Receive instruction in recognition and identification of hazardous insects.</li> </ul>			<b>L</b>

		<ul style="list-style-type: none"> <li>• Wear protective clothing.</li> <li>• Apply insect repellants.</li> <li>• If necessary, treat infested area with insecticides.</li> </ul>	
	Poisonous Plants	<ul style="list-style-type: none"> <li>• Receive instruction in recognition and identification of poisonous plants.</li> <li>• Wear protective clothing.</li> <li>• When practical, remove and destroy plant.</li> <li>• Cleanse affected body area with soap and water.</li> </ul>	L
	Exposure to Severe Inclement Weather	<ul style="list-style-type: none"> <li>• Wear clothing suitable for weather and work conditions.</li> <li>• At a minimum, wear a short-sleeve shirt, long pants, and protective footwear during warm weather conditions.</li> <li>• Apply sunscreen.</li> <li>• During cold weather conditions, dress in layers for appropriate level of warmth.</li> </ul>	L
	Exposure to Chemical Hazards	<ul style="list-style-type: none"> <li>• Wear appropriate levels of PPE.</li> <li>• When applicable, monitor for organic vapors in work zones and breathing zones.</li> <li>• Wash hands before eating and drinking.</li> <li>• Remove and properly store or dispose of contaminated clothing before leaving the work site.</li> <li>• Follow the soil sampling procedures as stated in Worksheet #14 of the Sampling and Analysis Plan, Appendix A of the Work Plan.</li> </ul>	L
	Vehicle Driving	<ul style="list-style-type: none"> <li>• Do not drive at speeds greater than the posted speed limits</li> <li>• Verify vehicles are in good operating condition for at all times (i.e., all lights, brakes, and gauges working by manufacturer's specifications), fluids topped and an inspection form completed and any damage noted</li> <li>• Ensure cut vegetation is properly secured to the vehicle prior to transport to the disposal facility</li> <li>• Cell phone use while driving is not allowed while the vehicle is in motion</li> <li>• Park vehicle on paved surfaces whenever possible Controls</li> </ul>	L

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
<ol style="list-style-type: none"> <li>1. Hand tools.</li> <li>2. Level D: Hard hat, short-sleeve shirt, full-length pants, safety-toe boots, safety glasses, chemically protective gloves when collecting and handling samples (as necessary).</li> <li>3. Use standard cloth or leather gloves when handling equipment.</li> <li>4. Hearing protection</li> <li>5. Eyewash station meeting ANSI Standard Z358.1-2009</li> <li>6. First aid kit, fire extinguisher.</li> </ol>	<ul style="list-style-type: none"> <li>• Only competent and trained personnel (i.e., general laborer familiar with the task [TBD]) should operate the equipment.</li> <li>• Make sure the work area is cleared before beginning operations.</li> <li>• All field personnel will have HAZWOPER 40-hour training and first aid and CPR training.</li> <li>• At least one field person will have HAZWOPER supervisor training.</li> <li>• Field personnel will be required to read and understand the Work Plan and Site Safety and Health Plan prior to start of field activities.</li> <li>• Battelle PM and SSHO will ensure that field personnel are specifically trained in the field tasks that they are required to perform.</li> <li>• Daily tailgate health and safety briefings will be conducted.</li> <li>• Follow procedures as stated in the Worksheet #14 of the Sampling and Analysis Plan, Appendix A of the Work Plan.</li> <li>• Refer to Appendix C of the Work Plan (Radiological Handling Plan) for special training radiation training requirements for personnel.</li> </ul>	<p>Three Phases: Pre/during/post</p> <ol style="list-style-type: none"> <li>1-5. Daily inspections.</li> <li>6. Ensure fire extinguisher is properly certified.</li> </ol>

Activity/Work Task: <b>Soil and Groundwater Sampling</b>		Overall Risk Assessment Code (RAC) (Use highest code)				<b>M</b>	
Project Location: <b>UXO 3, Dredge Pond 3E and Northern Marine Corps Firing Range, Former Mare Island Naval Shipyard, Vallejo, California</b>		<b>Risk Assessment Code (RAC) Matrix</b>					
Contract Number: N62473-11-D-2228 TO 0006		<b>Severity</b>	<b>Probability</b>				
Date Prepared: 10/09/2015			Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title): Max Zelenevich/Researcher		Catastrophic	E	E	H	H	M
Reviewed by (Name/Title): Ryan Moon, CIH, CSP		Critical	E	H	H	M	L
		Marginal	H	M	M	L	L
<b>Notes:</b> (Field Notes, Review Comments, etc.)		Negligible	M	L	L	L	L
		Step 1: Review each <b>"Hazard"</b> with identified safety <b>"Controls"</b> and determine RAC (See above)					
		<b>"Probability"</b> is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.				<b>RAC Chart</b>	
		<b>"Severity"</b> is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible				E = Extremely High Risk	
		Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.				H = High Risk	
						M = Moderate Risk	
						L = Low Risk	
<b>Job Steps</b>		<b>Hazards</b>		<b>Controls</b>			<b>RAC</b>
1. Subsurface Utility Clearance		Electrical shock (low voltage [millivolts])		<ul style="list-style-type: none"> <li>When connecting surveying equipment, make sure connections are undamaged and clear of potential obstructions.</li> <li>Make sure the area around the equipment is dry.</li> </ul>			L
		Struck by Passing Vehicles.		<ul style="list-style-type: none"> <li>Park field-support vehicles as far from roads and public rights-of-way as possible.</li> <li>Establish safe speed limit on access roads</li> </ul>			M
		Slip, Trip, Fall, Laceration, Cut, Abrasion to Skin		<ul style="list-style-type: none"> <li>Inspect work area and equipment for hazardous conditions and correct situation before continuing with other work.</li> <li>Create awareness through active monitoring of the site and field activities.</li> <li>Wear proper clothing and safety equipment (gloves, boots, hard hats, and eye protection, reflective safety vest [high-visibility orange or green]).</li> </ul>			L
		Pinching Fingers, Dropping Objects on Feet, Back Strain		<ul style="list-style-type: none"> <li>Wear gloves and steel-toe boots.</li> <li>Never lift more than 50 pounds without mechanical assistance.</li> <li>Use proper lifting techniques.</li> </ul>			L

	Material in Eyes, Foot Injuries, Head Injuries	<ul style="list-style-type: none"> <li>• Use protective eyewear.</li> <li>• Wear steel-toe boots.</li> <li>• If foot puncture hazard exists, employ the use of Rhino Tuff Insoles®.</li> <li>• Wear hard hat if overhead hazards exist.</li> <li>• Ensure eyewash station meeting ANSI Standard Z358.1-2009 is on site.</li> </ul>	L
	Insect Bites	<ul style="list-style-type: none"> <li>• Receive instruction in recognition and identification of hazardous insects.</li> <li>• Wear protective clothing.</li> <li>• Apply insect repellants.</li> <li>• If necessary, treat infested area with insecticides.</li> </ul>	L
	Poisonous Plants	<ul style="list-style-type: none"> <li>• Receive instruction in recognition and identification of poisonous plants.</li> <li>• Wear protective clothing.</li> <li>• When practical, remove and destroy plant.</li> <li>• Cleanse affected body area with soap and water.</li> </ul>	L
	Exposure to Severe Inclement Weather	<ul style="list-style-type: none"> <li>• Wear clothing suitable for weather and work conditions.</li> <li>• At a minimum, wear a short-sleeve shirt, long pants, and protective footwear during warm weather conditions.</li> <li>• Apply sunscreen.</li> <li>• During cold weather conditions, dress in layers for appropriate level of warmth.</li> </ul>	L
2. Task Specific Mobilization/ Demobilization/Site Setup	Inspection of Direct-Push Rig and Excavator	<ul style="list-style-type: none"> <li>• Initial inspection will be completed by competent person and daily inspections will be completed by operator using CESO Checklist 18-04, provided in Appendix H.</li> <li>• Make sure the vehicle is properly parked when checking the undercarriage.</li> <li>• Wear proper PPE and eye protection in case of spilling hydraulic fluid.</li> <li>• Make sure there are no loose joints on the heavy equipment.</li> </ul>	M
	Staging of IDW Bins and Drums	<ul style="list-style-type: none"> <li>• Use proper lifting techniques and use help when required.</li> <li>• When using forklift, ensure the operator is qualified and properly trained.</li> <li>• Do not block emergency exit points.</li> </ul>	L
	Auto Accident	<ul style="list-style-type: none"> <li>• Establish safe speed limit on access roads.</li> <li>• Stay alert and obey all traffic laws.</li> <li>• Be aware of other traffic around you.</li> <li>• Reduce speed during inclement weather.</li> <li>• Wear seat belt.</li> </ul>	M
	Slip, Trip, Fall, Laceration, Cut, Abrasion to Skin	<ul style="list-style-type: none"> <li>• Inspect work area and equipment for hazardous conditions and correct situation before continuing with other work.</li> </ul>	L

		<ul style="list-style-type: none"> <li>• Create awareness through active monitoring of the site and field activities.</li> </ul>	
	Pinching Fingers, Dropping Objects on Feet, Back Strain	<ul style="list-style-type: none"> <li>• Wear gloves and steel-toe boots.</li> <li>• Never lift more than 50 pounds without mechanical assistance.</li> <li>• Use proper lifting techniques.</li> </ul>	L
	Insect Bites	<ul style="list-style-type: none"> <li>• Receive instruction in recognition and identification of hazardous insects.</li> <li>• Wear protective clothing.</li> <li>• Apply insect repellants.</li> <li>• If necessary, treat infested area with insecticides.</li> </ul>	L
	Poisonous Plants	<ul style="list-style-type: none"> <li>• Receive instruction in recognition and identification of poisonous plants.</li> <li>• Wear protective clothing.</li> <li>• When practical, remove and destroy plant.</li> <li>• Cleanse affected body area with soap and water.</li> </ul>	L
	Exposure to Severe Inclement Weather	<ul style="list-style-type: none"> <li>• Wear clothing suitable for weather and work conditions.</li> <li>• At a minimum, wear a short-sleeve shirt, long pants, and protective footwear during warm weather conditions.</li> <li>• Apply sunscreen.</li> <li>• During cold weather conditions, dress in layers for appropriate level of warmth.</li> </ul>	L
	Material in Eyes, Foot Injuries, Head Injuries	<ul style="list-style-type: none"> <li>• Wear clothing suitable for weather and work conditions.</li> <li>• At a minimum, wear a short-sleeve shirt, long pants, and protective footwear during warm weather conditions.</li> <li>• Apply sunscreen.</li> <li>• During cold weather conditions, dress in layers for appropriate level of warmth.</li> </ul>	L
3. Setting up the Direct-Push Rig	Being Struck by Heavy Equipment	<ul style="list-style-type: none"> <li>• Stay clear of rotating equipment.</li> <li>• Make sure there are no loose hair, jewelry, loose-fitting PPE, and loose clothing that might get caught in moving mechanical parts. NOTE: loose clothing is prohibited during the use of drilling equipment.</li> <li>• Only professionally trained personnel may operate heavy machinery. Direct-push rig operator will be provided by a subcontractor to be determined.</li> <li>• Follow the drilling procedures as stated in Worksheet #14 of the Sampling and Analysis Plan, Appendix A of the Work Plan.</li> </ul>	M
	Slip, Trip, Fall, Laceration, Cut, Abrasion to Skin	<ul style="list-style-type: none"> <li>• Inspect work area and equipment for hazardous conditions and correct situation before continuing with other work.</li> </ul>	L

		<ul style="list-style-type: none"> <li>• Create awareness though active monitoring of the site and field activities.</li> </ul>	
	Overhead Utilities	<ul style="list-style-type: none"> <li>• Drilling equipment shall be posted with signs warning the operator of electrical hazards.</li> <li>• Equipment operator shall ensure proper clearance before moving equipment.</li> <li>• Clearance shall be monitored by a spotter or by an electrical proximity warning device.</li> </ul>	<b>M</b>
	Tipping Over	<ul style="list-style-type: none"> <li>• Equipment shall not be transported with the mast up.</li> <li>• Prior to setup, survey for overhead and terrain hazards.</li> <li>• Inspect surface for stability and the absence of holes, other ground hazards, and electrical hazards.</li> </ul>	<b>M</b>
	Auto Accident	<ul style="list-style-type: none"> <li>• Establish safe speed limit on access roads.</li> <li>• Stay alert and obey all traffic laws.</li> <li>• Be aware of other traffic around you.</li> <li>• Reduce speed during inclement weather.</li> <li>• Wear seat belt.</li> </ul>	<b>M</b>
	Struck by Passing Vehicles.	<ul style="list-style-type: none"> <li>• Park field-support vehicles as far from roads and public rights-of-way as possible.</li> <li>• Establish safe speed limit on access roads.</li> </ul>	<b>M</b>
4. Soil Sample Collection from Direct Push Cores and Test Pits	Exposure to Chemical Hazards	<ul style="list-style-type: none"> <li>• Wear appropriate levels of PPE.</li> <li>• When applicable, monitor for organic vapors in work zones and breathing zones.</li> <li>• Wash hands before eating and drinking.</li> <li>• Remove and properly store or dispose of contaminated clothing before leaving the work site.</li> <li>• Follow the soil sampling procedures as stated in Worksheet #14 of the Sampling and</li> <li>• Analysis Plan, Appendix A of the Work Plan.</li> </ul>	<b>L</b>
	Slip, Trip, Fall, Laceration, Cut, Abrasion to Skin	<ul style="list-style-type: none"> <li>• Inspect work area and equipment for hazardous conditions and correct situation before continuing with other work.</li> <li>• Create awareness though active monitoring of the site and field activities.</li> </ul>	<b>L</b>
	Material in Eyes, Foot Injuries, Head Injuries	<ul style="list-style-type: none"> <li>• Wear clothing suitable for weather and work conditions.</li> <li>• At a minimum, wear a short-sleeve shirt, long pants, and protective footwear during warm weather conditions.</li> <li>• Apply sunscreen.</li> </ul>	<b>L</b>

		<ul style="list-style-type: none"> <li>• During cold weather conditions, dress in layers for appropriate level of warmth.</li> </ul>	
	Exposure to Severe Inclement Weather	<ul style="list-style-type: none"> <li>• Wear clothing suitable for weather and work conditions.</li> <li>• At a minimum, wear a short-sleeve shirt, long pants, and protective footwear during warm weather conditions.</li> <li>• Apply sunscreen.</li> <li>• During cold weather conditions, dress in layers for appropriate level of warmth.</li> </ul>	L
	Pinching Fingers, Dropping Objects on Feet, Back Strain	<ul style="list-style-type: none"> <li>• Wear gloves and steel-toe boots.</li> <li>• Never lift more than 50 pounds without mechanical assistance.</li> <li>• Use proper lifting techniques.</li> </ul>	L
5. Groundwater Grab Samples	Exposure to Chemical Hazards	<ul style="list-style-type: none"> <li>• Wear appropriate levels of PPE.</li> <li>• When applicable, monitor for organic vapors in work zones and breathing zones.</li> <li>• Wash hands before eating and drinking.</li> <li>• Remove and properly store or dispose of contaminated clothing before leaving the work site.</li> <li>• Follow the soil sampling procedures as stated in Worksheet #14 of the Sampling and Analysis Plan, Appendix A of the Work Plan.</li> </ul>	L
	Material in Eyes, Foot Injuries, Head Injuries	<ul style="list-style-type: none"> <li>• Wear clothing suitable for weather and work conditions.</li> <li>• At a minimum, wear a short-sleeve shirt, long pants, and protective footwear during warm weather conditions.</li> <li>• Apply sunscreen.</li> <li>• During cold weather conditions, dress in layers for appropriate level of warmth.</li> </ul>	L
	Exposure to Severe Inclement Weather	<ul style="list-style-type: none"> <li>• Wear clothing suitable for weather and work conditions.</li> <li>• At a minimum, wear a short-sleeve shirt, long pants, and protective footwear during warm weather conditions.</li> <li>• Apply sunscreen.</li> <li>• During cold weather conditions, dress in layers for appropriate level of warmth.</li> </ul>	L

	Pinching Fingers, Dropping Objects on Feet, Back Strain	<ul style="list-style-type: none"> <li>• Wear gloves and steel-toe boots.</li> <li>• Never lift more than 50 pounds without mechanical assistance.</li> <li>• Use proper lifting techniques.</li> </ul>	L
Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements	
<ol style="list-style-type: none"> <li>1. Direct-Push Rig</li> <li>2. Excavator and hand digging tools</li> <li>3. Drum dolly</li> <li>4. Forklift</li> <li>5. PID to monitor for VOCs</li> <li>6. Level D: Hard hat, short-sleeve shirt, full-length pants, safety-toe boots, safety glasses, chemically protective gloves when collecting and handling samples (as necessary).</li> <li>7. Use standard cloth or leather gloves when handling equipment.</li> <li>8. Hearing protection</li> <li>9. Eyewash station meeting ANSI Standard Z358.1-2009</li> <li>10. First aid kit, fire extinguisher.</li> <li>11. Glass and plastic bottles</li> </ol>	<ul style="list-style-type: none"> <li>• Only competent and trained personnel (i.e. drill rig operator) should operate the equipment.</li> <li>• Make sure the work area is cleared before beginning operations.</li> <li>• All field personnel will have HAZWOPER 40-hour training and first aid and CPR training.</li> <li>• At least one field person will have HAZWOPER supervisor training.</li> <li>• Field personnel will be required to read and understand the Work Plan and Site Safety and Health Plan prior to start of field activities.</li> <li>• Battelle PM and SSO will ensure that field personnel are specifically trained in the field tasks that they are required to perform.</li> <li>• Daily tailgate health and safety briefings will be conducted.</li> <li>• Follow procedures as stated in the Worksheet #14 of the Sampling and Analysis Plan, Appendix A of the Work Plan.</li> <li>• Field personnel will also be instructed on sample preparation techniques.</li> </ul>	<p>Three Phases: Pre/during/post</p> <p>1-4. Daily inspections.</p> <p>5. Ensure battery is charged and PID is calibrated on a daily basis</p> <p>6-19. Daily inspections.</p> <p>10. Ensure fire extinguisher is properly certified.</p> <p>11. All samples will be inspected prior to shipment or courier pickup by the field sampler. This inspection will be required to ensure a safe and secure sample environment for the transporter.</p>	

Activity/Work Task: <b>Surface Radiological and DGM Survey</b>		Overall Risk Assessment Code (RAC) (Use highest code)				<b>L</b>	
Project Location: <b>UXO 3, Dredge Pond 3E and Northern Marine Corps Firing Range, Former Mare Island Naval Shipyard, Vallejo, California</b>		<b>Risk Assessment Code (RAC) Matrix</b>					
Contract Number: N62473-11-D-2228 TO 0006		<b>Severity</b>	<b>Probability</b>				
Date Prepared: 10/09/2015			Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title): Max Zelenevich/Researcher		Catastrophic	<b>E</b>	<b>E</b>	<b>H</b>	<b>H</b>	<b>M</b>
Reviewed by (Name/Title): Ryan Moon, CIH, CSP		Critical	<b>E</b>	<b>H</b>	<b>H</b>	<b>M</b>	<b>L</b>
		Marginal	<b>H</b>	<b>M</b>	<b>M</b>	<b>L</b>	<b>L</b>
		Negligible	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>Notes:</b> (Field Notes, Review Comments, etc.)		Step 1: Review each <b>"Hazard"</b> with identified safety <b>"Controls"</b> and determine RAC (See above)					
		"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.				<b>RAC Chart</b>	
		"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible				<b>E = Extremely High Risk</b>	
		Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.				<b>H = High Risk</b>	
				<b>M = Moderate Risk</b>			
				<b>L = Low Risk</b>			
<b>Job Steps</b>		<b>Hazards</b>		<b>Controls</b>			<b>RAC</b>
1. Perform Surface and Near-Surface Radiological Scans and DGM Survey		Slip, Trip, Fall, Laceration, Cut, Abrasion to Skin		<ul style="list-style-type: none"> <li>Inspect work area and equipment for hazardous conditions and correct situation before continuing with other work.</li> <li>Create awareness through active monitoring of the site and field activities.</li> <li>Wear proper clothing and safety equipment (gloves, boots, hard hats, and eye protection, reflective safety vest [high-visibility orange or green]).</li> <li>Have certification in first aid treatment and procedures.</li> <li>Conduct daily health and safety briefings.</li> <li>Ensure all personnel are trained in a proper response in case of an emergency.</li> </ul>			<b>L</b>
		Pinching Fingers, Dropping Objects on Feet, Back Strain		<ul style="list-style-type: none"> <li>Wear gloves and steel-toe boots.</li> <li>Never lift more than 50 pounds without mechanical assistance.</li> <li>Use proper lifting techniques.</li> </ul>			<b>L</b>
		Material in Eyes, Foot Injuries, Head Injuries		<ul style="list-style-type: none"> <li>Use protective eyewear.</li> <li>Wear steel-toe boots.</li> <li>If foot puncture hazard exists, employ the use of Rhino Tuff Insoles®.</li> <li>Wear hard hat if overhead hazards exist.</li> <li>Ensure eyewash station meeting ANSI Standard Z358.1-2009 is on site.</li> </ul>			<b>L</b>
		Insect Bites		<ul style="list-style-type: none"> <li>Receive instruction in recognition and identification of hazardous insects.</li> </ul>			<b>L</b>

		<ul style="list-style-type: none"> <li>• Wear protective clothing.</li> <li>• Apply insect repellants.</li> <li>• If necessary, treat infested area with insecticides.</li> </ul>	
	Poisonous Plants	<ul style="list-style-type: none"> <li>• Receive instruction in recognition and identification of poisonous plants.</li> <li>• Wear protective clothing.</li> <li>• When practical, remove and destroy plant.</li> <li>• Cleanse affected body area with soap and water.</li> </ul>	L
	Exposure to Severe Inclement Weather	<ul style="list-style-type: none"> <li>• Wear clothing suitable for weather and work conditions.</li> <li>• At a minimum, wear a short-sleeve shirt, long pants, and protective footwear during warm weather conditions.</li> <li>• Apply sunscreen.</li> <li>• During cold weather conditions, dress in layers for appropriate level of warmth.</li> </ul>	L
2. Use All Terrain Vehicle (ATV) to Pull Survey Equipment	Equipment Crash or Roll-Over	<ul style="list-style-type: none"> <li>• Ensure ATV operator is qualified and experienced in use of the equipment. The operator must demonstrate operating skills within the site terrain prior to full scale operation at the site. For UXO-3, the operator must demonstrate competence safely operating up and down the levee from the road into the pond bottom without the risk of rolling over.</li> <li>• Onsite speed shall not exceed 10 miles per hour.</li> <li>• The ATV shall be equipped with: <ul style="list-style-type: none"> <li>○ An adequate audible warning device (horn) at the operator's station in operable condition (if determined necessary for the work being performed); and</li> <li>○ Brake lights in operable condition (regardless of light conditions).</li> </ul> </li> <li>• Gloves and a helmet shall be worn while operating the ATV.</li> <li>• The ATVs will not be driven on public roadways except to cross the roadway.</li> <li>• Only ATVs with four or more wheels may be used.</li> <li>• Tires shall be inflated to the pressures recommended by the manufacturer.</li> </ul>	L
3. Probabilistic Soil Sampling	Exposure to Chemical Hazards	<ul style="list-style-type: none"> <li>• Wear appropriate levels of PPE.</li> <li>• When applicable, monitor for organic vapors in work zones and breathing zones.</li> <li>• Wash hands before eating and drinking.</li> <li>• Remove and properly store or dispose of contaminated clothing before leaving the work site.</li> <li>• Follow the soil sampling procedures as stated in Worksheet #14 of the Sampling and Analysis Plan, Appendix A of the Work Plan.</li> </ul>	L

	Slip, Trip, Fall, Laceration, Cut, Abrasion to Skin	<ul style="list-style-type: none"> <li>Inspect work area and equipment for hazardous conditions and correct situation before continuing with other work.</li> <li>Create awareness through active monitoring of the site and field activities.</li> </ul>	L
	Pinching Fingers, Dropping Objects on Feet, Back Strain	<ul style="list-style-type: none"> <li>Wear gloves and steel-toe boots.</li> <li>Never lift more than 50 pounds without mechanical assistance.</li> <li>Use proper lifting techniques.</li> </ul>	L
	Insect Bites	<ul style="list-style-type: none"> <li>Receive instruction in recognition and identification of hazardous insects.</li> <li>Wear protective clothing.</li> <li>Apply insect repellants.</li> <li>If necessary, treat infested area with insecticides.</li> </ul>	L
	Poisonous Plants	<ul style="list-style-type: none"> <li>Receive instruction in recognition and identification of poisonous plants.</li> <li>Wear protective clothing.</li> <li>When practical, remove and destroy plant.</li> <li>Cleanse affected body area with soap and water.</li> </ul>	L
	Exposure to Severe Inclement Weather	<ul style="list-style-type: none"> <li>Wear clothing suitable for weather and work conditions.</li> <li>At a minimum, wear a short-sleeve shirt, long pants, and protective footwear during warm weather conditions.</li> <li>Apply sunscreen.</li> <li>During cold weather conditions, dress in layers for appropriate level of warmth.</li> </ul>	L

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
<ol style="list-style-type: none"> <li>Level D: Hard hat, short-sleeve shirt, full-length pants, safety-toe boots, safety glasses, chemically protective gloves when collecting and handling samples (as necessary).</li> <li>Use standard cloth or leather gloves when handling equipment.</li> <li>Hearing protection</li> </ol>	<ul style="list-style-type: none"> <li>Only competent and trained personnel (i.e., Max Zelenevich and one TBD RAD personnel) should operate the equipment.</li> <li>Make sure the work area is cleared before beginning operations.</li> <li>All field personnel will have HAZWOPER 40-hour training and first aid and CPR training.</li> <li>At least one field person will have HAZWOPER</li> </ul>	<p>Three Phases: Pre/during/post</p> <ol style="list-style-type: none"> <li>Daily inspections.</li> <li>Ensure fire extinguisher is properly certified.</li> </ol>

<ol style="list-style-type: none"><li>4. Eyewash station meeting ANSI Standard Z358.1-2009</li><li>5. Excavator and/or Hand Digging Tools</li><li>6. First aid kit, fire extinguisher.</li></ol>	<ul style="list-style-type: none"><li>• supervisor training.</li><li>• Field personnel will be required to read and understand the Work Plan and Site Safety and Health Plan prior to start of field activities.</li><li>• Battelle PM and SSHO will ensure that field personnel are specifically trained in the field tasks that they are required to perform.</li><li>• Daily tailgate health and safety briefings will be conducted.</li><li>• Follow procedures as stated in the Worksheet #14 of the Sampling and Analysis Plan, Appendix A of the Work Plan.</li><li>• Refer to Appendix C of the Work Plan (Radiological Handling Plan) for special training radiation training requirements for personnel.</li></ul>	
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Activity/Work Task: <b>Vegetation Removal</b>		Overall Risk Assessment Code (RAC) (Use highest code)				<b>M</b>	
Project Location: <b>UXO 3, Dredge Pond 3E and Northern Marine Corps Firing Range, Former Mare Island Naval Shipyard, Vallejo, California</b>		<b>Risk Assessment Code (RAC) Matrix</b>					
Contract Number: N62473-11-D-2228 TO 0006		<b>Severity</b>	<b>Probability</b>				
Date Prepared: 10/09/2015			Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title): Max Zelenevich/Researcher		Catastrophic	E	E	H	H	M
Reviewed by (Name/Title): Ryan Moon, CIH, CSP		Critical	E	H	H	M	L
		Marginal	H	M	M	L	L
<b>Notes:</b> (Field Notes, Review Comments, etc.)		Negligible	M	L	L	L	L
		Step 1: Review each <b>"Hazard"</b> with identified safety <b>"Controls"</b> and determine RAC (See above)					
		"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.				<b>RAC Chart</b>	
		"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible				E = Extremely High Risk	
		Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.				H = High Risk	
						M = Moderate Risk	
						L = Low Risk	
<b>Job Steps</b>	<b>Hazards</b>	<b>Controls</b>				<b>RAC</b>	
1. Vegetation Removal	Slip, Trip, Fall, Laceration, Cut, Abrasion to Skin	<ul style="list-style-type: none"> <li>Inspect work area and equipment for hazardous conditions and correct situation before continuing with other work.</li> <li>Create awareness through active monitoring of the site and field activities.</li> <li>Wear proper clothing and safety equipment (gloves, boots, hard hats, and eye protection, reflective safety vest [high-visibility orange or green]).</li> <li>Have certification in first aid treatment and procedures.</li> <li>Conduct daily health and safety briefings.</li> <li>Ensure all personnel are trained in a proper response in case of an emergency.</li> </ul>				<b>M</b>	
	Pinching Fingers, Dropping Objects on Feet, Back Strain	<ul style="list-style-type: none"> <li>Wear gloves and steel-toe boots.</li> <li>Never lift more than 50 pounds without mechanical assistance.</li> <li>Use proper lifting techniques.</li> </ul>				<b>L</b>	
	Material in Eyes, Foot Injuries, Head Injuries	<ul style="list-style-type: none"> <li>Use protective eyewear.</li> <li>Wear steel-toe boots.</li> <li>If foot puncture hazard exists, employ the use of Rhino Tuff Insoles®.</li> <li>Wear hard hat if overhead hazards exist.</li> <li>Ensure eyewash station meeting ANSI Standard Z358.1-2009 is on site.</li> </ul>				<b>L</b>	
	Insect Bites	<ul style="list-style-type: none"> <li>Receive instruction in recognition and identification of hazardous insects.</li> </ul>				<b>L</b>	

		<ul style="list-style-type: none"> <li>• Wear protective clothing.</li> <li>• Apply insect repellants.</li> <li>• If necessary, treat infested area with insecticides.</li> </ul>	
	Poisonous Plants	<ul style="list-style-type: none"> <li>• Receive instruction in recognition and identification of poisonous plants.</li> <li>• Wear protective clothing.</li> <li>• When practical, remove and destroy plant.</li> <li>• Cleanse affected body area with soap and water.</li> </ul>	L
	Exposure to Severe Inclement Weather	<ul style="list-style-type: none"> <li>• Wear clothing suitable for weather and work conditions.</li> <li>• At a minimum, wear a short-sleeve shirt, long pants, and protective footwear during warm weather conditions.</li> <li>• Apply sunscreen.</li> <li>• During cold weather conditions, dress in layers for appropriate level of warmth.</li> </ul>	L
	Exposure to Chemical Hazards	<ul style="list-style-type: none"> <li>• Wear appropriate levels of PPE.</li> <li>• When applicable, monitor for organic vapors in work zones and breathing zones.</li> <li>• Wash hands before eating and drinking.</li> <li>• Remove and properly store or dispose of contaminated clothing before leaving the work site.</li> <li>• Follow the soil sampling procedures as stated in Worksheet #14 of the Sampling and Analysis Plan, Appendix A of the Work Plan.</li> </ul>	L
	Elevated Noise Levels	<ul style="list-style-type: none"> <li>• Use hearing protection when necessary or above 85 dBA.</li> <li>• Establish an exclusion zone so that only essential personnel are close to noisy equipment.</li> </ul>	L
	Vegetation Removal Machinery	<ul style="list-style-type: none"> <li>• Inspect blades and safety equipment daily prior to start of work</li> <li>• Ensure personnel trained on equipment used</li> <li>• Keep blades from contacting ground surface during operations</li> <li>• Start cutting brush from the top and work towards the ground surface</li> <li>• Maintain a 25 ft safety distance between machine operators and others</li> <li>• Allow engines to cool for 5 minutes prior to refueling</li> <li>• Fuel equipment using a drip pan to catch any spills</li> </ul>	M
	Vehicle Driving	<ul style="list-style-type: none"> <li>• Do not drive at speeds greater than the posted speed limits</li> <li>• Verify vehicles are in good operating condition for at all times (i.e., all lights, brakes, and gauges working by manufacturer's specifications), fluids topped and an inspection form completed and any damage noted</li> </ul>	L

- Ensure cut vegetation is properly secured to the vehicle prior to transport to the disposal facility
- Cell phone use while driving is not allowed while the vehicle is in motion
- Park vehicle on paved surfaces whenever possible Controls



Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
<ol style="list-style-type: none"> <li>1. Manual cutting tools.</li> <li>2. Weed eater with metal blade/chainsaws.</li> <li>3. Powered mower.</li> <li>4. Level D: Hard hat, short-sleeve shirt, full-length pants, safety-toe boots, safety glasses, chemically protective gloves when collecting and handling samples (as necessary).</li> <li>5. Use standard cloth or leather gloves when handling equipment.</li> <li>6. Hearing protection</li> <li>7. Eyewash station meeting ANSI Standard Z358.1-2009</li> <li>8. First aid kit, fire extinguisher.</li> </ol>	<p>Only competent and trained personnel (i.e., properly trained and experienced laborer [TBD]) should operate the equipment.</p> <ul style="list-style-type: none"> <li>• Make sure the work area is cleared before beginning operations.</li> <li>• All field personnel will have HAZWOPER 40-hour training and first aid and CPR training.</li> <li>• At least one field person will have HAZWOPER supervisor training.</li> <li>• Field personnel will be required to read and understand the Work Plan and Site Safety and Health Plan prior to start of field activities.</li> <li>• Battelle PM and SSHO will ensure that field personnel are specifically trained in the field tasks that they are required to perform.</li> <li>• Daily tailgate health and safety briefings will be conducted.</li> <li>• Follow procedures as stated in the Worksheet #14 of the Sampling and Analysis Plan, Appendix A of the Work Plan.</li> <li>• Refer to Appendix C of the Work Plan (Radiological Handling Plan) for special training radiation training requirements for personnel.</li> <li>• Vegetation Removal SOP-1</li> </ul>	<p>Three Phases: Pre/during/post</p> <ol style="list-style-type: none"> <li>1-7. Daily inspections.</li> <li>8. Ensure fire extinguisher is properly certified.</li> </ol>

**Appendix D**  
**Equipment Safety Checklists**

### DRILLING EQUIPMENT

<u>Contract Name and Number:</u>	<u>Contractor/Subcontractor:</u>		
<u>Government Inspector:</u>	<u>Location:</u>		
<u>Contractor Inspector:</u>	<u>Date:</u>		
Equipment name and number:			
	<b>Yes</b>	<b>No</b>	<b>N/A</b>
1. Is a copy of the manual for all drilling equipment available? (16.M.02)			
2. Has a survey been conducted to identify overhead electrical hazards and potential ground hazards and their locations identified in the site layout plan? (16.M.03)			
3. Does the hazard analysis contain copies of Material Safety Data Sheets for all drilling fluids available? (16.M.03a)			
4. Have all members of the drilling crew been trained on the operation, inspection, and maintenance of the equipment; the safety features and procedures to be used; and overhead electrical lines and underground hazards? (16.M.04a)			
5. Does the drilling equipment have two easily accessible emergency shutdown devices (one for the operator and one for the helper)? (16.M.05)			
6. Is the equipment posted with a warning of electrical hazards? (16.M.06a)			
7. Is there a spotter or an electrical proximity-warning device available to ensure safe distances from power lines are maintained? (16.M.06b)			
8. Before moving earth-drilling equipment, has the travel route been surveyed for overhead and terrain hazards, particularly overhead electrical hazards? (16.M.07a)			
9. Is equipment set up in a stable manner, with cribbing if necessary? (16.M.08a)			
10. Are outriggers being used in accordance with the manufacturer's recommendations? (16.M.08b)			
11. Are drill crewmembers prohibited from wearing loose clothing, jewelry, or equipment that might become caught in moving machinery? (16.M.09b)			
12. Are steps being taken to control dust? (16.M.09i)			
13. Are augers cleaned only when the rotating mechanism is in neutral and the auger is stopped? (16.M.09j)			
14. Means shall be provided to guard against employee contact with auger (guard around the auger; barricade around the perimeter of the auger; electronic brake activated by a presence-sensing device). (16.M .10l)			
Comments:			

# TRAILER INSPECTION FORM

Form must be filled out COMPLETELY upon check-out and check-in.

Date: \_\_\_\_\_ Inspected By: \_\_\_\_\_  
Job/Ph/Tsk: \_\_\_\_\_ Reserved For: \_\_\_\_\_

**Circle One:**

- |   |                                   |
|---|-----------------------------------|
| Generator, Tow Behind, 45 KW (TW# 49408)  | Equipment Trailer (TW# 8390)      |
| Generator, Tow Behind (TW# 11199)         | Equipment Trailer (TW# 13399)     |
| Generator, Tow Behind (TW# 11200)         | Equipment Trailer (TW# 10388)     |
| Generator, Tow Behind (TW# 11201)         | Welding Trailer (TW# 11076)       |
| Generator, Tow Behind, 25 KW (TW# 11203)  | Compressor, Air (TW# 10856)       |
| Generator, Tow Behind (TW# 11-27462)      | Office Trailer, Scots (TW# 10025) |
| Light Tower (TW# 11314)                   | Other (TW# _____): _____          |
| Water Trailer, 1000 Gallon (TW# 11-12374) |                                   |
| Water Trailer, Double Axle (TW# 10020)    |                                   |

**Exterior**

OK	Not OK	N/A	
___	___	___	Lights, signals.
___	___	___	Tires and valve stems.
___	___	___	Spare tire, tow hitches, hitch jack, hitch lock.
___	___	___	Tie downs/chains.
___	___	___	Frame/bed.
___	___	___	Company and DOT required license plates, stickers, placards, registration.
___	___	___	Exterior is clean.
___	___	___	Trailer ramps.
___	___	___	Fenders.
___	___	___	Registration and proof of insurance.
___	___	___	Hitch (Type: _____; Condition: _____; Pin Present? Y/ N;
___	___	___	See diagrams on back for inspection items)

**Engine**

OK	Not OK	N/A	
___	___	___	Oil, transmission fluid, radiator and antifreeze.
___	___	___	Belts, belt tension.
___	___	___	Outlets, GFCI.
___	___	___	Grounding wires.
___	___	___	Electrical, spark plug wires, battery terminals and cables.

**If "Not OK" what is the problem? What needs to be done? Was it fixed?**  
\_\_\_\_\_  
\_\_\_\_\_

**Post Trip: Any Changes?** Circle one: Yes No  
\_\_\_\_\_  
\_\_\_\_\_

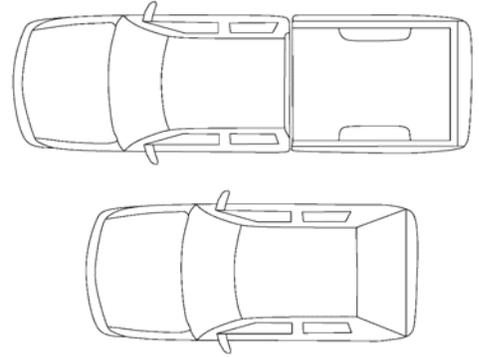
Returned by: \_\_\_\_\_ Date Returned: \_\_\_\_\_

**VEHICLE INSPECTION FORM**  
**Form must be filled out COMPLETELY upon check-out and check-in.**

Date: \_\_\_\_\_ Inspected By: \_\_\_\_\_  
 Job/Ph/Tsk: \_\_\_\_\_ Reserved For: \_\_\_\_\_  
 Starting Mileage: \_\_\_\_\_

**Circle Vehicle:**  
 2012 Ford Focus 6WIS131  
 2012 Toyota Tacoma 4x4 10529C1 (shell)  
 2012 F450 Dump Bed 63633C1  
 2014 Ford F250 Super Crew 24470P1  
 Other (make/mdl/lic #): \_\_\_\_\_

2011 F150 Ext. Cab 79242B1  
 2012 F250 4x4 02228F1  
 2013 F350 Stakebed 01407J1  
 2011 F250 Super Crew 44228B1



**Vehicle/Trailer Exterior**

OK	Not OK	N/A	
___	___	___	Windshield wipers.
___	___	___	Tires and valve stems.
___	___	___	Vehicle racks, boxes, lifts, tow hitches, hitch jack, hitch lock (see back page for tow hitch diagrams)
___	___	___	Tie downs/chains.
___	___	___	Body and windshields, doors and windows.
___	___	___	Company and DOT required license plates, stickers, placards.
___	___	___	Exterior is clean.

**Vehicle Interior**

OK	Not OK	N/A	
___	___	___	Interior lights, turn signal, hazard light indicators.
___	___	___	Pedals, controls, gauges and horn.
___	___	___	Interior is clean. Seats, interior panels, seat belts.

**Vehicle/Trailer Inventory**

OK	Not OK	N/A	
___	___	___	Registration and proof of insurance.
___	___	___	Reflector triangles.
___	___	___	Flashlight w/good batteries.
___	___	___	First aid kit present and stocked.
___	___	___	Jumper cables present.
___	___	___	ERRG accident reporting forms, Zurich accident kit, and disposable camera.
___	___	___	WEX Fuel and Enterprise fleet maintenance cards.
___	___	___	Fire extinguisher is present. TW# _____ Exp Date _____
___	___	___	Spare tire, jack, and tire iron.

**Engine Compartment**

OK	Not OK	N/A	
___	___	___	Oil, transmission fluid, radiator and antifreeze, and windshield wiper fluid levels.
___	___	___	Belts, belt tension.
___	___	___	Electrical, spark plug wires, battery terminals and cables.

**If "Not OK" what is the problem? What needs to be done? Was it fixed?**

\_\_\_\_\_

\_\_\_\_\_

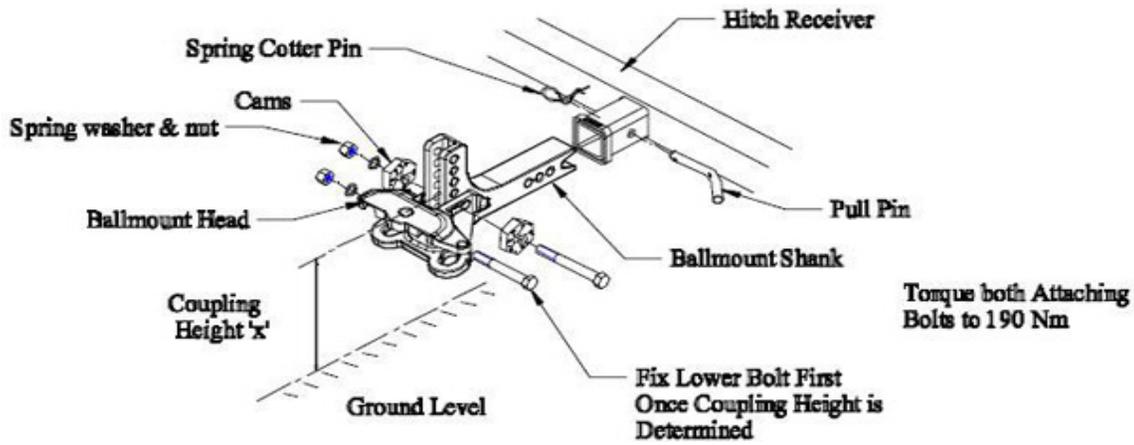
**Post Trip: Any Changes?** Circle one: Yes No

\_\_\_\_\_

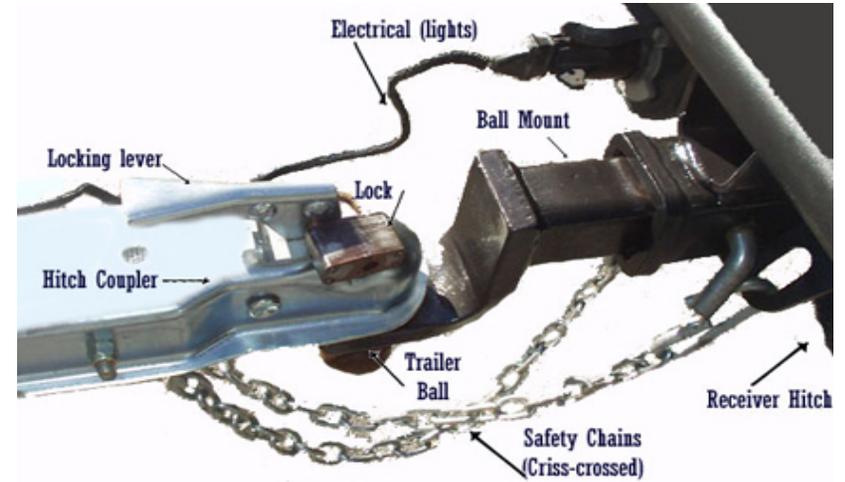
\_\_\_\_\_

Returned by: \_\_\_\_\_ Date Returned: \_\_\_\_\_ Ending Mileage: \_\_\_\_\_

**Please leave the form on clipboard until vehicle is returned. Then complete the form and put it in the "IN" box. Thank you.**



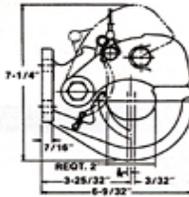
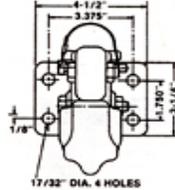
Ball Mount



Pintle Hook Mount



Combination Pintle/Ball Hitch



### 15-Ton Forged Heavy-Duty Pintle Hook

**Capacity**  
6,000 lbs. maximum vertical load • 30,000 lbs. M.G.T.W.

**Description**  
Drop forged alloy steel rigid type pintle hook. Finished with black powder coat for superior durability and corrosion resistance.

**Drawbar Eye Dimensions**  
2" to 3" I.D. with 1 1/4" to 1 1/2" diameter section

Pintle hooks are individually boxed and include mounting information sheet, spec. sheet, adhesive backed drilling template, and vehicle capacity decal. Optional fastener kit is described below.

PART NO.	DESCRIPTION	WEIGHT	CAT.
PH15	15-Ton Heavy-Duty Pintle Hook	11 lbs.	525
PH15WMK	15-Ton Heavy-Duty Pintle Hook	11.8 lbs.	525

WMK suffix includes mounting kit  
Interchanges with Holand® PH-T-60-AOL-8  
All dimensions shown are nominal.

**#8520 MOUNTING FASTENER KIT** .75 lbs. 525

For PH5, PH8, PH15, BHS or similar Pintle Hook Contains:  
Four 1/2" x 2" long grade-8 cap screws  
Four 1/2" grade-8 hex nuts  
Four 1/2" heavy lockwashers  
Four 1/2" flat washers



**Attachment 2**

**Battelle Health and Safety Forms**





**TAILGATE SAFETY MEETING FORM**

Date: \_\_\_\_\_ Time: \_\_\_\_\_ Job Number: \_\_\_\_\_

Client: \_\_\_\_\_ Address: \_\_\_\_\_

Site Location: \_\_\_\_\_

Scope of Work: \_\_\_\_\_

**SAFETY TOPICS PRESENTED**

Protective Clothing/Equipment: \_\_\_\_\_

Chemical Hazards: \_\_\_\_\_

Physical Hazards: \_\_\_\_\_

Special Equipment: \_\_\_\_\_

Emergency Procedures: \_\_\_\_\_

Hospital: \_\_\_\_\_ Phone: \_\_\_\_\_ Ambulance Phone: \_\_\_\_\_

Hospital Address and Route: \_\_\_\_\_

\_\_\_\_\_

**ATTENDEES**

NAME PRINTED

SIGNATURE

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Meeting Conducted by: \_\_\_\_\_ Signed by: \_\_\_\_\_

Site Safety Officer: \_\_\_\_\_ Construction Manager: \_\_\_\_\_







<i>(For Safety Staff only)</i>	REPORT NO.	EROC CODE	<b>UNITED STATES ARMY CORPS OF ENGINEERS ACCIDENT INVESTIGATION REPORT</b> <i>(For Use of this Form See Help Menu and USACE Suppl to AR 385-40)</i>			REQUIREMENT CONTROL SYMBOL: CEEC-S-8(R2)
<b>1. ACCIDENT CLASSIFICATION</b>						
PERSONNEL CLASSIFICATION		INJURY/ILLNESS/FATAL		PROPERTY DAMAGE		MOTOR VEHICLE INVOLVED
GOVERNMENT <input type="checkbox"/> CIVILIAN <input type="checkbox"/> MILITARY		<input type="checkbox"/>		<input type="checkbox"/> FIRE INVOLVED <input type="checkbox"/> OTHER		<input type="checkbox"/>
<input type="checkbox"/> CONTRACTOR		<input type="checkbox"/>		<input type="checkbox"/> FIRE INVOLVED <input type="checkbox"/> OTHER		<input type="checkbox"/>
<input type="checkbox"/> PUBLIC		<input type="checkbox"/> FATAL <input type="checkbox"/> OTHER		<del>XXXXXXXXXX</del>		<del>XXXXXX</del>
<b>2. PERSONAL DATA</b>						
a. Name <i>(Last, First, MI)</i>		b. AGE	c. SEX <input type="checkbox"/> MALE <input type="checkbox"/> FEMALE		d. SOCIAL SECURITY NUMBER	
f. JOB SERIES/TITLE		g. DUTY STATUS AT TIME OF ACCIDENT <input type="checkbox"/> ON DUTY <input type="checkbox"/> TDY  <input type="checkbox"/> OFF DUTY		h. EMPLOYMENT STATUS AT TIME OF ACCIDENT <input type="checkbox"/> ARMY ACTIVE <input type="checkbox"/> ARMY RESERVE <input type="checkbox"/> VOLUNTEER <input type="checkbox"/> PERMANENT <input type="checkbox"/> FOREIGN NATIONAL <input type="checkbox"/> SEASONAL <input type="checkbox"/> TEMPORARY <input type="checkbox"/> STUDENT <input type="checkbox"/> OTHER <i>(Specify)</i> _____		
<b>3. GENERAL INFORMATION</b>						
a. DATE OF ACCIDENT <i>(month/day/year)</i>		b. TIME OF ACCIDENT <i>(Military time)</i> hrs		c. EXACT LOCATION OF ACCIDENT		d. CONTRACTOR'S NAME
e. CONTRACT NUMBER _____ <input type="checkbox"/> CIVIL WORKS <input type="checkbox"/> MILITARY <input type="checkbox"/> OTHER <i>(Specify)</i> _____		f. TYPE OF CONTRACT <input type="checkbox"/> CONSTRUCTION <input type="checkbox"/> SERVICE <input type="checkbox"/> A/E <input type="checkbox"/> DREDGE <input type="checkbox"/> OTHER <i>(Specify)</i> _____		g. HAZARDOUS/TOXIC WASTE ACTIVITY <input type="checkbox"/> SUPERFUND <input type="checkbox"/> DERP <input type="checkbox"/> IRP <input type="checkbox"/> OTHER <i>(Specify)</i> _____		(1) PRIME:  (2) SUBCONTRACTOR:
<b>4. CONSTRUCTION ACTIVITIES ONLY (Fill in line and corresponding code number in box from list - see help menu)</b>						
a. CONSTRUCTION ACTIVITY _____ (CODE) # <input type="text"/>				b. TYPE OF CONSTRUCTION EQUIPMENT _____ (CODE) # <input type="text"/>		
<b>5. INJURY/ILLNESS INFORMATION (Include name on line and corresponding code number in box for items e, f &amp; g - see help menu)</b>						
a. SEVERITY OF ILLNESS/INJURY _____ (CODE) # <input type="text"/>				b. ESTIMATED DAYS LOST	c. ESTIMATED DAYS HOSPITALIZED	d. ESTIMATED DAYS RESTRICTED DUTY
e. BODY PART AFFECTED PRIMARY _____ (CODE) # <input type="text"/> SECONDARY _____ (CODE) # <input type="text"/>				g. TYPE AND SOURCE OF INJURY/ILLNESS TYPE _____ (CODE) # <input type="text"/> SOURCE _____ (CODE) # <input type="text"/>		
<b>6. PUBLIC FATALITY (Fill in line and correspondence code number in box - see help menu)</b>						
a. ACTIVITY AT TIME OF ACCIDENT _____ (CODE) # <input type="text"/>				b. PERSONAL FLOATATION DEVICE USED? <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A		
<b>7. MOTOR VEHICLE ACCIDENT</b>						
a. TYPE OF VEHICLE		b. TYPE OF COLLISION			c. SEAT BELTS	
<input type="checkbox"/> PICKUP/VAN <input type="checkbox"/> AUTOMOBILE <input type="checkbox"/> TRUCK <input type="checkbox"/> OTHER <i>(Specify)</i> _____		<input type="checkbox"/> SIDE SWIPE <input type="checkbox"/> HEAD ON <input type="checkbox"/> REAR END <input type="checkbox"/> BROADSIDE <input type="checkbox"/> ROLL OVER <input type="checkbox"/> BACKING <input type="checkbox"/> OTHER <i>(Specify)</i> _____			USED    NOT USED    NOT AVAILABLE (1) FRONT SEAT <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> (2) REAR SEAT <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
<b>8. PROPERTY/MATERIAL INVOLVED</b>						
a. NAME OF ITEM		b. OWNERSHIP			c. \$ AMOUNT OF DAMAGE	
(1)						
(2)						
(3)						
<b>9. VESSEL/FLOATING PLANT ACCIDENT (Fill in line and correspondence code number in box from list - see help menu)</b>						
a. TYPE OF VESSEL/FLOATING PLANT _____ (CODE) # <input type="text"/>				b. TYPE OF COLLISION/MISHAP _____ (CODE) # <input type="text"/>		
<b>10. ACCIDENT DESCRIPTION (Use additional paper, if necessary)</b>						

<b>11. CAUSAL FACTOR(S) (Read Instruction Before Completing)</b>					
a. (Explain YES answers in item 13)	YES	NO	a. (CONTINUED)	YES	NO
DESIGN: Was design of facility, workplace or equipment a factor?	<input type="checkbox"/>	<input type="checkbox"/>	CHEMICAL AND PHYSICAL AGENT FACTORS: Did exposure to chemical agents, such as dust, fumes, mists, vapors or physical agents, such as, noise, radiation, etc., contribute to accident?	<input type="checkbox"/>	<input type="checkbox"/>
INSPECTION/MAINTENANCE: Were inspection & maintenance procedures a factor?	<input type="checkbox"/>	<input type="checkbox"/>	OFFICE FACTORS: Did office setting such as, lifting office furniture, carrying, stooping, etc., contribute to the accident?	<input type="checkbox"/>	<input type="checkbox"/>
PERSON'S PHYSICAL CONDITION: In your opinion, was the physical condition of the person a factor?	<input type="checkbox"/>	<input type="checkbox"/>	SUPPORT FACTORS: Were inappropriate tools/resources provided to properly perform the activity/task?	<input type="checkbox"/>	<input type="checkbox"/>
OPERATING PROCEDURES: Were operating procedures a factor?	<input type="checkbox"/>	<input type="checkbox"/>	PERSONAL PROTECTIVE EQUIPMENT: Did the improper selection, use or maintenance of personal protective equipment contribute to the accident?	<input type="checkbox"/>	<input type="checkbox"/>
JOB PRACTICES: Were any job safety/health practices not followed when the accident occurred?	<input type="checkbox"/>	<input type="checkbox"/>	DRUGS/ALCOHOL: In your opinion, was drugs or alcohol a factor to the accident?	<input type="checkbox"/>	<input type="checkbox"/>
HUMAN FACTORS: Did any human factors such as, size or strength of person, etc., contribute to accident?	<input type="checkbox"/>	<input type="checkbox"/>	b. WAS A WRITTEN JOB/ACTIVITY HAZARD ANALYSIS COMPLETED FOR TASK BEING PERFORMED AT TIME OF ACCIDENT? <input type="checkbox"/> YES (If yes, attach a copy.) <input type="checkbox"/> NO		
ENVIRONMENTAL FACTORS: Did heat, cold, dust, sun, glare, etc., contribute to the accident?	<input type="checkbox"/>	<input type="checkbox"/>			
<b>12. TRAINING</b>					
a. WAS PERSON TRAINED TO PERFORM ACTIVITY/TASK?		b. TYPE OF TRAINING.		c. DATE OF MOST RECENT FORMAL TRAINING.	
<input type="checkbox"/> YES <input type="checkbox"/> NO		<input type="checkbox"/> CLASSROOM <input type="checkbox"/> ON JOB		(Month) (Day) (Year)	
<b>13. FULLY EXPLAIN WHAT ALLOWED OR CAUSED THE ACCIDENT; INCLUDE DIRECT AND INDIRECT CAUSES (See instruction for definition of direct and indirect causes.) (Use additional paper, if necessary)</b>					
a. DIRECT CAUSE					
b. INDIRECT CAUSE(S)					
<b>14. ACTION(S) TAKEN, ANTICIPATED OR RECOMMENDED TO ELIMINATE CAUSE(S).</b>					
DESCRIBE FULLY:					
<b>15. DATES FOR ACTIONS IDENTIFIED IN BLOCK 14.</b>					
a. BEGINNING (Month/Day/Year)			b. ANTICIPATED COMPLETION (Month/Day/Year)		
c. SIGNATURE AND TITLE OF SUPERVISOR COMPLETING REPORT		d. DATE (Mo/Da/Yr)	e. ORGANIZATION IDENTIFIER (Div, Br, Sect)	f. OFFICE SYMBOL	
CORPS _____					
CONTRACTOR _____					
<b>16. MANAGEMENT REVIEW (1st)</b>					
a. <input type="checkbox"/> CONCUR      b. <input type="checkbox"/> NON CONCUR      c. COMMENTS					
SIGNATURE		TITLE		DATE	
<b>17. MANAGEMENT REVIEW (2nd - Chief Operations, Construction, Engineering, etc.)</b>					
a. <input type="checkbox"/> CONCUR      b. <input type="checkbox"/> NON CONCUR      c. COMMENTS					
SIGNATURE		TITLE		DATE	
<b>18. SAFETY AND OCCUPATIONAL HEALTH OFFICE REVIEW</b>					
a. <input type="checkbox"/> CONCUR      b. <input type="checkbox"/> NON CONCUR      c. ADDITIONAL ACTIONS/COMMENTS					
SIGNATURE		TITLE		DATE	
<b>19. COMMAND APPROVAL</b>					
COMMENTS					
COMMANDER SIGNATURE				DATE	

10.

**ACCIDENT DESCRIPTION** *(Continuation)*

13a.

**DIRECT CAUSE** *(Continuation)*

13b.

**INDIRECT CAUSES** *(Continuation)*

14.

**ACTION(S) TAKEN, ANTICIPATED, OR RECOMMENDED TO ELIMINATE CAUSE(S)** *(Continuation)*

### Incident Analysis

NOTE: This section to be filled in by Safety Health & Emergency Response and/or Environmental Protection		
Event Report Number:	IA Report Number:	OSHA Case Log Number:
OSHA Recordable: <input type="checkbox"/> Yes <input type="checkbox"/> No	Type of recordable: <input type="checkbox"/> LWD <input type="checkbox"/> RD <input type="checkbox"/> Other;	OSHA Reportable: <input type="checkbox"/> Yes <input type="checkbox"/> No
EPA Reportable Incident: <input type="checkbox"/> Yes <input type="checkbox"/> No	Mercury spill <input type="checkbox"/> Yes <input type="checkbox"/> No	Oil spill <input type="checkbox"/> Yes <input type="checkbox"/> No

<b>SECTION I</b>	Date of Incident (dd/mm/yyyy):	Time of Incident: AM PM	Date Reported:
Did Incident result in Injury to Staff or a supervised person <input type="checkbox"/> Yes <input type="checkbox"/> No (If yes fill out ALL sections. If no omit Section II.)			

<b>SECTION II</b>	Staff Member's Name:	Employee Identification Number:
Reporting Location:	Division:	Organization Code:
Treatment at Time of Incident: <input type="checkbox"/> First Aid <input type="checkbox"/> EMT <input type="checkbox"/> Health Services <input type="checkbox"/> Other Medical Provider <input type="checkbox"/> No treatment at time of incident		
Injury Type (cut, bruise, strain, etc)		Location of Injury (hand, foot, etc)

<b>SECTION III</b>	Type of Incident: <input type="checkbox"/> Near-miss <input type="checkbox"/> Chemical Spill <input type="checkbox"/> Environmental Release <input type="checkbox"/> Property Damage <input type="checkbox"/> Injury/Illness <input type="checkbox"/> Other		
Name(s) of staff members involved:			
Job Assignment at Time of Incident:		Was this a routine part of the job? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Time in Job Assignment: <input type="checkbox"/> 0-14 days <input type="checkbox"/> 15-90 days <input type="checkbox"/> 3 months to 1 year <input type="checkbox"/> 1 to 3 years <input type="checkbox"/> 4-10 years <input type="checkbox"/> more than 10 years			
Name(s) of witnesses:			
<b>Describe What Happened:</b> Describe in sufficient detail to allow the scene to be visualized by a reader. Include what the staff member(s) was doing (task performed and experience in performing the task), where the incident occurred, what tools, equipment, chemicals etc were being used, what the result was. A complete description of the facts will aid in determining the cause(s) and corrective actions. Attach additional pages if necessary.			

SECTION IV	
Causes(s)	Proposed/Planned Corrective Action(s)
Reference Documents (if any):	

SECTION V		
Manager's Comments/Actions:		
Staff Member Name and Date	Supervisor's Name and Date	Witness Name and Date
Other Investigator's Name and Date	Other Investigator's Name and Date	Witness Name and Date
SH&ER/Environmental Protection Comments/Actions:		
Manager (final review) Name and Date:		SH&ER/Environmental Protection Name and Date

Form Number: ESHQ-SIH-FM-004	Revision Number: 1	Effective Date: 06/14/2007
---------------------------------	--------------------	----------------------------

Date \_\_\_\_\_

Site: \_\_\_\_\_

**CONTRACT WORK SHEET**

(complete for all contracts regardless if rad op is proposed or not)

Contract Number: \_\_\_\_\_

Contract Project: \_\_\_\_\_

Primary Contractor Name \_\_\_\_\_

(circle one)

1. Are Standard Radiation items worded in contract (*guide spec*)? (YES) (NO)
2. Was invitation secured to at least one Pre-Con Meeting (YES) (NO)
3. Did COT attend Pre-Con Meeting? (YES) (NO)
4. Were radiation operations/limitation discussed by COT during Pre-Con Meeting? (YES) (NO)
5. Are radiation operations for the contract proposed? (YES) (NO)
6. If no, were contractor and GDA informed to contact COT if rad ops later proposed? (YES) (NO)
7. If yes, was "Rad Operations Planning Work Sheet" & instructions given to contractor? (YES) (NO)
8. Were COT's/RSO's authority to stop rad op explained/acknowledged? (YES) (NO)
9. Were survey and escort requirements for gamma operations discussed? (YES) (NO)
10. KTR acknowledge no rad producing mat/equip on base without COT prior knowledge (YES) (NO)
11. Were submittals accepted (note reasons for non-acceptance)? (YES) (NO)

Radiation Vendor name, RML #, and exp date: \_\_\_\_\_

(attach a copy of: RML, [and if applicable: Notice of Receipt of Renewal Application for Review and NRC 241 unless base is Calif])

List of all radioactive producing material/equipment brought on-board:	Date in	Date out
1. _____	( _____ )	( _____ )
2. _____	( _____ )	( _____ )
3. _____	( _____ )	( _____ )

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Attachment 3**

**Health and Safety Credentials**

Association of  
Bay Area Governments



**ABAG** Training Center  
[www.hazmatschool.com](http://www.hazmatschool.com)

# CERTIFICATE OF COMPLETION

Max Zelenevich

has successfully completed the course titled

## ***OSHA 8-hr Annual HAZWOPER Refresher***

Satisfies 29 CFR 1910.120(e)(8)

on

***August 14, 2015***

***and has earned***

***0.8 CEUs (Continuing Education Units) (8Course hours) from the program***

*OSHA Requires recertification every year*

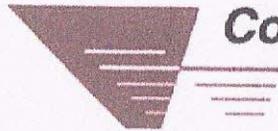
Certificate No. 121701  
(verify at [www.hazmatschool.com](http://www.hazmatschool.com))

***Brian Kirking, Training Director***

***Michelle McDaniels, Training Coordinator***

ABAG Training Center, 101 8th St., Oakland CA 94607; (510) 464-7964

***Paul W. Gantt, CSP, CET***  
***Safety Compliance Management, Inc.***



**Compliance Solutions**

*"Today's Training... Tomorrow's Solution"*

3960 Quebec St, 2nd Floor Denver, CO 80207-1633 800-711-2708

*Student Affiliation:*

*Battelle*

*33501*

## ***Certificate of Completion***

This is to certify that  
***Max Zelenevich***  
has been tested and successfully meets the training requirements for  
***40-Hour HAZWOPER***  
***as per 29 CFR 1910.120(e)***

**Presented**

***Tuesday, June 28, 2011***

***Compliance Solutions Occupational Trainers, Inc.***

***Certificate Number: 754827557***

Neval Gupta  
***Vice President***

Jeffrey Kline  
***President/CEO***

UCSD-7031981

## International Safety Education Institute (ISEI)

UC San Diego Extension  
**ISEI** INTERNATIONAL SAFETY  
EDUCATION INSTITUTE

**American  
Safety Council**

**MAX ZELENEVICH**

---

Has diligently and with merit completed a  
30-Hour OSHA Hazard Recognition Training for the Construction Industry Course  
on 7/21/2015

from the University of California San Diego, Extension International Safety Education Institute (ISEI)



---

Director: **Grace Miller**



**American  
Red Cross**

## **Max Zelenevich**

has successfully completed requirements for

Adult First Aid/CPR/AED: valid 2 Years

**Date Completed: 06/07/2015**

conducted by: American Red Cross

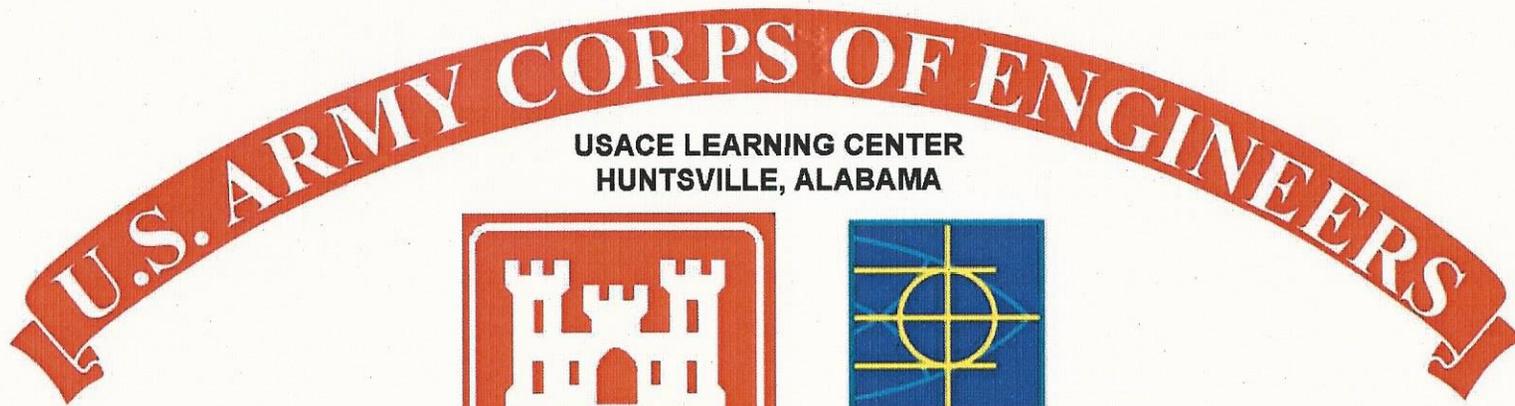
Instructor: Jennifer Ann Hoffmann



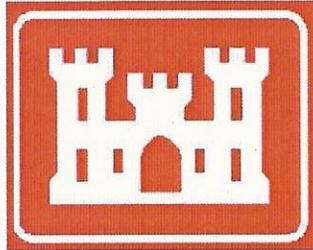
ID: 0X1RNF

Scan code or visit:

[redcross.org/confirm](http://redcross.org/confirm)



USACE LEARNING CENTER  
HUNTSVILLE, ALABAMA



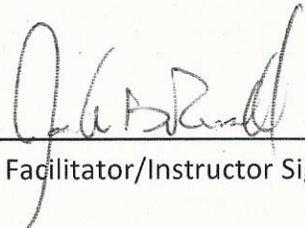
# CERTIFICATE

## Shawn Majors

Certificate #NWP-01-15-00649

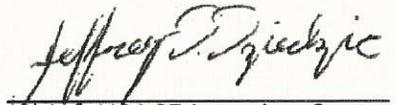
has completed the Corps of Engineers and Naval Facility Engineering Command Training Course

### CONSTRUCTION QUALITY MANAGEMENT FOR CONTRACTORS - #784

AGC Wilsonville, OR	6/26/2015	CENWP	Eileen R. Horiuchi
Location	Training Date(s)	Instructional District/NAVFAC	CQM-C Manager
Joseph B. Russell	Joseph.b.russell@usace.army.mil	503-808-4917	
Facilitator/Instructor	Email	Telephone	Facilitator/Instructor Signature

THIS CERTIFICATE EXPIRES FIVE YEARS FROM DATE OF ISSUE

CQM-C Recertification online course: <https://www.myuln.net>



Chief, USACE Learning Center

Jeffrey D. Dziedzic

HEARTSAVER FIRST AID CPR AED

Heartsaver®  
First Aid CPR AED



American  
Heart  
Association®

Shawn Majors

This card certifies that the above individual has successfully completed the objectives and skills evaluations in accordance with the curriculum of the AHA Heartsaver First Aid CPR AED Program. Optional completed modules are those **NOT** marked out:

Child CPR AED

Infant CPR

Written test

MAR 10 2015

Issue Date

MAR - - 2017

Recommended Renewal Date



36-003242105

This card acknowledges that the recipient has successfully completed a  
10-hour Occupational Safety and Health Training Course in  
**Construction Safety and Health**

SHAWN MAJORS

Rick C. Knight

11/4/2009

(Trainer name – print or type)

(Course end date)

Association of  
Bay Area Governments



**ABAG** Training Center  
[www.hazmatschool.com](http://www.hazmatschool.com)

# CERTIFICATE OF COMPLETION

**Shawn Majors**

has successfully completed the course titled

## ***OSHA 8-hr Annual HAZWOPER Refresher***

Satisfies 29 CFR 1910.120(e)(8)

on

***December 30, 2014***

***and has earned***

***0.8 CEUs (Continuing Education Units) (8Course hours) from the program***

Certificate No. 115291  
(verify at [www.hazmatschool.com](http://www.hazmatschool.com))

**Brian Kirking, Training Director**  
**Chanell Gumbs, Training Coordinator**  
[www.abag.ca.gov](http://www.abag.ca.gov); (510) 464-7964

**Paul W. Gantt, CSP, CET**  
**Safety Compliance Management, Inc.**



## Certificate of Course Completion

Shawn M Majors

Student's Name

OSHA - 10 Hour Construction Industry Outreach Training Program

Course Title

11/04/2009 14:01 CST

Course Completion Date

Shawn  
Majors

Digitally signed by Shawn Majors  
DN: cn=Shawn Majors, o=Battelle,  
ou=ENV,  
email=majorssm@battelle.org, c=US  
Date: 2010.01.11 09:33:19 -08'00'

Student's Signature

1431666

Certificate Number

10

# of hours approved

I hereby attest that I have completed the above named safety course  
in accordance with the ethical guidelines defined by, **Osha Pro's, Inc.**  
I acknowledge that I consumed all information and took all Pertinent  
quizzes and/or final tests.

**Osha Pro's, Inc.**  
4101 West Green Oaks Blvd., Suite # 305-267  
Arlington, TX, 76016  
Tel: 866-442-6742



## Certificate of Course Completion

Shawn M Majors

Student's Name

OSHA - 30 Hour Construction Industry Outreach Training Program

Course Title

01/13/2010 21:34 CST

Course Completion Date

Shawn  
Majors

Digitally signed by Shawn Majors  
DN: cn=Shawn Majors,  
o=Battelle, ou=ENV,  
email=majorssm@battelle.org,  
c=US  
Date: 2010.01.14 07:22:38 -08'00'

Student's Signature

1437240

Certificate Number

30

# of hours approved

I hereby attest that I have completed the above named safety course  
in accordance with the ethical guidelines defined by, **Osha Pro's, Inc.**  
I acknowledge that I consumed all information and took all Pertinent  
quizzes and/or final tests.

**Osha Pro's, Inc.**  
4101 West Green Oaks Blvd., Suite # 305-267  
Arlington, TX, 76016  
Tel: 866-442-6742

**Attachment 4**

**Explosive Safety Submission Determination Request**



**DEPARTMENT OF THE NAVY**  
**NAVAL ORDNANCE SAFETY AND SECURITY ACTIVITY**  
**FARRAGUT HALL**  
**3817 STRAUSS AVENUE, SUITE 108**  
**INDIAN HEAD, MD 20640-5151**

8020  
Ser N49/1748  
7 Dec 15

From: Commanding Officer, Naval Ordnance Safety and Security Activity  
To: Director, Base Realignment and Closure Program Management Office West (BPMOW.RP)  
Subj: EXPLOSIVES SAFETY SUBMISSION DETERMINATION REQUEST TO CONDUCT A PILOT STUDY AT UXO-3/DREDGE POND 3E, AT FORMER MARE ISLAND NAVAL SHIPYARD, VALLEJO, CALIFORNIA  
Ref: (a) E-mail BRACPMO West (BPMOW.RP) Mr. R. Paulding/NOSSA (N49) Mr. P. Altman of 23 Nov 15 (w/encl)  
(b) NOSSAINST 8020.15D  
(c) NAVSEA OP 5, Volume 1, Seventh Revision, Change 13

1. As requested by reference (a), the Naval Ordnance Safety and Security Activity (NOSSA) reviewed the subject Explosives Safety Submission (ESS) Determination Request (DR) in accordance with references (b) and (c). Based on the information provided, NOSSA has determined that an ESS is not required to conduct a pilot study using anomaly avoidance at Former Mare Island Naval Shipyard, Vallejo, California.

2. As outlined in your request, we understand that the likelihood of encountering Munitions and Explosives of Concern (MEC) and/or Material Potentially Presenting an Explosive Hazard (MPPEH) during the proposed project has been determined to be low and that the following conditions apply:

a. A 100% surface search was previously conducted. During the previous MEC/MPPEH surface removal action only one material documented as safe item was recovered. Anomaly avoidance techniques shall be employed by unexploded ordnance qualified personnel to avoid contact with MEC or MPPEH during vegetation removal activities. No intrusive digging activities will occur during this pilot study.

b. The site is outside of all existing explosives safety quantity distance arcs.

Subj: EXPLOSIVES SAFETY SUBMISSION DETERMINATION REQUEST TO  
CONDUCT A PILOT STUDY AT UXO-3/DREDGE POND 3E, AT FORMER  
MARE ISLAND NAVAL SHIPYARD, VALLEJO, CALIFORNIA

3. If MEC or MPPEH is discovered on the site while employing anomaly avoidance techniques, the item will be avoided and its location and description will be reported to the responsible project manager. An emergency response from the cognizant Explosive Ordnance Disposal detachment will be requested, if appropriate.

4. The NOSSA point of contact for this ESS determination is Mr. Pat Altman, who can be contacted at DSN 354-5630 or commercial at 301-744-5630.



TAMMY K. SCHIRF  
By direction

Copy to:  
CNO (N411B; N452)  
COMNAVFACENGCOM (ENV3)  
BRAC PMO West (BPMOW/PAM/JL)  
NAVFAC SW (VH)  
COMNAVREG SW SAN DIEGO (ESO)  
NOSSA (N544)  
ESSOPAC (N5P)