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FINAL GEOPHYSICAL INVESTIGATION PLAN FOR UNEXPLODED ORDNANCE 19 (UXO19)
IGNITER AREA NSWC INDIAN HEAD MD
12/1/2012
CH2M HILL

Final

Geophysical Investigation Plan for UXO 19 –Igniter Area

**Naval Support Facility Indian Head
Indian Head, Maryland**

Contract Task Order 0012

December 2012

Prepared for

**Department of the Navy
Naval Facilities Engineering Command
Washington**

Under the

**NAVFAC CLEAN 1000 Program
Contract N62470-08-D-1000**

Prepared by



CH2MHILL

Chantilly, Virginia

SIGNATURE PAGE

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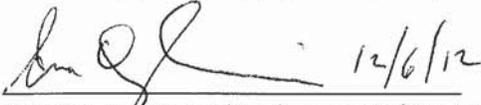
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Acronyms and Abbreviations

DGM	digital geophysical mapping
EPA	United States Environmental Protection Agency
FTP	file transfer protocol
GDB	Geosoft database
GIP	Geophysical Investigation Plan
GSV	geophysical system verification
IRA	interim removal action
ISO	industry standard object
IVS	instrument verification strip
MC	munitions constituents
MEC	munitions and explosives of concern
MPPEH	material potentially presenting an explosive hazard
MQO	measurement quality objective
MRSIMS	Munitions Response Site Information Management System
NAVFAC	Naval Facilities Engineering Command
Navy	Department of the Navy
NRL	Naval Research Laboratory
NSF-IH	Naval Support Facility Indian Head
PDF	portable document format
QC	quality control
UTM	Universal Transverse Mercator
UXO	Unexploded Ordnance
WAMS	Water Area Munitions Study

Introduction

This Geophysical Investigation Plan (GIP) presents the objectives, site background, approach, geophysical operational procedures, and quality control (QC) methods to be used to prepare for and perform digital geophysical mapping (DGM) at Unexploded Ordnance (UXO) 19, Igniter Area, at Naval Support Facility Indian Head (NSF-IH) in Indian Head, Maryland.

This GIP was prepared under the Department of the Navy (Navy), Naval Facilities Engineering Command (NAVFAC) Washington, Comprehensive Long-term Environmental Action, Contract Number N62470-08-D-1000, Contract Task Order 0012. This GIP was developed using background information contained in the Water Area Munitions Study (WAMS) (Malcolm Pirnie, 2005) and the Site Inspection report (CH2M HILL, 2010).

1.1 Base Setting

NSF-IH is a Navy facility in northwestern Charles County, Maryland, approximately 25 miles southwest of Washington, DC. The facility consists of two tracts of land: the Main Installation on the Cornwallis Neck Peninsula, and the Stump Neck Annex, across Mattawoman Creek (Figure 1).

The Main Installation contains approximately 2,500 acres and is bounded by the Potomac River to the northwest, west, and south; Mattawoman Creek to the south and east; and the town of Indian Head to the northeast. Included as part of the Main Area are Marsh Island and Thoroughfare Island, which are located in Mattawoman Creek. Elevations range from sea level to approximately 125 feet above mean sea level. The Stump Neck Annex contains approximately 1,084 acres and is bounded by Mattawoman Creek to the northeast, the Potomac River to the northwest, and Chicamuxen Creek to the south-southwest. Elevations range from sea level to approximately 10 feet above mean sea level. Both the Main Installation (Cornwallis Neck Peninsula) and the Stump Neck Annex are on the United States Environmental Protection Agency (EPA) National Priorities List. The Main Installation and Stump Neck Annex are separated by Mattawoman Creek (noncontiguous), have separate EPA identification numbers, and perform dissimilar operations.

1.2 Site Description

The WAMS reported that the Igniter Area is offshore along a wooded and marshy area in a small promontory known as "Thieves Point" on the Main Installation (Figure 1). The site covers approximately 0.01 acre (approximately 20 feet by 20 feet). The promontory is a wetland and considered a species protection area. One structure nearby, Building 1451, was formerly used for storage and was vacant at the time of the WAMS.

The WAMS reported that a small pile of igniters was found by Base personnel at the site during an extremely low tide in 1996 or 1997. Based on descriptions, the igniters were assumed to be electric primers or electrically primed rifle cartridges approximately .50 caliber in size. Furthermore, the igniters were suspected to be M2 and/or M60 time blasting fuse igniters. The WAMS reported that additional ordnance items were observed by Base personnel along the shoreline during a low-tide event in March 2004. These items appeared to be MK 1 MOD 1 or MK 2 MOD 0 float signals, and a 250-, 500-, or 750-pound old-style bomb.

Several of the igniters were reportedly picked up and disposed of, but it is unknown if the disposal of the remaining igniters occurred. The origin of the igniters, dates of use, or date of disposal were unknown. Interviews with former employees indicated that the igniters may have come from the Cast Plant. As part of the WAMS, a site visit was conducted in June 2003. The WAMS noted that igniters were not observed and there were no indications of munitions and explosives of concern (MEC) because the site was covered with water.

Based on the information collected and presented in the WAMS, the site was categorized as a MEC Area. The WAMS also documented that munitions constituents (MC) associated with the site include lead styphnate, the filler material used in M2 and M60 igniters, and smoke composition, the filler material used in MK 1 and MK 2

float signals. Because the type of old-style bomb found could not be identified, the associated MC was unknown. The WAMS recommended further investigation for MEC and MC.

On November 25, 2008, the Navy and CH2M HILL conducted a site visit. Building 1451 has been demolished since the WAMS was conducted. Igniters were not observed; however, munitions-related items, dead wood, and other debris were scattered at the Igniter Area and along an approximately 300-foot stretch of the land, shoreline, and shallow water. As a result, MEC and MC investigations will be conducted in a larger area, encompassing approximately 0.14 acre (300 feet along the shoreline by 20 feet of land), to examine the entire area where MEC-related items were observed.

On October 26, 2009 and January 12, 2010, CH2M HILL attempted to conduct a munitions inventory along the shoreline at UXO 19, but it was not completed because of algae-covered water and frozen water conditions, respectively. CH2M HILL did observe the 100-pound bomb (AN-M30A1 Old Style general purpose) as well as rocket motors (features consistent with 5.0-inch aircraft rocket motor) within a large hole in the shallow water.

In July 2012, an interim removal action (IRA) was completed under a Naval Ordnance Safety and Security Activity and Department of Defense Explosives Safety Board-approved Explosives Safety Submission (CH2M HILL, 2011). The IRA was proposed to be performed in an area approximately 1.1 acres (400 feet along the shoreline by 120 feet into the shallow water of Mattawoman Creek) to remove MEC and material potentially presenting an explosive hazard (MPPEH) on the surface of the shoreline and shallow water of Mattawoman Creek. Because of murky water conditions and submerged aquatic vegetation, visibility was poor and the IRA was completed over an area approximately 0.09 acre (400 feet by 10 feet). The objective of the IRA was to clear the surface of MEC and non-MEC items before conducting a geophysical survey. Items found included 4.5-inch rocket motor, M40 fragmentation bomb, SCAR Rocket Motor MK 15, 100-pound bomb, and 25-millimeter projectile. All items were classified as Material Documented as Safe except for the 25-millimeter projectile. The nomenclature could not be determined; however, it was safe to move and it was detonated in a detonation trench at Site 17.

1.3 Site Conditions Potentially Affecting DGM Operations

General field methodologies for performing DGM are described in this section. Several plans have been prepared in support of this scope and are provided as Appendix A (Geophysical Verification Plan) and Appendix B (Health and Safety Plan), which includes the Activity Hazard Analysis. The Project Quality Control Plan, Accident Prevention Plan, and standard operating procedures can be found in Appendices B, C, and D of the *Final Site Inspection Work Plan for Igniter Area – UXO 19* (CH2M HILL, 2009), respectively. The term “daily” refers to every working day. The term “daily” does not impose requirements on weekends and/or holidays when staff are not onsite.

1.3.1 Topography and Hydrology

Because UXO 19 is located along the shoreline of Mattawoman Creek, the site is covered by water except during low tides. The topography is flat to gentle, sloping into the creek. The depth of the water varies with the tide but is relatively shallow, typically 1 to 3 feet deep. The survey area is underwater within these depths.

1.3.2 Vegetation

Most of the underwater area is not safely traversable on foot. Dense aquatic plants and vegetation are present within the shallow water environment and may obscure the bottom of the underwater portion of the survey area, and thick mud poses unsafe walking and wading conditions.

1.3.3 Geology

The geology of UXO 19 consists of a thick layer of bottom sediments associated with Mattawoman Creek. The composition of these sediments is not known, although they are assumed not to affect geophysical instruments because previous underwater and near-shore, land-based DGM has been successfully conducted at NSF-IH.

1.3.4 Utilities

The presence of underground utilities is unknown at UXO 19, although it can be reasonably assumed that there would be few to none present because the site is located along the shore of Mattawoman Creek. CH2M HILL will review existing facility maps before DGM begins.

1.3.5 Weather Conditions

No site-specific dynamic events (that is, unusually strong winds or harsh weather conditions) that might affect DGM operations at the site are anticipated. Although it is possible that weather conditions may affect DGM operations at some time during the project, no significant delays or effects on DGM instruments resulting from abnormally severe weather are expected. However, water levels and/or localized weather conditions at the time of the DGM may result in temporarily inaccessible conditions. For example, these conditions may result if an unusually large amount of rainfall occurs within the general NSF-IH area, if storms are forecast for the data collection dates, or if strong winds are present on the data collection dates. CH2M HILL will monitor these conditions in the days prior to the DGM start date and will be in regular communication with the DGM field team. Daily assessments of these conditions will also be made during the site safety briefings.

1.3.6 Site Accessibility and Man-Made Features

There are no expected site accessibility impediments, and no man-made features (other than potential underwater debris, MEC and MPPEH) are expected at UXO 19.

1.3.7 Equipment Setup

There are no known adverse conditions associated with the site that would potentially affect the DGM instruments. However, the type of survey vessel used and the offset of the geophysical sensor from the vessel may result in noise spikes during maneuvering through the underwater portion of the survey area. It is assumed that appropriate offset distances between the sensors and the survey vessel will be determined before the start of the DGM production survey.

1.3.8 Other Hazards

Potential hazards include those associated with conducting field work in hot weather and shallow water environments (for example, heat stress, lifting, slips, trips, and falls). Additional hazards include those associated with conducting work over water and with maneuvering a survey vessel that is not under its own power. These hazards are addressed in more detail in the Activity Hazard Analysis and Health and Safety Plan found in Appendix B of this report, and will be addressed during daily site safety briefings.

1.4 Project Objective

The Navy wants to close out this site under an unrestricted use and unlimited exposure scenario. To accomplish this goal, a removal action of potential MEC and MPPEH must be completed along the shoreline and shallow water of UXO 19. DGM is necessary to identify the lateral extent of geophysical anomalies that may be indicative of potential MEC and MPPEH at the site. The DGM area encompasses approximately 1.1 acres (4,459 square meters/47,996 square feet), of which approximately 0.12 acre (483 square meters/5,199 square feet) is traversable ground (shoreline) and 0.98 acre (3,976 square meters/42,797 square feet) is in the shallow water (water depths range from less than 1 foot to approximately 3 feet). Minimal water current is present at the site, and the water is relatively clear. However, there is an abundance of shallow water plants and thick mud that would prevent safe wading or walking with geophysical equipment. Representative site photos are provided as Figure 2.

The DGM results will be used in support of a removal action at UXO 19. The results of the DGM will be used by the Navy, EPA, and Maryland Department of the Environment to assist in the decision making process for removing potential underwater MEC and MPPEH.

1.5 Project Organization

CH2M HILL will perform the geophysical investigation with support from the Navy. The Navy Remedial Project Manager at NAVFAC Washington is Mr. Joe Rail.

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1.6 Work Plan Organization

The remainder of this GIP is divided into the following sections:

- Section 2—DGM Methodologies; describes procedures for implementing the MEC investigation portion of the GIP
- Section 3—References; lists all documents cited in this GIP

Figures, tables and appendixes follow the References section.

DGM Methodologies

The term “daily” in this Section refers to every working day and/or any day in use. The term “daily” does not impose requirements on weekends and/or holidays when staff are not onsite and/or are not using a particular piece of equipment.

2.1 Handheld Geophysical Instrument

The primary handheld geophysical instrument to be used during non-DGM operations (such as MEC avoidance and placement of QC seeds) will be a White’s XLT all-metals detector or equivalent. The White’s XLT all-metals detector is capable of identifying both ferrous and non-ferrous metals and is swept back and forth at a height of a few inches above the ground surface. It will be used at the site to assist with MEC avoidance procedures during burial and placement of QC seed items to identify whether competing anomalies from subsurface metal (ferrous and non-ferrous) are present within 1 meter of an intended seed location. Audible tones and a digital display on the instrument will indicate the presence of subsurface metal. Use of the handheld instruments will be limited to the instrument verification strip (IVS) and shoreline portion of the UXO 19 survey area.

2.2 DGM Instrumentation

DGM will be conducted using the Geonics, Ltd., EM61-MK2 device. The EM61-MK2 has been presumptively selected based on existing site conditions, findings of the IRA, and successful use of the EM61-MK2 at other munitions response project sites at NSF-IH.

The EM61-MK2 survey will consist of a single coil system. The DGM survey will consist of 100 percent, comprehensive coverage of the shoreline area. This portion of the survey area would be collected in person-portable mode using either litter carry or wheel mode. The underwater portion of the survey area would be completed by attaching the EM61-MK2 coils to a survey vessel or floatation device towed behind a survey vessel. Although the specific survey vessel and configuration for the underwater DGM will ultimately be decided by the DGM subcontractor, it is recommended that a lightweight, flat-bottom vessel (for example, an aluminum hull jon boat) be used that could be maneuvered either by oars or a tether system. An engine-powered vessel is not recommended because of the shallow water and presence of dense underwater plants that would likely result in entanglement of a propeller.

Because of the inherent difficulties associated with data collection in this configuration and at this site, the survey coverage within the underwater portion of the survey area will constitute whatever percentage could be achieved in 2 full days of data collection.

Positioning of the DGM system will be maintained using a real-time kinematic global positioning system. All sensor data will be correlated with navigational data, based on a local “third order” (1:5,000) monument or survey marker. If a suitable control point is not available, a Professional Land Surveyor will establish a minimum of two new monuments or survey markers with a minimum of third-order accuracy. CH2M HILL will provide to the DGM subcontractor a geo-referenced shape file or geographic information system-compatible file of the working site boundary outline for use with the real-time kinematic global positioning system in order to initially constrain the survey area. No physical survey markers or boundaries will be placed in the field by CH2M HILL before DGM begins.

2.3 Geophysical System Verification

DGM system validation will be performed for the EM61-MK2 using the geophysical system verification (GSV) process. The GSV is a physics-based, presumptively selected technology process in which signal strength and sensor performance are compared to known response curves of industry standard objects (ISOs) to verify DGM systems before and during site surveys. The GSV process is designed to perform initial verification of the proposed DGM system using an IVS, followed by a blind seeding program for continued verification throughout the field operations. The IVS will consist of a land-based IVS that will be intended for use primarily with the

person-portable configuration. A modified approach to the GSV process will be implemented for the underwater system configuration that will primarily involve static and QC tests. An underwater IVS will not be constructed. The GSV Work Plan is provided as Appendix A to this GIP and provides additional details on the validation process for this site.

2.4 DGM Measurement Quality Objectives

The primary objective of the DGM activities at the subject site is to identify geophysical anomalies indicative of potential MEC or MPPEH. Measurement quality objectives (MQOs) particular to the DGM survey are provided in Table 1. Unless otherwise noted, these MQOs apply to both the person-portable and underwater system configuration.

2.4.1 DGM System Positioning

The MQO for DGM systems positioning is that the coordinates being obtained from the positioning systems are at a sufficient accuracy to allow for appropriate relocation of MEC or MPPEH for intrusive investigation. The measurement performance criterion for this is that the positional error of the system at known locations will not exceed 10 centimeters (4 inches). This will be evaluated by ensuring that, on a daily basis, the geophysical system being used passes QC Test # 4 in Table 2. Daily positional tests will be conducted at a local “third order” (1:5,000) monument or survey marker established by a Professional Land Surveyor.

2.4.2 DGM System Munitions Detection

The MQO for munitions detection is to demonstrate that the EM61-MK2 system is capable of detecting munitions items within industry standards. This capability is demonstrated through a process in which signal strength and sensor performance are compared to validated industry values. For the EM61-MK2, this process involves demonstrating that the maximum amplitude response from an ISO falls within 20 percent of the predicted, published sensor response for that item (Naval Research Laboratory [NRL], 2009). Once it has been demonstrated that the system responds comparably, a cross-correlation of industry experience with detection of munitions items can be assumed. In other words, the depths and orientations of munitions items that the EM61-MK2 has been shown to be effective under test scenarios and other projects can be expected (NRL, 2008).

The spike test results (QC Test #5, Table 2) will determine whether the geophysical instrument is responding to within a specific threshold. In this test, the distance from the coil and orientation of the ISO can be strictly controlled in the field.

2.4.3 Repeatability

The MQO for DGM systems data repeatability is that the systems respond consistently from the beginning to the end of daily operation. For the EM61-MK2, this process involves demonstrating that the maximum amplitude response from an ISO falls within 20 percent of the predicted, published sensor response for that item at the beginning and end of each survey day.

In addition, as part of this MQO, repeat data profiles will also be collected and qualitatively compared to the original line data. This evaluation is a qualitative evaluation due to potentially slight variations in the path traveled during survey line data and repeat line collection. The repeat data profile will only be required for the person-portable EM61-MK2 system.

Repeatability will be evaluated by ensuring that, on a daily basis, the geophysical system being used passes QC Tests #5 and #6 in Table 2.

2.4.4 Data Density

The MQO for down-line (along the survey transect) data density is to have sufficient data collected along each transect to detect MEC items and to minimize potential data gaps. The measurement performance criteria are that 98 percent or more of possible sensor readings are captured along each transect at distances of 0.213 meter (0.7 foot) or less and that no individual data gaps greater than 0.61 meter (2 feet) exist along a survey transect, unless the gap is associated with a surface obstruction. This spacing will be quantitatively evaluated in order to determine whether the DGM survey data used for anomaly selection meet this requirement.

2.4.5 Survey Coverage (Lane Spacing)

The MQO for lane spacing refers to the ability to maintain appropriate spacing between individual survey lanes so that 100 percent coverage of accessible portions of the survey area is achieved. The measurement performance criterion for this is that the lane spacing is no greater than 1 meter (3.3 feet), with an intended lane spacing of 0.75 meter (2.5 feet) for the EM61-MK2 survey. The specified lane spacing is intended to provide sufficient overlap of the sensor footprint in order to effectively achieve 100 percent coverage. Survey data will be evaluated for missing lines, improperly positioned lines, and data gaps that are not otherwise explained (such as a surface obstruction) in order to determine whether the DGM survey footprint has adequately achieved 100 percent coverage. This MQO will only apply to the person-portable EM61-MK2 system.

2.4.6 Data Positioning

The MQO for data positioning accuracy is that positioning of detected anomalies is accurate enough to allow for effective reacquisition of the anomaly. The measurement performance criterion for this is that 100 percent of anomaly locations representing QC seeds are within a 1-meter (3.3-foot) radius of a point on the ground surface directly above the source of the anomaly associated with the seed item. An anomaly that is selected outside of this radius will not be considered to be a successful detection of that item, unless the reasons for this occurrence can otherwise be explained. QC seeding will only be performed within the shoreline portion of the survey area.

2.4.7 Data Handling

The MQO for data handling is that pre-processed and final processed data must be delivered in a timely manner and in a useable format. During production surveys, the measurement performance criterion for data handling will require that “draft” (raw) data packages be completed and delivered to the CH2M HILL Project Geophysicist within 3 working days of data collection and that the final data packages be delivered within 5 working days of data collection. Compliance will be evaluated based on the actual delivery of data.

2.5 Data Acquisition, Processing, and Reporting

2.5.1 Field Data Sheets

Field information will be logged and recorded in the Munitions Response Site Information Management System (MRSIMS). Field devices will be set up for use with MRSIMS and will include the following data entry fields:

- Site identification number
- Survey Area identification number (grid, grid block, transects, etc.)
- Field team leader’s name
- Field team members’ names
- Date of data collection
- Geophysical instrument used
- Positioning method used
- Instrument serial numbers
- Geophysical data file names
- Data collection rate
- Line numbers (including survey direction, fiducial locations, and start and end points, if applicable)
- Weather conditions
- Terrain conditions
- Cultural conditions
- Survey area sketch
- Associated QC data file names
- Miscellaneous field notes

2.5.2 Data Processing

Instrument-specific software will be used for initial data processing, and the output will be imported into Geosoft Oasis Montaj (Geosoft) for additional processing, graphical display, anomaly selection, and QC evaluation. Types of processing will be system-specific, but the general processing steps include, but may not be limited to, the following:

- Positional offset correction
- Sensor bias, background leveling, and/or standardization adjustment
- Sensor drift removal
- Latency or lag correction
- Geophysical noise identification and removal (spatial, temporal, motional, or terrain induced)
- Contour-level selection with background shading
- Digital filtering and enhancement (low pass, high pass, band pass, convolution, correlation, non-linear, etc.)

2.5.3 Interpretation and Anomaly Selection

The data processor will use the following criteria, supplemented by site- and system-specific criteria established during instrument validation, for selecting geophysical anomalies that appear to be indicative of potential MEC or MPPEH:

- Maximum amplitude of the response with respect to local background conditions
- Decay curve characteristics
- Location of the response with respect to inaccessible areas, land features, cultural features, or utilities that bisect the transects
- Potential distortions in the response due to interference from manmade features that may be identified at the site during the DGM survey

2.5.4 Anomaly Locations

The data analysis process culminates in the creation of anomaly lists in MRSIMS format, an example of which is shown as Figure 3. These lists can be opened using Microsoft Excel or standard text editors and include, at a minimum, the following information:

- Unique anomaly identifiers
- Survey area identifier
- Predicted location in Universal Transverse Mercator (UTM), North American Datum 1983 coordinates, in Easting (meters) and Northing (meters)
- Coordinates in site-specific UTM zone
- Anomaly type identifier (for example, cultural debris, suspected utility, saturated response area, etc.)
- Response amplitude
- Unit of response (for example, millivolt)

2.5.5 Anomaly Maps

DGM deliverables will include anomaly maps that contain, at a minimum, the following information:

- Client name
- Project name
- DGM Subcontractor
- Map creator
- Map approver
- Date of map creation
- Map file name (full path and file extension)
- Map scale
- Survey area identification
- Contoured data with color scale

- Anomaly locations with unique identification numbers that match anomaly lists
- North arrow, legend, title block, etc.

2.5.6 Records Management

Data files and deliverables will be available for quality assurance verification throughout the project in order to verify that field and data processing procedures are implemented according to this GIP. Raw data files, final processed data files, hard copies, and field notes will be maintained for the duration of the project.

2.5.7 Final Reports, Maps, and Geophysical Data

Geophysical data will be provided via a secure file transfer protocol (FTP) site maintained by CH2M HILL. Data will also be provided on digital versatile disc or compact disc with the final report. Figure 4 presents the folder structure that will be used on the FTP site.

The deliverable requirements and data delivery schedule include the following:

- Raw data will be provided by the DGM subcontractor to CH2M HILL on a daily basis. Raw data are defined as data files stored on the instrument data logger, without any modification (or filtering) that changes the originally recorded values from the geophysical sensor and positional instrument (if applicable).
 - *File Format* - Raw data will be provided as American Standard Code for Information Interchange text format so the data files are viewable in text-editing software. Proprietary binary format data will be directly converted to text format before delivery.
 - *Naming Convention* - Each delivered raw file will have an informative and unique name. Daily production raw files will have the acquisition date as part of the file name.
- Within 3 working days of data collection, the DGM subcontractor will provide CH2M HILL pre-processed data. The following applies to pre-processed data deliverables:
 - Pre-processed geophysical data, including QC tests, will be delivered in Geosoft database (GDB) and xyz format, readable by Geosoft.
 - QC test databases and Adobe Acrobat portable document format (PDF) files containing images of QC test results will be provided and organized by date.
 - Pre-processed production data will be provided by designated survey area (e.g. grid, grid block, transect, etc.)
 - An MRSIMS pre-processed data delivery report in PDF format will be provided with each grid block, which will contain field notes and pre-processing information. Information provided by the MRSIMS report is summarized in Table 3.
 - Pre-processed production data will be delivered in GDB or xyz format, and will include the following minimum channel information:
 - Easting (X) and Northing (Y) coordinates in site-specific UTM projection and in units of meters
 - Time (with precision to at least 0.1 second)
 - Raw geophysical data channels
 - Pre-processed geophysical data channels
- Within 5 days of data collection, the DGM subcontractor will provide CH2M HILL with final processed data. The following applies to the final processed data deliverables:
 - Processed geophysical data, including QC tests, will be delivered in GDB or xyz format.
 - QC test databases and PDF files containing images of QC test results will be provided by survey area.
 - Processed production data will be provided by survey area.

- An MRSIMS final data delivery report will be provided with each survey area, which will contain field notes and final processing information. Information provided by the MRSIMS report is summarized in Table 3.
- Processed production databases will include the following minimum channel information:
 - Easting (X) and Northing (Y) coordinates in site-specific UTM projection (North American Datum 1983) and in units of meters
 - Time (with precision to at least 0.1 second)
 - Raw geophysical data channels
 - Pre-processed geophysical data channels
 - Processed geophysical data channels
- Final deliverables will include:
 - Geosoft “.map” file for each grid
 - PDF of Geosoft map for each grid
 - Geosoft grid “.grd” file for survey area, showing gridded data from the channel used for anomaly selection
 - Microsoft Excel (that is, MRSIMS format) and Geosoft “.xyz” target files for each grid (or a text file stating “there were no selected targets in Grid X”, if applicable)

Final processed filenames will include the grid or survey area name. Within 60 days of data collection, the processed geophysical field data, final maps, and supporting geophysical interpretations will be provided by the DGM subcontractor.

2.6 DGM Quality Control

The geophysical instruments will be field-tested as part of the daily functional checks and as a means of reviewing system performance for compliance with the project MQOs. A description of each test and its acceptance criteria and frequency are provided as follows and summarized in Table 2. Unless otherwise noted, these tests will apply to the person-portable and underwater system configurations.

- **Equipment Warm-up (Test #1).** The EM61-MK2 will be turned on for a minimum of 10 minutes before use. Equipment warm-up is performed each time the instrument is first turned on for the day or has been off for an extended period of time during which the instrument was allowed to cool down.
- **Personnel Test (Test #2).** This test checks the response of instruments to the personnel and their clothing and proximity to the system. On a daily basis, instrument sensors are checked for their response to the personnel operating the system, with response observed in the field for immediate corrective action. The personnel test is conducted at the beginning of the survey operations for each work day.
- **Vibration Test (Cable Shake) (Test #3).** This test checks the response of instruments to vibration. On a daily basis, instrument sensors are checked for their response to vibrations through shaking the cables and observing the response in the field for immediate corrective action. The vibration test is conducted at the beginning of the survey operations for each work day.
- **Record Sensor Positions (Test #4).** Positioning accuracy of the final processed data will be demonstrated by operating the equipment over one or more known points. The accuracy of the data positioning will be assessed by calculating the difference between a known location over which a positioning instrument is held and the displayed position. The sensor position test will be conducted at the beginning of the survey operation for each work day.

- **Static Background and Static Spike (Test #4).** Static tests are performed by keeping the survey equipment stationary and positioning them within, or close to, the survey boundaries in an area relatively free of sources of metallic interference. Data are initially collected for a specific period (typically 1 minute) in order to measure background conditions. While keeping the instrument in a fixed position, data are recorded with a “spike” (for example, ISO) placed at an accurately measured distance and orientation from the sensor. The purpose of the static test is to determine whether unusual levels of instrument or ambient noise exist. The static background and static spike test are conducted at the beginning and end of each survey operation as well as in between each survey area. For example, if the data are collected as grid blocks (where one block comprises several grids), the static tests will also be conducted in between each grid block. Therefore, this test effectively “opens” and “closes” out a survey area (grid, grid block, set of transects, etc.).

The ISO can be placed above or below the sensor so long as the distance is measured from the ISO center of mass to the center of the sensor. For the EM61-MK2, the center of the sensor corresponds to the center of the horizontal plane of the transmit coil (top of coil if item placed above coil, bottom of coil if item placed below), as illustrated on Figure 5.

- **Repeat Data (Test #5):** This test is performed in order to evaluate repeatability of the data and will be performed between collection of a survey area (grid, grid block, set of transects, etc.) after the initial survey over that area. Because of the intrinsic difficulty of following the exact same path for collecting repeat data, this test will be a qualitative comparison as opposed to quantitative. This test will only apply to the person-portable EM61-MK2 system.

2.7 Quality Control Seed Items

At least one QC seed item, consisting of a small ISO, will be buried within the shoreline portion of the survey area. Details of the blind seeding program are provided in the GSV Work Plan provided as Appendix A to this GIP.

2.8 Quality Control of DGM Data and Deliverables

CH2M HILL will perform QC of geophysical data and data deliverables at each step of the processing path. Figure 6 depicts the processing path and the QC steps performed. Data will not move to the next stage until they have passed each QC check.

2.9 Corrective Measures

Specific corrective measures are dependent on the type of geophysical equipment used. However, the following are the basic corrective measures to be followed in association with the DGM surveying:

- Replacement of sensors if they fail to meet functional check requirements
- Re-collection of survey area units (grids) if seeded items are not identified (do not appear in the DGM data)
- Re-analysis of the DGM data if there is a failure to select a seed item as a target anomaly, but the item is clearly present in the DGM data

2.10 Handheld Geophysical Instrument Quality Control

QC of the handheld geophysical instruments will be accomplished through daily functional checks before using them for field activities. Each instrument will be operated over a small metallic item buried close to the maximum detection depth determined for that item during instrument validation. If the instrument is not able to detect the item, it will be taken out of service until it can be repaired.

SECTION 3

References

CH2M HILL. 2009. Final Site Inspection Work Plan for Igniter Area – UXO 19. *Naval Support Facility Indian Head. Indian Head, Maryland.*

CH2M HILL. 2010. *Final Site Inspection Report for UXOs 6, 9, 11, 13, 18, 19, 20, 27, 29, 30, 31, and 33. Naval Support Facility Indian Head. Indian Head, Maryland.*

CH2M HILL. 2011. *Final Explosives Safety Submission for UXO 19, Igniter Area. Naval Support Facility Indian Head. Indian Head, Maryland.*

Malcolm Pirnie. 2005. *Final Water Area Munitions Study, Naval District Washington, Indian Head, Maryland.*

NRL. 2008. *Final Report for the Evaluation of UXO Detection Technology at the Standardized UXO Test Sites Aberdeen and Yuma Proving Grounds, Standardized UXO Technology Demonstration Site Program, SERDP. NRL/MR/6110-08-9155 (EM61-MK2 Response of Standard Munitions Items).*

NRL. 2009. *EM61-MK2 Response of Three Surrogates. NRL/MR/6110-09-9183.*

Tables

TABLE 1
 Project Measurement Quality Objectives
Geophysical Investigation Plan for UXO 19 – Igniter Area
NSF-IH, Indian Head, Maryland

MQO	Measurement Performance Criteria	Test Method
General System Function		
<i>DGM System Positioning.</i> Coordinates obtained from DGM system are of sufficient accuracy for relocation of anomalies.	Positional error of daily QC check of positioning systems will not exceed 10 cm (4 in.).	Results of QC Test #4 (Table 3) will be quantitatively evaluated for compliance.
<i>DGM System Munitions Detection.</i> DGM system response is within industry standards for detection.	Response to ISO will not vary more than $\pm 20\%$ from known response for specific distance from sensors in static test.	Results of QC Test #5 (Table 3) will be compared to published response curves.
<i>Repeatability.</i> Repeatable and accurate data are being obtained from DGM system.	Response to ISO will not vary more than $\pm 20\%$ from known response for specific distance from sensors in static tests conducted at the beginning and end of each survey day. In addition, response of repeat line is comparable to original line data (qualitative determination). The repeat data profile requirement will only apply to the person- portable system.	Results of QC Test #5 (Table 3) will be evaluated quantitatively for compliance. Results of QC Test #6 (Table 3) will be qualitatively compared to results of original survey data.
DGM Surveys		
<i>Data Density.</i> Down line data density is sufficient to detect MEC items.	Over 98% of possible sensor readings are captured along a survey transect with a spacing of no greater than 0.213 m (0.7 ft) between points. A data gap greater than 0.61m (2 ft) will not meet the MQO, unless the gap is associated with an obstruction.	Results of DGM surveys will be quantitatively evaluated for compliance.
<i>[Person Portable System Only] Survey Coverage (Lane Spacing).</i> Lane spacing intended to provide 100% coverage of accessible portions of the shoreline area within the DGM survey area.	Lane spacing is no greater than 1m (3 ft) with an intended lane spacing of 0.75m (2.5 ft). There will be no MQO for lane spacing of the underwater portion of the survey area.	Footprint coverage of DGM surveys will be evaluated for missing or improperly positioned survey lines as well as data gaps that are not otherwise explained.
<i>[Person Portable System Only] Data Positioning.</i> Positioning of detected anomalies is accurate.	Anomaly locations representing QC seeds occur within a 1m (3.3-ft) radius of a point on the ground surface directly above the QC seed. QC seeding will only be performed within the shoreline of the survey area.	Anomalies selected will be compared with known (i.e. surveyed) seed item locations for compliance.
Data Handling		
Data must be delivered in a timely manner and in a useable format.	Data packages are completed and delivered to the CH2M HILL Project Geophysicist within schedule (3 days pre-processed; 5 days processed).	Evaluated based on actual delivery of data.

cm = centimeters
 In = inches
 M = meter
 ft = feet/foot

TABLE 2
 Geophysical Instrument Standardization Tests and Acceptance Criteria
Geophysical Investigation Plan for UXO 19 – Igniter Area
NSF-IH, Indian Head, Maryland

Test	Test Description	Acceptance Criteria	Power On	Beginning of Day	Beginning and End of Day	Between Survey Areas	~2% of Daily Area Surveyed
1	Equipment Warm-up	Equipment specific (minimum 10 minutes)	x				
2	Personnel Test	Personnel, clothing, etc.. should not result in EM61-MK2 Channel 2 data spikes >2 mV from the mean		x			
3	Vibration Test (Cable Shake)	Data profile does not exhibit EM61-MK2 Channel 2 data spikes >2 mV from the mean		x			
4	Record Sensor Positions	Accuracy of positioning data at known, surveyed location is within 10cm (4 in)		X			
5	Static Background and Static Spike	±20% of standard item response, after background correction			x	x	
6	Repeat Data (Person- Portable System)	Qualitative repeatability of response amplitude					X

mV = millivolt

TABLE 3
 Processing Documentation Requirements
Geophysical Investigation Plan for UXO 19 – Igniter Area
NSF-IH, Indian Head, Maryland

Information Type	Raw Data Delivery Report	Final Data Delivery Report	In File Headers
Site ID	X	X	X
Geophysical instrument used	X	X	X
Positioning method used	X	X	X
Instrument serial numbers (geophysical and positioning)	X	X	
Coordinate system and unit of measure	X	X	X
Grid ID (or other identifier of surveyed area)	X	X	X
Date of data collection	X	X	X
Raw data file names associated with delivery	X	X	
Processed data file names associated with delivery	X	X	
Name of Project Geophysicist	X	X	
Name of Site Geophysicist	X	X	
Name of data processor	X	X	
Data processing software used with version number	X	X	
Despiking method and details	X	X	
Sensor drift removal and details	X	X	
Latency/lag correction and details	X	X	
Sensor bias, background leveling and/or standardization adjustment method and details		X	
PDF document showing graphical results of each field quality control test	X	X	
Geophysical noise identification and removal (spatial, temporal, motional, terrain induced) and details		X	
Other filtering/processing performed and details		X	
Gridding method		X	
Anomaly selection and decision criteria details		X	
Geosoft “.gdb” file for unit of survey being delivered (e.g. grid, grid block, or other area agreed upon with the client)		X	
Geosoft “.xyz” file for unit of survey being delivered (e.g. grid, grid block, or other area agreed upon with the client)		X	
Geosoft “.grd” file for unit of survey being delivered		X	
Geosoft “.map” file for unit of survey being delivered		X	
PDF of Geosoft map for unit of survey being delivered		X	
Other processing comments		X	
Date data processing is completed	X	X	
Data delivery date	X	X	
Scanned copy of field notes and field mobile data collection device notes (if applicable)	X		

Figures



Legend

- Proposed DGM Area
- UXO 19 Boundary in WAMS (Malcolm Pirnie, 2005)
- Installation Boundary



Figure 1
Geophysical Investigation Plan for UXO 19 - Igniter Area
NSF-IH, Indian Head, Maryland



Figure 2
Site Photographs
Geophysical Investigation Plan for UXO 19 - Igniter Area
NSF-IH, Indian Head, Maryland

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	ID	GRIDCELLID	X1	Y1	X2	Y2	X3	Y3	X4	Y4	TYPE	AMPLITUDE	UNITS	s_ColLineage	s_Generation	s_GUID	s_Lineage
2	1	K2F9J1WB	258959.4	2006299.6	0	0	0	0	0	0	1	3.67	mV				
3	2	K2F9J1WB	258962.4	2006302.2	0	0	0	0	0	0	1	19.42	mV				
4	3	K2F9J1WB	258964.2	2006301.8	0	0	0	0	0	0	1	4.47	mV				

FIGURE 3
 Example MRSIMS Anomaly List for EM61-MK2 Data
 Geophysical Investigation Plan for UXO 19 – Igniter Area
 NSF-IH, Indian Head, Maryland



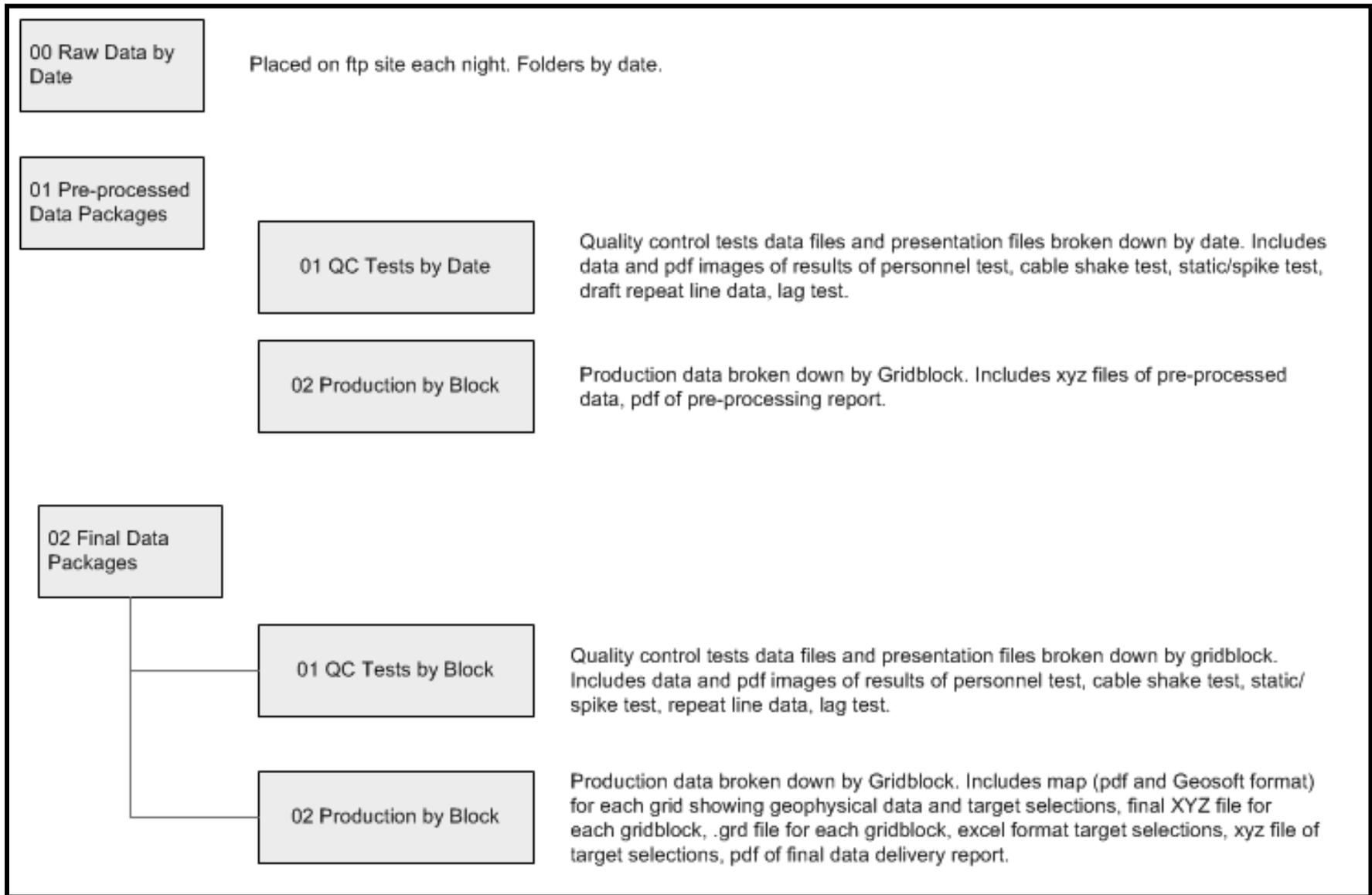


FIGURE 4
 FTP Site Directory Structure
 Geophysical Investigation Plan for UXO 19 – Igniter Area
 NSF-IH, Indian Head, Maryland
CH2MHILL



FIGURE 5
Example Spike Test Setup
*Geophysical Investigation Plan for UXO 19 – Igniter Area
NSF-IH, Indian Head, Maryland*
CH2MHILL

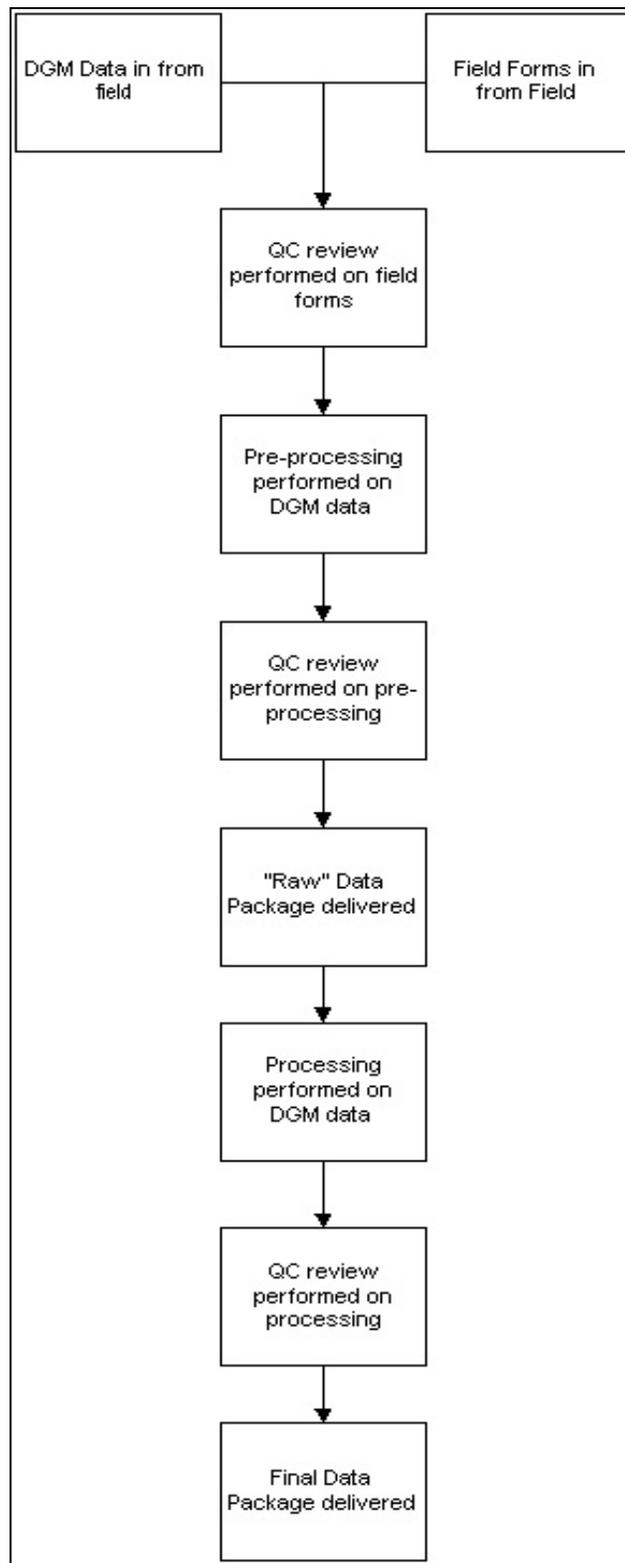


FIGURE 6
Quality Control of DGM Data – Process Flow Path
*Geophysical Investigation Plan for UXO 19 – Igniter Area
NSF-IH, Indian Head, Maryland*

Appendix A
Geophysical System Verification Plan

Final

Geophysical System Verification Plan for UXO 19 –Igniter Area

**Naval Support Facility Indian Head
Indian Head, Maryland**

Contract Task Order 0012

December 2012

Prepared for

**Department of the Navy
Naval Facilities Engineering Command
Washington**

Under the

**NAVFAC CLEAN 1000 Program
Contract N62470-08-D-1000**

Prepared by



CH2MHILL

Chantilly, Virginia

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A-6	QC Seed Burial Illustration

Acronyms and Abbreviations

bgs	below ground surface
cm	centimeter
DGM	digital geophysical mapping
ft	feet
GIP	Geophysical Investigation Plan
GPS	global positioning system
GSV	geophysical system verification
in	inch
ISO	industry standard object
IVS	instrument verification strip
m	meter
MEC	munitions and explosives of concern
MPPEH	material potentially presenting an explosive hazard
MQO	measurement quality objective
NRL	Naval Research Laboratory
QC	quality control
RTK	real-time kinematic
UXO	unexploded ordnance

Geophysical System Verification Plan

The geophysical system verification (GSV) process is a physics-based, presumptively selected technology process in which signal strength and sensor performance are compared to known response curves of industry standard objects (ISOs) to verify digital geophysical mapping (DGM) systems before and during site surveys. The GSV process is designed to perform initial verification of the proposed DGM system using an instrument verification strip (IVS), followed by a blind seeding program for continued verification throughout the field operations.

The GSV process will be implemented for the EM61-MK2 survey to be conducted in support of a removal action at the Naval Support Facility Indian Head in Indian Head, Maryland. DGM will be performed at the Igniter Area – UXO 19 (UXO 19).

1.1 Instrument Verification Strip

The initial phase of the GSV process is verification of the selected DGM system using an IVS. The IVS will be a land-based IVS. No underwater IVS will be constructed for the DGM at UXO 19.

1.2 Personnel and Qualifications

The following individuals will be involved in the IVS, GSV process, and DGM production survey:

- Project/Quality Control (QC) Geophysicist (CH2M HILL)
- Site Geophysicist (DGM Subcontractor)
- Field Geophysicist (DGM Subcontractor)
- Data Processor (DGM Subcontractor)
- Unexploded ordnance (UXO) personnel (CH2M HILL)

Personnel involved in performance of the IVS and the production geophysical surveys will meet the following qualifications and have the following responsibilities throughout the duration of the survey:

- The Project/QC Geophysicist will have a degree in geophysics, geology, geological engineering, or a closely related field, and have a minimum of 5 years of directly related geophysical experience working at munitions and explosives of concern (MEC) and material potentially presenting an explosive hazard (MPPEH) sites. This individual will be responsible for constructing the IVS for use during DGM operations. This individual will also be capable of overseeing geophysical operations and support activities (such as land surveying and vegetation clearing), serving as the project team technical lead, performing QC of data as packages are delivered, and coordinating with the CH2M HILL project manager.
- The Site Geophysicist will have a degree in geophysics, geology, geological engineering, or a closely related field, and have a minimum of 2 years of directly related geophysical experience working at sites with MEC and MPPEH. This individual will serve as the DGM subcontractor's primary point of contact in the field, be capable of managing field staff, maintain geophysical equipment, perform in-field data quality checks, and make sure that field work and records management are completed in accordance with the project work plans and health and safety plan.
- The Field Geophysicist will have a degree in geophysics, geology, geological engineering, or a closely related field and will have had training in the proper and safe operation of geophysical equipment. This individual will have at least 6 months of related geophysical experience working at MEC and MPPEH sites.
- The Data Processor will have a degree in geophysics, geology, geological engineering, or a closely related field, and will have at least 1 year of experience in processing geophysical data related to MEC and MPPEH projects.
- UXO personnel will be responsible for overall daily site access and safety aspects of the project, compiling subcontractor health and safety documents, conducting daily safety briefings and performing MEC

avoidance, as needed, in the field. Information on the specific qualifications for various UXO personnel support roles can be found in the Explosives Safety Submission.

1.3 Digital Geophysical Mapping System

DGM at UXO 19 will be conducted using the Geonics, Ltd. EM61-MK2. The EM61-MK2 has been presumptively selected based on existing site conditions, findings of the interim removal action, and successful use of the EM61-MK2 at other munitions response project sites at Naval Support Facility Indian Head.

The EM61-MK2 survey will consist of a single coil system to map geophysical anomalies that could represent subsurface MEC or MPPEH within the survey area. The DGM area at UXO 19 is divided into two general portions: the shoreline and underwater portion, which comprises the majority of the survey area. The full GSV process of surveying the IVS and using a blind seeding program will be implemented for the person-portable EM61-MK2 system at UXO 19.

The QC program to be implemented for both the person-portable and underwater system configurations during the DGM production survey is presented in the Geophysical Investigation Plan (GIP).

1.4 Geonics, Ltd. EM61-MK2

The EM61-MK2 is a high-resolution time-domain electromagnetic instrument designed to detect, with high spatial resolution, shallow ferrous and nonferrous metallic objects. The standard EM61-MK2 system consists of two air-cored, 1 meter (m) by 0.5 m (3.3 feet [ft] by 1.2 ft) coils, a digital data recorder, batteries, and processing electronics. The EM61-MK2's transmitter generates a pulsed primary magnetic field, which then induces eddy currents in nearby metallic objects. Each of the two spatially separated receiver coils measures these eddy currents. The EM61-MK2 offers the ability to measure the eddy currents at three distinct time intervals in the bottom coil or four intervals if no top coil measurements are recorded. Earlier time gates provide enhanced detection of smaller metallic objects. Secondary voltages induced in both coils are measured in millivolts. The arrangement of coils is such that there is a vertical separation of 40 centimeters (cm) (15.7 inches [in]). To obtain as much information about the decay of the induced electromagnetic signal as possible, the top coil will not be used at this site as a data channel, and four bottom coil sensor channels will be recorded. Assuming accurate data positioning, target resolution of approximately 50 cm (20 in) can be expected.

It is assumed that the shoreline portion of the survey area will be collected in person-portable mode using either litter carry or wheel mode. The underwater portion of the survey area would be completed by attaching the EM61-MK2 coils to a survey vessel or flotation device towed behind a survey vessel. Although the specific survey vessel and configuration for the underwater DGM shall ultimately be decided by the DGM subcontractor, it is recommended that a lightweight, flat-bottom vessel (such as an aluminum hull jon boat) be used that could be maneuvered either via oars or a tether system. An engine-powered vessel is not recommended because of the shallow water and presence of dense underwater plants that would likely result in entanglement of a propeller.

1.5 Positioning Method

Positioning of the DGM data will be accomplished using real-time kinematic global positioning system (RTK GPS). RTK GPS instruments are ideal for field-mapping applications with adequate satellite visibility conditions because they provide the highest GPS accuracy possible. Typical accuracies of geophysical data positioning after adding errors induced by the movement of the DGM system are in the range of 20 to 50 cm.

1.6 Location and Length of IVS

An area near the DGM survey area will be selected for the IVS. The IVS will not be located on the shoreline or in an area that could be under water. The exact location of the IVS will be finalized during the initial mobilization to the site. The IVS will be set up as a series of survey lanes, each with a minimum length of 20 m (66 ft). Section 1.7 provides additional details on the IVS setup and construction.

1.7 Industry Standard Objects

The ISOs (Figure 1) to be used in the IVS are 1-in by 4-in (2.54-cm by 10.16-cm) steel pipes (McMaster-Carr part number 44615K466 [<http://www.mcmaster.com>]) with the following specifications:

- Shape: straight nipple, threaded at both ends
- Schedule: 40
- Pipe Size: 1 in (1.315-in outer diameter)
- Length: 4 in
- Finish: black welded steel

Instrument response curves for this ISO have been developed by the Naval Research Laboratory (NRL) demonstrating their standard response under their most favorable orientation (perpendicular to the EM61-MK2 instrument plane—that is, buried vertically in the ground surface) and least favorable orientation (parallel to the instrument plane—that is, buried horizontally and perpendicular to the direction of travel with the EM61-MK2) at a variety of distances from the instrument's bottom transmit/receive coil (NRL, 2009).

1.8 IVS Procedures

Figure 2 illustrates the overall IVS process and the procedures to be employed (numbered in accordance with the steps shown on Figure 2) during site work according to the following steps:

1. An IVS area will be selected with preference for the following (although none of the conditions are vital for IVS success):
 - Terrain, geology, and vegetation similar to that of a majority of the DGM survey area
 - Geophysical noise conditions similar to those expected across the survey area
 - Large enough site to accommodate all necessary IVS tests and equipment and for adequate spacing (at least 3 m) of the ISO items to avoid ambiguities in data evaluation
 - Readily accessible to project personnel
 - Proximity to the actual survey site (if not within the site)
2. A background DGM survey will be performed with the EM61-MK2 using RTK GPS. This step will help determine the appropriateness of the location (for example, few existing anomalies), and will verify that ISOs are not seeded near existing anomalies. The data will be processed and provided to the CH2M HILL Project/QC Geophysicist for evaluation.
3. Once the IVS area is deemed suitable for use, (that is, free of significant subsurface anomalies or anomalies that are clearly identified so that they can be avoided during seeding), two small ISOs will be buried in a vertical orientation at depths below ground surface of approximately 3 and 7 times the small ISO diameter (10 cm and 23 cm, respectively). The ISO will be placed in a plastic sealable bag, identified as inert, and labeled with the applicable contract and contract task order number and CH2M HILL project manager contact information. These depths are intended to provide an adequate signal-to-noise ratio for detecting the items. The generalized setup of the seeded IVS transect is presented as Figure 3.

Measurements of the item depths will be to the center of mass of each item. CH2M HILL onsite personnel will bury the ISOs using shovels to dig the holes to the appropriate depths for burial of the seed items in coordination with the Project/QC Geophysicist. The background survey data and anomaly avoidance techniques will be reviewed so that transect start and end stakes and the seed items are not placed on top of or near existing anomalies. Personnel will bury the ISOs and record the emplacement depth and orientation.

4. Either the land surveying or DGM subcontractor will record the locations of the IVS transect start and end locations as well as the buried ISOs. The holes will then be filled with soil, and a vinyl-stem flag or wooden survey stake will be placed at each ISO location. If wooded stakes are used, they will not extend more than 1 ft above the ground surface so that the EM61-MK2 can easily pass over top of their locations.
5. A DGM survey using RTK GPS positioning methods will be performed over the IVS area, including the transects described in Table 1 and shown on Figure 4. The IVS data collection will only apply to person-portable systems and configurations used at UXO 19.

The IVS at UXO 19 will be established with transects A and D at a spacing of 0.75 m and Transect C at a spacing of 0.375 m relative to the center strip. Details on the DGM production survey approach are provided in the GIP.

The IVS “5-line” survey data will be processed and interpreted by the DGM subcontractor’s data processor and provided to the CH2M HILL Project/QC Geophysicist within 24 hours of completion of the IVS survey.

- If the initial measurement quality objectives (MQOs) have not been met, the Project/QC Geophysicist will discuss with the Site Geophysicist whether modifications to instrumentation or procedures can be made to the DGM system in order to meet the MQOs.
- If the MQOs cannot be met, the Project/QC Geophysicist will meet with the project team to discuss potential resolutions (such as modification of a MQO) before completing the IVS and beginning the production survey.
- Once the system has been determined to meet the initial (or modified) MQOs, the IVS survey will be complete.

1.9 Measurement Quality Objectives

The MQOs for the IVS are presented in Table 2. The EM61-MK2 will not be used for site surveys until it is able to meet these MQOs or until the project team agrees on modifications to existing MQOs. Additional MQOs for the production survey will be monitored through the blind seeding program and other QC tests, as discussed in the GIP. The IVS MQOs, measurement performance criteria, and test method to be used during the IVS are discussed in detail in the following subsections.

1.10 General System Verification

DGM System Positioning

The MQO for DGM system positioning is that the resulting anomaly coordinates from the DGM survey from the seeded ISOs are at a sufficient accuracy to allow for appropriate relocation of MEC items for intrusive investigation. The measurement performance criterion for this is that the positional error at known IVS seed locations will not exceed 25 cm (9.8 in). This MQO applies to only person portable systems used at UXO 19.

DGM System Munitions Detection

The MQO for munitions detection is to demonstrate that the EM61-MK2 system is capable of detecting munitions items within industry standards. This process involves demonstrating that the maximum amplitude response from an ISO falls within 20 percent of the predicted, published sensor response for that item (NRL, 2009). Once it has been demonstrated that the system responds comparably, a cross-correlation of industry experience with detection of munitions items can be assumed. In other words, the depths and orientations of munitions items which the EM61-MK2 has been shown to be effective under test scenarios and other projects can be expected (NRL, 2008). Figure 5 presents the EM61-MK2 predicted responses for Channel 2 from a small ISO (NRL, 2009).

The static spike test results (discussed in the GIP) will determine whether the geophysical instrument is responding to within a specific threshold. In this test, the distance from the coil and orientation of the ISO can be strictly controlled in the field.

Minor variations in the sensor height as it passes over the seeded item and slight variations in the path traveled down the IVS can affect the amplitude response received from the instrument. Therefore, the responses from the seeded ISOs in the IVS will be qualitatively evaluated for person-portable systems. A determination that the geophysical instrument itself is responding within a specific threshold will be through the static spike test results.

1.11 Data Handling

The MQO for data handling is that data must be delivered in a timely manner and in a useable format. Because of the need for rapid feedback during IVS operations to effectively test potential DGM systems, the measurement performance criterion for data handling during IVS activities will require that initial data be completed and delivered to the Project/QC Geophysicist within 24 hours of data collection. Processed data for the IVS shall be delivered to the Project/QC Geophysicist within 3 working days of data collection. This MQO will be evaluated based on the actual delivery of data from the subcontractor.

1.12 IVS Data Analysis and Interpretation

The IVS survey data will be post-processed and analyzed according to the data processing standard operating procedures and in accordance with Section 2.5 of the GIP.

1.13 DGM Quality Control

Achievement of the GSV MQOs will be verified by the CH2M HILL Project/QC Geophysicist. The selected IVS area, the process of emplacing the IVS items, and the survey locations will be verified through observation during the IVS set-up and execution. Standard operating procedures provided by the subcontractor before mobilization will be reviewed for compliance with the GIP and to confirm that equipment functional checks are established and utilized.

The QC tests discussed in detail in Section 2.6 of the GIP will be performed as part of the GSV and IVS procedure for the DGM systems being used.

1.14 IVS Data Evaluation and Reporting

The Project/QC geophysicist will evaluate the IVS survey results and QC tests as the last step in the validation process.

Blind Seeding

As a continuation of the GSV process, small ISOs will be used as blind seeds within the shoreline portion of the DGM survey area in order to provide on-going validation of the EM61-MK2 system.

2.1 Seed Placement

CH2M HILL will bury seed items with a vertical orientation and at a depth of 6 inches below ground surface. Depth will be measured to the center of mass of the item, as illustrated on Figure 6. Depths will be recorded in field notes.

At least one seed item will be placed within the shoreline portion of the DGM survey area at UXO 19. UXO personnel will use a White's XLT all-metals detector to clear the locations of each proposed seed location in order to avoid placing the seed near a subsurface metallic object. The following also applies to the placement of the seed items:

- UXO personnel will clear the proposed seed locations to make sure there are no potentially competing subsurface anomalies that may affect the ability to successfully detect the seed items with the geophysical instruments.
- Seeds will not be placed within a 1-m (3.3-ft) radius of a surveyor stake, tree, or other physical obstruction.
- Holes will be dug by UXO personnel or under their direct supervision.
- The seed items will be left exposed after emplacement so that the land surveyor can record the locations of the items. The surveyor will record the location of the center of the seed items.
- The seed items will be labeled with the CH2M HILL project manager's name and contact information, as well as the applicable contract number for the project. They will be placed in a sealed plastic bag or securely wrapped in non-metallic material to prevent groundwater from obscuring the labels.
- Once surveyed, the seeds will be carefully covered with soil to avoid disturbing their orientation.
- No physical markers will be left in place to denote the locations of the seed items.
- The locations of the seed items will be provided to the CH2M HILL Project/QC Geophysicist.

2.2 Validation

During review of the delivered data packages, the Project/QC Geophysicist will overlay the locations of the blind seeds to observe whether the munitions detection and positioning MQOs are met. Should an issue be detected (such as a data trend indicating a MQO limit is being approached) or a MQO is not met, a comprehensive root-cause analysis will be performed and a corrective action developed.

SECTION 3

Reporting

Results of the GSV process will be included in a report prepared by CH2M HILL. The report will include a summary of the IVS operations and initial validation, an as-built map of the IVS plot, discussion of the IVS and blind seeding program results.

SECTION 4

References

Naval Research Laboratory (NRL). 2009. *EM61-MK2 Response of Three Surrogates*, NRL/MR/6110-09-9183. March.

Naval Research Laboratory (NRL). 2008. *Final Report for the Evaluation of UXO Detection Technology at the Standardized UXO Test Sites Aberdeen and Yuma Proving Grounds, Standardized UXO Technology Demonstration Site Program, SERDP*. NRL/MR/6110-08-9155 (*EM61-MK2 Response of Standard Munitions Items*). October.

Tables

TABLE A-1
 IVS Transect Descriptions and Purpose
Geophysical System Verification Plan
NSF-IH, Indian Head, Maryland

Transect	Description	Purpose
A	Offset by 0.75 m	Demonstrate horizontal drop off of item response
B	Directly over center of strip (see Figure 3)	Verify response versus established response curves
C	Offset by 0.375 m (half of intended lane separation) from center of strip	Demonstrate horizontal drop off of item response
D	Offset by 0.75 m (on opposite side of strip from Transect A)	Demonstrate horizontal drop off of item response
E	Offset by ~3 m from strip	Measure background noise

m = meter

TABLE A-2
 IVS MOOs
Geophysical System Verification Plan
NSF-IH, Indian Head, Maryland

Measurement Quality Objective	Measurement Performance Criteria	Test Method During IVS
General System Verification		
<i>DGM System Positioning [Person Portable System Only]</i> Accurate coordinates are obtained from kinematic (i.e. in-motion) DGM positioning systems.	Positional error of ISO seeds will not exceed 25 centimeters (9.8 inches) relative to surveyed locations.	Results of IVS DGM survey versus IVS seed locations will be evaluated for compliance.
<i>DGM System Munitions Detection.</i> DGM system response is within industry standards for detection.	Response to buried ISO will not vary more than $\pm 20\%$ from known response for specific distance from sensors in static test.	Results of IVS surveys over seed items in strip will be qualitatively reviewed for the person portable system. Results of static tests described in GIP will be quantitatively reviewed for compliance for each system used.
Data Handling		
Data must be delivered in a timely manner and in a useable format.	IVS survey results are delivered within 24 hours of completion of survey. Final processed packages delivered within 3 days.	Evaluate based on actual delivery of data.

Figures

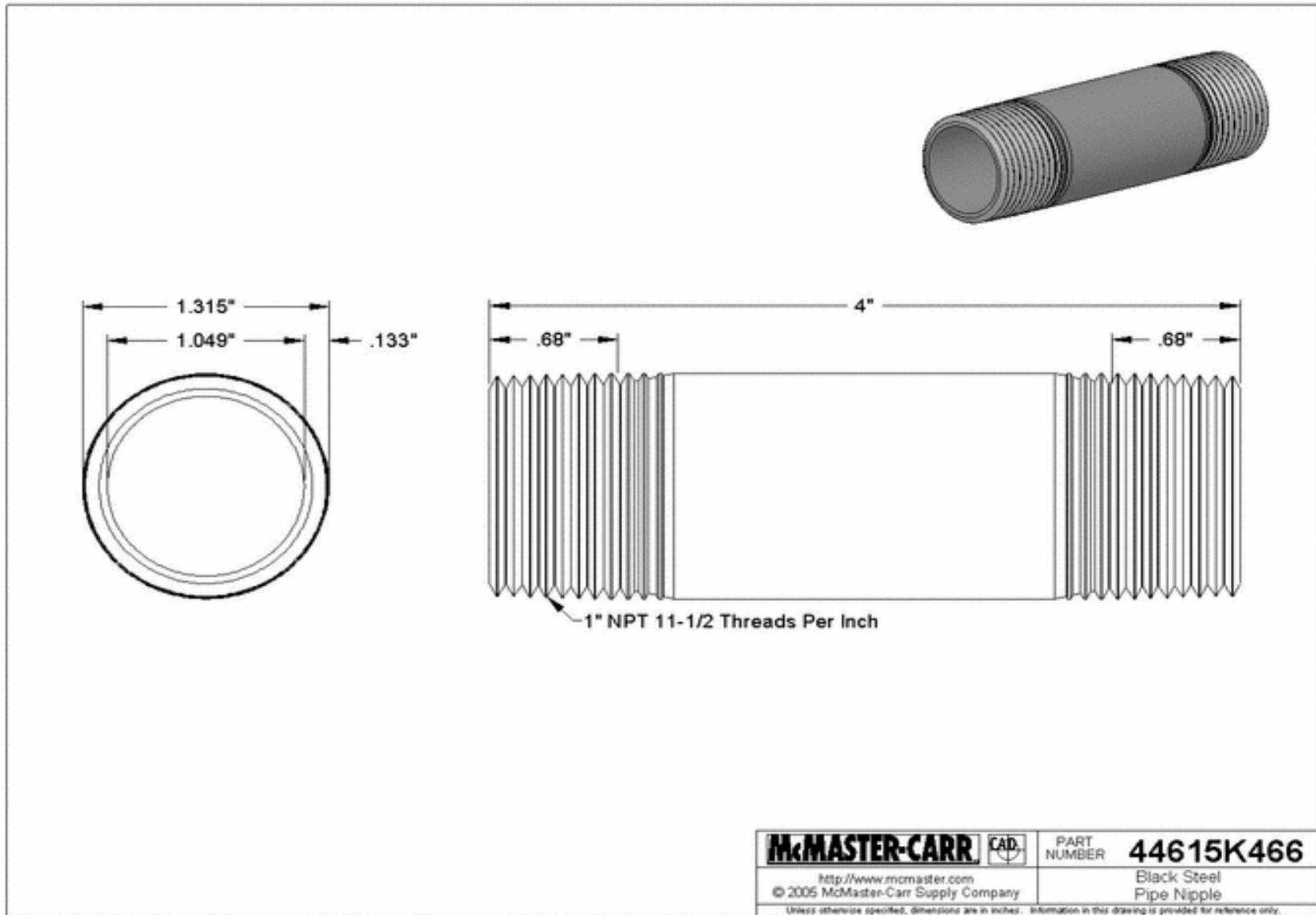


FIGURE A-1
 Small ISO
 Geophysical System Verification Plan
 NSF-IH, Indian Head, Maryland
CH2MHILL

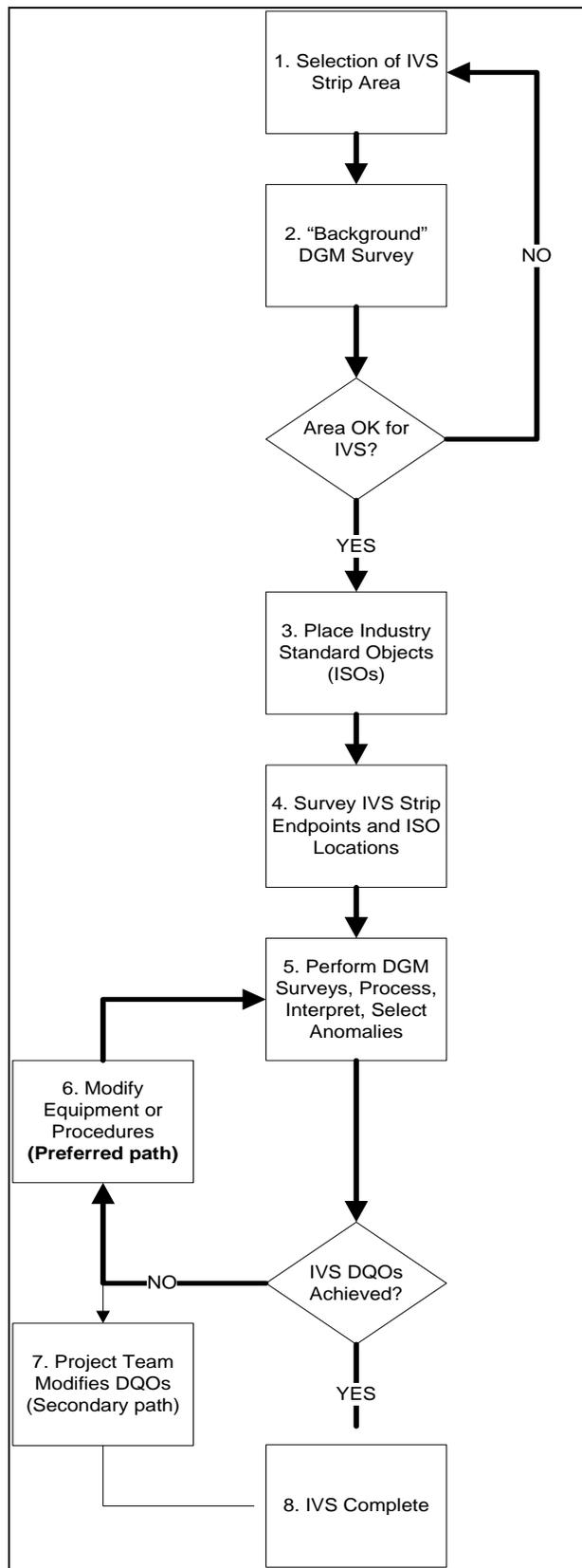


FIGURE A-2
 IVS Process
 Geophysical System Verification Plan
 NSF-IH, Indian Head, Maryland
CH2MHILL

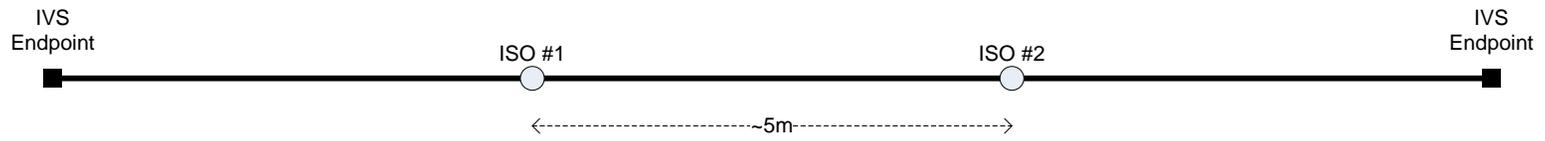


FIGURE A-3
Generalized IVS Seeded Transect
Geophysical System Verification Plan
NSF-IH, Indian Head, Maryland
CH2MHILL

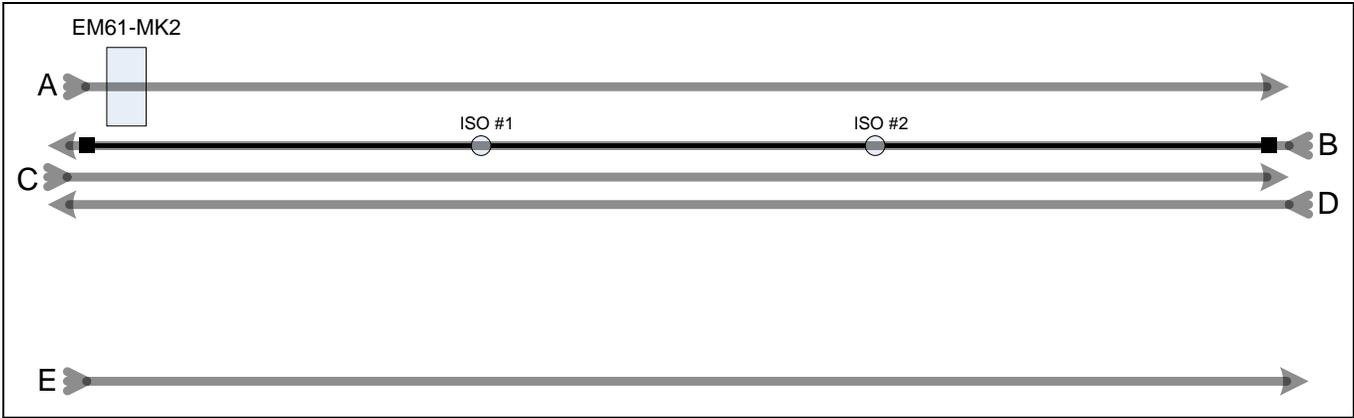


FIGURE A-4
IVS Layout
Geophysical System Verification Plan
NSF-IH, Indian Head, Maryland
CH2MHILL

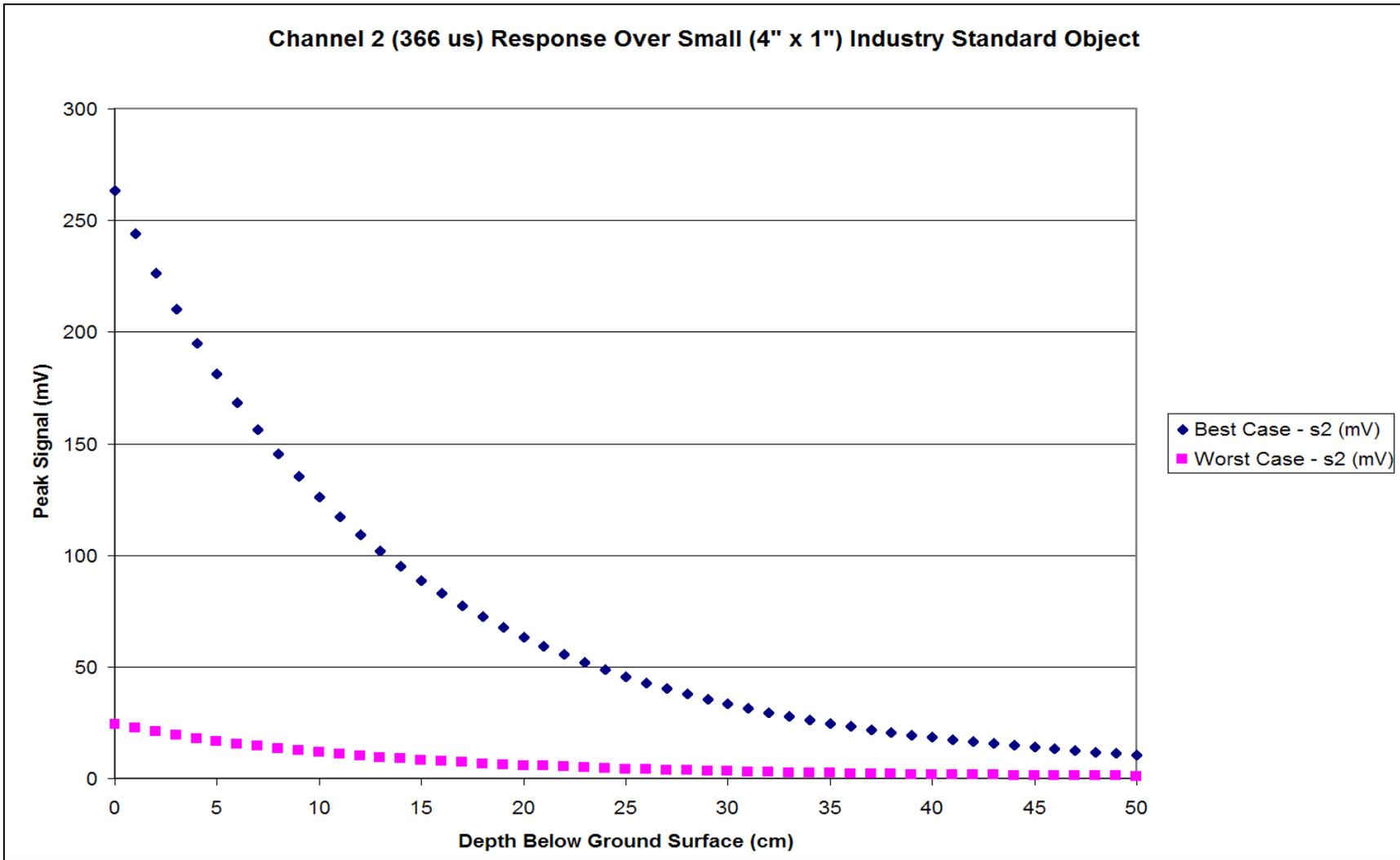


FIGURE A-5
NRL (2009) Results for Small ISO Tested using EM61-MK2 Bottom Coil, Channel 2
Geophysical System Verification Plan
NSF-IH, Indian Head, Maryland

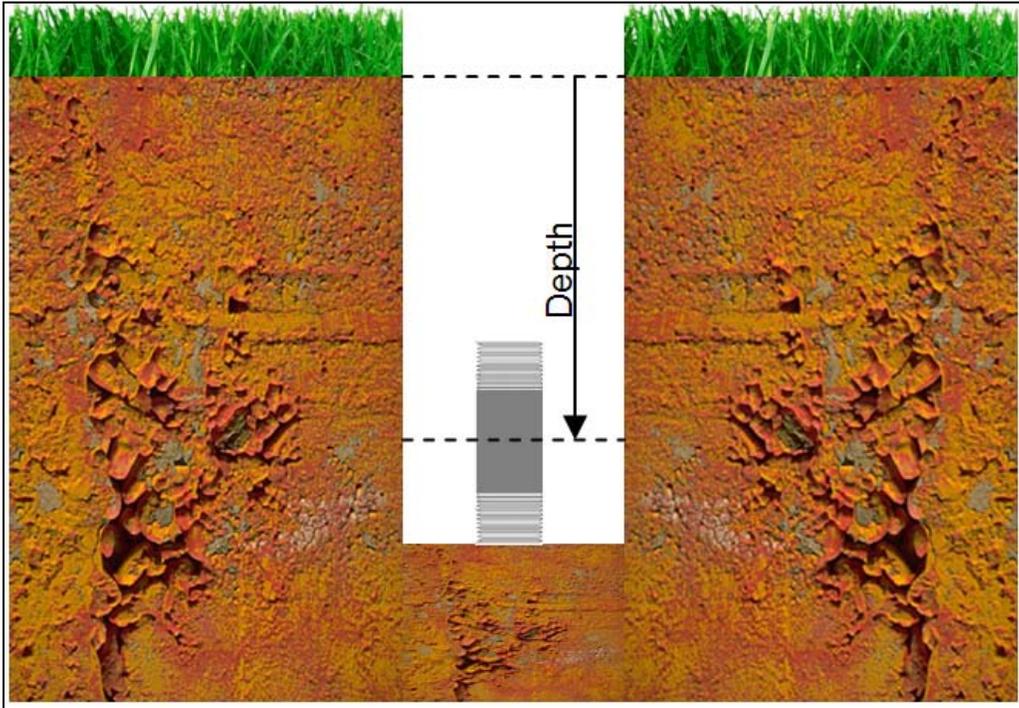


FIGURE A-6
QC Seed Burial Illustration
Geophysical System Verification Plan
NSF-IH, Indian Head, Maryland
CH2MHILL

Appendix B
Health and Safety Plan

Final

**Health and Safety Plan
UXO 19 - Igniter Area**

**Naval Support Facility Indian Head
Indian Head, Maryland**

Contract Task Order 0012

December 2012

Prepared for

**Department of the Navy
Naval Facilities Engineering Command
Washington**

Under the

**NAVFAC CLEAN 1000 Program
Contract N62470-08-D-1000**

Prepared by



CH2MHILL

Chantilly, Virginia

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ATTACHMENTS

- 1 Health and Safety Plan Employee Signoff Form
- 2 Chemical Inventory/Register Form
- 3 Chemical-Specific Training Form
- 4 Project Activity Self-Assessment Checklists/Forms/Permits
- 5 Key Target Zero Program Elements
- 6 Fact Sheets
- 7 Observed Hazard Form
- 8 Stop Work Order Form
- 9 Agency Inspection Target Zero Bulletin
- 10 Completed CH2M HILL AHAs
- 11 Material Safety Data Sheets

Approval

This site-specific Health and Safety Plan (HSP) has been written for use by CH2M HILL only. CH2M HILL claims no responsibility for its use by others unless that use has been specified and defined in project or contract documents. The plan is written for the specific site conditions and identified scope(s) of work and must be amended if those conditions or scope(s) of work change.

By approving this HSP, the Responsible Health and Safety Manager (RHSM) certifies that the personal protective equipment has been selected based on the project-specific hazard assessment.

Original Plan

RHSM Approval: Carl Woods

Date: 7/27/12

Project Manager Approval: Victoria Waranoski

Date: 12/06/12

Revisions

Revisions Made By:

Date:

Description of Revisions to Plan:

Revisions Approved By:

Date:

Acronyms and Abbreviations

°C	degrees Celsius
°F	degrees Fahrenheit
AHA	Activity Hazard Analysis
bpm	beats per minute
CFR	Code of Federal Regulations
CPR	cardiopulmonary resuscitation
COC	contaminant of concern
CRZ	contamination reduction zone
dBA	A-weighted decibel
DEET	N,N-diethyl-meta-toluamide
DGM	digital geophysical mapping
EM	Environmental Manager
EME	earth-moving equipment
ERC	Emergency Response Coordinator
ESBG	Environmental Services Business Group
EZ	exclusion zone
GFCI	ground fault circuit interrupter
GPS	global positioning system
HAZWOPER	hazardous waste operations and emergency response
HITS	Hours and Incident Tracking System
HSE	Health, Safety, and the Environment
HSP	Health and Safety Plan
HSSE	Health, Safety, Security and the Environment
IRF	Incident Report Form
kV	kilovolts
lx	lux
MEC	munitions and explosives of concern
MPPEH	material potentially presenting an explosive hazard
MSDS	material safety data sheet
NSF-IH	Naval Support Facility Indian Head
OSHA	Occupational Safety and Health Administration
PFD	personal flotation device
PIM	potentially infectious material
PM	Project Manager
PPE	personal protective equipment
PTSP	Pre-Task Safety Plan
RCA	Root Cause Analysis
RHSM	Responsible Health and Safety Manager
RMSF	Rocky Mountain spotted fever
SBO	Safe Behavior Observation

SC	Safety Coordinator
SOP	standard operating procedure
SUXOS	Senior UXO Supervisor
SZ	support zone
UL	Underwriters Laboratory
USCG	U.S. Coast Guard
USDOT	U.S. Department of Transportation
UV	ultraviolet
UXO	unexploded ordnance
VO	Virtual Office

Introduction



Health, Safety, and Environment Policy Commitment

Protection of people and the environment is a CH2M HILL core value. It is our vision to create a culture that empowers employees to drive this value into all global operations and achieve excellence in health, safety, and environment (HSE) performance. CH2M HILL deploys an integrated, enterprise-wide behavior based HSE management system to fulfill our mission and the expectations of our clients, staff, and communities based on the following principles:

- We require all management and supervisory personnel to provide the leadership and resources to inspire and empower our employees to take responsibility for their actions and for their fellow employees to prevent injuries, illnesses, and adverse environmental impacts, and create a safe, healthy, and environmentally-responsible workplace.
- We provide value to clients by tailoring HSE processes to customer needs and requiring CH2M HILL employees and subcontractors to deliver projects that identify HSE requirements and commit to compliance with applicable HSE laws and regulations, company standards, and external requirements.
- We are committed to pollution prevention in conjunction with our Sustainability Policy and by offering our clients sustainable solutions.
- We aspire to continually improve our performance and influence others to redefine world-class HSE excellence.
- We evaluate our design engineering and physical work environment to verify safe work conditions and practices are established, followed, and corrected as needed.
- We assess and continually improve our HSE program to achieve and maintain world-class performance by setting and reviewing objectives and targets, reporting performance metrics, and routinely evaluating our program.
- We expect all employees to embrace our Target Zero culture, share our core value for the protection of people and the environment, understand their obligations, actively participate, take responsibility, and “walk the talk” on and off the job.

The undersigned pledge our leadership, commitment, and accountability for making this Policy a reality at CH2M HILL.

Dated the 5th day of April, 2012

Lee McIntire
Chief Executive Officer

Margaret McLean
Chief Legal Officer

Jacqueline Rast
President, International Division

John Madia
Chief Human Resources Officer

Mike McKelvy
President, Government, Environment, and Infrastructure Division

Fred Brune
Chief Administrative Officer

Mike Lucki
Chief Financial Officer

Bob Card
President, Energy, Water and Facilities Division

Gene Lúpia
President, Delivery Excellence

Brad Barber
Director, Health, Safety, and Environment

1.1 CH2M HILL Policy and Commitment

1.1.1 Safe Work Policy

It is the policy of CH2M HILL to perform work in the safest manner possible. Safety must never be compromised. To fulfill the requirements of this policy, an organized and effective safety program must be carried out at each location where work is performed.

CH2M HILL believes that all injuries are preventable, and we are dedicated to the goal of a safe work environment. To achieve this goal, every employee on the project must assume responsibility for safety.

Every employee is empowered to:

- Conduct their work in a safe manner
- Stop work immediately to correct any unsafe condition that is encountered
- Take corrective actions so that work may proceed in a safe manner

Safety, occupational health, and environmental protection will not be sacrificed for production. These elements are integrated into quality control, cost reduction, and job performance, and are crucial to our success.

1.1.2 Health and Safety Commitment

CH2M HILL has embraced a philosophy for health and safety excellence. The primary driving force behind this commitment to health and safety is simple: employees are CH2M HILL's most significant asset and CH2M HILL management values their safety, health, and welfare. Also, top management believes that all injuries are preventable. CH2M HILL's safety culture empowers employees at all levels to accept ownership for safety and take whatever actions are necessary to eliminate injury. Our company is committed to world-class performance in health and safety and also understands that world-class performance in health and safety is a critical element in overall business success.

CH2M HILL is committed to the prevention of personal injuries, occupational illnesses, and damage to equipment and property in all of its operations; to the protection of the general public whenever it comes in contact with the Company's work; and to the prevention of pollution and environmental degradation.

Company management, field supervisors, and employees plan safety into each work task in order to prevent occupational injuries and illnesses. The ultimate success of CH2M HILL's safety program depends on the full cooperation and participation of each employee.

CH2M HILL management extends its full commitment to health and safety excellence.

1.1.3 Project-Specific Health, Safety, and the Environment Goals

All management and employees are to strive to meet the project-specific Health, Safety, and the Environment (HSE) goals outlined below. The team will be successful only if everyone makes a concerted effort to accomplish these goals. The goals allow the project to stay focused on optimizing the health and safety of all project personnel and, therefore, making the project a great success.

The project has established 11 specific goals and objectives:

- Create an injury-free environment
- Have zero injuries or incidents
- Provide management leadership for HSE by communicating performance expectations, reviewing and tracking performance, and leading by example
- Ensure effective implementation of the HSP through education, delegation, and teamwork
- Ensure 100 percent participation in HSE compliance
- Continuously improve our safety performance

- Maintain free and open lines of communication
- Make a personal commitment to safety as a value
- Focus safety improvements on high-risk groups
- Continue strong employee involvement initiatives
- Achieve health and safety excellence

SECTION 2

Applicability

This HSP applies to:

- All CH2M HILL staff, including subcontractors and tiered subcontractors of CH2M HILL working on the site
- All visitors to the construction site in the custody of CH2M HILL (including visitors from the client, the government, the public, and other staff of any CH2M HILL company)

This HSP does not apply to the third-party contractors, their workers, their subcontractors, their visitors, or any other persons not under the direct control or custody of CH2M HILL.

This HSP defines the procedures and requirements for the health and safety of CH2M HILL personnel and visitors when they are physically on the work site. The work site includes the project area (as defined by the contract documents) and the project offices, trailers, and facilities thereon.

This HSP will be kept onsite during field activities and will be reviewed as necessary. The HSP will be amended or revised as project activities or conditions change or when supplemental information becomes available. The HSP adopts, by reference, the enterprise-wide Core Standards and Standard Operating Procedures (SOPs), as appropriate. In addition, the HSP may adopt procedures from the project Work Plan and any governing regulations. If there is a contradiction between this HSP and any governing regulation, the more-stringent and -protective requirement shall apply.

All CH2M HILL personnel and subcontractors must sign the employee sign-off form included in this document as Attachment 1 to acknowledge review of this document. Copies of the signature page will be maintained onsite by the Safety Coordinator (SC).

General Project Information

3.1 Project Information and Background

Project Number: Comprehensive Long-term Environmental Action, Navy 1000, Contract Task Order 0012

Client: Naval Facilities Engineering Command Washington

Project/Site Name: Naval Support Facility Indian Head (NSF-IH) Igniter Area (UXO 19)

Site Address: Indian Head, Maryland

CH2M HILL Project Manager: Victoria Waranoski

CH2M HILL Office: Chantilly, Virginia

DATE HSP Prepared: 1/19/2009, updated 7/26/2012

Date(s) of Site Work: Summer/Fall 2012

3.2 Site Background and Setting

NSF-IH is a military facility consisting of the Main Installation (on the Cornwallis Neck Peninsula) and the Stump Neck Annex, near Indian Head, in northwestern Charles County, Maryland, approximately 25 miles southwest of Washington DC. The mission of NSF-IH is to provide primary technical capability in energetics for all warfare centers through engineering, fleet and operational support, manufacturing technology, limited production, and industrial base support. Secondary technical capability is provided through research, development, testing and evaluation of energetic materials, ordnance devices and components, and related ordnance engineering standards including chemicals, propellants and their propulsion systems, explosives, pyrotechnics, warheads, and simulators.

3.2.1 Igniter Area (UXO 19)

The Igniter Area covers approximately 0.01 acre and is located along the southeastern shoreline of the Main Installation peninsula in a small promontory known as "Thieves Point." The promontory is a wetland and considered a species protection area. The initial site boundary, as provided by the Base, covered the entire promontory shoreline, which was about 0.028 acre. The boundary was changed after further review during the Preliminary Assessment.

A small pile of igniters, the origin of which is unknown, was found at this site during an extremely low tide in 1996 or 1997. Several of the igniters were reportedly picked up and disposed of, but it is unknown if the disposal of the remaining igniters occurred. The igniters were described to be electric primers or electrically primed rifle cartridges approximately .50 caliber. Additional ordnance items seen along the shoreline during a low tide event appear to be float signals, MK 1 MOD 1 or MK 2 MOD 0, and 250-, 500-, or 750-pound old style bombs. The origin of the igniters, dates of use, or date of disposal are unknown. There is one structure nearby, Building 1451, which is currently vacant.

An interim removal of munitions and explosives of concern (MEC) and non-MEC items on the surface along the shoreline and shallow water has been completed. This HSP is to cover the digital geophysical mapping (DGM) of the shoreline and shallow water

See Site Map for work area.

3.3 Description of Tasks

All CH2M HILL and subcontractor employees engaging in hazardous waste operations and emergency response (HAZWOPER) shall receive appropriate training as required by 29 Code of Federal Regulations (CFR) 1910.120 and 29 CFR 1926.65 (or if required by subcontract). Personnel who have not met these training requirements shall not be allowed to engage in HAZWOPER activities. See the following tasks that fall under HAZWOPER requirements.

3.3.1 HAZWOPER-Regulated Tasks

- DGM along shoreline
- DGM in water

3.3.2 Non-HAZWOPER-Regulated Tasks

Under specific circumstances, the training and medical monitoring requirements of federal or state HAZWOPER regulations are not applicable. The following tasks do not involve exposure to safety or health hazards associated with the hazardous waste operations. HAZWOPER training or medical requirements do not apply for the tasks listed below.

TASKS

CONTROLS

Brief on hazards, limits of access, and emergency procedures.

Post areas of contamination as appropriate.

Perform air sampling/monitoring as specified in this HSP.

SITE MAP



Figure 1-2
 Site Map
 Site Inspection Work Plan for Igniter Area - UXO 19
 NSF-IH, Indian Head, Maryland

Project Organization and Responsibilities

4.1 Client

Contact Name: Mr. Joe Rail - Remedial Project Manager

Phone: 202-685-3105

Facility Contact Name: Mr. Jeff Bossart - Remedial Project Manager

Phone: 301-744-4705

4.2 CH2M HILL

4.2.1 Project Manager

PM Name: Victoria Waranoski

CH2M HILL Office: WDC

Telephone Number: 703/376-5049

The Project Manager (PM) is responsible for providing adequate resources (budget and staff) for project-specific implementation of the HSE management process. The PM has overall management responsibility for the tasks listed below. The PM may explicitly delegate specific tasks to other staff members, as described in sections that follow, but retains ultimate responsibility for completion of the following in accordance with this HSP:

- Incorporate standard terms and conditions, and contract-specific HSE roles and responsibilities in contract and subcontract agreements (including flow-down requirements to lower-tier subcontractors).
- Select safe and competent subcontractors by:
 - Choosing potential subcontractors based on technical ability and HSE performance
 - Implementing the subcontractor prequalification process
 - Ensuring that acceptable certificates of insurance, including CH2M HILL as named additional insured, are secured as a condition of subcontract award
 - Ensuring HSE submittals, subcontract agreements, and appropriate site-specific safety procedures are in place and accepted prior field mobilization.
- Ensure copies of training and medical monitoring records, and site-specific safety procedures are being maintained in the project file accessible to site personnel.
- Provide oversight of subcontractor HSE practices according to the site-specific safety plans and procedures.
- Manage the site and interfacing with third parties in a manner consistent with the contract and subcontract agreements and the applicable standard of reasonable care.
- Ensure that the overall, job-specific, HSE goals are fully and continuously implemented.
- Provide visible support and motivation for HSE programs, rules, procedures, processes, and training, leading by example and encouraging CH2M HILL employees to take ownership of HSE issues.
- Intervene or stop work when an unsafe condition or behavior is observed, and/or when an environmentally compromising condition is encountered.
- Make available to and require CH2M HILL employees to complete required HSE training within established timelines and provide project numbers for such training.

- Consistently and even-handedly enforce HSE rules, procedures, and requirements at the office and/or on project work sites.
- Promptly report all work-related HSE incidents or near misses.
- Wear any required personal protective equipment (PPE).
- Ensure CH2M HILL employees complete required HSE training within established timelines.
- Conduct, cooperate, or assist with HSE incident investigations.
- Consult with the Human Resources Delivery Partner before taking any disciplinary action (other than verbal counseling) associated with CH2M HILL Policy 203 and/or HSE programs rules, procedures, processes, and training.

4.2.2 CH2M HILL Responsible Health and Safety Manager

RHSM Name: Mark Orman

CH2M HILL Office: MKE

Telephone Number: 414/847-0597

Cellular Number: 414/712-4138

The RHSM is responsible for the following:

- Review and evaluate subcontractor HSE performance using the pre-qualification process.
- Approve HSP and its revisions as well as Activity Hazard Analyses (AHA).
- Review and evaluate subcontractor site-specific safety procedures for adequacy before the start of subcontractor's field operations.
- Support the oversight (or SC's direct oversight) of subcontractor and tiered subcontractor HSE practices.
- Permit upgrades and downgrades in respiratory protection after reviewing analytical data.
- Conduct audits as determined by project schedule and in coordination with PM.
- Participate in incident investigations, lessons learned, loss and near-loss reporting.

4.2.3 CH2M HILL Project Environmental Manager

EM Name: Hope Wilson

CH2M HILL Office: ATL

Telephone Number: 414/847-0597

Cellular Number: 414/712-4138

The Project Environmental Manager (EM) is responsible for the following:

- Provide environmental program support in areas such as training, auditing, planning, permit tracking, and subcontractor oversight as needed or as specified in the project environmental plan.
- Review and evaluate qualifications for subcontractors with a history of environmental non-compliance and for waste transportation and disposal subcontractors.
- Evaluate any spills, releases, or environmental permit incidents for appropriate follow-up actions, notifications, and recordkeeping requirements.
- Provide environmental compliance and environmental management expertise and advice to the project team as needed during the course of the project.

4.2.4 CH2M HILL Safety Coordinator

SC Name: TBD

CH2M HILL Office: TBD

Telephone Number: TBD

Cellular Number: TBD

The SC is responsible for verifying that the project is conducted in a safe manner, including the following specific obligations:

- Verify this HSP is current and amended when project activities or conditions change.
- Verify CH2M HILL site personnel and subcontractor personnel read the HSP and sign the Employee Sign-Off Form (Attachment 1) before beginning field activities.
- Verify CH2M HILL site personnel have completed any required specialty training (for example, fall protection, confined space entry, among others) and medical surveillance as identified in this HSP.
- Verify that project files include copies of subcontractor training and medical monitoring records, and accepted site-specific safety procedures before the start of subcontractor's field operations.
- Act as the project "Hazard Communication Coordinator" and perform the responsibilities outlined in this HSP.
- Act as the project "Emergency Response Coordinator" and perform the responsibilities outlined in this HSP.
- Post the Occupational Safety and Health Administration (OSHA) job-site poster; the poster is required at sites where project field offices, trailers, or equipment-storage boxes are established. If work is to be conducted in a state with an OSHA State Plan, make sure the State Plan poster is posted, if required.
- Hold and/or verify that safety meetings are conducted and documented in the project file initially and as needed throughout the course of the project (as tasks or hazards change).
- Verify that project health and safety forms and permits are being used as outlined this HSP.
- Perform oversight and assessments of subcontractor HSE practices in accordance with the site-specific safety plan and verify that project activity self-assessment checklists are being used as outlined this HSP.
- Coordinate with the RHSM regarding CH2M HILL and subcontractor operational performance, and third party interfaces.
- Verify appropriate PPE use, availability, and training.
- Ensure that the overall, job-specific HSE goals are fully and continuously implemented.
- Conduct accident investigations, including root cause analysis.
- Calibrate and conduct air monitoring in accordance with this HSP; maintain all air monitoring records in project file.
- Maintain HSE records and documentation.
- Facilitate OSHA or other government agency inspections, including accompanying the inspector and providing all necessary documentation and follow up.
- Deliver field HSE training as needed based on project-specific hazards and activities.
- Consistently and even-handedly enforce HSE rules, procedures, and requirements at the office and/or on project work sites.
- Wear any required PPE.
- Conduct, cooperate, or assist with HSE incident investigations.

- Contact the PM and RHSM when standards of conduct or CH2M HILL Policy 203 has been violated by a CH2M HILL employee.
- Contact the RHSM and PM in the event of an incident.
- Contact the RHSM and Project EM in the event of a spill or release immediately so evaluation of reportable quantity requirements and whether agency reporting is required.
- When an apparent imminent danger exists, immediately remove all affected CH2M HILL employees and subcontractors, notify subcontractor safety representative, stop affected work until adequate corrective measures are implemented, and notify the PM and RHSM as appropriate.
- Document all verbal health and safety-related communications in project field logbook, daily reports, or other records.

4.3 CH2M HILL Subcontractors

(Reference CH2M HILL SOP HSE-215, *Contracts and Subcontracts*)

Subcontractor: Digital Geophysical Mapping:

Subcontractor Contact Name:

Telephone:

Subcontractor:

Subcontractor Contact Name:

Telephone:

Subcontractors must comply with the following activities, and are responsible to:

- Comply with all local, state, and federal safety standards.
- Comply with project and owner safety requirements.
- Actively participate in the project safety program and either hold or attend and participate in all required safety meetings.
- Provide a qualified safety representative to interface with CH2M HILL.
- Maintain safety equipment and PPE for their employees.
- Maintain and replace safety protection systems damaged or removed by the subcontractor's operations.
- Notify the SC of any accident, injury, or incident (including spills or releases) immediately and submit reports to CH2M HILL within 24 hours.
- Install contractually required general conditions for safety (for example, handrail, fencing, fall protection systems, floor opening covers).
- Conduct and document weekly safety inspections of project-specific tasks and associated work areas.
- Conduct site-specific and job-specific training for all subcontractor employees, including review of the CH2M HILL HSP, subcontractor HSPs, and subcontractor AHAs, and sign appropriate sign-off forms.
- Identify and implement necessary controls and corrective actions to correct unsafe conditions.

The subcontractors listed above may be required to submit their own site-specific HSP and other plans such as lead or asbestos abatement compliance plans. Subcontractors are responsible for the health and safety procedures specific to their work, and are required to submit their plans to CH2M HILL for review and acceptance before the start of field work.

Subcontractors are also required to prepare AHAs before beginning each activity posing hazards to their personnel. The AHA shall identify the principal steps of the activity and potential health and safety hazards for

each step and recommended control measures for each identified hazard. In addition, a list of the equipment to be used to perform the activity, inspection requirements, and training requirements for the safe operation of the equipment listed must be identified.

4.4 Employee Responsibilities

All personnel are assigned responsibility for safe and healthy operations. This concept is the foundation for involving all employees in identifying hazards and providing solutions. For any operation, individuals have full authority to stop work and initiate immediate corrective action or control. In addition, each worker has a right and responsibility to report unsafe conditions or practices. This right represents a significant facet of worker empowerment and program ownership. Through shared values and a belief that all accidents are preventable, our employees accept personal responsibility for working safely.

Each employee is responsible for the following performance objectives:

- Understanding and abiding by CH2M HILL and client HSE programs, rules, procedures, processes, and training, including any that are project-specific.
- Completing all required HSE training made available and accessible within established timelines.
- Always wearing any required PPE.
- Intervening or stopping work for you or other CH2M HILL employees when an unsafe condition or behavior is encountered or observed, and/or when an environmentally compromising condition exists.
- Promptly notifying a supervisor, PM, SC, or RHSM when an unsafe condition or behavior is observed, and/or when an environmentally compromising condition exists.
- Promptly reporting a supervisor, PM, SC, or RHSM all work-related health, safety and environmental incidents or near-misses.
- Attending required project HSE pre-task briefings and meeting prior to performing work.
- Cooperating or assisting with HSE incident investigations.

4.4.1 Employee Authority

Each employee on the project has the obligation and authority to shut down any perceived unsafe work, and during employee orientation each employee will be informed of their authority to do so.

4.5 Client Contractors

(Reference CH2M HILL SOP HSE-215, Contracts, Subcontracts and HSE Management Practices)

Contractor: None

Contact Name:

Telephone:

Contractor Task(s):

This HSP does not cover contractors that are contracted directly to the client or the owner. CH2M HILL is not responsible for the health and safety or means and methods of the contractor's work, and we must never assume such responsibility through our actions (such as advising on health and safety issues). In addition to these instructions, CH2M HILL team members should review contractor safety plans so that we remain aware of appropriate precautions that apply to us. Self-assessment checklists are to be used by the SC and CH2M HILL team members to review the contractor's performance only as it pertains to evaluating CH2M HILL exposure and safety. The RHSM is the only person who is authorized to comment on or approve contractor safety procedures.

Health and safety-related communications with contractors should be conducted as follows:

- Request the contractor to brief CH2M HILL team members on the precautions related to the contractor's work.
- When an apparent contractor non-compliance or unsafe condition or practice poses a risk to CH2M HILL team members:
 - Notify the contractor safety representative.
 - Request that the contractor determine and implement corrective actions.
 - If necessary, stop affected CH2M HILL work until contractor corrects the condition or practice.
 - Notify the client, PM, and RHSM as appropriate.
- If apparent contractor non-compliance or unsafe conditions or practices are observed, inform the contractor safety representative (CH2M HILL's obligation is limited strictly to informing the contractor of the observation; the contractor is solely responsible for identifying and implementing necessary controls and corrective actions).
- If an apparent imminent danger is observed, immediately warn the contractor employee(s) in danger and notify the contractor safety representative (CH2M HILL's obligation is limited strictly to immediately warning the affected individual(s) and informing the contractor of the observation; the contractor is solely responsible for identifying and implementing necessary controls and corrective actions).
- All verbal health and safety-related communications will be documented in project field logbook, daily reports, or other records.

Standards of Conduct

All individuals associated with this project must work injury-free and drug-free and must comply with the following standards of conduct, the HSP, and the safety requirements of CH2M HILL. Commonly accepted standards of conduct help maintain good relationships between people. They promote responsibility and self-development. Misunderstandings, frictions, and disciplinary action can be avoided by refraining from thoughtless or wrongful acts.

5.1 Standards of Conduct Violations

All individuals associated with this project are expected to behave in a professional manner. Violations of the standards of conduct would include, but not be limited to:

- Failure to perform work
- Inefficient performance, incompetence, or neglect of work
- Willful refusal to perform work as directed (insubordination)
- Negligence in observing safety regulations, poor housekeeping, or failure to report on-the-job injuries or unsafe conditions
- Unexcused or excessive absence or tardiness
- Unwillingness or inability to work in harmony with others
- Discourtesy, irritation, friction, or other conduct that creates disharmony
- Harassment or discrimination against another individual
- Failure to be prepared for work by wearing the appropriate construction clothing or bringing the necessary tools
- Violation of any other commonly accepted reasonable rule of responsible personal conduct.

5.2 Disciplinary Actions

The Environmental Services business group (ESBG) employees, employees working on ESBG business group projects, and subcontractor employees are subject to disciplinary action for not following HSE rules and requirements. Potential disciplinary action is equally applicable to all employees, including management and supervision personnel. Disciplinary action may include denial of access to the worksite, warnings, reprimands, and other actions up to and including termination depending on the specific circumstances.

5.3 Subcontractor Safety Performance

CH2M HILL should continuously endeavor to observe subcontractors' safety performance and adherence to their plans and AHAs. This endeavor should be reasonable, and include observing for hazards or unsafe practices that are both readily observable and occur in common work areas. CH2M HILL is not responsible for exhaustive observation for hazards and unsafe practices. CH2M HILL oversight does not relieve subcontractors of their responsibility for effective implementation and compliance with the established plan(s).

5.3.1 Observed Hazard Form

When apparent non-compliance or unsafe conditions or practices are observed, notify the subcontractor's supervisor or safety representative verbally, and document using the Observed Hazard Form, included as an attachment to this HSP, and require corrective action.

If necessary, stop subcontractor's work using the Stop Work Order Form until corrective actions is implemented for observed serious hazards or conditions. Update the Observed Hazard Form to document that corrective actions have been taken. The subcontractor is responsible for identifying and implementing necessary controls and corrective actions.

5.3.2 Stop Work Order

CH2M HILL has the authority, as specified in the contract, and the responsibility to stop work when any CH2M HILL employee observes unsafe conditions or the subcontractor fails to adhere to its safe work practices, or observes a condition or practice that may result in a release or violation of an environmental requirement. This authority and action does not in any way relieve the subcontractor of its responsibilities for the means and methods of the work or, therefore, of any corrective actions. Failure to comply with safe work practices can be the basis for restriction or removal of the subcontractor staff from the job site, termination of the subcontract, restriction from future work, or all three.

When an apparent imminent danger is observed, immediately stop work and alert all affected individuals. Remove all affected CH2M HILL employees and subcontractor staff from the danger, notify the subcontractor's supervisor or safety representative, and do not allow work to resume until adequate corrective measures are implemented. Notify the PM, Contract Administrator, and RHSM.

When repeated non-compliance or unsafe conditions are observed, notify the subcontractor's supervisor or safety representative and stop affected work by completing and delivering the Stop Work Order Form (attached to this HSP) until adequate corrective measures are implemented. Consult the Contract Administrator to determine what the contract dictates for actions to pursue in event of subcontractor non-compliance, including work stoppage, back charges, progress payments, removal of subcontractor manager, monetary penalties, or termination of subcontractor for cause.

5.4 Incentive Program

Each project is encouraged to implement a safety incentive program that rewards workers for exhibiting exemplary safety behaviors. Actions that qualify are those that go above and beyond what is expected. Actions that will be rewarded include spotting and correcting a hazard, bringing a hazard to the attention of your foreman, telling your foreman about an incident, coming up with a safer way to get the work done, or stopping a crew member from doing something unsafe. The program will operate throughout the project, covering all workers. The incentive program will be communicated to all employees during the project employee orientation and project safety meetings.

5.5 Reporting Unsafe Conditions/Practices

Responsibility for effective health and safety management extends to all levels of the project and requires good communication between employees, supervisors, and management. Accident prevention requires a proactive policy on near-misses, close calls, unsafe conditions, and unsafe practices. All personnel must report any situation, practice, or condition that might jeopardize the safety of our projects. All unsafe conditions or unsafe practices will be corrected immediately. CH2M HILL has zero tolerance of unsafe conditions or unsafe practices.

No employee or supervisor will be disciplined for reporting unsafe conditions or practices. Individuals involved in reporting the unsafe conditions or practices will remain anonymous.

The following reporting procedures will be followed by all project employees:

- Upon detection of any unsafe condition or practice, the responsible employee will attempt to safely correct the condition.
- The unsafe condition or practice will be brought to the attention of the worker's direct supervisor, unless the unsafe condition or practice involves the employee's direct supervisor. If so, the SC needs to be notified at once by the responsible employee.

-
- Either the responsible employee or responsible employee's direct supervisor is responsible for immediately reporting the unsafe condition or practice to the SC.
 - The SC will act promptly to correct the unsafe condition or practice.
 - Details of the incident or situation will be recorded by the SC in the field logbook or use the Observed Hazard Form if subcontractor was involved.

Safety Planning and Change Management

6.1 Daily Safety Meetings and Pre-Task Safety Plans

Daily safety meetings are to be attended by all project personnel to review the hazards posed and required HSE procedures and AHAs that apply for each day's project activities. The Pre-Task Safety Plans (PTSPs) serve the same purpose as these general assembly safety meetings, but the PTSPs are held between the crew supervisors and their work crews to focus on those hazards posed to individual work crews.

At the start of each day's activities, the crew supervisor completes the PTSP, provided as an attachment to this HSP, with input from the work crew, during their daily safety meeting. The day's tasks, personnel, tools, and equipment that will be used to perform these tasks are listed, along with the hazards posed and required HSE procedures, as identified in the HSP and AHA. The use of PTSPs promotes worker participation in the hazard recognition and control process while reinforcing the task-specific hazard and required HSE procedures with the crew each day.

6.2 Change Management

This HSP addresses all known activities and associated hazards. As work progresses, if significant changes are identified that could affect health and safety at the site, coordinate with the RHSM to determine whether an HSP update is necessary.

The following are examples of changes that may require a revision to the plan:

- Change in CH2M HILL staff
- New subcontractor to perform work
- New chemicals brought to site for use
- Change in scope or addition of new tasks
- Change in contaminants of concern (COCs) or change in concentrations of COCs
- New hazards or hazards not previously identified that are not addressed in this HSP.

6.3 Agency Inspection Guidance

(Reference CH2M HILL SOP HSE-201, Agency Inspections and Communications)

Agency inspections (for example, by OSHA, U.S. Environmental Protection Agency, or other regulatory agencies) are on the rise. CH2M HILL implements safety and environmental programs in order to ensure safety to workers, the public, and the environment. This plan addresses things such as labeling containers, completing the hazard communication training using the attachments to this HSP, listing training requirements and PPE requirements, and addressing project-specific hazards. Field personnel need to contact the RHSM to update this plan if hazards are encountered that are not addressed.

[SOP HSE-201](#) addresses agency inspections in detail, and the attached **Target Zero Bulletin on Agency Inspections** provides a good summary of the inspection process and what to do if a representative from an agency such as OSHA or the U.S. Environmental Protection Agency shows up at the site. It is critical to make immediate notification to the RHSM if an inspector arrives (and EM if it is environmental-related); they can help facilitate and make additional notifications.

Review the Target Zero Bulletin and keep it with your HSP /Environmental Plan. Make it a topic at a safety meeting and keep it readily available in the event of an inspection.

Project Hazard Analysis

A health and safety risk analysis (Table 1) has been performed for each task. In the order listed below, the RHSM considers the various methods for mitigating the hazards. Employees are trained on this hierarchy of controls during their hazardous waste training and reminded of them throughout the execution of projects:

- Elimination of the hazards (use remote sampling methodology to avoid going into a confined space)
- Substitution (reduce exposure to vapors by using of a geoprobe instead of test pitting)
- Engineering controls (ventilate a confined space to improve air quality)
- Warnings (establish exclusion zones (EZs) to keep untrained people away from hazardous waste work)
- Administrative controls (implement a work-rest schedule to reduce chance of heat stress) or
- Use of PPE (use of respirators when action levels are exceeded).
- The hazard controls and safe work practices are summarized in the following sections of this HSP:
- General hazards and controls
- Project-specific hazards and controls
- Physical hazards and controls
- Biological hazards and controls
- COCs

7.1 Activity Hazard Analysis

An AHA must be developed for each CH2M HILL job activity. The AHA shall define the work tasks required to perform each activity, along with potential HSE hazards and recommended control measures for each hazard. In addition, a list of the equipment to be used to perform the activity, inspection requirements to be performed, and training requirements for the safe operation of the equipment listed must be identified. Workers are briefed on the AHA before performing the work and their input is solicited before, during, and after the performance of work to further identify the hazards posed and control measures required. The AHA shall identify the work tasks required to perform each activity, along with potential HSE hazards and recommended control measures for each hazard.

The following hazard controls and applicable CH2M HILL core standards and SOPs should be used as a basis for preparing AHAs.

AHAs prepared for CH2M HILL activities are included as an attachment to this HSP.

7.2 Subcontractor Activity Hazard Analysis

CH2M HILL subcontractors are required to provide AHAs specific to their scope of work on the project for acceptance by CH2M HILL. Each subcontractor shall submit AHAs for their field activities, as defined in their scope of work, along with their project-specific safety plan and procedures. Additions or changes in field activities, equipment, tools, or material used to perform work or hazards not addressed in existing AHAs requires either a new AHA to be prepared or an existing AHA to be revised.

GENERAL ACTIVITY HAZARD ANALYSIS

Potential Hazard	Project Activity	DGM on shoreline	DGM over water						
Biological Hazards		X	X						
Boating			X						
Chemical Hazard		X							
Explosives Usage or Munitions Response		X	X						
Field Vehicles		X	X						
Hand & Power Tools		X	X						
Knife Use		X	X						
Manual Lifting		X	X						
MEC/MPPEH		X	X						
Temperature Extremes		X	X						
Ultraviolet Light exposure (sunburn)		X	X						
Work Over Water			X						

MPPEH = material potentially presenting an explosive hazard

General Hazards and Controls

This section describes safe work practices and control measures used to reduce or eliminate potential hazards. It is a summarized list of requirements. Always consult the appropriate CH2M HILL SOP to ensure all requirements are implemented.

8.1 Bloodborne Pathogens

(Reference CH2M HILL SOP HSE-202, *Bloodborne Pathogens*)

Exposure to bloodborne pathogens may occur when rendering first aid or cardiopulmonary resuscitation (CPR), or when coming into contact with landfill waste or waste streams containing potentially infectious material (PIM).

Employees trained in first-aid/CPR or those exposed to PIM must complete CH2M HILL's 1-hour bloodborne pathogens computer-based training module annually. When performing first-aid/CPR, the following shall apply:

- Observe universal precautions to prevent contact with blood or other PIMs. Where differentiation between body fluid types is difficult or impossible, consider all body fluids to be potentially infectious materials.
- Always wash your hands and face with soap and running water after contacting PIMs. If washing facilities are unavailable, use an antiseptic cleanser with clean paper towels or moist towelettes.
- If necessary, decontaminate all potentially contaminated equipment and surfaces with chlorine bleach as soon as possible. Use one part chlorine bleach (5.25 percent sodium hypochlorite solution) diluted with 10 parts water for decontaminating equipment or surfaces after initially removing blood or other PIMs. Remove contaminated PPE as soon as possible before leaving a work area.

CH2M HILL will provide exposed employees with a confidential medical examination should an exposure to PIM occur. This examination includes the following procedures:

- Documenting the exposure
- Testing the exposed employee's and the source individual's blood (with consent)
- Administering post-exposure prophylaxis

8.2 Chemical Storage

The following are general guidelines for storing chemicals and other hazardous materials:

- Keep acids away from bases.
- Keep oxidizers (nitric acid, nitrates, peroxides, chlorates) and organics away from inorganic reducing agents (metals).
- Keep flammables and corrosives in appropriate storage cabinets.
- Do not store paper or other combustibles near flammables.
- Use secondary containment and lipped shelving that is secured.
- Have a fire suppression system available.

8.2.1 Storage of Flammable/Combustible Liquids

- Only approved containers and portable tanks shall be used for storage and handling of flammable and combustible liquids.

- Approved safety cans shall be used for the handling and use of flammable liquids in quantities of 5 gallons (19 liters) or less. Do not use plastic gas cans.
- For quantities of 1 gallon (3.78 liters) or less, the original container may be used for storage and use of flammable liquids.
- Flammable or combustible liquids shall not be stored in areas used for stairways or normally used for the passage of people.

8.2.2 Indoor Storage of Flammable/Combustible Liquids

- No more than 25 gallons (95 liters) of flammable or combustible liquids shall be stored in a room outside of an approved storage cabinet.
- Quantities of flammable and combustible liquids in excess of 25 gallons (95 liters) shall be stored in an acceptable or approved cabinet.
- Cabinets shall be conspicuously lettered: "FLAMMABLE: KEEP FIRE AWAY."
- Not more than 60 gallons (228 liters) of flammable or 120 gallons (456 liters) of combustible liquids shall be stored in any one storage cabinet. Not more than three such cabinets may be located in a single storage area.

8.2.3 Outside Storage of Flammable/Combustible Liquids

- Storage of containers (not more than 60 gallons [228 liters] each) shall not exceed 1,100 gallons (4180 liters) in any one area. No area shall be within 20 feet (6.1 meters) of any building.
- Storage areas shall be graded to divert spills away from buildings and surrounded by an earthen dike.
- Storage areas may not be located near a storm drain. Overflow and spills must be diverted away from storm drains or surface waters.
- Storage areas shall be free from weeds, debris, and other combustible materials.
- Outdoor portable tanks shall be provided with emergency vent devices and shall not be closer than 20 feet (6.1 meters) to any building.
- Signs indicating no smoking shall be posted around the storage area.

8.2.4 Storage of Hazardous Waste

- All facilities storing ignitable and combustible liquids and hazardous wastes must be designed, constructed, maintained, and operated to minimize the possibility of a fire, explosion, or any release of hazardous constituents.
- Flammable wastes should be stored more than 50 feet from the property line.

8.2.5 Storage of Chemical Injection Chemicals/Materials

- When chemical injection remediation technologies are being used at a site, the following storage guidelines must be followed:
- Some injection chemicals, such as strong oxidizers, may have stringent storage requirements per local or national fire codes. Verify that appropriate storage provisions are in place before starting work.

NOTE: Counties and cities may have requirements specific to storing these chemicals. Also, storage and use of certain chemicals (such as potassium permanganate and hydrogen peroxide) may be subject to the new Chemical Facility Anti-Terrorism Standards of the Department of Homeland Security – the applicability depends on the chemical, quantity/concentration, and type of facility. Please contact the Project EM to determine whether chemicals are subject to these standards.

- Injection chemicals must be stored in a designated, secured area with spill prevention capabilities. Review the relevant material safety data sheets (MSDSs) or other information to identify potential incompatible materials. Incompatible materials shall not be stored together. Ensure all containers are labeled.

8.3 Driving Safety

(Reference CH2M HILL HSE Policy 205, Distracted Driving – Wireless Devices, Vehicle Safety Core Standard)

All CH2M HILL employees are prohibited from using wireless devices while operating a motor vehicle when conducting company business, regardless of the location or vehicle ownership and whether or not it is being operated during regular working hours.

All CH2M HILL contractors and subcontractors are prohibited from using wireless devices while operating a CH2M HILL- or CH2M HILL client-owned, leased, or rented motor vehicle, or while operating any other motor vehicle on the project site.

- Prohibited use includes the following:
 - Dialing or speed dialing
 - Using a hands-free or voice recognition (blue tooth) device to dial or speed dial
 - Engaging in conversation or listening to a conversation using a wireless device
 - Checking emails or surfing the Internet using a wireless device
 - Texting or e-mailing (reading, sending, or screening) with a wireless device
 - Programming or entering coordinates into a global positioning system (GPS) device (following directions by a GPS is permitted)
 - Using a wireless device for voice recording or dictation
- Employees, contractors, and subcontractors who need to use a wireless device must pull off the road to a safe location, with the vehicle securely stopped and emergency flashers on, or wait until they reach their destination.
- Avoid distractions from mobile phones, smart phones, voice recognition systems, personal digital assistants, notebook, tablets (or similar devices), or laptops, by turning off or silencing the wireless devices before operating a motor vehicle.

Follow the guidelines below when operating a vehicle:

- Obey speed limits; be aware of blind spots or other hazards associated with low visibility. Practice defensive driving techniques, such as leaving plenty of room between your vehicle and the one ahead of you.
- Do not drive while drowsy. Drowsiness can occur at any time, but is most likely after 18 hours or more without sleep.
- Maintain focus on driving. Eating, drinking, smoking, adjusting controls can divert attention from the road. Take the time to park and perform these tasks when parked rather than while driving.
- Ensure you are familiar with the safe operation of vehicles of the type and size to be operated. Large vehicles such as full size vans and pick-ups have different vision challenges and handling characteristics than smaller vehicles.

8.4 Electrical Safety

(Reference CH2M HILL SOP HSE-206, *Electrical Safety*)

Below are the hazard controls and safe work practices to follow when using electrical tools, extension cords, and/or other electrically powered equipment or when exposed to electrical hazards. Ensure the requirements of the referenced SOP are followed:

- Only qualified personnel are permitted to work on unprotected energized electrical systems.
- Only authorized personnel are permitted to enter high-voltage areas.
- CH2M HILL employees who might from time to time work in an environment influenced by the presence of electrical energy must complete Awareness Level Electrical Safety Training located on the CH2M HILL Virtual Office (VO).
- Do not tamper with electrical wiring and equipment unless qualified to do so. All electrical wiring and equipment must be considered energized until lockout/tagout procedures are implemented.
- Inspect electrical equipment, power tools, and extension cords for damage before use. Do not use defective electrical equipment, remove from service.
- CH2M HILL has selected ground fault circuit interrupters (GFCIs) as the standard method for protecting employees from the hazards associated with electric shock:
 - GFCIs shall be used on all 120-volt, single phase 15- and 20-ampere receptacle outlets that are not part of the permanent wiring of the building or structure.
- An assured equipment grounding conductor program may be required under the following scenarios:
 - GFCIs cannot be used.
 - Client requires such a program to be implemented.
 - Business group decides to implement program in addition to GFCI protection.
- Extension cords must be equipped with third-wire grounding. Cords passing through work areas must be covered, elevated, or protected from damage. Cords should not be routed through doorways unless protected from pinching. Cords should not be fastened with staples, hung from nails, or suspended with wire;
- Electrical power tools and equipment must be effectively grounded or double-insulated and Underwriters Laboratory (UL) -approved;
- Electric power tools and equipment must be operated and maintained according to manufacturers' instructions;
- Safe clearance distances must be maintained between overhead power lines and any electrical conducting material unless the power lines have been de-energized and grounded, or where insulating barriers have been installed to prevent physical contact. At least 10 feet (3 meters) must be maintained from overhead power lines for voltages of 50 kilovolts (kV) or less, and 10 feet (3 meters) plus 0.4 inches (1.0 cm) for every 1 kV over 50 kV;
- Temporary lights shall not be suspended by their electric cord unless designed for suspension. Lights shall be protected from accidental contact or breakage.
- All electrical equipment, tools, switches, and outlets shall be protected from environmental elements.

8.5 Field Vehicles

- Field vehicles may be personal vehicles, rental vehicles, fleet vehicles, or project vehicles.
- Maintain a first aid kit, bloodborne pathogen kit, and fire extinguisher in the field vehicle at all times.
- Utilize a rotary beacon on vehicle if working adjacent to active roadway.

- Familiarize yourself with the following features prior to operating a rental vehicle:
 - Vision fields and blind spots
 - Vehicle size
 - Mirror adjustments
 - Seat adjustments
 - Cruise control features, if offered
 - Pre-program radio stations and GPS, if equipped
- Always wear seatbelt while operating vehicle.
- Adjust headrest to proper position.
- Tie down loose items if utilizing a van or pick-up truck.
- Close car doors slowly and carefully. Fingers can get pinched in doors.
- Park vehicle in a location where it can be accessed easily in the event of an emergency. If not possible, carry a phone.
- Have a designated place for storing the field vehicle keys when not in use.
- Ensure back-up alarms are functioning, if equipped. Before backing a vehicle, take a walk around the vehicle to identify obstructions or hazards. Use a spotter when necessary to back into or out of an area.
- See the Vehicle Accident Guidance attached to this HSP, if a vehicle incident is experienced in a rental or fleet vehicle.

8.6 Fire Prevention

(Reference CH2M HILL SOP HSE-403, *Hazardous Material Handling*)

Follow the fire prevention and control procedures listed below.

8.6.1 Fire Extinguishers and General Fire Prevention Practices

- Fire extinguishers shall be provided so that the travel distance from any work area to the nearest extinguisher is less than 100 feet (30.5 meters). When 5 gallons (19 liters) or more of a flammable or combustible liquid is being used, an extinguisher must be within 50 feet (15.2 meters). Extinguishers must:
 - be maintained in a fully charged and operable condition
 - be visually inspected each month
 - undergo a maintenance check each year
- The area in front of extinguishers must be kept clear.
- Post “Exit” signs over exiting doors, and post “Fire Extinguisher” signs over extinguisher locations.
- Combustible materials stored outside should be at least 10 feet (3 meters) from any building.
- Solvent waste and oily rags must be kept in a fire-resistant, covered container until removed from the site.
- Keep areas neat. Housekeeping is important.

8.6.2 Dispensing of Flammable/Combustible Liquids

- Areas in which flammable or combustible liquids are dispensed in quantities greater than 5 gallons (22.7 liters) shall be separated from other operations by at least 25 feet (7.6 meters).
- Drainage away from storm drains or surface waters or other means of containment shall be provided to control spills.

- Adequate natural or mechanical ventilation shall be provided to maintain the concentration of flammable vapor at or below 10 percent of the lower flammable limit.
- Dispensing of flammable liquids from one container to another shall be performed only when containers are electrically interconnected (bonded).
- Dispensing flammable or combustible liquids by means of air pressure on the container or portable tanks is prohibited.
- Dispensing devices and nozzles for flammable liquids shall be of an approved type.

8.7 General Practices and Housekeeping

The following are general requirements applicable to all portions of the work:

- Perform site work during daylight hours whenever possible.
- Maintain good housekeeping at all times in all project work areas.
- Establish common paths of travel and keep them free from the accumulation of materials.
- Keep access to aisles, exits, ladders, stairways, scaffolding, and emergency equipment free from obstructions.
- Provide slip-resistant surfaces, ropes, or other devices to be used.
- Designate specific areas for the proper storage of materials.
- Store tools, equipment, materials, and supplies in an orderly manner.
- As work progresses, neatly store scrap and unessential materials or remove them from the work area.
- Provide containers for collecting trash and other debris and remove them at regular intervals.
- Clean up all spills quickly; clean oil and grease from walking and working surfaces.
- Review the safety requirements of each job you are assigned to with your supervisor. You are not expected to perform a job that may result in injury or illness to yourself or to others.
- Familiarize yourself with, understand, and follow jobsite emergency procedures.
- Do not fight or horseplay while conducting the firm's business.
- Do not use or possess firearms or other weapons while conducting the firm's business.
- Report unsafe conditions or unsafe acts to your supervisor immediately.
- Report emergencies, occupational illnesses, injuries, vehicle accidents, and near misses immediately.
- Do not remove or make ineffective safeguards or safety devices attached to any piece of equipment.
- Report unsafe equipment, defective or frayed electrical cords, and unguarded machinery to your supervisor.
- Shut down and lock out machinery and equipment before cleaning, adjustment, or repair. Do not lubricate or repair moving parts of machinery while the parts are in motion.
- Do not run in the workplace.
- When ascending or descending stairways, use the handrail and take one step at a time.
- Do not apply compressed air to any person or clothing.
- Do not wear steel taps or shoes with metal exposed to the sole at any CH2M HILL project location.

- Do not wear finger rings, loose clothing, wristwatches, and other loose accessories when within arm's reach of moving machinery.
- Remove waste and debris from the workplace and dispose of in accordance with federal, state, and local regulations.
- Note the correct way to lift heavy objects (secure footing, firm grip, straight back, lift with legs), and get help if needed. Use mechanical lifting devices whenever possible.
- Check the work area to identify any problems or hazards that may exist.

8.8 Hazard Communication

(Reference CH2M HILL SOPs HSE-107, *Hazard Communication* and HSE-403, *Hazardous Material Handling*)

The hazard communication coordinator is to perform the following:

- Complete an inventory of chemicals brought on site by CH2M HILL using the chemical inventory form included as an attachment to this HSP.
- Confirm that an inventory of chemicals brought on site by CH2M HILL subcontractors is available.
- Request or confirm locations of MSDSs from the client, contractors, and subcontractors for chemicals to which CH2M HILL employees potentially are exposed.
- Before or as the chemicals arrive on site, obtain an MSDS for each hazardous chemical and include on the chemical inventory sheet (attached to this HSP) and add the MSDS to the MSDS attachment section of this HSP.
- Label chemical containers with the identity of the chemical and with hazard warnings, and store properly.
- Give employees required chemical-specific hazardous communication training using the chemical-specific training form included as an attachment to this HSP.
- Store all materials properly, giving consideration to compatibility, quantity limits, secondary containment, fire prevention, and environmental conditions.

8.9 Knife Use

Open-bladed knives (for example, box cutters, utility knives, pocket knives, machetes, and multi-purpose tools with fixed blades such as a Leatherman) are prohibited at worksites except where the following three conditions are met:

- The open-bladed knife is determined to be the best tool for the job.
- An approved AHA or written procedure is in place that covers the necessary safety precautions (work practices, PPE, and training).
- Knife users have been trained and follow the AHA.

8.10 Lighting

Lighting shall be evaluated when conducting work inside buildings, confined spaces, or other areas/instances where supplemental light may be needed (for example, work before sunrise or after sunset). A light meter can be used to evaluate the adequacy of lighting. The following are common requirements for lighting and the conditions/type of work being performed:

- While work is in progress outside construction areas shall have at least 33 lux (lx);
- Construction work conducted inside buildings should be provided with at least 55-lx light;

- The means of egress shall be illuminated with emergency and non-emergency lighting to provide a minimum of 11 lx measured at the floor. Egress illumination shall be arranged so that the failure of any single lighting unit, including the burning out of an electric bulb, will not leave any area in total darkness.

8.11 Manual Lifting

(Reference CH2M HILL SOP HSE-112, *Manual Lifting*)

Back injuries are the leading cause of disabling work, and most back injuries are the result of improper lifting techniques or overexertion. Use the following to mitigate the hazards associated with lifting:

- When possible, the task should be modified to minimize manual lifting hazards.
- Lifting of loads weighing more than 40 pounds (18 kilograms) shall be evaluated by the SC using the Lifting Evaluation Form contained in SOP HSE-112.
- Using mechanical lifting devices is the preferred means of lifting heavy objects such as forklifts; cranes, hoists, and rigging; hand trucks; and trolleys.
- Personnel shall seek assistance when performing manual lifting tasks that appear beyond their physical capabilities.
- In general, the following steps must be practiced when planning and performing manual lifts: Assess the situation before you lift; ensure good lifting and body positioning practices; ensure good carrying and setting down practices.
- All CH2M HILL workers must have training in proper manual lifting training either through the New Employee Orientation or through Manual Lifting module located on the VO.

8.12 Personal Hygiene

Good hygiene is essential for personal health and to reduce the potential of cross-contamination when working on a hazardous waste site. Implement the following:

- Keep hands away from nose, mouth, and eyes during work.
- Keep areas of broken skin (chapped, burned, etc.) covered.
- Wash hands with soap and water before eating, smoking, or applying cosmetics.

8.13 Personal Security

Follow the guidelines below for personal security measures. The RISM and firm-wide security office can be contacted if additional, specific measures are needed (such as evaluating the needs for security service).

General Safety and Security Guidelines

CH2M HILL's corporate Security Department recommends the following guidelines for workers in the United States:

- Stay alert and be aware of your surroundings. Avoid pre-occupations with mobile devices, while in an unfamiliar area.
- Whenever possible, use the buddy system with another employee or client or subcontractor employee.
- Trust your intuition; if a situation appears strange or wrong, it probably is.
- Be confident in your walk or stride; do not give the appearance you are new in town.
- Avoid carrying and displaying large sums of cash.

- If you sense or see dangerous situations along your route, change your route and depart the area quickly. If you believe that you are being followed, go to the nearest police station or safe location and file a complaint with the police. Provide a description of the person, their vehicle, license plate number, and any other useful information.
- Only walk short distances that are safe and secure while visiting an unfamiliar city or location.
- Use host-approved transportation modes for long distances.
- “Fight or Flight?” Leaving the possible or dangerous area is always better than staying to fight.
- Always report suspicious activity to the nearest local law enforcement agency.
- Locate emergency exits in your hotel or where you are staying so that you know where to go in case of a fire or a natural or man-made disaster.
- Secure your electronic devices when left in your room or take them with you if you are not able to secure them properly.
- If you believe your life is in danger, call 911. Be sure to speak clearly and concisely and give the dispatcher a good description of where you are physically located.

Operating or Riding in Vehicles

- When waiting for public transportation or a taxi, remain in a store or restaurant as long as possible before catching your ride and never wait by yourself in an isolated area.
- Approach your vehicle with keys firmly in your hand and ready to unlock the car.
- Quickly check your car before entering it to identify any damage or the presence of an intruder.
- Vulnerable times can be stopping to find your keys to enter your vehicle or stepping out of your vehicle in an isolated area. Be aware of your surroundings before you perform these activities.
- Always keep your doors locked during transit and when the vehicle is parked.
- Never leave your vehicle unlocked, even when performing a quick task such as checking in a hotel, getting gas, or picking up food.
- If confronted by an individual inside a vehicle pointing a weapon at you, run the opposite way from where the vehicle is facing and scream as loud as you can. This evasive action will probably cause the individual to drive away.
- If an individual in a passing car points at your tires or engine to indicate a malfunction, only pull over in a well-lit and populated gas or rest stop. Never pull over in an isolated or dimly lit area. You may have a malfunction or the passing motorist may be attempting to rob you.
- Always park your vehicle in a well-lit and secure area. If your vehicle is parked in a dimly lit or isolated area in a parking garage; ask an attendant or friend to accompany you to your vehicle.
- Secure your valuables in the trunk, or place them out of sight or cover them with a blanket or coat if there is no secure storage area in the vehicle. The would-be-perpetrator likes to see what to steal and not knowing what you have concealed will normally prevent a break in.

Riding in a Taxi

- Have your host or a designated travel agent suggest or reserve a reputable taxi service for you during your stay.
- Only use a taxi service that has been vetted for safety and reliability.
- If possible, place luggage, laptop, and personal belongings inside the taxi.

- When you first enter the taxi, check the driver photo identification card, normally located on the driver's visor, with the driver to ensure they match.

Walking

- If you experience automotive trouble, remain inside the locked vehicle and call for assistance.
- If you can't reach assistance via a mobile phone, only walk for help in a safe area facing the traffic.
- If while walking, you are shadowed or followed by a vehicle, run back in the direction of your vehicle and enter the vehicle if possible. File a police report on the incident as soon as practicable.
- Be aware of your surroundings and those around you while walking and do not be distracted by using electronic devices.
- Regularly change your route if you are walking to and from meetings or conferences and choose only well-lit areas to walk in at night.
- If walking long distances, identify a "safe house, shop, store or restaurant" to duck into if confronted by a perpetrator.

Jogging or Running

- Always jog or run in an area that is safe, secure, and used for exercising.
- Avoid running along busy roads or highways.
- If you chose to venture out on a jog or run, check the route by vehicle before beginning to exercise.
- Let the host or a friend know when you leave, when you plan to return, and the route you will take during exercising.
- Take a photo identification and mobile phone with you for emergencies.
- Avoid physically over-extending yourself because reflexes and decision-making ability can be impaired.

Clothing and Jewelry

- Dress to blend in with locals, maintain a low profile, and avoid drawing attention to yourself.
- Travel with inexpensive clothing and jewelry.
- Avoid wearing CH2M HILL distinctive clothing or using CH2M HILL logos on luggage or laptops.

Emergency Numbers and Information

- Leave your itinerary and emergency contact numbers where you can be reached with family members and only those that have a need to know.
- Pre-program emergency numbers in the mobile device you are traveling with.
- Carry a list of current medications and specific doses in your purse or wallet.
- Record medical emergency information on a document that can be readily available if you are unable to speak or unconscious.
- Have a photo copy of your driver's license, passport, and credit card information separately in case your wallet or purse is stolen.

8.14 Shipping and Transportation of Hazardous Materials

(Reference CH2M HILL SOP HSE-417, *Hazardous Materials Transportation*)

The U.S. Department of Transportation (USDOT) has specific regulations governing shipping of hazardous materials (also called dangerous goods). Chemicals brought to the site might be defined as hazardous materials by USDOT. Hazardous wastes that may be shipped offsite are also defined as hazardous materials by USDOT. Other wastes may also be USDOT-classified hazardous materials. To confirm whether a material or a waste is a USDOT hazardous material, check with the ESG Waste Coordinator (Lisa Schwan/ATL), the Project EM, or the CH2M HILL Dangerous Goods Shipping Coordinators (John Blasco/BAO or Rob Strehlow/MKW).

All personnel who affect shipment of hazardous materials, including receiving hazardous materials, preparing profiles or manifests, packaging hazardous wastes, labeling, or transporting hazardous materials by road, are called HazMat employees (note CH2M HILL cannot transport hazardous wastes by public road). HazMat employees must receive CH2M HILL online training in shipping dangerous goods. CH2M HILL's online Dangerous Goods Shipping course can be found on the CH2M HILL Health, Safety, Security, and the Environment (HSSE) website.

All hazardous materials that are shipped (for example, via Federal Express) or are transported by road must be properly identified, labeled, packed, and documented by trained staff. If the material is a product that is being shipped (such as calibration gas), use the HazMat ShipRight tool on the CH2M HILL VO (under Company Resources – Online Shipping). Contact the Dangerous Goods Shipping coordinators, the ESG Waste Coordinator, or the Project EM for additional information.

49 CFR 172 requires that all hazmat employees be aware of potential transportation security concerns. Hazardous materials security is addressed in CH2M HILL's Hazardous Materials SOP (HSE-403). The following points are provided as an overview of security measures to increase awareness of this important matter:

- It is essential that each employee understand the security risks involved with transporting hazardous materials.
- All transporters of hazardous materials must be prequalified by a Contracts Administrator who evaluate the carrier's safety rating, security measures, and employee screening procedures.
- When shipping hazardous materials, check driver credentials and ask about shipping details.
- When receiving a hazardous materials shipment, inspect packages for signs of tampering or damage to the contents. Verify the driver and company information on the form with the driver.
- If there is suspicious or unusual behavior (for example, a driver without credentials, evasive answers) or any discrepancies are identified, do not offer or accept the shipment, and immediately notify the PM or the RHSM.

Employees responsible for shipping hazard materials must also review the CH2M HILL Transportation Security Plan (HSE-417 Appendix A).

8.15 Substance Abuse

(Reference CH2M HILL SOP HSE-105, *Drug-Free Workplace*)

Employees who work under the influence of controlled substances, drugs, or alcohol may prove to be dangerous or otherwise harmful to themselves, other employees, clients, the company, the company's assets and interests, or the public. CH2M HILL does not tolerate illegal drug use, or any use of drugs, controlled substances, or alcohol that impairs an employee's work performance or behavior.

Prohibitions onsite include:

- Use or possession of intoxicating beverages while performing CH2M HILL work
- Abuse of prescription or nonprescription drugs
- Use or possession of illegal drugs or drugs obtained illegally
- Sale, purchase, or transfer of legal, illegal, or illegally obtained drugs

- Arrival at work under the influence of legal or illegal drugs or alcohol

Drug and/or alcohol testing is applicable under CH2M HILL Constructors, Inc. and munitions response projects performed in the United States. In addition, employees may be required to submit to drug and/or alcohol testing as required by clients. When required, this testing is performed in accordance with SOP HSE-105, Drug-Free Workplace. Employees who are enrolled in drug or alcohol testing are required to complete annual training located on the CH2M HILL VO.

Project-specific Hazard Controls

This section describes safe work practices and control measures to reduce or eliminate potential hazards. These practices and controls are to be implemented by the party in control of either the work or the particular hazard. Each person onsite is required to abide by the hazard controls. Always consult the appropriate CH2M HILL SOP to ensure all requirements are implemented. CH2M HILL employees and subcontractors must remain aware of the hazards affecting them regardless of who is responsible for controlling the hazards. CH2M HILL employees and subcontractors who do not understand any of these provisions should contact the RHSM for clarification.

9.1 Boating Safety

Personnel who will operate a boat during the course of a project shall first demonstrate to the site manager that they are experienced in operating boats similar to those used for the project and that they are knowledgeable of the U.S. Coast Guard (USCG) boating safety requirements (33 CFR Subchapter S). Project boats shall be operated by experienced boat operators only. Boat operators shall also possess basic mechanical knowledge necessary to troubleshoot common mechanical problems that can and do occur. The boat operator shall be responsible for the safety of all personnel on board the boat he or she is operating and for the integrity of all boat and safety equipment.

Each designated boat operator shall give a safety briefing to all occupants of the boat before leaving the shore. Boats are to be occupied during use by not less than one qualified operator plus one additional person.

The boat captain has the final authority with regard to boat safety and navigational safety.

Use the boat safety checklist in Attachment 4 to evaluate and verify necessary equipment before leaving the shore.

Boat Requirements

All project boats will meet or exceed USCG requirements for safety equipment, as applicable to the operation and type of boat. These requirements are summarized below for small craft (less than 40 feet [12 meters] in length).

Flame Arresters

All gasoline engines, except outboard motors, installed in a boat must have an approved flame arrestor (backfire preventer) fitted to the carburetor.

Sound Signaling Devices

Boats shall carry at least one air horn or similar sound-signaling device. Radio or cell-phone communication must be in place as well.

Personal Flotation Devices

All personnel and passengers shall wear an approved personal flotation device (PFD) at all times when operating or being transported in a boat. A positively buoyant wet suit or dry suit may be substituted for a PFD. PFDs shall be Type II or higher (capable of turning its wearer in a vertical or slightly backward position in the water). In addition, each boat shall be equipped with at least one Type IV PFD, designed to be thrown to a person in the water and grasped and held by the user until rescued. A buoyant boat cushion equipped with straps and a float ring are common examples of a Type IV PFD.

Fire Extinguishers

Each boat shall carry at least one Type B-I or B-II fire extinguisher (for use in gasoline, oil and grease fires) that is UL-approved. Each fire extinguisher shall be inspected to ensure that it is sufficiently charged and that the nozzles are free and clear. Discharged fire extinguishers shall be replaced or recharged immediately.

Emergency Planning

As part of this HSP and the AHAs, emergencies and response actions must be addressed for potential emergencies such as fire, sinking, flooding, severe weather, man overboard, hazardous material incidents, etc.

Load Capacity

Boats shall not be loaded with passengers and gear beyond the weight capacity printed on the USCG information plate attached to the stern. In addition, several factors must be considered when loading a boat: distribute the load evenly, keep the load low, do not stand up in a small boat or canoe, and do not overload the boat.

Tool Kit

All motorized boats shall carry a tool kit sufficient for the boat operator to troubleshoot common mechanical problems such as fouled spark plugs, flooded carburetor, electrical shorts, etc. Boats operated in remote areas shall also carry appropriate spare parts (propellers, shear pins, patch kits, air pumps, etc.). The tool kit shall be maintained by the boat operator and supplies used up shall be replaced immediately.

Communications

All boats to be operated shall carry a two-way radio or cellular telephone that enables communication back to the field camp or other pre-established location.

Good Housekeeping

Personnel using a boat shall properly stow and secure all gear and equipment against unexpected shifts when underway. Decks and open spaces must be kept clear and free from clutter and trash to minimize slip, trip, and fall hazards.

Fuel Management

Personnel shall utilize the "one-third rule" in boating fuel management. Use one-third of the fuel to get to the destination, one-third to return, and keep one-third in reserve.

No smoking is permitted on board vessels or during refueling operations.

Pollution Control

The Clean Water Act prohibits the discharge of oil, hazardous substances, or other materials or wastes in quantities that may be harmful into U.S. navigable waters. No person may intentionally drain oil or oily wastes from any source into the bilge of any vessel. Larger vessels equipped with toilet facilities must be equipped with a USCG-approved marine sanitation device.

Employees shall report any significant oil spills to water to the SC and/or supervisor and the RHSM. The procedure for incident reporting and investigation shall be followed when reporting the spill.

Training

All operators and passengers shall be trained on the requirements outlined above, as well as trained on the HSP/AHA(s), including emergency response actions.

9.2 Hand and Power Tools

(Reference CH2M HILL, SOP HSE-210, *Hand and Power Tools*)

The hazard controls and safe work practices listed below shall be followed when personnel or subcontractors are using hand and power tools. Ensure the requirements in the referenced SOP are also followed:

- Tools shall be inspected before use and damaged tools will be tagged and removed from service.
- Hand tools will be used for their intended use and operated in accordance with manufacturer's instructions and design limitations.
- All hand and power tools will be maintained in a safe condition.
- PPE (such as gloves, safety glasses, earplugs, and face shields) is required when exposed to a hazard from a tool.
- Power tools shall not be carried or lowered by their cords or hoses.
- Plug portable power tools in only to GFCI-protected outlets.
- Portable power tools will be UL-listed and have a three-wire grounded plug or be double insulated.
- Tools shall be disconnected from energy sources when they are not in use, before servicing and cleaning them, and when changing accessories (such as blades, bits, and cutters).
- Safety guards on tools must remain installed while the tool is in use and must be promptly replaced after repair or maintenance has been performed.
- Tools shall be stored properly in a place where they will not be damaged or come in contact with hazardous materials.
- If a cordless tool is connected to its recharge unit, both pieces of equipment must conform strictly with electrical standards and manufacturer's specifications.
- Tools used in an explosive environment must be rated for work in that environment (that is, intrinsically safe, spark-proof, etc.).
- Working with manual and pistol-grip hand tools may involve highly repetitive movement, extended elevation, constrained postures, and/or awkward positioning of body members (for example, hand, wrist, arm, shoulder, neck, etc.). Consider alternative tool designs, improved posture, the selection of appropriate materials, changing work organization, and sequencing to prevent muscular, skeletal, repetitive motion, and cumulative trauma stressors.

Machine Guarding

- All machine guards must be in place to prevent contact with drive lines, belts, chains, pinch points, or any other sources of mechanical injury.
- Unplugging jammed equipment will only be performed when equipment has been shut down, all sources of energy have been isolated, and equipment has been locked/tagged and tested.
- Maintenance and repair of equipment that results in the removal of guards or would otherwise put anyone at risk requires lockout of that equipment prior to work.

9.3 MEC/MPPEH Avoidance

(Reference CH2M HILL, SOP HSE-610, Explosives Usage and Munitions Response)

9.3.1 Hazard Identification

The nature of activities on this project will result in the potential for encountering MEC and MPPEH items that have been fired, disposed, or abandoned, but may still represent a hazard. Non-unexploded ordnance (UXO)-trained personnel will avoid all contact with MEC/MPPEH.

Hazard Mitigation/Prevention

All field personnel will be given munitions recognition training before being allowed to work on the site. The training will be verified by signature on the site training form. Personnel will be instructed to be alert for MEC/MPPEH. The following general precautions concerning suspect MEC will be observed at all times:

- Suspect MEC item(s) WILL NOT be touched or moved regardless of the markings or apparent condition. Only UXO-trained personnel are allowed to handle MEC/MPPEH.
- Radios or cellular phones WILL NOT be used in the vicinity of suspect MEC items.
- Areas where the ground cannot be seen WILL NOT be traveled across without escort.
- Vehicles WILL NOT be driven into suspected MEC areas; clearly marked lanes will be used.
- Matches, cigarettes, lighters, or other flame-producing devices WILL NOT be carried on to a munitions response site.
- Color codes WILL NOT be relied on for positive identification of MEC items or their contents.
- Suspect MEC items will be approached from the side whenever possible; approaching the front or rear areas will be avoided.
- Personnel will always assume that a MEC item contains a live charge until it can be determined otherwise.
- Earth-moving equipment (EME) operations within an EZ will be performed under the supervision of a UXO technician III
- EME will not be used to excavate soils within 12 inches of an anomaly.
- Anomaly investigation personnel are not permitted to enter an excavation deeper than 4 feet. If an investigation needs to be performed in an excavation deeper than 4 feet, operations at that work area will be halted and the Site Safety & Health Officer will be notified. If further investigation is warranted, the Site Safety & Health Officer will notify RHSM to decide on the appropriate safety measures (for example, sloping, shoring, etc.) to be implemented. The implementation of excavation safety provisions will require an amendment to this HSP.
- When anomaly investigation personnel must be in the area of EME:
 - Maintain sufficient separation between ground support personnel and operating EME.
 - Wear reflective vests or high-visibility clothing to promote visibility of ground personnel by equipment operators.
 - Isolate equipment swing areas from workers, fixed objects or other equipment. Ground personnel shall avoid positioning themselves between fixed object and operating equipment.
 - Make/maintain eye contact with operators before approaching equipment. Do not approach equipment from rear or from blind spot of operator. Stay out of the swing radius of operating heavy equipment.
 - Do not pass suspended loads over ground personnel and ground personnel shall not walk under or in front of suspended loads.

The following actions will be taken if munitions are found:

- Personnel who are not UXO-qualified will note the area of concern and leave the immediate vicinity. They WILL NOT touch, move, or otherwise disturb the item.
- Personnel should not be misled by markings on the munitions item stating or indicating that the item is a practice bomb or inert. Even practice bombs may have explosive charges that are used to mark/spot the point of impact, or the item could be incorrectly marked.
- Immediately upon locating any suspect MEC, the Senior UXO Supervisor (SUXOS) and UXO Safety Officer will be notified. In turn, the SUXOS will notify the PM, who will then provide required notifications to the client.

- Operations in the immediate area of the suspect MEC will be halted and the appropriate procedures (as described below) will be implemented.

Removal and disposal of MEC is part of this scope of work and will be undertaken by a MEC support contractor under the oversight of CH2M HILL UXO-qualified personnel. MEC will be consolidated, demilitarized, and disposed of in accordance with procedures outline in the approved Work Plan and Explosives Safety Submission.

When a MEC item is detected and identified as potentially loaded with explosives, chemicals, propellant, or pyrotechnics, or when a buried object is exposed and cannot be identified as non-MEC, the MEC support contractor will coordinate with the CH2M HILL SUXOS for assistance. The location of the object will be marked with a yellow survey marker flag and all investigation activities at that location will cease. The MEC support contractor will maintain site access control and ensure personnel safety until Navy Explosive Ordnance Disposal personnel arrive and take control of the site. The contractor must supply the GPS coordinates for each item upon arrival of the emergency response team. The GPS positions must also be noted in the final report. The contractor will allow the Navy Explosive Ordnance Disposal personnel sufficient time to complete field evaluation, render safe, recover and dispose of MEC, per incident, when a MEC item that cannot be identified is detected.

9.4 Working Over Water

If any activities pose a risk to drowning, implement the following during the activity:

- Fall protection should be provided to prevent personnel from falling into water. Where fall protection systems are not provided and the danger of drowning exists, USCG-approved PFDs or a life jacket shall be worn.
- Provide employees with an approved (USCG for U.S. operations) life jacket or buoyant work vest.
 - Employees should inspect life jackets or work vests daily before use for defects. Do not use defective jackets or vests.
- Post ring buoys with at least 90 feet (27.4 meters) of 3/8-inch solid-braid polypropylene (or equal) line next to the work area. If the work area is large, post extra buoys 200 feet (61 meters) or less from each other.
- Provide at least one life-saving skiff, immediately available at locations where employees are working over or adjacent to water.
 - Ensure the skiff is in the water and capable of being launched by one person and is equipped with both motor and oars.
- Designate at least one employee onsite to respond to water emergencies and operate the skiff at times when there are employees working above water.
 - If the designated skiff operator is not within visual range of the water, provide him or her with a radio or provide some form of communication to inform them of an emergency.
 - The designated employee should be able to reach a victim in the water within 3 to 4 minutes.
- Ensure at least one employee who is trained in CPR and first aid is onsite during work activities.

Physical Hazards and Controls

Physical hazards include exposure to temperature extremes, sun, noise, and radiation. If you encounter a physical hazard that has not been identified in this plan, contact the RHSM so that a revision to this plan can be made.

10.1 Noise

(Reference CH2M HILL SOP HSE-108, Hearing Conservation)

CH2M HILL is required to control employee exposure to occupational noise levels of 85 decibels, A-weighted (dBA) and above by implementing a hearing conservation program that meets the requirements of the OSHA Occupational Noise Exposure standard, 29 CFR 1910.95. A noise assessment may be conducted by the RHSM or designee based on potential to emit noise above 85 dBA and also considering the frequency and duration of the task.

- Areas or equipment emitting noise at or above 90dBA shall be evaluated to decide on feasible engineering controls. When engineering controls are not feasible, administrative controls can be developed and appropriate hearing protection will be provided.
- In areas or equipment emitting noise levels at or above 85 dBA, hearing protection must be worn.
- Employees exposed to 85 dBA or a noise dose of 50 percent must participate in the Hearing Conservation program, including initial and annual (as required) audiograms.
- The RHSM will evaluate appropriate controls measures and work practices for employees who have experienced a standard threshold shift in their hearing.
- Employees who are exposed at or above the action level of 85 dBA are required to complete the online Noise Training Module located on CH2M HILL's VO.
- Hearing protection will be maintained in a clean and reliable condition, inspected before use and after any occurrence to identify any deterioration or damage, and damaged or deteriorated hearing protection will be repaired or discarded.
- In work areas where actual or potential high noise levels are present at any time, hearing protection must be worn by employees working or walking through the area.
- Areas where tasks requiring hearing protection are taking place may become hearing protection required areas as long as that specific task is taking place.
- High-noise areas requiring hearing protection should be posted or employees must be informed of the requirements in an equivalent manner, and a copy of the OSHA standard 29 CFR 1910.95 shall be posted in the workplace.

10.2 Ultraviolet Radiation (Sun Exposure)

Health effects regarding ultraviolet (UV) radiation are confined to the skin and eyes. Overexposure can result in many skin conditions, including erythema (redness or sunburn), photoallergy (skin rash), phototoxicity (extreme sunburn acquired during short exposures to UV radiation while on certain medications), premature skin aging, and numerous types of skin cancer. Implement the following controls to avoid sunburn.

Limit Exposure Time

- Rotate staff so the same personnel are not exposed all of the time.

- Limit exposure time when UV radiation is at peak levels (approximately 2 hours before and after the sun is at its highest point in the sky).
- Avoid exposure to the sun, or take extra precautions when the UV index rating is high.

Provide Shade

- Take lunch and breaks in shaded areas.
- Create shade or shelter through the use of umbrellas, tents, and canopies.
- Fabrics such as canvas, sailcloth, awning material, and synthetic shade cloth create good UV radiation protection.
- Check the UV protection of the materials before buying them. Seek protection levels of 95 percent or greater, and check the protection levels for different colors.

Clothing

- Reduce UV radiation damage by wearing proper clothing; for example, long-sleeved shirts with collars and long pants. The fabric should be closely woven and should not let light through.
- Head protection should be worn to protect the face, ears, and neck. Wide-brimmed hats with a neck flap or “Foreign Legion” style caps offer added protection.
- Wear UV-protective sunglasses or safety glasses. These should fit closely to the face. Wrap-around style glasses provide the best protection.

Sunscreen

- Apply sunscreen generously to all exposed skin surfaces at least 20 minutes before exposure, allowing time for it to adhere to the skin.
- Re-apply sunscreen at least every 2 hours, and more frequently when sweating or performing activities where sunscreen may be wiped off.
- Choose a sunscreen with a high sun protection factor. Most dermatologists advocate a sun protection factor of 30 or higher for significant sun exposure.
- Waterproof sunscreens should be selected for use in or near water, and by those who perspire sufficiently to wash off non-waterproof products.
- Check for expiration dates, because most sunscreens are only good for about 3 years. Store in a cool place out of the sun.
- No sunscreen provides 100 percent protection against UV radiation. Other precautions must be taken to avoid overexposure.

10.3 Temperature Extremes

(Reference CH2M HILL SOP HSE-211, *Heat and Cold Stress*)

Each employee is responsible for the following:

- Recognizing the symptoms of heat or cold stress
- Taking appropriate precautionary measures to minimize their risk of exposure to temperature extremes (see following sections)
- Communicating any concerns regarding heat and cold stress to their supervisor or the SC

10.3.1 Heat

Heat-related illnesses are caused by more than just temperature and humidity factors.

Physical fitness influences a person's ability to perform work under heat loads. At a given level of work, the more fit a person is, the less the physiological strain, the lower the heart rate, the lower the body temperature (indicates less retained body heat—a rise in internal temperature precipitates heat injury), and the more efficient the sweating mechanism.

Acclimatization is a gradual physiological adaptation that improves an individual's ability to tolerate heat stress. Acclimatization requires physical activity under heat-stress conditions similar to those anticipated for the work. With a recent history of heat-stress exposures of at least 2 continuous hours per day for 5 of the last 7 days to 10 of the last 14 days, a worker can be considered acclimatized. Its loss begins when the activity under those heat-stress conditions is discontinued, and a noticeable loss occurs after 4 days and may be completely lost in 3 to 4 weeks. Because acclimatization is to the level of the heat-stress exposure, a person will not be fully acclimatized to a sudden higher level; such as during a heat wave.

Dehydration reduces body water volume. This reduces the body's sweating capacity and directly affects its ability to dissipate excess heat.

The ability of a body to dissipate heat depends on the ratio of its surface area to its mass (surface area/weight).

Heat dissipation is a function of surface area, whereas heat production depends on body mass. Therefore, overweight individuals (those with a low ratio) are more susceptible to heat-related illnesses because they produce more heat per unit of surface area than if they were thinner. Monitor these persons carefully if heat stress is likely.

When wearing **impermeable clothing** (clothing doesn't allow for air or water vapor movement such as Tyvek), the weight of an individual is not as important in determining the ability to dissipate excess heat because the primary heat dissipation mechanism, evaporation of sweat, is ineffective.

SYMPTOMS AND TREATMENT OF HEAT STRESS

	Heat Syncope	Heat Rash	Heat Cramps	Heat Exhaustion	Heat Stroke
Signs and Symptoms	Sluggishness or fainting while standing erect or immobile in heat.	Profuse tiny raised red blister-like vesicles on affected areas, along with prickling sensations during heat exposure.	Painful spasms in muscles used during work (arms, legs, or abdomen); onset during or after work hours.	Fatigue, nausea, headache, giddiness; skin clammy and moist; complexion pale, muddy, or flushed; may faint on standing; rapid thready pulse and low blood pressure; oral temperature normal or low	Red, hot, dry skin; dizziness; confusion; rapid breathing and pulse; high oral temperature.
Treatment	Remove to cooler area. Rest lying down. Increase fluid intake. Recovery usually is prompt and complete.	Use mild drying lotions and powders, and keep skin clean for drying skin and preventing infection.	Remove to cooler area. Rest lying down. Increase fluid intake.	Remove to cooler area. Rest lying down, with head in low position. Administer fluids by mouth. Seek medical attention.	Cool rapidly by soaking in cool—but not cold—water. Call ambulance, and get medical attention immediately!

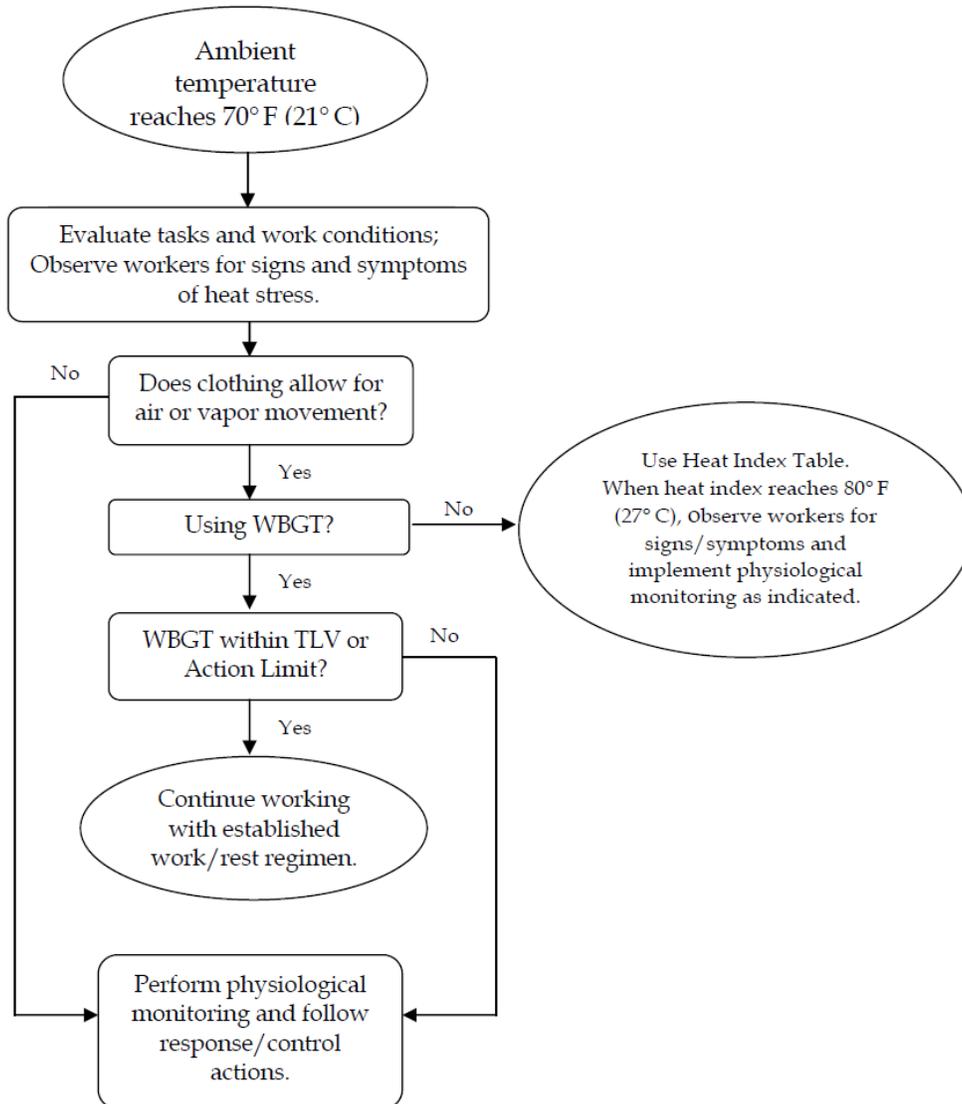
Precautions

- Drink 16 ounces of water before beginning work. Disposable cups and water maintained at 50 degrees Fahrenheit (°F) (10 °Celsius [C]) to 60 °F (15.6 °C) should be available. Under severe conditions, drink 1 to 2 cups every 20 minutes, for a total of 1 to 2 gallons (7.5 liters) per day. Remind employees to drink water throughout their work shift.
- Do not use alcohol in place of water or other nonalcoholic fluids. Decrease your intake of coffee and caffeinated soft drinks during working hours.

- Acclimate to site work conditions by slowly increasing workloads; for example, do not begin site work with extremely demanding activities. Closely monitor employees during their first 14 days of work in the field.
- Supervisors and SCs must continually observe employees throughout the work shift for signs and symptoms of heat stress or illness. Employees must monitor themselves for heat stress as well as observe their co-workers.
- Effective communication must be maintained with employees throughout the work shift either by voice, observation, or electronic device.
- Use cooling devices, such as cooling vests, to aid natural body ventilation. These devices add weight, so their use should be balanced against efficiency.
- Use mobile showers or hose-down facilities to reduce body temperature and cool protective clothing.
- Conduct field activities in the early morning or evening and rotate shifts of workers, if possible.
- Avoid direct sun whenever possible, which can decrease physical efficiency and increase the probability of heat stress. Take regular breaks in a cool, shaded area. Use a wide-brim hat or an umbrella when working under direct sun for extended periods.
- Provide adequate shade to protect personnel against radiant heat (sun, flames, hot metal).
- Use portable fans for convection cooling or in extreme heat conditions, an air-conditioned rest area when needed.
- In hot weather, rotate shifts of workers.
- Maintain good hygiene standards by frequent changes of clothing and showering. Clothing should be permitted to dry during rest periods. Persons who notice skin problems should consult medical personnel.
- Brief employees initially before the project work begins and routinely as part of the daily safety briefing, on the signs and symptoms, of heat-relatedness illnesses, precautions to measures and emergency procedures to follow as described in this plan.
- Observe one another for signs of heat stress. PREVENTION and communication is key.

Thermal Stress Monitoring

Thermal Stress Monitoring Flow Chart



Thermal Stress Monitoring – Permeable or Impermeable Clothing

When **permeable work clothes** are worn (street clothes or clothing ensembles over street clothes), regularly observe workers for signs and symptoms of heat stress and implement physiological monitoring as indicated below. This should start when the heat index reaches 80 °F (27 °C) [see Heat Index Table below], or sooner if workers exhibit symptoms of heat stress indicated in the table above. These heat index values were devised for shady, light wind conditions; exposure to full sunshine can increase the values by up to 15 °F (8 °C). Also, strong winds, particularly with very hot, dry air, can be extremely hazardous.

When wearing **impermeable clothing**, physiological monitoring as described below shall be conducted when the ambient temperature reaches 70 °F (21 °C), or sooner when climatic conditions may present greater risk of heat stress combined with wearing unique variations of impermeable clothing, or workers exhibit symptoms of heat stress.

Heat Index Temperature (°F)

	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	126	130					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution
 Extreme Caution
 Danger
 Extreme Danger

Heat Index	Possible Heat Disorders	Minimum Frequency of Physiological Monitoring
80°F - 90°F (27°C - 32°C)	Fatigue possible with prolonged exposure and/or physical activity	Conduct initial monitoring as baseline and observe workers for signs of heat stress and implement physiological monitoring if warranted.
90°F - 105°F (32°C - 41°C)	Sunstroke, heat cramps, or heat exhaustion possible with prolonged exposure and/or physical activity	Conduct initial monitoring as baseline, then at least every hour, or sooner, if signs of heat stress are observed.
105°F - 130°F (41°C - 54°C)	Sunstroke, heat cramps, or heat exhaustion likely, and heat stroke possible with prolonged exposure and/or physical activity.	Conduct initial monitoring as baseline, then every 30 minutes or sooner if signs of heat stress are observed.
130°F or Higher (54°C or Higher)	Heat/Sunstroke highly likely with continued exposure.	Conduct initial monitoring as baseline, then every 15 minutes or sooner if signs of heat stress are observed.

Source: National Weather Service

Physiological Monitoring and Associated Actions

For employees wearing permeable clothing, follow the minimum frequency of physiological monitoring listed in the Heat Index Table.

For employees wearing impermeable clothing, physiological monitoring should begin initially at a 15- minute interval, then if the employee’s heart rate or body temperature is within acceptable limits, conduct the subsequent physiological monitoring at 30 minutes, and follow the established regimen protocol described below.

When physiological monitoring is required, use either radial pulse or aural temperature and follow actions below:

- The sustained heart rate during the work cycle should remain below 180 beats per minute (bpm) minus the individual's age (for example, 180 – 35 year old person = 145 bpm). The sustained heart rate can be estimated by measuring the heart rate at the radial pulse for 30 seconds as quickly as possible before starting the rest period.
- The heart rate after a 1-minute rest period should not exceed 120 bpm.
- If the heart rate is higher than 120 bpm after the FIRST minute into the rest period, the next work period should be shortened by 33 percent, while the length of the rest period stays the same.
- If the pulse rate still exceeds 120 bpm at the beginning of the next rest period, the following work cycle should be further shortened by 33 percent.
- Continue this procedure until the rate is maintained below 120 bpm after the FIRST minute into the rest period.

Alternately, the body temperature can be measured, either oral or aural (ear), before the workers have something to drink.

- If the oral or aural temperature exceeds 99.6 °F (37.6 °F) at the beginning of the rest period, the following work cycle should be shortened by 33 percent.
- Continue this procedure until the oral or aural (ear) temperature is maintained below 99.6 °F (37.6 °C). While an accurate indication of heat stress, oral temperature is difficult to measure in the field, however, a digital aural (aural) thermometer is easy to obtain and inexpensive to purchase.
- Use the form attached to this HSP to track workers' measurements and actions taken.

Procedures for when Heat Illness Symptoms are Experienced

- **Always** contact the RHSM when any heat illness-related symptom is experienced so that controls can be evaluated and modified, if needed.
- In the case of cramps, reduce activity, increase fluid intake, move to shade until recovered.
- In the case of all other heat-related symptoms (fainting, heat rash, heat exhaustion), and if the worker is a CH2M HILL worker, contact the occupational physician at 1-866-893-2514 and the immediate supervisor.
- In the case of heat stroke symptoms, call 911, have a designee give location and directions to ambulance service if needed, and follow the precautions described under the emergency medical treatment of this HSP.
- Follow the Incident Notification, Reporting, and Investigation section of this HSP.

10.3.2 Cold

General

Low ambient temperatures increase the heat lost from the body to the environment by radiation and convection. In cases where the worker is standing on frozen ground, the heat loss is also due to conduction.

Wet skin and clothing, whether because of water or perspiration, may conduct heat away from the body through evaporative heat loss and conduction. As a result, the body cools suddenly when chemical protective clothing is removed if the clothing underneath is perspiration-soaked.

Movement of air across the skin reduces the insulating layer of still air just at the skin's surface. Reducing this insulating layer of air increases heat loss by convection.

Non-insulating materials in contact or near-contact with the skin, such as boots constructed with a metal toe or shank, conduct heat rapidly away from the body.

Certain common drugs, such as alcohol, caffeine, or nicotine, may exacerbate the effects of cold, especially on the extremities. These chemicals reduce the blood flow to peripheral parts of the body, which are already high-risk areas because of their large surface area to volume ratios. These substances may also aggravate an already hypothermic condition.

Precautions

- Be aware of the symptoms of cold-related disorders, and wear proper, layered clothing for the anticipated fieldwork. Appropriate rain gear is a must in wet weather.
- Consider monitoring the work conditions and adjusting the work schedule using guidelines developed by the U.S. Army (wind-chill index) and the National Safety Council.
- The wind-chill index (below) is used to estimate the combined effect of wind and low air temperatures on exposed skin. The wind-chill index does not take into account the body part that is exposed, the level of activity, or the amount or type of clothing worn. For those reasons, it should only be used as a guideline to warn workers when they are in a situation that can cause cold-related illnesses.
- Persons who experience initial signs of immersion foot, frostbite, and/or hypothermia should report it immediately to their supervisor/PM to avoid progression of cold-related illness.
- Observe one another for initial signs of cold-related disorders.
- Obtain and review the weather forecast – be aware of predicted weather systems along with sudden drops in temperature, increase in winds, or precipitation.

SYMPTOMS AND TREATMENT OF COLD STRESS

	Immersion (Trench) Foot	Frostbite	Hypothermia
Signs and Symptoms	Feet discolored and painful; infection and swelling present.	Blanched, white, waxy skin, but tissue resilient; tissue cold and pale.	Shivering, apathy, sleepiness; rapid drop in body temperature; glassy stare; slow pulse; slow respiration.
Treatment	Seek medical treatment immediately.	Remove victim to a warm place. Re-warm area quickly in warm—but not hot—water. Have victim drink warm fluids, but not coffee or alcohol. Do not break blisters. Elevate the injured area, and get medical attention.	Remove victim to a warm place. Have victim drink warm fluids, but not coffee or alcohol. Get medical attention.



		Temperature (°F)																	
		40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
Wind (mph)	Cal	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
	5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
	10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
	15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
	20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
	25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
	30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
	35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
	40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
	45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
	50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
	55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98	

Frostbite Times ■ 30 minutes ■ 10 minutes ■ 5 minutes

Wind Chill (°F) = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})
 Where, T= Air Temperature (°F) V= Wind Speed (mph) Effective 11/01/01

10.4 Radiological Hazards

Refer to CH2M HILL's Core Standard, Radiological Control and Radiological Controls Manual for additional requirements.

Hazards	Controls
None Known	None Required

Biological Hazards and Controls

Biological hazards are everywhere and change with the region and season. During the project planning stages, ask the site point of contact if there are insect or other biological hazards have been noted in any of the work sites.

If you encounter a biological hazard that has not been identified in this plan, contact the RHSM so that a revision to this plan can be made. Whether it is contact with a poisonous plant, a poisonous snake, or a bug bite, do not take bites or stings lightly. If there is a chance of an allergic reaction or infection, or to seek medical advice on how to properly care for the injury, contact the occupational nurse at 1-866-893-2514.

11.1 Bees and Other Stinging Insects

Bees and other stinging insects may be encountered almost anywhere and may present a serious hazard, particularly to people who are allergic.

Precautions include:

- Watch for and avoid nests.
- Keep exposed skin to a minimum.
- Carry a kit if you have had allergic reactions in the past, and inform your supervisor and/or a buddy. When working at a remote location, ensure that first-aid kits contain over-the-counter allergy and itch medication (Benadryl, Claritin, etc.) as well as other over-the-counter medications that may not be available to aid in symptom treatment.
- If bees or other stinging insects are known to be present, determine whether additional protective clothing should be donned before entering/working in brushy areas.
- Before entering a heavily vegetated or brushy area, observe the area for several minutes to see if bees or other stinging insects may be present. If nests or individual insects are observed, retreat and inquire whether a specialist or a client service can be contacted to clear the area before work proceeds.
- Consider if heavy-weight clothing or Tyvek, or head netting would provide additional protection in areas where wasps/bees are known or suspected. Be aware of heat stress conditions additional clothing may cause.
- Use insect repellent on clothing. Wear light-colored clothing and remove bright reflective safety-colored clothing if not working near a roadway because these may attract the wasps.
- Wear fragrance-free or lightly scented sunscreen, and body lotions. Bees are attracted to sweet scents. Avoid using floral scented soaps, shampoos, or conditioners.
- Move slowly and calmly through vegetated areas and try to avoid major disturbance of vegetation because wasps/bees often react to aggressive movement.
- If you encounter a wasp, back away slowly and calmly, do not run or swat at the insect. Wait for it to leave, or gently move or brush it off gently with a piece of paper or other light object. Do not use your hand.

If you are stung, contact the occupational nurse at 1-866-893-2514, no matter how minor it may seem. If a stinger is present, remove it as soon as possible using something with a thin, hard edge (such as a credit card) to scrape the stinger out. Be sure to sanitize the object first with hand sanitizer, alcohol or soap and water. Wash and disinfect the wound, cover it, and apply ice. Watch for an allergic reaction if you have never been stung before. Call 911 if the reaction is severe.

11.2 Feral Dogs

Avoid all dogs – both leashed and stray. Do not disturb a dog while it is sleeping, eating, or caring for puppies. If a dog approaches to sniff you, stay still. An aggressive dog has a tight mouth, flattened ears and a direct stare. If you are threatened by a dog, remain calm, do not scream, and avoid eye contact. If you say anything, speak calmly and firmly. Do not turn and run; try to stay still until the dog leaves, or back away slowly until the dog is out of sight or you have reached safety (such as a vehicle). If attacked, retreat to a vehicle or attempt to place something between you and the dog. If you fall or are knocked to the ground, curl into a ball with your hands over your head and neck and protect your face. If bitten, contact the occupational nurse at 1-866-893-2514. Report the incident to the local authorities.

11.3 Fire Ants

Several types of fire ants in the United States can cause painful bites and allergic reactions. Fire ants aggressively defend their nests by stinging several times after climbing on their victims. Large ant mounds are easily visible, but there can be smaller mounds or nests with little “worked” soil that can be stepped on inadvertently. They can also be under rocks, wood, or other debris. Implement the following when fire ants are observed:

- Be aware of fire ants and take care not to stand on ant nests.
- Use insect repellents on clothing and footwear to temporarily discourage ants from climbing.
- Tuck pants into socks.

If stung, get away from the area you are standing on, briskly brush off ants—wash affected area with soap. Call the occupational nurse.

11.4 Giant Hogweed

Giant hogweed is a noxious weed that has become established in New York, Pennsylvania, Ohio, Maryland, Oregon, Washington, Michigan, Virginia, Vermont, New Hampshire, Maine, and adjacent areas of Canada, but can be spread to surrounding areas.

Its sap, in combination with moisture and sunlight, can cause phytophotodermatitis—a serious skin inflammation and severe eye irritation leading to blindness. Contact between the skin and the sap of this plant occurs either through brushing against the bristles on the stem or breaking the stem or leaves. Eye exposure to the sap can occur during the breaking of the stems (during clearing/grubbing). Heat, sunlight, and moisture worsen the skin reaction.

Giant hogweed is a biennial or perennial which can grow up to 12 feet (approximately 3.5 meters) or more. Its hollow, ridged stems grow 2-4 inches (5-10 cm) in diameter and have dark reddish-purple blotches. Its large compound leaves can grow up to 5 feet (1.5 meters) wide. Its white flower heads can grow up to 2.5 feet (approximately 1 meter) in diameter.

Symptoms of exposure include initial itching and redness, then painful blisters form within 48 hours and the area becomes dark and pigmented. Long-term effects include scarring, sensitivity of the affected area to sunlight, and temporary or permanent blindness if the sap gets into the eyes.

As with all hazardous plants, recognition and avoidance is key. Do not touch any portion of the plant. Become familiar with the identity of these plants (see below). Wear protective clothing that covers exposed skin and clothes. Avoid contact with plants and the outside of protective clothing. If skin contacts a plant, wash the area with soap and cold water immediately. Keep exposed areas away from sunlight for 48 hours. Contact the occupational nurse immediately.



Hogweed.

11.5 Leeches

Leeches are bloodsucking aquatic or terrestrial worms. They can crawl through or over your socks or brush onto you from shrubbery. They carry no disease and there is low risk of significant blood loss. Leech bites do not hurt because they release an anesthetic, but they can bleed profusely due to an anticoagulant they release to facilitate the flow of blood.

Possible Complications

- Some people suffer allergic reaction from leech bites and require urgent medical care. Symptoms include an ulcer infection, itchy rash, red blotches or an itchy rash over the body, swelling around the lips or eyes, feeling faint or dizzy, and difficulty breathing. If you experience any of these symptoms, seek medical attention immediately.

Prevention Options

- The best protection against leeches is covering up and using tropical strength insect repellent on socks and clothing.
- Use anti-leech socks and fit them over outer garments to serve as a barrier.
- Various reports suggest applying salt, dettol spray, bath soap, eucalyptus oil, or lemon juice to your skin.
- Inspect your body after leaving leech-infested waters or area, removing them promptly.

First Aid

- Locate the head with a sucker attached to the wound. It will be the narrow end of leech's body.
- Use your fingernail or other flat, blunt object to break the seal of the oral sucker, at which point the leech's jaws will detach. Repeat with the posterior end.
- Quickly flick the leech away before it bites you again and reattaches.
- Treat the wound with soap and water and antiseptic wipes; then bandage to stop bleeding.
- Do not just pull off the leech because this may cause a severe wound and the jaws may stay imbedded in the skin.

- If the leech has attached to an orifice such ear, nose or mouth, use salt or strong (drinkable) alcohol to cause it to release before it expands.
- Apply pressure to the area and a cold pack to reduce pain or swelling.
- The wound normally itches as it heals, but should not be scratched because this may complicate healing and introduce other infections. Apply an antihistamine if necessary to reduce itching.
- If assisting a bitten person, use the usual protective universal precautions to protect against blood- borne pathogens.
- Call the occupational nurse.

11.6 Mosquito Bites

Due to the recent detection of the West Nile virus in the southwestern United States, it is recommended that preventative measures be taken to reduce the probability of being bitten by mosquitoes whenever possible. Mosquitoes are believed to be the primary source for exposure to the West Nile virus as well as several other types of encephalitis. The following guidelines should be followed to reduce the risk of these concerns for working in areas where mosquitoes are prevalent:

- Stay indoors at dawn, dusk, and in the early evening.
- Wear long-sleeved shirts and long pants whenever you are outdoors.
- Spray clothing with repellents containing permethrin or N,N-diethyl-meta-toluamide (DEET) since mosquitoes may bite through thin clothing;
- Apply insect repellent sparingly to exposed skin. An effective repellent will contain 35 percent DEET. Repellents may irritate the eyes and mouth, so avoid applying repellent to the hands.
- Whenever you use an insecticide or insect repellent, be sure to read and follow the manufacturer's DIRECTIONS FOR USE, as printed on the product.

Vitamin B and "ultrasonic" devices are NOT effective in preventing mosquito bites.

Symptoms of Exposure to the West Nile Virus

Most infections are mild, and symptoms include fever, headache, and body aches, occasionally with skin rash and swollen lymph glands. More-severe infection may be marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, paralysis, and, rarely, death.

The West Nile virus incubation period is from 3 to 15 days.

Contact the RHSM with questions, and immediately report any suspicious symptoms to your supervisor and the PM, and contact the occupational nurse at 1-866-893-2514.

11.7 Poison Ivy, Poison Oak, and Poison Sumac

Poison ivy, poison oak, and poison sumac typically are found in brush or wooded areas. They are more commonly found in moist areas or along the edges of wooded areas. Shrubs are usually 12 to 30 inches high, or can also be a tree-climbing vine, with triple leaflets and short, smooth hair underneath. Plants are red and dark green in spring and summer, with yellowing leaves anytime especially in dry areas. Leaves may achieve bright reds in fall, but plants lose their (yellowed, then brown) leaves in winter, leaving toxic stems. All parts of the plant remain toxic throughout the seasons. These plants contain urushiol, a colorless or pale yellow oil that oozes from any cut or crushed part of the plant, including the roots, stems, and leaves, and causes allergic skin reactions when contacted. The oil is active year round.

Become familiar with the identity of these plants (see below). Wear protective clothing that covers exposed skin and clothes. Avoid contact with plants and the outside of protective clothing. If skin contacts a plant, wash the area with soap and water immediately. If the reaction is severe or worsens, seek medical attention.

Poison Ivy



Poison Sumac



Poison Oak



Contamination with poison ivy, sumac, or oak can happen through several pathways, including:

- Direct skin contact with any part of the plant (even roots once above ground foliage has been removed).
- Contact with clothing that has been contaminated with the oil.
- Contact from removing shoes that have been contaminated (shoes are coated with urishol oil).
- Sitting in a vehicle that has become contaminated.
- Contact with any objects or tools that have become contaminated.
- Inhalation of particles generated by weed whacking, chipping, vegetation clearing.

If you must work on a site with poison ivy, sumac, or oak, the following precautions are necessary:

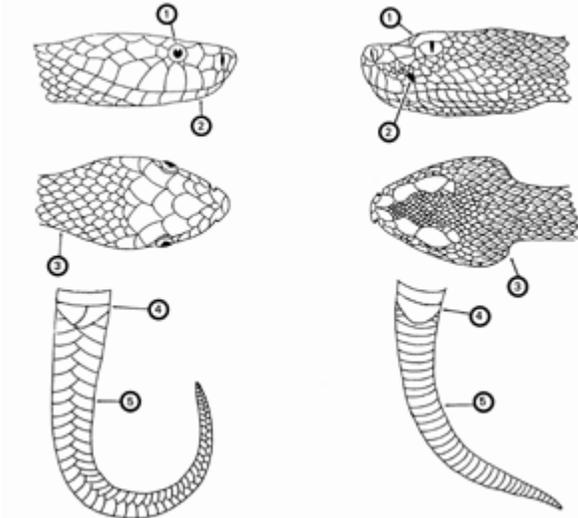
- Do not drive vehicles onto the site where it will come into contact with poison ivy, sumac, or oak. Vehicles that need to work in the area, such as drill rigs or heavy equipment, must be washed as soon as possible after leaving the site.
- All tools used in the poison ivy, sumac or oak area, including those used to cut back poison oak, surveying instruments used in the area, air monitoring equipment, or other test apparatus, must be decontaminated before they are placed back into the site vehicle. If onsite decontamination is not possible, use plastic to wrap any tools or equipment until they can be decontaminated.
- PPE, including Tyvek coveralls, gloves, and boot covers, must be worn. PPE must be placed into plastic bags and sealed if they are not disposed immediately into a trash receptacle.
- As soon as possible following the work, shower to remove any potential contamination. Any body part with suspected or actual exposure should be washed with Zanfel, Tecnu or other product designed for removing urishiol. If you do not have Zanfel or Tecnu, wash with cold water. Do not take a bath because the oils can form an invisible film on top of the water and contaminate your entire body upon exiting the bath.
- Tecnu may also be used to decontaminate equipment.
- Use IvyBlock or similar products to prevent poison oak, ivy, and sumac contamination. Check with the closest CH2M HILL warehouse to see if these products are available. Follow all directions for application.

If you do come into contact with one of these poisonous plants and a reaction develops, contact your supervisor and the occupational nurse 1-866-893-2514.

11.8 Snakes

Snakes typically are found in underbrush and tall grassy areas. If you encounter a snake, stay calm and look around; there may be other snakes. Turn around and walk away on the same path you used to approach the area. If bitten by a snake, wash and immobilize the injured area, keeping it lower than the heart if possible. Call the occupational nurse at 1-866-893-2514 immediately. Do not apply ice, cut the wound, or apply a tourniquet. Try to identify the type of snake: note color, size, patterns, and markings. Below is a guide to identifying poisonous snakes from non-poisonous snakes.

Identification of Poisonous Snakes

Major Identification Features Non-venomous Snake	Major Identification Features Venomous Snake
<ol style="list-style-type: none"> 1. Round pupils 2. No sensing pit 3. Head slightly wider than neck 4. Divided anal plate 5. Double row of scales on the underside of the tail 	<ol style="list-style-type: none"> 1. Elliptical pupils 2. Sensing pit between eye and nostril 3. Head much wider than neck 4. Single anal plate 5. Single scales on the underside of the tail
	

11.9 Spiders - Brown Recluse and Widow

The brown recluse spider can be found most anywhere in the United States. It varies in size in shape, but the distinguishing mark is the violin shape on its body. They are typically non-aggressive. Keep an eye out for irregular, pattern-less webs that sometimes appear almost tubular and is built in a protected area such as in a crevice or between two rocks. The spider will retreat to this area of the web when threatened.

The black widow, red widow and the brown widow spiders are all poisonous. Most have globose, shiny abdomens that are predominantly black with red markings (although some may be pale or have lateral stripes), with moderately long, slender legs. These spiders are nocturnal and build a three-dimensional tangled web, often with a conical tent of dense silk in a corner where the spider hides during the day.

Hazard Controls

- Inspect or shake out any clothing, shoes, towels, or equipment before use.
- Wear protective clothing such as a long-sleeved shirt and long pants, hat, gloves, and boots when handling stacked or undisturbed piles of materials.
- Minimize the empty spaces between stacked materials.
- Remove and reduce debris and rubble from around the outdoor work areas.
- Trim or eliminate tall grasses from around outdoor work areas.
- Store apparel and outdoor equipment in tightly closed plastic bags.
- Keep your tetanus boosters up-to-date (every 10 years). Spider bites can become infected with tetanus spores.

If you think you have been bit by a poisonous spider, immediately call the occupational nurse at 1-866-893-2514 and follow the guidance below:

- Remain calm. Too much excitement or movement will increase the flow of venom into the blood.
- Apply a cool, wet cloth to the bite or cover the bite with a cloth and apply an ice bag to the bite.
- Elevate the bitten area, if possible.
- Do not apply a tourniquet and do not try to remove venom.
- Try to positively identify the spider to confirm its type. If the spider has been killed, collect it in a plastic bag or jar for identification purposes. Do not try to capture a live spider—especially if you think it is a poisonous spider.

Black Widow



Red Widow



Brown Widow



Brown Recluse



11.10 Stinging Caterpillars



If you find a fuzzy or spiny caterpillar which inflicts a painful sting upon contact, you probably have found a stinging caterpillar. The intensity of the irritation, whether it is caused by “venomous” or “irritating” hairs or barbed hooks and/or sharp, hollow spines, will depend on the species of caterpillar and the individual’s sensitivity. Reaction ranges from mild, with local reddening, swelling and itching, to rather severe depending on the susceptibility of the individual, the tenderness of the skin, and the place of contact, and may even require hospital care for unusually sensitive persons. Hypersensitive persons may

experience symptoms and/or allergic reactions such as severe swelling, nausea, difficulty in breathing and generalized systemic reaction.

Saddleback caterpillars are an example of a stinging caterpillar. These are prevalent along the east coast from Florida to Massachusetts. They are most active within August and September. Contact with this caterpillar may produce a rash and a high fever.

Stings usually occur when people brush against a caterpillar or attempt to remove it from their body or their clothing. Only a few of the many thousand caterpillars can sting.

Avoid handling any hairy caterpillars or material with which they have been in contact. Suitable protective clothing, including safety glasses and gloves, should always be worn if handling these insects is necessary. Remember, dead caterpillars can still cause painful stings. Most caterpillar infestations are usually short-lived and should be left undisturbed, unless they are causing a problem. All the moth larvae are leaf feeders, which is where they can be found. Infested shrubs and trees may be vacuumed or sprayed or dusted to reduce or eliminate the caterpillars. Contact the RHSM if caterpillars are abundant and cannot be avoided to determine if spraying foliage or removal of caterpillars is necessary.

If you are stung, call the occupational nurse at 1-866-893-2514. Applying tape, such as adhesive or duct or cellophane transparent and pulling it off may be helpful in removing broken spines. Washing the affected skin area thoroughly with soap and water may also help to remove insect hairs/spines and/or irritating venom. Prompt application of an ice pack and a baking soda poultice may help to reduce pain and prevent swelling.

11.11 Ticks

Every year employees are exposed to tick bites at work and at home, putting them at risk of illness. Ticks typically are in wooded areas, bushes, tall grass, and brush. Ticks are black, black and red, or brown and can be up to one-quarter inch (6.4 mm) in size.

In some geographic areas, exposure is not easily avoided. Wear tightly woven light-colored clothing with long sleeves and pant legs tucked into boots; spray only outside of clothing with permethrin or permethrin and spray skin with only DEET; and check yourself frequently for ticks.

Where site conditions (vegetation above knee height, tick endemic area) or when tasks (having to sit or kneel in vegetation) diminish the effectiveness of the other controls mentioned above, bug-out suits (check with your local or regional warehouse) or Tyvek shall be used. Bug-out suits are more breathable than Tyvek.

Take precautions to avoid exposure by including pre-planning measures for biological hazards before starting field work. Avoid habitats where possible, and reduce the abundance through habitat disruption or application of acaricide. If these controls aren't feasible, contact your local or regional warehouse for preventative equipment such as repellants, protective clothing, and tick removal kits. Use the buddy system and perform tick inspections prior to entering the field vehicle. If ticks were not planned to be encountered and are observed, do not continue field work until these controls can be implemented.

See Tick Fact Sheet attached to this HSP for further precautions and controls to implement when ticks are present. If bitten by a tick, follow the removal procedures found in the tick fact sheet, and call the occupational nurse at 1-866-893-2514.

Be aware of the symptoms of Lyme disease or Rocky Mountain spotted fever (RMSF). Lyme disease is a rash that might appear that looks like a bull's eye with a small welt in the center. RMSF is a rash of red spots under the skin 3 to 10 days after the tick bite. In both RMSF and Lyme disease, chills, fever, headache, fatigue, stiff neck, and bone pain may develop. If symptoms appear, again contact the occupational nurse at 1-866-893-2514.

Be sure to complete an Incident Report (either use the Hours and Incident Tracking System [HITS] system on the VO) if you do come in contact with a tick.

SECTION 12

Contaminants of Concern

The table below summarizes the potential COCs and their occupational exposure limit and signs and symptoms of exposure. The table also includes the maximum concentration of each COC and the associated location and medium that was sampled (groundwater, soil boring, surface soil). These concentrations were used to determine engineering and administrative controls described in the “Project-Specific Hazard Controls” section of this HSP, as well as PPE and site monitoring requirements.

Contaminants of Concern					
Contaminant	Location and Maximum ^a Concentration (ppm)	Exposure Limit ^b	IDLH ^c	Symptoms and Effects of Exposure	PIP ^d (eV)
Smoke Composition—Reference RDX and TNT	UK	1.5 mg/m ³	UK	Irritation eyes, skin; headache, irritability, lassitude (weakness, exhaustion),	NL
Lead Styphnate	UK	(lead) 0.050 mg/m ³	(lead) 100 mg/m ³	contains lead	NL
<p>Footnotes:</p> <p>a Specify sample-designation and media: SB (Soil Boring), A (Air), D (Drums), GW (Groundwater), L (Lagoon), TK (Tank), SS (Surface Soil), SL (Sludge), SW (Surface Water).</p> <p>b Appropriate value of permissible exposure limit (PEL), recommended exposure limit (REL), or threshold limit value (TLV) listed.</p> <p>c IDLH = immediately dangerous to life and health (units are the same as specified “Exposure Limit” units for that contaminant); NL = No limit found in reference materials</p> <p>d PIP = photoionization potential; NA = Not applicable; UK = Unknown.</p> <p>eV = electron volt</p> <p>mg/m3 = milligrams per cubic meter</p>					
Potential Routes of Exposure					
<p>Dermal: Contact with contaminated media. This route of exposure is minimized through use of engineering controls, administrative controls and proper use of PPE.</p>		<p>Inhalation: Vapors and contaminated particulates. This route of exposure is minimized through use of engineering controls, administrative controls and proper use of respiratory protection when other forms of control do not reduce the potential for exposure.</p>		<p>Other: Inadvertent ingestion of contaminated media. This route should not present a concern if good hygiene practices are followed (e.g., wash hands and face before drinking or smoking).</p>	

SECTION 13

Site Monitoring

(Reference CH2M HILL SOP HSE-207, Exposure Monitoring for Airborne Chemical Hazards)

No air monitoring will be necessary for DGM on the shoreline or on the water at UXO 19 - Igniter Area.

Personal Protective Equipment

(Reference CH2M HILL- SOP HSE-117, *Personal Protective Equipment*)

14.1 Required Personal Protective Equipment

PPE must be worn by employees when actual or potential hazards exist and engineering controls or administrative practices cannot adequately control those hazards.

A PPE assessment has been conducted by the RHSM based on project tasks (see PPE specifications below). Verification and certification of assigned PPE by task is completed by the RHSM who approved this plan. Below are items that need to be followed when using any form of PPE:

- Employees must be trained to properly wear and maintain the PPE.
- Employees must be trained in the limitations of the PPE.
- In work areas where actual or potential hazards are present at any time, PPE must be worn by employees working or walking through the area.
- Areas requiring PPE should be posted or employees must be informed of the requirements in an equivalent manner.
- PPE must be inspected prior to use and after any occurrence to identify any deterioration or damage.
- PPE must be maintained in a clean and reliable condition.
- Damaged PPE shall not be used and must either be repaired or discarded.
- PPE shall not be modified, tampered with, or repaired beyond routine maintenance.

The table below outlines PPE to be used according to task based on project-specific hazard assessment. If a task other than the tasks described in this table needs to be performed, contact the RHSM so this table can be updated.

Project-Specific Personal Protective Equipment Requirements^a

Task	Level	Body	Head	Respirator ^b
DGM on shore or on water	D	Work clothes; safety-toed leather work boots and gloves, or rubber boots. PFD if working over water.	Hardhat ^c Safety glasses with side shields Ear protection ^d	None required
		Work clothes or cotton coveralls Boots: Safety-toe, chemical-resistant boots OR safety -toe, leather work boots with outer rubber boot covers Gloves: Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Hardhat ^c Safety glasses with side shields Ear protection ^d	
	Modified D	OR Work Clothes or Coveralls. SC to determine body protection based on potential contact with site contaminants. If outer layer of personal clothing cannot be kept clean, then outer cotton coveralls or uncoated Tyvek coveralls shall be worn. (Polycoated Tyvek when there is potential to contact contaminated groundwater or free liquids from drums.)		None required
	Modified D	Coveralls: Uncoated Tyvek	Hardhat ^c	None required.

Project-Specific Personal Protective Equipment Requirements^a

Task	Level	Body	Head	Respirator ^b
		Boots: Safety -toe, chemical-resistant boots OR safety -toe, leather work boots with outer rubber boot covers Gloves: Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Splash shield ^c Safety glasses with side shields Ear protection ^d	
Work near vehicular traffic ways or earth moving equipment.	All	Appropriate level of ANSI/ISEA 107-2010 high-visibility safety vests.	Work near vehicular traffic ways or earth moving equipment.	
Equipment decontamination if using pressure washer	Modified D with splash protection	Coveralls: Polycoated Tyvek Boots: 16-inch-high steel-toed rubber boots Gloves: Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Hardhat ^c Splash shield ^c over safety glasses with side shields or splash goggles Ear protection ^d	None required.
Task Requiring upgrade -Not Authorized, Contact RHSM	C	Coveralls: Polycoated Tyvek Boots: Safety -toe, chemical-resistant boots OR safety -toe, leather work boots with outer rubber boot covers Gloves: Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Hardhat ^c Splash shield ^c Ear protection ^d Spectacle inserts	APR, full face, MSA Ultratwin or equivalent; [specify cartridge type] ^e .
Tasks requiring upgrade -Not Authorized, Contact RHSM	B	Coveralls: Polycoated Tyvek Boots: Safety -toe, chemical-resistant boots OR safety -toe, leather work boots with outer rubber boot covers Gloves: Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Hardhat ^c Splash shield ^c Ear protection ^d Spectacle inserts	Positive-pressure demand self-contained breathing apparatus (SCBA); MSA Ultralite, or equivalent.

Reasons for Upgrading or Downgrading Level of Protection (with approval of the RHSM)

Upgrade ^f	Downgrade
<ul style="list-style-type: none"> Request from individual performing tasks. Change in work tasks that will increase contact or potential contact with hazardous materials. Occurrence or likely occurrence of gas or vapor emission. Known or suspected presence of dermal hazards. Instrument action levels in the "Site Monitoring" section exceeded. 	<ul style="list-style-type: none"> New information indicating that situation is less hazardous than originally thought. Change in site conditions that decrease the hazard. Change in work task that will reduce contact with hazardous materials.

^a Modifications are as indicated. CH2M HILL will provide PPE only to CH2M HILL employees.

^b No facial hair that would interfere with respirator fit is permitted.

^c Hardhat and splash-shield areas are to be determined by the SC.

^d Ear protection should be worn when conversations cannot be held at distances of 3 feet (1 meter) or less without shouting.

^e See cartridge change-out schedule.

^f Performing a task that requires an upgrade to a higher level of protection (Level D to Level C) is permitted only when the PPE requirements have been approved by the RHSM, and an SC qualified at that level is present.

14.2 Respiratory Protection

(Reference CH2M HILL SOP HSE-121, *Respiratory Protection*)

No respiratory protection is required.

Worker Training and Qualification

15.1 CH2M HILL Worker Training

(Reference CH2M HILL SOP HSE-110, *Training*)

15.1.1 Hazardous Waste Operations Training

All employees engaging in HAZWOPER shall receive appropriate training as required by 29 CFR 1910.120 and 29 CFR 1926.65. At a minimum, the training shall have consisted of instruction in the topics outlined in 29 CFR 1910.120 and 29 CFR 1926.65. Personnel who have not met these training requirements shall not be allowed to engage in HAZWOPER activities.

15.1.1.1. Initial Training

General site workers engaged in hazardous waste operations shall, at the time of job assignment, have received a minimum of 40 hours of initial health and safety training for hazardous waste site operations, unless otherwise noted in the above-referenced standards.

Employees who may be exposed to health hazards or hazardous substances at treatment, storage, and disposal operations shall receive a minimum of 24 hours of initial training to enable them to perform their assigned duties and functions in a safe and healthful manner.

Employees engaged in emergency response operations shall be trained to the level of required competence in accordance with 29 CFR 1910.120.

15.1.1.2. Three-Day Actual Field Experience

General site workers for hazardous waste operations shall have received 3 days of actual experience (on-the-job training) under the direct supervision of a trained, qualified supervisor and shall be documented. If the field experience has not already been received and documented at a similar site, this supervised experience shall be accomplished and documented at the beginning of the assignment of the project.

15.1.1.3. Refresher Training

General site workers and treatment, storage, and disposal workers shall receive 8 hours of refresher training annually (within the previous 12-month period) to maintain qualifications for fieldwork. Employees engaged in emergency response operations shall receive annual refresher training of sufficient content and duration to maintain their competencies or shall demonstrate competency in those areas at least annually.

15.1.1.4. Eight-Hour Supervisory Training

Onsite managers or supervisors who will be directly responsible for, or supervise employees engaged in hazardous waste site operations, will have received at least 8 hours of additional specialized training on managing such operations. Employees designated as SC– Hazardous Waste are considered 8-hour HAZWOPER Site Safety Supervisor -trained.

15.1.2 First Aid/Cardiopulmonary Resuscitation

First aid and CPR training consistent with the requirements of a nationally recognized organization such as the American Red Cross Association or National Safety Council shall be administered by a certified trainer. A minimum of two personnel per active field operation will have first aid and CPR training. Bloodborne pathogen training located on CH2M HILL's VO is also required for those designated as first aid/CPR-trained.

15.1.3 Safety Coordinator Training

SCs are trained to implement the HSE program on CH2M HILL field projects. A qualified SC is required to be identified in the site-specific HSP for CH2M HILL field projects. SCs must also meet the requirements of the worker category appropriate to the type of field project (construction or hazardous waste). In addition, the SCs shall have completed additional safety training required by the specific work activity on the project that qualifies them to implement the HSE program (for example, fall protection, excavation).

15.1.4 Site-specific Training

Before beginning their field activities, all field personnel assigned to the project will have completed site-specific training that will address the contents of applicable HSPs, including the activities, procedures, monitoring, and equipment used in the site operations. Site-specific training will also include site and facility layout, potential hazards, risks associated with identified emergency response actions, and available emergency services. This training allows field workers to clarify anything they do not understand and to reinforce their responsibilities regarding safety and work operations for their particular activity.

15.1.5 Project-specific Training Requirements

Project-specific training for this project includes:

- HSPs/AHAs
- 3R training (Recognize, Report, Retreat)

Medical Surveillance and Qualification

(Reference CH2M HILL SOP HSE-113, *Medical Surveillance*)

All site workers participating in HAZWOPER activities will maintain an adequate medical surveillance program in accordance with 29 CFR 1910.120 or 29 CFR 1926.65 and other applicable OSHA standards. Documentation of employee medical qualification (for example, physician's written opinion) will be maintained in the project files and made available for inspection.

16.1 Hazardous Waste Operations and Emergency Response

CH2M HILL personnel expected to participate in onsite HAZWOPER tasks are required to have a current medical qualification for performing this work. Medical qualification shall consist of a qualified physician's written opinion regarding fitness for duty at a hazardous waste site, including any recommended limitations on the employee's assigned work. The physician's written opinion shall state whether the employee has any detected medical conditions that would place the employee at increased risk of material impairment of the employee's health from work in hazardous waste operations or emergency response, or from respirator use.

16.2 Job or Site-Specific Medical Surveillance

Due to the nature of hazards for a particular job or work site, specialized medical surveillance may be necessary. This surveillance could include biological monitoring for specific compounds, or specialized medical examinations.

- No site-specific medical surveillance is required for this project.

16.3 Respirator User Qualification

Personnel required to wear respirators must have a current medical qualification to wear respirators. Medical qualification shall consist of a qualified physician's written opinion regarding the employee's ability to safely wear a respirator in accordance with 29 CFR 1910.134.

16.4 Hearing Conservation

Personnel working in hazardous waste operations or operations that fall under 29 CFR 1910.95 and exposed to noise levels in excess of the 85dBA time-weighted average shall be included in a hearing conservation program that includes annual audiometric testing.

Site-Control Plan

17.1 Site-Control Procedures

(Reference CH2M HILL SOP HSE-218, *Hazardous Waste Operations*)

Site control is established to prevent the spread of contamination throughout the site and to ensure that only authorized individuals are permitted into potentially hazardous areas.

The SC will implement site control procedures, including the following bulleted items:

- Establish support, contamination reduction, and EZs. Delineate with flags or cones as appropriate. Support zone should be upwind of the site. Use access control at entry and exit from each work zone.
- Establish onsite communication consisting of the following:
 - Line-of-sight and hand signals
 - Air horn
 - Two-way radio or cellular telephone if available
- Establish offsite communication.
- Establish and maintain the “buddy system.”

17.2 Remediation Work Area Zones

(Reference CH2M HILL SOP HSE-218 Hazardous Waste Operations)

A three-zone approach will be used to control areas where site contaminants exist. Access will be allowed only after verification of appropriate training and medical qualification. The three-zone approach shall include an EZ, contamination reduction zone (CRZ) and a support zone (SZ). The three-zone approach is not required for construction work performed outside contaminated areas where control of site contamination is not a concern.

Specific work control zones shall be established as necessary during task planning. Site work zones should be modified in the field as necessary, based on such factors as equipment used, air monitoring results, environmental conditions, or alteration of work plans. The following guidelines shall be used for establishing and revising these preliminary zone designations.

17.2.1 Support Zone

The SZ is an uncontaminated area (trailers, offices, field vehicles, etc.) that will serve as the field support area for most operations. The SZ provides field team communications and staging for emergency response. Appropriate sanitary facilities and safety and emergency response equipment will be located in this zone. Potentially contaminated personnel/materials are not allowed in this zone. The only exception will be appropriately packaged and decontaminated materials, or personnel with medical emergencies that cannot be decontaminated.

17.2.2 Contamination Reduction Zone

The CRZ is established between the EZ and the SZ, upwind of the contaminated area where possible. The CRZ provides an area for decontamination of personnel, portable handheld equipment and tools, and heavy equipment. In addition, the CRZ serves as access for heavy equipment and emergency support services.

17.2.3 Exclusion Zone

The EZ is where activities take place that may involve exposure to site contaminants and/or hazardous materials or conditions. This zone shall be demarcated to prevent unauthorized entry. More than one EZ may be established if there are different levels of protection to be employed or different hazards that exist in the same work area. The EZ shall be large enough to allow adequate space for the activity to be completed, including field personnel and equipment, as well as necessary emergency equipment.

The EZ shall be demarcated with some form of physical barrier or signage. The physical barrier or signage shall be placed so that they are visible to personnel approaching or working in the area. Barriers and boundary markers shall be removed when no longer needed.

17.2.4 Other Controlled Areas

Other work areas may need to be controlled due to the presence of an uncontrolled hazard, to warn workers of requirements, or to prevent unauthorized entry. Examples include general construction work areas, open excavations, high-noise areas, vehicle access areas, and similar activities or limited access locations. These areas shall be clearly demarcated with physical barriers (fencing, cones, reinforced caution tape or rope) as necessary and posted with appropriate signage.

Decontamination

(Reference CH2M HILL SOP HSE-218, *Hazardous Waste Operations*)

Decontamination areas will be established for work in potentially contaminated areas to prevent the spread of contamination. Decontamination areas should be located upwind of the EZ where possible and should consider any adjacent or nearby projects and personnel. The SC must establish and monitor the decontamination procedures and their effectiveness. Decontamination procedures found to be ineffective will be modified by the SC. The SC must ensure that procedures are established for disposing of materials generated on the site.

No eating, drinking, or smoking is permitted in contaminated areas and in exclusion or decontamination zones. The SC should establish areas for eating, drinking, and smoking.

18.1 Contamination Prevention

Preventing or avoiding contamination of personnel, tools, and equipment will be considered in planning work activities at all field locations. Good contamination prevention and avoidance practices will assist in preventing worker exposure and result in a more efficient decontamination process. Procedures for contamination prevention and avoidance include the following:

- Do not walk through areas of obvious or known contamination.
- Do not directly handle or touch contaminated materials.
- Make sure there are no cuts or tears in PPE.
- Fasten all closures in suits and cover them with duct tape, if appropriate.
- Take particular care to protect any skin injuries.
- Stay upwind of airborne contamination, where possible.
- Do not eat or drink in contaminated work areas.
- Do not carry food, beverages, tobacco, or flame-producing equipment into contaminated work areas.
- Minimize the number of personnel and amount of equipment in contaminated areas to that necessary for accomplishing the work.
- Choose tools and equipment with nonporous exterior surfaces that can be easily cleaned and decontaminated.
- Cover monitoring and sampling equipment with clear plastic, leaving openings for the sampling ports, as necessary.
- Minimize the amount of tools and equipment necessary in contaminated areas.

18.2 Personnel and Equipment Decontamination

Personnel exiting an EZ must ensure that they are not spreading potential contamination into clean areas or increasing their potential for ingesting or inhaling potential contaminants. Personal decontamination may range from removing outer gloves as exiting the EZ, to proceeding through an outer layer doffing station, including a boot and glove wash and rinse, washing equipment, etc. Equipment that has come into contact with contaminated media must also be cleaned/decontaminated when it is brought out of the EZ.

18.3 Decontamination during Medical Emergencies

Standard personnel decontamination practices will be followed whenever possible. For emergency life- saving first aid and/or medical treatment, normal decontamination procedures may need to be abbreviated or omitted. In this situation, site personnel shall accompany contaminated victims to advise emergency response personnel on potential contamination present and proper decontamination procedures.

Outer garments may be removed if they do not cause delays, interfere with treatment, or aggravate the problem. Protective clothing can be cut away. If the outer garments cannot be safely removed, a plastic barrier between the individual and clean surfaces should be used to help prevent contaminating the inside of ambulances or medical personnel. Outer garments can then be removed at the medical facility.

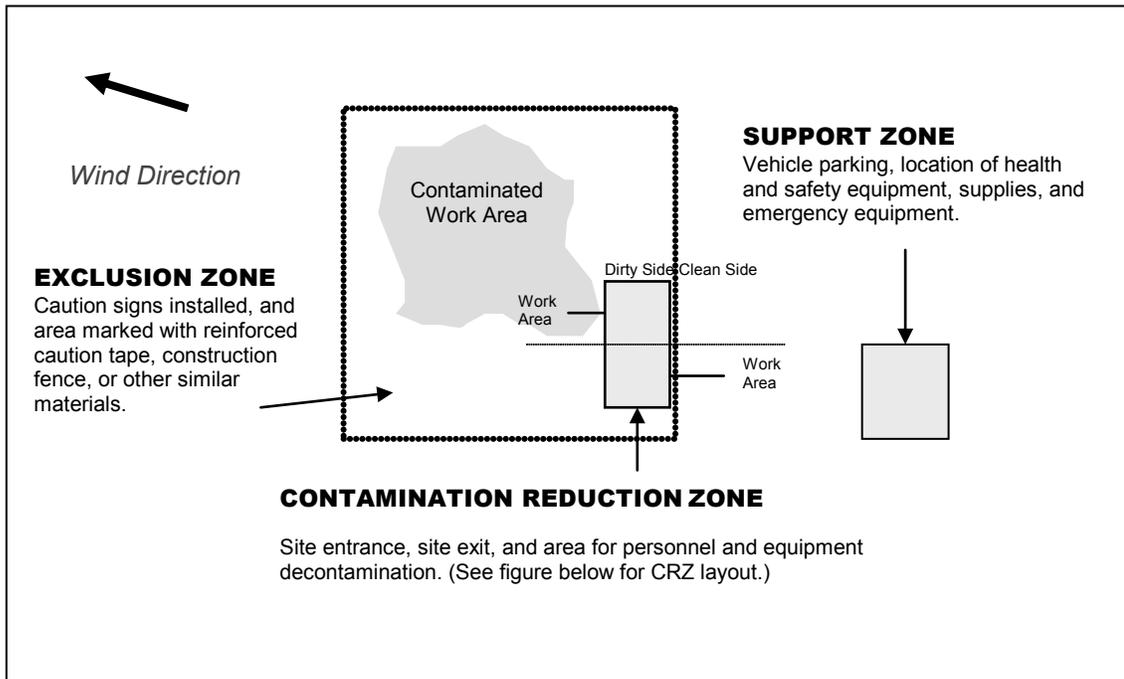
18.4 Waste Collection and Disposal

All contaminated material generated through the personnel and equipment decontamination processes (such as contaminated disposable items, gross debris, liquids, sludges) will be properly stored in containers and labeled, stored at a secure location, and disposed in accordance with the project plans.

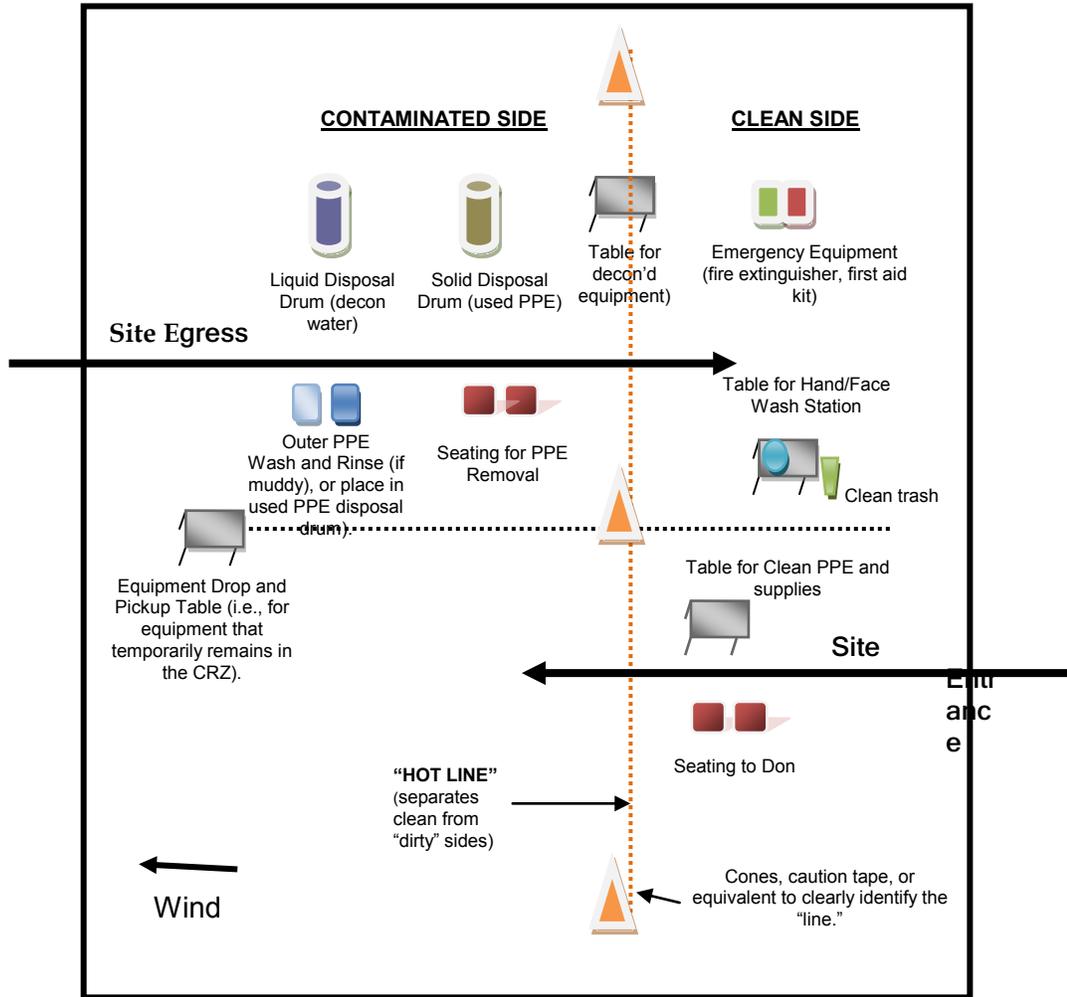
18.5 Diagram of Personnel-Decontamination Line

The following figure illustrates a conceptual establishment of work zones, including the decontamination line. Work zones are to be modified by the SC to accommodate task-specific requirements.

Work Area - Set up appropriately based on wind direction



Typical Contamination Reduction Zone



Emergency Response Plan

(Reference CH2M HILL SOP HSE-106, *Emergency Planning*)

19.1 Pre-emergency Planning

The Emergency Response Coordinator (ERC), typically the SC or designee, performs the applicable pre-emergency planning tasks before the field activities begin and coordinates emergency response with CH2M HILL onsite parties, the facility, and local emergency-service providers as appropriate. Pre-emergency planning activities performed by the ERC include:

- Review the facility emergency and contingency plans where applicable.
- Determine what onsite communication equipment is available (two-way radio, air horn).
- Determine what offsite communication equipment is needed (nearest telephone, cell phone).
- Confirm and post the “Emergency Contacts” page and route to the hospital located in this section in project trailer(s) and keep a copy in field vehicles, along with evacuation routes and assembly areas. Communicate the information to onsite personnel and keep it updated.
- Field Trailers: Post “Exit” signs above exit doors, and post “Fire Extinguisher” signs above locations of extinguishers. Keep areas near exits and extinguishers clear.
- Review changed site conditions, onsite operations, and personnel availability in relation to emergency response procedures.
- Where appropriate and acceptable to the client, inform emergency room and ambulance and emergency response teams of anticipated types of site emergencies.
- Inventory and check site emergency equipment, supplies, and potable water.
- Communicate emergency procedures for personnel injury, exposures, fires, explosions, and releases.
- Rehearse the emergency response plan before site activities begin. This may include a “tabletop” exercise or an actual drill depending on the nature and complexity of the project. Drills should take place periodically but no less than once a year.
- Brief new workers on the emergency response plan.
- The ERC will evaluate emergency response actions and initiate appropriate follow-up actions.

19.2 Emergency Equipment and Supplies

The ERC shall ensure the following emergency equipment is onsite. Verify and update the locations of this equipment as needed. The equipment will be inspected in accordance with manufacturer’s recommendations. The inspection shall be documented in a field logbook or similar means to be kept in the project files.

Emergency Equipment and Supplies	Location
20 (or two 10) class A,B,C fire extinguisher	Vehicle
First aid kit	Vehicle
Eye wash	Vehicle
Potable water	Vehicle
Bloodborne-pathogen kit	Vehicle

19.3 Incident Response

In fires, explosions, or chemical releases, actions to be taken include the following:

- Notify appropriate response personnel.
- Shut down CH2M HILL operations and evacuate the immediate work area.
- Account for personnel at the designated assembly area(s).
- Assess the need for site evacuation, and evacuate the site as warranted.
- Implement HSE-111, Incident Notification, Reporting and Investigation.
- Notify and submit reports to clients as required in contract.

Small fires or spills posing minimal safety or health hazards may be controlled with onsite spill kits or fire extinguishers without evacuating the site. When in doubt evacuate. Follow the incident reporting procedures in the “Incident Notification, Reporting, and Investigation” section of this HSP.

19.4 Emergency Medical Treatment

Emergency medical treatment is needed when there is a life-threatening injury (such as severe bleeding, loss of consciousness, or breathing or heart has stopped). When in doubt if an injury is life-threatening or not, treat it as needing emergency medical treatment.

- Notify 911 or other appropriate emergency response authorities as listed in the “Emergency Contacts” page located in this section.
- The ERC will assume charge during a medical emergency until the ambulance arrives or until the injured person is admitted to the emergency room.
- Prevent further injury, perform decontamination (if applicable) where feasible; lifesaving and first aid or medical treatment takes priority.
- Initiate first aid and CPR where feasible.
- Notify supervisor and if the injured person is a CH2M HILL employee, the supervisor will call the occupational nurse at 1-866-893-2514 and make other notifications as required by HSE SOP-111, *Incident Notification, Reporting and Investigation*.
- Make certain that the injured person is accompanied to the emergency room.
- Follow the serious incident reporting process in HSE SOP-111, *Incident Notification, Reporting and Investigation*, and complete incident report using the HITS system on the VO or if not feasible, use the hard copy forms provided as an attachment to this HSP.
- Notify and submit reports to client as required in contract.

19.5 Evacuation

- Evacuation routes, assembly areas, and severe weather shelters (and alternative routes and assembly areas) are to be specified on the site map.
- Evacuation route(s) and assembly area(s) will be designated by the ERC or designee before work begins.
- Personnel will assemble at the assembly area(s) upon hearing the emergency signal for evacuation.
- The ERC and a “buddy” will remain on the site after the site has been evacuated (if safe) to assist local responders and advise them of the nature and location of the incident.
- The ERC will account for all personnel in the onsite assembly area.
- A designated person will account for personnel at alternate assembly area(s).

- The ERC will follow the incident reporting procedures in the “Incident Notification, Reporting and Investigation” section of this HSP.

19.6 Evacuation Signals

Signal	Meaning
Grasping throat with hand	Emergency-help me.
Thumbs up	OK; understood.
Grasping buddy's wrist	Leave area now.
Continuous sounding of horn	Emergency; leave site now.

19.7 Inclement Weather

Sudden inclement weather can rapidly encroach upon field personnel. Preparedness and caution are the best defenses. Field crew members performing work outdoors should carry clothing appropriate for inclement weather. Personnel are to take heed of the weather forecast for the day and pay attention for signs of changing weather that indicate an impending storm. Signs include towering thunderheads, darkening skies, or a sudden increase in wind. If stormy weather ensues, field personnel should discontinue work and seek shelter until the storm has passed.

Protective measures during a lightning storm include seeking shelter; avoiding projecting above the surrounding landscape (don't stand on a hilltop--seek low areas); staying away from open water, metal equipment, railroad tracks, wire fences, and metal pipes; and positioning people several yards apart. Some other general precautions include:

- Know where to go and how long it will take to get there. If possible, take refuge in a large building or vehicle. Do not go into a shed in an open area;
- The inclination to see trees as enormous umbrellas is the most frequent and most deadly mistake. Do not go under a large tree that is standing alone. Likewise, avoid poles, antennae, and towers.
- If the area is wide open, go to a valley or ravine, but be aware of flash flooding.
- If you are caught in a level open area during an electrical storm and you feel your hair stand on end, drop to your knees, bend forward and put your hands on your knees or crouch. The idea is to make yourself less vulnerable by being as low to the ground as possible and taking up as little ground space as possible. Lying down is dangerous, since the wet earth can conduct electricity. Do not touch the ground with your hands.
- Do not use telephones during electrical storms, except in the case of emergency.

Remember that lightning may strike several miles from the parent cloud, so work should be stopped and restarted accordingly. The lightning safety recommendation is 30-30: seek refuge when thunder sounds within 30 seconds after a lightning flash; and do not resume activity until 30 minutes after the last thunder clap.

High winds can cause unsafe conditions, and activities should be halted until wind dies down. High winds can also knock over trees, so walking through forested areas during high-wind situations should be avoided. If winds increase, seek shelter or evacuate the area. Proper body protection should be worn in case the winds hit suddenly, because body temperature can decrease rapidly.

19.7.1 Tornado Safety

Recognizing imminent tornado signs include seeing an unusually dark sky, possibly with some green or yellow clouds. You may hear a roaring or rumbling sound like a train, or a whistling sound like a jet. Large hail may also be falling. You may be able to see funnels, or they may be hidden by rain or hail.

Listen to your radio for tornado warnings during bad thunderstorms. If a tornado warning is issued, don't panic. Instead, listen and look. Quickly but calmly follow directions for getting to shelter.

Take cover. Indoors, you should go down into the basement and crouch down under the stairs, away from windows. Do not take an elevator. If you can't get to a basement, go into a closet or bathroom and pull a mattress over you or sit underneath a sturdy piece of furniture on the ground floor near the center of the building. Pull your knees up under you and protect your head with your hands.

A bad place to be in a tornado is in a building with a large freestanding roof such as a gymnasium, arena, auditorium, church, or shopping mall. If you are caught in such a building, take cover under something sturdy.

More than half of tornado deaths occur in mobile homes. If a tornado threatens, get out and go to a building with a good foundation, or lay down in a ditch away from vehicles and other objects.

If you are driving, get to a shelter, lie down in a ditch or seek cover up under the girders of an overpass or bridge. Stay as close to the ground as you can. Protect your head and duck flying debris.

Stay away from metal and electrical equipment because lightning accompanies tornadoes.

If you have time before the tornado strikes, secure objects such as garbage cans and lawn furniture, which can injure people. Although most tornado damage is a result of the violent winds, most injuries and deaths actually result from flying debris.

Emergency Contacts

24-hour CH2M HILL Injury Reporting— 1-866-893-2514**24-hour CH2M HILL Serious Incident Reporting Contact – 720-286-4911****Medical Emergency – off base 911**

Facility Medical Response #:301/744-4333 (if in restricted area, use red call boxes-no cell phone usage in restricted area!)

Local Ambulance #: off base 911

CH2M HILL- Medical Consultant

WorkCare
Dr. Peter Greaney M.D.
300 S. Harbor Blvd, Suite 600
Anaheim , CA 92805
800-455-6155/866-893-2514
714-978-7488

Fire/Spill Emergency – 911

Facility Fire Response #: 301/744-4333

Local Fire Dept #:911

CH2M HILL Director – Health, Safety, Security & Environment

Andy Strickland/DEN
(720) 480-0685 (cell) or (720) 286-2393 (office)

Security & Police – 911

Facility Security #:301/744-4333 (if in restricted area, use red call boxes-no cell phone usage in restricted area!)

Local Police #: 911

CH2M HILL RHSM

Name: Mark Orman
Phone: (414) 847-0597

Utilities Emergency Phone Numbers

On base: Contact Nick Carros, NSF-IH

Phone: 301-744-2263

CH2M HILL Human Resources Department

Phone: Employee Connect toll-free number
1-877-586-4411
(U.S. and Canada)

CH2M HILL PM

Name: Victoria Waranoski

Phone: 703/376-5049

CH2M HILL Worker's Compensation:

Contact Business Group HR dept. to have form completed or contact Jennifer Rindahl after hours: (720)891-5382

CH2M HILL SC

Name: TBD

Phone:

Media Inquiries Corporate Strategic Communications

Name: John Corsi

Phone: (720) 286-2087

CH2M HILL Project EM

Name: Hope Wilson

Phone: 678/530-4226

Automobile Accidents

Rental: Jennifer Rindahl/DEN: 720-286-2449

CH2M HILL owned vehicle: Linda George/DEN: 720-286-2057

Federal Express Dangerous Goods Shipping

Phone: 800/238-5355

CHEMTEL (hazardous material spills)

Phone: 800/255-3924

Facility Alarms: Because CH2M HILL personnel will not always be working close to each other, hand signals, voice commands, air horns, and two-way radios will comprise the mechanisms to alert site personnel of an emergency. All onsite contractors must read and sign the "Hazard Control Briefing for Environmental Division Visitors IHDIVNAVSURFAWARCEN", and attend the "Pre-construction Safety Briefing" from the Safety Department before starting work.

Evacuation Assembly Area(s): If the site must be evacuated, all personnel will immediately stop activities and report to a safe place of refuge at the SZ. The safe place of refuge may also serve as the telephone communication point because communication with emergency response agencies may be necessary. A telephone communication point and safe place of refuge will be determined before site activities begin.

Facility/Site Evacuation Route(s): TBD before start of work.

Directions to Local Hospital

Local Hospital Hospital Phone#: 301-609-4000

Civista Medical Center

701 East Charles St., LaPlata MD 20646

Start at : Indian Head, MD

1) Head **east** on **Strauss Ave** toward **Ward Rd** 0.6 mi

2) Continue on **MD-210** for 2 mi

Turn **right** at **Hawthorne Rd/MD-225**. Continue to follow MD-225 for 10.9 mi

Turn **right** at **Kent Ave.** go 0.7 mi

Turn **left** at Charles **St/MD-6** Destination will be on the right go 0.2 mi

Spill Containment Procedures

CH2M HILL and subcontractor personnel working at the project site shall be knowledgeable of the potential HS&E concerns associated with petroleum and other substances that could be released at the project site.

The following is a list of criteria that must be addressed in CH2M HILL's or the subcontractor's plans in the event of a spill or release. In the event of a large quantity spill notify emergency services. Personnel discovering a spill shall (only if safe to do so):

- Stop or contain the spill immediately (if possible) or note source. Shut off the source (for example, pump, treatment system) if possible. If unsafe conditions exist, then leave the area, call emergency services, inform nearby personnel, notify the site supervisors, and initiate incident reporting process. Notify the SC notified immediately.
- Extinguish sources of ignition (flames, sparks, hot surfaces, cigarettes).
- Clear personnel from the spill location and barricade the area.
- Use available spill control equipment in an effort to ensure that fires, explosions, and releases do not occur, recur, or spread.
- Use sorbent materials to control the spill at the source.
- Construct a temporary containment dike of sorbent materials, cinder blocks, bricks or other suitable materials to help contain the spill.
- Attempt to identify the character, exact source, amount, and extent of the released materials. Identification of the spilled material should be made as soon as possible so that the appropriate cleanup procedure can be identified.
- Contact the RHSM and Project EM in the event of a spill or release immediately so evaluation of reportable quantity requirements and whether agency reporting is required.
- Assess possible hazards to human health or the environment as a result of the release, fire or explosion.
- Follow incident notification, reporting, and investigation section of this HSP.

Inspections

21.1 Management Health, Safety, Security, and Environment Inspections

The Management Inspection Checklist (attached to this plan) is intended to facilitate PM leadership, provide an opportunity for PMs to mentor field staff on HSE, and identify any big-picture actions that need to be addressed. Observations that would improve global HSE program should also be included on the form. This checklist does NOT take the place of a formal HSE audit. The PM shall:

- Complete one checklist per month during field work when visiting the site. The PM may delegate completion to the task lead, field team leader, or construction manager if the project is short duration and a visit is not planned.
- Complete applicable sections of the checklist (can be typed or hand-written). Address issues with the field team, taking the opportunity to mentor staff by identifying the “root cause” of observation (for example: Why are SBOs not being completed? Had this hazard been noted by any other team members?).
- Send completed form to Project Delivery Manager, Sector HSE Lead, and RHSM for tracking and review. The original should be kept in the project files.

21.2 Project Activity Self-assessment Checklists

In addition to the hazard controls specified in this document, Project Activity Self-Assessment Checklists are contained as an attachment to this HSP. The Project-Activity Self-Assessment Checklists are based upon minimum regulatory compliance, and some site-specific requirements may be more stringent. The objective of the self-assessment process is to identify gaps in project safety performance, and prompt for corrective actions in addressing these gaps. The self-assessment checklists, including documented corrective actions, shall be made part of the permanent project records and maintained by the SC.

The self-assessment checklists will also be used by the SC in evaluating the subcontractors and any client contractors’ compliance on site.

The self-assessment checklists for the following tasks and exposures are required when the task or exposure is initiated and weekly thereafter while the task or exposure is taking place. The checklists shall be completed by the SC or other CH2M HILL representative and maintained in project files:

- Heat stress physiological monitoring form
- Boating

21.3 Safe Behavior Observations

SBOs are a tool to be used by supervisors to provide positive reinforcement for work practices performed correctly, while also identifying and eliminating deviations from safe work procedures that could result in a loss.

The SC or designee shall perform at least one SBO each week for any field work performed by subcontractors or when there are at least two CH2M HILL personnel performing field work.

The SC or designee shall complete the SBO form (attached to this HSP) for the task/operation being observed and submit them weekly.

For federal projects, SBOs may be submitted electronically by e-mailing them to the address, “CH2M HILL ES FED Safe Behavior Observations” when connected to the network or at CH2MHILLESFEDSafeBehaviorObservation@ch2m.com.

Incident Notification, Reporting, and Investigation

(Reference CH2M HILL SOP HSE-111, Incident Notification, Reporting and Investigation)

22.1 General Information

This section applies to the following:

- All injuries involving employees, third parties, or members of the public
- Damage to property or equipment
- Interruptions to work or public service (hitting a utility)
- Incidents which attract negative media coverage
- Near-misses
- Spills, leaks, or regulatory violations
- Motor vehicle accidents

Documentation, including incident reports, investigation, analysis, and corrective measure taken, shall be kept by the SC and maintained onsite for the duration of the project.

22.2 Section Definitions

Incident: An incident is an event that causes or could have caused undesired consequences. An incident may be caused by natural forces, employees, subcontractors, or third parties in any location associated with CH2M HILL operations, including offices, warehouses, project sites, private property, or public spaces. Incidents include:

- Injury or illness to a CH2M HILL employee or subcontractor employee, or member of the public
- Property damage
- Spill or release
- Environmental requirement or permit violation
- A near-miss
- Other (fire, explosion, bomb threat, workplace violence, threats)
- **Accident:** an incident involving actual loss through injury, damage to assets, or environmental harm.

Near-Miss: A near-miss occurs when an intervening factor prevented an injury or illness, property damage, spill or release, permit violation, or other event from occurring. Examples of near-miss situations include: a hard hat or other PPE prevented an injury; secondary containment or emergency shutoff prevented a spill; or an alert co-worker prevented an incident.

Serious Incident: A serious incident must be immediately reported to senior management and includes:

- Work-related death, or life-threatening injury or illness of a CH2M HILL employee, subcontractor, or member of the public
- Kidnap/missing person
- Acts or threats of terrorism
- Event that involves a fire, explosion, or property damage that requires a site evacuation or is estimated to result in greater than \$ 500,000 in damage
- Spill or release of hazardous materials or substances that involves a significant threat of imminent harm to site workers, neighboring facilities, the community, or the environment.

22.3 Reporting Requirements

All employees and subcontractors' employees shall immediately report any incident (including near-misses, as defined in the section above) in which they are involved or witness to their supervisor.

The CH2M HILL or subcontractor supervisor, upon receiving an incident report, shall inform his immediate superior and the CH2M HILL SC.

The SC shall immediately report the following information to the RHSM and PM by phone and e-mail:

- Project Name and Site Manager
- Date and time of incident
- Description of incident
- Extent of known injuries or damage
- Level of medical attention
- Preliminary root cause/corrective actions

If the incident was an environmental permit issue (potential permit non-compliance, other situation that result in a notice of violation) or a spill or release, contact the Project EM immediately so evaluation of reportable quantity requirements and whether agency reporting is required.

The CH2M HILL team shall comply with all applicable statutory incident reporting requirements such as those to OSHA, the police, or state or federal environmental agency.

Be aware that many OSHA-designated states (for example, California and Washington) require reporting to the area OSHA office if one person is admitted to the hospital; whereas federal OSHA requires it if three or more are admitted.

22.4 HITS System and Incident Report Form

CH2M HILL maintains a HITS entry and/or Incident Report Form (IRF) for all work-related injuries and illnesses sustained by its employees in accordance with recordkeeping and insurance requirements. A HITS entry and/or IRF will also be maintained for other incidents (property damage, fire or explosion, spill, release, potential violation, and near-misses) as part of our loss prevention and risk reduction initiative.

The SC shall complete an entry in the HITS database system located on CH2M HILL's VO (or if the VO is not available, use the hard copy IRF and Root Cause Analysis (RCA) form and forward to the RHSM) within 24 hours and finalize those forms within 3 calendar days.

22.5 Injury Management/Return-to-Work (for US/Puerto Rico-based CH2M HILL Staff Only)

(Reference CH2M HILL, SOP HSSE-124, Injury Management/Return-to-Work)

22.5.1 Background

The Injury Management Program has been established to provide orderly, effective and timely medical treatment and return-to-work transition for an employee who sustains a work-related injury or illness. It also provides guidance and assistance with obtaining appropriate treatment to aid recovery, keep supervisors informed of employee status, and to quickly report and investigate work-related injury/illnesses to prevent recurrence.

To implement the Injury Management/Return-to-Work Program successfully, supervisors and/or SC should:

- Ensure employees are informed of the Injury Management/Return-to-Work Program
- Become familiar with the notification process (detailed below)
- Post the Injury Management/Return-to-Work Notification poster

22.5.2 Injury Management/Return-to-Work Notification Process

- Employee informs their supervisor.
- Employee calls the Injury Management Program toll free number 1-866-893-2514 immediately and speaks with the occupational injury nurse. This number is operable 24 hours per day, 7 days a week.
- Supervisor ensures employee immediately calls the Injury Management Program number. Supervisor makes the call with the injured worker or for the injured worker, if needed.
- Nurse assists employee with obtaining appropriate medical treatment, and as necessary schedules clinic visit for employee (calls ahead, and assists with any necessary follow-up treatment). The supervisor or SC accompanies the employee if a clinic visit is necessary to ensure that employee receives appropriate and timely care.
- Supervisor or SC completes the HITS entry or IRF immediately (within 24 hours) and forwards it to the PM and RHSM.
- Nurse notifies appropriate CH2M HILL staff members by e-mail (supervisor, Health & Safety, Human Resources, Workers' Compensation).
- Nurse communicates and coordinates with and for employee on treatment through recovery.
- Supervisor ensures suitable duties are identified and available for injured or ill workers who are found to be medically fit to return to work on transitional duty (temporary and progressive).
- Supervisor ensures medical limitations prescribed (if any) by physician are followed until the worker is released to full duty.

22.6 Serious Incident Reporting Requirements

(Reference CH2M HILL SOP HSE-111, Incident Reporting, Notification and Investigation)

The serious incident reporting requirements ensures timely notification and allows for positive control over the flow of information so that the incident is handled effectively, efficiently, and in conjunction with appropriate corporate entities. This standard notification process integrates HSSE and firm-wide security operations requirements for the consistent reporting of and managing of serious events throughout our operations.

22.6.1 Serious Incident Determination

The following are general criteria for determining whether an incident on CH2M HILL-owned or -managed facilities or program sites is considered serious and must be immediately reported up to Group President level through the reporting/notification process:

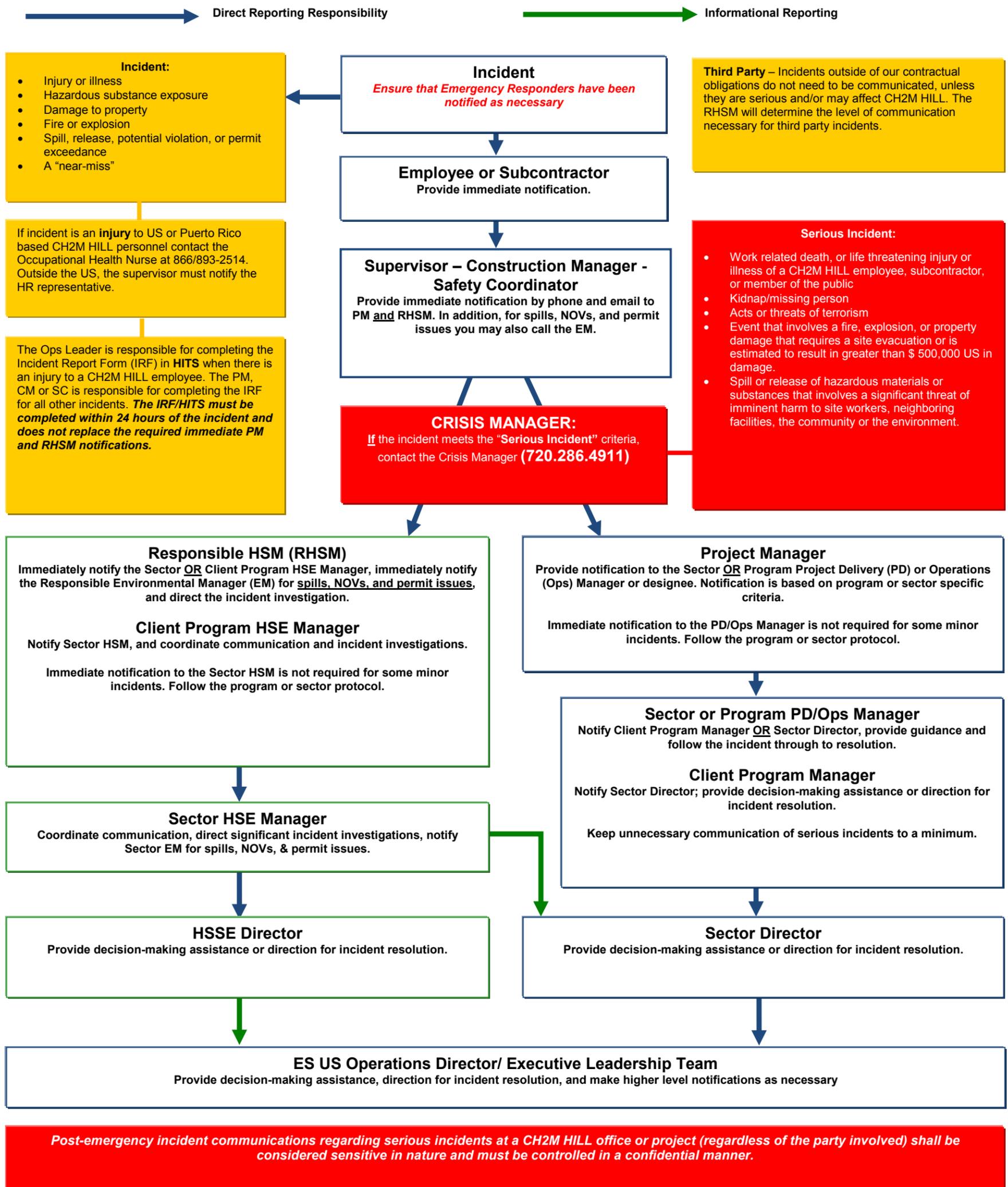
- Work-related death, or life-threatening injury or illness of a CH2M HILL employee, subcontractor, or member of the public
- Kidnap or missing person
- Acts or threats of terrorism
- Event that involves a fire, explosion, or property damage that requires a site evacuation or is estimated to result in greater than \$ 500,000 in damage
- Spill or release of hazardous materials or substances that involves a significant threat of imminent harm to site workers, neighboring facilities, the community, or the environment

22.6.2 Serious Incident Reporting

If an incident meets the “serious incident” criteria, the PM shall immediately contact the Crisis Manager at 720-286-4911, then follow the standard incident reporting procedure.

For all serious incidents, this standard reporting process is implemented immediately to ultimately achieve notification to the Business Group President within 2 hours of incident onset or discovery, and notification to the appropriate corporate Crisis Management Support Team.

ESBG US Operations Incident Reporting Flow Diagram



Incident Root Cause Analysis

The accident analysis is essential if all causes of the incident are to be identified so that the correct remedial actions can be taken to prevent the same or similar type of incident from recurring. Root cause analysis (RCA) shall be completed for all recordable injuries, property damage incidents in excess of \$5,000 (U.S.), environmental permit violations, spills and releases that are required to be reported to regulatory agencies, and any other incident, including near-misses, where the RHSM or PM concludes that an RCA is appropriate. The RHSM/Project EM is responsible for ensuring it is completed and results are entered in the incident report form in HITS. RCAs must be completed using a team that includes, at a minimum, the RHSM or designee, the involved party(ies), a responsible operations representative (such as the PM, construction manager, crew supervisor, etc.) and an independent management representative not associated with the incident.

The RCA form must be completed for all loss incidents and near-loss incidents. This form must be submitted to the investigation team for review.

For minor losses or near-losses, the information may be gathered by the supervisor or other personnel immediately following the loss. Based on the complexity of the situation, this information may be all that is necessary to enable the investigation team to analyze the loss, identify the root cause, and develop recommendations. More-complex situations may require the investigation team to revisit the loss site or re-interview key witnesses to obtain answers to questions that may arise during the investigation process.

Photographs or videotapes of the scene and damaged equipment should be taken from all sides and from various distances. This point is especially important when the investigation team will not be able to review the loss scene.

The investigation team must follow the RCA flow chart (see Attachment 4 of the SOP) to assist in identifying the root cause(s) of a loss. Any loss may have one or more root causes and contributing factors. The root cause is the primary or immediate cause of the incident, while a contributing factor is a condition or event that contributes to the incident happening, but is not the primary cause of the incident. Root causes and contributing factors that relate to the person involved in the loss, his or her peers, or the supervisor should be referred to as “personal factors.” Causes that pertain to the system within which the loss or injury occurred should be referred to as “job factors.”

Personal factors include:

- Lack of skill or knowledge
- Correct way takes more time and/or requires more effort
- Short-cutting standard procedures is positively reinforced or tolerated
- Person thinks there is no personal benefit to always doing the job according to standards

Job factors include:

- Lack of or inadequate operational procedures or work standards
- Inadequate communication of expectations regarding procedures or standards
- Inadequate tools or equipment

The root cause(s) could be any one or a combination of these seven possibilities or some other uncontrollable factor. In the vast majority of losses, the root cause is very much related to one or more of these seven factors. Uncontrollable factors should be used rarely and only after a thorough review eliminates all seven other factors.

22.6.3 Corrective Actions

Include all corrective actions taken or those that should be taken to prevent recurrence of the incident. Include the specific actions to be taken, the employer and personnel responsible for implementing the actions, and a timeframe for completion. Be sure the corrective actions address the causes.

Once the investigation report has been completed, the PM shall hold a review meeting to discuss the incident and provide recommendations. The responsible supervisors shall be assigned to carry out the recommendations, and shall inform the SC upon successful implementation of all recommended actions.

- Evaluation and follow-up of the IRF will be completed by the type of incident by the RHSM, EM, or FWSO.
- Incident investigations must be initiated and completed as soon as possible but no later than 72 hours after the incident.

Records and Reports

An organized project filing system is essential for good documentation and recordkeeping. There are many benefits to an organized filing system:

- Other CH2M HILL employees can easily and quickly find documents.
- Records are readily available for review.
- Records may be needed during OSHA investigations, audits, or other legal matters.
- Records may be needed on short notice in case of an accident, illness or other emergency.
- Systematic recordkeeping aids in overall project organization.

The project filing system shall be established at the beginning of the project and maintained throughout all phases of construction and archived in accordance with CH2M HILL's records retention policy. The information contained in the filing system shall be updated regularly and/or as specified in this document. The PM and SC are responsible for collecting documentation, including subcontractor documentation, and maintaining a complete and organized filing system.

Below are examples of records that must be maintained as the project progresses:

- Exposure records includes air monitoring data (including calibration records), MSDSs, exposure modeling results
- Physical hazard exposure records include noise, ionizing radiation, non-ionizing radiation, vibration, and laser exposure assessments and measurements
- Respiratory fit test records
- Training records
- Incident reports, investigations and associated backup information such as agency notifications, calculations, and corrective actions taken
- Federal or state agency inspection records

Other records:

- Ergonomic evaluations
- HSE audits and assessments
- Project-specific HSE plans
- Confined space entry permits
- Equipment inspections
- Equipment maintenance
- Emergency equipment inspection records
- SBOs
- Self-assessment checklists

The RHSM shall coordinate with the PM or designee to ensure that final project-specific HSE records described in this section, including negative exposure determinations, are maintained with the project files in accordance with the CH2M HILL records retention schedule, or forwarded to the Medical Surveillance Program Administrator, as appropriate. Records retention requirements are detailed in the *Recordkeeping and Access to Records SOP*, HSE-119.

CH2M HILL Health and Safety Plan
Attachment 1

Health and Safety Plan Employee Sign-off Form

CH2M HILL Health and Safety Plan
Attachment 2

Chemical Inventory/Register Form

CH2M HILL Health and Safety Plan

Attachment 3

Chemical-Specific Training Form

CHEMICAL-SPECIFIC TRAINING FORM

Refer to SOP HSE-107 Attachment 1 for instructions on completing this form.

Location:	Project # :
HCC:	Trainer:

TRAINING PARTICIPANTS:

NAME	SIGNATURE	NAME	SIGNATURE

REGULATED PRODUCTS/TASKS COVERED BY THIS TRAINING:

The HCC shall use the product MSDS to provide the following information concerning each of the products listed above.

- Physical and health hazards
- Control measures that can be used to provide protection (including appropriate work practices, emergency procedures, and personal protective equipment to be used)
- Methods and observations used to detect the presence or release of the regulated product in the workplace (including periodic monitoring, continuous monitoring devices, visual appearance or odor of regulated product when being released, etc.)

Training participants shall have the opportunity to ask questions concerning these products and, upon completion of this training, will understand the product hazards and appropriate control measures available for their protection.

Copies of MSDSs, chemical inventories, and CH2M HILL's written hazard communication program shall be made available for employee review in the facility/project hazard communication file.

CH2M HILL Health and Safety Plan

Attachment 4

Project Activity Self-Assessment Checklists/Permits/Forms

Heat stress physiological monitoring Form

Boating

HEAT STRESS PHYSIOLOGICAL MONITORING FORM

Project:

Date:

Company:

1. Take and record measurement of temperature or pulse at the frequency indicated in the safety plan.
2. Follow the Physiological Monitoring Protocol in the safety plan.
3. Never continue work if your body temperature is more than 100.4° F/38° C, or if you are experiencing sudden and severe fatigue, nausea, dizziness, or lightheadedness.

Employee:

Describe action taken below if measurements are exceeded:

Time								
Temp								
Pulse								

Employee:

Describe action taken below if measurements are exceeded:

Time								
Temp								
Pulse								

Employee:

Describe action taken below if measurements are exceeded:

Time								
Temp								
Pulse								

Employee:

Describe action taken below if measurements are exceeded:

Time								
Temp								
Pulse								

Employee:

Describe action taken below if measurements are exceeded:

Time								
Temp								
Pulse								

Boat Operator Sea Trial:

Name:

Date:

Boat Type:

Size:

Boat Operator Task	Yes	NO	N/A
1. Review SOP	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. File float plan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Inspect boat (Boat checklist)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Check fuel level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Start boat engine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Get boat underway	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Initiate right and left turns	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Stop boat and back down	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Motor boat ahead full throttle	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Reduce speed and return to pier/dock	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Land boat along side pier/dock	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Secure boat and shut down engine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Close out float plan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

_____ has successfully demonstrated his/her ability to operate the above listed boat on (date) _____.

Qualified Boat Operator Name: _____

Signature: _____

Health and Safety Self Assessment Checklist-BOATS

This self assessment is only to be used at locations where CH2M HILL controls the work. It is not to be used at locations where others control the work.

Project Name: _____	Project No.: _____
Location: _____	
PM: _____	
Auditor: _____	Title: _____
Date: _____	

If an assessment item is complete/correct the “Yes” box should be checked. If an item is incomplete or deficient the “No” box should be checked. Items that are considered to be imminently dangerous must be corrected immediately or all exposed personnel must be removed from the hazard. All deficiencies shall be brought to the attention of the appropriate party that is responsible for correcting the deficiency. If an item is not applicable, the “N/A” box should be checked. If an item is applicable but was not observed during the assessment, the “N/O” box should be checked.

	Yes	No	NA	N/O
GENERAL				
1. Weather forecast checked.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. At Least one Team Member is trained in First Aid/CPR.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Lights, horn, battery, fuel, steering, bilge pump, anchor & propeller checked.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Daily safety briefing/meeting conducted with crew	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Personal Floatation Devices (PFD's) inspected daily.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Fire extinguisher available, charged and accessible.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. First aid kit available	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Project Instructions and H&S Plan available	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Potable water available	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Sunscreen & Bug Spray available	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Distress communications available (flare gun, air horn, Cell phone, CB)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. An oar is available on board the boat in the event of mechanical failure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Yes No NA N/O

BOAT TRANSPORT

- 13. Boat motor secured prior to boat transport
- 14. Turn signals and brake lights verified as operable.
- 15. Safety chains available on trailer and secured in a criss-cross fashion
- 16. Trailer winch engaged
- 17. Ball hitch seated and latch pin installed
- 18 Tools and equipment secured prior to boat movement
- 19 Personnel not allowed ride on boat as it is being towed
- 20. Safe distance is maintained with traveling around power lines
- 21. Backup alarm or spotter used when backing boat
- 22. Boat is unhitched on a level and stabile surface

BOAT OPERATION

- 23. Boat holds appropriate size load
- 24. Personnel cleared during boat start-up
- 25. Kill switch clearly identified and operational
- 26. Personnel wearing appropriate PPE
- 27. All personnel wearing PFD's
- 28. Boat will not be used for recreational purposes

Attachment : 3 Boat Equipment Checklist

Boat Check List Item	Yes	No	N/A
State Numbering			
Personal Flotation Device			
Throwable PFD/Ring Bouy			
Visual Distress Signal			
Backfire Flame Arrestor			
Sound Producing Device			
Fire Extinguisher			
Navigation/Anchor Lights			
Radio/Communications			
First Aid Kit			
Flashlight			
Tool Kit			
Mooring Lines			
Food and Water			
Binoculars			
Spare Batteries			
Spare Parts			
Spare Fuel			
AM/FM Radio			
Anchor and Tackle			
Alternate Propulsion			
Overall Boat Condition-Satisfactory			
Electrical Systems-Satisfactory			
Fuel Systems-Satisfactory			
File Float Plan			
Weather Forecast			

Inspected By:	Boat Operator:
Date	

CH2M HILL Health and Safety Plan

Attachment 5

Key Target Zero Program Elements

(blank forms for field use)

Activity Hazard Analysis

Pre-Task Safety Plans

Safe Behavior Observation

Incident Report and Investigation

(use electronic form when possible)

[HITS](#)

Lessons Learned Template

ACTIVITY HAZARD ANALYSIS

Activity:	Date:
	Project Name:
Description of the work:	Site Supervisor:
	Site Safety Officer:
	Review for latest use: Before the job is performed

Work Activity Sequence (Identify the principal steps involved and the sequence of work activities)	Potential Health and Safety Hazards (Analyze each principal step for potential hazards)	Hazard Controls (Develop specific controls for each potential hazard)

Work Activity Sequence (Identify the principal steps involved and the sequence of work activities)	Potential Health and Safety Hazards (Analyze each principal step for potential hazards)	Hazard Controls (Develop specific controls for each potential hazard)

Equipment to be used (List equipment to be used in the work activity)	Inspection Requirements (List inspection requirements for the work activity)	Training Requirements (List training requirements including hazard communication)

PRINT NAME

SIGNATURE

Supervisor Name: _____

Date/Time: _____

Safety Officer Name: _____

Date/Time: _____

Employee Name(s): _____

Date/Time: _____

Pre-Task Safety Plan (PTSP) and Safety Meeting Sign-in Sheet

Project: _____ Location: _____ Date: _____
 Supervisor: _____
 Job Activity: _____

Attendees:	Print Name	Sign Name

List Tasks and verify that applicable AHAs have been reviewed:

Tools/Equipment Required for Tasks (ladders, scaffolds, fall protection, cranes/rigging, heavy equipment, power tools):

Potential H&S Hazards, including chemical, physical, safety, biological and environmental (check all that apply):

<input type="checkbox"/> Chemical burns/contact	<input type="checkbox"/> Trench, excavations, cave-ins	<input type="checkbox"/> Ergonomics
<input type="checkbox"/> Pressurized lines/equipment	<input type="checkbox"/> Overexertion	<input type="checkbox"/> Chemical splash
<input type="checkbox"/> Thermal burns	<input type="checkbox"/> Pinch points	<input type="checkbox"/> Poisonous plants/insects
<input type="checkbox"/> Electrical	<input type="checkbox"/> Cuts/abrasions	<input type="checkbox"/> Eye hazards/flying projectile
<input type="checkbox"/> Weather conditions	<input type="checkbox"/> Spills	<input type="checkbox"/> Inhalation hazard
<input type="checkbox"/> Heights/fall > 6 feet	<input type="checkbox"/> Overhead Electrical hazards	<input type="checkbox"/> Heat/cold stress
<input type="checkbox"/> Noise	<input type="checkbox"/> Elevated loads	<input type="checkbox"/> Water/drowning hazard
<input type="checkbox"/> Explosion/fire	<input type="checkbox"/> Slips, trip and falls	<input type="checkbox"/> Heavy equipment
<input type="checkbox"/> Radiation	<input type="checkbox"/> Manual lifting	<input type="checkbox"/> Aerial lifts/platforms
<input type="checkbox"/> Confined space entry	<input type="checkbox"/> Welding/cutting	<input type="checkbox"/> Demolition
<input type="checkbox"/> Underground Utilities	<input type="checkbox"/> Security	<input type="checkbox"/> Poor communications

Other Potential Hazards (Describe):

Hazard Control Measures (Check All That Apply):			
PPE <input type="checkbox"/> Thermal/lined <input type="checkbox"/> Eye <input type="checkbox"/> Dermal/hand <input type="checkbox"/> Hearing <input type="checkbox"/> Respiratory <input type="checkbox"/> Reflective vests <input type="checkbox"/> Flotation device <input type="checkbox"/> Hard Hat <input type="checkbox"/> Safety-Toed Boots	Protective Systems <input type="checkbox"/> Sloping <input type="checkbox"/> Shoring <input type="checkbox"/> Trench box <input type="checkbox"/> Barricades <input type="checkbox"/> Competent person <input type="checkbox"/> Locate buried utilities <input type="checkbox"/> Daily inspections <input type="checkbox"/> Entry Permits/notification	Fire Protection <input type="checkbox"/> Fire extinguishers <input type="checkbox"/> Fire watch <input type="checkbox"/> Non-spark tools <input type="checkbox"/> Grounding/bonding <input type="checkbox"/> Intrinsically safe equipment	Electrical <input type="checkbox"/> Lockout/tagout <input type="checkbox"/> Grounded <input type="checkbox"/> Panels covered <input type="checkbox"/> GFCI/extension cords <input type="checkbox"/> Power tools/cord inspected <input type="checkbox"/> Overhead line clearance <input type="checkbox"/> Underground utils ID'd
Fall Protection <input type="checkbox"/> Harness/lanyards <input type="checkbox"/> Adequate anchorage <input type="checkbox"/> Guardrail system <input type="checkbox"/> Covered opening <input type="checkbox"/> Fixed barricades <input type="checkbox"/> Warning system	Air Monitoring <input type="checkbox"/> PID/FID <input type="checkbox"/> Detector tubes <input type="checkbox"/> Radiation <input type="checkbox"/> Personnel sampling <input type="checkbox"/> LEL/O2 <input type="checkbox"/> No visible dust <input type="checkbox"/> Other	Proper Equipment <input type="checkbox"/> Aerial lift/ladders/scaffolds <input type="checkbox"/> Forklift/heavy equipment <input type="checkbox"/> Backup alarms <input type="checkbox"/> Hand/power tools <input type="checkbox"/> Crane with current inspection <input type="checkbox"/> Proper rigging <input type="checkbox"/> Operator qualified	Welding & Cutting <input type="checkbox"/> Cylinders secured/capped <input type="checkbox"/> Cylinders separated/upright <input type="checkbox"/> Flash-back arrestors <input type="checkbox"/> No cylinders in CSE <input type="checkbox"/> Flame retardant clothing <input type="checkbox"/> Appropriate goggles
Confined Space Entry <input type="checkbox"/> Isolation <input type="checkbox"/> Air monitoring <input type="checkbox"/> Trained personnel <input type="checkbox"/> Permit completed <input type="checkbox"/> Rescue	Medical/ER <input type="checkbox"/> First-aid kit <input type="checkbox"/> Eye wash <input type="checkbox"/> FA-CPR trained personnel <input type="checkbox"/> Route to hospital	Heat/Cold Stress <input type="checkbox"/> Work/rest regime <input type="checkbox"/> Rest area <input type="checkbox"/> Liquids available <input type="checkbox"/> Monitoring <input type="checkbox"/> Training	Vehicle/Traffic <input type="checkbox"/> Traffic control <input type="checkbox"/> Barricades <input type="checkbox"/> Flags <input type="checkbox"/> Signs
Permits <input type="checkbox"/> Hot work <input type="checkbox"/> Confined space <input type="checkbox"/> Lockout/tagout <input type="checkbox"/> Excavation <input type="checkbox"/> Demolition <input type="checkbox"/> Energized work	Demolition <input type="checkbox"/> Pre-demolition survey <input type="checkbox"/> Structure condition <input type="checkbox"/> Isolate area/utilities <input type="checkbox"/> Competent person <input type="checkbox"/> Hazmat present	Inspections: <input type="checkbox"/> Ladders/aerial lifts <input type="checkbox"/> Lanyards/harness <input type="checkbox"/> Scaffolds <input type="checkbox"/> Heavy equipment <input type="checkbox"/> Drill rigs/geoprobe rigs <input type="checkbox"/> Cranes and rigging <input type="checkbox"/> Utilities marked	Training: <input type="checkbox"/> Hazwaste (current) <input type="checkbox"/> Construction <input type="checkbox"/> Competent person <input type="checkbox"/> Task-specific <input type="checkbox"/> FA/CPR <input type="checkbox"/> Confined Space <input type="checkbox"/> Hazcom
Underground Utilities <input type="checkbox"/> Dig alert called <input type="checkbox"/> 3 rd Party locator <input type="checkbox"/> As-builts reviewed <input type="checkbox"/> Interview site staff <input type="checkbox"/> Client review <input type="checkbox"/> soft locate necessary?	Incident Communications <input type="checkbox"/> Work stops until cleared by TM/CM <input type="checkbox"/> Immediate calls to TM/CM <input type="checkbox"/> Client notification <input type="checkbox"/> 24 hour notification setup <input type="checkbox"/> Clear communications	AHA' s <input type="checkbox"/> reviewed and approved by HSM <input type="checkbox"/> on site and current <input type="checkbox"/> applicable for this day's work <input type="checkbox"/> Communication and incident processes included?	
Field Notes (including observations from prior day, etc.): <hr/> <hr/>			

Name (Print): _____

Signature: _____ Date: _____

Safe Behavior Observation Form

<input type="checkbox"/> Federal <input type="checkbox"/> Commercial (check one) <input type="checkbox"/> International	<input type="checkbox"/> Construction or <input type="checkbox"/> Consulting (check one)
--	--

Project Number (required):	Client/Program:
----------------------------	-----------------

Project Name:	Observer:	Date:
---------------	-----------	-------

Position/Title of worker observed:	Background Information/ comments:
------------------------------------	-----------------------------------

Task/Observation Observed: _____

- ❖ Identify and reinforce safe work practices/behaviors
- ❖ Identify and improve on at-risk practices/acts
- ❖ Identify and improve on practices, conditions, controls, and compliance that eliminate or reduce hazards
- ❖ Proactive PM support facilitates eliminating/reducing hazards (do you have what you need?)
- ❖ Positive, corrective, cooperative, collaborative feedback/recommendations

Actions & Behaviors	Safe	At-Risk	Observations/Comments
Current & accurate Pre-Task Planning/Briefing (Project safety plan, STAC, AHA, PTSP, tailgate briefing, etc., as needed)			Positive Observations/Safe Work Practices:
Properly trained/qualified/experienced			
Tools/equipment available and adequate			
Proper use of tools			Questionable Activity/Unsafe Condition Observed:
Barricades/work zone control			
Housekeeping			
Communication			
Work Approach/Habits			
Attitude			
Focus/attentiveness			Observer's Corrective Actions/Comments:
Pace			
Uncomfortable/unsafe position			
Inconvenient/unsafe location			
Position/Line of fire			
Apparel (hair, loose clothing, jewelry)			Observed Worker's Corrective Actions/Comments:
Repetitive motion			
Other...			

For ES Federal Sector projects please email completed forms to: [CH2M HILL ES FED Safe Behavior Observation](mailto:CH2MHILL_ES_FED_Safe_Behavior_Observation@ch2m.com)
 For ES Commercial Sector projects please email completed forms to: [CH2M HILL ES COM Safe Behavior Observation](mailto:CH2MHILL_ES_COM_Safe_Behavior_Observation@ch2m.com)
 For CNR ES staff please email completed forms to: cnessafe@ch2m.com
 For International ES projects please e-mail completed forms to: ESINTLSafeBehaviorObservation@ch2m.com

HITS Incident Report Hardcopy (Phase 1 – Initial Entry)

Phase 1 – Initial Entry

Type of Incident (May select more than one)

- Injury/Illness
- Property Damage
- Spill/Release
- Environment/Permit
- Near Miss
- Other

General Information Section

Preparer's Name: _____ Preparer's Phone Number: _____

Date of Incident: _____ Time of Incident: _____ AM / PM

What Business Group is accountable for this incident: _____

What Business Group SubGroup is accountable for this incident: _____

What CH2M HILL Company is accountable for this incident: _____

Where did the Incident occur?

- United States, Geographic Region: _____
- Canada, Province/Territory: _____
- International, County: _____

Location of Incident?

- Company Premises, CH2M HILL Office (use 3 letter office code if available): _____
- Project, Project name: _____
- In Transit
Traveling from: _____
Traveling to: _____
- At Home
- Other, Specify: _____

Describe the incident: _____

Describe how this event could have been prevented: _____

Provide Witness Information:

Name: _____ Phone: _____

Name: _____ Phone: _____

Name: _____ Phone: _____

Personnel Notified of Incident (Provide name, date and time):

CH2M HILL Personnel: _____

Client Personnel: _____

Additional Comments: _____

Injury/Illness Section [Complete only if Injury/Illness Incident type selected]

Who was injured?

- CH2M HILL Employee or CH2M HILL Temp Employee
- Subcontractor to CH2M HILL (Non-LLC Joint Venture Project)
- LLC Joint Venture Partner Employee
- LLC Joint Venture Project Subcontractor/Contractor
- Other

Name of Injured: _____

Job Title: _____

Employee Name: _____

Supervisor of Employee: _____

Complete for CH2M HILL Employee Injuries

Business Group of Injured Employee: _____

Has the employee called the Injury Management Administrator (1-866-893-2514)?

Yes No Not Sure

Has the injured employee's supervisor been notified of this incident?

Yes No Not Sure

Complete for Non-CH2M HILL Employee Injuries

Has the project safety coordinator been notified of this incident?

Yes No Not Sure

Project Safety Coordinator: _____

Body Part Affected: _____

Injury/Illness (Result): _____

Describe treatment provided (if medication provided, identify whether over-the-counter or prescription): _____

Describe any work restriction prescribed (include dates and number of days): _____

Physician/Health Care Provider Information

Name: _____

Phone: _____

Was treatment provided away from the worksite?

No

Yes

Facility Name: _____

Address: _____

City: _____

Phone Number: _____

Was injured treated in an emergency room?

No

Yes

Was injured hospitalized overnight as an in-patient?

No

Yes

General Information Environmental Section [Complete only if Environment/Permit or Spill/Release Incident type selected]

Who had control of the area during the incident?

CH2M HILL, Company: _____

Subcontractor, Company: _____

Joint Venture Partner/Contractor/Subcontractor, Company: _____

Other, Company: _____

Relationship to CH2M HILL: _____

Property Damage Section [Complete only if Property Damage Incident type selected]

Property Damaged: _____

Property Owner: _____

Damage Description: _____

Estimated US Dollar Amount: _____

Spill or Release Section [Complete only if Spill/Release Incident type selected]

Substance: _____

Estimated Quantity: _____

Did the spill/release move off the property?: _____

Spill/Release From: _____

Spill/Release To: _____

Environment/Permit Section [Complete only if Environment/Permit Incident type selected]

Describe Environmental or Permit Issue: _____

Permit Type: _____

Permitted Level or Criteria (e.g., discharge limit): _____

Permit Name and Number (e.g., NPDES No. ST1234): _____

Substance and Estimated Quantity: _____

Duration of Permit Exceedence: _____



Lessons Learned

[Date] ESBG LL-11-xx

Subject	[Insert Descriptive Name of Lessons Learned]
CH2M HILL Project?	[Yes or No]
Situation	[Describe incident or situation that occurred in general terms. Try to be brief and avoid unnecessary details such as names of people or projects, business groups, divisions, dates, location, etc.]
Lessons Learned (Recommendations and Comments)	Bullet out any lessons learned, recommendations or other important “take away” information that would benefit others. Tie the recommendations to the incident or event, and avoid including information that is not directly tied to the event.
Submitted By	[Name/Office Location/Phone]
Additional Information Contact	[Name/Office Location/Phone]
Keywords/Categories	[Insert any keywords or incident categories that would aid in a search for this lessons learned]

Send completed Lessons Learned to the ESBG HSSE Director for posting and distribution. Please include a recommended distribution list.

CH2M HILL Health and Safety Plan

Attachment 6

Fact Sheets

Tick Fact Sheet

Vehicle Accident Guidance

Working Alone

Tick-Borne Pathogens — A Fact Sheet

Most of us have heard of Lyme disease or Rocky Mountain Spotted Fever (RMSF), but there are actually six notifiable tick-borne pathogens that present a significant field hazard. In some areas, these account for more than half of our serious field incidents. The following procedures should be applied during any field activity—even in places that are predominantly paved with bordering vegetation.

Hazard Recognition

An important step in controlling tick related hazards is understanding how to identify ticks, their habitats, their geographical locations, and signs and symptoms of tick-borne illnesses.

Tick Identification

There are five varieties of hard-bodied ticks that have been associated with tick-borne pathogens. These include:

- Deer (Black Legged) Tick (eastern and pacific varieties)
- Lone Star Tick
- Dog Tick
- Rocky Mountain Wood Tick

These varieties and their geographical locations are illustrated on the following page.

Tick Habitat

In eastern states, ticks are associated with deciduous forest and habitat containing leaf litter. Leaf litter provides a moist cover from wind, snow, and other elements. In the north-central states, is generally found in heavily wooded areas often surrounded by broad tracts of land cleared for agriculture.

On the Pacific Coast, the bacteria are transmitted to humans by the western black-legged (deer) tick and habitats are more diverse. For this region, ticks have been found in habitats with forest, north coastal scrub, high brush, and open grasslands. Coastal tick populations thrive in areas of high rainfall, but ticks are also found at inland locations.

Illnesses and Signs & Symptoms

There are six notifiable tick-borne pathogens that cause human illness in the United States. These pathogens may be transmitted during a tick bite—normally hours after attachment. The illnesses, presented in approximate order of most common to least, include:

- Lyme (bacteria)
- RMSF (bacteria)
- Ehrlichiosis (bacteria)
- STARI (Southern Tick-Associated Rash Illness) (bacteria)
- Tularemia (Rabbit Fever) (bacteria)
- Babesia (protozoan parasite)

Symptoms will vary based on the illness, and may develop in infected individuals typically between 3 and 30 days after transmission. Some infected individuals will not become ill or may develop only mild symptoms. These illnesses present with some or all of the following signs & symptoms: fever, headache, muscle aches, stiff neck, joint aches, nausea, vomiting, abdominal pain, diarrhea, malaise, weakness, small solid, ring-like, or spotted rashes. The bite site may be red, swollen, or develop ulceration or lesions. For Lyme disease, the bite area will sometimes resemble a target pattern. A variety of long-term symptoms may result if the illness is left untreated, including debilitating effects and death.



Deer Tick



Distribution of Deer Tick (dark green)



From Left: adult female, adult male, nymph, and larvae Deer Tick (cm scale)



Distribution of Pacific Deer Tick (dark green)



Lone Star Tick



Distribution of Lone Star Tick (Green)



Dog Tick



Rocky Mountain Wood Tick



Hazard Control

The methods for controlling exposure to ticks include, in order of most- to least-preferred:

- Avoiding tick habitats and ceasing operations in heavily infested areas
- Reducing tick abundance through habitat disruption or application of acaricide
- Personal protection through use of repellants and protective clothing
- Frequent tick inspections and proper hygiene

Vaccinations are not available and preventative antibiotic treatment after a bite is generally not recommended.

Avoidance and Reduction of Ticks

To the extent practical, tick habitats should be avoided. In areas with significant tick infestation, consider stopping work and withdrawing from area until adequate tick population control can be achieved. Stopping and withdrawing should be considered as seriously as entering an area without proper energy control or with elevated airborne contaminants—tick-borne pathogens present risk of serious illness!

In areas where significant population density or infestation exists, tick reduction should be considered. Tick reduction can be achieved by disrupting tick habitats and/or direct population reduction through the use of tick-toxic pesticides (Damminix, Dursban, Sevin, etc.).

Habitat disruption may include only simple vegetative maintenance such as removing leaf litter and trimming grass and brush. Tick populations can be reduced by between 72 and 100 percent when leaf litter alone is removed. In more heavily infested areas, habitat disruption may include grubbing, tree trimming or removal, and pesticide application (Damminix, Dursban, Sevin, etc.). This approach is practical in smaller, localized areas or perimeter areas that require occasional access. Habitat controls are to be implemented with appropriate health and safety controls, in compliance with applicable environmental requirements, and may be best left to the property owner or tenant or to a licensed pesticide vendor. Caution should be exercised when using chemical repellents or pesticides in or around areas where environmental or industrial media samples will be collected for analysis.

Personal Protection

After other prevention and controls are implemented, personal protection is still necessary to control exposure to ticks. Personal protection must include all of the following steps:

- So that ticks may be easily seen, wear light-colored clothing. Full-body New Tyvek (paper-like disposable coveralls) may also be used
- To prevent ticks from getting underneath clothing tuck pant legs into socks or tape to boots
- Wear long-sleeved shirts, a hat, and high boots
- Apply DEET repellent to exposed skin or clothing per product label
- Apply permethrin repellent to the outside of boots and clothing before wearing, per product label
- Frequently check for ticks and remove from clothing
- At the end of the day, search your entire body for ticks (particularly groin, armpits, neck, and head) and shower
- To prevent pathogen transmission through mucous membranes or broken/cut skin, wash or disinfect hands and/or wear surgical-style nitrile gloves any time ticks are handled

Pregnant individuals and individuals using prescription medications should consult with their physician and/or pharmacists before using chemical repellents. Because human health effects may not be fully known, use of chemical repellents should be kept to a minimum frequency and quantity. Always follow manufacturers' use

instructions and precautions. Wash hands after handling, applying, or removing protective gear and clothing. Avoid situations such as hand-to-face contact, eating, drinking, and smoking when applying or using repellents. Remove and wash clothes per repellent product label. Chemical repellents should not be used on infants and children.

Vaccinations are generally not available for tick-borne pathogens. Although production of the LYMERix™ Lyme disease vaccination has been ceased, vaccination may still be considered under specific circumstances and with concurrence from the consulting physician.

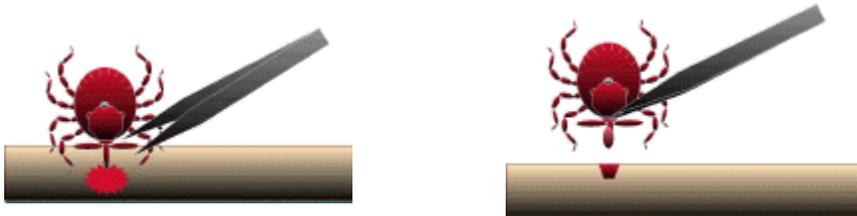
Tick Check

A tick check should be performed after field survey before entering the field vehicle (you do not want to infest your field vehicle with ticks). Have your field partner check your back; the backs of your legs, arms, and neck; and your hairline. Shake off clothing as thorough as possible before entering the vehicle. Once the field day is complete, repeat this procedure and perform a thorough self check.

If a tick has embedded itself into the skin, remove the tick as described below.

Tick Removal

1. Use the tick removal kit obtained through the CH2M HILL Milwaukee warehouse, or a fine-tipped tweezers or shield your fingers with a tissue, paper towel, or nitrile gloves.
2. Grasp the tick as close to the skin surface as possible and pull upward with steady, even pressure. Do not



twist or jerk the tick; this may cause the mouthparts to break off and remain in the skin. If this happens, remove mouthparts with tweezers. Consult your healthcare provider if infection occurs.

3. Avoid squeezing, crushing or puncturing the body of the tick because its fluids (saliva, hemolymph, gut contents) may contain infectious organisms. Releasing these organisms to the outside of the tick's body or into the bite area may increase the chance of infectious organism transmission.
4. Do not handle the tick with bare hands because infectious agents may enter through mucous membranes or breaks in the skin. This precaution is particularly directed to individuals who remove ticks from domestic animals with unprotected fingers. Children, elderly persons, and immunocompromised persons may be at greater risk of infection and should avoid this procedure.
5. After removing the tick, thoroughly disinfect the bite site and wash your hands with soap and water.
6. Should you wish to save the tick for identification, place it in a plastic bag, with the date of the tick bite, and place in your freezer. It may be used at a later date to assist a physician with making an accurate diagnosis (if you become ill).

Note: Folklore remedies such as petroleum jelly or hot matches do little to encourage a tick to detach from skin. In fact, they may make matters worse by irritating the tick and stimulating it to release additional saliva, increasing the chances of transmitting the pathogen. These methods of tick removal should be avoided. In addition, a number of tick removal devices have been marketed, but none are better than a plain set of fine tipped tweezers.



First-Aid and Medical Treatment

Tick bites should always be treated with first-aid. Clean and wash hands and disinfect the bite site after removing embedded tick. Individuals previously infected with Lyme disease does not confer immunity—re-infection from future tick bites can occur even after a person has contracted a tick-borne disease.

The employee should contact the Injury Management/Return To Work provider (IMRTW), WorkCare using the toll-free number 866-893-2514 to report the tick bite. WorkCare will follow-up with each CH2M Hill employee who reports a tick bite and is at risk of developing Lyme disease by monitoring for symptoms up to 45 days, and will refer the employee to a medical provider for evaluation and treatment as necessary.

2011 Vehicle Accident Guidance—ESBG

Remember that if you are **renting** a non-CH2M HILL owned vehicle (short-term rental) in the U.S., you should carry the [insurance card](#) from the state where your driver's license is issued.

If you operate a **fleet vehicle**, carry the [insurance card](#) where the vehicle is registered.

For ALL Vehicles if you are in an accident:

1. If you are injured, call 911 for emergency medical treatment or 1-866-893-2514 to contact the CH2M HILL Occupational Nurse/Physician for minor injuries. If you feel you have not been injured, contact the RHSM for guidance on whether calling the CH2M HILL Occupation Nurse/Physician is applicable.
2. **Call the Police**--For any vehicle accident/damage, it is recommended that the local police (or site security/emergency services if working on a client site that provides such services) be called to determine if a report needs to be filed. In some instances, a report may not be required (during accident alerts, or in public parking lots). Document that the authorities were called and follow up with any guidance they give you. State requirements vary. If a report is filed, obtain a copy.
3. Notify Supervisor, (and PM/RHSM if working on a project site)
4. Complete a HITS report on the VO.

Additional Steps

To report an auto accident, and before a claim can be taken by telephonic reporting, have available your name (the company name alone is no longer accepted, a driver's name must be provided even for fender benders), location of accident and your office address if different than the accident location, business group and project number. A claim cannot be taken without your name, address, business group and your project number. By location the state where the accident occurred, and which office you are aligned to, i.e., accident occurs in Idaho, but you are out of the Denver office. Advise the claim recorder the accident occurred in ID, but that your office location is Denver. This will assist the claim intake person in identifying location coding for the claims.

Auto accidents involve two different sections of an Auto policy:

- 1) Liability to others due to Bodily Injury and Property Damage
- 2) Physical Damage - Comprehensive and Collision - damage to the vehicle CH employee is driving

CH2M Hill has Liability coverage for any auto - our policy will respond on either a primary or excess basis.

Refer to the table below for additional notifications to make based on the type of accident experienced and type of vehicle being used.

Liability - Bodily Injury or Property Damage to Others

Scenario	Which Coverage Responds	What to do if in an accident
CH2M Hill fleet, pool or project vehicle - long term lease - lower 48	CH2M Hill - Primary	Contact Broadspire (1-800-753-6737); Jennifer Rindahl/DEN (720-286-2449); Linda George/DEN (720-286-2057)
CH2M Hill fleet, pool or project vehicle - long term lease - Alaska (North Slope)	CH2M Hill - Primary	Contact Jennifer Rindahl/DEN (720-286-2449)
Client vehicle driven by CH2M Hill employee	Client's auto policy unless client has made CH2M Hill responsible for vehicle	Contact Broadspire (1-800-753-6737); Contact Jennifer Rindahl/DEN (720-286-2449); contact client;
Short term lease (30 days or less)	Rental car company if rented through Enterprise, Budget or Hertz; CH2M Hill excess	Contact Broadspire (1-800-753-6737); Contact local branch of rental car company where vehicle leased (ERAC includes 24 hour roadside assistance) and Jennifer Rindahl/DEN (720-286-2449)
Short term lease (30 days or less)	CH2M Hill - Primary if rented through company other than our national agreements; \$100,000 deductible	Contact Broadspire (1-800-753-6737); Contact rental car company and Jennifer Rindahl/DEN (720-286-2449)
Personal vehicle used on business	Employee's personal auto policy; CH2M Hill on an excess basis	Contact personal auto insurance company; contact Jennifer Rindahl/DEN (720-286-2449)

Physical Damage - damage to vehicle CH employee was driving

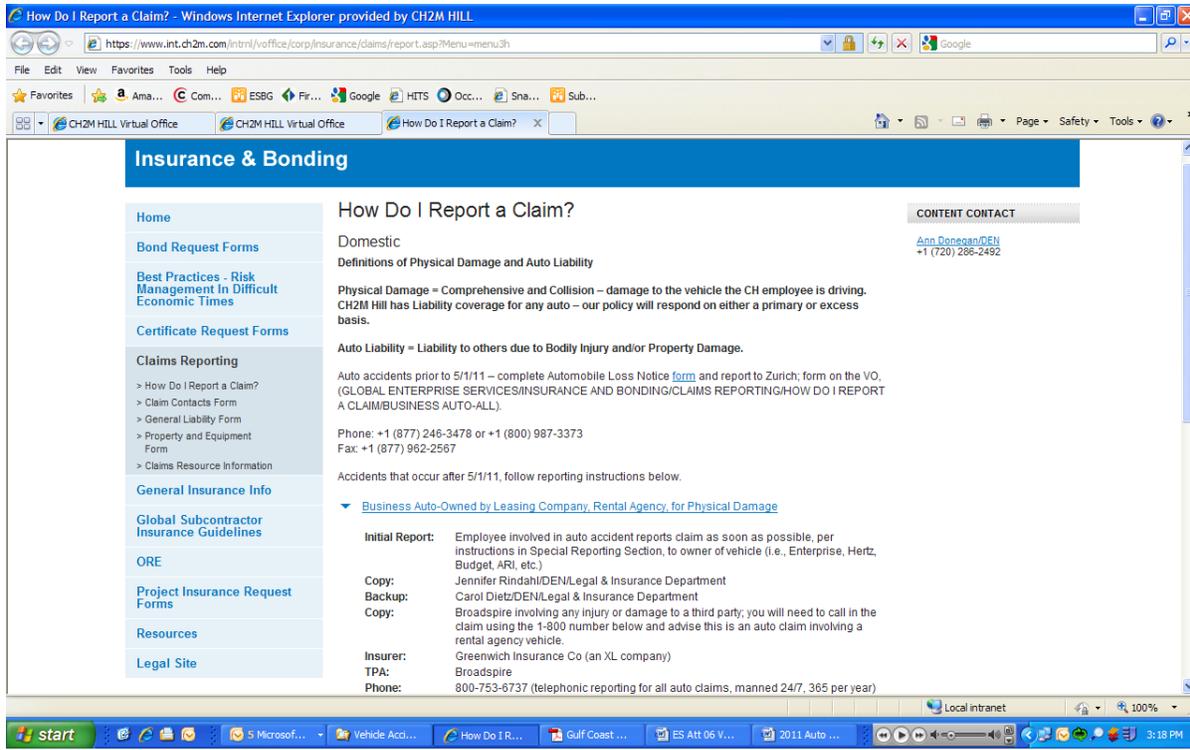
Scenario	Which Coverage Responds	What to do if in an accident
CH2M Hill fleet, pool or project vehicle - long term lease - lower 48	CH2M Hill ONLY if vehicle is scheduled on policy - \$5,000 deductible	Contact Broadspire (1-800-753-6737); Jennifer Rindahl/DEN (720-286-2449); Linda George/DEN (720-286-2057)
CH2M Hill fleet, pool or project vehicle - long term lease - Alaska (North Slope)	CH2M Hill Equipment Schedule if scheduled on policy	Contact Jennifer Rindahl/DEN (720-286-2449)
CH2M Hill fleet, pool or project vehicle - long term lease	ARI if physical damage coverage purchased - \$500 deductible	Contact Jennifer Rindahl/DEN 720.286.2449; call ARI at 1-800-221-1645 give them Client Code and ARI fleet vehicle number; and notify Linda George/DEN - Fleet Coordinator - 720-286-2057
Client vehicle CH2M Hill Employee is driving	Client's auto policy unless client has made CH2M Hill contractually responsible for vehicle	Contact Jennifer Rindahl/DEN (720-286-2449); contact client; contact Broadspire (1-800-753-6737)
Short term lease (30 days or less) using corporate VISA	VISA if corporate credit card used and vehicle is not a pickup, truck, cargo van or used off-road	Contact VISA - 1-800-847-2911 or http://www.visa.com/eclaim
Short term lease (30 days or less) through Enterprise (ERAC) and vehicle is used off-road and physical damage coverage included when vehicle leased	ERAC up to \$3,000 in damage; CH2M Hill's coverage is excess	Notify Rental Car Company; contact Jennifer Rindahl/DEN (720-286-2449) if damage over \$5,000
Short term lease (30 days or less) did not use corporate VISA	CH2M Hill - \$5,000 deductible (project responsibility)	Contact Broadspire (1-800-753-6737); Contact Jennifer Rindahl/DEN 720-286-2449; contact VISA - 1-800-847-2911 or http://www.visa.com/eclaim
Personal vehicle used on business	CH will reimburse the amount of the deductible carried on the employee's policy up to \$500 whichever is less	Contact Jennifer Rindahl/DEN (720-286-2449); contact client; contact Broadspire (1-800-753-6737)

Details for reporting a claim on the CH2M Hill VO are accessed by going to the VO home page and clicking:

GLOBAL ENTERPRISE SERVICES/INSURANCE & BONDING/CLAIMS REPORTING

HOW DO I REPORT A CLAIM TAB or access the following URL:

<https://www.int.ch2m.com/intrnl/voffice/corp/insurance/claims/report.asp?Menu=menu3h>



Insurance & Bonding

Home

Bond Request Forms

Best Practices - Risk Management in Difficult Economic Times

Certificate Request Forms

Claims Reporting

- > How Do I Report a Claim?
- > Claim Contacts Form
- > General Liability Form
- > Property and Equipment Form
- > Claims Resource Information

General Insurance Info

Global Subcontractor Insurance Guidelines

ORE

Project Insurance Request Forms

Resources

Legal Site

How Do I Report a Claim?

Domestic

Definitions of Physical Damage and Auto Liability

Physical Damage = Comprehensive and Collision – damage to the vehicle the CH employee is driving. CH2M Hill has Liability coverage for any auto – our policy will respond on either a primary or excess basis.

Auto Liability = Liability to others due to Bodily Injury and/or Property Damage.

Auto accidents prior to 5/1/11 – complete Automobile Loss Notice [form](#) and report to Zurich; form on the VO, (GLOBAL ENTERPRISE SERVICES/INSURANCE AND BONDING/CLAIMS REPORTING/HOW DO I REPORT A CLAIM/BUSINESS AUTO-ALL).

Phone: +1 (877) 246-3478 or +1 (800) 987-3373
 Fax: +1 (877) 962-2567

Accidents that occur after 5/1/11, follow reporting instructions below.

Business Auto-Owned by Leasing Company, Rental Agency, for Physical Damage

Initial Report: Employee involved in auto accident reports claim as soon as possible, per instructions in Special Reporting Section, to owner of vehicle (i.e., Enterprise, Hertz, Budget, ARI, etc.)

Copy: Jennifer Rindahl/DEN Legal & Insurance Department

Backup: Carol Diets/DEN Legal & Insurance Department

Copy: Broadspire involving any injury or damage to a third party; you will need to call in the claim using the 1-800 number below and advise this is an auto claim involving a rental agency vehicle.

Insurer: Greenwich Insurance Co (an XL company)

TPA: Broadspire

Phone: 800-753-8737 (telephonic reporting for all auto claims, manned 24/7, 365 per year)

CONTENT CONTACT

[Ann Donegan/DEN](#)
 +1 (720) 286-2492

For Personally Owned Vehicles (POVs):

CH2M HILL does not provide auto insurance for POVs, it is responsibility of the owner. If you are in a vehicle accident conducting company business, contact the police as above, supervisor, and 911 or CH2M HILL's occupational nurse/physician as stated above. Complete a HITS report. Contact Jennifer Rindahl/DEN for assistance for meeting personal insurance deductibles (up to \$500) with proof of insurance and deductible.

If using your POV for extended project use, notify the PM to make sure a rental car is not needed. Check your insurance policy for guidance on using the POV for business use.

Additional Resources:

[Claims Resource Manual](#)



**WORKING ALONE PROTOCOL
CALL – IN CONTACT FORM**

Date of site work: _____ Expected start time: _____

Name of CH2M HILL employee in the field: _____

Name of CH2M HILL employee responsible to receive contact: _____

Client Emergency Contact (if any): _____

CH2M HILL employee’s contact numbers:

Radio # _____

Cell Phone # _____

Address and Location of work: _____

Directions/Map:

Planned Activity: _____

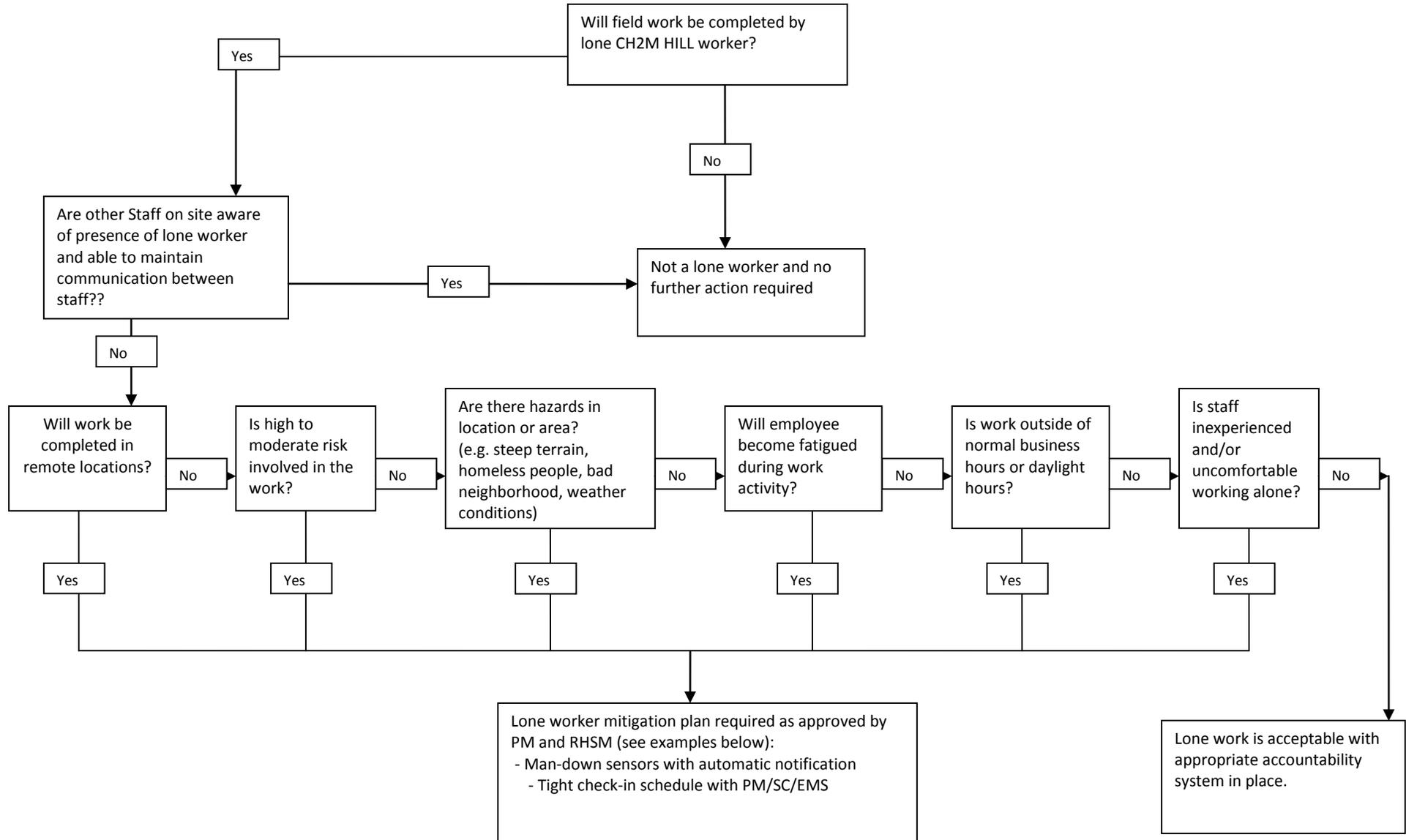
Specified Frequency and time for call in: _____

Time	Verified	Location

If lone worker fails to call in at specified frequency/time:

- 1) Call worker’s radio and cell to determine if an emergency exists.
- 2) If no reply, immediately call Client security/emergency service if there is one at the site.
- 3) If there is no client security call Emergency Services (911). Inform the dispatcher there is a lone worker that cannot be contacted and there may be an emergency on site. Provide the lone worker’s name, their last known location, and your contact information.
- 4) After Emergency Services have been contacted, call the other emergency contacts, Project Manager, and Responsible Health and Safety Manager.

Lone Worker Protocol



CH2M HILL HEALTH AND SAFETY PLAN

Attachment 7

Observed Hazard Form

CH2M HILL HEALTH AND SAFETY PLAN

Attachment 8

Stop Work Order Form

Stop Work Order

REPORT PREPARED BY:

Name:	Title:	Signature:	Date:

ISSUE OF NONPERFORMANCE:

Description:	Date of Nonperformance:
	<div style="border-bottom: 1px solid black; width: 80%; margin: 0 auto;"></div>

SUBCONTRACTOR SIGNATURE OF NOTIFICATION:

Name:	Title:	Signature:	Date:

** Corrective action is to be taken immediately. Note below the action taken, sign and return to CCI.* Work may not resume until authorization is granted by CH2M HILL Constructors, Inc. Representative,*

SUBCONTRACTOR'S CORRECTIVE ACTION

Description:	Date of Nonperformance:
	<div style="border-bottom: 1px solid black; width: 80%; margin: 0 auto;"></div>

SUBCONTRACTOR SIGNATURE OF CORRECTION

Name:	Title:	Signature:	Date:

CH2M HILL HEALTH AND SAFETY PLAN

Attachment 9

Agency Inspection Target Zero Bulletin

TARGET ZERO Bulletin

Subject: HSSE Agency Inspections (OSHA, EPA, DOT, State Health Department)

Do you know what YOU would do if an agency inspector arrived at your site unannounced?

Recently, a State Occupational Safety and Health Administration (OSHA) inspector made an unannounced visit to one of our Federal project sites. OSHA, U.S. Environmental Protection Agency (EPA), and authorized state or local agencies have authority to inspect any facility that is subject to health, safety, and environmental legislation. Inspections may be announced or unannounced. This particular inspector indicated that the project was targeted for an inspection because the work was funded by the American Recovery and Reinvestment Act (ARRA).

Enterprise Standard Operating Procedure (SOP) HSE-201, *Agency Inspections and Communications*, describes the responsibilities, procedures, and requirements associated with inspections conducted by external regulatory agencies, as well as the methods for communicating information to key individuals. This Target Zero Bulletin is a brief summary of what to do in the event of an agency inspection at your site. Refer to the SOP for more specific guidance.

Notification of Inspections

- If the inspection is an announced regulatory agency inspection, the Project Manager (PM) should notify the Responsible Health and Safety Manager (RHSM) and Responsible Environmental Manager (REM) well in advance of the inspection.
- If an unannounced agency inspector visits one of our projects, Field personnel must immediately notify the project Emergency Response Coordinator (ERC). Typically the ERC is the Safety Coordinator (SC).
- The **ERC must immediately notify the RHSM/REM**, as appropriate, of unannounced inspections, or designate someone to call the RHSM/REM. The RHSM/REMs can provide guidance to the field staff and PM.

Inspector Credential Verification

- Upon arrival, the ERC must request the inspector to provide official credentials. Record the inspector's name and office phone number or obtain the inspector's business card.
- The inspector shall sign the visitors log and be given a site-specific health, safety, and environmental protection briefing.
- The inspector shall meet any site access requirements associated with security clearances, specialized training, and medical monitoring. The CH2M HILL representative shall verify that the inspector possesses these requirements; access will only be granted to those areas where appropriate access requirements are met. Some inspectors have the authority to gain access to any work area at any time, such as an inspector with a search warrant. In these cases, we can stop work operations as necessary to protect the safety of the inspector(s).

Opening Conference

- The CH2M HILL Project Manager, ERC, RHSM, or REM, and the inspector shall determine attendees for the opening conference. The RHSM (for OSHA and other worker health and safety inspections) or REM (for environmental inspections) shall join the opening conference via conference call.
- The inspector shall inform CH2M HILL of the purpose of the inspection and provide a copy of the complaint, if applicable.
- The inspector shall outline the scope of the inspection, including employee interviews conducted in private, physical inspection of the workplace and records, possible referrals, discrimination complaints, and the closing conference(s).

Requests for OSHA Logs

- An OSHA inspector may request to review the project OSHA Injury/Illness log, better known as the OSHA 300 Log. Contact your RHSM for assistance in obtaining the OSHA 300 Log.

- Field projects with a continuous duration of one year or longer are considered to be separate establishments and are required to maintain an OSHA 300 log specific to the project. The project OSHA 300 log should be maintained onsite and kept current.
- Recordable injuries and illnesses sustained on field projects less than one year in duration are maintained on the CH2M HILL office log where the injured employee is based.

The Inspection

- The scope of the inspection shall be limited to that indicated by the inspector in the opening conference. The inspector shall be escorted to relevant areas only. The ERC or other designated by the RHSM or REM must accompany the inspector during the inspection.
- Ensure that the inspection is limited to the scope that the inspector disclosed during the opening conference. The ERC should always take notes which identify: areas inspected, machinery or equipment and materials examined, employees or other persons interviewed, and photographs taken by the inspector.
- The inspector will observe safety, health, and environmental conditions and practices and document the inspection process. The inspector may also take photos and instrument readings, examine records, collect air samples, measure noise levels, survey existing engineering controls, and monitor employee exposure to toxic vapors, gases, and dusts.
- CH2M HILL should gather duplicate information (photographs, readings, samples) in the same manner and condition as the inspector. If the equipment needed to take duplicate samples is not onsite, ask the inspector if the sampling can wait until the equipment is available. If samples are taken, request a description of the tests that the agency intends to perform on the samples and request results as soon as they are available.
- Employees may be questioned during the inspection tour. The employee can refuse to speak to an inspector, can speak to the inspector with a company representative (including management) present, or can speak to the inspector privately. It is CH2M HILL policy that employees who wish to speak to the inspector are not discriminated against, intimidated, or otherwise mistreated for exercising their rights during compliance inspections.
- Copies of documents should not be provided to the inspector without the approval of the RHSM or REM or Legal Insurance Department (LID). **DO NOT** voluntarily release documents. Respond only to inspection team requests.
- During the course of the inspection, the inspector may point out violations. For each violation, the CH2M HILL representative should ask the inspector to discuss possible corrective action. Where possible, violations detected by the inspector should be corrected immediately and noted by the inspector as corrected.
- For those items which cannot be corrected immediately, an action plan shall be formulated for timely correction. In any instance, employees exposed to hazards shall be removed from the area.

Closing Conference

After the inspection, a closing conference is normally held as follows:

- The CH2M HILL PM, ERC, RHSM or REM shall be involved via conference call in the closing conference, at a minimum;
- The inspector shall describe the apparent violations found during the inspection and other pertinent issues as deemed necessary by the inspector. CH2M HILL shall be advised of their rights to participate in any subsequent conferences, meetings or discussions. Any unusual circumstances noted during the closing conference shall be documented by the ERC;
- The inspector shall discuss violations observed during the inspection and indicate for which violations a citation and a proposed penalty may be issued or recommended;
- The ERC shall request receipts for all samples and approved documents photocopied by the inspector, request a photocopy of the inspector's photograph log, and request a copy of the final inspection report; and
- Any documentation from an agency inspection must be transmitted immediately to the RHSM or REM, and LID.

Unannounced regulatory agency inspections may happen at any time on our projects -

Get your RHSM/REM and PM involved immediately if an Inspector arrives.

CH2M HILL HEALTH AND SAFETY PLAN

Attachment 10

Completed CH2M HILL AHAs

Activity/Job Hazard Analysis (AHA/JHA)

Activity: DGM along shoreline and in water for Igniter Area UXO 19.	Date: 07/24/12
	Project: Indian Head UXO 19 Igniter Area, shoreline and water DGM.
Description of the work: DGM along the shoreline and in shallow water up to about 3 feet deep just off the shoreline of the Igniter Area, UXO 19, Indian Head, MD.	Site Supervisor: TBD
	Site Safety Officer: TBD
	Review for latest use: Before the job is performed.

Work Activity Sequence (Identify the principal steps involved and the sequence of work activities)	Potential Health and Safety Hazards (Analyze each principal step for potential hazards)	Hazard Controls (Develop specific controls for each potential hazard)
General site work	<ol style="list-style-type: none"> 1. Slips/trips/falls 2. Loading heavy equipment/pinch points back strain 3. Shifting loads/pinch points 4. Fueling vehicles 5. Driving accidents 6. Hitting objects while backing 	<ol style="list-style-type: none"> 1. Watch for slippery steps; watch footing. 2. Use partner or dolly, lift w/ legs follow safe lifting procedures/SOP. 3. Tie down loads securely with rope, bungee cords, load bars. 4. Vehicles, radios, and cell phones turned off when fueling. 5. Watch for other contractors, drive defensively. 6. Use GOAL (get out and look) technique.
Drive to closest access point for site.	Auto accident	<p><u>Drive very defensively.</u> Obey the speed limit, and drive slowly and defensively along roads. Employees and subcontractors are prohibited from using mobile (cell) phones while operating any motor vehicle on DoD installations. Some areas of NSF-IH do not allow the use of cell phones in case the proximity of radio-sensitive fuses could be set off by them. Furthermore, wearing of any portable headphones, earphones, or other listening devices and use or wireless devices while operating a CH2M HILL- or CH2M HILL client-owned, leased, or rented motor vehicle, or while operating any other motor vehicle on a CH2M HILL project site (including DoD installations) is prohibited.</p> <p>Wireless device prohibitions while driving includes but is not limited to the following:</p> <ul style="list-style-type: none"> • Dialing or speed dialing a wireless device • Using a hands-free or voice recognition (Blue Tooth) device to dial or speed dial a

Work Activity Sequence (Identify the principal steps involved and the sequence of work activities)	Potential Health and Safety Hazards (Analyze each principal step for potential hazards)	Hazard Controls (Develop specific controls for each potential hazard)
		wireless device <ul style="list-style-type: none"> • Engaging in conversation or listening to a conversation using a wireless device • Checking emails or surfing the internet using a wireless device • Texting or e-mailing (reading, sending, or screening) with a wireless device • Programming or entering coordinates into a GPS device (following directions by a GPS is permitted) • Using a wireless device for voice recording or dictation
Walking in to and on site	Trip hazards from uneven surfaces covered by low vegetation or shoreline debris.	Watch out for trip hazards, vines, and low stumps of previously cut vegetation under current ground cover vegetation. Watch out for holes and uneven terrain. Set up geophysical instruments such that they can be carried easily with the weight evenly distributed. If weight is over 40 lbs, set up for two-person carry or sled/cart.
Walking on site	Cuts from subsurface sharps	Use boots with sturdy soles. Don't walk in areas where mud comes up to near top of ankles.
	Biological hazards, poison Ivy, oak and sumac.	Know what poison ivy looks like and avoid, follow HSP for poison ivy, oak, and sumac exposure. Avoid, wear protective clothing and barrier creams as necessary. If you must work on a site with poison ivy, sumac or oak the following precautions are necessary: Do not drive vehicles onto the site where it will come into contact with poison ivy, sumac, or oak. Vehicles that need to work in the area, such as drill rigs or heavy equipment, must be washed as soon as possible after leaving the site. All tools used in the poison ivy, sumac, or oak area, including those used to cut back poison oak, surveying instruments used in the area, air monitoring equipment or other test apparatus, must be decontaminated before they are placed back into the site vehicle. If onsite decontamination is not possible, use plastic to wrap any tools or equipment until they can be decontaminated. PPE, including Tyvek coveralls, gloves, and boot covers, must be worn. PPE must be placed into plastic bags and sealed if they are not disposed immediately into a trash receptacle. As soon as possible following the work, shower to remove any potential contamination. Any body part with suspected or actual exposure should be washed with Zanfel, Tecnu, or other product designed for removing urushiol. If you do not have Zanfel or Tecnu, wash with cold water. Do not take a bath because the oils can form an invisible film on top of

Work Activity Sequence (Identify the principal steps involved and the sequence of work activities)	Potential Health and Safety Hazards (Analyze each principal step for potential hazards)	Hazard Controls (Develop specific controls for each potential hazard)
		<p>the water and contaminate your entire body upon exiting the bath.</p> <p>Tecnu may also be used to decontaminate equipment.</p> <p>Use IvyBlock or similar products to prevent poison oak, ivy, and sumac contamination. Check with the closest CH2M HILL warehouse to see if these products are available. Follow all directions for application.</p> <p>If you do come into contact with one of these poisonous plants and a reaction develops, contact your supervisor.</p> <p>If you know you have to go into an area where you will likely contact poison ivy, use Tyvek and gloves, and remove and decontaminate before re-entering the vehicle.</p>
	<p>Tick disease transmission.</p>	<p>Use appropriate tick protection for the task.</p> <p>So that ticks may be easily seen, wear light-colored clothing. Full-body new Tyvek (paper-like disposable coveralls) may also be used</p> <p>To prevent ticks from getting underneath clothing, tuck pant legs into socks or tape to boots</p> <p>Wear long-sleeved shirts, a hat, and high boots.</p> <p>Apply DEET repellent to exposed skin or clothing per product label.</p> <p>Apply permethrin repellent to the outside of boots and clothing before wearing, per product label.</p> <p>Frequently check for ticks and remove from clothing.</p> <p>At the end of the day, search your entire body for ticks (particularly groin, armpits, neck, and head) and shower.</p> <p>To prevent pathogen transmission through mucous membranes or broken/cut skin, wash or disinfect hands and/or wear surgical-style nitrile gloves any time ticks are handled.</p> <p>Follow HSP for tick protection.</p>
	<p>Heat stress</p>	<p>Follow HSP guidelines for heat stress. Drink plenty of fluids. Take breaks as necessary. Watch yourself and your co-worker for signs of heat stress. Make sure to carry sufficient drinking water and sports drinks with you. Keep a cooler in the car with cool water bottles and sports drinks. Measure your resting pulse rate and as specified in the HSP</p>
<p>Working on land and in shallow water</p>	<p>Snakes</p>	<p>Watch for snakes and where you put your feet.</p>

Work Activity Sequence (Identify the principal steps involved and the sequence of work activities)	Potential Health and Safety Hazards (Analyze each principal step for potential hazards)	Hazard Controls (Develop specific controls for each potential hazard)
	Sunburn	Wear a hat and sun screen. Wear long-sleeved shirts and long pants. Use sunscreen every morning before the sun gets hot and re-apply sunscreen regularly, every 2 hours or so. .
	UXO	All surface UXO should have been removed from this site before this phase of the work has started, but if you see something that looks suspicious, stop work, clear the area and notify your supervisor.
General site work	Lightning/wind	Monitor weather. If lightning is expected, shut down until 30 minutes after last seen or heard strike.
Working over water	drowning	Use approved PFD when working over water. Follow the boat safety checklist in the HSP. If you fall out of the boat, stand up and carefully climb back in. The water is only a few feet deep.
Shallow water walking	Wader safety	Watch for sharps in mud and use caution walking. Make sure you can get out of your waders in an emergency.

Activity/Job Hazard Analysis (AHA/JHA)

Equipment to be used (List equipment to be used in the work activity)	Inspection Requirements (List inspection requirements for the work activity)	Training Requirements (List training requirements including hazard communication)
First aid kit with ice pack.	Make sure first aid supplies haven't expired, and that chemical ice pack hasn't gone off by itself.	
Fire extinguisher	Monthly inspection documented on tag, yearly inspection by extinguisher inspection company.	Fire extinguisher training
PFD	Inspect daily	

Activity/Job Hazard Analysis (AHA/JHA)

PRINT NAME

SIGNATURE

Supervisor Name: TBD _____

Date/Time: _____

Safety Officer Name: TBD _____

Date/Time: _____

Employee Name(s): TBD _____

Date/Time: _____

TBD _____

Date/Time: _____

CH2M HILL HEALTH AND SAFETY PLAN

Attachment 11

Material Safety Data Sheets