

N96095.AR.000916
NWIRP CALVERTON
5090.3a

DIGITAL GEOPHYSICAL MAPPING WORK PLAN MUNITIONS RESPONSE SITE 2 FIRE
TRAINING AREA NWIRP CALVERTON NY
5/10/2013
RESOLUTION CONSULTANTS

**DIGITAL GEOPHYSICAL MAPPING WORK PLAN
Naval Weapon Industrial Reserve Plant
Calverton, New York
Munitions Response Site 02 – Fire Training Area**

FINAL

Prepared for:



Department of the Navy
Naval Facilities Engineering Command, Mid-Atlantic
9742 Maryland Avenue, Bldg. Z-144
Norfolk, VA 23511-3095

Comprehensive Long-Term Environmental Action Navy
Contract Number N62470-11-D-8013

CTO WE32

Prepared by:



Resolution Consultants
A Joint Venture of AECOM & EnSafe
1500 Wells Fargo Building
440 Monticello Avenue
Norfolk, VA 23510

10 May 2013

This page intentionally left blank

Table of Contents

EXECUTIVE SUMMARY.....	III
LIST OF ACRONYMS AND ABBREVIATIONS.....	V
1.0 INTRODUCTION.....	1
1.1 Purpose of Report	1
1.2 Scope and Objectives	1
1.3 Work Plan Organization	2
2.0 BACKGROUND	3
2.1 NWIRP-Calverton	3
2.1.1 Project Location	3
2.1.2 Facility History.....	3
2.1.3 Regional Climate	4
2.2 MRS 02 – Fire Training Area.....	4
2.2.1 Site Description	4
2.2.2 Current and Projected Land Use.....	5
2.2.3 Previous Site Investigations.....	5
2.2.4 Initial Summary of Risk from MEC	6
3.0 TECHNICAL APPROACH	7
3.1 Applicable Guidance, Regulations, and Policies	7
3.2 Project Organization	7
3.3 Project Schedule	9
3.4 Data Quality Objectives	9
3.4.1 Problem Definition	10
3.4.2 Identify the Goal of the Study	10
3.4.3 Identify the Information Inputs	10
3.4.4 Define the Boundaries of the Study	10
3.4.5 Develop the Decision Rules	11
3.4.6 Specify Performance or Acceptance Criteria.....	11
3.4.7 Design for Collecting the Data	12
4.0 FIELD OPERATIONS	13
4.1 Mobilization and Site Set-Up.....	13
4.1.1 Site-Specific Training	13
4.1.2 Equipment Check-Out.....	13
4.1.3 IVS Construction	14
4.2 Site Preparation	14
4.2.1 Anomaly Avoidance	14
4.2.2 Surveying.....	15
4.2.3 Vegetation Clearance.....	16
4.3 Geophysical Investigation	17
4.3.1 General Approach.....	17
4.3.2 Investigation Areas.....	18
4.3.3 Geophysical Survey Types.....	18
4.3.4 Potential Limitations	20

4.3.5	Geophysical System Verification	21
4.3.6	Data Processing, Corrections and Advanced Analysis	22
4.3.7	Qualitative Interpretation	24
4.4	Demobilization	25
5.0	QUALITY CONTROL.....	27
5.1	Equipment/Electronics Warm-Up	27
5.2	Personnel and Cable Shake Tests	27
5.3	Static Background and Static Spike Response Tests.....	28
5.4	Static Position Repeatability Test.....	28
6.0	REFERENCES	29

Tables

Table 3-1	Milestone Project Schedule	9
Table 3-2	Activity Performance Criteria	11

Figures

Figure 3-1	Project Organization	8
------------	----------------------	---

Appendices

Appendix A	Site Maps
Appendix B	Explosive Safety Submission-Determination Request (ESS-DR)
Appendix C	Project Schedule
Appendix D	Health and Safety Plan (HASP)

Executive Summary

The scope of this Contract Task Order (CTO) is to conduct a Digital Geophysical Mapping (DGM) assessment of Munitions Response Site (MRS) 02, Fire Training Area, to determine the spatial extent of subsurface metallic debris contamination beyond the preliminary MRS boundary.

In February 2010 the Navy was in the process of delineating petroleum-contaminated soils for a removal action within a 50 foot by 150 foot area of the 30.56-acre Former Site 2, Fire Training Area. During soil sampling activities, five remnants of 20mm projectiles were encountered on the ground surface at the site. Following the removal of the projectile remnants by Explosive Ordnance Disposal Mobile Unit 12, a 7-acre area surrounding the location where the munitions were encountered was preliminarily designated as Naval Weapon Industrial Reserve Plant (NWIRP) Calverton MRS 02 - Fire Training Area. In 2011 the Navy conducted a DGM survey and subsequent "selected response" action on the numerous anomalies identified within the preliminary 7-acre MRS boundary. The selected response action was conducted to a depth of 18 inches and resulted in the removal of over 34,000 lbs of scrap metal pieces and over 17,000 20mm projectiles, of which three were determined to be MEC items.

Site observations during the "selected response" indicate a possibility that 20mm projectiles may be present in the areas immediately beyond the 7-acre boundary. These observations were based on visual evidence of construction and demolition debris that appears to be similar to the material encountered during the "selected response." Therefore, this project involves conducting a supplemental DGM survey up to 200 feet beyond the 7-acre boundary (adding approximately 14 acres to the investigation footprint) to identify the potential extent of munitions beyond the preliminary site boundary.

The final deliverable will include a color-coded map with qualitative interpretations (e.g., geometric shape files, arrows, annotations, etc.) of the DGM survey results along with a summary report of all field activities and recommendations for future investigation activities.

This page intentionally left blank

List of Acronyms and Abbreviations

AGM	Analog Geophysical Mapping
AST	Above-Ground Storage Tank
ASTM	American Society for Testing and Materials
AGVIQ-CH2M Hill	AGVIQ/CH2M Hill Constructors, Inc., Joint Venture III
bgs	below ground surface
°C	degrees Celsius
CD	Cultural Debris
CLEAN	Comprehensive Long-Term Environmental Action Navy
CPG	Certified Professional Geologist
CTO	Contract Task Order
DDESB	Department of Defense Explosives Safety Board
DGM	Digital Geophysical Mapping
DGPS	Differential Global Positioning System
DoD	Department of Defense
DQO	Data Quality Objective
EODMU	Explosive Ordnance Disposal Mobile Unit
EME	Earth Moving Equipment
EMI	Electromagnetic Induction
ESO	Explosives Safety Officer
ESS-DR	Explosives Safety Submission-Determination Request
°F	degrees Fahrenheit
FS	Feasibility Study
GIS	Geographic Information System
GSV	Geophysical System Verification
HASP	Health and Safety Plan
HAZMAT	Hazardous Material
HAZWOPER	Hazardous Waste Operations and Emergency Response
IAS	Initial Assessment Study
IAMS	Instrument-Aided Visual Search
ISO	Industry Standard Object
IVS	Instrument Verification Strip
MC	Munitions Constituents
MCL	Maximum Concentration Level
MD	Munitions Debris
MDAS	Material Documented as Safe
MDEH	Material Documented as an Explosive Hazard
MEC	Munitions and Explosives of Concern

MRP	Munitions Response Program
MRS	Munitions Response Site
msl	mean sea level
mV	millivolt
NAD	North American Datum
NCP	National Contingency Plan
NOSSA	Naval Ordnance Safety and Security Activity
NRCS	Natural Resources Conservation Service
NRL	Naval Research Laboratory
NWIRP	Naval Weapon Industrial Reserve Plan
OSHA	Occupational Safety and Health Administration
PAL	Project Action Limit
POC	Point of Contact
PPE	Personal Protective Equipment
QA	Quality Assurance
QC	Quality Control
RI	Remedial Investigation
RRD	Range Related Debris
RPM	Remedial Project Manager
SI	Site Inspection
SOP	Standard Operating Procedure
TDEM	Time Domain Electromagnetic
TP	Technical Paper
μs	microsecond
UST	Underground Storage Tank
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
UTM	Universal Transverse Mercator
UXO	Unexploded Ordnance
VSP	Visual Sampling Plan
WP	Work Plan

1.0 INTRODUCTION

1.1 Purpose of Report

This Work Plan (WP) outlines the technical approach for conducting a Digital Geophysical Mapping (DGM) investigation at the Naval Weapon Industrial Reserve Plant (NWIRP) Calverton NY, Munitions Response Site (MRS) 02 (Fire Training Area). The WP was prepared by Resolution Consultants in response to Contract Task Order (CTO) WE32 under the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract Number N62470-11-D-8013. The purpose of the WP is to introduce the methods, techniques, and/or procedures as applied to each field investigation activity to accomplish the objective of assessing the site to determine the aerial extent of subsurface metallic contamination at MRS 02.

1.2 Scope and Objectives

The scope of the CTO involves conducting a series of DGM transect surveys to assess the subsurface for anomalous regions indicative of metallic debris material (e.g., Cultural Debris [CD], Range Related Debris [RRD], Munitions Debris [MD], Munitions and Explosives of Concern [MEC], Material Potentially Presenting an Explosive Hazard [MPPEH], etc.) up to 200 feet in all cardinal directions beyond the preliminary boundary of the 7-acre MRS. The two primary objectives of the DGM survey are to:

- 1) Identify areas of concentrated subsurface metallic debris as indicated by an abundant series of high anomalous Electromagnetic Induction (EMI) readings within a localized area; and
- 2) Determine the areal extent of subsurface metallic debris as indicated by a significant reduction in the aforementioned high anomalous EMI readings.

Both objectives will be accomplished through qualitative map-view interpretations (e.g., response size-shape characteristics, apparent anomaly density changes, etc.) of the acquired geophysical data. The geophysical data collection effort will involve the following field investigation activities:

- 1) Conducting a site mark-out to identify the boundaries of the investigation area;
- 2) Preparing the site for investigation by reducing/removing impeding vegetation and non-munitions metallic debris from the surface;
- 3) Performing a series of DGM surveys extending up to 200 feet beyond the previous 7-acre preliminary MRS boundary, or until the property fence line is reached, whichever occurs first; and

- 4) Generating a site map that displays the EMI DGM data with qualitative interpretations and identification of key physical features observed during the geophysical survey.

1.3 Work Plan Organization

The DGM Work Plan is organized as follows: Section 1 provides an introduction to the project including the scope and objectives; Section 2 provides site background information that may impact the field investigation approach including the site's conditions and previous investigations; Section 3 outlines the technical approach for managing the CTO, establishes data quality objectives for the data collection effort, and discusses how the collected data will be evaluated; Section 4 details the field activities that will be conducted to obtain required data including appropriate measures to ensure data quality; Section 5 outlines the proposed quality control measures; and Section 6 provides a list of applicable references.

2.0 BACKGROUND

2.1 NWIRP-Calverton

2.1.1 Project Location

NWIRP Calverton is located in central portion of Suffolk County, New York, approximately 70 miles east of New York City, NY, and a little over three miles west of Riverhead, NY. The NWIRP Calverton covers approximately 209 acres of the original 6,000 acre facility with the main entrance at the confluence of Grumman Boulevard and the Calverton Executive Airpark Main Road. The majority of the former facility currently consists of private businesses, primarily the executive airport, directly across the street from Swan Lake Golf Club and just north of McKay Lake. The general locations of the facility is shown on Figure A-1 (Appendix A).

2.1.2 Facility History

NWIRP Calverton was used for the development, assembly, and testing of naval combat aircraft until 1996. The aircraft included the Grumman F-14 Tomcat, which used 20mm size aircraft gun systems. NWIRP Calverton contained a firing stop butt area for testing, sighting, and performing static target practice using aircraft firing systems. The static firing stop butt area was lined with approximately 50 feet x 50 feet of sand from the floor to approximately 20 feet height within a covered and wood-line revetment. The butt was reinforced with 12 inches of dense concrete on the floors and the walls to which aircraft would fire from and towards a static position approximately 200 feet away.

Facility operations ended in February 1996. As the plant closed and the facilities were decommissioned, the aircraft firing stop butt was abandoned in place. The Phase II Environmental Baseline Survey for NWIRP (C.F. Braun, 1997) indicated the soil backstop had been moved but no documentation was apparent to where the soil from the backstop had been relocated. In September 1998, the majority of land was transferred to the Town of Riverhead, NY, for redevelopment. The 30.56-acre Former Site 2, Fire Training Area, (depicted on Figure A-1, Appendix A) was not part of the land transfer.

In February 2010 the Navy was in the process of delineating petroleum-contaminated soils for a removal action within a 50 foot by 150 foot area of the Fire Training Area. During soil sampling activities, five remnants of 20mm projectiles were encountered on the ground surface at the site. The projectile remnants were encountered within a 30 foot by 30 foot area. In March 2010, personnel from Explosive Ordnance Disposal Mobile Unit 12 (EODMU12) inspected the projectiles and removed them from the site. A 7-acre area surrounding the location where the munitions were encountered was preliminarily designated as NWIRP Calverton MRS 02 - Fire Training Area (see attached Figure A-2, Appendix A).

2.1.3 Regional Climate

NWIRP Calverton has a continental-type climate with four well-defined seasons. Located in the middle latitudes of North America, atmospheric flow is from west to east, with exception of Nor'easter storms. The Atlantic Ocean, the Long Island Sound, and associated weather patterns significantly affect the climate, moderating extreme temperatures and causing higher humidity leading to more precipitation in the region. The coldest period occurs in late January and early February, with low temperatures averaging 24.4 degrees Fahrenheit (°F). July is the warmest month, with average high temperatures of 84°F. Annual precipitation is well distributed, with July and August as the wettest months. Average annual precipitation comprises 46 inches of rain and 27 inches of snowfall, inclusive of 206 sunny days and 114 precipitation days per year.

2.2 MRS 02 – Fire Training Area

2.2.1 Site Description

Site Location

MRS 02, Fire Training Area, is located in the south-central portion of NWIRP Calverton (Figure A-2, Appendix A). It encompasses seven acres with the southern entrance approximately half a mile west of the Calverton Executive Airpark entrance along Grumman Boulevard. MRS 02 also has unnamed dirt road entrances from the east, west, and north, all of which are gated for safety.

Prior to encountering munitions at the site, the Navy excavated a 2-acre portion of the future MRS to address petroleum contamination. This excavation was conducted to a depth of approximately six feet, and was backfilled with clean, imported fill. The location of the 2-acre excavation area is depicted on Figure A-2 (Appendix A).

Topography

Elevations at MRS 02 from approximately 50 feet to 70 feet above mean sea level (msl). The topography is flat to gently sloping in the northern portion of the range and steeply sloping in the south-southeastern portion of the range. A selected response action conducted at the site resulted in seven acres located in the central portion of the site being graded to approximately 60 feet msl. Thus, the overall topography of MRS 02 is downward sloping from northwest to southeast. For the most part, the steepest slopes are primarily related to man-made influence from pushing/maneuvering soil piles using heavy earth moving equipment. The resulting soil piles are generally located within the 50 feet of the MRS boundary.

Hydrology

There are no surface water bodies within the boundaries of MRS 02.

Site Geology

According to the Soil Survey of Suffolk County as captured by the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), the native soils at MRS 02 are almost exclusively Carver and Plymouth sands with zero to three percent slopes over the north-western portion of the site trending down to four to fifteen percent slopes over the east-southeastern portion (NRCS, 2012). Both the soil types and slope ratings correspond to observed existing site conditions. Additional site geological observations include the cut-fill soils, which are almost exclusively sand, along with concrete and other metallic debris that overly the aforementioned native soils.

Vegetation

Vegetation at MRS 02 is characterized by large wooded areas and open grassy areas.

Endangered Species

No endangered or special status species are known to exist at MRS 02.

Cultural and Natural Resources

MRS 02 is located within the publicly protected Long Island Central Pine Barrens that overlays and recharges a portion of a federally designated sole source aquifer.

2.2.2 Current and Projected Land Use

MRS 02 is presently closed and unused by the installation except for environmental assessment, investigation, monitoring, remediation and restoration field activities conducted by the Navy and its various contractors. No future land use changes are planned for the area until the site is remediated, at which time the property may be released to the Town of Riverhead, NY, for economic redevelopment.

2.2.3 Previous Site Investigations

In 2012, AGVIQ-CH2M Hill was contracted to conduct a "selected response" action on the 7-acres of the MRS. The selected response action was conducted to a depth of 18 inches and resulted in the removal of over 34,000 lbs of scrap metal pieces and over 17,000 20mm projectile MD items. Two acres located within the selected response action area were previously excavated to a depth of six feet and backfilled with clean imported fill material.

Further investigation by AGVIQ-CH2M Hill indicated a possibility that 20mm projectiles may be present in the areas immediately beyond the 7-acre boundary. This was based on visual evidence of construction and demolition debris that appears to be similar to the material encountered during the "selected response."

2.2.4 Initial Summary of MEC Risk

The only reported MEC or MPPEH encountered in MRS 02 are 20mm projectiles. During the March 2010 EOD response, the specific nomenclature of the 20-mm projectiles could not be determined by EODMU12 because of the deteriorated condition of the projectiles due to weathering and the physical damage from subsequent repeat impacts. Approximately 8,000 of the 20mm projectiles recovered during the selected response action required destruction via explosive demolition. The remaining 9,000 projectiles were classified as MD.

The likelihood of encountering MEC/MPPEH while conducting the scope of work is determined to be "LOW" based on the proposed operations and safety precautions to be implemented. The procedures that will be used when conducting site activities, as outlined in this WP, are in accordance with the provisions of the Department of Defense Explosive Safety Board (DDESB)-approved Explosives Safety Submission-Determination Request (ESS-DR) (Appendix B).

3.0 TECHNICAL APPROACH

3.1 Applicable Guidance, Regulations, and Policies

The non-invasive, subsurface geophysical investigation, inclusive of site preparation field activities (e.g., land surveying, surface clearance, vegetation reduction/removal, etc.), will be performed in accordance with all local, state, and federal regulation including CERCLA Sections 104 and 121, Executive Order 12580, and the National Oil and Hazardous Substances Pollution Contingency Plan. All munitions response activities will be performed in accordance with the approved ESS-DR and associated approval letter. Other key guidance, regulations, and policies applicable include, but are not limited to:

- DoD 6055.09-M, *Department of Defense Ammunition and Explosives Safety Standards*, Department of Defense Manual, 2010.
- NAVSEA OP-5, Volume 1, Seventh Revision, *Ammunitions and Explosives Safety Ashore*, 2007.
- NOSSA Instruction 8020.15C, *Explosives Safety Review, Oversight, and Verification of Munitions Response*, 2011
- 29 CFR 1910.120, *Hazardous Waste Operations and Emergency Response*

3.2 Project Organization

The Remedial Project Manager (RPM) for this project is:

Mr. James M. Tarr, CPG, CG
Naval Facilities Engineering Command
NAFVAC Mid-Atlantic
9742 Maryland Avenue, Bldg. Z-144
Norfolk, VA 23511-3095
(757) 341-2009
James.Tarr@navy.mil

An alternate Point of Contact (POC) for this project is:

Ms. Lora Fly
Naval Facilities Engineering Command
NAFVAC Mid-Atlantic
9742 Maryland Avenue, Bldg. Z-144
Norfolk, VA 23511-3095
(757) 341-2012
Lora.Fly@navy.mil

The Resolution Consultants' project organization is provided in Figure 3-1.

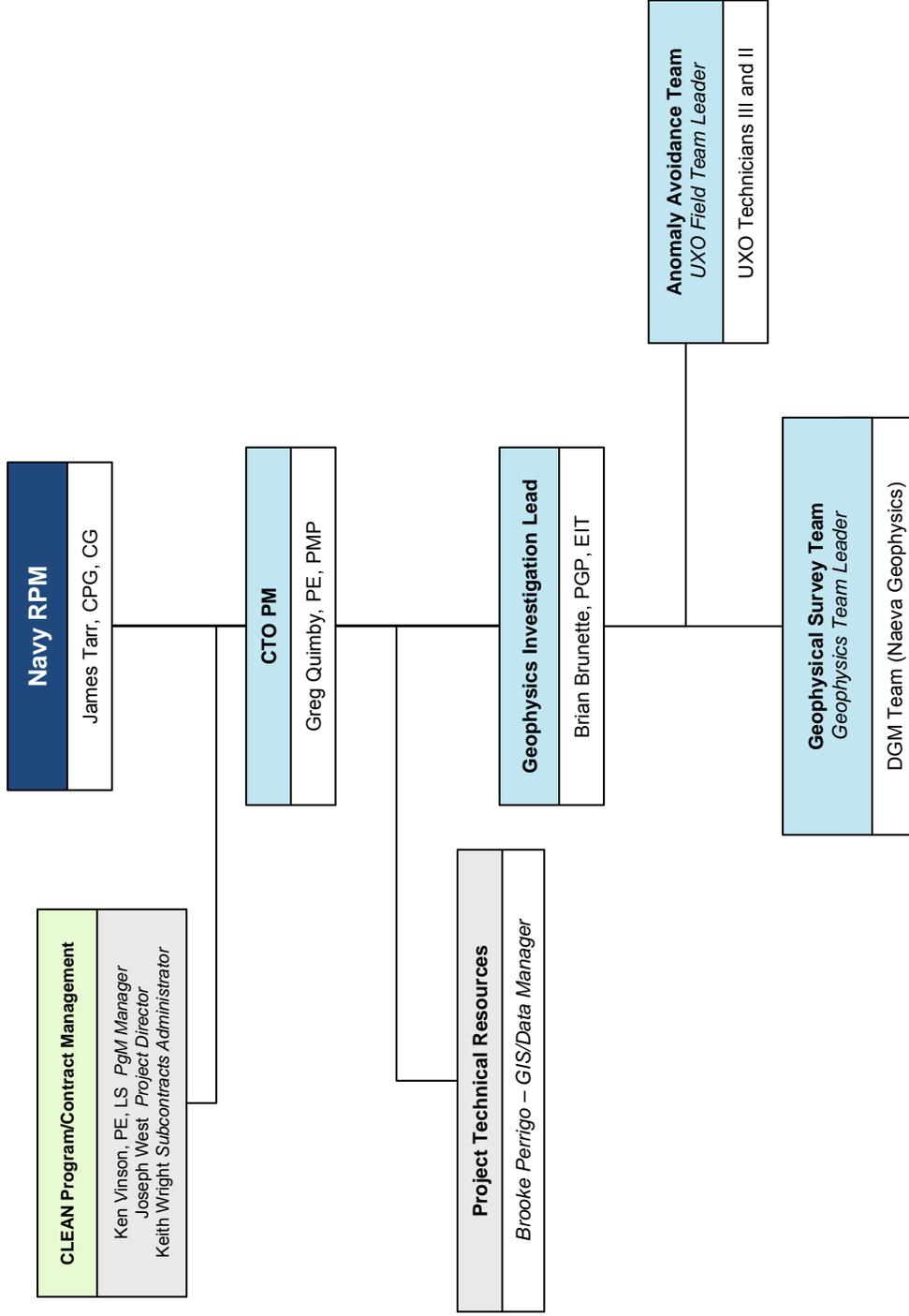


Figure 3-1
Project Organization

3.3 Project Schedule

The following table presents the anticipated milestone project schedule. A detailed project schedule is provided in Appendix C.

**Table 3-1
Milestone Project Schedule**

Activities	Anticipated Start Date	Anticipated Completion Date	Deliverable
Prepare ESS-DR	12/10/2012	2/27/2013	ESS-DR
Prepare Preliminary Draft Project Work Plan	2/11/2013	3/1/2013	Preliminary Draft Work Plan
Prepare Draft Project Work Plan	3/25/2013	4/5/2013	Draft Work Plan
Prepare Final Project Work Plan	4/29/2013	5/10/2013	Final Work Plan
Conduct Mobilization, Site Set-up, and Training	5/20/2013	5/20/2013	Letter notification to Navy RPM
Conduct Site Survey	5/21/2013	5/22/2013	Site survey map prepared
Conduct Vegetation Removal	5/23/2013	5/27/2013	Daily Field Report
Conduct Geophysical Survey	5/28/2013	5/30/2013	Raw geophysical survey data
Demobilization	5/31/2013	5/31/2013	Letter notification to Navy RPM
Prepare Preliminary Draft Report	6/3/2013	6/28/2013	Preliminary Draft Final Report
Prepare Draft Report	7/29/2013	8/2/2013	Draft Report
Prepare Draft Final Report	9/2/2013	9/6/2013	Draft Final Report
Prepare Final Report	10/7/2013	10/11/2013	Final Report

3.4 Data Quality Objectives

The site-specific data quality objectives (DQOs) presented below were developed following the seven-step process outlined in EPA's *Guidance on Systematic Planning Using the Data Quality Objectives Process* (USEPA, 2006).

3.4.1 Problem Definition

Results of the previous selected response has classified the 7-acre area of MRS 02 as being heavily impacted by metal debris (in the form of both CD/RRD and MEC/MPPEH) as indicated by encountering over 35,000 lbs of scrap metal and over 17,000 20mm projectiles. MEC/MPPEH is a safety hazard and may constitute an imminent and substantial endangerment to the general public, on-site personnel, and the environment. Because there is the potential for MEC/MPPEH to be located outside of the 7-acre preliminary MRS boundary, additional hazards may be present at the site. Knowing the spatial extent of subsurface metallic contamination will help the Navy determine if the MRS boundary needs to be expanded and evaluate appropriate response actions required to address the site hazards.

3.4.2 Identify the Goal of the Study

The currently planned DGM investigation will use EMI sensors data to qualitatively delineate the extent of the subsurface metallic contamination beyond the current 7-acre MRS boundary.

3.4.3 Identify the Information Inputs

Data and information that will be required to make the decisions include the following:

1. Distribution of MEC/MPPEH – The aerial extent will be determined by collecting a series of transect-pattern DGM surveys. Transect spacing design will be defined by conservative estimates using Visual Sampling Plan (VSP).
2. Types of MEC/MPPEH – Previous intrusive investigation and site history summaries have identified 20mm projectiles as the only MEC/MPPEH items encountered in MRS 02.

3.4.4 Define the Boundaries of the Study

This project involves conducting a supplemental DGM survey up to 200 feet beyond the 7-acre MRS boundary to identify the potential extent of munitions at the site. This DGM survey may include up to 14 acres of the site. However, the 30.56-acre Former Site 2 Fire Training Area is partially surrounded by a fence delineating portions of the property currently under Navy control. The exact location of the fence is not available, so the DGM survey will be conducted up to 200 feet beyond the 7-acre boundary or until the fence line is encountered, whichever occurs first.

The vertical boundary for the intrusive DGM survey will be the depth of detection of the DGM EMI sensor (i.e. EM61-MK2, typically 11 times the diameter of the subsurface anomaly source) used to acquire the transect surveys. Depth estimations for identified anomalies will not be calculated given inherent limitations of attempting depth estimations from DGM data captured along single-

swath transects from multiple anomalous sources containing various anomaly sizes within the subsurface.

Based on prior intrusive investigations results, there is a high potential for munitions to be comingled with an abundance of RRD/CD in the subsurface. Data from this investigation will be used to estimate subsurface anomalies that may be associated with 20mm projectiles to the greatest extent as technically feasible; however, the results of the non-invasive investigation will only indicate the extent of metallic debris without conclusively identifying the source(s) of each anomalous location or saturated region.

3.4.5 Develop the Decision Rules

The decision rules for the DGM data analysis are as follows:

1. If results of the DGM survey results indicate a response greater than or equal to the peak amplitude value threshold of 3 mV (on CH2 data) established for a 20mm projectile, then the location will be considered anomalous.
2. If results of the DGM survey results indicate a response less than the peak amplitude value threshold of 3 mV (on CH2 data) established for a 20mm projectile, then the location will not be considered anomalous.

3.4.6 Specify Performance or Acceptance Criteria

The investigation activity results will be considered acceptable if the performance criteria identified in Table 3-2 are achieved:

**Table 3-2
Activity Performance Criteria**

Investigation Task	Acceptance Criteria
Site Mark Out	Investigation boundaries, site benchmarks, and transect survey waypoints are established with physical marking cues (e.g., survey stakes, pins, etc.) with co-ordinates tabulated achieving sub-meter accuracy.
Vegetation Clearance	Vegetation (e.g., tree limbs, deadfall, shrubs, grass, etc.) along the transects has been reduced ¹ within 4-6 inches of ground surface up to 8 feet above ground surface, to increase visibility and limit tripping or head bump hazards.
DGM Investigation: IVS Tests	IVS constructed using anomaly avoidance techniques. DGM survey crew has conducted twice-daily ² passes back-and-forth along IVS and record responses within 25%, or 1 mV (whichever is larger) / position within 50-cm along-line using fiducial methods as compared to day 1 results.

Investigation Task	Acceptance Criteria
DGM Investigation: Regimented Tests	Twice-daily ² personnel, cable shake, static background, and static spike tests conducted in "anomaly-free electromagnetically-quiet" area with data exhibiting no spikes greater than +/- 3mV on CH2, the established threshold. ³ Twice-daily ² static response compared to ISO Curve on Day 1 and +/- 10% of previous test reading thereafter
DGM Investigation: Production Data	Sample Separation of transect data within 25-cm greater than 98% of time. No single gap greater than 2-ft without documentation of obstacle. ⁴
DGM Data Analysis	Data from previous DGM survey is integrated into new DGM results. Color-coded map displays DGM data, highlighting values above the 3 mV on CH2 threshold ³ over GIS layers (aerial photo, property boundary, surface features identified during site visits or field activities, and previously acquired DGM data). Areas of interest and saturated areas are identified. As applicable, any potential man-made features are identified.

- Notes: ¹ *Vegetation reduction* may slightly skew paths to avoid trees which cannot be removed;
² *Twice-daily* is to occur at the start and end of each work day;
³ *Interpretation threshold* for 20-mm projectiles previously established by AGVIQ-CH2M HILL in 2010 will continue to be used; and
⁴ *Obstacles* include trees, deadfall, fencing, or other impedances which could not be circumvented.

Data acquisition procedures, documentation methods, and progress tracking for the evaluation of data as compared to the performance criteria for tasks identified in Table 3-2 are summarized in Sections 4.2 and 4.3.

3.4.7 Design for Collecting the Data

The investigation design is outlined in Chapter 4, below.

4.0 FIELD OPERATIONS

4.1 Mobilization and Site Set-Up

Resolution Consultants will schedule the arrival of its workforce, and subcontracted workforce, in a manner that is most effective and designed to allow immediate productivity. All personnel mobilized to the site will meet the Occupational Safety and Health Administration (OSHA) training and medical surveillance requirements specified in the Health and Safety Plan (HASP) included as Appendix D. The UXO Technicians will have the appropriate level of training and experience as stated in Department of Defense Explosives Safety Board (DDESB) Technical Paper 18 (TP-18). As part of the mobilization process, site-specific training for all on-site personnel will be performed in order to emphasize roles/responsibilities of each person or team, inclusive of a thorough review of the Standard Operating Procedures (SOPs) and specifically tailored for each key DGM field investigation activity discussed in Sections 4.2 and 4.3, below.

4.1.1 Site-Specific Training

Site-specific training will include, but is not limited to, a review of all applicable project documents (e.g., WP, ESS-DR, HASP, SOPs, etc.) by each Resolution Consultants or Resolution Consultants subcontract employee. Training will be provided by the Resolution Consultants Field Team Leader, and Resolution Consultants corporate staff, as required. The purpose of this training is to ensure that personnel fully understand the operational procedures and methods to be used at NWIRP Calverton, to include individual duties and responsibilities, and all safety and environmental concerns associated with conducting munitions response operations.

Digital and paper copies of required project documents will be maintained on site for reference. Site workers, whether arriving at the start of the project or rotating on site as a substitution for another employee, will not be allowed to conduct their daily field operations without reviewing the required documents and signing off that they have reviewed, understood, and will follow the project plan documents.

4.1.2 Equipment Check-Out

Project equipment for the anomaly avoidance surface assessments and vegetation clearance/reduction will come from Resolution Consultants sources and local leases/purchases, while the remaining project equipment used for production activities (e.g., site surveying, geophysical investigations, etc.) will be provided by each vendor conducting the fieldwork. Resolution Consultants will provide any equipment required to conduct quality inspection or safety audits of subcontractors, inclusive of instruments, software/hardware, and vehicles. All equipment, regardless of source, will be checked to ensure its completeness and operational readiness. Any equipment found damaged or defective will be returned to the point of origin, and a replacement

will be secured. All instruments and equipment that require routine maintenance and/or calibration will be checked initially upon arrival and then prior to use each day, if needed to support that day's operations. This system of checks ensures that the equipment is functioning properly. If an equipment check indicates that any piece of equipment is not operating correctly and field repair cannot be made, the equipment will be tagged and removed from service, and a request for replacement equipment will be placed immediately. Replacement equipment will meet the same specifications for accuracy and precision as the equipment removed from service.

4.1.3 IVS Construction

If possible, Resolution Consultants will use the Instrument Verification Strip (IVS) constructed for previous DGM surveys, if it still exists. Otherwise, a new IVS will be constructed using anomaly avoidance techniques (refer to Section 4.2.1) in the 2-acre area that was previously excavated to a depth of six feet (see Figure A-2, Appendix A). The IVS will be constructed of medium-sized Industry Standard Objects (ISOs) seeded in an in-line manner. The ISOs will consist of Schedule 40 pipe nipples that are threaded on both ends, and made of welded steel that has been manufactured to the specifications of the American Society for Testing and Materials (ASTM). The ISOs will measure 2.375 inches in diameter and 8 inches in length. The objects will be painted blue and tagged with a sequentially numbered identification (ID).

The objects will be placed sufficiently far apart such that the sensor signal returns to the background noise level between objects; the anticipated design for the IVS is that total length will be less than 100 feet and the objects will be buried at depths between three and seven times the diameter of the ISO, equivalent to depths of between seven and 17 inches bgs, to ensure adequate signals above the background noise level. An accurate measurement will be made from the ground surface to the center point of the objects and their locations will be measured and marked on the ground surface after burial. Finally, the end points will be surveyed and a roped tied between in order to provide a visual cue of controlling the walk-path and limiting controllable sources of errors while providing regimented consistency between passes.

4.2 Site Preparation

4.2.1 Anomaly Avoidance

As documented in the ESS-DR (Attachment B), the following precautionary measures are required to be implemented for all field activities:

- Notifying the Navy RPM regarding the planned commencement of field work (2 weeks out);
- Providing all personnel with a UXO Awareness Safety Brief prior to the start of fieldwork;
and

- Providing two UXO personnel (one of whom will be a UXO Technician II or above) to conduct anomaly avoidance activities and escort all field teams, site visitors, and non-essential personnel.

During anomaly avoidance, UXO personnel will conduct an instrument-aided visual survey using handheld Schonstedt GA-52Cx magnetometers. Any metallic items that can clearly be identified as non-munitions related material (i.e., CD) will be removed from the transect path. Metallic items suspected as being MPPEH will be documented (e.g., photograph, logbook), and its position will be paced off relative to nearest survey stake. The location will be clearly marked with a pin-flag or orange-cone for avoidance by future field investigation team(s). Documentation on any marked metallic items will be included as an attachment to the Final Report.

4.2.2 Surveying

Survey activities will involve using the existing, on-site, surveyed monitoring wells as control points for marking out the investigation boundaries and a series of DGM Survey positional waypoints using a GPS-based Trimble VRS system capable of achieving sub-meter accuracy. The locations of the proposed transects are identified in Figure A-2 (Appendix A).

The investigation boundary will consist of a 200 foot extension from the previous selected response action area in all directions up to the property fence line. If the property fence line is less than 200 feet, the locations of the waypoints will be limited to within the confines of Navy-owned property. The transect survey will involve placing along-line waypoints at line-of-sight distances (up to 200 feet maximum) or at locations of directional changes. The purpose of these waypoints is to provide control point guidance to confine future vegetation clearance, anomaly avoidance, and DGM survey field investigation activities. In addition to the investigation area, the IVS will be marked out. The IVS will be located within the 2-acre area previously cleared to a depth of six feet.

The extensive overhead tree-canopy in the MRS 02 DGM survey area may severely limit the effectiveness of the preferred Real-Time-Kinematic Differential Global Position System equipment used by the previous contractor. As such, distance-over-ground (e.g., wheel-odometer-fiducial, paced-time-fiducial, tape-line, etc.) will be substituted for DGM surveying.

Survey markers will consist of wooden lathes to serve as for visual cues for field personnel. All survey emplacements will be indelibly marked to identify the location of the specific point. Resolution Consultants will provide a full-time UXO Technician escort for anomaly avoidance procedures during the emplacement of the wooden laths.

All site location data (e.g., list of coordinates, map-view representation, etc.) will be provided in the project coordinate system of Universal Transverse Mercator (UTM) Zone 18 North (N), North American Datum (NAD) 1983, meters (m).

4.2.3 Vegetation Clearance

Vegetation clearance activities will be performed by Resolution Consultants' UXO Technicians prior to performing future field activities to remove any potential physical impediments (e.g., mobility, balance, tripping, head bumps, walk path road blocks, etc.) or line-of-sight obstructions (e.g., visual, communication signals, electronic signals). The purpose of the vegetation reduction activities are to improve: (1) the surveyor's ability to accurately emplaced stakes at some locations currently blocked by vegetation obstacles; (2) the DGM team(s)' abilities to accurately position and maneuver the metal detectors within close proximity to the ground surface; and (3) the UXO Technicians' abilities to clearly locate and mark surface items identified during anomaly avoidance activities.

Based on observations from a recent site visit, MRS 02 will require full vegetation reduction/removal of the underbrush, deadfall, branches, and overhanging limbs located in the path of the transects. No trees will be removed as part of these activities. Vegetation clearance will be accomplished using the following types of equipment/techniques:

- Hand-held brush cutters will be used to cut light vegetation and small grassy areas;
- Mechanized equipment will be used to remove brush and grasses;
- Chain saws (standard and pole) will be used in heavier brush areas and to cut tree branches; and
- Brush/vegetation debris cut from deadfall and any grass/shrubs cut with weed whackers will be left on site outside of the transect path's edge. Any tree branches cut from live trees will be mulched and left on site outside of the transect path's edge or disposed of at an appropriate off site facility.

During vegetation removal, equipment will be operated such that the blades will be kept a minimum of six inches above the ground surface to prevent subsurface disturbance or potential contact with surficial MPPEH. Areas that contain suspect surface MPPEH or approach close proximity (i.e., 5-10 ft) to large metal or concrete structures (e.g., magazines, fences, bunkers, buildings, metal frames, exposed debris piles, etc.) will be circumvented to avoid the potential of damaging equipment or injuring personnel. Avoided locations will be clearly documented in the UXO Technician escort's daily logbook entries as to the nature and extent of the circumvented

areas. Safety precautions and technical procedures outlined in the HASP (Appendix D) will be followed while conducting vegetation clearance activities.

4.3 Geophysical Investigation

4.3.1 General Approach

The geophysical data collection effort will consist of transect DGM surveys, following the same patterns staked-out by the surveyor. DGM team(s) will use the survey points to aid the positioning of EMI data in straight line segments by utilizing fiducial marks within the recorded data to document each time (in the data) the operator passes a survey stake. The field acquisition team will complete a field data sheet documenting survey procedures that will include information such as the team personnel, survey area, stake identification, survey type, terrain, vegetation, weather, file names, time, equipment serial numbers, instrument voltages, obstacles/data gaps, and any other comments that may be applicable to the investigation results. This information may be recorded digitally on handheld personal digital assistant devices or recorded manually in a field logbook. At the end of each day, the digital geophysical data will be transferred or converted to the project's electronic files. The electronic files, inclusive of recorded DGM data, tabulated transect waypoint data, and field notes, will be used by processors to interpolate EMI readings between transects waypoints to position the data within the confines of the UTM Zone 18 NAD 1983 coordinate system.

The geophysical investigation activities will be performed sequentially as follows:

Mobilization/Demobilization/IVS

The geophysical investigation team will mobilize to the site and use either the previously constructed IVS or the newly constructed IVS. If a new IVS is constructed, end-points will be established during the site mark-out and the seeds will be emplaced by UXO technicians. Geophysical teams will use the IVS to demonstrate an initial Day 1 successful repeated response over well defined items. The teams will demonstrate successful performance on the IVS twice-daily thereafter in addition to conducting the standard equipment functionality tests standard to the UXO industry (e.g. static response, static position, personnel, etc.). All subsequent tests will be compared to the initial Day 1 results. After the Day 1 start of project IVS and standard Quality Control (QC) tests have been completed, tabulated, and proven acceptable, the DGM Subcontractor will provide a brief few page summary letter report with the findings clearly shown. This report will be included in an appendix of the Final Report and production DGM surveys may commence after the results have been documented to have surpassed the QC metric standards as part of the project DQO criteria.

Transect-Pattern DGM Surveys

After start of project QC tests and IVS assessments are completed, full coverage transect-pattern DGM surveys will be completed within the MRP boundary as specified in Section 4.3.2 using the *Geonics* EM61-MKII system in conjunction with fiducial methods. The transect-pattern survey locations are identified on Figure A-2 (Appendix A). The transect-pattern Production Area DGM activities will use *Geonics* EM61-MKII sensor system in conjunction with fiducial positioning methods to accurately assess the areas along the surveyed and wooded lath marked transect paths. The purpose of DGM surveys and subsequent interpretative assessment is to fully record, digitally capture, geospatially map, and ultimately document response distributions of metallic debris, in the form of potential MEC (i.e. 20mm's), potential RRD (i.e. concrete structures, metal frames, and construction debris related to target infrastructure), and/or potential CD (e.g., rail-road ties, fencing, cans, etc.), in order to determine the bounded extents of subsurface contamination.

4.3.2 Investigation Areas

The planned DGM surveys will follow the actual paths, as physically demarcated by the survey stakes and brush reduction down the paths, and will comprise an estimated 3-4 miles (equivalent to approximately 1.3 acres) of transect path DGM survey sections within the previously defined MRS 02 boundary. Field conditions may dictate slight lateral deviations (for isolated cases on the order of a few feet maximum) from the planned paths, particularly when encountering: (1) deadfall, metal pipes, shrub vines, or other tripping hazards or (2) mounds, metal pieces, concrete pieces, or other topographic visual signs of burial to ensure record documentation. Implementing slight deviations as listed will not only limit safety hazards but will also improve the inherent quality and usefulness of the final product through common sense.

4.3.3 Geophysical Survey Types

The detection equipment will consist of two types of Time-Domain Electromagnetic (TDEM) sensor systems: 1) Analog Geophysical Mapping (AGM) sensor systems; and 2) Digital Geophysical Mapping (DGM) sensor systems.

AGM sensor systems are almost exclusively a hand-held platform with smaller sized coil (or sensor separation in case of non-TDEM magnetic gradiometers) swept just above the ground surface. The platform and electronics design allows for increased mobility and pin-point accuracy; therefore, the design has preferred characteristics required by the end-user UXO Technician for surface sweeps, near surface clearances, anomaly reacquire, and intrusive investigation activities, while still providing an adequate end-product. Of the previously listed activities, only anomaly avoidance support will use AGM sensors. This activity is a key safety precaution required for both surveying and vegetation reduction tasks, which precede the DGM tasks, for the MRS 02 area.

Unlike AGM sensor systems, DGM sensor systems are placed on wheeled-pushcart or within littered-carry style platform configurations using a standard when conducting single coil operations, all of which increases coil-height stability while limiting mobility through rough terrain. The DGM sensors also have a larger coil size (e.g., 1 x 0.5 meter, or similar, etc.) which generally increases detection of deeper seeded items than the hand-held sensors which meets the intended purpose of detecting metal objects indicative of ordnance hazards from a practical range of depths, normally on the order of 11 times the diameter of the elongated shaped ordnance items. After the UXO Technicians complete anomaly avoidance and vegetation reduction, field geophysicists will use the DGM sensors to cover the sites to assess the subsurface for metallic anomalies.

Analog Geophysical Equipment and Field Procedures

Hand-held AGM sensors are mounted at the end of the handle, away from the operator and towards the ground surface, with no digital readout, recording, or integrated positioning capabilities that indicates proximity to metal by generating different strengths, tones, pitches, or frequencies of an audible signal (representation of the digital signal and vice-versa) based on the size/depth and material properties of the item versus background soil contrast. The two most common are the *Schonstedt Instruments* magnetic locator and *White's Instruments* metal detector. Since no non-ferrous MEC hazards have been documented at the site, only magnetic locator AGM sensors will be used.

The *Schonstedt* GA-52Cx and GA-72cd are handheld magnetometers with the same sensor technology based upon the principles from fluxgate magnetometers organized in a gradiometer format. The *Schonstedt* employs two (2) fluxgate magnetometers that are aligned and mounted a fixed distance apart to detect changes in the earth's ambient magnetic field caused by ferrous metal (as the sensors are fixed and aligned to eliminate a response to the earth's ambient field). The *Schonstedt* is capable of detecting ferrous objects, simple to use, rugged, and requires little field maintenance outside of replacement of standard flashlight batteries every few days of use.

The *Schonstedt* magnetic locator will be used to aid in anomaly avoidance during brush-cutting, site surveying, and geophysical surveying tasks. Prior to each day's use, the UXO Technician will perform a functions check of the AGM sensor, and document the results in the field log book.

Digital Geophysical Equipment and Field Procedures

The *Geonics* EM61-MK2 TDEM DGM sensor is designed to detect, with high spatial resolution, shallow ferrous and non-ferrous metallic objects. In comparison with other metal detectors, especially magnetometers, the EM61-MK2 is better suited for work in close proximity to man-made structures and in areas of dense subsurface metallic debris such as the subsurface conditions expected at MRS 02. The standard EM61-MK2 system consists of two 0.5 meter by 1.0 meter air-

cored coils, a digital data recorder, batteries and processing electronics. The EM61-MK2's transmitter generates a pulsed primary electro-magnetic (EM) 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 (as planned for this work). The four time-gates to be measured are the 216-microsecond (μs), 366- μs , and 660- μs , and 1,266- μs time gates from the bottom receiver coil, mounted approximately 16.5 inches (± 1 inch) above the ground surface from the coil center. Earlier time gates provide enhanced detection of smaller metallic objects or objects of non-ferrous metal (e.g. brass, aluminum, etc.). Assuming accurate data positioning, target resolution up to one meter plus up to an additional foot of offset (depending on the aforementioned lateral deviations dictated by field conditions) can be expected in tree-canopied environments, such as those at the MRS 02 Area which mandate the use of fiducial positioning methods. Lastly, as a matter of practicality, none of the deviations listed will change the end-product result as the transect spacing, which is on the order of a factor of 10 times the positional offset, will be the true limiting factor for determining the spatial extent of contamination.

4.3.4 Potential Limitations

The DGM data collection system will be assessed in terms of the ability to meet the following DQOs:

- Achieve a down-line (sample separation) density $\leq 25\text{cm}$ in depth ≥ 98 percent of the time;
- Interpret the position of an anomaly (x-y) within 50cm down-line and 100cm radial distances from the item(s) seeded location in the IVS ≥ 95 percent of the time; and
- Meet or exceed other DGM performance criteria listed in Section 3.4.6.

The AGM data collection system will be assessed in terms of the ability to meet the following DQOs:

- Provide an audible response while a metallic item is moved towards the sensor.

Former infrastructure in the form of metallic debris (e.g., concrete, rebar, fencing, railroad ties, etc.) located in MRS 02 will present site-specific constraints that may potentially affect the ability to clearly identify discrete anomalies in the DGM data acquired. Specifically, areas within five to ten feet of the debris may result in a saturated geophysical response that will prevent the identification of discernible peak anomalies within these areas. However, since the intent of the surveys are to determine the extent of contamination through qualitative interpretation of trends and ultimately

determine at what point substantial amounts of metallic debris are no longer apparent, the saturation effects are noteworthy but not a major concern at this time.

4.3.5 Geophysical System Verification

The Geophysical System Verification (GSV) program typically consists of two elements, IVS surveys and a blind seeds. However, only the IVS surveys will be conducted as seeding is not the most effective quality control (QC) measure for transect surveys (ESTCP, 2009). Furthermore, blind seeds are not authorized to be placed in the subsurface in accordance with the provisions of the ESS-DR.

Initial IVS Passes with Letter Report

The initial IVS pass using the DGM (i.e. *Geonics* EM61-MK2) sensor will conduct a geophysical survey along the line of seed of items using the roped visual cue in a constrained travel pattern. Immediately after the initial pass, an additional pass will be made and the responses will be compared to ensure constancy. The controlling of coil positions is currently deemed the best method to maximize the repeatability between individual kinematic passes, and to minimize error as much as possible as compared to the Naval Research Laboratory (NRL) curves, keeping in mind the NRL curves were established statically. As a practical supplement to the process, small ISOs will be centrally mounted above the coil and compared to the NRL curves as a part of the daily static tests described in later sections. Thus, data will be collected both statically and kinematically over well-defined ISO objects at the beginning and the end of each work day, and also after any modifications to the system (e.g., replacement of coils, changing of coil height, etc.).

The initial IVS pass using the AGM hand-held sensor will require each UXO Technician operator to conduct a geophysical survey starting from within the localized vicinity (i.e., 3 feet away) from the flagged seed location and working his/her way towards the surface flag location of the seed centroid. The operator will ensure an audible sound is generated from the instrument for each seed clearly detected by all operators during the Day 1 IVS survey. Each location that audibly responds to the sensor will be annotated within the operator's logbook. If a previously constructed IVS is used, any seeds which do not indicate audible sound on Day 1, will be eliminated from future AGM testing.

The results from Day 1 IVS survey, for both EM61 and hand-held sensors, will be considered the benchmark for comparison against each day thereafter. As long as each supplement pass is representative of the Day 1 results and other required daily QC tests are passed successfully, the equipment-operator system will be considered to be functioning properly as a cohesive unit. The Day 1 and subsequent IVS results will be documented in the project final report. The report will include the following items:

- A map showing as-built design of the IVS;
- Pictures of non-ISO or not obviously well-defined seed items;
- A presentation of kinematic data collected over the IVS;
- Comparison of static test data to depth/response curves; and
- An assessment of the data quality for the first day of production.

Full-scale data collection will commence either the same day or by the following morning as long as there are no unresolved issues pertaining to equipment performance compared to project goals. The letter will be provided as an attachment to the DGM Summary Report.

4.3.6 Data Processing, Corrections and Advanced Analysis

Data Quality Objectives (DQOs) outlined in Section 3.4.6 were developed to ensure that the data generated during the geophysical investigation program are of appropriate quality to support the anticipated end use of the data. The geophysical survey DQOs define the performance criteria that need to be met to validate the geophysical data collection and processing efforts. In general, the data will be processed and analyzed using Geosoft's Oasis Montaj™ with the UX-Detect package. The data will be processed into ASCII data files with the delineated fields X, Y, Z, T, V1, V2, etc., where X and Y are project coordinates in Easting and Northing, Z is sensor elevation (optional), T is time as a function of a 24 hour military time, and V1, V2, etc. are the measured electromagnetic response, with additional channel names as needed to transparently display processing steps such as amplitude adjustments or positional corrections. Further details of processing guidelines and key QC inspection locations for performance metric verification are detailed below.

Initial Data Review

The initial data review step is important in order to quickly ascertain and swiftly determine whether any additional data requires collection or whether any erroneous data requires recollection from the previous day's activities. First, the data will be visually inspected in profile-view to check for broad-scale electromagnetic equipment errors such as erratic responses, step responses, incoherent or excessive noise, dropouts, and spikes. The initial review primarily concerns identifying any errors within the data that cannot be predictably corrected through processing techniques. Second, the data will be checked in map-view for down-line sampling (e.g., distance/time separation, speed, etc.), cross-line sampling (e.g., footprint coverage), systematic track-path errors (e.g., excessive overlap or gaps in data), and unique gridding features (e.g., utility features, localized clutter of anomalies, etc.). Additionally, the field notes will be reviewed to determine if there is any source(s) of interference such as utilities, radio sources, trees, fences, or metal scrap that might affect data quality which can be correlated to findings during the initial data review process. Any findings

which are unique or are not explained through the use of available information of correlating site conditions to equipment responses will be communicated to the project team. The initial data review is important to be completed up front in order to not consume valuable standard and advanced processing time for data that may not meet the project DQOs.

Standard Data Analysis

After the initial data review, various corrections applied at the processors discretion, dependent on sensor type and acquisition method, as follows.

- *Positional Offset Adjustment* corrects for the fixed geometry between the center of the electromagnetic sensors and the positioning system or method.
- *Amplitude Adjustments* corrects the data to a common background level. The amplitude adjustment process generally includes a mixture of filtering (e.g., Demedian, moving demedian, or drift correction) and hand-leveling techniques.
- *Spike Removal* uses a non-linear to remove sporadic spikes which are typical with electromagnetic sensors and usually occur infrequently. The occurrence of numerous spikes indicates sensor problems.
- *Latency/Lag Correction* adjusts for inherent timing/distance issues when collecting asynchronous data streams from various unrelated instruments. The results from the IVS will be used as guidance.
- *Static Noise Calculation* will assess Peak-to-Peak and statistical noise levels determined for each electromagnetic sensor based on the Static Test.
- *Kinematic Noise Calculation* will assess Peak-to-Peak and noise levels will be determined for each sensor based on data collected from an area predetermined to be EM quiet, such as the IVS.

After processing is complete, the data will be gridded and contoured in preparation for target anomaly selection. The use of a grid cell size between 0.25 to 0.5 times the transect swath is anticipated. Since some standard data analysis and processing steps may change based on site-specific ambient and subsurface conditions, the steps will be initially demonstrated and fine-tuned during the IVS.

4.3.7 Qualitative Interpretation

Individual target anomalies will be selected through the application of qualitative interpretation methods. For the MRS 02 Area, Resolution Consultants will use warm colors (e.g., yellows, oranges, reds) to indicate locations on a site-wide DGM map greater than the previously established peak amplitude value threshold of 3 mV on CH2 data for interpretation of 20-mm targets of interest within the EMI data. Other considerations include:

- Geophysical response such as length, width, size, shape and amplitude;
- Local background conditions;
- Data completeness, quality and accuracy;
- Field notes and observations annotated on aerial photo;
- Trends apparent from previously collected data; and
- Proximity of natural and cultural features.

As a footnote, the interpretation method is not only representative of the lower end response of a 20mm projectile as determined from previous investigations but also aligns with the theoretical lower end response from a 20mm projectile as determined by the EM61-MK2 Response Calculator (Naval Research Laboratory, 2008). Once a color-coded map is generated with an aerial photograph and previously acquired DGM data underlying the newly acquired DGM data, a qualitative interpretation will be completed to determine: 1) areas of concentrated metallic debris material and 2) the outer boundary or extent of metallic debris material as introduced in Section 1.2. Areas identified as containing metallic debris material will either have characteristics of saturated responses along a single line or elevated density (above background) responses covering multiple transect lines until a point at which elevated responses have deteriorated to a point that signs of metal debris are no longer evident. The color-coded map will be marked with geometric shapes or polygons indicative of each type of feature and the qualitative interpretation will be annotated on a symbol legend on the map. Once completed, the map along with associated QC deliverables will be reviewed by the Geophysics QC Scientist to verify that the appropriate information has been inserted into onto the map and applicable DQOs have been achieved. The EMI data and associated qualitative interpretation color-coded shapes will be exported into GIS format for external to Resolution Consultants use for supporting future remediation activities. Lastly, a final DGM Summary Report will be written detailing field activities and an interpretation summary, both of which will be used to culminate in recommending the extents of the path forward for future investigation/remediation activities.

4.4 Demobilization

Due to the nature of the scope of work, no temporary facilities requiring demobilization will be used. Upon the completion of fieldwork, Resolution Consultants and its subcontractors will decontaminate and remove all temporary equipment from the site. Decontamination of equipment that has not been exposed to contaminants will consist of performing a dry-decontamination (i.e., scraping dirt and mud from the equipment) prior to demobilization.

This page intentionally left blank

5.0 Quality Control

The regimented QC testing of DGM survey equipment includes the following four tests:

- Equipment/Electronics Warm-up;
- Personnel & Cable Shake Tests;
- Static Background & Static Spike Tests; and
- Static Position Repeatability Test.

Depending on the geophysical survey instrument used, however, the test may require modification as introduced below and detailed further in the SOP applicable to each set of equipment.

5.1 Equipment/Electronics Warm-Up

The Equipment/Electronics Warm-up test minimizes sensor drift caused by thermal stabilization. Most instruments need a few minutes to warm-up before data collection begins. All manufacturer instructions will be followed, or if none are given, data readings will be observed until they stabilize. Acceptance Criterion: Equipment Specific, but typically 5 minutes in warm dry weather up to 15-20 minutes in cold damp weather. This warm-up period will be allotted each time the unit is started. Lastly, a secondary key indicator that the equipment is ready for use is that the readings have stabilized for the geophysical survey sensor responses and/or the geodetic survey equipment telemetry signals while within the confines of an electromagnetically quiet area with no overriding ambient noise from EM or RF interference sources (e.g., power line, communication tower, etc). For most cases, all potential sources of noise are determined and fixed the first day on site as they do not change dramatically on a short term time scale, such as our project field effort.

5.2 Personnel and Cable Shake Tests

The Personnel Test ensures that survey personnel have removed all potential interference sources from their bodies. Common interference sources are steel-toed boots and large metallic belt buckles, which can produce anomalies signatures similar to investigation targets. The Cable Shake Test, as it implies, simply requires manipulating cable connections and maneuvering cables to simulate movement under normal operation. As a prime example, cables that approach their breaking point often generate spikes from even gentle movement near their connecting points. After the cable shake test is complete, the operators will check all cabling to ensure the connection seals are tight to prevent water or moisture inundation within the connection ports. The Acceptance Criterion: no repetitive (non-isolated occurrence) signals generated greater than the interpretation threshold without clearly documented noise source. Both tests will be conducted at the beginning of each day for the EM61-MK2 sensors only. As a matter of practicality, the influences are generally minimal due to the standard operator to sensor separation; however, as an

extra layer of precaution, equipment operators will still be screened for metal before operating any metal detectors.

5.3 Static Background and Static Spike Response Tests

The Static Background and Static Spike Tests determine the responses and repeatability of the instrument to representative area of metal free subsurface soil in an electromagnetically quiet ambient area, both with and without the use of a standard test item, such as an ISO. Both tests will be conducted at the beginning and end of each day for EM61-MK2 sensors only. The Acceptance Criterion: no signals generated greater than the interpretation threshold without clearly documented noise source and 10% of the spike response variation between tests when using an ISO mounted within a jig at a fixed location relative to the EM coil sensor. Incorrect channel or time-gate settings on electronics box, improper coil type or geometry or sample frequency settings within data logger, shorting of electronics box circuit boards or wiring, dampness in connections or coils, and faulty cabling or connectivity are the primary causes of inconsistent non-repeatable readings from improper instrument functionality.

5.4 Static Position Repeatability Test

The Static Position Repeatability Test determines the instrument accuracy by surveying and recording coordinate reading(s) over a known control, while not moving, and subsequently compared the recorded reading to the documented coordinates for the control point to measure distance offset. The test will be conducted at the beginning and end of each day for satellite or line-of-sight instruments only. Acceptance Criterion: Within 1-m for sub-meter GPS units; within 10-cm for RTK-DGPS, RTS, or Theodolite units; and within manufacture's specifications for varying types of lower accuracy hand-held units. Since no positioning equipment will be used by the DGM field crew, the static position test does not apply at this time.

6.0 REFERENCES

- AGVIQ-CH2M HILL, 2011. *Final Explosives Safety Submission for Munitions Response Site 02 – Former Fire Training Area*, Naval Weapons Industrial Reserve Plant, Calverton, NY. May 2011.
- AGVIQ-CH2M HILL, 2012. *Final Remedial Work Plan, Munitions Response Site 02 (Fire Training Area) Removal Action and Munitions Response*, Naval Weapons Industrial Reserve Plant, Calverton, NY. May 2012.
- AGVIQ-CH2M HILL, 2013. *Final Summary Report, Munitions Response Site 02 (Fire Training Area) Removal Action and Munitions Response*, Naval Weapons Industrial Reserve Plant, Calverton, NY. TBD 2013.
- C.F. Braun, 1997. *Phase II Environmental Baseline Study for NWIRP*. December, 1997.
- DDESB, 2004. *Minimum Qualifications for Unexploded Ordnance (UXO) Technicians and Personnel, Technical Paper (TP) No. 18*. Prepared by the Department of Defense Explosives Safety Board. 20 December 2004.
- Environmental Security Technology Certification Program (ESTCP), 2009. *Geophysical System Verification (GSV): A Physics-Based Alternative to Geophysical Prove-Outs for Munitions Response*. July 2009.
- NAVFAC NE, 2012. *SOW for Munitions Response Site 02 (Fire Training Area)*, Naval Weapons Industrial Reserve Plant, Calverton, NY. October 2012.
- Naval Research Laboratory, 2008. *EM61-MK2 Response of Standard Munitions Items*, NRL/MR/61110-08-9155, October 2008.
- NOSSA, 2013. *Approval Letter for Explosives Safety Submission Determination Request for Munitions Response Site 02 (Fire Training Area)*, Naval Weapons Industrial Reserve Plant, Calverton, NY. Feb 2013.
- Sovereign Consulting Inc., 2008. *Final Removal Action Work Plan for Installation Restoration (IR) Site 2 – Fire Training Area, Non-Time Critical Removal Action (NTCRA)*, Naval Weapons Industrial Reserve Plant, Calverton, NY. October 2008.
- Sovereign Consulting Inc., 2008-2009. *Field Efforts for Final Removal Action at Installation Restoration (IR) Site 2*, Naval Weapons Industrial Reserve Plant, Calverton, NY. October 2008 – December 2009.
- Resolution Consultants, 2012. *Client Approved Site Visit at Munitions Response Site 02 (Fire Training Area)*, Naval Weapons Industrial Reserve Plant, Calverton, NY. November 2012.
- Resolution Consultants, 2012. *POA/CE for Munitions Response Site 02 (Fire Training Area)*, Naval Weapons Industrial Reserve Plant, Calverton, NY. November 2012.

Resolution Consultants, 2013. *Explosives Safety Submission Determination Request for Munitions Response Site 02 (Fire Training Area)*, Naval Weapons Industrial Reserve Plant, Calverton, NY. January 2013.

Tetra Tech NUS, Inc., 2006. *Feasibility Study / Corrective Measures Study*, Naval Weapons Industrial Reserve Plant, Calverton, NY. May 2006.

Tetra Tech NUS, Inc., 2010. *Construction Oversight and Confirmation Soil Sampling Report at Site 2 – Fire Training Area*, Naval Weapons Industrial Reserve Plant, Calverton, NY. May 2010.

U.S. Department of Agriculture (USDA), 2012. *On-line Map Excerpt of Soil Survey of Suffolk County, New York*. Prepared, Natural Resource Conservation Service. December 2012.

U.S. Environmental Protection Agency (EPA), 2004. *Ecological Risk Assessment Freshwater Screening Benchmarks*. U.S. EPA Mid-Atlantic Risk Assessment, <http://www.epa.gov/reg3hwmd/risk/eco/btag/sbv/fw/screenbench.htm>, last updated October 23, 2012.

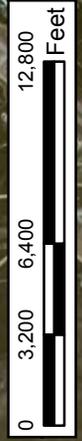
U.S. Environmental Protection Agency (EPA), 2006. *Guidance on Systematic Planning Using the Data Quality Objectives Process, EPA/240/B-06/001*. February 2006.

U.S. Environmental Protection Agency (EPA), 2008. *Munitions and Explosives of Concern Hazard Assessment Methodology, EPA505b08001*. October 2008.

Appendix A

Site Maps

This page intentionally left blank



Legend

Former Site 2 - Fire Training Area (30.56 Acres)

CONTRACT NO N62470-11-D-8013		TASK ORDER WE32	
DESIGNED BY B. Perrigo	DRAWN BY B. Perrigo	DATE January 2013	SHEET 1 of 1
SCALE 1" = 1.27 mi			
Figure_A-1_Location_MRS_02.mxd			

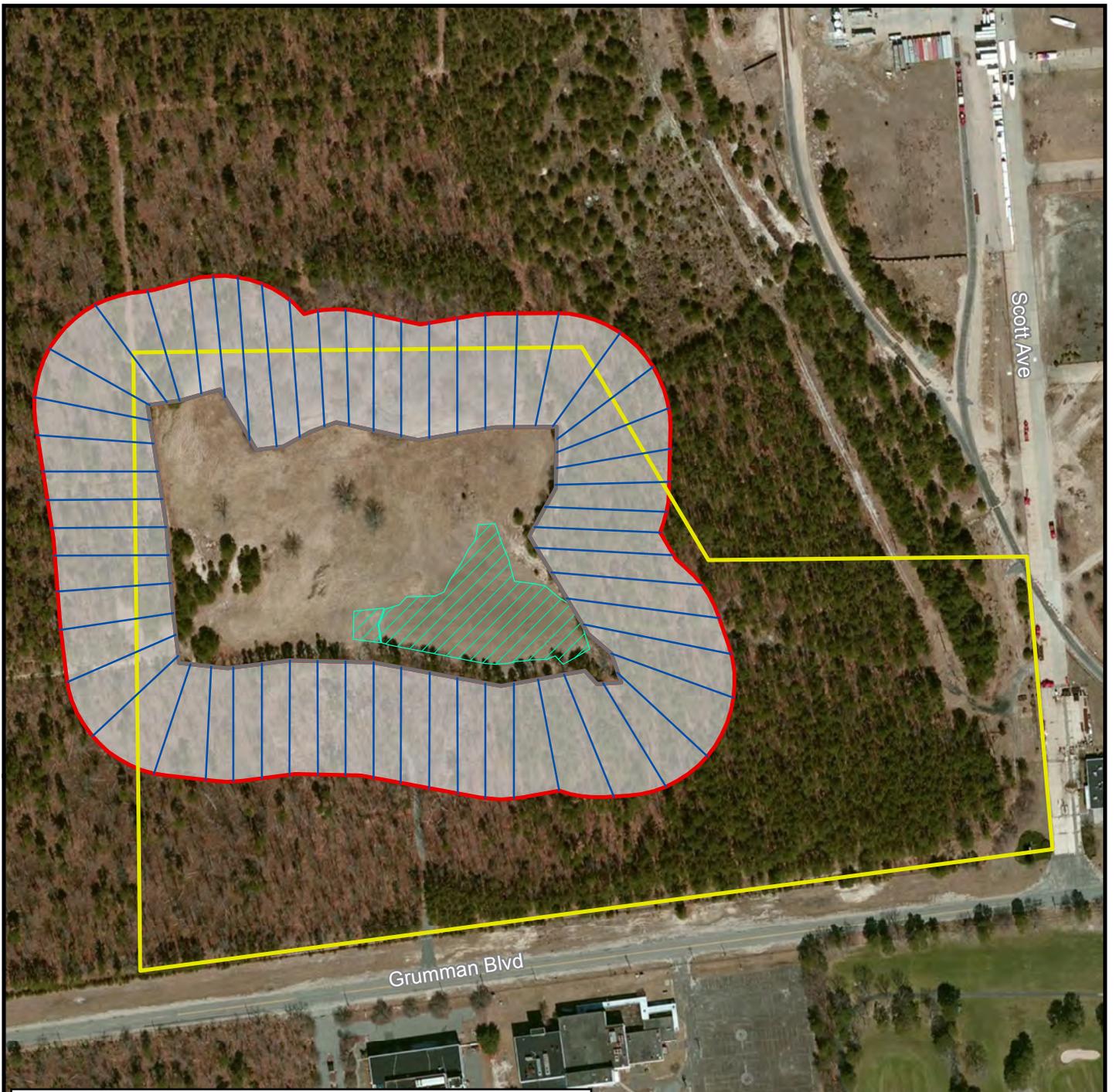
NWIRP Calverton

FIGURE A-1

Location Map of MRS 02 NWIRP Calverton
Calverton, NY



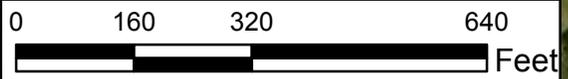
This page intentionally left blank



Legend

-  Proposed DGM Transect Locations
-  MRS 02 - Fire Training Area (7 acres)
-  DGM Investigation Area (approx. 14 acres)
-  Former Site 2 – Fire Training Area (30.56 Acres)
-  Excavation Area (2 Acres)/IVS Location

Note: The Actual DGM Investigation Area will be determined in the field based on the location of the partially enclosed Former Site 2 boundary fence.



L:\Common\GIS_Data\0203778_NWIRP_Calverton\MXD\Figure A-2_Boundary_Map_MRS_02.mxd

CONTRACT NO N62470-11-D-8013		TASK ORDER WE32	
DESIGNED BY B. Perrigo	DRAWN BY B. Perrigo	DATE January 2013	
CHECKED BY G. Quimby	SHEET 1 of 1		
SCALE 1" = 260'			
Figure_A-2_Boundary_Map_MRS_02.mxd			

NWIRP Calverton

FIGURE A-2

Boundary Map of MRS 02 NWIRP Calverton
Calverton, NY



This page intentionally left blank

Appendix B

Explosives Safety Submission Determination Request

This page intentionally left blank



DEPARTMENT OF THE NAVY
NAVAL ORDNANCE SAFETY AND SECURITY ACTIVITY
FARRAGUT HALL
3817 STRAUSS AVENUE, SUITE 108
INDIAN HEAD, MD 20640-5151

8020
Ser N47/288
25 Feb 13

From: Commanding Officer, Naval Ordnance Safety and Security Activity
To: Commanding Officer, Naval Facilities Engineering Command, Mid-Atlantic (00)
Subj: EXPLOSIVES SAFETY SUBMISSION DETERMINATION REQUEST FOR DIGITAL GEOPHYSICAL MAPPING OF THE MUNITIONS RESPONSE SITE 02, FIRE TRAINING AREA, NAVAL WEAPONS INDUSTRIAL RESERVE PLANT, CALVERTON, NEW YORK
Ref: (a) E-mail NAVFAC Mid-Atlantic (OPT3-5) Mr. J. Tarr/ NOSSA (N47) Ms. K. Garcia of 21 Feb 13 w/ encl
(b) NOSSAINST 8020.15C
(c) NAVSEA OP 5, Volume 1, Seventh Revision, Change 10
(d) DDESB memo DDESB-PE of 23 May 11 [CC-060]

1. As requested by reference (a), the Naval Ordnance Safety and Security Activity (NOSSA) reviewed the subject Explosives Safety Submission (ESS) Determination Request (DR) in accordance with references (b) and (c). Based on the information provided, NOSSA has determined that an ESS is not required to conduct vegetation reduction and support activities for a Digital Geophysical Mapping (DGM) at Munitions Response Site (MRS) 02, the Fire Training Area, Naval Weapons Industrial Reserve Plant (NWIRP), Calverton, New York.

2. As outlined in your request, we understand that the likelihood of encountering Munitions and Explosives of Concern (MEC) and/or Material Potentially Presenting an Explosive Hazard (MPPEH) during the proposed project has been determined to be low and that the following conditions apply:

a. Anomaly avoidance techniques shall be employed by unexploded ordnance (UXO) qualified personnel to support operations and to avoid contact with MEC or MPPEH. No intentional physical contact or other intrusive activities with MEC/MPPEH are authorized.

b. The UXO qualified personnel will escort surveyors who will mark the MRS boundary to assure area is clear of anomalies. In addition all personnel will receive a UXO Safety Awareness brief prior to performing work on-site.

Subj: EXPLOSIVES SAFETY SUBMISSION DETERMINATION REQUEST FOR
DIGITAL GEOPHYSICAL MAPPING OF THE MUNITIONS RESPONSE
SITE 02, FIRE TRAINING AREA, NAVAL WEAPONS INDUSTRIAL
RESERVE PLANT, CALVERTON, NEW YORK

c. UXO qualified personnel will perform a detector aided visual survey of the MRS during the vegetation reduction, which will occur to within 6 inches of the ground surface. In a similar manner, transects will be placed and an instrument aided visual survey of the surface will be performed.

d. DGM using sensors, such as an EM-61 MK 2 or equivalent, will be used to identify subsurface anomalies while employing anomaly avoidance techniques by qualified UXO personnel. The Instrument Verification Strip (IVS) from the approved ESS operations will be used if available or a new IVS will be established within the confines of the cleaned filled 2 acre Excavation Area.

e. The site is outside of all existing explosives safety quantity distance arcs; however, the site does have areas which are located within Exclusions Zones (EZ) generated from operations outlined in the ESS for MRS 02 - Former Fire Training Area dated May 11, as approved by reference (d). Therefore, no ESS operations that encumber the ESS DR areas/operations at MRS 02 - Former Fire Training Area shall be conducted while ESS DR operations are being performed.

3. If surface MEC or MPPEH is discovered on the site while employing anomaly avoidance techniques, the item will be avoided and its location and description will be reported to the cognizant Explosive Safety Officer and the Navy Project Manager. An emergency response from the cognizant Explosive Ordnance Disposal detachment will be requested, as appropriate.

4. The NOSSA point of contact for this ESS determination is Ms. Kathy Garcia, who can be contacted at commercial at 301-744-5636.



TAMMY K. SCHIRF
By direction

Copy to: (See next page)

Subj: EXPLOSIVES SAFETY SUBMISSION DETERMINATION REQUEST FOR
DIGITAL GEOPHYSICAL MAPPING OF THE MUNITIONS RESPONSE
SITE 02, FIRE TRAINING AREA, NAVAL WEAPONS INDUSTRIAL
RESERVE PLANT, CALVERTON, NEW YORK

Copy to:

CNO (N411C2; N452)

COMNAVFACENGCOM (ENV3)

NAVFAC MIDLANT (OPT3-5)

COMNAVREG MIDLANT (N05)

NAVAIR (Code 7.10)

NOSSA ESSOLANT (N5L)

EXPLOSIVES SAFETY SUBMISSION DETERMINATION REQUEST

Instructions: Project managers shall complete all blocks of this ESS DR and attach it to a digitally-signed e-mail sent to either:

NOSSA (N53) E-mail: inhdnossa-ess@navy.mil	COMMARSYSCOM (PM Ammo) E-mail: explosivessafety@usmc.mil
---	---

Site name/number, Activity, City, State and ZIP code:

Site Name: MRS 02, Fire Training Area, Naval Weapon Industrial Reserve Plant (NWIRP) Calverton, NY, 33040.

Date submitted:

February 21, 2013

Project manager and ESO: Names and contact information

Project Manager:
James M. Tarr, CPG, CG NAVFAC Midlant, 9742 Maryland Ave., Bldg. Z-144, Norfolk, VA 23511-3095, phone: (757) 341-2009
Explosive Safety Officer (ESO): None Listed.

EOD Det/UXO contractor: Name(s) and contact information

EOD Det: EODMU12 (Earle), Colts Neck, NJ; Com: (732) 866-2082, Cell: 558-7468
UXO Contractor / PM Contact: Resolution Consultants, 1500 Wells Fargo Bldg., 440 Monticello Ave., Norfolk, VA 23510 / Tel: (908) 616-0223, Email: Gregory.Quimby@aecom.com

Site history:
Briefly describe past MEC or MPPEH use at the site

NWIRP Calverton is located in central portion of Suffolk County, New York, approximately 70 miles east of New York City and a little over three miles west of Riverhead, NY (See Attached Figure A-1). The facility was used for the development, assembly, and testing of naval combat aircraft until 1996. The aircraft included the Grumman F-14 Tomcat, which used aircraft gun systems firing 20-mm cannon ammunition. NWIRP Calverton contained a firing stop-butt area for testing, sighting, and performing static target practice using aircraft firing systems. The stop-butt consisted of a sand backstop with dimensions approximately 50 feet wide by 50 feet deep and extending 20 feet high. The backstop was located within a covered and wood-line revetment. The stop-butt was reinforced with 12 inches of dense concrete on the floors and the walls. The aircraft would fire towards a static target position from approximately 200 feet away. As the plant closed and the facilities were decommissioned, the aircraft firing stop-butt was abandoned in place. The *Phase II Environmental Baseline Survey for NWIRP* (C.F. Braun, 1997) indicated the soil backstop had been moved; however, no documentation identifying the final location of the soil was provided.

In February 2010 the Navy was in the process of delineating petroleum-contaminated soils for a removal action within a 50 foot by 150 foot area of the 30.56-acre Former Site 2, Fire Training Area (Figure A-1 and A-2). During soil sampling activities, five remnants of 20mm projectiles were encountered on the ground surface at the site. The projectile remnants were encountered within a 30 foot by 30 foot area. In March 2010, personnel from Explosive Ordnance Disposal Mobile Unit 12 (EODMU12) inspected the projectiles and removed them from the site. A 7-acre area surrounding the location where the munitions were encountered was preliminarily designated as NWIRP Calverton MRS 02 - Fire Training Area (see attached Figure A-2).

The Navy subsequently conducted a "selected response" action on the preliminary 7-acre MRS boundary. The selected response action was conducted to a depth of 18 inches and has resulted in the removal of over 34,000 lbs of scrap metal pieces and over 17,000 20-mm projectiles. Prior to encountering munitions at the site, the Navy

excavated a 2-acre portion of the site to address petroleum contamination. This excavation was conducted to a depth of approximately 6 feet, and was backfilled with clean, imported fill. The location of the 2-acre excavation area is depicted on Figure A-2.

It should be noted that the Explosives Safety Submission (ESS) submitted for the site (AGVIQ CH2M Hill, 2011) reported the MRS 02 boundary as encompassing nine acres. However, subsequent GIS analysis identified a miscalculation in the previously reported acreage. The 7-acre boundary where the “selected response” was conducted encompasses the 2-acre portion of the site previously excavated by the Navy. This 2-acre portion of the site was inadvertently added to the 7-acre boundary that encompasses these two acres, to result in an incorrectly reported area of nine acres.

NAVFAC has issued a Task Order to Resolution Consultants under the Comprehensive Long-Term Environmental Action Navy contract N62470-11-D-8013 to conduct a non-invasive Digital Geophysical Mapping (DGM) survey to determine the qualitative distribution of subsurface anomalies outside of the 7-acre selected response area. The purpose of this work is to determine the potential extent of munitions impacts beyond the preliminary 7-acre MRS boundary. This work is not intended to delineate the nature and extent of munitions impacts. However, if the results of this DGM survey suggest that an expansion of the MRS boundary is appropriate, then the ESS will be amended to reflect this boundary change prior to resuming any further intrusive work authorized under the ESS.

MEC or MPPEH known or suspected to be present: Identify quantity, type/nomenclature, and condition

The only reported Munitions and Explosives of Concern (MEC) or Material Potentially Presenting and Explosive Hazard (MPPEH) encountered in MRS 02 – Fire Training Area are 20-mm projectiles. During the March 2010 EOD response, the specific nomenclature of the 20-mm projectiles could not be determined by EODMU12 because of the deteriorated condition of the projectiles due to weathering and the physical damage from subsequent repeat impacts. The results of the “selected response” action are not yet available to provide clarification on the nomenclature of the encountered munitions.

Approximately 8,000 of the 20-mm projectiles recovered during the “selected response” action required destruction via explosive demolition. The remaining 9,000 projectiles were classified as Munitions Debris (MD).

Work task/project
being proposed:
Briefly describe
proposed work;
identify encumbering
ESQD arcs

Previous DGM results suggest that subsurface anomalies may extend beyond the boundaries of the 7-acre "selected response" area. Additionally, there are earthen berms located immediately beyond the 7-acre "selected response" boundary. These berms appear to be constructed of the same fill material investigated during the "selected response," suggesting that 20-mm projectiles may also be present in these berms. Therefore, this project involves conducting a supplemental DGM survey up to 200 feet beyond the 7-acre boundary to identify the potential extent of munitions at the site. This DGM survey may include up to 14 acres of the site. However, the 30.56-acre Former Site 2 Fire Training Area is partially surrounded by a fence delineating portions of the property currently under Navy control. The exact location of the fence is not available, so the DGM survey will be conducted up to 200 feet beyond the 7-acre boundary or until the fence line is encountered, whichever occurs first. Figure A-2 depicts the proposed DGM transect locations. The actual transect locations and extent of DGM surveying will be determined during fieldwork.

The primary objective of the DGM survey is to conduct a non-invasive, qualitative assessment (i.e. determine the boundaries of contamination and distribution of anomalous regions) of the subsurface using standard Electro-magnetic Induction (EMI) sensors (e.g. EM61, etc.). No intrusive investigations will be conducted at this stage of the project. Site preparation and testing, prior to conducting the DGM survey, includes the following activities:

1. Vegetation Reduction activities;
2. Registered Land Survey (RLS) benchmark and transect guidance emplacements;
3. Instrument Aided Visual Survey (IAVS) of the surface; and
4. Instrument Verification Strip (IVS) construction for testing and calibrating DGM equipment.

Vegetation reduction activities will be performed by UXO-qualified personnel. Vegetation reduction will consist of removal of the underbrush, deadfall, branches, and overhanging limbs located in the path of the transects as these obstacles present physical hazards and impediments to data quality. Only hand-held equipment will be used to remove vegetation. During vegetation removal, equipment will be operated such that the blades will be kept a minimum of six inches above the ground surface to prevent subsurface disturbance. Areas that contain suspect surface MPPEH will be avoided and documented.

UXO escorting of surveyors and IAVS field activities will be conducted exclusively by UXO-qualified personnel. The UXO Technicians will mark and document locations of any surface MPPEH items for future anomaly avoidance. Additionally, UXO Technicians will provide anomaly avoidance support for the RLS and DGM survey activities. This support will involve escorting all non-UXO personnel outside of the cleared area and checking the surface and near subsurface for anomalies prior to emplacing survey stakes.

If the IVS used during the previous "selected response" action is available, it will be used. Otherwise, Resolution Consultants will construct a new IVS within the confines of the 2-acre "Excavation Area" depicted on Figure A-2.

No seeding will be completed as a part of the Geophysical System Verification (GSV) process as seeding is not the most effective quality control (QC) measure for transect surveys (Naval Research Lab, 2009). However, the DGM teams will survey the IVS at the beginning and end of each day of geophysical data collection to validate the data collection results. Additional DGM quality assurance/quality control (QA/QC) measures that will be implemented to ensure data quality objectives are achieved include:

- Personnel & Cable Shake Tests;
- Static Background & Static Spike Tests; and
- Static Position Repeatability Test.

These QA/QC measures will be performed at the beginning and end of each day of DGM surveying. Additionally, an equipment/electronics warm-up test will be performed once prior to the start of DGM surveying activities. Acceptance criteria for the various QA/QC measures are outlined in the Project Work Plan.

Likelihood of encountering MEC or MPPEH: Low, Medium or High; include rationale for selected likelihood

Likelihood: The likelihood of encountering MEC/MPPEH is determined to be “LOW” based on the proposed operations and safety precautions to be implemented.

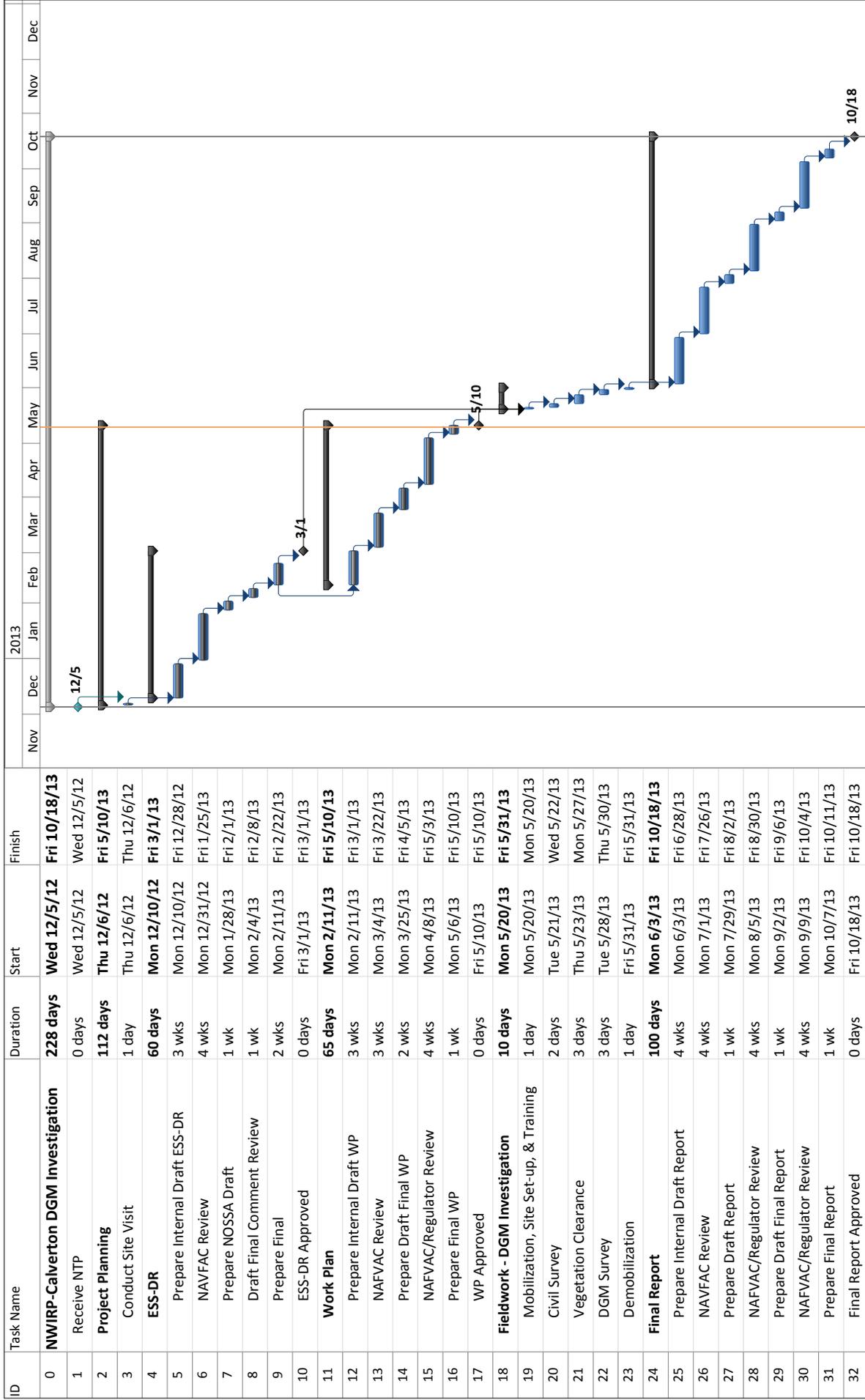
Rationale: The LOW likelihood of encountering MEC/MPPEH is based on the following rationale:

1. Anomaly avoidance techniques will be employed during all field activities;
2. All field teams or site visitors will be escorted by UXO-qualified personnel;
3. No intrusive activities or intentional physical contact with MEC/MPPEH will be conducted; and
4. The site is not located within any active Explosive Safety Quantity-Distance (ESQD) arcs from Potential Explosion Sites (PESs). No intrusive “Selected Response” activities authorized under the previously approved ESS will be conducted while fieldwork activities authorized under this contracted scope of work are being performed.

Appendix C

Project Schedule

This page intentionally left blank



Project: NWIRP-Calverton DGM in
Date: Fri 5/10/13

Task	External Tasks	Manual Task	Finish-only
Split	External Milestone	Duration-only	Deadline
Milestone	Inactive Task	Manual Summary Rollup	Progress
Summary	Inactive Milestone	Manual Summary	
Project Summary	Inactive Summary	Start-only	

This page intentionally left blank

Appendix D

Health and Safety Plan

This page intentionally left blank

SITE HEALTH AND SAFETY PLAN

**DIGITAL GEOPHYSICAL MAPPING INVESTIGATION OF MRS 02
Naval Weapons Industrial Reserve Plant
Calverton, New York
Munitions Response Site 02 – Fire Training Area**

Revision: 0

Resolution Consultants Job Number:
60283778

Prepared for:



**Department of the Navy
Naval Facilities Engineering Command, Mid-Atlantic
9742 Maryland Avenue, Bldg. Z-144
Norfolk, VA 23511-3095**

Prepared by:



Resolution Consultants
A Joint Venture of AECOM & EnSafe
1500 Wells Fargo Building
440 Monticello Avenue
Norfolk, Virginia 23510

Contract Number: N62470-11-D-8013
Delivery Order Number: WE32

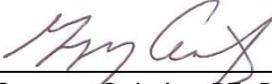
February 2013

This page intentionally left blank

SITE HEALTH AND SAFETY PLAN

This Site Health and Safety Plan (HASP) was prepared for employees performing a specific, limited scope of work. It was prepared based on the best available information regarding the physical and chemical hazards known or suspected to be present on the project site. While it is not possible to discover, evaluate, and protect in advance against all possible hazards that may be encountered during the completion of this project, adherence to the requirements of the HASP will significantly reduce the potential for occupational injury. By signing below, I acknowledge that I have reviewed and hereby approve the HASP for the NWIRP-Calverton, MRS 02 DGM Survey. This HASP has been written for the exclusive use of Resolution Consultants, their employees, and subcontractors. The plan is written for specified site conditions, dates, and personnel, and must be amended if these conditions change.

Prepared by:



Gregory Quimby, PE, PMP
MEC Investigation Technical Lead
732-564-3920

January 11, 2013

Date



Sean Liddy, CSP
District H&S Manager
443-553-1403

February 5, 2013

Date

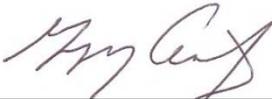
Concurrence by:



John Knopf, CSP
Resolution Consultants H&S Manager
901-372-7962

February 19, 2013

Date



Gregory Quimby, PE, PMP
CTO Manager
732-564-3920

February 19, 2013

Date

EXECUTIVE SUMMARY

The purpose of this Site Health and Safety Plan (HASP) is to address health and safety concerns related to Resolution Consultants managed activities at the project site. The document is intended to identify known potential hazards and facilitate communication and control measures to prevent injury or harm. Additionally, provisions to control the potential for environmental impact from these activities are included where applicable.

SUMMARY TABLE					
Resolution Consultants SOW		Resolution Consultants will be providing UXO escort services for subcontractors, performing all anomaly avoidance activities, and conducting vegetation reduction/removal activities to support site preparation tasks for the DGM surveys at MRS 02.			
Surveyors (TBD) SOW		A subcontracted surveyor will be performing site boundary surveys and establishing a series of transect waypoints along the areas proposed for investigation.			
Geophysics Subcontractor (TBD) SOW		A subcontracted Geophysics firm will be conducting digital geophysical mapping services over the proposed investigation area.			
PRIMARY PHYSICAL HAZARDS					
x	Underground Utilities		Traffic Control		Electrical Hazards
	Overhead Utilities	x	Slips, Trips/Walking Surface		Excavation & Trenching
X	Biological Hazards	x	Manual Lifting		Working adjacent to Railway
CHEMICAL HAZARDS, MONITORING, ACTION LEVELS					
COC		MONITORING		ACTION LEVELS	
MEC/MPPEH		Analog Geophysical Sensors (Schonstedt GA-52Cx or GA-72cd magnetometers; White's PI Surfmaster or XLT all-metals detectors)		Non-UXO Qualified personnel will practice UXO avoidance procedures under escort by a UXO Technician II or higher; only UXO Qualified personnel will conduct MEC/MPPEH investigation operations	

All staff is bound by the provisions of this HASP and are required to participate in a preliminary project safety meeting to familiarize them with the anticipated hazards and respective onsite controls. The discussion will cover the entire HASP subject matter, putting emphasis on critical elements of the plan; such as the emergency response procedures, personal protective equipment, site control strategies, and monitoring requirements. In addition, daily tailgate safety meetings will be held to discuss: the anticipated scope of work, required controls, identified new hazards and controls, incident reporting, the results of inspections, any lessons learned or concerns from the previous day.

Table of Contents

1.0	INTRODUCTION.....	1
1.1	General.....	1
1.2	Project Policy Statement	1
1.3	References.....	2
2.0	SITE INFORMATION AND SCOPE OF WORK.....	5
2.1	Site Information	5
2.1.1	General Description.....	5
2.1.2	Site Background/History	5
2.1.3	Previous Investigations.....	6
2.2	Scope of Work.....	6
2.2.1	Mobilization/Demobilization	7
2.2.2	Anomaly Avoidance.....	7
2.2.3	Site Surveying.....	7
2.2.4	Vegetation Removal	7
2.2.5	Geophysical Investigations.....	8
2.2.6	MPPEH Management	8
2.2.7	Additional Work Operations	8
3.0	HAZARD ASSESSMENT (SAFETY).....	9
3.1	Physical Hazards.....	9
3.1.1	Slips, Trips, Falls, and Protruding Objects	9
3.1.2	Housekeeping.....	10
3.1.3	Manual Lifting.....	10
3.1.5	Vehicle Operations	10
3.1.6	Spill Prevention.....	10
3.1.7	Unexploded Ordnance.....	11
3.2	Biological Hazards.....	12
3.2.1	Small Mammals.....	12
3.2.2	Venomous Animals.....	12
3.2.3	Poisonous Plants	12
3.2.4	Insects.....	14
3.3	Ultraviolet Hazards	14
3.4	Weather Hazards.....	15

3.5	Hazard Analysis	16
3.6	Task Specific SH&E Procedures.....	16
4.0	SH&E REQUIREMENTS (SAFETY).....	17
4.1	HAZWOPER Qualifications	17
4.2	Site-Specific Safety Training	17
4.3	Tailgate Meetings (SWAP)	17
4.4	Hazard Communication	17
4.5	Hazardous, Solid, or Municipal Waste.....	18
4.6	General Safety Rules.....	18
4.6.1	Housekeeping	18
4.6.2	Smoking, Eating, or Drinking	19
4.6.3	Personal Hygiene	19
4.6.4	Buddy System.....	20
4.7	Stop Work Authority	20
4.8	Client Specific Safety Requirements	20
5.0	EXPOSURE MONITORING PROCEDURES (HEALTH)	21
5.1	Contaminant Exposure Hazards	21
5.2	Real-Time Exposure Measurement	21
5.2.1	Health and Safety Action Levels	21
5.2.2	Monitoring Procedures.....	22
5.3	Heat and Cold Stress	22
5.3.1	Responding to Heat-Related Illness	23
5.3.2	Responding to Cold-Related Illness	24
6.0	ENVIRONMENTAL PROGRAM (ENVIRONMENT).....	27
6.1	Environmental Compliance and Management.....	27
6.1.1	Air Emissions	27
6.1.2	Hazardous Waste Management	27
6.1.3	Storm Water Pollution Prevention.....	27
6.1.4	Wetlands Protection	27
6.1.5	Critical Habitat Protection	27
6.1.6	Environmental Protection.....	27
7.0	PERSONAL PROTECTIVE EQUIPMENT	29
7.1	Personal Protective Equipment	29

7.2	PPE Doffing and Donning (UTILIZATION) Information	29
7.3	Decontamination	30
7.3.1	General Requirements	30
7.3.2	Decontamination Equipment	30
7.3.3	Personal/Equipment Decontamination	31
8.0	PROJECT HEALTH AND SAFETY ORGANIZATION	33
8.1	Project Manager [Gregory Quimby]	33
8.2	Field Team Leader [TBD]	33
8.2.1	Responsibilities	33
8.2.2	Authority	33
8.2.3	Qualifications	33
8.3	Site Safety and Health Officer [TBD]	34
8.3.1	Responsibilities	34
8.3.2	Authority	35
8.3.3	Qualifications	35
8.4	Employees	35
8.4.1	Employee Responsibilities	35
8.4.2	Employee Authority	35
8.5	Resolution Consultants Health and Safety Manager [John Knopf, CSP]	36
8.6	Subcontractors	36
8.7	Visitors	37
8.7.1	Visitor Access	37
9.0	SITE CONTROL	39
9.1	General	39
9.2	Controlled Work Areas	39
9.2.1	Exclusion Zone	39
9.2.2	Contamination Reduction Zone	40
9.2.3	Support Zone	40
9.3	Site Access Documentation	40
9.4	Site Security	40
10.0	EMERGENCY RESPONSE PLANNING	43
10.1	Emergency Action Plan	43
10.1.1	Emergency Coordinator	43

10.1.2	Site-Specific Emergency Procedures	45
10.1.3	Spill Containment Procedure	45
10.1.4	Safety Accident/Incident Reporting	46
10.1.5	Environmental Spill/Release Reporting.....	46
11.0	PERSONNEL ACKNOWLEDGEMENT	49

Figures

Figure 9-1	Typical Site Control Layout	42
Figure 9-1	Typical Site Control Layout	42
Figure 10-1	Emergency Occupational Hospital Route/Detail Map	48
Figure 10-1	Emergency Occupational Hospital Route/Detail Map	48

Tables

Table 3-1	Hazardous Plant Identification Guide	13
Table 5-3	Identification and Treatment of Heat-Related Illness	23
Table 5-4	Progressive Clinical Symptoms of Hypothermia	24
Table 7-1	Personal Protective Equipment	29
Table 7-1	Personal Protective Equipment	29
Table 10-1	Emergency Contacts.....	44
Table 10-2	Emergency Planning.....	45

Attachments

Attachment 1	Cross Reference Table
Attachment 2	HASP Revision Table
Attachment 3	Task Hazard Analyses
Attachment 4	Applicable SH&E SOPs
Attachment 5	Daily Safety Meeting Form (SWAP)
Attachment 6	Incident Investigation and Reporting Forms
Attachment 7	Material Safety Data Sheets
Attachment 8	State Spill Response Procedures/Spill Reporting Card

This page intentionally left blank

Acronyms and Abbreviations

ACGIH	American Conference of Governmental Industrial Hygienists
ANSI	American National Standards Institute
APP	Accident Prevention Plan
°C	Degrees Celsius
CAS	Chemical Abstracts Service
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
COC	Contaminant of Concern
CRZ	Contaminant Reduction Zone
CSP	Certified Safety Professional
dBA	Decibels on the A-weighted scale
DDESB	Department of Defense Explosives Safety Board
DGM	Digital Geophysical Mapping
DOT	Department of Transportation
EAP	Emergency Action Plan
EC	Emergency Coordinator
ESS-DR	Explosives Safety Submission Determination Request
EZ	Exclusion Zone
GFCI	Ground Fault Circuit Interrupter
HAZWOPER	Hazardous Waste Operations and Emergency Response
HASP	Health and Safety Plan
IDLH	Immediately Dangerous to Life or Health
IDW	Investigative-Derived Waste
MD	Munitions Debris
MEC	Munitions and Explosives of Concern
MPPEH	Material Potentially Presenting an Explosive Hazard
MSDS	Material Safety Data Sheet
NIOSH	National Institute for Occupational Safety and Health
NIST	National Institute of Standards and Technology
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
PM	Project Manager

PPE	Personal Protective Equipment
PHSP	Programmatic Health and Safety Plan
QC	Quality Control
SH&E	Safety, Health, and Environmental
SOP	Standard Operating Procedure
SOW	Statement of Work
SWAP	Safe Work Assessment Permit
SZ	Support Zone
THA	Task Hazard Analysis
TLV	Threshold Limit Value
TP	Technical Paper
USACE	US Army Corps of Engineers
USCG	US Coast Guard
USEPA	United States Environmental Protection Agency
UV	Ultraviolet
UXO	Unexploded Ordnance

1.0 INTRODUCTION

This project Health and Safety Plan (HASP) (including Attachments 1-8) provide a general description of the levels of personal protection and safe operating guidelines expected of each employee or subcontractor associated with the environmental services being conducted at the project site. This HASP also identifies chemical and physical hazards known to be associated with the Resolution Consultants-managed activities addressed in this document.

A cross-reference table is provided in Attachment 1 which provides information concerning the corresponding elements between this HASP and the Accident Prevention Plan (APP) requirements of the United States Army Corps of Engineers (USACE) *Safety and Health Requirements Manual*, EM-385-1-1, 2008.

This HASP may be modified as necessary to address any additional activities or changes in site conditions, which may occur during field operations. All changes to the HASP must be approved by the Resolution Consultants Health and Safety Manager or designee in advance of the execution of respective work.

1.1 General

The provisions of this HASP are mandatory for all Resolution Consultants personnel (including both AECOM and EnSafe employees, as applicable) engaged in fieldwork associated with the environmental services being conducted at the subject site. For the purposes of this HASP, the term "Resolution Consultants" means an employee of any of the three firms. A copy of this HASP, any applicable HASP supplements shall be accessible on site and available for review at all times. Recordkeeping will be maintained in accordance with this HASP and the applicable Standard Operating Procedures (SOPs). In the event of a conflict between this HASP, the SOPs and federal, provincial, state, and local regulations, workers shall follow the most stringent/protective requirements. Concurrence with the provisions of this HASP is mandatory for all personnel at the site covered by this HASP and must be signed on the acknowledgement page (Section 11.0).

1.2 Project Policy Statement

Resolution Consultants is committed to protecting the safety and health of our employees and meeting our obligations with respect to the protection of others affected by our activities. We are also committed to protecting and preserving the natural environment and communities in which we operate. The safety of persons and property is of vital importance to the success of this

project and accident prevention measures shall be taken toward the avoidance of needless waste and loss. It shall be the policy of this project that all operations be conducted safely. Onsite supervisors are responsible for those they supervise by maintaining a safe and healthy working environment in their areas of responsibility, and by fairly and uniformly enforcing safety and health rules and requirements for all project personnel. Subcontractors shall comply with the requirements of this HASP, provisions contained within the contract document and all applicable rules, requirements and health, safety and environmental regulations. All practical measures shall be taken to promote safety and maintain a safe place to work. Contractors are wholly responsible for the prevention of accidents on work under their direction and shall be responsible for thorough safety and loss control programs and the execution of their own safety plans for the protection of workers.

1.3 References

This HASP conforms to the regulatory requirements and guidelines established in the following documents:

- Department of Labor. Occupational Safety and Health Administration. (2012). Title 29, Part 1910 of the Code of Federal Regulations (29 CFR 1910), Occupational Safety and Health Standards (with special attention to Section 120, Hazardous Waste Operations and Emergency Response). Washington D.C: US Government Printing Office.
- Department of Labor. Occupational Safety and Health Administration. (2012). Title 29, Part 1926 of the Code of Federal Regulations (29 CFR 1926), Safety and Health Regulations for Construction (Chapter XVII). Washington D.C: US Government Printing Office.
- National Institute for Occupational Safety and Health (NIOSH). Occupational Safety and Health Administration. U.S. Coast Guard (USCG). US Environmental Protection Agency (USEPA) (1985). Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (Publication No. 85-115).
- Department of Defense Ammunition and Explosives Safety Standards. (2010). Department of Defense Manual (6055.09-M).
- Naval Sea Systems Command. (2007). Ammunition and Explosives Safety Ashore (NAVSEA OP-5, Volume 1, Seventh Revision).
- Department of the Navy. U.S. Army Corps of Engineers. (2008). Safety and Health Requirements Manual (Publication No. EM 385-1-1).
- Department of Defense Explosives Safety Board (DDESB) TP 18
- Resolution Consultants, Programmatic Health and Safety Plan.

- National Wetland Inventory. (2013, January 11). U.S. Fish and Wildlife Service. Retrieved from <http://www.fws.gov/wetlands/Data/mapper.html>.
- Critical Habitat Portal. (n.d.). U.S. Fish and Wildlife Service. Retrieve from <http://criticalhabitat.fws.gov>.

This page intentionally left blank

2.0 SITE INFORMATION AND SCOPE OF WORK

Resolution Consultants will conduct environmental services at the project site. Work will be performed in accordance with the applicable Statement of Work (SOW) and associated Project Work Plan developed for project site. Deviations from the listed SOW will require that the Resolution Consultants Health and Safety Manager or designee review and approve changes made to this HASP to ensure adequate protection of personnel and other property. All changes to this HASP must be documented in Attachment 2.

The following is a summary of relevant data concerning the project site, and the work procedures to be performed. The Project Work Plan prepared by Resolution Consultants as a companion document to this HASP provides more detail concerning both site history and planned work operations.

2.1 Site Information

This section provides a general description and historical information associated with the site.

2.1.1 General Description

MRS 02 (Fire Training Area) is located approximately seven miles west of Riverhead, NY, with southern entrance approximately 0.5 miles west of the Executive Airport entrance along Grumman Boulevard. MRS 02 also has unnamed dirt road entrances from the east, west, and north, all of which are gated as the entire site is "fenced-in" for safety. Based on a recent aerial photo, MRS 02 consists of a centrally located de-vegetated seven-acre area surrounded by overgrown shrub-filled woodlands, both of which are part of the overall 32 acre area federal property.

MRS 02 was used for fire training activities since 1955, and possibly as early as 1952. According to the Initial Assessment Study, soil disturbances were continually evident from aerial photographs and before 1982, site activities exclusively consisted of clearing an area of 100 feet in diameter and continually enclosing the area with an earthen berm. Additional details pertaining to the historical use of MRS 02 is further documented in the Site Background/History to follow.

2.1.2 Site Background/History

NWIRP Calverton was used for the development, assembly, and testing of naval combat aircraft until 1996. The aircraft included the Grumman F-14 Tomcat, which used 20-mm size aircraft gun systems. NWIRP Calverton contained a firing stop butt area for testing, sighting, and performing static target practice using aircraft firing systems. The static firing stop butt area was lined with approximately 50 feet x 50 feet of sand from the floor to approximately 20 feet height within a

covered and wood-line revetment. The butt was reinforced with 12 inches of dense concrete on the floors and the walls to which aircraft would fire from and towards a static position approximately 200 feet away.

Facility operations ended in February 1996. As the plant closed and the facilities were decommissioned, the aircraft firing stop butt was abandoned in place. The Phase II Environmental Baseline Survey for NWIRP indicated the soil backstop had been moved but no documentation was apparent to where the soil from the backstop had been relocated. In September 1998, the majority of land was transferred to the town of Riverhead, NY, for redevelopment. MRS 02 was not part of the land transfer.

2.1.3 Previous Investigations

Five remnants of 20-mm projectiles were encountered on the surface within a 30 foot by 30 foot square area in February 2010, during soil sampling activities at a petroleum contaminated area of the site. In March 2010, personnel from Explosive Ordnance Disposal Mobile Unit 12 inspected the projectiles, attempted to identify the nomenclature (but could not due to decay from weather exposure and splitting of rounds from subsequent impacts), and removed them from the site.

NAVFAC NE contracted AVIQ-CH2M to conduct a "selected response" action on the 7-acres of the MRS. Two acres located within the selected response action area were previously removed to a depth of approximately six feet by another contractor addressing petroleum contamination. As of December 2012, AVIQ-CH2M has removed over 35,000 lbs of scrap metal pieces and over 17,000 20-mm projectiles. Preliminary results from the selected response indicate that subsurface metallic anomalies extend beyond the 7-acre boundary.

2.2 Scope of Work

The scope of this munitions response is to conduct a DGM Assessment of the Former Fire Training Area (MRS 02). The objective of the assessment is to collect sufficient data to determine lateral extent of subsurface metallic debris contamination while potentially locating areas of interest within the boundaries of the investigation. No intrusive investigation activities or intentional contact with Material Potentially Presenting an Explosive Hazard (MPPEH) will occur under this scope of work. The following fieldwork activities will be performed as part of the scope of work:

- Mobilization/Demobilization
- Anomaly Avoidance;
- Civil Survey;
- Instrument Verification Strip Construction;

- Vegetation Clearance; and
- Geophysical Investigation.

2.2.1 Mobilization/Demobilization

Mobilization and demobilization represent limited pre and post-task activities. These activities include driving to and from the site; initial site preparations, such as toilet facilities setup; and post-work activities, such as removing files and field equipment and general housekeeping. This activity does not represent any investigation, assessment, or intrusive activities.

2.2.2 Anomaly Avoidance

Resolution Consultants will supply two UXO-qualified Technicians to provide anomaly avoidance support during fieldwork activities. During anomaly avoidance, UXO personnel will conduct an instrument-aided visual survey using handheld Schonstedt GA-52Cx magnetometers. Any metallic items that can clearly be identified as non-munitions related material (i.e., CD) will be removed from the transect path. Metallic items suspected as being MPPEH will be documented (e.g., photograph, logbook), and its position will be paced off relative to nearest survey stake. The location will be clearly marked with a pin-flag or orange-cone for avoidance by future FI team(s). Documentation on any marked metallic items will be included as an attachment to the Final Report. Anomaly avoidance will also involve escorting all non-UXO personnel through the site to ensure no direct physical contact with any identified MPPEH occurs. Prior to installing any wooden lathes or metallic pins to mark survey points, a UXO Technician will conduct a survey of the location using a magnetometer to ensure the area is free of subsurface anomalies.

2.2.3 Site Surveying

A surveying team will use established control points (i.e., existing monitoring wells) for surveying activities at the sites. Survey activities will involve marking out the locations of the geophysical transects. Surveying activities will work directly with a UXO-qualified technician to ensure anomaly avoidance measures are conducted at each survey marking location.

2.2.4 Vegetation Removal

Vegetation clearance activities will be performed by Resolution Consultants' UXO Technicians prior to performing future field activities to remove any potential physical impediments (e.g., mobility, balance, tripping, head bumps, walk path road blocks, etc.) or line-of-sight obstructions (e.g.,

visual, communication signals, electronic signals). Vegetation clearance will be accomplished using the following types of equipment/techniques:

- Hand-held brush cutters will be used to cut light vegetation and small grassy areas;
- Mechanized equipment will be used to remove brush and grasses;
- Chain saws (standard and pole) will be used in heavier brush areas and to cut tree branches; and
- Brush/vegetation debris will be left on site outside of the transect paths edge.

During vegetation removal, equipment will be operated such that the blades will kept a minimum of six inches above the ground surface to prevent subsurface disturbance. Areas that contain suspect surface MPPEH or approach close proximity (i.e., 5-10 ft) to large metal or concrete structures (e.g., magazines, fences, bunkers, buildings, metal frames, exposed debris piles, etc.) will be circumvented to avoid the potential of damaging equipment or injuring personnel.

2.2.5 Geophysical Investigations

The geophysical investigation will consist of Digital Geophysical Mapping (DGM) surveys along planned and pre-staked transects using a Geonics EM61-MKII high-sensitivity EMI metal detector. EMI sensor systems will be placed on wheeled-pushcart or within littered-carry style platforms while conducting the geophysical investigations along the transect paths. The DGM teams will survey the areas that have been established by the land surveyor and subsequently cleared of vegetation by the UXO Technicians by following the transect paths demarcated with survey points every one hundred to two hundred feet.

2.2.6 MPPEH Management

If MPPEH are coincidentally encountered during the field operations, the location will be marked for avoidance and their locations will be reported to NWIRP Calverton personnel through the Navy RPM. No MPPEH will be handled as part of this scope of work.

2.2.7 Additional Work Operations

Operations at the site may require additional tasks not identified in this section or addressed in Attachment 3, THAs. A THA must be prepared, and approved by the Safety Professional before performing any task not covered in this HASP. Given the current scope and planned level of effort, the possibility for additional work operations or safety precautions is unlikely.

3.0 HAZARD ASSESSMENT (SAFETY)

3.1 Physical Hazards

The following physical hazards are anticipated to be present on the site. Additional hazards may be noted on the THAs developed for the individual tasks.

3.1.1 Slips, Trips, Falls, and Protruding Objects

A variety of conditions may exist that may result in injury from slips, trips, falls, and protruding objects. Slips and trips may occur as a result of wet, slippery, or uneven walking surfaces. To prevent injuries from slips and trips, always keep work areas clean; keep walkways free of objects and debris; and report/clean up liquid spills. Protruding objects are any object that extends into the path of travel or working area that may cause injury when contacted by personnel. Always be aware of protruding objects and when feasible remove or label the protruding object with an appropriate warning.

Slippery, uneven footing and tripping hazards will likely be present at the site. Be vigilant, avoid puddles, and wear footwear with slip resistant soles. In addition, tall ground cover (high grass) can make it difficult to detect holes and depressions in the ground. Remain vigilant and travel slowly through areas with tall ground cover.

Walk around, not over or on top of debris or trash piles. When carrying equipment, identify a path that is clear of any obstructions. It might be necessary to remove obstacles to create a smooth, unobstructed access point to the work areas on site.

During the winter months, snow shovels and salt crystals should be kept on site to keep work areas free of accumulated snow and ice. Furthermore, use sand or other aggregate material to help keep work surfaces from being slippery, especially where salt/calcium chloride cannot be used. In addition, make sure work boots have soles that provide good traction.

Maintaining a work environment that is free from accumulated debris is the key to preventing slip, trip, and fall hazards at construction sites. Essential elements of good housekeeping include

- Orderly placement of materials, tools and equipment out of walkways
- Placing trash receptacles at appropriate locations for the disposal of miscellaneous rubbish
- Prompt removal and secure storage of items that are not needed to perform the immediate task at hand

3.1.2 Housekeeping

During site activities, work areas will be continuously policed for identification of excess trash and unnecessary debris. Excess debris and trash will be collected and stored in an appropriate container (e.g., plastic trash bags, garbage can, roll-off bin) prior to disposal. At no time will debris or trash be intermingled with waste PPE or contaminated materials. Additional information on the requirements of housekeeping can be found in *5-307-Housekeeping, Worksite*.

3.1.3 Manual Lifting

Most materials associated with investigation and remedial activities are moved by hand. The human body is subject to severe damage in the forms of back injury, muscle strains, and hernia if caution is not observed in the handling process. Whenever possible, use mechanical assistance to lift or move materials and at a minimum, use at least two people to lift, or roll/lift with your arms as close to the body as possible. For additional requirements and guidance, refer to *5-308-Manual Lifting*.

3.1.5 Vehicle Operations

Site vehicles present serious hazards site personnel. Blind spots, failure to yield, and other situations may cause heavy equipment/vehicles to come into contact with personnel. To reduce the possibility of contact between equipment/traffic and personnel, always adhere to the following:

- Personnel must wear a high visibility, reflective safety vest or clothing at all times when working near heavy equipment and/or other vehicle traffic.
- Personnel must always yield to equipment/vehicle traffic and stay as far as possible from all equipment/vehicle traffic. Always maintain eye contact with operators.
- When feasible, place barriers between work areas and equipment/vehicle traffic.
- Ensure Daily Equipment Safety Inspections are being performed and documentation on site.

3.1.6 Spill Prevention

Work activities may involve the use of hazardous materials (e.g., fuels, solvents) or work involving drums or other containers. The following procedures will be used to prevent or contain spills:

- All hazardous material will be stored in appropriate containers
- Tops/lids will be placed back on containers after use
- Containers of hazardous materials will be stored appropriately away from moving equipment

At least one spill response kit, to include an appropriate empty container, materials to allow for booming or diking the area to minimize the size of the spill, and appropriate clean-up material (e.g., speedy dri) shall be available at each work site with the potential for a chemical spill (more as needed). For the current project, spill prevention is only anticipated to apply to refueling gas powered vegetation / brush trimming, grass mowing equipment, or tree limb cutting equipment.

- All hazardous commodities in use (e.g., fuels) shall be properly labeled
- Containers shall only be lifted using equipment specifically manufactured for that purpose
- For drums/containers, follow the procedures in *5-308-Manual Lifting Safe Work Practices*, to minimize spillage

3.1.7 Unexploded Ordnance

Due to the nature of the SOW, the potential for encountering UXO exists and should be considered potential physical hazards. Anomaly avoidance support will be provided by a UXO-qualified Technician during all intrusive operations performed by non-UXO personnel and while non-UXO personnel are conducting site activities in areas that have not been surface cleared. Only UXO Technicians meeting the requirements of DDESB TP-18 will be authorized to provide anomaly avoidance services.

The Resolutions Consultants UXO Field Team Leader will provide a briefing to all Resolution Consultants personnel and visitors regarding the nature of the UXO hazard prior to them accessing the site. The following requirements shall be observed during all phases of the investigation.

- UXO Technicians will escort all personnel and visitors beyond the selected response action area within the overall site boundary.
- Personnel and visitors shall follow the instructions provided by UXO Technicians and restrict themselves to areas and routes identified by UXO Technicians.
- UXO Technicians will conduct tailgate safety briefings for all site personnel and visitors.
- UXO Technicians shall be notified of any unidentified items observed.
- Direct visual observation of personnel and visitors within the active work zone shall be maintained by UXO Technicians.
- Devices that produce sparks or flames are prohibited within the work area. Smoking is not permitted.

UXO Technicians shall escort all personnel and visitors within the active work zone. Any surface MPPEH discovered will be marked and reported.

3.2 Biological Hazards

It is anticipated that numerous biological hazards will be present on the project site. Poisonous plants may be found along the tree lines, and adjacent to monitoring wells, along with ticks and other biting insects. Stinging insects, such as bees and wasps may build nests inside of monitoring wells or be within proximity of the work zone. Below is a discussion of the most common biological hazards found on project sites, and those anticipated to be of concern here.

3.2.1 Small Mammals

Working in the field either directly or indirectly with small mammals has inherent risks of injury or exposure to zoonotic diseases (infectious diseases that can be transmitted from animals to humans) that all field staff need to protect themselves against. The risks are usually higher when there is direct contact with a wild animal, either through a break in the skin (blood), saliva, or excrement; however, there are also risks through air-borne diseases (e.g., Hantavirus). Should you encounter any small mammals please avoid contact with them.

3.2.2 Venomous Animals

Some animals have the ability to inject venom. These include: rattlesnakes, black widow spiders, and scorpions. These all have limited distributions, so in most areas you are unlikely to encounter them. Other spiders possess venom but they are not harmful to humans. Shrews have poisonous saliva but the chance of being envenomed by them is extremely unlikely unless they are handled. Should you encounter any potentially venomous animals please avoid contact with them.

If bitten by any of these animals special care should be taken to treat the wound as it may lead to complications due to the toxin. A bite from a venomous snakes or animals, which may expose varying degrees of toxic venom, is rarely fatal but should always be considered a medical emergency.

3.2.3 Poisonous Plants

Sensitivity to toxins generated by plants, insects and animals varies according to dosage and the ability of the victim to process the toxin; therefore, it is difficult to predict whether a reaction will occur, or how severe the reaction will be. Staff should be aware that there are a large number of organisms capable of causing serious irritations and allergic reactions. Some reactions will only

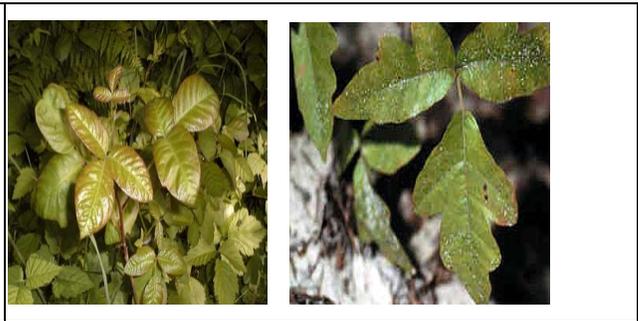
erupt if a secondary exposure to sunlight occurs. Depending on the severity of the reaction, the result can result in severe scarring, blindness or even death.

Plants that field staff should recognize and take precautions to avoid include: Poison Sumac, Poison Ivy (terrestrial and climbing), Poison Oak, Giant Hogweed (or Giant Cow Parsnip), Wild Parsnip, Devil's Club and Stinging Nettle. Many others are extremely poisonous to eat (e.g., Poison Hemlock, Water Parsnip) — do not eat anything that has not been identified.

A large number of plants are not harmful to touch but may contain poisonous berries or foliage that could cause serious complications or death if they are ingested. It goes without saying not to eat any berries or plants that you are not absolutely sure of their identity. Examples of common poisonous or irritating plant species, common to the United States, are shown in Table 3-1.

Care should be taken to avoid contact with poisonous vegetation by personnel who are allergic to the affects and those that are not. However, if you come into contact with poisonous plants accidentally, you can use cleansing agents such as 'Ivy-X wipes' or 'Technu' cream to lift the poisonous oils from the skin. It is recommended that you have cleansing agents available in the field for post exposure hygienic activities.

Table 3-1 Hazardous Plant Identification Guide	
Poison Ivy <ul style="list-style-type: none">• Grows in West, Midwest, Texas, East• Several forms — vine, trailing shrub, or shrub• Three leaflets (can vary 3-9)• Leaves green in summer, red in fall• Yellow or green flowers• White berries	

<p>Poison Oak</p> <ul style="list-style-type: none">• Grows in the East (NJ to Texas), Pacific Coast• 6-foot tall shrubs or long vines• Oak-like leaves, clusters of three• Yellow berries	
--	--

3.2.4 Insects

Insects for which precautionary measures should be taken include: mosquitoes (potential carriers of disease aside from dermatitis), black flies, wasps, bees, ticks, and Fire Ant.

Wasps and bees will cause a painful sting to anyone if they are harassed. They are of most concern for individuals with allergic reactions who can go into anaphylactic shock. Also instances where an individual is exposed to multiple stings can cause a serious health concern for anyone. These insects are most likely to sting when their hive or nest is threatened.

Ticks can be encountered when walking in tall grass or shrubs. They crawl up clothing searching for exposed skin where they will insert mouthparts to drink blood. Most serious concern is possibility of contracting Lyme disease which is spread by the Black-legged or Deer Tick. Occasionally a tick can cause Tick Paralysis if it is able to remain feeding for several days. Full recovery usually occurs shortly after the tick is removed.

The Fire Ant is spreading and often very abundant where it is established. It is very aggressive and commonly climbs up clothing and stings unprovoked when it comes into contact with skin. Painful irritations will persist for an hour or more.

Precautionary measures such as the use of insect repellent containing DEET should be utilized to help minimize the likelihood of bites from insects. The use of Premetherin for ticks is strongly encouraged. Refer to the manufacturer's directions regarding application of this repellent.

3.3 Ultraviolet Hazards

Workers performing field work outdoors may be susceptible to sunburn if not properly protected with sunscreen or protective clothing and hats. Skin can burn in minutes when the ultraviolet (UV)

Index is VERY HIGH. Protective measures, to include ≥ 30 SPF sunscreen and UVA/UVB protective clothing/safety glasses, are advisable year round.

3.4 Weather Hazards

The SSHO will be attentive to daily weather forecasts for the project area each morning. Predicted weather conditions of potential field impact are to be included in safety briefings and the Safe Work Assessment Permit (SWAP) for that day. Weather changes should initiate a review and updates SWAP as necessary. Weather-related hazards will directly correlate to the type of weather involved. Hot, dry weather may cause greater dust emissions, particularly during intrusive activities. Rain may increase slip/trip hazards, particularly for ground workers.

Severe weather can occur with little warning. Employees will be vigilant for the potentials for storms, lightning, high winds, and flash flood events. Additionally, lightning strikes during electrical storms could also be a potential hazard. The following procedures will be implemented once thunder is heard or lightning spotted:

- 1) If thunder is heard, all site personnel are to be alert of any visible lightning flashes. The SSHO will observe the storm front and track the direction it is moving. The SSHO will continue to observe the storm front until it passes or until the prevailing direction is determined to be away from the site.
- 2) If lightning is observed, the Site Supervisor or SSHO are to be notified. When the next lightning flash is observed, a "second" count shall be initiated from the time the lightning is observed until the thunder from the strike is heard.
- 3) The following action guidelines shall be implemented once the "second" count is ≤ 30 seconds:
 - a) "second" count > 30 , the Site Supervisor or SSHO will continually observe the storm front. If the front is moving away, work will continue. If the front is moving towards the site, the SS will initially place workers on alert for potential evacuation.
 - b) "second" count ≤ 30 , the Site Supervisor will issue the evacuation command and all workers are to report to the break/lunch trailer. Work can be re-initiated once the front has passed by and thunder has not been heard for 30 minutes.
- 4) If lightning is observed and the storm front is moving away from or around the site and is > 20 miles away, work will be permitted to continue. The location of the storm can be confirmed via internet access to a local weather website that has a Doppler radar tracking system.

3.5 Hazard Analysis

Task Hazard Analyses (THAs) have been completed for all tasks identified in the SOW:

- Anomaly Avoidance;
- Site Surveying;
- Vegetation Clearance; and
- Geophysical Investigation.

As a result of unanticipated work activities or changing conditions, additional THAs may be required. All additional THAs will be reviewed and approved by the Resolution Consultants Health and Safety Manager or designee.

3.6 Task Specific SH&E Procedures

Personnel may be exposed to a variety of chemical, physical, and radiological hazards resulting from task or equipment-specific activities. The controls for many of these hazards are discussed in the Resolution Consultants Safety, Health, and Environment (SH&E) SOPs. Copies of applicable SOPs are located in Attachment 4.

4.0 SH&E REQUIREMENTS (SAFETY)

4.1 HAZWOPER Qualifications

Personnel performing work at the job site must be qualified as Hazardous Waste Operations and Emergency Response (HAZWOPER) workers (unless otherwise noted in specific THAs or by the SSHO), and must meet the medical monitoring and training requirements specified in the Resolution Consultants' SH&E SOPs. If site monitoring procedures indicate that a possible exposure has occurred above the Occupational Safety and Health Administration (OSHA) permissible exposure limit (PEL), employees may be required to receive supplemental medical testing to document any symptoms that may be specific to the particular materials present.

4.2 Site-Specific Safety Training

All Resolution Consultants personnel performing activities at the site will be trained in accordance with *5-003-SH&E Training*. All personnel are required to remain current in all of their required training and evaluate their need for additional training when there is a change in work. In addition to the general health and safety training programs, personnel will be required to complete any supplemental task specific training developed for the tasks to be performed. Administration and compliance with the requirements for additional task-specific training will be the responsibility of the project or lead manager. Any additional required training that is completed will be documented and tracked in the project files.

4.3 Tailgate Meetings (SWAP)

Prior to the start of daily project activities, a tailgate meeting will be conducted by the UXO Field Team Leader. The meeting is to review the specific requirements of this HASP, applicable THA, and relevant risks and mitigation strategies for the planned SOW. Attendance at the daily tailgate meeting is mandatory for all employees at the site covered by this HASP and must be documented on the SWAP form (Attachment 5). All safety training documentation is maintained in the project file by the SSHO.

4.4 Hazard Communication

Hazardous materials that may be encountered as existing on-site environmental or physical/health contaminants during the work activities are addressed in this HASP and their properties, hazards and associated required controls will be communicated to all affected staff and subcontractors.

Any employee or organization (contractor or subcontractor) intending to bring any hazardous material onto MRS 02 must first provide a copy of the item's MSDS to the UXO Field Team Leader for review and filing (for maintenance and reference on site). MSDS may not be available for locally-obtained products, in which case some alternate form of product hazard documentation will be acceptable in accordance with *5-507-Hazardous Materials Communication/WHMIS* requirements.

All personnel shall be briefed on the hazards of any chemical product they use, and shall be aware of and have access to all MSDS. All containers on site shall be properly labeled to indicate their contents. Labeling on any containers not intended for single-day, individual use shall contain additional information indicating potential health and safety hazards (flammability, reactivity, etc.) In addition, any specific spill response planning or notification requirements are the responsibility of the contractor controlling and managing the materials at the site.

Attachment 7 contains copies of MSDS for hazardous contaminants of concern and hazardous chemicals planned to be brought onsite at the time this HASP is prepared. This information will be updated as required during site operations.

4.5 Hazardous, Solid, or Municipal Waste

If hazardous, solid, and/or municipal wastes are generated during any phase of the project, the waste shall be accumulated, labeled, and disposed of in accordance with applicable Federal, State, Provincial, Territorial and/or local regulations. Consult the Project Manager for further guidance.

4.6 General Safety Rules

All site personnel shall conduct themselves in a safe manner and maintain a working environment that is free of additional hazards, in adherence to *5-001-Safe Work Standards and Rules* and *5-307-Housekeeping, Worksite*.

4.6.1 Housekeeping

During site activities, work areas will be continuously policed for identification of excess trash and unnecessary debris. Excess debris and trash will be collected and stored in an appropriate container (e.g., plastic trash bags, garbage can, roll-off bin) prior to disposal. At no time will debris or trash be intermingled with waste PPE or contaminated materials.

4.6.2 Smoking, Eating, or Drinking

Smoking, eating and drinking will not be permitted inside any controlled work area at any time. Field workers will first wash hands and face immediately after leaving controlled work areas (and always prior to eating or drinking). Consumption of alcoholic beverages is prohibited at any Resolution Consultants site. Smoking, eating, or drinking must be in an approved area.

4.6.3 Personal Hygiene

The following personal hygiene requirements will be observed:

Water Supply: A water supply meeting the following requirements will be utilized:

Potable Water — An adequate supply of potable water will be available for field personnel consumption. Potable water can be provided in the form of water bottles, canteens, water coolers, or drinking fountains. Where drinking fountains are not available, individual-use cups will be provided as well as adequate disposal containers. Staff sharing a potables cooler shall not introduce individually opened containers into the team cooler in an effort to minimize concerns for indirect contamination. Additionally, each potable cooler will be sealed to protect the water quality.

Potable water containers will be properly identified in order to distinguish them from non-potable water sources. All containers of potable water will be marked with a label stating:

Potable Water ONLY
Not Intended for Sample Storage

Non-Potable Water — Non-potable water may be used for hand washing and cleaning activities. Non-potable water will not be used for drinking purposes. All containers of non-potable water will be marked with a label stating:

Non-Potable Water
Not Intended for Drinking Water Consumption

Toilet Facilities: A minimum of one toilet will be provided for every 20 personnel on site, with separate toilets maintained for each sex except where there are less than 5 total personnel on site.

For mobile crews where work activities and locations permit transportation to nearby toilet facilities on-site facilities are not required.

Washing Facilities: Employees will be provided washing facilities (e.g., buckets with water and Alconox) at each work location. The use of water and hand soap (or similar substance) will be required by all employees following exit from the Exclusion Zone, prior to breaks, and at the end of daily work activities.

4.6.4 Buddy System

All field personnel will use the buddy system when working within any controlled work area. Personnel belonging to another organization on site can serve as "buddies" for Resolution Consultants personnel. Under no circumstances will any employee be present alone in a controlled work area.

4.7 Stop Work Authority

All employees have the right and duty to stop work when conditions are unsafe, and to assist in correcting these conditions as outlined in *5-002-Stop Work Authority*. Whenever the SSHO determines that workplace conditions present an uncontrolled risk of injury or illness to employees, immediate resolution with the appropriate supervisor shall be sought. Should the supervisor be unable or unwilling to correct the unsafe conditions, the SSHO is authorized and required to stop work, which shall be immediately binding on all affected Resolution Consultants employees and subcontractors.

Upon issuing the stop work order, the SSHO shall implement corrective actions so that operations may be safely resumed. Resumption of safe operations is the primary objective; however, operations shall not resume until the Resolution Consultants Health and Safety Manager or designee has concurred that workplace conditions meet acceptable safety standards.

4.8 Client Specific Safety Requirements

All work performed under this SOW is subject to the ESS-DR that has been approved by the Navy.

5.0 EXPOSURE MONITORING PROCEDURES (HEALTH)

5.1 Contaminant Exposure Hazards

Based on the scope of work, there are no identified chemical contaminant exposure hazards. If changed site conditions are observed during fieldwork activities, this section will be amended to address any identified chemical hazards.

5.2 Real-Time Exposure Measurement

Based on current analytical data for the sites, contaminant toxicity and exposure hazards are insufficient to require real-time monitoring. Based on data obtained during investigation activities, this section will be amended to include any chemical hazards discovered during investigations.

5.2.1 Health and Safety Action Levels

An action level is a point at which increased protection is required due to the concentration of contaminants in the work area or other environmental conditions. The concentration level (above background level) and the ability of the PPE to protect against that specific contaminant determine each action level. The action levels are based on concentrations in the breathing zone. Action levels are based upon sound scientific principles as expressed by various regulatory agencies or industry groups.

If ambient levels are measured which exceed the action levels in areas accessible to unprotected personnel, necessary control measures (barricades, warning signs, and mitigative actions to limit, etc.) must be implemented prior to commencing activities at the specific work area.

Personnel should also be able to upgrade or downgrade their level of protection with the concurrence of the Field Team Leader or the Resolution Consultants Health and Safety Manager or designee.

Reasons to upgrade:

- Known or suspected presence of dermal hazards
- Occurrence or likely occurrence of gas, vapor, or dust emission
- Change in SOW will increase the exposure or potential exposure to hazardous materials

Reasons to downgrade:

- New information indicating that the situation is less hazardous than was originally suspected
- Change in site conditions that decrease the potential hazard

- Change in work task that will reduce exposure to hazardous materials

5.2.2 Monitoring Procedures

Based on current analytical data for the sites, contaminant toxicity and exposure hazards are insufficient to require real-time monitoring. Based on data obtained during investigation activities, this section will be amended to include any chemical hazards discovered during investigations.

5.2.2.1 Monitoring Equipment Calibration

All instruments used will be calibrated at the beginning and end of each work shift, in accordance with the manufacturer's recommendations. If the owner's manual is not available, the personnel operating the equipment will contact the applicable office representative, rental agency or manufacturer for technical guidance for proper calibration. If equipment cannot be pre-calibrated to specifications, site operations requiring monitoring for worker exposure or off-site migration of contaminants will be postponed or temporarily ceased until this requirement is completed.

5.2.2.2 Personal Sampling

Should site activities warrant performing personal sampling (breathing zone) to better assess chemical exposures experienced by Resolution Consultants employees, the UXO Field Team Leader, under the direction of a Certified Industrial Hygienist (CIH) or a Certified Safety Professional (CSP) will be responsible for specifying the monitoring required. Within five working days after the receipt of monitoring results, the CIH or CSP will notify each employee, in writing, of the results that represent that employee's exposure. Copies of air sampling results will be maintained in the project files.

If the site activities warrant, the subcontractor will ensure its employees' exposures are quantified via the use of appropriate sampling techniques. The subcontractor shall notify the employees sampled in accordance with health and safety regulations, and provide the results to the UXO Field Team Leader for use in determining the potential for other employees' exposure.

5.3 Heat and Cold Stress

Heat and cold stress may vary based upon work activities, PPE/clothing selection, geographical locations, and weather conditions. To reduce the potential of developing heat/cold stress, be aware of the signs and symptoms of heat/cold stress and watch fellow employees for signs of heat/cold stress.

5.3.1 Responding to Heat-Related Illness

Heat stress can be a significant field site hazard, particularly for non-acclimated personnel operating in a hot, humid setting. Site personnel will be instructed in the identification of a heat stress victim, the first-aid treatment procedures for the victim and the prevention of heat stress casualties. Work-rest cycles will be determined and the appropriate measures taken to prevent heat stress as outlined in *5-511-Heat Stress Prevention*.

The guidance below will be used in identifying and treating heat-related illness.

Type of Heat-Related Illness	Description	First Aid
Mild Heat Strain	The mildest form of heat-related illness. Victims exhibit irritability, lethargy, and significant sweating. The victim may complain of headache or nausea. This is the initial stage of overheating, and prompt action at this point may prevent more severe heat-related illness from occurring.	<ul style="list-style-type: none"> • Provide the victim with a work break during which he/she may relax, remove any excess protective clothing, and drink cool fluids. • If an air-conditioned spot is available, this is an ideal break location. • Once the victim shows improvement, he/she may resume working; however, the work pace should be moderated to prevent recurrence of the symptoms.
Heat Exhaustion	Usually begins with muscular weakness and cramping, dizziness, staggering gait, and nausea. The victim will have pale, clammy moist skin and may perspire profusely. The pulse is weak and fast and the victim may faint unless they lie down. The bowels may move involuntarily.	<ul style="list-style-type: none"> • Immediately remove the victim from the work area to a shady or cool area with good air circulation (<i>avoid drafts or sudden chilling</i>). • Remove all protective outerwear. • Call a physician. • Treat the victim for shock. (<i>Make the victim lie down, raise his or her feet 6–12 inches, and keep him/her cool by loosening all clothing</i>). • If the victim is conscious, it may be helpful to give him/her sips of water. • Transport victim to a medical facility ASAP.
Heat Stroke	The most serious of heat illness, heat stroke represents the collapse of the body's cooling mechanisms. As a result, body temperature may rise to 104 degrees Fahrenheit or higher. As the victim progresses toward heat stroke, symptoms such as headache, dizziness, nausea can be noted, and the skin is observed to be dry, red, and hot. Sudden collapse and loss of consciousness follows quickly and death is imminent if exposure continues. Heat stroke can occur suddenly.	<ul style="list-style-type: none"> • Immediately evacuate the victim to a cool/shady area. • Remove all protective outerwear and as much personal clothing as decency permits. • Lay the victim on his/her back w/the feet slightly elevated. • Apply cold wet towels or ice bags to the head, armpits, and thighs. • Sponge off the bare skin with cool water. • The main objective is to cool without chilling the victim. • Give no stimulants or hot drinks. • Since heat stroke is a severe medical condition requiring professional medical attention, emergency medical help should be summoned immediately to provide onsite treatment of the victim and proper transport to a medical facility.

5.3.2 Responding to Cold-Related Illness

If work on this project is conducted in the winter months, thermal injury due to cold exposure can become a problem for field personnel. Work will cease under unusually hazardous conditions (e.g., wind-chill less than 0°F, or wind-chill less than 10°F with precipitation). Systemic cold exposure is referred to as hypothermia. Localized cold exposure is generally labeled frostbite. Recognition of the symptoms of cold related illness will be discussed during the health and safety briefing conducted prior to the onset of site activities. Refer to the 2003 American Conference of Governmental Industrial Hygienists (ACGIH) threshold limit values (TLV) for Chemical Substances and Physical Agents for additional information on cold stress prevention, monitoring, and work-warming regimens. Work-rest cycles will be determined and the appropriate measures taken to prevent cold stress as outlined in *5-505-Cold Stress*.

5.3.2.1 Hypothermia

Hypothermia is a life-threatening condition in which the core body temperature falls below 95 degrees Fahrenheit (°F). Hypothermia can occur at temperatures above freezing particularly, when the skin or clothing becomes wet. During exposure to cold, maximum shivering occurs when the core temperature falls to 95°F. As hypothermia progresses, depression of the central nervous system becomes increasingly more severe. This accounts for the progressive signs and symptoms ranging from sluggishness and slurred speech to disorientation and eventually unconsciousness (see Table 5-2).

Table 5-2 Progressive Clinical Symptoms of Hypothermia

Core Temperature (°F)	Clinical Signs
95°	Maximum shivering
87° — 89°	Consciousness clouded; blood pressure becomes difficult to obtain; pupils dilated
84° — 86°	Progressive loss of consciousness; muscular rigidity; respiratory rate decreases
79°	Victim rarely conscious
70° — 72°	Maximum risk of ventricular fibrillation

The ability to sustain metabolic rate and to reduce skin blood flow is diminished by fatigue. Thus, fatigue increases the risk of severe hypothermia by decreasing metabolic heat. Additionally, because blood flow through the skin is reduced to conserve heat, the skin and underlying tissues become more susceptible to frostbite.

5.3.2.2 Frostbite

Frostbite is both the general and medical term given to areas of cold injury. Unlike hypothermia, frostbite rarely occurs unless environmental temperatures are less than freezing and usually less than 20°F. Frostbite injuries occur most commonly on the distal parts of the body (nose, earlobes, hands, and feet) that are subject to intense vasoconstriction. The three general categories of frostbite are:

- Frostnip — A whitened area of the skin, which is slightly burning or painful;
- Superficial frostbite — Waxy, white skin with a firm sensation but with some resiliency. Symptomatically feels “warm” to the victim with a notable cessation of pain; and
- Deep frostbite — Tissue damage deeper than the skin, at times, down to the bone. The skin is cold, numb, and hard.

5.3.2.3 Preventing Cold Related Illness

The following are precautions that will be taken to prevent illness relating to cold stress:

- Educate worker to recognize the symptoms of frostbite and hypothermia.
- Ensure the availability of an enclosed, heated environment within the vehicles. The nearest heated environment will be the interior of the vehicles at the site.
- Ensure the availability of dry changes of clothes.
- Record temperature readings.
- Ensure the availability of warm beverages, preferably non-caffeinated.

5.3.2.4 Monitoring for Cold Exposure

Cold stress monitoring will be conducted in accordance with the ACGIH cold stress TLV. The TLV objective is to prevent the deep body core temperature from falling below 96.8°F and to prevent cold injury to body extremities. Temperature monitoring and recording will be initiated in the following situations:

- At the SSHO discretion when suspicion is based on changes in worker's performance or mental status
- At worker's request
- As a screening measure whenever any one worker on the site develops hypothermia
- Any person developing moderate hypothermia (a core temperature of 92°F) cannot return to work for 48 hours

This page intentionally left blank

6.0 ENVIRONMENTAL PROGRAM (ENVIRONMENT)

6.1 Environmental Compliance and Management

This project and the individual tasks will comply with all federal, state, provincial, and local environmental requirements.

6.1.1 Air Emissions

No air emission concerns are foreseen on the site. As such, no additional protective measures are required for the execution of the project.

6.1.2 Hazardous Waste Management

No hazardous waste will be generated as part of this scope of work.

6.1.3 Storm Water Pollution Prevention

No storm water pollution prevention concerns are foreseen on the site. As such, no additional protective measures are required for the execution of the project.

6.1.4 Wetlands Protection

No wetland protection concerns are foreseen on the site.

6.1.5 Critical Habitat Protection

No known critical habitats or endangered species exist on site except for the New Jersey pine, which is not native prior to the establishment of NWIRP. No trees will be felled during vegetation clearance.

6.1.6 Environmental Protection

No additional environmental protection concerns are foreseen on the site. As such, no additional protective measures are required for the execution of the project.

This page intentionally left blank

7.0 PERSONAL PROTECTIVE EQUIPMENT

7.1 Personal Protective Equipment

The purpose of PPE is to provide a barrier, which will shield or isolate individuals from the chemical and/or physical hazards that may be encountered during work activities. *5-208-Personal Protective Equipment Program* lists the general requirements for selection and usage of PPE. Table 7-1 lists the minimum PPE required during site operations and additional PPE that may be necessary. The specific PPE requirements for each work task are specified in the individual THAs. By signing this HASP the employee agree having been trained in the use, limitations, care and maintenance of the protective equipment to be used by the employee at this project. If training has not been provided, request same of the Project Manager/SSHO for the proper training before signing.

Table 7-1 Personal Protective Equipment

Type	Material	Additional Information
Minimum PPE		
Safety Vest	ANSI Type II high-visibility	Must have reflective tape/be visible from all sides
Boots	Leather (or appropriate to the task at hand)	ANSI approved safety toe (only composite toe is authorized for geophysical investigation operations)
Safety Glasses		ANSI Approved; ≥98% UV protection
Hard Hat		ANSI Approved; recommended wide-brim
Work Uniform		No shorts/cutoff jeans or sleeveless shirts
Additional PPE		
Hearing Protection	Ear plugs and/ or muffs	In hazardous noise areas
Leather Gloves		If working with sharp objects or powered equipment.
Protective Chemical Gloves	Inner: Chemical resistant	Use during handling of all potentially impacted media.
Sunscreen	SPF 30 or higher	
Insect Repellent	Deet, Permethrin, etc.	Adhere to manufacturers application instructions and precautions
Biological Wipes or Wash	Ivy X Wipes or Technu	Post exposure wipes and wash for poison oak, ivy, sumac etc.

7.2 PPE Doffing and Donning (UTILIZATION) Information

The following information is to provide field personnel with helpful hints that, when applied, make donning and doffing of PPE a more safe and manageable task:

- Have a “buddy” check your ensemble to ensure proper donning before entering controlled work areas because unnoticed discrepancies may result in a potential exposure situation.
- Never perform personal decontamination with a pressure washer.

7.3 Decontamination

7.3.1 General Requirements

All possible and necessary steps shall be taken to reduce or minimize contact with chemicals and contaminated/impacted materials while performing field activities (e.g., avoid sitting or leaning on, walking through, dragging equipment through or over, tracking, or splashing potential or known contaminated/impacted materials, etc.)

All personal decontamination activities shall be performed with an attendant (buddy) to provide assistance to personnel that are performing decontamination activities. Depending on specific site hazards, attendants may be required to wear a level of protection that is equal to the required level in the Exclusion Zone (EZ).

All persons and equipment entering the EZ shall be considered contaminated, and thus, must be properly decontaminated prior to entering the Support Zone (SZ).

Decontamination procedures may vary based on site conditions and nature of the contaminant(s). If chemicals or decontamination solutions are used, care should be taken to minimize reactions between the solutions and contaminated materials. In addition, personnel must assess the potential exposures created by the decontamination chemical(s) or solutions. The applicable MSDS must be reviewed, implemented, and filed by personnel contacting the chemicals/solutions.

All contaminated PPE and decontamination materials shall be contained, stored and disposed of in accordance with site-specific requirements determined by site management.

7.3.2 Decontamination Equipment

The equipment required to perform decontamination may vary based on site-specific conditions and the nature of the contaminant(s). The following equipment is commonly used for decontamination purposes:

- Soft-bristle scrub brushes or long-handled brushes to remove contaminants
- Hoses, buckets of water or garden sprayers for rinsing
- Large plastic/galvanized wash tubs or children's wading pools for washing and rinsing solutions
- Large plastic garbage cans or similar containers lined with plastic bags for the storage of contaminated clothing and equipment

- Metal or plastic cans or drums for the temporary storage of contaminated liquids
- Paper or cloth towels for drying protective clothing and equipment

7.3.3 Personal/Equipment Decontamination

All equipment leaving the EZ shall be considered contaminated and must be properly decontaminated to minimize the potential for exposure and off-site migration of impacted materials. Such equipment may include, but is not limited to: sampling tools, heavy equipment, vehicles, PPE, support devices (e.g., hoses, cylinders, etc.), and various handheld tools.

All employees performing equipment decontamination shall wear the appropriate PPE to protect against exposure to contaminated materials. The level of PPE may be equivalent to the level of PPE required in the EZ. Following equipment decontamination, employees may be required to follow the proper personal decontamination procedures above.

The PPE to be used on-site is considered disposable and will be removed and containerized in the CRZ during decontamination activities. Suits and booties will be removed first, and gloves last.

- For Glove removal:
 - Grasp the cuff of the dominant hand and pull glove over the bulk of the hand, leaving the fingers inside the glove.
 - Use the dominant hand to grasp the cuff of the non-dominant hand and pull the glove completely off (inside-out) and place inside of the dominant hand glove.
 - Once removed, employee should only touch the inside material of the dominant hand glove.
 - Thoroughly wash hands.

This page intentionally left blank

8.0 PROJECT HEALTH AND SAFETY ORGANIZATION

8.1 Project Manager [Gregory Quimby]

The Project Manager (PM) has overall management authority and responsibility for all site operations, including safety. The PM will provide the site supervisor with work plans, staff, and budgetary resources, which are appropriate to meet the safety needs of the project operations.

8.2 Field Team Leader [TBD]

The Field Team Leader has the overall responsibility and authority to direct work operations at the job site according to the provided work plans. The PM may act as the site supervisor while on site.

8.2.1 Responsibilities

The Field Team Leader is responsible to:

- Discuss deviations from the work plan with the Site Safety and Health Officer (SSHO) and PM
- Discuss safety issues with the PM, SSHO, and field personnel
- Assist the SSHO with the development and implementation of corrective actions for site safety deficiencies
- Assist the SSHO with the implementation of this HASP and ensuring compliance
- Assist the SSHO with inspections of the site for compliance with this HASP and applicable SOPs

8.2.2 Authority

The Field Team Leader has authority to:

- Verify that all operations are in compliance with the requirements of this HASP, and halt any activity that poses a potential hazard to personnel, property, or the environment.
- Temporarily suspend individuals from field activities for infractions against the HASP pending consideration by the SSHO, the Resolution Consultants Health and Safety Manager or designee, and the PM.

8.2.3 Qualifications

In addition to being HAZWOPER-qualified (see Section 4.1), the Field Team Leader is required to have completed the 8-hour HAZWOPER Supervisor Training Course in accordance with 29 CFR 1910.120 (e)(4).

8.3 Site Safety and Health Officer [TBD]

8.3.1 Responsibilities

The SSHO is responsible to:

- Update the site-specific HASP to reflect changes in site conditions or the scope of work. HASP updates must be reviewed and approved by the Resolution Consultants Health and Safety Manager or designee. Updates must be documented using the Revision History in Attachment 2.
- Be aware of changes in Resolution Consultants Safety Policies, Programmatic Health and Safety Plan (PSHP), or SOPs.
- Monitor the lost time incidence rate for this project and work toward improving it.
- Inspect the site for compliance with this HASP and the SOPs using the appropriate audit inspection checklist provided by the Resolution Consultants Health and Safety Manager or designee.
- Work with the site supervisor and PM to develop and implement corrective action plans to correct deficiencies discovered during site inspections. Deficiencies will be discussed with project management to determine appropriate corrective action(s).
- Contact the Resolution Consultants Health and Safety Manager or designee for technical advice regarding safety issues.
- Provide a means for employees to communicate safety issues to management in a discreet manner (e.g., suggestion box, etc.).
- Determine emergency evacuation routes, establishing and posting local emergency telephone numbers, and arranging emergency transportation.
- Check that all site personnel and visitors have received the proper training and medical clearance prior to entering the site.
- Establish any necessary controlled work areas (as designated in this HASP or other safety documentation).
- Present tailgate safety meetings and maintain attendance logs and records.
- Discuss potential health and safety hazards with the Site Supervisor, the Resolution Consultants Health and Safety Manager or designee, and the PM.
- Select an alternate SSHO by name and inform him/her of their duties, in the event that the SSHO must leave or is absent from the site. The alternate SSHO must be approved by the PM.

8.3.2 Authority

The SSHO has authority to:

- Verify that all operations are in compliance with the requirements of this HASP.
- Issue a "Stop Work Order" under the conditions set forth in this HASP.
- Temporarily suspend individuals from field activities for infractions against the HASP pending consideration by the Resolution Consultants Health and Safety Manager or designee and the PM.

8.3.3 Qualifications

In addition to being HAZWOPER-qualified, the SSHO is required to have completed the 8-hour HAZWOPER Supervisor Training Course in accordance with 29 CFR 1910.120 (e)(4).

8.4 Employees

8.4.1 Employee Responsibilities

Responsibilities of employees associated with this project include, but are not limited to:

- Understanding and abiding by the policies and procedures specified in the HASP and other applicable safety policies, and clarifying those areas where understanding is incomplete.
- Providing feedback to health and safety management relating to omissions and modifications in the HASP or other safety policies.
- Notifying the SSHO, in writing, of unsafe conditions and acts.

8.4.2 Employee Authority

The health and safety authority of each employee assigned to the site includes the following:

- The right to refuse to work and/or stop work authority when the employee feels that the work is unsafe (including subcontractors or team contractors), or where specified safety precautions are not adequate or fully understood.
- The right to refuse to work on any site or operation where the safety procedures specified in this HASP or other safety policies are not being followed.
- The right to contact the SSHO or the Resolution Consultants Health and Safety Manager or designee at any time to discuss potential concerns.
- The right and duty to stop work when conditions are unsafe, and to assist in correcting these conditions

8.5 Resolution Consultants Health and Safety Manager [John Knopf, CSP]

The Health and Safety Manager is assigned to provide guidance and technical support for the project. Duties include the following:

- Approving this HASP and any required changes
- Approving the designated SSHO
- Reviewing all personal exposure monitoring results
- Investigating any reported unsafe acts or conditions

The Health and Safety Manager may designate another safety professional as the direct liaison for this project; if that is the case, he will remain available for any or all of the tasks listed here or elsewhere in this HASP in lieu of the designee.

8.6 Subcontractors

The requirements for subcontractor selection and subcontractor safety responsibilities are outlined in *5-213-Subcontractors*. Each Resolution Consultants subcontractor is responsible for assigning specific work tasks to their employees. Each subcontractor's management will provide qualified employees and allocate sufficient time, materials, and equipment to safely complete assigned tasks. In particular, each subcontractor is responsible for equipping its personnel with any required PPE and all required training.

Resolution Consultants considers each subcontractor to be an expert in all aspects of the work operations for which they are tasked to provide, and each subcontractor is responsible for compliance with the regulatory requirements that pertain to those services. Each subcontractor is expected to perform its operations in accordance with its own unique safety policies and procedures, to ensure that hazards associated with the performance of the work activities are properly controlled. Copies of any required safety documentation for a subcontractor's work activities will be provided to Resolution Consultants for review prior to the start of onsite activities, if required.

Hazards not listed in this HASP but known to any subcontractor, or known to be associated with a subcontractor's services, must be identified and addressed to the Resolution Consultants PM or the Site Supervisor prior to beginning work operations. The Site Supervisor or authorized representative has the authority to halt any subcontractor operations, and to remove any

subcontractor or subcontractor employee from the site for failure to comply with established health and safety procedures or for operating in an unsafe manner.

8.7 Visitors

Authorized visitors (e.g., client representatives, regulators, Resolution Consultants management staff, etc.) requiring entry to any work location on the site will be briefed by the PM on the hazards present at that location. Visitors will be escorted at all times at the work location and will be responsible for compliance with their employer's health and safety policies. In addition, this HASP specifies the minimum acceptable qualifications, training and personal protective equipment which are required for entry to any controlled work area; visitors must comply with these requirements at all times.

8.7.1 Visitor Access

Visitors to any HAZWOPER controlled-work area must comply with the health and safety requirements of this HASP, and demonstrate an acceptable need for entry into the work area. All visitors desiring to enter any controlled work area must observe the following procedures:

1. A written confirmation must be received by Resolution Consultants documenting that each of the visitors has received the proper training and medical monitoring required by this HASP. Verbal confirmation can be considered acceptable provided such confirmation is made by an officer or other authorized representative of the visitor's organization.
2. Each visitor will be briefed on the hazards associated with the site activities being performed and acknowledge receipt of this briefing by signing the appropriate tailgate safety briefing form.
3. All visitors must be escorted by a Resolution Consultants employee.

Unauthorized visitors, and visitors not meeting the specified qualifications, will not be permitted within established controlled work areas.

This page intentionally left blank

9.0 SITE CONTROL

9.1 General

The purpose of site control is to minimize potential contamination of workers, protect the public from site hazards, and prevent vandalism. The degree of site control necessary depends on the site characteristics, site size, and the surrounding community.

Controlled work areas will be established at each work location, and if required, will be established directly prior to the work being conducted. Diagrams designating specific controlled work areas will be drawn on site maps, posted in the support vehicle or trailer and discussed during the daily safety meetings. If the site layout changes, the new areas and their potential hazards will be discussed immediately after the changes are made. General examples of zone layouts have been developed for drilling and earth moving activities (e.g., excavating, trenching, drilling) and are attached to this section.

9.2 Controlled Work Areas

Each HAZWOPER controlled work area will consist of the following three zones:

- *Exclusion Zone (EZ):* Contaminated work area
- *Contamination Reduction Zone (CRZ):* Decontamination area
- *Support Zone (SZ):* Uncontaminated or "clean area" where personnel should not be exposed to hazardous conditions

Each zone will be periodically monitored in accordance with the access control requirements as outlined in this HASP and the ESS-DR.

9.2.1 Exclusion Zone

The Exclusion Zone is the area where primary activities occur, such as intrusive MEC investigation, sampling, installation of wells, cleanup work, etc. This area must be clearly marked with hazard tape, barricades or cones, or enclosed by fences or ropes. Only personnel involved in work activities, and meeting the requirements specified in the applicable THA and this HASP will be allowed in an Exclusion Zone. The extent of each area will be sufficient to ensure that personnel located at/beyond its boundaries will not be affected in any substantial way by hazards associated with sample collection activities.

All personnel should be alert to prevent unauthorized, accidental entrance into controlled-access areas (the EZ and CRZ). If such an entry should occur, the trespasser should be immediately escorted outside the area, or all HAZWOPER-related work must cease. All personnel, equipment, and supplies that enter controlled-access areas must be decontaminated or containerized as waste prior to leaving (through the CRZ only).

9.2.2 Contamination Reduction Zone

The Contamination Reduction Zone is the transition area between the contaminated area and the clean area. Decontamination is the main focus in this area. The decontamination of workers and equipment limits the physical transfer of hazardous substances into the clean area. This area must also be clearly marked with hazard tape and access limited to personnel involved in decontamination.

9.2.3 Support Zone

The Support Zone is an uncontaminated zone where administrative and other support functions, such as first aid, equipment supply, emergency information, etc., are located. The Support Zone shall have minimal potential for significant exposure to contaminants (i.e., background levels). Employees will establish a Support Zone (if necessary) at the site before the commencement of site activities. The Support Zone would also serve as the entry point for controlling site access.

9.3 Site Access Documentation

If implemented by the PM, all personnel entering the site shall complete the "Site Entry/Exit Log" located at the site trailer or primary site support vehicle.

9.4 Site Security

Site security is necessary to:

- Prevent the exposure of unauthorized, unprotected people to site hazards
- Avoid the increased hazards from vandals or persons seeking to abandon other wastes on the site
- Prevent theft
- Avoid interference with safe working procedures

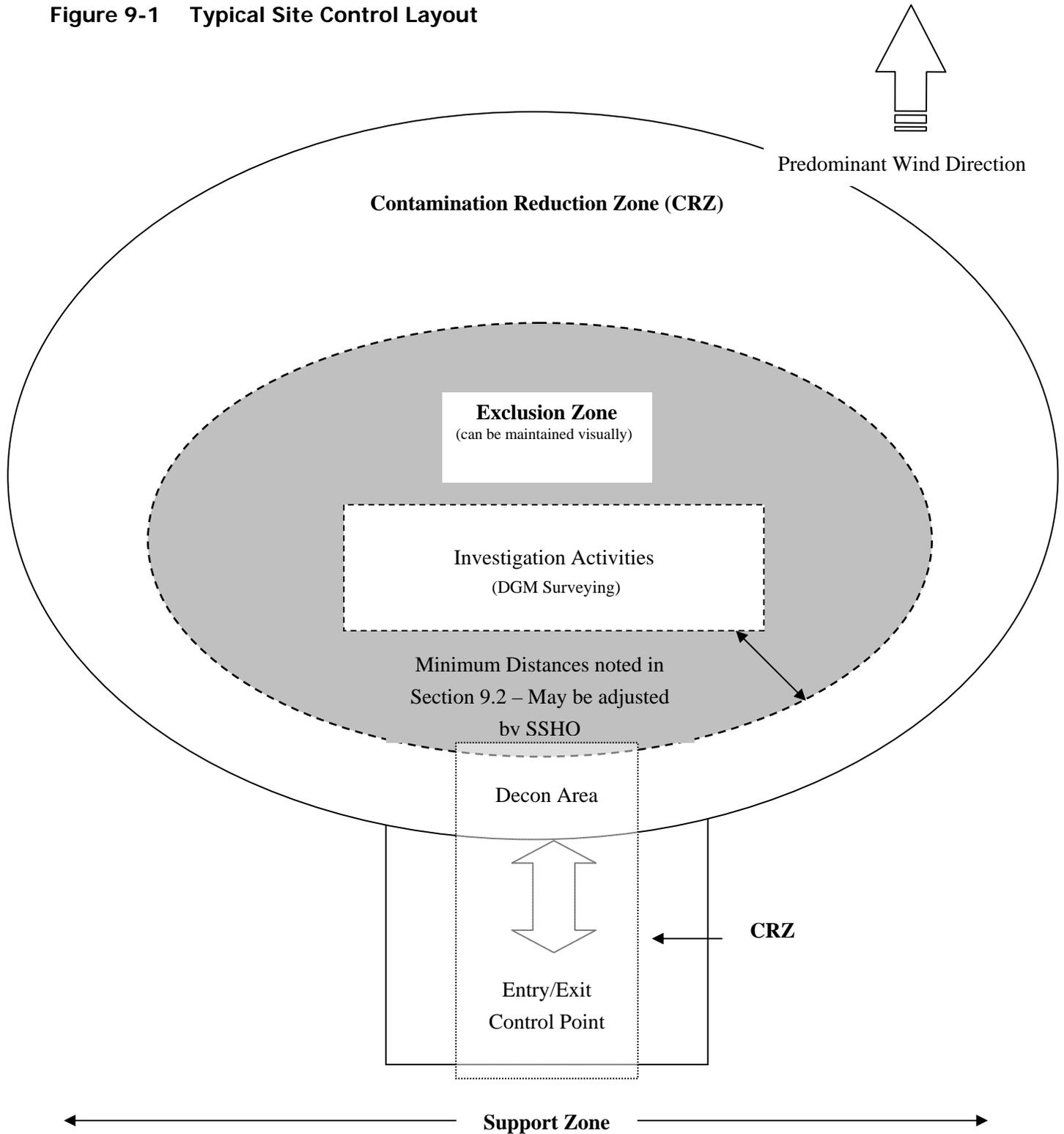
To maintain site security during working hours:

1. Maintain security in the Support Zone and at access control points.
2. Establish an identification system to identify authorized persons and limitations to their approved activities.
3. Assign responsibility for enforcing authority for entry and exit requirements.
4. When feasible, install fencing or other physical barrier around the site.
5. If the site is not fenced, post signs around the perimeter and whenever possible, coordinate with site security personnel to patrol the perimeter.
6. Have the PM approve all visitors to the site. Make sure they have valid purpose for entering the site. Have trained site personnel accompany visitors at all times and require them to wear the appropriate protective equipment.

To maintain site security during off-duty hours:

1. Coordinate with NWIRP-Calverton security guards to patrol the site boundary.
2. Secure the equipment.

Figure 9-1 Typical Site Control Layout



10.0 EMERGENCY RESPONSE PLANNING

10.1 Emergency Action Plan

Although the potential for an emergency to occur is remote, an emergency action plan has been prepared for this project should such critical situations arise. The only significant type of onsite emergency that may occur is physical injury or illness to a member of the Resolution Consultants team. The Emergency Action Plan (EAP) will be reviewed by all personnel prior to the start of field activities. On long term sites, a test of the EAP will be performed within the first three (3) days of the project field operations. This test will be evaluated and documented in the project records.

Four major categories of emergencies could occur during site operations:

1. Illnesses and physical injuries (including injury-causing chemical exposure)
2. Catastrophic events (fire, explosion, earthquake, or chemical)
3. Workplace Violence, Bomb Threat
4. Safety equipment problems

10.1.1 Emergency Coordinator

The duties of the Emergency Coordinator (EC) include:

- Implement the EAP based on the identified emergency condition
- Notify the appropriate project and SH&E Department personnel of the emergency (Table 10-1)
- Verify emergency evacuation routes and muster points are accessible
- Conduct routine EAP drills and evaluate compliance with the EAP

Table 10-1 Emergency Contacts

Emergency Coordinators/Key Personnel			
Name	Title/Workstation	Telephone Number	Mobile Phone
James Tarr	Client Contact, NAVFAC RPM	(757) 341-2009	TBD
Greg Quimby	Project Manager	(732) 564-3920	(908) 616-0223
TBD	Site Supervisor	Use Mobile	TBD
TBD	Site Safety Health Officer	Use Mobile	TBD
TBD	Emergency Coordinator	Use Mobile	TBD
John Knopf	Resolution Consultants H&S Manager	(901) 372-7962	(901) 451-1464
Herold Hannah	AECOM Regional SH&E Manager	(412) 904-3606	(412) 303-1199
Sean Liddy	AECOM District SH&E Manager		(443) 553-1403
Incident Reporting	AECOM Personnel	(800) 348-5046	
	EnSafe Personnel	Call John Knopf	
Ann-Alyssa Hill	AECOM TDG/IATA Shipping Expert	(804) 515-8506	(804) 640-4815
Kevin Arick	EnSafe TDG/IATA Shipping Expert	(901) 372-7962	(901) 356-3525
Organization/Agency			
Name			Telephone Number
Police Department (local)			911 (631) 727-4500
Fire Department (local)			911 (631) 727-2751
Ambulance Service <i>(EMT will determine appropriate hospital for treatment)</i>			911 (631) 727-1686
Emergency Hospital <i>(Use by site personnel is only for emergency cases)</i>			
Peconic Bay Medical Center (Non-Trauma Center)			(631) 548-6000
1300 Roanoke Avenue; Riverhead, NY			
Emergency Hospital Route: See Figure 10-1			
Poison Control Center			(800) 222-1222
Pollution Emergency			(800) 292-4706
National Response Center			(800) 424-8802
Title 3 Hotline			(800) 424-9346
Public Utilities			
Name			Telephone Number
Call Before You Dig (NYC / LI One-Call Service)			(800) 272-4480

10.1.2 Site-Specific Emergency Procedures

Prior to the start of site operations, the EC will complete Table 10-2 with any site-specific information regarding evacuations, muster points, communication, and other site-specific emergency procedures.

Table 10-2 Emergency Planning

Emergency	Evacuation Route	Muster Location
Chemical Spill	<ul style="list-style-type: none"> Upwind 	<ul style="list-style-type: none"> Site vehicles
Fire/Explosion	<ul style="list-style-type: none"> Upwind 	<ul style="list-style-type: none"> Site vehicles
Tornado/Severe Weather	<ul style="list-style-type: none"> Closest available tornado shelter 	<ul style="list-style-type: none"> Building # (TBD by SSHO)
Lightning	<ul style="list-style-type: none"> Closest available shelter 	<ul style="list-style-type: none"> Vehicle/Site Trailer
Additional Information		
Communication Procedures	Direct verbal communications. Must be supplemented when voices cannot be clearly perceived above ambient noise levels and when a clear line-of-sight cannot be maintained by personnel. Personnel will bring a mobile phone to the site to ensure that communications with local emergency responders is maintained, when necessary.	
CPR/First Aid Trained Personnel	<i>TBD- a minimum of two individuals will have current certification of CPR and First Aid training; these team members will be identified prior to mobilization and during site-specific training prior to the start of work.</i>	
Site-Specific Spill Response Procedures	Chemicals brought onsite will be limited to fuel for vehicles and small quantities of laboratory preservatives. In the event of a minor spill, sorbent material will be placed on the spill and then transferred to a container for disposal. Field personnel will immediately notify the PM who in turn will notify the account manager and the Department project representative.	

10.1.3 Spill Containment Procedure

Work activities may involve the use of hazardous materials (e.g., fuels, solvents) or work involving drums or other containers. State specific spill reporting procedures have been included in Attachment 8. If anything beyond these procedures is required, a site specific spill reporting card/procedure must be developed for the site. Procedures outlined below will be used to prevent or contain spills:

- All hazardous material will be stored in appropriate containers
- Tops/lids will be placed back on containers after use
- Containers of hazardous materials will be stored appropriately away from moving equipment

At least one spill response kit, to include an appropriate empty container, materials to allow for booming or diking the area to minimize the size of the spill, and appropriate clean-up material (e.g., speedy dri) shall be available at each work site (more as needed).

- All hazardous commodities in use (e.g., fuels) shall be properly labeled
- Containers shall only be lifted using equipment specifically manufactured for that purpose
- Drums/containers will be secured and handled in a manner which minimizes spillage and reduces the risk of musculoskeletal injuries

10.1.4 Safety Accident/Incident Reporting

All accidents and incidents that occur on-site during any field activity will be promptly reported to the SSHO and the immediate supervisor.

If any Resolution Consultants employee is injured and requires medical treatment, the Site Supervisor will report the incident in accordance with Resolution Consultants' incident reporting procedures. A copy of the final Supervisor's Report of Incident will be provided to the Resolution Consultants Health and Safety Manager or designee before the end of the following shift.

If any employee of a subcontractor is injured, documentation of the incident will be accomplished in accordance with the subcontractor's procedures; however, copies of all documentation (which at a minimum must include the OSHA Form 301 or equivalent) must be provided to the SSHO within 24 hours after the accident has occurred.

All accidents/incidents will be investigated. Copies of all subcontractor accident investigations will be provided to the SSHO within five (5) days of the accident/incident.

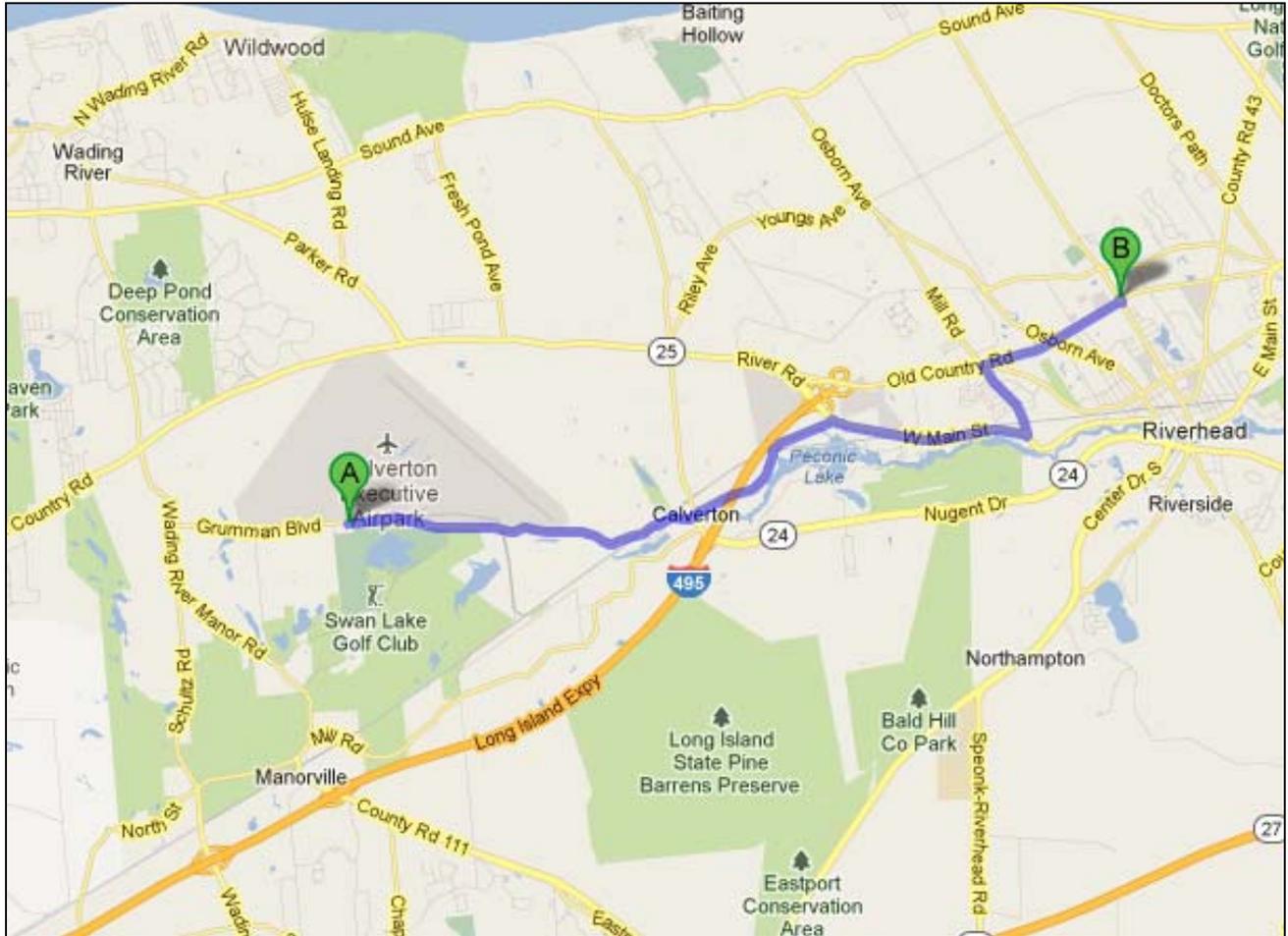
Near misses describe incidents where no property was damaged and no personal injury was sustained, but where, given a slight shift in time or position, damage and/or injury easily could have occurred. Near misses shall be reported to the Resolution Consultants H&S Manager as soon as possible.

10.1.5 Environmental Spill/Release Reporting

All environmental spills or releases of hazardous materials (e.g., fuels, solvents, etc.), whether in excess of the Reportable Quantity or not, will be reported to the PM and Resolution Consultants

H&S Manager. In determining whether a spill or release must be reported to a regulatory agency, the Site Supervisor will assess the quantity of the spill or release and evaluate the reporting criteria against the state-specific reporting requirements, your applicable regulatory permit, and/or client-specific reporting procedures. In order to support the Site Supervisor and expedite the decision to report to a state regulatory agency, state specific spill reporting procedures and/or spill reporting card are included in (Attachment 8). **If reporting to a US state or Federal regulatory agency is required, Resolution Consultants has 15 minutes from the time of the spill/release to officially report it.**

Figure 10-1 Emergency Occupational Hospital Route/Detail Map



Approximate time: 18 Minutes (8.4 Miles)

1. Head east on Grumman Blvd., proceed 1.3 miles
2. Continue onto River Rd., proceed 3.3 miles
3. Turn right onto W. Main St., proceed 1.7 miles
4. Turn left onto Mill Rd., proceed 0.7 miles
5. Turn right onto Old Country Rd., proceed 1.3 miles
6. At the traffic circle, take 3rd exit onto County Road 73/Roanoke Ave
7. Destination will be 300 feet on the right

This page intentionally left blank

Attachment 1
Cross Reference Table

This page intentionally left blank

The following cross-reference table provides information concerning the corresponding elements between the HASP and the accident prevention plan (APP) outline presented in Appendix A of the 2008 United States Army Corps of Engineers (USACE) *Safety and Health Requirements Manual*, EM-385-1-1. The format, content, procedures, and requirements in this HASP are directed solely to meet the onsite needs of Resolution Consultants' field workers and subcontractors who will be performing the work activities addressed in the HASP. Consequently, the document does not address any non site-specific safety performance requirements or programs, except to specify site/task-level site implementation in the work force. Nor does the HASP attempt to duplicate or reproduce any of Resolution Consultants' Corporate Safety, Health, and Environmental (SH&E) Program requirements, or information, except where specifying site-specific implementation needs¹. APP outline elements, which are not site specific, and are only addressed in Resolution Consultants' Corporate SH&E Program (rather than the HASP), are so indicated.

USACE Accident Prevention Plan Requirement	Resolution Consultants' Health and Safety Plan Section
1. SIGNATURE SHEET.	An Approval page is located at the front of the HASP. The CTO manager and health and safety manager provide signed approval of the FINAL (not Draft) version of the HASP.
2. BACKGROUND INFORMATION. List the following:	
a. Contractor	HASP Cover and Section 1.
b. Contract number	HASP Cover and Section 1.
c. Project name	HASP Cover and Section 1.
d. Brief project description, description of work to be performed, and location (map)	HASP Section 2. Information is presented in the Work Plan and will be available on the work site.
e. Contractor accident experience (provide information such as EMR, OSHA 200 Forms, corporate safety trend analyses)	This information is not site/project specific, and hence is not included as part of HASP.
f. Listing of phases of work and hazardous activities requiring activity hazards analyses	HASP Section 2.2.
3. STATEMENT OF SAFETY AND HEALTH POLICY.	HASP Section 1.2.
4. RESPONSIBILITIES AND LINES OF AUTHORITIES.	
a. Identification and accountability of personnel responsible for safety – at both corporate and project level	HASP Section 8.
b. Lines of authority	HASP Section 8.
c. Names of Competent Persons	HASP Section 4.2.1
d. Competent Person Role	HASP Section 4.2.1

¹ Resolution Consultants' Corporate Health and Safety Program documentation was provided to NAVFAC Pacific and accepted as part of the CLEAN Contract award process. Since these Programs are not site-specific they are not included as part of the CTO's work planning document submittals.

USACE Accident Prevention Plan Requirement	Resolution Consultants' Health and Safety Plan Section
e. Requirements for pre-task hazard analysis.	HASP Section 3.5
f. Lines of Authority	HASP Section 8.
g. Non-compliance policies and Procedures	Information not included in HASP. Programmatic level documents/plans.
h. Manager/Supervisor accountability for safety.	HASP Section 8.
5. SUBCONTRACTORS AND SUPPLIERS. Provide the following:	
a. Identification of subcontractors and suppliers (if known)	HASP Executive Summary and Section 2.
b. Means for controlling and coordinating subcontractors and suppliers	HASP Section 8.6
c. Safety responsibilities of subcontractors and suppliers	HASP Section 8.6
6. TRAINING.	
a. List subjects to be discussed with employees in safety indoctrination	HASP Section 4.2
b. List mandatory training and certifications, which are applicable to this project and any requirements for periodic retraining/recertification	HASP Section 4.1 through 4.5
c. Identify requirements for emergency response training (if applicable)	HASP Section 10
d. Outline requirements (who attends, when given, who will conduct etc.) for supervisory and employee safety meetings	HASP Section 4.3
7. SAFETY AND HEALTH INSPECTIONS.	
a. Who will conduct safety inspections, when inspections will be conducted, how the inspections will be recorded, deficiency tracking system, follow-up procedures, etc	HASP Section 8. Resolution Consultants' site audit policies are also part of our Corporate SH&E Program documentation.
b. Any external inspections/certifications which may be required	HASP Section 4.9
8. ACCIDENT REPORTING.	
a. Exposure data (man hours worked).	This information is part of Resolution Consultants' Corporate SH&E Program and are not included in this HASP.
b. Accident investigations, reports, logs.	HASP Section 8, 10.5 and 10.6
c. Requirements for immediate notifications	HASP Section 10.5 and Attachment 6
9. PLANS (PROGRAMS, PROCEDURES) REQUIRED BY THE SAFETY MANUAL (as applicable).	
a. Layout plans (04.A.01)	HASP Section 2 (if applicable)
b. Emergency response plans:	HASP Section 10
- procedures and tests (01.E.01)	HASP Section 10.3
- spill plans (01.E.01, 06.A.02)	HASP Section 10.4 and 10.6

USACE Accident Prevention Plan Requirement	Resolution Consultants' Health and Safety Plan Section
- firefighting plan (01.E.01, Section 19)	Not applicable. Resolution Consultants' policy is to notify professional fire response agencies immediately in the event of fire. Resolution Consultants do not perform fire fighting activities.
- posting of emergency telephone numbers (01.E.05)	HASP Section 10, Table 10-1
- man overboard/abandon ship (19.A.04)	HASP Section 10 (if applicable)
- Medical Support (Section 03.A.02; 03.D)	HASP Section 10.3, Table 10-2
c. Prevention of alcohol and drug abuse (01.C.02)	Information not included in HASP. Programmatic level documents/plans.
d. Site Sanitation Plan (Section 02)	HASP Section 4.7.3
e. Access and haul road plan (4.B)	HASP Section 2 (if applicable)
f. Respiratory protection plan (05.G)	HASP Section 7
g. Health hazard control program (06.A)	HASP Section 5 and individual Task Hazard Analyses presented in Attachment 3.
h. Hazard communication program (06.B.01)	HASP Section 4.4
i. Process Safety Management Plan (06.B.04)	HASP Section 5 (if applicable)
j. Lead abatement plan (06.B.05 & specifications)	Provided as Attachment 9 if applicable.
k. Asbestos abatement plan (06.B.05 & specifications)	Provided as Attachment 9 if applicable.
l. Radiation Safety Program (06.E.03.a)	Provided as Attachment 9 if applicable.
m. Abrasive blasting (06.H.01)	Provided as Attachment 9 if applicable.
n. Heat/Cold Stress Monitoring Plan (06.I.02)	HASP Section 5.3
o. Crystalline Silica Monitoring Plan (assessment) (06.M)	Provided as Attachment 9 if applicable.
p. Night Operations Lighting Plan (07.A.08)	Provided as Attachment 9 if applicable.
q. Fire Prevention Plan (09.A)	HASP Section 10 and individual Task Hazard Analyses presented in Attachment 3.
r. Wild Land Fire Management Plan (09.K)	Provided as Attachment 9 if applicable.
s. Hazardous energy control plan (12.A.01)	HASP Section 3.
t. Critical lift plan (16.H)	Provided as Attachment 9 if applicable.
u. Contingency plan for severe weather (19.A.03)	HASP Section 3.4 and Table 10-2
v. Float Plan (19.F.04)	Provided as Attachment 9 if applicable.
w. Site Specific Fall Protection & Prevention Plan (21.C)	Provided as Attachment 9 if applicable.
x. Demolition plan (to include engineering survey) (23.A.01)	Provided as Attachment 9 if applicable.

USACE Accident Prevention Plan Requirement	Resolution Consultants' Health and Safety Plan Section
y. Excavation/Trenching Plan (25.A.01)	HASP Section 2
z. Emergency rescue (tunneling) (26.A)	HASP Section 10 (if applicable)
aa. Underground construction fire prevention and protection plan (26.D.01)	HASP Section 10 (if applicable)
bb. Compressed air plan (26.I.01)	Provided as Attachment 9 if applicable.
cc. Formwork and shoring erection and removal plans (27.C)	Provided as Attachment 9 if applicable.
dd. Pre-cast concrete plans (27.D)	Provided as Attachment 9 if applicable
ee. Lift slab plans (27.E)	Provided as Attachment 9 if applicable
ff. Steel Erection Plan (27.F.01)	Provided as Attachment 9 if applicable
gg. Site Safety & Health Plan for HTRW Work (28.B)	Refer to HASP, Section 1
hh. Blasting plan (29.A.01)	Provided as Attachment 9 if applicable
ii. Diving plan (30.A.13)	Provided as Attachment 9 if applicable
jj. Confined Space Program (34.A)	HASP Section 4.5 (if applicable)
10. Risk Management Processes	
a. Hazards and Controls outlined in Activity Hazard Analysis for each major phase/activity of work (01.A.13)	HASP Section 3.5. Individual Task Hazard Analyses presented in Attachment 3.

CLEAN Comprehensive Long-Term Environmental Action Navy

CTO contract task order

EMR experience modification ratio

HASP Health and Safety Plan

IDW investigation derived waste

OSHA Occupational Safety and Health Administration

PPE personal protective equipment

SH&E Safety, Health, and Environment

SOP standard operating procedure

USACE United States Army Corps of Engineers

Attachment 2
HASP Revision Table

This page intentionally left blank

Site Health and Safety Plan
NSF-IH Stump Neck Annex, Sites UXO 4 and UXO 21
Revision History

Revision No.	Revision Date	Approved By (Initials)	Changes, Discussion
0			

This page intentionally left blank

Attachment 3
Task Hazard Analysis

This page intentionally left blank

Task Hazard Analysis (THA)

Activity/Work Task: Mobilization/Demobilization	Overall Risk Assessment Code (RAC) (Use highest code)				L																													
Project Location: NWIRP-Calverton, MRS 02 Fire Training Area	Risk Assessment Code (RAC) Matrix																																	
Project Number: 60283778	<table border="1"> <thead> <tr> <th rowspan="2">Severity</th> <th colspan="4">Probability</th> </tr> <tr> <th>Frequent</th> <th>Likely</th> <th>Occasional</th> <th>Seldom</th> </tr> </thead> <tbody> <tr> <td>Catastrophic</td> <td>E</td> <td>H</td> <td>H</td> <td>H</td> </tr> <tr> <td>Critical</td> <td>E</td> <td>H</td> <td>H</td> <td>M</td> </tr> <tr> <td>Marginal</td> <td>H</td> <td>M</td> <td>M</td> <td>L</td> </tr> <tr> <td>Negligible</td> <td>M</td> <td>L</td> <td>L</td> <td>L</td> </tr> </tbody> </table>					Severity	Probability				Frequent	Likely	Occasional	Seldom	Catastrophic	E	H	H	H	Critical	E	H	H	M	Marginal	H	M	M	L	Negligible	M	L	L	L
Severity							Probability																											
						Frequent	Likely	Occasional	Seldom																									
Catastrophic						E	H	H	H																									
Critical						E	H	H	M																									
Marginal	H	M	M	L																														
Negligible	M	L	L	L																														
Date Prepared: 2/5/2013																																		
Prepared by (Name/Title): Gregory Quimby																																		
Reviewed by (Name/Title): Sean Liddy, CSP/John Knopf, CSP																																		
Notes: (Field Notes, Review Comments, etc.)	Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)																																	
	"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.				RAC Chart																													
	"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible																																	
	Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.																																	
Recommended PPE:																																		
x Safety Glasses With Sideshields	Steel-Toed Boots	Hard Hat	Nitrile Gloves	x Leather Gloves	Heating Protection																													
Flame Retardant Clothing																																		
Job Steps			Controls																															
MOBE - Check the weather.			Check local weather forecast, have a weather radio for remote sites, observation and communication among team members. Discuss weather issues during tailgate safety meeting. At the first sign of lightning, thunder or strong winds, immediately move away and take shelter. Do not resume work until 30 minutes have passed without signs of storm.																															
MOBE - Mobilize with equipment and supplies to site.			Know the symptoms of heat and/or cold stress, and the potential for their occurrence based on expected weather conditions. Take precautions to avoid them. Refer to the HASP or ask your supervisor if you have questions. Follow safe driving procedures. Always use the buddy system when moving vehicles. Plan your travel path ahead of time. Use maps and known construction zones to make your selection. Consult with the other team members before making any changes to travel path.																															
Accidents caused by use of improper equipment/tools.			Use an equipment checklist to verify you have the appropriate equipment/tools for your tasks.																															
Injuries caused by improper lifting techniques.			Use proper bending/lifting techniques by bending and lifting with legs and not with back.																															

Job Steps	Hazards	Controls	RAC
	Damage to equipment/tools and/or accidents with loose objects.	Stow all materials in vehicle properly, use appropriate cases and bags. Secure equipment in bed of truck with netting or straps. Do not leave any equipment loose in the cab or bed or the truck. It can cause property damage or serious injuries to others or yourself by falling-off from vehicle.	
Perform perimeter walk around of vehicle for damage or unusual conditions.	Low air pressure, flat tire, blowout, impaired vision, collision, injury or death.	Complete Vehicle Inspection checklist. Assure tires are properly inflated and there is sufficient tread (including spare). Assure there are no cuts or bulges in the sidewalls, all wheels/ribs are in good condition. Assure windshield and window glass is clean and free from obstructions. Lift wiper arms and check wiper blades for damage or deterioration. Check to see that all lights work. Check for fluid leaks under vehicle. Check oil, radiator, brake, transmission and washer fluid levels. Check behind vehicle for obstructions.	L
Slowly pull out of parking space.	Collision with other vehicles, pedestrians, or stationary objects.	Release parking brake. Check mirrors and over shoulder in all directions prior to slowly pulling out of parking space. Signal if parallel parked along a street. Use a spotter if available.	L
DURING TRIP - Keep your eyes moving.	Collision, injury or death to occupants or other parties.	DRIVE DEFENSIVELY. Move eyes at least every 2 seconds. Scan major and minor intersections before entry (left-right-left). Check mirrors when slowing or stopping vehicle. Scan mirrors frequently, at least one mirror every 5-8 seconds. Avoid staring while evaluating road conditions. Do not use cell phones or perform other distraction activities while car is in motion. If necessary, pull off the roadway and park prior to performing other activities. Be cautious about the use of cruise control if available on vehicle - never use in inclement weather, within cities and towns, or during hours without daylight.	L
Aim high in steering.	Collision, injury or death to occupants or other parties.	Maintain 12 second eye lead time (1 1/2 blocks in city traffic, 1/4 mile in highway traffic). Assess information from distant objects (i.e., flashers on?). Adjust eye lead distance to speed.	L
MOBE/DEMOBE - Secure equipment in vehicle.	Damage to equipment/tools and/or accidents with loose objects. Pinch points.	Stow all materials in vehicle properly, use appropriate cases and bags. Secure equipment in bed of truck with netting or straps. Do not leave any equipment loose in the cab or bed or the truck. It can cause property damage or serious injuries to others or yourself by falling-off from vehicle. When securing equipment, watch for pinch points. Straps and netting can get caught on objects and snap back as well as trap a finger if hand placement is not correct. Use a buddy to help secure equipment when possible.	L
Perform perimeter walk around of vehicle for damage or unusual conditions.	Low air pressure, flat tire, blowout, impaired vision, collision, injury or death.	Complete Vehicle Inspection checklist. Assure tires are properly inflated and there is sufficient tread (including spare). Assure there are no cuts or bulges in the sidewalls, all wheels/ribs are in	L

Job Steps	Hazards	Controls	RAC
		good condition. Assure windshield and window glass is clean and free from obstructions. Lift wiper arms and check wiper blades for damage or deterioration. Check to see that all lights work. Check for fluid leaks under vehicle. Check oil, radiator, brake, transmission and washer fluid levels. Check behind vehicle for obstructions.	
Demobilize from site.	Vehicle accident. Fixed facilities.	Follow safe driving procedures. Always use the buddy system when moving vehicles. Use maps and known construction zones to make your selection. Consult with the other team members before making any changes to travel path. When parked near a fixed facility (building, monitoring well, bollards, etc...) evaluate and plan route prior to mobilization. Use the buddy system when backing-up vehicle.	L

Chemical Hazards and Monitoring Procedures

Chemical Hazard(s) (list):	NA
Applicable HASP Section(s):	NA
Monitoring Instrument(s):	N/A

Additional Safety Considerations

<ol style="list-style-type: none"> 1. No Chemical Hazards anticipated. 2. Use caution around delivery trucks and stay clear if not involved in spotting operation. Use one person to communicate with driver via hand signals to avoid unnecessary confusion. Watch for overhead utilities. Wear high vis vest at all times. 3. Maintain eye contact with equipment operator during stone installation and use proper hand signals. Do not approach running equipment unless eye contact is made, and acknowledgment is received from operator. 4. Stow all materials in vehicle properly, use appropriate cases and bags. Secure equipment in bed of truck with netting or straps. Do not leave any equipment loose in the cab or bed or the truck. It can cause property damage or serious injuries to others or yourself by falling-off from vehicle. 5. When securing equipment, watch for pinch points. Straps and netting can get caught on objects and snap back as well as trap a finger if hand placement is not correct. Use a buddy to help secure equipment when possible. 6. Keep clear area around work area, maintain good housekeeping practices. When possible, use mechanical equipment to perform lifting of heavy objects. When lifting, follow safe lifting practices. Use the buddy system when lifting. 7. Avoid the use of chains for lifting. If necessary, ensure chain is equipped with annual load rating cert and proper hooks being used. For synthetic slings, ensure red warning line is not showing and item is in good condition. For wire ropes, inspect for broken wires (6 in a lay, 3 in a strand). 8. Keep line of site with co-worker and ensure regular verbal contact. If out of the line of site, ensure radio or cell phone contact is established and maintained.
--

Additional Operational Safety Procedures

	PPE
SH&E 005, Driver Safety Program SH&E 313, Wildlife, Plants, and Insects SH&E 517, Non-Ionizing Radiation SH&E 511, Heat Stress Prevention	LEVEL D <ul style="list-style-type: none"> • ANSI approved safety glasses • Shirts with sleeves and full-length pants. • Leather boots.

	<ul style="list-style-type: none"> • High visibility reflective traffic vest • Leather work gloves • First aid kit (located in vehicle). • Fire extinguisher (located in vehicle).
--	--

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
Utility Vehicles	<ul style="list-style-type: none"> • Training Complete. • Familiarity with the vehicle being operated. 	Daily Preventative Maintenance Checks
Communications Equipment	<ul style="list-style-type: none"> • Familiarity with the equipment. • Knowledge of Emergency Response Procedures. 	Daily communications Checks
Fire Extinguishers	<ul style="list-style-type: none"> • Limitations and placement of the extinguishers. • Techniques for the use of the extinguishers. 	Initial and Monthly Serviceability Checks
First Aid Kit (s)	<ul style="list-style-type: none"> • First Aid/CPR training current. • Universal safety precautions for blood borne pathogens. 	Weekly Inspection/Inventory
Hand Tools	<ul style="list-style-type: none"> • Use hand tools for their intended purposes. • Familiarity with the equipment. 	Inspect hand tools for serviceability
	<p><u>Other Training:</u></p> <ul style="list-style-type: none"> • Evacuation, Emergency Response and Notifications Procedures IAW HASP. • MEC/MPPEH Hazards and Safety Precautions. • Safe work practices and precautions IAW HASP. • OSHA qualifications and training as required IAW HASP. 	

Task Hazard Analysis (THA)

Activity/Work Task: Site Surveying	Overall Risk Assessment Code (RAC) (Use highest code)				M																													
Project Location: NWIRP-Calverton, MRS 02 Fire Training Area	Risk Assessment Code (RAC) Matrix																																	
Project Number: 60283778	<table border="1"> <thead> <tr> <th rowspan="2">Severity</th> <th colspan="4">Probability</th> </tr> <tr> <th>Frequent</th> <th>Likely</th> <th>Occasional</th> <th>Seldom</th> </tr> </thead> <tbody> <tr> <td>Catastrophic</td> <td>E</td> <td>E</td> <td>H</td> <td>H</td> </tr> <tr> <td>Critical</td> <td>E</td> <td>H</td> <td>H</td> <td>M</td> </tr> <tr> <td>Marginal</td> <td>H</td> <td>M</td> <td>M</td> <td>L</td> </tr> <tr> <td>Negligible</td> <td>M</td> <td>L</td> <td>L</td> <td>L</td> </tr> </tbody> </table>					Severity	Probability				Frequent	Likely	Occasional	Seldom	Catastrophic	E	E	H	H	Critical	E	H	H	M	Marginal	H	M	M	L	Negligible	M	L	L	L
Severity							Probability																											
						Frequent	Likely	Occasional	Seldom																									
Catastrophic						E	E	H	H																									
Critical						E	H	H	M																									
Marginal	H	M	M	L																														
Negligible	M	L	L	L																														
Date Prepared: 2/5/2013																																		
Prepared by (Name/Title): Gregory Quimby																																		
Reviewed by (Name/Title): Sean Liddy, CSP/John Knopf, CSP																																		
Notes: (Field Notes, Review Comments, etc.)	<p>Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)</p> <p>"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.</p> <p>"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible</p> <p>Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.</p>																																	
Recommended PPE: X Safety Glasses With Sideshields	Steel-Toed Boots*	Hard Hat	Nitrile Gloves	X Leather Gloves	Hearing Protection	Flame Retardant Clothing																												
Job Steps	Hazards																																	
General Physical Hazards	<ul style="list-style-type: none"> Slip/Trip/Fall Cold/Heat Stress Biological Hazards Cuts/Scrapes/Bruises Manual lifting 																																	
	<ul style="list-style-type: none"> Level D PPE required. Maintain a clean and organized work area. Watch your step and ensure proper footing. Provide drinking water and first aid kit. Wear appropriate clothing for weather conditions. Assess work area for poisonous plants and animals and communicate observations to avoid them. Wear appropriate work gloves for task Maintain 3 points of contact when climbing into vehicle Use proper lifting techniques by bending and lifting with legs and not back, and do not over extend or twist (Do not lift over 49lb. without assistance) Monitor radio or installation notifications for weather alerts If able to access internet, track approaching event on local radar If thunder is heard and intervals between are increasing (less than 30 seconds apart), seek shelter in site vehicles Be aware of changing weather condition and provide appropriate weather gear. When work is halted due to inclement weather, personnel are to seek shelter in vehicles or building designated Shelter in 																																	
	Controls																																	
	RAC																																	
	L																																	
	L																																	

Job Steps	Hazards	Controls	RAC
		Place (SIP)	
	Poison Ivy and ticks.	<ul style="list-style-type: none"> • Areas where present will be mapped out by the SSHO and relayed to teams. • When entering into work areas that contain, upgrade to modified level D PPE and follow all proper decontamination procedures. • Watch for signs of rash within 24-48 hours and report any immediately. • For ticks, use repellent (DEET) or permethrin treated clothing. 	M
Conduct site survey with UXO avoidance support	Personnel encountering Munitions and Explosives of Concern MEC/MPPEH.	<ul style="list-style-type: none"> • Observe all MEC safety precautions and safe work practices. • Only UXO qualified personnel will escort non-UXO personnel. • Direct non-UXO personnel around the surface MEC. • Do not strike or disturb MEC. • Only qualified personnel will use geophysical instruments. • Use geophysical instruments to locate MEC in heavy brush and mark all MEC for subsequent avoidance and removal • Areas where intrusive activities or placement of marking devices will be checked with the geophysical instrument prior to performing tasks. • Do not permit geophysical instrument probes to come in contact with MEC. • Do not place marking devices (pin flags) directly on MEC. • UXO personnel will not wear steel-toed shoes that may affect geophysical instruments. • UXO personnel will not wear hard-hats unless an overhead hazard exists. Chin straps will be used to secure the hard-hat since a falling hat may initiate MEC. • Post barriers and barricades as necessary prior to commencing operations and maintain positive site control. 	L
	Unauthorized personnel entering work area	<ul style="list-style-type: none"> • Only UXO qualified personnel will escort non-UXO personnel. • Direct non-UXO personnel around the surface MEC. • Only essential personnel will enter EZ. • Maintain positive site control. 	L

Chemical Hazards and Monitoring Procedures

Chemical Hazard(s) (list):	N/A
Applicable HASP Section(s):	2.2.2
Monitoring Instrument(s):	N/A

Additional Safety Considerations

1. Ensure all personnel have read the HASP.
2. Maintain good housekeeping practices.
3. Follow safe driving procedures. Always use the buddy system when moving vehicles. Plan your travel path ahead of time. Use maps and known construction zones to make your selection.
4. Use an equipment checklist to verify you have the appropriate equipment/tools for your tasks. Consult appropriate THAs or SOPs.
5. Stow all materials in vehicle properly, use appropriate cases and bags. Secure equipment in bed of truck with netting or straps. Do not leave any equipment loose in the cab or bed of the truck. It can cause property damage or serious injuries by falling from vehicle.
6. When securing equipment, watch for pinch points. Straps and netting can get caught on objects and snap back as well as trap a finger if hand placement is not correct. Use a buddy to help secure equipment when possible.

Additional Operational Safety Procedures

	PPE
SH&E 305, Hand & Power Tools	LEVEL D <ul style="list-style-type: none"> • ANSI approved safety glasses • Shirts with sleeves and full-length pants. • Leather boots. • High visibility reflective traffic vest • Leather work gloves • First aid kit (located in vehicle). • Fire extinguisher (located in vehicle).
SH&E 307, Housekeeping	
SH&E 308, Manual Lifting	
SH&E 313, Wildlife, Plants, and Insects	
SH&E 417, Underground Utilities	
SH&E 511, Heat Stress Prevention	
SH&E 514, Munitions and Explosives of Concern / Unexploded Ordnance	

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
Utility Vehicles	<ul style="list-style-type: none"> • Training Complete. • Familiarity with the vehicle being operated. 	Daily Preventative Maintenance Checks
Communications Equipment	<ul style="list-style-type: none"> • Familiarity with the equipment. • Knowledge of Emergency Response Procedures. 	Daily communications Checks
Fire Extinguishers	<ul style="list-style-type: none"> • Limitations and placement of the extinguishers. • Techniques for the use of the extinguishers. 	Initial and Monthly Serviceability Checks
First Aid Kit(s)	<ul style="list-style-type: none"> • First Aid/CPR training current. • Universal safety precautions for blood borne pathogens. 	Weekly Inspection/Inventory
Hand Tools	<ul style="list-style-type: none"> • Use hand tools for their intended purposes. • Familiarity with the equipment. 	Inspect hand tools for serviceability

	<p><u>Other Training:</u></p> <ul style="list-style-type: none">• Evacuation, Emergency Response and Notifications Procedures IAW HASP.• MEC/MPPEH Hazards and Safety Precautions.• Safe work practices and precautions IAW HASP.• OSHA qualifications and training as required IAW HASP.	
--	--	--

Acknowledgement

All employees, subcontractors, and visitors must sign the Acknowledgement form, in this section, before conducting field activities at this site.

By signing this form, Resolution Consultants employees agree that:

- I have read this Task Hazard Analysis and I understand the requirements of the THA.
- I will conduct work at this site in accordance with the requirements of the THA.

By signing this form, subcontractors and visitors agree that:

- I have read and understood the potential hazards associated with the site.
- I will ensure compliance with my company's policies on health and safety.

Print Name & Company

Date

Signature

Print Name & Company

Date

Signature

Print Name & Company

Date

Signature

Print Name & Company

Date

Signature

Print Name & Company

Date

Signature

Print Name & Company

Date

Signature

Print Name & Company

Date

Signature

Print Name & Company

Date

Signature

Task Hazard Analysis (THA)

Activity/Work Task: Brush Clearing and Removal	Overall Risk Assessment Code (RAC) (Use highest code)				M																																			
Project Location: NWIRP-Calverton, MRS 02 Fire Training Area	Risk Assessment Code (RAC) Matrix																																							
Project Number: 60283778	<table border="1"> <thead> <tr> <th rowspan="2">Severity</th> <th colspan="5">Probability</th> </tr> <tr> <th>Frequent</th> <th>Likely</th> <th>Occasional</th> <th>Seldom</th> <th>Unlikely</th> </tr> </thead> <tbody> <tr> <td>Catastrophic</td> <td>E</td> <td>E</td> <td>H</td> <td>H</td> <td>M</td> </tr> <tr> <td>Critical</td> <td>E</td> <td>H</td> <td>H</td> <td>M</td> <td>L</td> </tr> <tr> <td>Marginal</td> <td>H</td> <td>M</td> <td>M</td> <td>L</td> <td>L</td> </tr> <tr> <td>Negligible</td> <td>M</td> <td>L</td> <td>L</td> <td>L</td> <td>L</td> </tr> </tbody> </table>					Severity	Probability					Frequent	Likely	Occasional	Seldom	Unlikely	Catastrophic	E	E	H	H	M	Critical	E	H	H	M	L	Marginal	H	M	M	L	L	Negligible	M	L	L	L	L
Severity							Probability																																	
						Frequent	Likely	Occasional	Seldom	Unlikely																														
Catastrophic						E	E	H	H	M																														
Critical	E	H	H	M	L																																			
Marginal	H	M	M	L	L																																			
Negligible	M	L	L	L	L																																			
Date Prepared: 2/5/2013																																								
Prepared by (Name/Title): Gregory Quimby																																								
Reviewed by (Name/Title): Sean Liddy, CSP/John Knopf, CSP																																								
Notes: (Field Notes, Review Comments, etc.)	Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)																																							
	"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: F frequent, Likely, Occasional, Seldom or Unlikely.				RAC Chart																																			
	"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible																																							
	Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.																																							
Recommended PPE:	Steel-Toed Boots*	Hard Hat	Nitrile Gloves	X Leather Gloves	X Hearing Protection	Flame Retardant Clothing																																		
Job Steps	Hazards		Controls																																					
General Physical Hazards	<ul style="list-style-type: none"> Slip/Trip/Fall Cold/Heat Stress Biological Hazards Cuts/Scrapes/Bruises Manual lifting 	<ul style="list-style-type: none"> Level D PPE required. Maintain a clean and organized work area. Watch your step and ensure proper footing. Provide drinking water and first aid kit. Wear appropriate clothing for weather conditions. Assess work area for poisonous plants and animals and communicate observations to avoid them. Wear appropriate work gloves for task Maintain 3 points of contact when climbing into vehicle Use proper lifting techniques by bending and lifting with legs and not back, and do not over extend or twist (Do not lift over 49lb. without assistance) 	L																																					
Adverse Weather	<ul style="list-style-type: none"> Monitor radio or installation notifications for weather alerts If able to access internet, track event on local radar If thunder is heard and intervals between are increasing (less than 30 seconds apart), seek shelter in site vehicles Be aware of changing weather condition and provide appropriate weather gear. When work halted due to inclement weather, personnel to seek shelter in designated Shelter in Place (SIP) vehicles/building 		L																																					

Job Steps	Hazards	Controls	RAC
	Heavy Lifting	<ul style="list-style-type: none"> Evaluate the load and when lifting heavy or awkward objects, get help when needed. Personnel trained in safe lifting techniques (bend knees, straight back, load close to body). Lifts of 40 lbs or greater requires assistance or mechanical means. Do not load shovel with more weight than you can handle. Do not twist body when moving soil with shovel. Use mechanical lifting devices whenever possible. 	L
Vegetation Clearance Using Hand Tools and Mechanical Equipment	Heat Stress. Refer to SH&E 511, <i>Heat Stress Prevention</i> , for additional guidance.	<ul style="list-style-type: none"> Implement Heat Stress monitoring. Check pulse and blood pressure in mornings for baseline and throughout day. Follow the established Work/Rest regiment assigned. Drink the appropriate amount of warm fluids on a frequent basis. Refrain from drinking caffeinated beverages. Take breaks in cool areas. Reduce work periods as necessary. If someone exhibits signs of heat stress, remove them from the work site and take to cool (air conditioned) rest area. Immediately notify the SSHO. 	L
	Cuts and Abrasions	<ul style="list-style-type: none"> Wear work gloves and appropriate PPE when handling materials. Maintain all hand tools in a safe condition; keep guards in place 	L
	Cumulative Trauma Prevention	<ul style="list-style-type: none"> Supervisors monitor physical activities that stress body's capabilities to ensure they are designed to match worker capability. Warm-up and stretch prior to commencing work. Rotate tasks between team members. Keep hands warm. Recognize hazards, isolate causative factors, inform and train workers. 	L
	Eye Injuries from flying debris, dirt, dust etc.	<ul style="list-style-type: none"> Wear safety glasses/goggles. Ensure that eyewash is in proper working condition. 	L
	Chemical substances brought on to the site (i.e. gasoline, paint etc.). Refer to SH&E 507, <i>Hazardous Materials Communication</i> , for additional guidance.	<ul style="list-style-type: none"> Implement Hazard Communication Program. MSDS are required for chemical substances brought on site and MSDS made available to the workers. Label all containers as to contents and dispose of empty containers properly. 	L

Job Steps	Hazards	Controls	RAC
	<p>Poison Ivy and ticks.</p> <p>Munitions and Explosives of Concern (MEC) and related materials.</p>	<ul style="list-style-type: none"> • Areas where present will be mapped out the SSHO and relayed to teams. • When entering into work areas that contain, upgrade to modified level D PPE and follow all proper decontamination procedures. • Watch for signs of rash within 24-48 hours and report any immediately. • For ticks, use repellent (DEET) or permethrin treated clothing. • Observe all MEC safety precautions and safe work practices. • Only UXO qualified personnel will escort non-UXO personnel. • Direct non-UXO personnel around the surface MEC. • Do not strike or disturb MEC. • Do not place marking devices (pin flags) directly on MEC. • Only qualified personnel will use geophysical instruments. • Do not permit geophysical instrument probes to come in contact with MEC. • UXO personnel will not wear steel-toed shoes that may affect geophysical instruments. • UXO personnel will not wear hard-hats unless an overhead hazard exists. Chin straps will be used to secure the hard-hat since a falling hat may initiate MEC. • Post barriers and barricades as necessary prior to commencing operations and maintain positive site control. 	M
			M

Chemical Hazards and Monitoring Procedures

Chemical Hazard(s) (list):	N/A
Applicable HASP Section(s):	2.2.4
Monitoring Instrument(s):	N/A

Additional Safety Considerations

1. Ensure all personnel have read the HASP.
2. Maintain good housekeeping practices. When possible, use mechanical equipment to perform lifting of heavy objects. When lifting, follow safe lifting practices. Use the buddy system when lifting.
3. Follow safe driving procedures. Always use the buddy system when moving vehicles. Plan your travel path ahead of time. Use maps and known construction zones to make your selection.
4. Use an equipment checklist to verify you have the appropriate equipment/tools for your tasks. Consult appropriate THAs or SOPs.
5. Stow all materials in vehicle properly, use appropriate cases and bags. Secure equipment in bed of truck with netting or straps. Do not leave any equipment loose in the cab or bed of the truck. It can cause property damage or serious injuries by falling from vehicle.

Additional Safety Considerations

6. When securing equipment, watch for pinch points. Straps and netting can get caught on objects and snap back as well as trap a finger if hand placement is not correct. Use a buddy to help secure equipment when possible.

Additional Operational Safety Procedures	PPE
SH&E 305, Hand & Power Tools SH&E 307, Housekeeping SH&E 308, Manual Lifting SH&E 309, Heavy Equipment SH&E 313, Wildlife, Plants, and Insects SH&E 406, Overhead Electrical Lines SH&E 511, Heat Stress Prevention SH&E 514, Munitions and Explosives of Concern / Unexploded Ordnance	LEVEL D <ul style="list-style-type: none"> • ANSI approved safety glasses • Shirts with sleeves and full-length pants. • Leather work boot or approved equivalent. • High visibility reflective traffic vest • Nitrile Gloves • Leather work gloves • Hearing protection required when around operating machines (85 dBA). • First aid kit (located in vehicle). • Fire extinguisher (located in vehicle).

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
Utility Vehicles	<ul style="list-style-type: none"> • Training Complete. • Familiarity with the vehicle being operated. 	Daily Preventative Maintenance Checks
Communications Equipment	<ul style="list-style-type: none"> • Familiarity with the equipment. • Knowledge of Emergency Response Procedures. 	Daily communications Checks
Fire Extinguishers	<ul style="list-style-type: none"> • Limitations and placement of the extinguishers. • Techniques for the use of the extinguishers. 	Initial and Monthly Serviceability Checks
First Aid Kit (s)	<ul style="list-style-type: none"> • First Aid/CPR training current. • Universal safety precautions for blood borne pathogens. 	Weekly Inspection/Inventory
Hand and gas powered Tools	<ul style="list-style-type: none"> • Use hand tools for their intended purposes. • Familiarity with the equipment. <p><u>Other Training:</u></p> <ul style="list-style-type: none"> • Evacuation, Emergency Response and Notifications Procedures IAW HASP. • MEC/MPPEH Hazards and Safety Precautions. • Safe work practices and precautions IAW HASP. • OSHA qualifications and training as required IAW HASP. 	Inspect hand tools for serviceability

Task Hazard Analysis (THA)

Activity/Work Task: DGM Surveys	Overall Risk Assessment Code (RAC) (Use highest code)				M	
Project Location: NWIRP-Calverton, MRS 02 Fire Training Area						
Project Number: 60283778						
Date Prepared: 2/5/2013						
Prepared by (Name/Title): Gregory Quimby						
Reviewed by (Name/Title): Sean Liddy, CSP/John Knopf, CSP						
Notes: (Field Notes, Review Comments, etc.)						
Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)						
Probability						
Severity		Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic		E	E	H	H	M
Critical		E	H	H	M	L
Marginal		H	M	M	L	L
Negligible		M	L	L	L	L
Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.						
RAC Chart						
E = Extremely High Risk						
H = High Risk						
M = Moderate Risk						
L = Low Risk						
Recommended PPE:						
<input checked="" type="checkbox"/> Safety Glasses With Sideshields	<input type="checkbox"/> Steel-Toed Boots*	<input type="checkbox"/> Nitrile Gloves	<input checked="" type="checkbox"/> Leather Gloves	<input type="checkbox"/> Hearing Protection	<input type="checkbox"/> Flame Retardant Clothing	
Job Steps		Controls				
General Physical Hazards		<ul style="list-style-type: none"> Level D PPE required. Maintain a clean and organized work area. Watch your step and ensure proper footing. Provide drinking water and first aid kit. Wear appropriate clothing for weather conditions. Assess work area for poisonous plants and animals and communicate observations to avoid them. Wear appropriate work gloves for task Maintain 3 points of contact when climbing into vehicle Use proper lifting techniques by bending and lifting with legs and not back, and do not over extend or twist (Do not lift over 49lb. without assistance) 				
Adverse Weather		<ul style="list-style-type: none"> Monitor radio or installation notifications for weather alerts If able to access internet, track event on local radar If thunder is heard and intervals between are increasing (less than 30 seconds apart), seek shelter in site vehicles Be aware of changing weather condition and provide appropriate weather gear. When work is halted due to inclement weather, personnel are to seek shelter in vehicles or building designated Shelter in Place (SIP) 				

Job Steps	Hazards	Controls	RAC
Conduct Geophysical Surveys with EM61 MK2	Heat Stress. Refer to SH&E 511, <i>Heat Stress Prevention</i> , for additional guidance.	<ul style="list-style-type: none"> Implement Heat Stress monitoring. Check pulse and blood pressure in mornings for baseline and throughout day. Follow the established Work/Rest regiment assigned. Drink the appropriate amount of warm fluids on a frequent basis. Refrain from drinking caffeinated beverages. Take breaks in cool areas. Reduce work periods as necessary. If someone exhibits signs of heat stress, remove them from the work site and take to cool (air conditioned) rest area. Immediately notify the SSHO. 	L
	Slips, Trips, and Falls	<ul style="list-style-type: none"> Watch where you step and be aware that sticks, rocks, or other items can be concealed by leaves and grass. Continually inspect work areas for slip, trip and fall hazards. Determine best access route before transporting equipment. Flag inconspicuous holes to protect against fall. Look before you step and ensure safe and secure footing. Keep work area free of loose equipment and materials Avoid routing cords and hoses across pathways. Wear approved and appropriate work boots with traction soles. 	L
	Heavy Lifting	<ul style="list-style-type: none"> Evaluate the load and when lifting heavy or awkward objects, get help when needed. Personnel trained in safe lifting techniques (bend knees, straight back, load close to body). Lifts of 40 lbs or greater requires assistance or mechanical means. Use mechanical lifting devices whenever possible. 	L
	Cumulative Trauma Prevention	<ul style="list-style-type: none"> Supervisors monitor physical activities to ensure they are designed to match worker capability. Warm-up and stretch prior to commencing work. Rotate tasks between team members. Keep hands warm. Recognize hazards, isolate causative factors, inform and train workers. 	L
	Poison Ivy and ticks.	<ul style="list-style-type: none"> Areas where present will be mapped out by the SSHO and relayed to teams. When entering into work areas that contain, upgrade to modified level D PPE and follow all proper decontamination procedures. Watch for signs of rash within 24-48 hours and report any immediately. For ticks, use repellent (DEET) or permethrin treated clothing. 	M

Chemical Hazards and Monitoring Procedures	
Chemical Hazard(s) (list):	N/A
Applicable HASP Section(s):	2.2.5
Monitoring Instrument(s):	N/A

Additional Safety Considerations
<ol style="list-style-type: none"> 1. Ensure all personnel have read the HASP. 2. Maintain good housekeeping practices. When possible, use mechanical equipment to perform lifting of heavy objects. When lifting, follow safe lifting practices. Use the buddy system when lifting. 3. Follow safe driving procedures. Always use the buddy system when moving vehicles. Plan your travel path ahead of time. Use maps and known construction zones to make your selection. 4. Use an equipment checklist to verify you have the appropriate equipment/tools for your tasks. Consult appropriate THAs or SOPs. 5. Stow all materials in vehicle properly, use appropriate cases and bags. Secure equipment in bed of truck with netting or straps. Do not leave any equipment loose in the cab or bed of the truck. It can cause property damage or serious injuries by falling from vehicle. 6. When securing equipment, watch for pinch points. Straps and netting can get caught on objects and snap back as well as trap a finger if hand placement is not correct. Use a buddy to help secure equipment when possible.

Additional Operational Safety Procedures	PPE
SH&E 305, Hand & Power Tools SH&E 307, Housekeeping SH&E 308, Manual Lifting SH&E 313, Wildlife, Plants, and Insects SH&E 511, Heat Stress Prevention SH&E 514, Munitions and Explosives of Concern / Unexploded Ordnance	LEVEL D <ul style="list-style-type: none"> • ANSI approved safety glasses • Shirts with sleeves and full-length pants. • Leather work boots or approved equivalent. • High visibility reflective traffic vest • Nitrile Gloves • Leather work gloves • Hearing protection required when around operating machines (85 dBA). • First aid kit (located in vehicle). • Fire extinguisher (located in vehicle).

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
Utility Vehicles	<ul style="list-style-type: none"> • Training Complete. • Familiarity with the vehicle being operated. 	Daily Preventative Maintenance Checks
Communications Equipment	<ul style="list-style-type: none"> • Familiarity with the equipment. • Knowledge of Emergency Response Procedures. 	Daily communications Checks
Fire Extinguishers	<ul style="list-style-type: none"> • Limitations and placement of the extinguishers. • Techniques for the use of the extinguishers. 	Initial and Monthly Serviceability Checks

First Aid Kit (s)	<ul style="list-style-type: none"> • First Aid/CPR training current. • Universal safety precautions for blood borne pathogens. 	Weekly Inspection/Inventory
Hand Tools	<ul style="list-style-type: none"> • Use hand tools for their intended purposes. • Familiarity with the equipment. 	Inspect hand tools for serviceability
	<p><u>Other Training:</u></p> <ul style="list-style-type: none"> • Evacuation, Emergency Response and Notifications Procedures IAW HASP. • MEC/MPPEH Hazards and Safety Precautions. • Safe work practices and precautions IAW HASP. • OSHA qualifications and training as required IAW HASP. 	

Acknowledgement

All employees, subcontractors, and visitors must sign the Acknowledgement form, in this section, before conducting field activities at this site.

By signing this form, Resolution Consultants employees agree that:

- I have read this Task Hazard Analysis and I understand the requirements of the THA.
- I will conduct work at this site in accordance with the requirements of the THA.

By signing this form, subcontractors and visitors agree that:

- I have read and understood the potential hazards associated with the site.
- I will ensure compliance with my company's policies on health and safety.

Print Name & Company

Date

Signature

Print Name & Company

Date

Signature

Print Name & Company

Date

Signature

Print Name & Company

Date

Signature

Print Name & Company

Date

Signature

Print Name & Company

Date

Signature

Print Name & Company

Date

Signature

Print Name & Company

Date

Signature

Attachment 4
Resolution Consultants Safety
Standard Operating Procedures

This page intentionally left blank

5-001-Safety Rules

1.0 Rules for all Employees

- 1.1 Work in a manner that will not put oneself, other personnel or equipment or facilities at risk.
- 1.2 Identify hazardous conditions and activities in the work environment consistent with the job and training.
- 1.3 If a hazard cannot be eliminated, report it to the manager or supervisor promptly.
- 1.4 Implement established control methods consistent with project procedures and/or training.
- 1.5 Cooperate and comply with all Resolution Policies and Standard Operating Procedures.
- 1.6 Immediately report all acts of aggression, verbal or physical threats, assaults, sexual or other harassment to your supervisor or manager.
- 1.7 Take any safety training required for your job function or tasks.
- 1.8 Use or wear all personal protective equipment, devices or clothing required in accordance with manufacturers' instructions and Resolution training and/or procedures.
- 1.9 Do not perform any work task or activity which you believe is unsafe. Inform your supervisor immediately.
- 1.10 Immediately report all incidents (including near misses), injuries, property damage, spills, hazards, safety concerns and safety violations to your supervisor.
- 1.11 Report all observed unsafe acts, conditions, or behaviors that compromise the safety of Resolution employees, its clients, subconsultants, general contractors, or the public to your supervisor.
- 1.12 Keep all personal work areas clean from debris and tripping hazards.
- 1.13 Operate all Resolution vehicles and mobile equipment in accordance with applicable regulations.
- 1.14 Do not use or operate any equipment, machine or device that may endanger you or another worker.
- 1.15 Do not remove, damage, disable or make ineffective any protective safety, fire fighting or first aid equipment or devices.
- 1.16 Use only vehicles, equipment and tools that are in safe operating condition and maintained in accordance with manufacturer's specifications. Report, remove from service, or have repaired, any tool or equipment that is damaged, not working properly or may otherwise be hazardous if used.
- 1.17 Do not use any hand-held wireless device while driving a vehicle or performing other safety critical tasks like working near traffic or working with power tools.
- 1.18 When travelling, working alone or working away from the Resolution office, particularly in remote areas, follow applicable call-in procedures.
- 1.19 Do not bring firearms onto Resolution property or allow them on Resolution projects unless expressed permission is provided by management for the use in wildlife protection.
- 1.20 Do not smoke in areas designated as "NO SMOKING" or in any Resolution facility.
- 1.21 Do not use, sell or distribute, be under the influence, or have in their possession any controlled substances, drugs, or alcohol while performing work duties.

2.0 Project or Field Work

- 2.1 Always report to site supervisor before performing work on site to determine specific requirements for the site or project. Follow all safety requirements, including Resolution's, or that of a client or prime contractor, as applicable.
- 2.2 Use only designated project entrances, parking areas and facilities.
- 2.3 Show or produce evidence of identification or required training if requested to gain entry to or while on a project.
- 2.4 Obey all warning signs (e.g., "Do Not Enter," "Eye, Hearing or Respiratory Protection Required," "Permit Required Confined Space," "Authorized Personnel Only").
- 2.5 Do not block, deface or remove any signage, barricade or fencing without approval.
- 2.6 Keep passageways clean and clear of debris, materials, hoses, cords, and tripping obstructions. Items should be moved to low activity areas or overhead.
- 2.7 Verify with the **Project Manager** that all required Permits are in place prior to commencing work.
- 2.8 Be aware of work going on, around or above you including contractor activities and public motor vehicles.
- 2.9 Do not work alone when performing high risk or remote work.
- 2.10 Personal cameras, video recorders, and other photographic equipment shall not be permitted on site without the **Project Manager** and client's approval.
- 2.11 Plan work tasks before beginning work and consider any hazards that may exist and how to avoid them through safe work practices or safe work procedures.

5-002-Stop Work Authority for Unsafe Work

1.0 Purpose and Scope

- 1.1 This procedure establishes the requirements for Resolution personnel to stop work if they believe there is an imminent safety, health, or environmental risk as described below that will affect them, their co-workers, the public, or the environment.
- 1.2 This procedure applies to all Resolution-based employees and operations.

2.0 Terms and Definitions

- 2.1 **Discrepancy/Deficiency:** An omission or commission, a condition, or a situation that is in conflict with the procedures and requirements of Resolution's SH&E standards.
- 2.2 **Imminent Danger:** An impending or threatening situation that, if left uncorrected, is likely to result in serious injury, property damage, or environmental impairment.
- 2.3 **Potentially Dangerous:** Minor violations that present a low potential for serious injury, property damage, or environmental impairment.
- 2.4 **Stop Work Order:** A directive to cease Resolution-controlled work issued for failure to follow procedures, imminent danger situations/conditions, accumulation of safety violations, etc. The Stop Work Order will apply to Resolution and its direct subcontractors placed at risk by the situations or conditions.

3.0 References

None.

4.0 Procedure

4.1 Roles and Responsibilities

- 4.1.1 **Employees** are responsible for stopping all Resolution-directed work and for bringing it to the attention of the appropriate manager, Site Safety Officer, Project Manager, and/or Contractor representative any time an employee identifies a discrepancy, deficiency, or potentially dangerous condition or act that is likely to cause an unsafe or unhealthy situation or an imminent danger situation.
- 4.1.2 **Employees** may report unsafe working conditions anonymously, but they must provide sufficient detail and promptness to allow Resolution management and the SH&E staff to initiate corrective action.
- 4.1.3 **The Site Safety Officer or Local SH&E Representative** must initiate the development and implementation of corrective actions to eliminate the condition causing the Stop Work Order for Resolution employees and other personnel under Resolution's direct control affected by such condition. Report the details of the Stop Work Order and any corrective actions implemented to the **Project Manager** and the appropriate **Regional SH&E Manager**
- 4.1.4 **Project managers (field task managers, supervisors)**
- Verify that corrective actions taken appropriately address the conditions leading to the Stop Work Order.
 - If Resolution has control over the circumstance that led to the condition, initiate additional corrective actions necessary to correct the conditions leading to the Stop Work Order. Otherwise, remain in communication with the persons or entities that are taking the corrective measures.
 - Communicate such corrective actions and the effects of such corrective actions on the project/office to the client and/or Region Management.

- Ensure that documentation related to the Stop Work Order and corrective actions is placed in the project/office file.

4.1.5 **Regional Business line Managers (regional, district and office managers)**

- Provide support, in accordance with our contractual responsibilities for the project, for the implementation of corrective actions and communications with clients.
- Ensure that no reprimand or reprisal is associated with the initiation of a Stop Work Order.

4.1.6 **Regional SH&E Managers**

- Provide technical guidance for the development and implementation of corrective actions.
- Communicate with the SH&E group and assist with the development of Shared Learning and Safety Alert notices.
- Report all instances when Stop Work Authority has been implemented to the Resolution Consultants SH&E Manager.

4.2 **Commitment**

4.2.1 It is Resolution's policy and firm commitment that employees are expected to stop their work to prevent unacceptable exposure to workplace hazards, including unsafe conditions or worker behaviors, without fear of reprimand or reprisal.

4.2.2 Cases involving reprisal, reprimand, or any attempt to discourage the initiation of Stop Work Orders or reporting of unsafe or unhealthy conditions or situations within Resolution should be immediately reported to the employee's **Manager, Human Resources Representative, and Regional SH&E Manager, Resolution Consultants SH&E Manager.**

4.3 **Authority**

4.3.1 Resolution's stop work authority applies to all work controlled by Resolution, its employees, and Resolution -controlled subcontractor work activities. All Resolution personnel are authorized to stop work in the event of an identified unsafe condition. If the responsible organization fails to provide resolution, or if at any time their acts or failure to act cause substantial harm or imminent danger to the health and safety of project employees, the public, or the environment, Resolution may issue an order stopping work in whole or in part. In the event that Resolution issues a Stop Work Order, an order issued by Resolution Consultants SH&E Manager (or his designee) authorizing the resumption of work must be in place prior to restarting work.

4.3.2 In most cases, a Stop Work Order affects only those areas immediately involved in the hazardous situation. Resolution may issue a Stop Work Order for a portion of the work area(s) or for an entire work area when unacceptable risks exist that cannot be mitigated by reasonable engineering controls, administrative actions, or personal protective equipment. The Stop Work Order will remain in effect until the responsible organization resolves the problem(s) and brings the work area(s) to satisfactory conformance with established SH&E requirements. Work will not resume until appropriate corrective actions have been completed, ensuring that the condition has been rectified. The Stop Work Order will apply to Resolution and its direct subcontractors placed at risk by the situations or conditions.

4.4 **Severity of Hazards**

4.4.1 **Imminent Danger Situations**

- Upon becoming aware of an imminently dangerous situation that Resolution does not control, the employee should immediately inform the persons or entities in control of such imminently dangerous activities and his or her project manager about the situation. If the activities pertain to work that is controlled by Resolution, then the employee may stop the work upon discovering an imminently dangerous situation and then immediately notify his project manager, who may determine the appropriate further action to be taken (including the issuance of a formal Stop Work Order).

- “Stopping work” for Resolution -controlled work includes stabilizing an imminent danger situation to the extent that it can be left unattended for a prolonged period of time until the issue is resolved.
- The person requesting the work stoppage will notify the organization responsible for the work.
- The responsible organization will notify Resolution project/office management immediately of any stop work action(s) taken to rectify the situation.
- An Resolution’s failure to comply with any Stop Work Order in whole or in part may result in disciplinary action. An Resolution subcontractor employee’s failure to comply with any Stop Work Order may result in immediate removal from the project and/or office location.

4.4.2 Potentially Dangerous Situations

- Informal stop work interventions to correct minor conditions (e.g., to remind workers to put on their hard hats, safety glasses, etc.) do not require formal notification.
- If the minor condition cannot be corrected, a formal Stop Work Order must be issued and work must not be resumed until the situation has been eliminated.

4.5 Management-issued Stop Work Orders

4.5.1 **Project Managers** and/or **SH&E Managers** may issue a formal Stop Work Order for Resolution-controlled work in the following situations:

- Imminent danger exists involving the public or employee’s safety and health or damage to the environment, facilities, or property.
- Continuing work or equipment usage will result in significant repair, rework, or removal.
- A project, or any segment of the project, is executed improperly or is out of compliance with applicable regulations or standards.

4.6 Resuming Work

4.6.1 Work associated with the affected area or operation will not resume unless all corrective actions identified in the applicable Stop Work Order have been completed and closed.

4.6.2 All personnel affected by the Stop Work Order will be instructed on the corrective actions and preventative measures taken.

5.0 Records

5.1 The completed Stop Work Order and any corrective action reports generated will be maintained at the project site for the duration of the project and placed in the closed project file.

6.0 Attachments

5-002 Stop Work Order

5-002- Stop Work Order

This form must be completed if any of the following Criteria are met:

1. Imminent danger exists involving the public or employees' safety and health, the environment, facilities, or property.
2. Continuing work or equipment usage will result in significant repair, rework, or removal.
3. There is a discrepancy, deficiency, or potentially dangerous condition or act that is likely to cause an unsafe or unhealthy situation or an imminent danger situation.

Project Name:			
Project Manager:		Project #:	
Reported by:		Date/Time:	
Office:		Address:	
Stop Work Order is the result of the following:			
Inspection/Audit <input type="checkbox"/>	Environmental Impairment <input type="checkbox"/>	Injury/Incident <input type="checkbox"/>	
Unsafe Condition <input type="checkbox"/>	Unsafe Behavior/Act <input type="checkbox"/>	Improper Scope of Work <input type="checkbox"/>	
Other <input type="checkbox"/>			
Stop Work Order (Describe):			

All Stop Work Orders will be sent to the Regional SH&E Manager for Review

Return to Work

The above Stop Work Order issues/concerns have been corrected and documented. By signing below, I certify that the above Stop Work Order scenario has been corrected and work is safe to resume.

Title	Print Name	Signature
Project Manager:		
Individual/party issuing Stop Work Order:		
Sub-Contractor Supervisor (if applicable):		

5-003-SH&E Training

1.0 Purpose and Scope

- 1.1 Resolution's Safety, Health and Environmental (SH&E) Training Program is designed to provide training for all personnel which address the safety needs of their assigned job duties and responsibilities.
- 1.2 This procedure applies to all Resolution based employees and operations.
- 1.3 Major objectives of the SH&E Training Program include:
 - Identify accountability, responsibility, and authority pertaining to the SH&E training program requirements.
 - Establish minimum training course and/or instructor criteria to ensure compliance with applicable regulatory requirements as well as Resolution's SH&E Program requirements.
 - Define documentation and corresponding archive requirements for the training program.
 - Maintain consistency in SH&E training content throughout North America for Resolution.

2.0 Terms and Definitions

- 2.1 **Training Needs Assessment (TNA):** A documented or electronic selection process whereby each employee identifies SH&E training based on their job role(s), responsibility(s) and associated hazards, and reviews the selected course(s) with his/her supervisor for approval and provision.
- 2.2 **Learning Management System (LMS):** A documented or electronic process of recording the commitment of the TNA and the successful completion of the associated SH&E training material.
- 2.3 **SH&E Administrators:** Employees that are located in various offices who coordinate the staff and/or trainers for delivery of SH&E training and record training completion data into the LMS or maintain hard copy files of training data for the location(s).

3.0 References

None.

4.0 Procedure

The requirements included in this procedure are the minimum applicable for Resolution activities. Further training may be identified to meet local jurisdiction or client requirements.

4.1 Training Needs Assessment

- 4.1.1 For Resolution to provide the necessary SH&E training for all employees to safely perform their work, job hazards that each employee may be exposed to must be identified and appropriate training provided about those hazards.
- 4.1.2 Upon employment and annually thereafter, employees must review their SH&E training requirements by completing the SH&E Training Needs Assessment (TNA) form. Their supervisor will review and confirm these training requirements and confirm enrolment into the required training programs.
- 4.1.3 Training Needs Assessments must be reviewed if any employee has been assigned a significantly different job with new hazards or project reassignment.

4.2 Training Delivery

- 4.2.1 SH&E Training is delivered in several methods to meet Resolution's wide diversity of staff, office and project locations. The local **SH&E Administrator** can work with the **Regional SH&E Manager** to develop a Regional training schedule and appropriate methods of delivery.

- 4.2.2 Every employee must attend the required training to meet the commitment established in the TNA and to demonstrate successful participation and knowledge transfer by completing and passing the associated quizzes or examinations.
- 4.3 **Internal Training**
- 4.3.1 Internal training represents training that is performed by Resolution's internal resources and may include intranet and classroom-based training. Generally this training material is customized to meet the specific requirements of Resolution or the project.
- 4.3.2 Courses that are self-taught and individually paced and delivered via Resolution's intranet: These courses are developed and maintained by the **SH&E Department**. Resolution's intranet will also be used to provide training by an **SH&E Instructor** in a WebEx format to facilitate personnel training based in multiple locations.
- 4.3.3 Courses taught by an Resolution instructor in a classroom format: Trainers are SH&E Department-approved personnel using materials developed specifically to train Resolution employees. All training course curricula is reviewed and approved by the SH&E Department prior to provision of training.
- 4.4 **External Training**
- 4.4.1 External vendors conduct training that is not available through internal training sources. All external vendors are to be selected and pre-approved by the SH&E Department prior to any employee attending a training class.
- 4.4.2 Resolution will use Internet training to supplement internal training courses. All Internet-based safety training courses and providers must be approved by the SH&E Department prior to any employee participating in training. Employees will be provided sign-on privileges.
- 4.5 **Project Specific Training**
- 4.5.1 In the course of employment with Resolution, employees may be asked to participate in project work with activities new to them or activities for which they have let their safety, health or environmental training expire. Should this occur they must immediately inform their supervisor and not participate in any tasks with hazards for which they have not been trained.
- 4.5.2 **Project Managers** must review all employees scheduled to work on their projects for compliance with SH&E training for hazards present or anticipated on their particular project. **Project Managers** must not let any employee that does not have current training for the identified hazards work on their projects.
- 4.6 **Training Tracking**
- 4.6.1 Records documenting employee participation safety training will be maintained in accordance with applicable regulatory and Resolution SH&E Program requirements.
- 4.6.2 Each region/district is responsible for maintaining documentation of course completion by each individual employee. **SH&E Administrators** will generally maintain such documentation.
- 4.6.3 For any employee who cannot be entered into the electronic database i.e.: contract employees, subconsultant employees, client personnel, the District or Office **SH&E Administrator** is required to maintain an individual non-employee training file with hard copies of certification from any safety training records.
- 4.7 **Training Program Management**
- 4.7.1 **Regional SH&E Managers** will be responsible for verifying training vendors, Internet training courses, or any other external training programs used by their operating units to comply with applicable regulatory or legislative requirements and Resolution SH&E Program parameters. Resolution will not consider any training received through an unapproved vendor to be valid until reviewed and accepted by a **Regional SH&E Manager**.
- 4.7.2 Resolution's **SH&E** group may provide training support services (e.g., registration) for Resolution-approved programs in addition to training provided by individual business lines and outside vendors.

4.8 **Roles and Responsibilities**

4.8.1 **Employing JV Partner** is responsible for establishing adequate resources (budget, training staff, etc.) within the business line(s) to implement the identified SH&E training.

4.8.2 **Regional Managers** are responsible for supporting the SH&E training program, and for the implementation and enforcement of this procedure within their region. This includes:

- Allocating resources for the effective implementation of this program.
- Participating with the **Regional SH&E Manager** in the development of tools to identify, track and monitor the implementation of SH&E training.

4.8.3 **Project Managers** (including field task managers, supervisors) are responsible that all assigned personnel comply with the requirements of this program. They will also:

- Identify local **SH&E Administrators** to coordinate SH&E training and to handle the training program data for their district/department.
- Confirm that training requirements are reviewed with each employee, based upon anticipated hazards associated with current and probable job functions and past performance if the job has not changed.
- Confirm that a SH&E TNA is completed by each employee and their supervisor as part of an employee's new hire orientation and upon annual review.
- Identify supplemental employee training courses based on local/client requirements.
- Identify additional employee SH&E training requirements based upon prudent risk management considerations and local performance issues.
- Implement corrective actions when employees fail to meet training requirements.

4.8.4 **Resolution Consultants SH&E Manager** is responsible for the following:

- Establishing SH&E Training Program parameters and communicating same to corporate executive management.
- Providing the necessary tools, support, and staff for development of the SH&E training program.
- Developing a list and schedule of training courses, including routine recurring training for standard courses.
- Reporting/communicating training status to senior management.

4.8.5 **SH&E Group** is responsible for the following:

- Developing and maintaining the LMS.
- Developing a list and schedule of training courses, including routine recurring training for standard courses. Communicating such information accordingly.
- Developing a resource of Resolution on-line, vendor or classroom training materials.
- Developing a roster of approved SH&E courses and syllabi.
- Collaborating with the **Regional SH&E Managers** in course development and content.
- Auditing for compliance with training program parameters.
- Reporting the status of the SH&E Training Program to the **Group SH&E Director** and **Regional SH&E Managers**.

4.8.6 **Regional SH&E Manager** is responsible for the following:

- Working with Regional and Business Line management to verify all SH&E training needs are identified and captured in the LMS.
- Developing a schedule and performing internal safety training classes as requested by regional, district, office or **Project Managers**.
- Reviewing and approving qualifications of Resolution employees providing internal safety training.

- Approving training lesson plans and course agendas for all internal training courses.
- Approving external safety training vendors and on-line (Internet) training providers.
- Monitoring for compliance with training program requirements.

4.8.7 **SH&E Administrators** are responsible for the following:

- Inputting and maintaining records pertaining to all safety training courses, medical monitoring, and other safety events into the LMS.
- Assigning training courses to employees, based on approved TNA results.
- Maintaining a hardcopy file of employee training records, sign-in sheets and other SH&E records related to training (such as quizzes and course evaluations where available).
- Supporting employees in obtaining refresher training prior to expiration.
- Providing office, department, location or business lines managers training compliance reports at an interval agreed upon by manager.

4.8.8 **Employees** are responsible for the following:

- Reviewing with their supervisor the SH&E hazards they may be exposed to in their day-to-day functions, and requesting the training for that hazard by completing a SH&E TNA.
- Coordinating with their supervisor to take the required SH&E training course prior to performing tasks with identified hazards.
- Monitoring their own training expiration dates and coordinating with their local **SH&E Administrator** (and supervisor) for refresher training to prevent expiration of any required training certifications.
- Supplying copies of training completion certificates to the **SH&E Administrator** for inclusion in the LMS.

5.0 Records

None.

6.0 Attachments

6.1 5-003-SH&E Training Sign In Sheet

5-003-SH&E Training Sign-In Sheet

Course Name:					
Region:		District:			
Business Line:		Dept #:			
Office:		Address:			
Date:		Start Time:		Stop Time:	
Certification Level (Check One): Awareness <input type="checkbox"/> Performance <input type="checkbox"/> Competent Person <input type="checkbox"/>					
Lead Instructor:		Instructor 1:		Instructor 2:	
Employee Name: (PRINT LEGIBLY)		Region/Office Company (if not Resolution)		Employee ID #:	
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					

This page intentionally left blank

5-208-Personal Protective Equipment Program

1.0 Purpose and Scope

- 1.1 Provide an effective Personal Protective Equipment (PPE) Program to protect Resolution employees from potential workplace safety and health hazards.
- 1.2 This procedure applies to all Resolution employees and operations.
- 1.3 The proper use of appropriate PPE, in combination with effective engineering and administrative controls, can provide Resolution employees with protection against potential workplace hazards and can reduce the potential for workplace injury and illness.

2.0 Terms and Definitions

- 2.1 **PPE:** Personal Protective Equipment
- 2.2 **ANSI:** American National Standards Institute

3.0 References

- 3.1 Occupational Safety and Health Administration (OSHA) PPE standard (29 CFR 1910.132) requires Resolution to assess workplace(s) to determine if hazards that necessitate the use of PPE exist in the workplace, and, if such hazards are present, to
 - 3.1.1 Select the appropriate types of PPE and
 - 3.1.2 Provide employees with training about the use and care of the selected PPE.

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 Regional SH&E Professional

- Provide guidance to Project Managers, Field Task Managers, Supervisors, and field staff on the assessment of hazards and the selection of PPE.
- Provide training materials to Project Managers, Field Task Managers and Supervisors for employee training.

4.1.2 Project Managers (Field Task Managers, Supervisors)

- Conduct Hazard Assessments to identify hazards present and to specify PPE appropriate for those hazards.
- Determine which of your staff members will require employee-issued PPE.
- Approve the purchase of company-issued PPE.
- Verify that appropriate PPE is utilized by your employees when required or necessary.

4.1.3 Employee

- In accordance with your training and instructions, utilize appropriate PPE that has been issued to them when required or necessary.
- Inspect your PPE prior to use to confirm that it is functional, and maintain your PPE in a clean and functional condition.
- Follow instructions and manufacturers' guidance on the care, use, and storage of your PPE.
- Prior to using any type of PPE, confirm that it is in good shape, free of dirt and debris, and that you are familiar with its correct use. Always make sure PPE fits adequately to perform the use intended.
- Refrain from wearing PPE outside of the work area for which it is required if doing so would constitute a hazard.

4.2 Hazard Assessment for Office Locations

Office Hazard Analysis will be completed for applicable tasks as required in 29 CFR 1910.132 following the guidelines as specified in OSHA Pamphlet 3151-12R 2003 (Personal Protective Equipment),

4.3 Hazard Assessment for Off-Site Locations

4.3.1 HAZWOPER Locations

- Each Health and Safety Plan (HASP) that is prepared for waste site investigations/remediation includes a hazard assessment for each proposed field activity. Task-specific PPE requirements are listed in the HASP. Therefore, the HASP will serve as the certificate of hazard assessment for each project that involves off-site work activities that require the use of PPE.

4.3.2 All Other Off-Site Locations

- The Task Hazard Analysis will serve as the certificate of hazard assessment for projects that involves offsite work activities that require the use of PPE. The checklist will be reviewed with the entire field team prior to arriving at the site.

4.4 Training

4.4.1 Staff will receive adequate instruction on the correct use, limitations, and assigned maintenance duties for the equipment to be used. The following information, at a minimum, will be covered during PPE training:

- What PPE is required.
- When it is required.
- Why it is required.
- How to properly don, doff, adjust, and wear the PPE described.
- The limitations of the PPE, including its expected useful life.
- How to properly care for, maintain, and dispose of the PPE.

4.4.2 Field staff are responsible for confirming that they have reviewed the operation manual for the PPE before work commences.

4.4.3 All staff will receive an orientation to the hazards on the job site as well as initial Field Safety orientation that outlines appropriate PPE requirements.

4.4.4 Resolution Consultants employees who have participated in the 40-hour HAZWOPER training course are considered to have met the employee training requirements of the PPE standard. The training certificates that are issued as documentation of successful completion of the 40-hour HAZWOPER course will also serve as documentation of training as required by the PPE standard. Employees who have not participated in the HAZWOPER training will be provided PPE training specific to your assignment and/or location. The PPE Facts Sheets (attached) can serve as the basis for training.

4.5 Determining the Need for PPE

4.5.1 Using the Task Hazard Assessment or HASP, the need for the following types of PPE will be evaluated.

4.5.2 PPE will:

- Be selected and used in accordance with recognized standards and provide effective protection.
- Not in itself create a hazard to the wearer.
- Be compatible, so that one item of PPE does not make another item ineffective.
- Be maintained in good working order and in a sanitary condition.

- 4.5.3 Prior to entering any regulated work area, confirm that you have access to or are equipped with the following CSA-approved PPE, appropriate to the site hazards:
- Head Protection
 - Eye & Face Protection
 - Foot Protection
 - Hi-Visibility Vests
 - Hearing Protection
- 4.5.4 After the hazard assessments have been completed, the Project Manager will select the appropriate PPE for each job category or task, as necessary. The selected equipment will be indicated on the hazard assessment. PPE will be provided to each employee appropriate for the hazards present. All PPE selected and purchased by Resolution will meet or exceed the American National Standards Institute (ANSI) standards, Canadian Standards Association (CSA) standards, or other standards as dictated by provincial, territorial, or state legislation.
- 4.6 **Eye and Face Protection**
- 4.6.1 The OSHA standard requires that Resolution employees use appropriate eye and face protection when exposed to eye or face hazards from flying particles, molten metal, liquid chemicals, acid and caustic liquids, chemical gases or vapors, and injurious light radiation. The standard further requires that eye protection provide side protection when there is a hazard from flying objects.
- 4.7 **Head Protection**
- 4.7.1 Protective helmets (hard hats) are required when employees are working in areas where there is a potential for falling objects to cause injury to the head. When working near exposed electrical conductors that could contact the head, helmets designed to reduce electrical shock will be worn.
- 4.8 **Foot Protection**
- 4.8.1 Protective footwear is required when employees are working in areas where there is a danger of foot injuries from falling and rolling objects or from objects piercing the sole and where an employee's feet are exposed to electrical hazards.
- 4.9 **Hand Protection**
- 4.9.1 Appropriate hand protection is required when employee's hands are exposed to hazards such as those from skin absorption of harmful substances, severe cuts and lacerations, severe abrasions, punctures, chemical burns, thermal burns, or harmful temperature extremes.
- 4.9.2 Chemically Resistant Clothing
- 4.9.3 Chemically resistant clothing is required when there is significant potential for the employee to come in direct contact with the chemicals he/she is handling. Tasks that involve chemical handling will be evaluated for the potential of splashing or spilling.
- 4.9.4 High-Visibility Apparel
- 4.9.5 High-visibility apparel with reflective banding (ANSI Class II and III garment) is required for all field activities in close proximity to moving traffic and other modes of transportation (transit, airlines, marine, etc.), in proximity to heavy equipment operations, or whenever otherwise specified in a project HASP. Color of apparel (orange or lime) may be client/project-specific.
- 4.10 **Personal Clothing**
- 4.10.1 For personal safety on the job site, do not wear
- Loose or unsecured clothing or loose fitting cuffs.
 - Greasy or oily clothing, gloves, or boots.
 - Torn or ragged clothing.

- 4.10.2 Neck chains are hazardous and will be worn under clothing so that they do not hang out. Long hair will be tied back or otherwise confined.
- 4.10.3 Clothing made of synthetic fibres can be readily ignited and melted by electric flash or extreme heat sources. Cotton or wool fabrics are recommended for general use.
- 4.11 **Specialized PPE**
- 4.11.1 In addition to basic PPE, additional specialized PPE may be required to provide appropriate protection to the employee. Refer to applicable OH&S legislation and related Standard Operating Procedures for additional information on PPE requirements.
- Fall Protection: Only full body harnesses with shock-absorbing lanyards will be used for personal fall arrest.
 - Respiratory Protection: Respiratory protection shall be selected based on the contaminant and concentration to which the employee will be exposed. Refer to 5-519 *Respiratory Protection Program* and the task- or project-specific Baseline Hazard Assessments for specific requirements.
 - Fire Resistant Clothing: Approved fire resistant outer clothing may be required at work locations with flammable or explosive materials or environments.
 - Other Head Protection: Operators and passengers (if permitted) of all terrain vehicles and snowmobiles will wear approved helmets.
 - Chemical Protective Clothing: Approved chemical protection appropriate to the hazard will be worn. Review applicable Material Safety Data Sheets (MSDSs) for appropriate PPE.
 - Protection from Drowning: Employees being transported by boat are required to wear life jackets. Employees exposed to any other drowning hazards are required to wear personal flotation devices. Life jackets and personal flotation devices will have the proper regulatory approval.
- 4.12 **PPE Supplies**
- 4.12.1 Each Resolution office will maintain a supply of safety equipment including safety glasses, gloves, and chemically resistant clothing based on the nature of their field activities. The Office Manager or designee will be responsible for maintaining this inventory. PPE that is required for large field efforts will be ordered by the Project Manager or their designee.
- 4.12.2 At a minimum, the office will review its PPE program annually.
- 4.13 **Obtaining Personalized Safety Gear**
- 4.13.1 The OSHA standard in 29 CFR 1910 - Subpart I / 29 CFR 1926 requires that protective equipment, including PPE for eyes, face, head, and extremities, protective clothing, and respiratory devices, be provided to employees wherever necessary by reason of hazards.
- 4.13.2 Employees are not expected to provide their own general PPE. Although each Resolution office stocks and issues various general issue safety gear such as hard hats, plain safety glasses, disposable gloves and coveralls, fall protection, and hearing protection, certain personalized safety gear such as prescription safety glasses, safety-toed (capped) boots, and cotton coveralls will be ordered and sized specifically for the user.
- 4.13.3 Most PPE will be provided to the employee at no charge, with the exception of the above personalized safety equipment (safety glasses, safety toed boots, washable coveralls). A partial cost reimbursement to the employee may be made based on legacy company practice or project stipulations.
- 4.13.4 Prescription Safety Glasses
- As with all hazards, staff will be notified of their potential for injury and will be provided with the appropriate PPE. If wearing contact lenses poses a hazard to the worker's eyes during work, the worker will be advised of the hazards and the alternatives to wearing contact lenses.
 - Eligibility

- Employees will wear safety glasses during activities that involve exposure to eye hazards such as flying particles, chemical splash, or certain types of radiation such as ultraviolet light from welding operations. Typically, the following types of field activities will require the use of safety glasses:
 - Site investigation or remediation and construction activities.
 - Stack monitoring and other types of air emissions monitoring.
 - Audits and assessments in industrial or manufacturing facilities.
 - Activities conducted within laboratories.
 - Activities at client facilities where safety glasses are required.
- Eligibility to obtain prescription safety glasses will be determined by the employee's supervisor based upon the guidance above.
- Procurement of Prescription Safety Glasses
 - Except for eye examinations, associated prescription eyewear costs will be paid by Resolution. The employee may be asked to pay an optician's dispensing fee, which may be submitted on an expense report for reimbursement. Because eye examinations are not covered, employees who have had recent eye examinations should contact the eye care professional in advance to determine their procedure for handling a current prescription.
 - Employees who are eligible will be allowed to order one pair of prescription safety glasses every other year from the selection of glasses offered by the program.
 - Contact the Regional SH&E Professional for guidance on the procurement of prescription safety glasses.

4.13.5 Safety Toed Boots/Shoes

- Eligibility
 - Employees will wear safety boots/shoes during activities that pose the potential for foot injury from dropped objects or penetrations through the sole. Typically, safety toed boots/shoes will be required for the same type of activities, with the exception of laboratory activities, for which safety glasses are required. In addition, work around all types of heavy equipment will typically require the use of safety shoes.
 - Eligibility to obtain safety shoes will be determined by the employee's supervisor based upon the guidance above.
- Procurement of Safety Shoes
 - Eligible employees will be allowed to purchase one pair of safety shoes every other year.
 - Employees who have been authorized to purchase safety shoes by their supervisor should consult the Regional SH&E Manager for obtaining for detailed instructions on how and where to purchase the equipment. The style chosen (i.e., boot or shoe) should be determined based upon the application. For example, low cut shoes may be appropriate for audits and assessments in light industry applications, while safety boots will be more appropriate for environmental remediation, construction, and heavy industry work with significant foot hazards. Before purchasing, the employee is required to verify that the safety boots or shoes meet the specifications above.
 - After the purchase, an employee expense report, including a dated receipt for the shoes, should be submitted for approval and reimbursement. Resolution will reimburse the employee up to a amount that is specified by the SH&E Department or Regional Operations management.

4.13.6 Reusable Coveralls

- Eligibility

- Reusable cotton (or some other washable fabric) coveralls may be made available to employees who regularly perform field work based on conditions. Coveralls can be worn over personal clothing to help protect and keep them clean.
- Eligibility to obtain washable coveralls will be determined by the employee's supervisor based upon the guidance above.

5.0 Records

None.

6.0 Attachments

None.

5-213-Subcontractors

1.0 Purpose and Scope

- 1.1 Provides a process through which Resolution Subcontractors are evaluated to determine if the use of that Subcontractor will pose an unacceptable risk to Resolution and/or its clients, employees, equipment, or property.
- 1.2 This policy applies to all Resolution North America based operations.

2.0 Terms and Definitions

- 2.1 **Subcontractor:** Any contractor or organization procured to provide direct services for, or in support of, an Resolution managed activity or operation. This is inclusive of any Resolution managed activity or operation that requires the physical presence of that contractor at the location to conduct the contracted service. Examples include, but are not limited to:
- Heavy equipment operations
 - Surveying
 - Construction/renovation/clean-construction operations
 - Demolition
 - Well abandonment
 - Electrical system installation/service
 - HAZWOPER Activities
- 2.2 **Resolution field site:** A site at which Resolution is providing field-related services.

3.0 References

None.

4.0 Procedure

4.1 Subcontractor Selection Requirements

- 4.1.1 For all subcontractors, the selection process will include consideration of the candidate firms' SH&E management and performance indicators.
- 4.1.2 Subcontractor bids/submittals shall include a completed Subcontractor SH&E Evaluation. Each questionnaire will be evaluated during the subcontractor selection process to identify any organizations whose past SH&E performance may disqualify them from selection.
- 4.1.3 Prior to the start of their on-site operations, the selected subcontractor firms are required to provide copies of any SH&E documentation (e.g., insurance carrier supplied Experience Modification Rates documents, insurance certificates, safety plan, manual of safety procedures, employee training/medical monitoring certifications) to the Project Manager and/or subcontractor selection manager.
- 4.1.4 Although the questionnaire is to be used as a guideline to determine whether a bidder's safety and health record is acceptable, there are no simple pass/fail criteria. The guidance outlines the standards Resolution's JV Partner's SH&E Department has established to reflect performance acceptability. Marginal performance (Score is less than 3) will require evaluation for final approval of a subcontractor by the PM in coordination with the SH&E Department. Priority will be given to subcontractors who have obtained certification standards (e.g., OHSAS 18001; Certificate of Recognition).

- 4.2 **Procurement Phase.** Prior to starting fieldwork, each subcontractor organization shall provide the Resolution Project Manager (or Resolution representative) with at least one of the following for review and acceptance:
- 4.2.1 Site-specific SH&E documentation addressing specific performance requirements for the subcontractor's on-site work activities, site safety coordinator's name and responsible persons; or
- 4.2.2 A written statement of adoption of the provisions in Resolution's project SH&E documentation as the subcontractor's minimum procedures while working on the job site. This documentation must be in letter format (company letterhead), and must include the following information:
- Site location
 - Anticipated scope of work activities to be performed and equipment to be used by the subcontractor
 - Name of the subcontractor's Site Safety Officer, with contact phone numbers
 - Name of the subcontractor's Health and Safety Manager, with contact phone numbers
 - In addition to the subcontractor's own SH&E requirements, a statement adopting the Resolution's project SH&E documentation as the subcontractor's minimum requirements for the project
 - Statement requiring that only qualified and trained personnel (to the level of assigned responsibilities) will perform assigned work activities on the site
 - Designation of required personal protective equipment anticipated for the subcontractor's assigned work activities
 - Copies of supplemental or additional subcontractor-specific provisions, policies, procedures and/or protocols that will be implemented by the subcontractor during site activities
- 4.3 **On-Site Subcontractor SH&E Requirements**
- 4.3.1 Subcontractor organizations are responsible for safely performing their assigned work activities in accordance with all applicable federal and state/provincial/territorial occupational safety and health regulations, acts, and codes.
- 4.3.2 Subcontractors are responsible for providing Resolution with a copy of their project-specific SH&E documentation for the subject work. The specification of minimum acceptable on-site SH&E performance should be included.
- 4.3.3 Subcontractors are responsible for confirming that their employees are provided the appropriate equipment and training to perform the work safely.
- 4.3.4 All subcontractors must provide input to, and be orientated to, the hazards associated with the site and activities of the project.
- 4.3.5 All subcontractors must provide proof of safety training as required for the hazards identified, inclusive of any required medical surveillance documentation.
- 4.3.6 Subcontractors will be provided with a copy of Resolution's project-specific SH&E documentation for the specification of minimum acceptable on-site SH&E performance.
- 4.3.7 If at any time the subcontractor obtains the services of another subcontractor, consultant, or lower tier subcontractor for any portion of the work to be performed, a copy of the Statement of Work and the approved project-specific SH&E documentation shall be provided as part of the package submitted to each respective subcontractor, consultant, or lower-tier subcontractor. Prior to the start of work, the subcontractor shall submit in writing to the PM, subcontractor selection manager, or their designee the names of any lower-tier subcontractors that may be used in the project that have yet to be approved. The start of work is conditional upon this approval.
- 4.4 **Roles and Responsibilities**
- 4.4.1 **Regional Management** is responsible for:

- Providing the resources to implement the subcontractor evaluation process.
- Maintaining all subcontractor SH&E performance data (developing and managing a database recommended).

4.4.2 **Project Managers** are responsible for confirming that all subcontractors have been properly evaluated for SH&E performance and potential risk. This includes:

- Communicating the requirements established in this procedure to the subcontractor and providing them with the Subcontractor SH&E Evaluation form.
- Reviewing the completed subcontractor evaluation and confirming their potential risk prior to the start of work.
- Providing a completed evaluation to the project file and the administrator or database manager in their region.
- Verifying a subcontractor's minimum level of insurance coverage as stipulated by Resolution's Legal and Procurement Departments (Workers' Compensation, Auto Insurance, General Liability, etc.).

4.4.3 **Regional SH&E Manager** is responsible for:

- Providing support to the project managers in understanding the subcontractor evaluation process and requirements.

5.0 Records

5.1 Business Line management will maintain subcontractor evaluations and associated documentation either in the project file, or, preferably, in a centralized database for tracking.

6.0 Attachments

5-213-Subcontractor SH&E Evaluation

This page intentionally left blank

5-307 Housekeeping, Worksite

1.0 Purpose and Scope

- 1.1 This procedure provides Resolution Consultants' work practices as well as personal hygiene and work site sanitation standards for housekeeping.
- 1.2 Applies to all Resolution Consultants staff and field worksites.

2.0 Terms and Definitions

None.

3.0 References

None.

4.0 Procedure

4.1 Roles and Responsibilities

- 4.1.1 **Project Manager (Field Task Manager, Supervisor)** is responsible for the procedure's implementation and the details of addressing housekeeping policy within the construction/demolition worksite.
- 4.1.2 **SH&E Professionals** will monitor, assess, and report on project housekeeping when visiting locations.
- 4.1.3 Employees are responsible for reporting any areas of concern to the Site Supervisor for prompt resolution as well as for maintaining worksites that are free from debris, clutter, and slipping or tripping hazards.

4.2 Smoking, Eating, and Drinking

- 4.2.1 Eating and drinking will be permitted in designated areas at Resolution Consultant project sites and as specified on client sites. Smoking will be permitted only in areas designated in compliance with applicable local laws, regulations, legislation, and ordinances, by the Field Supervisor and situated in locations that are not in the immediate vicinity of activities associated with work site activities. Additionally, Field Supervisor will designate each smoking area giving primary consideration to those personnel who do not smoke.
- 4.2.2 Personnel involved in the performance of certain activities will not be permitted to smoke, eat, drink, or use smokeless tobacco, except during breaks (e.g., HAZWOPER-controlled work areas).
- 4.2.3 Site personnel will first wash hands and face after completing work activities and prior to eating or drinking.

4.3 Water Supply

- 4.3.1 Water supplies will be available for use on site and will comply with the following requirements:
- 4.3.2 **Potable Water:** An adequate supply of drinking water will be available for site personnel consumption. Potable water can be provided in the form of approved well or city water, bottled water, or drinking fountains. Where drinking fountains are not available, individual use cups will be provided as well as adequate disposal containers. Potable water containers will be properly identified and tape sealed in order to distinguish them from nonpotable water sources and protect the potable water integrity.
- 4.3.3 **Nonpotable Water:** Nonpotable water will not be used for drinking purposes. Nonpotable water may not be used for hand washing or other personal hygiene activities but may be used for other types of cleaning activities. All containers/supplies of nonpotable water used will be properly identified and labeled as such.

4.4 Toilet Facilities

- 4.4.1 Toilet facilities will be available for site personnel and visitors. Should subcontractor personnel be located on-site for extended periods, it may become necessary to obtain temporary toilet facilities.

Exceptions to this requirement will apply to mobile crews where work activities and locations permit transportation to nearby toilet facilities.

4.4.2 A minimum of one toilet will be provided for every 20 site personnel, with separate toilets maintained for each sex, except where there are less than five total personnel on site. For mobile crews where work activities and locations permit use of nearby toilet facilities (e.g., gas station, or rest stop), on-site facilities are not required.

4.4.3 Washing Facilities

4.4.4 Hand and Face: Site personnel will wash hands and face after completing work activities and prior to breaks, lunch, or completion of workday.

4.4.5 Personal Cleaning Supplies: Cleaning supplies at Resolution Consultant project sites will consist of soap, water, and disposable paper towels or items of equal use/application (e.g., anti-bacterial gels, wipes, etc.).

4.5 **Clothing and Personal Protective Equipment (PPE)**

4.5.1 All PPE will be kept clean at all times and maintained in accordance with the manufacturer's, Resolution Consultant's, and applicable regulatory, legislative, or provincial requirements.

4.5.2 General Work Areas

4.5.3 At all times work areas will be kept free of dirt and debris that may impact the safety of site personnel and visitors. All trash receptacles will be emptied regularly.

4.5.4 Break Areas and Lunchrooms

Site personnel will observe the following requirements when using break areas and lunchrooms at Resolution Consultant project sites:

4.5.5 All food and drink items will be properly stored when not in use.

4.5.6 Food items will not be stored in personal lockers for extended periods in order to prevent the potential for vermin infestation.

4.5.7 Perishable foods will be refrigerated whenever possible.

4.5.8 All waste food containers will be discarded in trash receptacles.

4.5.9 All tables, chairs, counters, sinks, and similar surfaces will be kept clean and free of dirt, waste food, and food containers at all times.

4.5.10 Refrigerators used to store food items will be maintained at 45 degrees Fahrenheit and emptied of all unclaimed food items weekly. Refrigerators used to store food will be labeled as such so that only food and drinks are stored within the refrigerator.

4.5.11 Routine cleaning of refrigerators will also be performed on a regular basis.

4.6 **Vermin Control**

4.6.1 Every enclosed workplace shall be constructed, equipped, and maintained, so far as reasonably practicable, to prevent the entrance or harborage of rodents, insects, and other vermin.

4.6.2 A continuing and effective extermination program shall be instituted where the presence of rodents, insects, or other vermin is detected.

4.7 **General Housekeeping**

4.7.1 All work areas shall be kept clean to the extent that the nature of the work allows.

4.7.2 Every work area shall be maintained, so far as practicable, in a dry condition. Where wet processes are used, drainage shall be maintained and platforms, mats, or other dry standing places shall be provided, where practicable, or appropriate waterproof footwear shall be provided.

4.7.3 Protruding objects or placement of materials on paths or foot traffic areas present a problem with regard to slips, trips, falls, and puncture wounds. Personnel will use a reasonable amount of effort to keep slip, trip, and fall hazards to a minimum.

- 4.7.4 Excess debris and trash will be collected and stored in an appropriate container (e.g., plastic trash bags, garbage can, roll-off bin) prior to disposal.
- 4.7.5 At no time will debris or trash be intermingled with waste PPE or contaminated materials.
- 4.7.6 Material and equipment must be placed, stacked, or stored in a stable and secure manner. Stacked material or containers must be stabilized as necessary by interlocking, strapping, or other effective means of restraint to protect the safety of workers.
- 4.7.7 An area in which material may be dropped, dumped, or spilled must be guarded to prevent inadvertent entry by workers or protected by adequate covers and guarding.
- 4.7.8 Floors, platforms, ramps, stairs, and walkways available for use by workers must be maintained in a state of good repair and kept free of slipping and tripping hazards. If such areas are taken out of service, the employer must take reasonable means for preventing entry or use.
- 4.7.9 Hazardous areas not intended to be accessible to workers must be secured by locked doors or equivalent means of security and must not be entered unless safe work procedures are developed and followed.

4.8 Worksite Offices and Trailers

Worksite offices and trailers will be maintained in accordance with *RC-103-Housekeeping, Office*.

5.0 Records

None.

6.0 Attachments

None.

This page intentionally left blank

5-308-Manual Lifting, Field

1.0 Purpose and Scope

- 1.1 This procedure provides the requirements for use when performing manual materials handling activities (e.g., lifting/handling of items or materials).
- 1.2 This procedure applies to all field staff for Resolution Consultants operations.

2.0 Terms and Definitions

- 2.1 **Manual Materials Handling:** Moving or handling things by lifting, lowering, pushing, pulling, carrying, holding, or restraining.
- 2.2 **Team Handling:** Team handling occurs when more than one person is involved during the lift.

3.0 References

- 3.1 OSHA Technical Manual: http://www.osha.gov/dts/osta/otm/otm_vii/otm_vii_1.html
- 3.3 National Safety Council: www.nsc.org

4.0 Procedure

4.1 Roles and Responsibilities

- 4.1.1 The **Project Manager** will effectively implement the procedure, providing resources as required, and providing direction on proper lifting/handling techniques.
- 4.1.2 The **Resolution Consultants Health and Safety Manager** will assist in identifying activities with a high potential for lifting/handling strains/injuries as well as the associated mitigation strategies and training on proper lifting/manual materials handling techniques.
- 4.1.3 **Employees** are responsible for reviewing and following *5-308- Manual Lifting Safe Work Practices*.

4.2 Mechanical Controls

- 4.2.1 Mechanical equipment or assistance such as dollies, carts, come-alongs, or rollers are preferable to be used whenever possible rather than the employee physically moving materials.
- 4.2.2 Mechanical assistance will be of proper size, have wheels sized for the terrain, and be designed to prevent pinching or undue stress on wrists.
- 4.2.3 Objects to be moved will be secured to prevent falling and properly balanced to prevent tipping.

4.3 Administrative Controls

- 4.4 When significant, sustained lifting work is required, it is desirable to rotate employees to spread the work load among several people and thereby avoid fatigue.
- 4.5 Rotation is not simply performing a different job but instead is performing a job that utilizes a completely different muscle group from the ones that have been overexerted.

5.0 Records

None.

6.0 Attachments

None.

This page intentionally left blank

05-505-Cold Stress Prevention

1.0 Purpose and Scope

- 1.1 To protect workers from the severest effects of cold stress (hypothermia) and cold injury and to identify exposures to cold working conditions under which it is believed nearly all workers can be repeatedly exposed without adverse health effects.
- 1.2 This procedure applies to all Resolution Consultants employees and operations.

2.0 Terms and Definitions

- 2.1 **Cold Stress:** The production of physiological effects due to cold temperatures and/or wind chill.
- 2.2 **Frostbite:** Freezing of tissue, often resulting in tissue death.
- 2.3 **Hypothermia:** Condition of reduced core body temperature resulting in loss of dexterity, loss of mental alertness, collapse, and possible death.
- 2.4 **Wind Chill:** The effect of air movement on apparent temperature in a cold environment.

3.0 References

None.

4.0 Procedure

4.1 Restrictions

- 4.1.1 Staff working in extreme cold or snow for extended periods of time away from a shelter or vehicle shall not work alone.
- 4.1.2 All staff working in extreme cold or snow conditions should understand the following guidelines for preventing and detecting hypothermia and frost bite.
- 4.1.3 If you experience frost bite or hypothermia, find shelter and warmth and contact a medical practitioner if symptoms persist.
- 4.1.4 Take frequent short breaks in warm dry shelters to allow your body to warm up. Limit time of exposure.
- 4.1.5 Try to schedule work for the warmest part of the day or when the wind is most calm.
- 4.1.6 Avoid exhaustion or fatigue because energy is needed to keep muscles warm.
- 4.1.7 Because prolonged exposure to cold air or to immersion in cold water at temperatures even well above freezing can lead to dangerous hypothermia, whole-body protection shall be used.

4.2 Roles and Responsibilities

- 4.2.1 Project Managers/Field Task Managers:
 - Implement cold stress prevention measures as applicable at each work site.
 - Develop/coordinate a work-warning regimen, as applicable.
 - Confirm cold stress hazard assessments/evaluations were completed for the planned activities.
 - Assign personnel physically capable of performing the assigned tasks.
 - Confirm personnel are properly trained to recognize the symptoms of cold stress.

- 4.2.2 Regional SH&E Managers:
- Conduct/support cold stress assessments/evaluations.
 - Conduct/support incident investigations related to potential cold stress-related illnesses.
 - Assist project teams develop appropriate work-warming regimens.
 - Provide cold stress awareness training.
- 4.2.3 Supervisors:
- Identify the tasks that may be most impacted by cold stress and communicate the hazard to the assigned employees.
 - Confirm that employees have been trained on the recognition of cold stress-related illnesses.
 - Confirm that adequate supplies of warm fluids/drinks are readily available to employees.
 - Confirm that a warm/sheltered rest area is available, as applicable.
 - Conduct cold stress monitoring, as applicable.
 - Implement the work-warming regimen.
 - Confirm that first aid measures are implemented once cold stress symptoms are identified.
 - Confirm that personnel are physically capable of performing the assigned tasks and are not in a physically compromised condition.
- 4.2.4 Employees:
- Observe each other for the early symptoms of cold stress-related illnesses.
 - Maintain an adequate intake of available fluids.
 - Report to work in a properly vested condition.
 - Report all suspected cold stress-related illnesses.
- 4.3 **Training**
- 4.3.1 Before they begin work, project staff who may be exposed to cold stress will be informed of the potential for cold stress and how to prevent cold stress.
- 4.3.2 Personnel potentially exposed to cold stress will receive training including, but not limited to:
- Sources of cold stress, the influence of protective clothing, and the importance of acclimatization
 - How the body loses heat.
 - Recognition of cold-related illness symptoms.
 - Preventative/corrective measures.
 - Employees will be informed of the harmful effects of excessive alcohol consumption in a cold stress environment.
 - First aid procedures for symptoms related to cold stress.
- 4.4 **Personal Protective Equipment**
- 4.4.1 Wear multiple layers of clothing to maintain immobile layers of warm air next to the body.
- 4.4.2 Avoid cotton, especially blue jeans.
- 4.4.3 Wear proper clothing, including head coverings and gloves or mittens for cold, wet, and windy conditions.
- 4.4.4 Use insulated footwear with adequate traction to prevent slips and falls.
- 4.4.5 Confirm extra blankets or sleeping bags are on-site.
- 4.4.6 Sunglasses and sunscreen should be used when there is a persistent combination of snow and direct sun.
- 4.4.7 If shelter is not readily available, confirm that staff carry fire starter materials (see the Safe Work Practice for Wilderness Isolation).

4.4.8 Pack warm, sweet drinks, and high-calorie food for snacks.

4.5 General Cold Stress Prevention Measures

4.5.1 In order to prevent hypothermia:

- Wear multiple layers of clothing to maintain immobile layers of warm air next to the body. Avoid cotton, especially blue jeans.
- When active, ventilate excess heat by opening or removing outer layers of clothing to avoid sweating.
- Start with the mitten or gloves, unless protection from ice, snow, or cold metal surfaces is needed.
- Next remove head gear and neck wrappings.
- Then coats/parkas should be opened at the waist and sleeves.
 - Finally, layers of clothing should be taken off.
 - When resting or tired, or colder conditions are encountered, add additional layers of clothing/ close outer layers in the reverse of the above order, or get out of the cold. Have a sweet drink but do not indulge in heavy eating.
 - Garments worn to keep out rain and spray should also allow water vapor to escape.
 - Take advantage of heat from the sun and stay out of the wind as much as possible.
 - Have available emergency shelter providing protection from wind and rain and insulation from the ground.
 - Replace wet clothing. If wet clothing cannot be replaced, then cover it with a layer of non-breathing material to prevent evaporation. Place an insulation layer over this non-breathing material.
 - Get adequate rest; conserve energy.
 - Get adequate nutrition to replenish energy stores; rest after meals.
 - Drink adequate fluids to avoid dehydration.
 - If any project staff member shows signs of hypothermia, stop and treat him/her.

4.5.2 In order to prevent frostbite:

- Dress to prevent hypothermia and protect the feet and hands.
- Avoid obstruction of circulation by, for example, tight boots or tightly fitting clothing.
- Avoid nicotine, particularly cigarettes, and alcohol.
- Keep ears and nose covered and out of the wind.
- Frostbite of the corneas of the eyes can be prevented by protective goggles.
- Adopt a “buddy system” of constantly watching the faces of others in the party for white skin tissue, which is evidence of frostbite (frostnip).
- Practice constant personal vigilance for signs of trouble in one’s own fingers and toes; when in doubt, investigate thoroughly before it is too late.

4.5.3 Adequate, insulating dry clothing that will help maintain core temperatures above 96.8°F (37°C) shall be provided to workers if work is performed in air temperatures below 40°F (5°C). Wind chill cooling rate and the cooling power of air are critical factors. The higher the wind speed and the lower the temperature in the work area, the greater the insulation value of the protective clothing required.

4.5.4 An Equivalent Chill Temperature (ECT) chart relating the actual dry bulb air temperature and the wind velocity is presented in *05-505-Temperature Thresholds*. Unless unusual or extenuating circumstances exist, cold injury to other than hands, feet, and head is not likely to occur without the development of the initial signs of hypothermia. Superficial or deep local tissue freezing will occur only at temperatures below 32°F (0°C) regardless of wind speed. However, older workers or workers with circulatory problems require special precautionary protection against cold injury. The use of extra insulating clothing and/or a reduction in the duration of the exposure period are among the special precautions that should be considered.

- 4.5.5 Continuous exposure of skin should not be permitted when the air speed and temperature results in an ECT of -25°F (-32°C) or below.
- 4.5.6 At air temperatures of 40°F (5°C) or less, it is imperative that workers who become immersed in water or whose clothing becomes wet be immediately removed from the cold environment, provided a change of clothing, and be treated for hypothermia.
- 4.5.7 If the air velocity at the job site is increased by wind, draft, or artificial ventilating equipment, the cooling effect of the wind should be reduced by shielding the work area or by wearing an easily removable windbreak garment.
- 4.5.8 Adequate protection, such as general ventilation, shall be incorporated into any warming shelter design to prevent carbon monoxide poisoning.
- 4.5.9 Operation of internal combustion or similar devices within warming shelters is prohibited.
- 4.5.10 If the available clothing does not give adequate protection to prevent hypothermia or frostbite, work should be modified or suspended until adequate clothing is made available or until weather conditions improve.

4.6 Cold Stress Prevention Measures for the Hands

- 4.6.1 Special protection of the hands is required to maintain manual dexterity for the prevention of accidents including, but not limited to the following:
- If fine work is to be performed with bare hands for more than 10 to 20 minutes in an environment below 60°F (15°C), special provisions should be established for keeping the workers' hands warm. For this purpose, warm air jets, radiant heaters (fuel burner or electric radiator), or contact warm plates may be utilized. Metal handles of tools and control bars should be covered by thermal insulating material at temperatures below 30°F (-1°C).
 - If the air temperature falls below 60°F (15°C) for sedentary work, 40°F (5°C) for light work, or 20°F (-6°C) for moderate work, and fine manual dexterity is not required, workers should use gloves.
- 4.6.2 To prevent contact frostbite, workers should wear anti-contact gloves:
- When cold surfaces below 20°F (-6°C) are within reach, each worker should be warned to prevent inadvertent contact by bare skin.
 - If the air temperature is 0°F (-18°C) or less, workers should protect their hands with mittens. Machine controls and tools for use in cold conditions should be designed so that they can be handled without removing the mittens.
- 4.6.3 Provisions for additional total body protection are required if work is performed in an environment at or below 40°F (5°C). The workers should wear cold protective clothing appropriate for the level of cold and physical activity.
- 4.6.4 Additional Cold Stress Prevention Measures. For work practices at or below 10°F (-12°C) ECT, the following will apply:
- The worker should be under constant protective observation (buddy system or supervision).
 - The work rate should not be so high as to cause heavy sweating that will result in wet clothing. If heavy work is being performed, rest periods should be taken in heated shelters and opportunities to change into dry clothing should be provided.
 - New employees should not be required to work full time in the cold during the first days of employment until they become acclimated to the working conditions and required protective clothing.
 - The weight and bulkiness of clothing should be included in estimating the required work performance and weights to be lifted by the worker.
 - The work should be arranged in such a way that sitting still or standing still for long periods is minimized. Unprotected metal chair seats should not be used. The worker should be protected from drafts to the greatest extent possible.
 - Workers should be instructed in safety and health procedures, which should address:
 - Proper rewarming procedures and appropriate first aid treatment.

- Proper clothing practices.
 - Proper eating and drinking habits.
 - Recognition of impending frostbite.
 - Recognition of signs and symptoms of impending hypothermia or excessive cooling of the body even when shivering does not occur.
 - Safe work practices.
- 4.6.5 Eye protection for workers employed outdoors in a snow and/or ice-covered terrain should be supplied. Special safety goggles to protect against blowing ice crystals and ultraviolet light and glare (which can produce temporary conjunctivitis and/or temporary loss of vision) should be required when there is an expanse of snow coverage causing a potential eye exposure hazard.
- 4.6.6 Workers handling evaporative liquid (gasoline, alcohol, or cleaning fluids) at air temperatures below 40°F should take special precautions to avoid soaking of clothing or gloves with the liquids because of the added danger of cold injury due to evaporative cooling. Special note should be taken of the particularly acute effects of splashes of “cryogenic fluids” or those liquids with a boiling point that is just above ambient temperature.
- 4.6.7 Trauma sustained in freezing or subzero conditions requires special attention, because an injured worker is predisposed to cold injury. Special provisions should be made to prevent hypothermia and freezing of damaged tissue in addition to providing for first aid treatment.
- 4.7 Work-Warming Regimen**
- 4.7.1 If work is performed continuously in the cold at an equivalent chill temperature (ECT) at or below -15°F (-26°C), heated warming shelters (tents, cabins, rest rooms, etc.) should be made available nearby. The workers should be encouraged to use these shelters at regular intervals; the frequency will depend on the severity of the environmental exposure.
- 4.7.2 The onset of heavy shivering, minor frostbite (frostnip), the feeling of excessive fatigue, drowsiness, irritability, or euphoria are indications for immediate return to the shelter.
- 4.7.3 When entering the heated shelter, the outer layer of clothing should be removed and the remainder of the clothing should be loosened to permit sweat evaporation or a change of dry work clothing provided.
- 4.8 A change of dry work clothing should be provided as necessary to prevent workers from returning to the cold environment with wet clothing.

5.0 Records

None.

6.0 Attachments

- 6.1 05-505-Temperature Thresholds
- 6.2 05-505-Symptoms and Treatment
- 6.3 05-505-Cold Exposure

05-505-Temperature Thresholds

1.0 Purpose and Scope

1.1 The following table gives apparent temperatures (wind chill) for various combinations of wind and air temperature, as well as guidelines to the danger of skin exposure.

Table 1. Wind Chill Chart (C)

Actual Temp (°C)	Wind Speed in km/hour									
	8	16	24	32	40	48	56	64	72	80
Ambient Temperature (°C)										
0	-2	-8	-11	-14	-16	-17	-18	-19	-19	-20
-5	-7	-14	-18	-21	-23	-25	-26	-27	-28	-28
-10	-12	-20	-25	-28	-31	-33	-34	-35	-36	-36
-15	-18	-26	-32	-35	-38	-40	-42	-43	-43	-44
-20	-23	-32	-38	-43	-46	-48	-50	-51	-52	-52
-25	-28	-38	-45	-50	-53	-56	-57	-59	-59	-60
-30	-33	-45	-52	-57	-61	-63	-65	-67	-67	-68
-35	-39	-51	-59	-64	-68	-71	-73	-75	-75	-76
-40	-44	-57	-65	-71	-75	-79	-81	-83	-83	-84
-45	-49	-63	-72	-78	-83	-86	-89	-90	-91	-92
-50	-54	-69	-79	-85	-90	-94	-96	-98	-99	-100

Note: A. Little Danger: if less than one hour of exposure to dry skin.

B. Danger: Exposed flesh freezes within one minute.

C. Great Danger: Flesh may freeze with in 30 seconds.

Source: *Threshold Limit Values (TLV™) and Biological Exposure Indices (BEI™) booklet; published by ACGIH, Cincinnati, Ohio.

Table 2. Equivalent Chill Temperature Chart (F)

Estimated Wind Speed (mph)	Actual Temperature Reading (°F)										
	50	40	30	20	10	0	-10	-20	-30	-40	
Equivalent Chill Temperature (°F)											
Calm	50	40	30	20	10	0	-10	-20	-30	-20	
5	48	37	27	16	6	-5	-15	-26	-36	-47	
10	40	28	16	4	-9	-24	-33	-46	-58	-70	
15	36	22	9	-5	18	-32	-45	-58	-72	-85	
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	
25	30	16	0	-15	-29	-44	-59	-75	-88	-104	
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	
35	27	11	-4	-20	35	-51	-67	-82	-98	-113	
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	
Wind speeds >40 mph have little additional effect	LITTLE DANGER			INCREASING DANGER				GREAT DANGER			
Trenchfoot and immersion foot may occur at any point on this chart.											

Table 3. Work-Warming Schedule Guidelines

Air Temp. (Sunny Sky) °F	No Noticeable Wind		5 mph Wind		10 mph Wind		15 mph Wind		20 mph Wind		25 mph Wind		Air Temp. (Sunny Sky) °C								
	Max. Work Period	Breaks																			
above 5°	Normal Work Schedule		above -15°																		
5° to -1°											100 min	2	-15° to -17°								
0° to -4°											75 min	2	-18° to -20°								
-5° to -9°											55 min	3	-21° to -22°								
-10° to -14°											40 min	4	-23° to -25°								
-15° to -19°											30 min	5	-26° to -28°								
-20° to -24°											Cease Work		Cease Work		Cease Work		Cease Work		Cease Work		-29° to -31°
-25° to -29°																					-32° to -34°
-30° to -34°																					-35° to -37°
-35° to -39°																					-38° to -39°
-40° to -44°	-40° to -42°																				
-44° & below	-43° & below																				

Modified from ACGIH 2002 Threshold Limit Values for Chemical Substances and Physical Agents.

- Note 1: Schedule describes the maximum continuous duration of work and number of 10-15 minute breaks to be observed during any 4-hour work period and assumes that period will be followed by an extended warm-up period (e.g., lunch). Allowed breaks should be taken in a warm environment.
- Note 2: Schedule applies to moderate to heavy work performed by acclimated workers wearing appropriate layered clothing. For light to moderate work apply the schedule for conditions one step lower. For unacclimated workers apply the schedule for conditions two steps lower. These modifications are additive.
- Note 3: For work under 25%–50% overcast/clouds, apply the schedule for conditions one step lower. For work at night or under greater than 50% overcast/clouds, apply the schedule for conditions two steps lower. These modifications are additive with any applicable modifications from Note 2.
- Note 4: For wind speeds in excess of 25 mph, cease all nonemergency work when temperatures fall below 5°F.

05-505-Symptoms and Treatment

1.0 Cold Stress-related Illnesses

1.1 Frostbite

- 1.1.1 Frostbite is a localized cold injury characterized by freezing of the tissues with ice crystal formation.
- 1.1.2 This injury is almost always limited to the upper and lower extremities or to such appendages as the ears or nose.
- 1.1.3 Conditions conducive to frostbite include sub-zero temperatures, hypothermia (most important predisposing factor), dehydration, obstruction of the blood supply to the extremities (by constricting clothing, especially on the feet or at the wrists or ankles), contact with cold metal, contact with organic liquids (such as gasoline or solvents that have been left outdoors in sub-zero temperatures), use of substances that cause vasoconstriction (such as smoking tobacco), or other injury or shock.
- 1.1.4 Symptoms of frostbite include:
- Pain in the involved tissue is the earliest symptom.
 - Sudden and complete cessation of cold or discomfort in affected fingers or toes, often followed by a pleasant feeling of warmth.
 - Subsequently the only symptom may be the absence of any sensation in the frozen part.
 - Paleness in the affected tissues.
 - Firm or hard tissues.
 - Purple tissue, if a large area, such as an entire hand or foot, is frostbitten.
- 1.1.5 If exposure occurs in temperatures that are below freezing (32°F or below), frostbite or trench foot (immersion foot) may accompany or complicate the symptoms of hypothermia. Frostbite is the freezing of living tissues with a resultant breakdown of cell structure. Symptoms due to frostbite may include, but is not limited to:
- Superficial redness of the skin
 - Slight numbness
 - Blisters
 - Obstruction of blood flow (ischemia)
 - Blood clots (thrombosis)
 - Skin discoloration due to insufficient oxygen in the blood (cyanosis)
- 1.1.6 Frostbite may occur if the skin comes into contact with objects with a surface temperature below freezing, such as metal tool handles. Trench foot is caused by continuous exposure to cold combined with persistent dampness or immersion in water. Injuries in this case include permanent tissue damage due to oxygen deficiency, damage to capillary walls, severe pain, blistering, tissue death, and ulceration.
- 1.1.7 Additionally, cold exposures may either induce or intensify vascular abnormalities. These include chilblain (a swelling or sore), Raynaud's disease, acrocyanosis (blueness of hands and feet) and thromboangiitis (inflammation of the innermost walls of blood vessels with accompanying clot formation). Workers suffering from these ailments should take particular precautions to avoid chilling.

1.2 Hypothermia

- 1.2.1 Hypothermia is a lower than normal body temperature that occurs when outer cold cools the body faster than the body can produce heat to stay warm.
- 1.2.2 Hypothermia can be caused by exposure to wind, cold, and/or moisture. The combination of wind, cold, and moisture can be deadly.
- 1.2.3 Early warning signs of hypothermia:
- Feeling of being cold and tired.
 - Heavier breathing and increased pulse rate.
 - Tendency to keep moving (e.g., stamping feet, rubbing hands, continued walking/pacing).
 - Goose bumps, holding arms tightly wrapped around the body, hunching of shoulders.

- Shivering.
- 1.2.4 Hypothermia damages both the body's internal temperature mechanisms (hypothalamus) and the peripheral mechanisms to prevent heat loss (vasoconstriction and perspiration.) These effects may last up to three years after the initial hypothermia episode. Symptoms of hypothermia may include, but are not limited to:
- Pain in the extremities.
 - Severe shivering and numbness.
 - Low core body temperature.
 - Drowsiness and muscular weakness.
 - Apathy.
 - Mental confusion.
 - Loss of consciousness.
 - Shock.
 - Decreasing pulse and breathing rate.

2.0 Recommended Treatment for Cold Stress-related Illnesses

2.1 Frostbite

- 2.1.1 Wrap the victim in woolen blanket and keep dry until he or she can be brought inside.
- 2.1.2 Remove the victim from the cold environment.
- 2.1.3 Do not rub, chafe, or manipulate frozen parts.
- 2.1.4 Place the victim in warm water (102°F to 105°F) and make sure the water remains warm. Test the water by pouring it on the inner surface of your forearm. Never thaw affected body parts if the victim has to go back out into the cold; refreezing can cause significant tissue damage.
- 2.1.5 Do not use hot water bottles or a heat lamp, and do not place the victim near a hot stove.
- 2.1.6 Do not allow the victim to walk if his or her feet are affected.
- 2.1.7 Have the victim gently exercise the affected parts once they are thawed.
- 2.1.8 Seek immediate medical attention for thawing of serious frostbite.

2.2 Hypothermia

- 2.2.1 Bring the victim into a warm room or shelter as quickly as possible.
- 2.2.2 Give artificial respiration and stop any bleeding, if necessary.
- 2.2.3 If the victim cannot be moved (spinal injury, etc.), carefully place newspapers, blankets, or some other insulation between the victim and the ground.
- 2.2.4 Remove all wet clothing.
- 2.2.5 Provide an external heat source, because the body cannot generate its own heat. Wrap the victim in prewarmed blankets, place him or her in the liner of a portable hypothermia treatment unit, put the torso (not the extremities) into a tub of warm water, or use body-to-body contact to rewarm the body core. These measures will slowly reopen the peripheral circulation, minimizing the possibility of after-shock or after-drop (the flowing of cooled, stagnated blood from the limbs to the heart), which may cause ventricular fibrillation, cardiac arrest, or death.
- 2.2.6 Do not allow the victim to sleep.
- 2.2.7 Give warm, sweet drinks. Do not give alcohol or pain relievers.
- 2.2.8 Keep the victim still. Do not try to walk.
- 2.2.9 Do not rub numb skin.
- 2.2.10 Get medical attention as soon as possible.

05-505-Cold Exposure

The following Occupational Health and Safety regulations apply directly to cold and snow hazards:

Jurisdiction	Regulation
United States	
OSHA	Title 29, Code of Federal Regulations, Sections 1910.1027 and 1926.1127
Canada	
Alberta	n/a
British Columbia	OHS Regulation (1997) Sect 7.33 – 7.38
Manitoba	Workplace Health and Safety Regulation (217/2006) Sect 4.12, 4.14
New Brunswick	OHS Regulation (91-191) Sect 44
Newfoundland/Labrador	OHS Regulation (C.N.L.R. 1165/96) Sect 10
Nova Scotia	n/a
NWT/NU Territories	n/a
Ontario	O. Reg. 851 Sect 39, 129
Prince Edward Island	OHS Regulations (EC180/87) Sect 42.1
Quebec	OHS Regulation (R.R.Q., c. S-2.1, r.19.01 O.C. 885-2001) Schedule 4
Saskatchewan	OHS Regulation (R.R.S., c. O-1, r. 1) Sect 70 Cold Conditions Guidelines for Outside Workers
Yukon Territory	Occupational Health Regulations (O.I.C. 1986/164) Sect 9

5-507-Hazardous Materials Communication / WHMIS

1.0 Purpose and Scope

- 1.1 Provides a Hazard Communication Program so that Resolution employees are informed of the hazards of the chemicals to which they may be exposed in the course of their work by way of container labeling and other forms of warning, material safety data sheets (MSDS), and employee training.
- 1.2 This procedure applies to all Resolution JV Partner employees and operations.
- 1.3 The program applies to the use of any hazardous substances which are known to be present in the workplace in such a manner that employees may be exposed under normal conditions of use or in a foreseeable emergency.

2.0 Terms and Definitions

A complete list of definitions can be found in their entirety in the HMR, the TDG Regulations, and the IATA DGR.

- 2.1 **Acute Effect:** An adverse effect on the human body with immediate onset of symptoms.
- 2.2 **Article:** A manufactured item: (1) which is formed to a specific shape or design during manufacture; (2) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and, (3) which does not release or otherwise result in exposure to, a hazardous chemical, under normal conditions of use.
- 2.3 **Carcinogen:** Those chemicals appearing in any of the following reference sources are established as carcinogens for hazard communication purposes:
 - National Toxicology Program (NTP) Annual Report on Carcinogens.
 - International Agency for Research on Cancer (IARC) Monographs, Volumes 1-34. Note: The Registry of Toxic Effects of Chemical Substances published by NIOSH indicates whether a substance has been found by NTP or IARC to be a potential carcinogen.
- 2.4 **Chemical Name:** The scientific designation of a substance in accordance with the nomenclature system developed by the International Union of Pure and Applied Chemistry or the system developed by the Chemical Abstracts Service.
- 2.5 **Chronic Effect:** An adverse effect on the human body with symptoms which develop slowly over a long period of time or which frequently recur.
- 2.6 **Combustible Liquid:** Any liquid having a flash point at or above 100°F (37.8°C) but below 200°F (93.3°C), except any mixture having components with flash points of 200°F (93.3°C), or higher, the total volume of which makes up 99% or more of the total volume of the mixture.
- 2.7 **Common Name:** Any designation or identification such as code name, code number, trade name or brand name used to identify a substance other than by its chemical name.
- 2.8 **Container:** Any bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, storage tank or the like that contains a hazardous chemical. For purposes of this Safety Operating Procedure (SOP) and Occupational Safety and Health Administration (OSHA) standard, pipes or piping systems, and engines, fuel tanks, or other operating systems in a vehicle are not considered to be containers.
- 2.9 **Establishment:** Any separate and distinct Resolution office, laboratory or other company facility.
- 2.10 **Exposure:** Any situation arising from work operations where an employee may ingest, inhale, absorb through the skin or eyes or otherwise come into contact with a hazardous substance.
- 2.11 **Flammable:** A substance that falls into one of the following categories:
 - **Flammable Aerosol:** An aerosol that when tested by the method described in 16 CFR 1500.45, yields a flame projection exceeding 18 inches at full valve opening or flashback (a flame extending back to the valve) at any degree of valve opening;
 - **Flammable Gas:** A gas that at ambient temperature and pressure:

- Forms a flammable mixture with air at a concentration of 13% of volume or less; or
 - Forms a range of flammable mixtures with air wider than 12% by volume, regardless of the lower limit.
 - **Flammable Liquid:** Any liquid having a flash point below 100°F (37.8°C), except any mixture having components with flash points of 100°F (37.8°C) or higher, the total of which make up 99% or more of the total volume of the mixture.
 - **Flammable Solid:** A solid, other than a blasting agent or explosive as defined in 8 CCR 5237(a), that is liable to cause fire through friction, absorption of moisture, spontaneous chemical change or retained heat from manufacturing or processing or which can be ignited readily and when ignited burns so vigorously and persistently as to create a serious hazard.
 - A chemical shall be considered to be a flammable solid if, when tested by the method described in 16 CFR 1500.44, it ignites and burns with a self-sustained flame at a rate greater than one-tenth of an inch per second along its major axis.
- 2.12 **Flash Point:** Minimum temperature of a liquid at which it gives off sufficient vapors to form an ignitable mixture with the air near the surface of the liquid or within the container used.
- 2.13 **Hazardous Chemical:** Those chemicals appearing in any of the following reference sources are established as hazardous chemicals for hazard communication purposes.
- 29 CFR Part 1910, Subpart Z, Toxic and Hazardous Substances, OSHA.
 - Hazardous Products Act, R.C.S. 1985, c. H-3, section 2, Canada
 - For operations within the state of California, the list of hazardous substances prepared by the California Director of Industrial Relations pursuant to Labor Code Section 6382. The concentrations and footnotes, which are applicable to the list, shall be understood to modify the same substance on all other source lists or hazard determinations set forth in § 8 CCR 5194(d)(3)(B) and (d)(5)(D).
- 2.14 **Hazardous Substance:** A hazardous chemical or carcinogen, or a product or mixture containing a hazardous chemical or carcinogen provided that:
- The hazardous chemical is 1% or more of the mixture or product or 2% if the hazardous chemical exists as an impurity in the mixture; or
 - The carcinogen is 0.1% or more of the mixture or product.
 - Manufacturers, importers and distributors will be relied upon to perform the appropriate hazard determination for the substances they produce or sell.
- 2.15 The following materials are not covered by the Hazard Communication Standard:
- Any hazardous waste as defined by the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 USC 6901 et seq.) when subject to regulations issued under that act by the Environmental Protection Agency.
 - Tobacco or tobacco products
 - Wood or wood products. Note: Wood dust is not exempt since the hazards of wood dust are not “self-evident” as are the hazards of wood or wood products
 - Consumer products (including pens, pencils, adhesive tape) used in the work place under typical consumer usage
 - Articles (i.e. plastic chairs)
 - Foods, drugs, or cosmetics intended for personal consumption by employees while in the work place
 - Foods, drugs, cosmetics in retail store packaged for retail sale
 - Any drug in solid form used for direct administration to the patient (i.e., tablets or pills)

- 2.16 **Hazardous Substance Inventory (HSI):** A listing of all chemicals stored or used at an office or project site. Note that the HSI may be imbedded in a project Health and Safety Plan.
- 2.17 **Immediate Use:** Means that the hazardous chemical will be under the control of and used only by the person who transfers it from a labeled container and only within the work shift in which it is transferred.
- 2.18 **MSDS:** A material safety data sheet prepared pursuant to state and federal regulations, OSHA Form 174 and Canada regulations (Controlled Products regulations, schedule 1).
- 2.19 **MSDS Administrator:** The individual designated by the Office Manager to maintain the additional establishment-specific HSI and the MSDS binder required if that establishment uses or stores hazardous substances.
- 2.20 **NFPA:** A system of categories, colors and numbers was created to provide basic hazard information. It enables firefighters and other emergency personnel to easily decide whether or not to evacuate an area or proceed with emergency control operations. The three principal categories of identification are Health, Flammability and Instability. A numerical range of "0 to 4" indicates the severity of the hazard. A "4" indicates the most severe and a "0" indicates a minimal hazard.
- 2.21 **Mixture:** Any solution or intimate admixture of two or more substances which do not react chemically with each other.
- 2.22 **Reactivity:** A measure of the tendency of a substance to undergo chemical reaction with the release of energy.
- 2.23 **Solubility:** The ability of substance to blend and mix uniformly with another.
- 2.24 **Specific Gravity (density):** Ratio of the weight of a substance to the weight of the same volume of another substance. As used in this directive, specific gravity or density refers to the weight of substance as compared to the weight of an equal volume of water.
- 2.25 **Vapor Density:** The weight of a vapor-air mixture resulting from the vaporization of a volatile liquid at equilibrium temperature and pressure conditions, as compared with the weight of an equal volume of air under the same conditions.
- 2.26 **WHMIS:** The Workplace Hazardous Materials Information System (WHMIS) is Canada's national hazard communication standard. The key elements of the system are cautionary labelling of containers of WHMIS "controlled products", the provision of material safety data sheets (MSDSs) and worker education and training programs.

3.0 References

None.

4.0 Procedure

- 4.1 All employees have a right to, and should, know the properties and potential hazards of substances to which they may be exposed.
- 4.2 Should Resolution assign employees that do not read and speak English to tasks with chemical exposures, communications will be provided in the language understood by that employee.
- 4.3 **Hazardous Waste Exemption**
- 4.3.1 In the U.S., hazardous wastes are excluded from the state and federal Hazard Communication standards. However, Resolution employees who handle or are otherwise exposed to hazardous wastes are covered by the requirements of the OSHA Hazardous Waste Operations and Emergency Response (HAZWOPER) standard at 29 CFR 1910.120 – Hazardous Waste Operations And Emergency Response. This standard requires that:
- Employees receive 40-hour initial and 8-hour annual SH&E training; and that
 - Information on the hazards of hazardous wastes be documented in a site-specific Health and Safety Plan (HASP) and communicated to all employees in site-specific briefing on-site training required by the standard.

- 4.3.2 Therefore, Resolution HAZWOPER projects are not required to comply with the requirements of this SOP as they relate to the hazardous wastes that are present at those project sites.
- 4.3.3 A Resolution's HASP requirements are specified in *5-509-Hazardous Waste Operations and Emergency Response*.
- 4.4 **Hazardous Substance Inventory**
- 4.4.1 Establishment-Specific HSI
- If an Resolution establishment uses or stores additional hazardous substances, an establishment-specific HSI must be maintained at that establishment.
 - If it is determined that an office-specific HSI is needed, the Resolution **Office Manager** shall assure that one is developed and maintained by someone appointed as the establishment's MSDS Administrator.
 - The content of the office-specific written inventory shall be updated as new hazardous substances are procured for, or removed from, the establishment and shall be verified by the **Regional SH&E Manager** through regular inspections of the establishment.
 - In order to meet the 30-years-after-employment-termination record retention requirement, the office-specific HSIs shall be treated as a permanent record.
- 4.5 **Material SAFETY Data Sheets**
- 4.5.1 Establishment-Specific MSDS Inventory
- If it is determined that an Resolution establishment is required to maintain an establishment-specific HSI ,MSDSs for those specific hazardous substances must be maintained on file at that establishment.
 - The **Regional SH&E Manager** shall audit the local office program for MSDS request and maintenance and report deficiencies to the appropriate management level, as necessary, to assure compliance with this SOP.
- 4.5.2 Field Project Sites and Client Facilities
- The **Project Manager** and/or the **Site Safety Officer** shall access or obtain, and maintain copies of MSDS from:
 - All Resolution subcontractors bringing chemicals onto the project site; and
 - The client, for all of the client's chemicals to which Resolution or Resolution subcontract employees are potentially exposed.
- 4.5.3 Employee Access to MSDSs
- MSDSs should be maintained at the local establishment that uses that hazardous substance. Copies of the MSDS should be made available to the employee upon request to the office's MSDS Administrator.
- 4.5.4 Field Access to MSDSs
- When hazardous substances are brought into the field, the user must assure that a copy of the MSDS for that substance accompanies it and is available at the field location where it is to be used.
- 4.5.5 MSDSs for Resolution Products
- It is unlikely that Resolution activities would create a chemical for which a new MSDS were needed. If such a chemical were created, the Corporate SH&E Department shall work with the appropriate operations groups to draft, review, and publish the new MSDS.
- 4.5.6 Content of the Material Safety Data Sheet
- As a minimum, the MSDS must contain the following information:
 - The name, address, and telephone number of the source of the product or material, preferably those of the manufacturer
 - The trade name and synonyms of the product or material

- Chemical names of hazardous ingredients, including, but not limited to, those in mixtures
- An indication of the percentage, by weight or volume, which each ingredient of a mixture bears to the whole mixture
- Physical data pertaining to the product or material, including boiling point (in °F); vapor pressure (in mm of mercury); vapor density of gas or vapor (air = 1); solubility in water (in percent by weight); specific gravity of material (water = 1); percentage volatile by volume (at 70 °F); evaporation rate for liquids (either butyl acetate or ether may be taken as 1); and appearance and odor
- Fire and explosion hazard data pertaining to the product or material, including flash point (in °F); flammable limits (in percent by volume in air); suitable extinguishing media or agents; special fire fighting procedures; and unusual fire and explosion hazard information
- Health hazard data pertaining to the product or material, including exposure limits, effects of overexposure and medical conditions aggravated by exposure, and emergency and first-aid procedures
- Reactivity data, including stability, incompatibility, hazardous decomposition products, and hazardous polymerization
- Procedures to be followed and precautions to be taken in cleaning up and disposing of materials leaked or spilled
- Special protection information, including use of personal protective equipment, such as respirators, eye protection, and protective clothing, and ventilation or other control measures
- Special precautionary information about handling and strong
- Any other general precautionary information
- MSDSs that do not contain this information shall be returned to the distributor or manufacturer to be updated.

4.5.7 Trade Secrets

- Some hazardous substance suppliers may claim the information requested on MSDSs is proprietary and not provide the information to Resolution.
- When MSDSs supplied to the Resolution Regional SH&E Manager indicate that proprietary information has been withheld, the Regional SH&E Manager will either obtain the necessary information to make a hazard assessment or reject the material for use within Resolution.

4.6 Labeling

4.6.1 Containers of hazardous substances used or stored in each Resolution establishment must be labeled, tagged or marked with the following information:

- Identification of the hazardous substance(s)
- Appropriate hazard warnings
- Name and address of the manufacturer, importer or other responsible parties
- Safe Handling Instructions
- Statement that an MSDS is available for the product

4.6.2 Labels on containers shall not be removed or defaced. Labels or other forms of warning shall be legible, in English and French (Canada), and prominently displayed on the container.

4.6.3 Any failure to have the appropriate labeling information on a container at any time will be cause to suspend use of the product until the container is properly labeled.

4.6.4 Carcinogen Labeling

- Chemicals which have been indicated as positive or suspect carcinogens by either OSHA, ACGIH, the International Agency for Research on Cancer (IARC) (World Health Organization), or the National Toxicology Program (NTP) will be considered to be carcinogenic for purpose of the HCS. Those chemicals identified as being “known to be carcinogenic” by NTP must have carcinogen warnings on the label and information on the MSDSs.

4.6.5 Stationary Process Containers

- If there is stationary process equipment within a work area, signs, placards, process sheets, batch tickets, operating procedures, or other such written materials may be used in lieu of fixed labels on the containers, as long as the alternative method conveys the appropriate hazard information. The written materials shall be readily accessible to the employees in the work area.

4.6.6 Portable Containers

- Portable containers of hazardous substances need not be labeled when the substance is transferred from labeled containers and is intended for immediate use of the employee who performs the transfer.
- Containers of hazardous substances transferred from labeled containers and not intended for the immediate use of the employee performing the transfer shall be labeled with the chemical name and a hazard warning label in accordance with the National Fire Protection Association's (NFPA) 704M Hazard Identification System shall be attached.

4.7 Chemical Storage

4.7.1 Hazardous chemicals are to be stored in their original, labeled containers with the lids securely closed and taped if possible. Flammable and combustible materials must be stored in fire impervious cabinets in designated stockroom areas. Chemicals must be stored in compliance with instructions provided on their labels, MSDS, or the manufacturer's specifications.

4.7.2 All hazardous chemicals must be stored in a manner that prevents spillage and leakage from exposing people or the environment to the chemical.

4.7.3 Hazardous chemicals shall not be stored with foods or beverages. Food and beverages shall not be consumed in areas where hazardous chemicals are used or stored.

4.8 Chemical Use in Offices

4.8.1 In general, hazardous substances should not be taken into office areas, conference rooms, or break areas. If this general requirement is infeasible, contact the SH&E Department for guidance.

4.8.2 General exceptions to this rule are the following:

- Liquid paper
- Toner
- Cleaners
- Isobutylene calibration gas
- pH calibration solutions for instruments

4.9 Employee Information and Training

4.9.1 Each Resolution employee who handles or is exposed to hazardous substances must be provided information and training on hazardous substances in their work area.

- At the time of their initial assignment
- Whenever a new hazard is introduced into their work area

4.9.2 As a minimum, the training requirements apply to Resolution personnel in the following job categories:

- All personnel who perform field work that involves the use of, or potential exposure to, hazardous substances
- Laboratory Employees

4.10 Initial Training Content

4.10.1 The Initial Training will provide instruction in the following:

- Methods and observations that may be used to detect the presence or release of a hazardous substance in the work area (such as personal monitoring, visual appearance or odor of hazardous substances being released, etc.);

- The physical and health hazards of substances in the work area and measures and procedures Resolution has implemented to protect employees; and
 - The details of this hazard communication program (SOP), including an explanation of the labeling system and the MSDS, and how he/she can obtain and use appropriate hazard information.
- 4.10.2 The Initial Training will also inform the employee of the following:
- Any operations in their work area in which hazardous substances are present
 - Location and availability of this written hazard communications program (SOP)
 - Their right to personally receive information regarding hazardous substances to which they may be exposed
 - Their right to have their physician receive information regarding hazardous substances to which they may be exposed
 - Their right against discharge or other discrimination (in California) due to the employee's exercise of rights afforded pursuant to provisions of the California Hazardous Substances Information and Training Act
- 4.11 **Periodic Training and Training for Non-Routine Tasks**
- 4.11.1 Additional training will be provided to employees who have received initial training whenever:
- A new hazardous substance is introduced into their work area
 - A new or revised MSDS is received, which indicates significantly increased risks to employee health as compared to those stated on the previous MSDS
 - Non-routine tasks are performed, which will potentially result in exposure to hazardous substances, or exposure under circumstances, which were not addressed during initial training
- 4.11.2 Supervisors, in coordination with their **Regional SH&E Manager**, shall provide such training through an explanation of the information on the contents of the MSDS for that substance.
- 4.11.3 When training their employees, supervisors shall explain:
- Any health hazards associated with use of the substance or mixture
 - Proper precautions for handling
 - Necessary personal protective equipment or other safety precautions to prevent or minimize exposure
 - Emergency procedures for spills, fire, disposal, and first aid
- 4.11.4 For most projects involving field work, this periodic training requirement will be facilitated through the implementation of the site specific HASP that has been developed for the project.

4.12 **Documentation of Initial and Periodic Training**

4.12.1 All training required by this SOP shall be documented at the time it is performed by having the employee sign a copy of a training attendance sheet.

4.13 **Chemical Usage**

4.13.1 Prior to using any chemical, a Task Hazard Analysis (THA) shall be completed by the employees assigned to use the chemical. The analysis will identify the hazards associated with the tasks to be performed and prescribe the Personal Protective Equipment (PPE) to be used.

4.14 **Office Specific Written Program**

4.14.1 Each office or location using or storing hazardous materials will develop a written office/ location-specific Hazard Communication/WHMIS Program. If the local office decides to implement the requirements of the standard in any way that differs from this procedure, they shall verify the changes with the SH&E department, document the changes, and communicate the differences to all affected employees.

4.14.2 For Canadian operations, all relevant MSDS must be current (no more than 3 years) and readily available (in French and English) for all hazardous materials.

4.15 **Canada-specific**

4.15.1 Consumer products are exempt from supplier labels and MSDS requirements. Some cleaning solvents may be packaged as consumer products and these must be labelled in accordance with the Consumer Product Act requirements.

4.15.2 In addition to the labelling of storage containers in the workplace, the contents of process piping (including valves), process vessels and reaction vessels are required to be identified through the use of colour coding, labels, placards or other modes of identifications that must be communicated to workers through training programs. It is very important for employees to be aware of and understand Client labelling requirements for these types of process systems.

4.16 **Roles and Responsibilities**

4.16.1 **Regional SH&E Managers will:**

- Audit their regional offices to assure that they maintain an establishment-specific Hazardous Substance Inventory (HSI).
- Audit their regional offices to assure that if an establishment-specific HSI is required, that MSDSs are available for each substance listed on the HSI.
- Provide interpretation of MSDSs and hazard information for HMIS labels/NFPA labels and other information to assist in training employees.
- Provide hazard communication training to Resolution employees and file documents of this training in the Corporate SH&E office.
- Review MSDS for adequacy of completion to meet the OSHA and Canadian standard and returning them to supplier, if necessary.

4.16.2 **Office Managers will:**

- Have an operations-specific, written hazard communication program which at least describes how the requirements of this Procedure and the US OSHA and Canadian Hazard Communication requirements for labels and other forms of warning, material safety data sheets, and employee information and training will be met.
- Appoint an MSDS administrator for their establishment if they store or use hazardous substances.
- Confirm, if required, that the MSDS Administrator maintains an HSI for their establishment.
- Confirm that MSDS are available for all substances listed on their establishment's HSI.
- Confirm that a copy of this Procedure and the site-specific MSDS are available to all employees. Employees shall be instructed in the location of this Procedure and the MSDS.
- Confirm that all employees in their office affected by the HAZCOM standard are provided with the appropriate training, including new employees.

4.16.3 **Project Managers (field task managers, supervisors) will:**

- Confirm that all employees under their supervision have received the initial and periodic training required by this SOP prior to assigning employees to tasks involve the use of, or potential exposure to, hazardous substances.
- Notify employees of hazardous substances covered by this SOP that are used in their work area.
- Determine the potential fire, toxic, or reactivity hazards which are likely to be encountered in the handling or utilization of a hazardous substance and will communicate this information to their affected employees, before any are permitted to work with it.
- Confirm that an MSDS is available for each hazardous substance used, or potentially encountered, in the work areas or on the projects that are under their supervision.
- Notify subcontractors (working for Resolution) of any hazardous substances that are used or stored by Resolution to which the subcontractor's employees may be exposed.
- Notify clients or property owner/operators of chemicals brought onto their property by Resolution or Resolution's subcontractors.
- Request MSDSs from all subcontractor organization for the relevant chemicals they bring onto an Resolution controlled site.

4.16.4 **Employees will:**

- Confirm that they have received appropriate hazard communication training prior to working with materials that fall under the standard.
- Only work with materials for which they have been instructed on how to find an MSDS and how to work with that material safely.
- Provide a copy of all MSDSs received to the MSDS Administrator at their facility.
- Verify that an MSDS is available in their work area for each hazardous substance that they use.
- Confirm that containers of hazardous substances that they use are properly labeled.

5.0 Records

None.

6.0 Attachments

None.

This page intentionally left blank

5-511 Heat Stress Prevention

1.0 Purpose and Scope

- 1.1 Establishes a heat stress prevention program to help ensure that employees know and recognize the symptoms of heat stress-related illnesses and are prepared to take appropriate corrective action.
- 1.2 This procedure applies to all Resolution Consultants employees and operations.

2.0 Terms and Definitions

- 2.1 **Acclimated:** Workers who have developed physiological adaptation to hot environments characterized by increased sweating efficiency, circulation stability, and tolerance of high temperatures without stress. Acclimatization occurs after 7 to 10 consecutive days of exposure to heat and much of its benefit may be lost if exposure to hot environments is discontinued for a week.
- 2.2 **Chemical Protective Clothing (CPC):** Apparel that is constructed of relatively impermeable materials intended to act as a barrier to physical contact of the worker with potentially hazardous materials in the workplace. Such materials include: Tyvek® coveralls (all types) and polyvinyl chloride (PVC) coveralls and rain suits.
- 2.3 **Unacclimated:** Workers who have not been exposed to hot work conditions for one week or more or who have become heat-intolerant due to illness or other reasons.
- 2.4 **Heat Cramps:** A form of heat stress brought on by profuse sweating and the resultant loss of salt from the body.
- 2.5 **Heat Exhaustion:** A form of heat stress brought about by the pooling of blood in the vessels of the skin and in the extremities.
- 2.6 **Heat Rash:** A heat-induced condition characterized by a red, bumpy rash with severe itching.
- 2.7 **Heat Stress.** The combination of environmental and physical work factors that constitute the total heat load imposed on the body.
- 2.8 **Heat Stroke:** The most serious form of heat stress, which involves a profound disturbance of the body's heat-regulating mechanism.
- 2.9 **Sunburn:** Is caused by unprotected exposure to ultraviolet light that is damaging to the skin. The injury is characterized by red painful skin, blisters, and/or peeling.

3.0 References

- 3.1 5-003-SH&E Training
- 3.2 5-208-Personal Protective Equipment
- 3.3 5-314-Working Alone and Remote Travel

4.0 Procedures

4.1 Restrictions

- 4.1.1 Staff working in extreme heat or sun for extended periods of time away from a shelter or vehicle must not work alone.
- 4.1.2 Staff shall not be exposed to levels that exceed those listed in the screening criteria for heat stress exposure in the heat stress and strain section of the ACGIH Standard.
- 4.1.3 Clothing corrections shall be applied in accordance with the heat stress and strain section of the ACGIH Standard.

4.2 Roles and Responsibilities

- 4.2.1 Project Managers/field task managers' responsibilities:

- Evaluate the need for heat stress prevention measures and incorporate as appropriate into the Health and Safety Plan.
 - Implement heat stress prevention measures, as applicable, at each work site.
 - Develop/coordinate a work-rest schedule, as applicable.
 - Ensure heat stress hazard assessments/evaluations were completed for the planned activities.
 - Assign personnel physically capable of performing the assigned tasks.
 - Ensure that personnel are properly trained in the recognition of heat stress-related symptoms.
- 4.2.2 SH&E Managers' responsibilities:
- Provide heat stress awareness training.
 - Assist project teams develop appropriate work-rest schedules.
 - Conduct/support incident investigations related to potential heat stress-related illnesses.
- 4.2.3 Site Supervisors' responsibilities:
- Identify those tasks that may be most impacted by heat stress and communicate the hazard to the assigned employees.
 - Ensure that employees have been trained on the recognition of heat stress-related illness.
 - Ensure that adequate supplies of appropriate fluids are readily available to employees.
 - Ensure that a proper rest area is available.
 - Conduct heat stress monitoring, as applicable.
 - Implement the work-rest schedule.
 - Ensure that first aid measures are implemented once heat stress symptoms are identified.
 - Ensure personnel are physically capable of performing the assigned tasks and are not in a physically compromised condition.
 - Report all suspected heat stress-related illnesses.
- 4.2.4 Employees' responsibilities:
- Observe each other for the early symptoms of heat stress-related illnesses.
 - Maintain an adequate intake of available fluids.
 - Be familiar with heat stress hazards, predisposing factors, and preventative measures.
 - Report to work in a properly vested and hydrated condition.
 - Report all suspected heat stress-related illnesses.
- 4.3 **Controls**
- 4.3.1 If staff are or may be exposed, the supervisor shall:
- Conduct a heat stress assessment to determine the potential for hazardous exposure of workers, and
 - Develop and implement a heat stress exposure control plan.
- 4.3.2 If staff are or may be exposed, the supervisor shall implement engineering controls (e.g., shelters, cooling devices, etc.) to reduce the exposure of staff to levels below those listed in the screening criteria for heat stress exposure in the heat stress and strain section of the ACGIH Standard.
- 4.3.3 If engineering controls are not practicable, the supervisor shall reduce the exposure of workers to levels below those listed in the screening criteria for heat stress exposure in the heat stress and strain section of the ACGIH Standard by providing administrative controls, including a work-rest cycle or personal protective equipment, if the equipment provides protection equally effective as administrative controls.
- 4.3.4 If staff are or may be exposed, the supervisor shall provide and maintain an adequate supply of cool, potable water close to the work area for the use of a heat exposed worker.
- 4.3.5 If a staff person shows signs or reports symptoms of heat stress or strain, they shall be removed from the hot environment and treated by an appropriate first aid attendant, if available, or by a physician.

- 4.3.6 Heat stress can be a significant field site hazard, especially for workers wearing CPC. The workforce will gradually work up to a full workload under potentially stressful conditions to allow for proper acclimation.
- 4.3.7 Site personnel shall be instructed in the recognition of heat stress symptoms, the first aid treatment procedures for severe heat stress, and the prevention of heat stress injuries. Workers must be encouraged to immediately report any heat stress that they may experience or observe in fellow workers. Supervisors must use such information to adjust the work-rest schedule to accommodate such problems.
- 4.3.8 Wherever possible, a designated break area should be established in an air conditioned space, or in shaded areas where air conditioning is impractical. The break area should be equipped to allow workers to loosen or remove protective clothing, and sufficient seating should be available for all personnel. During breaks, workers must be encouraged to drink plenty of water or other liquids, even if not thirsty, to replace lost fluids and to help cool off. Cool water should be available at all times in the break area, and in the work area itself unless hygiene/chemical exposure issues prevent it.
- 4.4 **Symptoms and Treatment**
- 4.4.1 Workers who exhibit ANY signs of significant heat stress (e.g., profuse sweating, confusion and irritability, pale, clammy skin), shall be relieved of all duties at once, made to rest in a cool location, and provided with large amounts of cool water.
- 4.4.2 Anyone exhibiting symptoms of heat stroke (red, dry skin, or unconsciousness) must be taken immediately to the nearest medical facility, taking steps to cool the person during transportation (clothing removal, wet the skin, air conditioning, etc.).
- 4.4.3 Severe heat stress (heat stroke) is a life-threatening condition that must be treated by a competent medical authority.
- 4.5 **Prevention**
- 4.5.1 All staff working in extreme heat or sun should understand the following guidelines for preventing and detecting heat exhaustion and heat stroke.
- If you experience heat exhaustion or heat stroke you must immediately seek shelter and water.
 - Take frequent short breaks in areas sheltered from direct sunlight; eat and drink small amounts frequently.
 - Try to schedule work for the coolest part of the day, early morning and evening.
- 4.5.2 Prevention of heat-related illnesses:
- Avoid strenuous physical activity outdoors during the hottest part of the day.
 - Wear a hat and light-colored, loose-fitting clothing to reflect the sun.
 - Avoid sudden changes of temperature. Air out a hot vehicle before getting into it.
 - If you take diuretics, ask your doctor about taking a lower dose during hot weather.
 - Drink 8 to 10 glasses of water per day. Drink even more if you are working or exercising in hot weather.
 - Avoid caffeine and alcohol as they increase dehydration.
 - If you exercise strenuously in hot weather, drink more liquid than your thirst seems to require.
- 4.6 **Personal Protective Equipment**
- Wear a hat and light-colored, loose-fitting clothing to reflect the sun.
 - Apply sunscreen to exposed skin (SPF 30 or greater, follow directions on label).
 - Wear sunglasses with UV protection.
 - Pack extra water to avoid dehydration (try freezing water in bottles overnight to help keep the water cooler for longer during the day).
- 4.7 **Work-Rest Schedule Practices**
- Intake of fluid will be increased beyond that which satisfies thirst, and it is important to avoid "fluid debt," which will not be made up as long as the individual is sweating.
 - Two 8-ounce glasses of water should be taken prior to beginning work, then up to 32 oz. per hour during the work shift; fluid replacement at frequent intervals is most effective.

- The best fluid to drink is water; liquids like coffee or soda do not provide efficient hydration and may increase loss of water.
- If commercial electrolyte drinks (e.g., Gatorade) are used, the drink should be diluted with water, or 8 ounces of water should be taken with each 8 ounces of electrolyte beverage.
- Additional salt is usually not needed and salt tablets should not be taken.
- Replacement fluids should be cool, but not cold.
- Breaks will be taken in a cool, shaded location, and any impermeable clothing should be opened or removed.
- Dry clothing or towels will be available to minimize chills when taking breaks.
- Manual labor will not be performed during breaks, other than paperwork or similar light tasks.
- Other controls that may be used include:
 - Scheduling work at night or during the cooler parts of the day (6 am–10 am, 3 pm–7 pm).
 - Erecting a cover or partition to shade the work area.
 - Wearing cooling devices such as vortex tubes or cooling vests beneath protective garments. If cooling devices are worn, only physiological monitoring will be used to determine work activity.

4.8 **Evaluating the Work-Rest Schedule's Effectiveness**

4.8.1 Once a work-rest schedule is established, the work supervisor must continually evaluate its effectiveness through observation of workers for signs/symptoms of heart stress. Measurement of each worker's vitals (e.g., pulse, blood pressure, and temperature) can provide additional information in determining if the schedule is adequate, and is accomplished as follows:

4.8.2 At the start of the workday each worker's baseline pulse rate (in beats per minute – bpm) is determined by taking a pulse count for 15 seconds and multiplying the result by four or an automated pulse count device may be utilized. Worker pulse rates can then be measured at the beginning and end of each break period to determine if the rest period allows adequate cooling by applying the following criteria:

- Each worker's maximum heart rate at the start of any break should be less than [180 minus worker's age] bpm. If this value is exceeded for any worker, the duration of the following work period will be decreased by at least 10 minutes.
- At the end of each work period all workers' heart rates must have returned to within +10% of the baseline pulse rate. If any worker's pulse rate exceeds this value the break period will be extended for at least 5 minutes, at the end of which pulse rates will be remeasured and the end-of-break criteria again applied.

4.8.3 Use a clinical thermometer or similar device to measure the oral/ear temperature at the beginning (before drinking liquids) and end of each break period and apply the following criteria:

- If the oral temperature exceeds 99.6°F, shorten the next work cycle by one-third without changing the rest period.
- If the oral temperature still exceeds 99.6°F (36.6°C) at the beginning of the next rest period, shorten the following work cycle by one-third.

4.8.4 Use of an automated or similar blood pressure device will be used to assess each employee's blood pressure at the beginning and end of each break period to determine if the rest period allows adequate cooling by applying the following criteria:

- If the blood pressure of an employee is outside of 90/60 to 150/90, then the employee will not be allowed to begin or resume work; extend the break period by at least five minutes, at the end of which blood pressure rates will be remeasured and the end-of-break criteria again applied.

4.8.5 All physiological monitoring of heat stress will be documented using *5-511-Heat/Cold Stress Monitoring Log*.

4.9 **Training**

4.9.1 Project staff and their supervisors that may be exposed to the hazard will be oriented to the hazard and the controls prior to work commencing.

4.9.2 Those personnel potentially exposed to heat stress will receive training including, but not limited to

- Sources of heat stress, influence of protective clothing, and importance of acclimatization.
- How the body handles heat.
- Recognition of heat-related illness symptoms.
- Preventative/corrective measures.
 - Employees will be informed of the harmful effects of excessive alcohol consumption in the prevention of heat stress.
 - All employees will be informed of the importance of adequate rest and proper diet in the prevention of heat stress.
- First aid procedures for heat stress-related illnesses.

5.0 Records

None.

6.0 Attachments

6.1 5-511-FM Heat/Cold Stress Monitoring Log



5-511 Form 1 Heat Stress Monitoring Log

The purpose of this form is to track entry into hot zones wearing chemically protective clothing and monitor employees for heat stress-related illness. It is the responsibility of the foreman or supervisor-in-charge to ensure that each person entering the hot zone completes the required information. Vital signs must be taken by a competent person.

Project Name:		Foreman/Supervisor:		Work/Rest Schedule1:													
Date:	Water Provided ²		Acclimated ³		Initial Vitals ³					Vital Signs and Time In/Out ⁴							
	Yes	No	Yes	No	Vitals	In	Out	Vitals	In	Out	Vitals	In	Out	Vitals	In	Out	
Employee Name																	
					P				P					P			
					BP				BP					BP			
					Temp				Temp					Temp			
					P				P					P			
					BP				BP					BP			
					Temp				Temp					Temp			
					P				P					P			
					BP				BP					BP			
					Temp				Temp					Temp			
					P				P					P			
					BP				BP					BP			
					Temp				Temp					Temp			
					P				P					P			
					BP				BP					BP			
					Temp				Temp					Temp			

1. Please refer to 5-511 Heat Stress. Section 6.3 provides specific details on how to develop a work-rest schedule.
2. Each employee should be provided a sufficient amount of water or sports drink before entering the hot zone. Drinks such as coffee and cola should be discouraged.
3. A worker is "acclimated" if he/she has worked in a hot environment for at least 7 to 10 consecutive days. If a worker is not acclimated, check "No" and reduce the "Min In" by 50 percent for that employee until the 7- to 10-day period is reached.
4. "Vitals" refers to employee vital signs (e.g., pulse [P], blood pressure [BP], body temperature [Temp], etc.). Initial vitals must be taken and recorded before the start of work operations in the hot zone. Each time the employee exits the hot zone, vitals must be taken and evaluated for heat stress criteria. Section 6.4 of 5-511 Heat Stress provides specific instructions for taking and evaluating employee vital signs.
5. Body temperature vital signs will be recorded in °F.

Attachment 5
Daily Safety Meeting Form (SWAP)

This page intentionally left blank



Resolution Consultants

Daily Safe Work Assessment & Permit (SWAP)

This form must be filled out daily prior to work in the field and reviewed with all project personnel in a daily safety brief. The SWAP is to be completed before each work day to continually assess and communicate project-related hazards. Please have all SWAPs initiated by the Project Manager or Supervisor after returning from the field and place all completed SWAPs in the project file.

Section 1: Project Information

Project/Client Name: _____	SWAP Date/Time: _____
Location of the Work: _____	Project Number: _____
Description of Work: _____	

Has a HASP been created for this job? Yes No If Yes, has the HASP been reviewed prior to work? Yes No

Section 2: Identify hazards associated with tasks and tools **FOR THIS DAY:**

Critical Safety Tasks are listed below: (If answered "Yes" please call H&S for additional guidance/checks)

	Yes	No		Yes	No
Performing work in Confined Spaces - - - - -	<input type="checkbox"/>	<input type="checkbox"/>	Use of Respiratory Protection- - - - -	<input type="checkbox"/>	<input type="checkbox"/>
Hazardous Chemical Exposure- - - - -	<input type="checkbox"/>	<input type="checkbox"/>	Involvement with Lockout/Tagout Activities - - -	<input type="checkbox"/>	<input type="checkbox"/>
Falls Greater than Six (6) Feet- - - - -	<input type="checkbox"/>	<input type="checkbox"/>	Trenching or Excavation - - - - -	<input type="checkbox"/>	<input type="checkbox"/>

List each task that presents hazards and identify controls you will take to minimize risk. If No hazards were identified, write NONE in the first Task box. All additional project personnel involved must initial the bottom of each task identified below signifying that they have reviewed this information. Use back of SWAP as necessary for General Safety and Precautions, and to add additional hazards.

Following is a non-inclusive list of potential hazards.

- | | | |
|--|--|---|
| <ul style="list-style-type: none"> Chemicals (inhalation, dermal) Biologic Hazards (poison ivy, ants, snakes) Potentially unsafe area or neighborhood Sampling around heavy equipment (backhoe bucket, Vac. Truck, etc.) Working around high noise (> 85 dBA) Activities that require coring or drilling Drilling around underground utilities | <ul style="list-style-type: none"> Work with equipment around power lines Slick, uneven walking/working surfaces Climbing ladders / scaffolds Using gas or propane powered equipment in enclosed areas Work in extreme heat (> 104°F) or extreme cold (<30°F) Working around heavy equipment / traffic | <ul style="list-style-type: none"> Power tools (hammer drills, auger, etc.) Working with lifting / hoisting equipment Vehicular traffic, fork lifts, scissors lifts Inclement weather (lightning, high winds) Work with ergonomic hazards (lifting hazards, twisting, excessive repetitive) Working in proximity to deep water > 3ft Remote location w/ limited communication |
|--|--|---|

Task: _____ Hazards: _____ Controls: _____

Attachment 6
Incident Investigation and Reporting Forms

This page intentionally left blank

S3NA-004-FM1 Supervisor's Report of Incident

SUPERVISOR'S REPORT OF INCIDENT		
1. SEEK IMMEDIATE MEDICAL ATTENTION IF NECESSARY 2. EMPLOYEE MUST REPORT ALL INCIDENTS TO THEIR SUPERVISOR IMMEDIATELY . 3. REPORT THE INCIDENT TO THE APPROPRIATE INCIDENT REPORTING LINE. <div style="display: flex; justify-content: space-around; font-weight: bold;"> US (800) 348-5046 CANADA 1 (866) 417-7717 </div>		
ORGANIZATION INFORMATION		
REGION: <input type="checkbox"/> WEST <input type="checkbox"/> MIDWEST <input type="checkbox"/> SOUTHWEST/MOUNTAIN <input type="checkbox"/> SOUTHEAST <input type="checkbox"/> MID-ATLANTIC <input type="checkbox"/> NORTHEAST <input type="checkbox"/> CAN-EAST <input type="checkbox"/> CAN-CENTRAL <input type="checkbox"/> CAN-WEST	DISTRICT: DEPARTMENT #: PROJECT NUMBER:	
BUSINESS LINE: <input type="checkbox"/> WATER <input type="checkbox"/> TRANSPORTATION <input type="checkbox"/> ENERGY&POWER <input type="checkbox"/> ENVIRONMENT <input type="checkbox"/> PDD-EDAW <input type="checkbox"/> PDD-DESIGN <input type="checkbox"/> AECOM CORPORATE <input type="checkbox"/> SHARED SERVICES CENTER		
CLIENT NAME:	PROJECT NAME:	
ADMINISTRATIVE		
EMPLOYEE/CLAIMANT NAME:	EMPLOYEE NUMBER:	
WORK PHONE:	CELL PHONE:	
EMPLOYEE STATUS <input type="checkbox"/> FULL TIME <input type="checkbox"/> PART TIME <input type="checkbox"/> SUBCONTRACTOR/SUBCONSULTANT <input type="checkbox"/> TEMP AGENCY EMPLOYEE <input type="checkbox"/> THIRD PARTY EMPLOYEE	HOME OFFICE LOCATION:	
JOB TITLE:		
LIST WITNESSES:		
<i>REMEMBER: Reporting an incident does not imply guilt but assists in preventing further incidents or injuries.</i>		
DESCRIPTION OF EVENT		
TYPE OF OCCURRENCE: <input type="checkbox"/> PERSONAL INJURY/ILLNESS <input type="checkbox"/> PROPERTY DAMAGE <input type="checkbox"/> ENVIRONMENTAL DAMAGE/SPILL <input type="checkbox"/> MOTOR VEHICLE ACCIDENT <input type="checkbox"/> BOATING INCIDENT <input type="checkbox"/> NOV/CITATION <input type="checkbox"/> REPUTATIONAL (AECOM, CLIENT, OTHER)		
DATE OF INCIDENT:	TIME OF INCIDENT:	
DATE REPORTED TO SUPERVISOR:	TIME REPORTED TO SUPERVISOR:	
INCIDENT LOCATION:	CITY:	
STATE/PROVINCE/TERRITORY:	ZIP/POSTAL CODE:	
WERE ANY SUBCONTRACTORS OR OTHER PERSONS INVOLVED: <input type="checkbox"/> Yes <input type="checkbox"/> No IF YES, PLEASE PROVIDE DETAILS		

SUPERVISOR'S REPORT OF INCIDENT		
DESCRIPTION OF INCIDENT:		
<i>What, when, where, why, how? Attached notes/diagrams as required.</i>		
PERSONAL INJURY		
TYPE OF INJURY: <input type="checkbox"/> FIRST AID (TREATED ON-SITE) <input type="checkbox"/> MEDICAL AID (TREATED BY PROFESSIONAL) <input type="checkbox"/> FATALITY <input type="checkbox"/> RESTRICTED DUTY <input type="checkbox"/> LOST TIME (OFF WORK BEYOND DAY OF INJURY)		
DESCRIBE THE INJURY:		
BODY PART INJURED:		
WAS A DOCTOR OR HOSPITAL VISITED? <input type="checkbox"/> Yes <input type="checkbox"/> No	IF YES, WHEN:	
MEDICAL RECEIVED:	DOCTOR/HOSPITAL NAME:	
PROVIDER ADDRESS:	PHONE NUMBER:	
ON-SITE/CORRECTIVE ACTIONS		
INCIDENT IMMEDIATELY REPORTED ON-SITE TO:		
WHAT CORRECTIVE ACTIONS WERE IMMEDIATELY IMPLEMENTED ON-SITE?		
WHAT LONG-TERM OR PERMANENT CORRECTIVE ACTIONS ARE RECOMMENDED?		
PROPERTY DAMAGE (COMPLETE FOR PROPERTY DAMAGE ONLY)		
TYPE OF DAMAGE: <input type="checkbox"/> AECOM PROPERTY <input type="checkbox"/> MOTOR VEHICLE (COMPLETE MVA REPORT PAGE 3) <input type="checkbox"/> SPILL OR RELEASE OF A HAZARDOUS SUBSTANCE <input type="checkbox"/> MAJOR STRUCTURAL FAILURE <input type="checkbox"/> CLIENT, SUBCONTRACTOR, OTHER:		
DESCRIBE THE SPECIFIC DAMAGE, STRUCTURAL FAILURE OR HAZARDOUS RELEASE:		
WHERE CAN THE PROPERTY BE SEEN?		
PROPERTY OWNER NAME:	CONTACT INFORMATION:	
IS THERE ANY POTENTIAL FOR CIVIL, CRIMINAL OR REGULATORY LIABILITY AGAINST AECOM OR AN EMPLOYEE? <input type="checkbox"/> Yes <input type="checkbox"/> No IF YES, DISCUSS WITH AECOM REGIONAL COUNSEL BEFORE PROCEEDING WITH ANY FURTHER REPORTING.		
RANK THE SEVERITY OF THE DAMAGE: <input type="checkbox"/> MINOR <input type="checkbox"/> SERIOUS <input type="checkbox"/> MAJOR		
INDICATE WHO HAS BEEN NOTIFIED OF THE EVENT (E.G., OWNER/OPERATOR, STATE (US) OR GOVERNING BODY OF LABOUR, OH&S (CANADIAN PROVINCIAL/TERRITORIAL MINISTRY OF LABOUR/ENVIRONMENT, ETC.)?		
ACKNOWLEDGEMENTS		
EMPLOYEE SIGNATURE:	DATE:	
WITNESS SIGNATURE(S):	DATE:	
MANAGER SIGNATURE:	DATE:	

SUPERVISOR'S REPORT OF INCIDENT		
FOR REGIONAL SH&E MANAGER USE ONLY:		
CORRECTIVE ACTIONS REQUIRING IMPLEMENTATION BY SH&E MANAGER:		RATIONALE:
SIGNATURE:		DATE:
RECORDABILITY DETERMINATION <input type="checkbox"/> FIRST AID <input type="checkbox"/> RECORDABLE <input type="checkbox"/> RECORDABILITY UNDETERMINED <input type="checkbox"/> NON WORK <input type="checkbox"/> PROPERTY DAMAGE <input type="checkbox"/> GENERAL LIABILITY <input type="checkbox"/> VANDALISM		

Filename: S3NA_004_FM1_Supervisors Report of Incident
Directory: E:\Procedures\Phase 1 & 2
Template: C:\Documents and Settings\reynoldsr1\Application
Data\Microsoft\Templates\Normal.dotm

Title:

Subject:

Author: David Finch

Keywords:

Comments:

Creation Date: 1/12/2011 3:47:00 PM

Change Number: 2

Last Saved On: 1/12/2011 3:47:00 PM

Last Saved By: Kacey Ebbitt

Total Editing Time: 3 Minutes

Last Printed On: 10/9/2012 3:05:00 PM

As of Last Complete Printing

Number of Pages: 3

Number of Words: 518

Number of Characters: 3,049

Attachment 7
Material Safety Data Sheets

This page intentionally left blank

AMERADA HESS CORPORATION

MATERIAL SAFETY DATA SHEET

Gasoline, All Grades

MSDS No. 9950

EMERGENCY OVERVIEW

DANGER!

**EXTREMELY FLAMMABLE - EYE AND MUCOUS MEMBRANE IRRITANT
- EFFECTS CENTRAL NERVOUS SYSTEM - HARMFUL OR FATAL IF
SWALLOWED - ASPIRATION HAZARD**



NFPA 704 (Section 16)

High fire hazard. Keep away from heat, spark, open flame, and other ignition sources.

If ingested, do NOT induce vomiting, as this may cause chemical pneumonia (fluid in the lungs). Contact may cause eye, skin and mucous membrane irritation. Harmful if absorbed through the skin. Avoid prolonged breathing of vapors or mists. Inhalation may cause irritation, anesthetic effects (dizziness, nausea, headache, intoxication), and respiratory system effects.

Long-term exposure may cause effects to specific organs, such as to the liver, kidneys, blood, nervous system, and skin. Contains benzene, which can cause blood disease, including anemia and leukemia.

1. CHEMICAL PRODUCT and COMPANY INFORMATION (rev. Jan-04)

**Amerada Hess Corporation
1 Hess Plaza
Woodbridge, NJ 07095-0961**

EMERGENCY TELEPHONE NUMBER (24 hrs):

CHEMTREC (800)424-9300

COMPANY CONTACT (business hours):

Corporate Safety (732)750-6000

MSDS Internet Website

www.hess.com/about/enviro.html

SYNONYMS: Hess Conventional (Oxygenated and Non-oxygenated) Gasoline; Reformulated Gasoline (RFG); Reformulated Gasoline Blendstock for Oxygenate Blending (RBOB); Unleaded Motor or Automotive Gasoline

See Section 16 for abbreviations and acronyms.

2. COMPOSITION and INFORMATION ON INGREDIENTS * (rev. Jan-04)

INGREDIENT NAME (CAS No.)	CONCENTRATION PERCENT BY WEIGHT
Gasoline (86290-81-5)	100
Benzene (71-43-2)	0.1 - 4.9 (0.1 - 1.3 reformulated gasoline)
n-Butane (106-97-8)	< 10
Ethyl Alcohol (Ethanol) (64-17-5)	0 - 10
Ethyl benzene (100-41-4)	< 3
n-Hexane (110-54-3)	0.5 to 4
Methyl-tertiary butyl ether (MTBE) (1634-04-4)	0 to 15.0
Tertiary-amyl methyl ether (TAME) (994-05-8)	0 to 17.2
Toluene (108-88-3)	1 - 25
1,2,4- Trimethylbenzene (95-63-6)	< 6
Xylene, mixed isomers (1330-20-7)	1 - 15

A complex blend of petroleum-derived normal and branched-chain alkane, cycloalkane, alkene, and aromatic hydrocarbons. May contain antioxidant and multifunctional additives. Non-oxygenated Conventional Gasoline and RBOB do not have oxygenates (Ethanol or MTBE and/or TAME). Oxygenated Conventional and Reformulated Gasoline will have oxygenates for octane enhancement or as legally required.

AMERADAHESSE CORPORATION

MATERIAL SAFETY DATA SHEET

Gasoline, All Grades

MSDS No. 9950

3. HAZARDS IDENTIFICATION (rev. Dec-97)

EYES

Moderate irritant. Contact with liquid or vapor may cause irritation.

SKIN

Practically non-toxic if absorbed following acute (single) exposure. May cause skin irritation with prolonged or repeated contact. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are exposed repeatedly.

INGESTION

The major health threat of ingestion occurs from the danger of aspiration (breathing) of liquid drops into the lungs, particularly from vomiting. Aspiration may result in chemical pneumonia (fluid in the lungs), severe lung damage, respiratory failure and even death.

Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous system (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest, and death may occur.

INHALATION

Excessive exposure may cause irritations to the nose, throat, lungs and respiratory tract. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death.

WARNING: the burning of any hydrocarbon as a fuel in an area without adequate ventilation may result in hazardous levels of combustion products, including carbon monoxide, and inadequate oxygen levels, which may cause unconsciousness, suffocation, and death.

CHRONIC EFFECTS and CARCINOGENICITY

Contains benzene, a regulated human carcinogen. Benzene has the potential to cause anemia and other blood diseases, including leukemia, after repeated and prolonged exposure. Exposure to light hydrocarbons in the same boiling range as this product has been associated in animal studies with systemic toxicity. See also Section 11 - Toxicological Information.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE

Irritation from skin exposure may aggravate existing open wounds, skin disorders, and dermatitis (rash). Chronic respiratory disease, liver or kidney dysfunction, or pre-existing central nervous system disorders may be aggravated by exposure.

4. FIRST AID MEASURES (rev. Dec-97)

EYES

In case of contact with eyes, immediately flush with clean, low-pressure water for at least 15 min. Hold eyelids open to ensure adequate flushing. Seek medical attention.

SKIN

Remove contaminated clothing. Wash contaminated areas thoroughly with soap and water or waterless hand cleanser. Obtain medical attention if irritation or redness develops.

INGESTION

DO NOT INDUCE VOMITING. Do not give liquids. Obtain immediate medical attention. If spontaneous vomiting occurs, lean victim forward to reduce the risk of aspiration. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

INHALATION

Remove person to fresh air. If person is not breathing, ensure an open airway and provide artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.

AMERAD HESS CORPORATION

MATERIAL SAFETY DATA SHEET

Gasoline, All Grades

MSDS No. 9950

5. FIRE FIGHTING MEASURES (rev. Dec-97)

FLAMMABLE PROPERTIES:

FLASH POINT:	-45 °F (-43°C)
AUTOIGNITION TEMPERATURE:	highly variable; > 530 °F (>280 °C)
OSHA/NFPA FLAMMABILITY CLASS:	1A (flammable liquid)
LOWER EXPLOSIVE LIMIT (%):	1.4%
UPPER EXPLOSIVE LIMIT (%):	7.6%

FIRE AND EXPLOSION HAZARDS

Vapors may be ignited rapidly when exposed to heat, spark, open flame or other source of ignition. Flowing product may be ignited by self-generated static electricity. When mixed with air and exposed to an ignition source, flammable vapors can burn in the open or explode in confined spaces. Being heavier than air, vapors may travel long distances to an ignition source and flash back. Runoff to sewer may cause fire or explosion hazard.

EXTINGUISHING MEDIA

SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO₂, water spray, fire fighting foam, or Halon.

LARGE FIRES: Water spray, fog or fire fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

During certain times of the year and/or in certain geographical locations, gasoline may contain MTBE and/or TAME. Firefighting foam suitable for polar solvents is recommended for fuel with greater than 10% oxygenate concentration - refer to NFPA 11 "Low Expansion Foam - 1994 Edition."

FIRE FIGHTING INSTRUCTIONS

Small fires in the incipient (beginning) stage may typically be extinguished using handheld portable fire extinguishers and other fire fighting equipment.

Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH/MSHA- approved pressure-demand self-contained breathing apparatus with full facepiece and full protective clothing.

Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

See Section 16 for the NFPA 704 Hazard Rating.

6. ACCIDENTAL RELEASE MEASURES (rev. Dec-97)

ACTIVATE FACILITY SPILL CONTINGENCY or EMERGENCY PLAN.

Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to confirm spill areas. Spills may infiltrate subsurface soil and groundwater; professional assistance may be necessary to determine the extent of subsurface impact.

Carefully contain and stop the source of the spill, if safe to do so. Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors. The proper use of water spray may effectively disperse product

AMERADA HESS CORPORATION

MATERIAL SAFETY DATA SHEET

Gasoline, All Grades

MSDS No. 9950

vapors or the liquid itself, preventing contact with ignition sources or areas/equipment that require protection.

Take up with sand or other oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal - caution, flammable vapors may accumulate in closed containers. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

7. HANDLING and STORAGE (rev. Dec-97)

HANDLING PRECAUTIONS

*****USE ONLY AS A MOTOR FUEL*****

*****DO NOT SIPHON BY MOUTH*****

Handle as a flammable liquid. Keep away from heat, sparks, and open flame! Electrical equipment should be approved for classified area. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Special slow load procedures for "switch loading" must be followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil) is loaded into tanks previously containing low flash point products (such as this product) - see API Publication 2003, "Protection Against Ignitions Arising Out Of Static, Lightning and Stray Currents.

STORAGE PRECAUTIONS

Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition.

Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

WORK/HYGIENIC PRACTICES

Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not use as a cleaning solvent on the skin. Do not use solvents or harsh abrasive skin cleaners for washing this product from exposed skin areas. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapors which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves.

8. EXPOSURE CONTROLS and PERSONAL PROTECTION (rev. Jan-04)

EXPOSURE LIMITS

Component (CAS No.)	Source	Exposure Limits			Note
		TWA (ppm)	STEL (ppm)		
Gasoline (86290-81-5)	ACGIH	300	500	A3	
Benzene (71-43-2)	OSHA	1	5	Carcinogen	
	ACGIH	0.5	2.5	A1, skin	
	USCG	1	5		
n-Butane (106-97-8)	ACGIH	800	--	2003 NOIC: 1000 ppm (TWA) Aliphatic Hydrocarbon Gases Alkane (C1-C4)	
Ethyl Alcohol (ethanol) (64-17-5)	OSHA	1000	--		
	ACGIH	1000	--	A4	
Ethyl benzene (100-41-4)	OSHA	100	--		
	ACGIH	100	125	A3	

AMERADA HESS CORPORATION

MATERIAL SAFETY DATA SHEET

Gasoline, All Grades

MSDS No. 9950

Component (CAS No.)	Source	TWA (ppm)	STEL (ppm)	Exposure Limits	Note
n-Hexane (110-54-3)	OSHA	500	--		
	ACGIH	50	--	skin	
Methyl-tertiary butyl ether [MTBE] (1634-04-4)	ACGIH	50		A3	
Tertiary-amyl methyl ether [TAME] (994-05-8)				None established	
Toluene (108-88-3)	OSHA	200		Ceiling: 300 ppm; Peak: 500 ppm (10 min.)	
	ACGIH	50	--	A4 (skin)	
1,2,4-Trimethylbenzene (95-63-6)	ACGIH	25	--		
Xylene, mixed isomers (1330-20-7)	OSHA	100	--		
	ACGIH	100	150	A4	

ENGINEERING CONTROLS

Use adequate ventilation to keep vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

EYE/FACE PROTECTION

Safety glasses or goggles are recommended where there is a possibility of splashing or spraying.

SKIN PROTECTION

Gloves constructed of nitrile or neoprene are recommended. Chemical protective clothing such as that made of of E.I. DuPont Tychem®, products or equivalent is recommended based on degree of exposure.

Note: The resistance of specific material may vary from product to product as well as with degree of exposure. Consult manufacturer specifications for further information.

RESPIRATORY PROTECTION

A NIOSH-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection and limitations.

Use a positive pressure, air-supplied respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

9. PHYSICAL and CHEMICAL PROPERTIES (rev. Jan-04)

APPEARANCE

A translucent, straw-colored or light yellow liquid

ODOR

A strong, characteristic aromatic hydrocarbon odor. Oxygenated gasoline with MTBE and/or TAME may have a sweet, ether-like odor and is detectable at a lower concentration than non-oxygenated gasoline.

ODOR THRESHOLD

	<u>Odor Detection</u>	<u>Odor Recognition</u>
Non-oxygenated gasoline:	0.5 - 0.6 ppm	0.8 - 1.1 ppm
Gasoline with 15% MTBE:	0.2 - 0.3 ppm	0.4 - 0.7 ppm
Gasoline with 15% TAME:	0.1 ppm	0.2 ppm

BASIC PHYSICAL PROPERTIES

BOILING RANGE:	85 to 437 °F (39 to 200 °C)
VAPOR PRESSURE:	6.4 - 15 RVP @ 100 °F (38 °C) (275-475 mm Hg @ 68 °F (20 °C)
VAPOR DENSITY (air = 1):	AP 3 to 4
SPECIFIC GRAVITY (H ₂ O = 1):	0.70 – 0.78
EVAPORATION RATE:	10-11 (n-butyl acetate = 1)
PERCENT VOLATILES:	100 %

AMERAD HESS CORPORATION

MATERIAL SAFETY DATA SHEET

Gasoline, All Grades

MSDS No. 9950

SOLUBILITY (H₂O): Non-oxygenated gasoline - negligible (< 0.1% @ 77 °F). Gasoline with 15% MTBE - slight (0.1 - 3% @ 77 °F); ethanol is readily soluble in water

10. STABILITY and REACTIVITY (rev. Dec-94)

STABILITY: Stable. Hazardous polymerization will not occur.

CONDITIONS TO AVOID

Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources

INCOMPATIBLE MATERIALS

Keep away from strong oxidizers.

HAZARDOUS DECOMPOSITION PRODUCTS

Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke). Contact with nitric and sulfuric acids will form nitrocresols that can decompose violently.

11. TOXICOLOGICAL PROPERTIES (rev. Dec-97)

ACUTE TOXICITY

Acute Dermal LD50 (rabbits): > 5 ml/kg

Acute Oral LD50 (rat): 18.75 ml/kg

Primary dermal irritation (rabbits): slightly irritating

Draize eye irritation (rabbits): non-irritating

Guinea pig sensitization: negative

CHRONIC EFFECTS AND CARCINOGENICITY

Carcinogenicity: OSHA: NO IARC: YES - 2B

NTP: NO

ACGIH: YES (A3)

IARC has determined that gasoline and gasoline exhaust are possibly carcinogenic in humans. Inhalation exposure to completely vaporized unleaded gasoline caused kidney cancers in male rats and liver tumors in female mice. The U.S. EPA has determined that the male kidney tumors are species-specific and are irrelevant for human health risk assessment. The significance of the tumors seen in female mice is not known. Exposure to light hydrocarbons in the same boiling range as this product has been associated in animal studies with effects to the central and peripheral nervous systems, liver, and kidneys. The significance of these animal models to predict similar human response to gasoline is uncertain.

This product contains benzene. Human health studies indicate that prolonged and/or repeated overexposure to benzene may cause damage to the blood-forming system (particularly bone marrow), and serious blood disorders such as aplastic anemia and leukemia. Benzene is listed as a human carcinogen by the NTP, IARC, OSHA and ACGIH.

This product may contain methyl tertiary butyl ether (MTBE): animal and human health effects studies indicate that MTBE may cause eye, skin, and respiratory tract irritation, central nervous system depression and neurotoxicity. MTBE is classified as an animal carcinogen (A3) by the ACGIH.

12. ECOLOGICAL INFORMATION (rev. Jan-04)

Keep out of sewers, drainage areas and waterways. Report spills and releases, as applicable, under Federal and State regulations. If released, oxygenates such as ethers and alcohols will be expected to exhibit fairly high mobility in soil, and therefore may leach into groundwater. The API (www.api.org) provides a number of useful references addressing petroleum and oxygenate contamination of groundwater.

13. DISPOSAL CONSIDERATIONS (rev. Dec-97)

Consult federal, state and local waste regulations to determine appropriate disposal options.

AMERADAHESSE CORPORATION

MATERIAL SAFETY DATA SHEET

Gasoline, All Grades

MSDS No. 9950

14. TRANSPORTATION INFORMATION (rev. Jan-04)

DOT PROPER SHIPPING NAME: Gasoline
 DOT HAZARD CLASS and PACKING GROUP: 3, PG II
 DOT IDENTIFICATION NUMBER: UN 1203
 DOT SHIPPING LABEL: FLAMMABLE LIQUID

PLACARD:



15. REGULATORY INFORMATION (rev. Jan-04)

U.S. FEDERAL, STATE, and LOCAL REGULATORY INFORMATION

This product and its constituents listed herein are on the EPA TSCA Inventory. Any spill or uncontrolled release of this product, including any substantial threat of release, may be subject to federal, state and/or local reporting requirements. This product and/or its constituents may also be subject to other federal, state, or local regulations; consult those regulations applicable to your facility/operation.

CLEAN WATER ACT (OIL SPILLS)

Any spill or release of this product to "navigable waters" (essentially any surface water, including certain wetlands) or adjoining shorelines sufficient to cause a visible sheen or deposit of a sludge or emulsion must be reported immediately to the National Response Center (1-800-424-8802) or, if not practical, the U.S. Coast Guard with follow-up to the National Response Center, as required by U.S. Federal Law. Also contact appropriate state and local regulatory agencies as required.

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIRONMENT)

The CERCLA definition of hazardous substances contains a "petroleum exclusion" clause which exempts crude oil, refined, and unrefined petroleum products and any indigenous components of such. However, other federal reporting requirements (e.g., SARA Section 304 as well as the Clean Water Act if the spill occurs on navigable waters) may still apply.

SARA SECTION 311/312 - HAZARD CLASSES

<u>ACUTE HEALTH</u>	<u>CHRONIC HEALTH</u>	<u>FIRE</u>	<u>SUDDEN RELEASE OF PRESSURE</u>	<u>REACTIVE</u>
X	X	X	--	--

SARA SECTION 313 - SUPPLIER NOTIFICATION

This product contains the following toxic chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372:

<u>INGREDIENT NAME (CAS NUMBER)</u>	<u>CONCENTRATION WT. PERCENT</u>
Benzene (71-43-2)	0.1 to 4.9 (0.1 to 1.3 for reformulated gasoline)
Ethyl benzene (100-41-4)	< 3
n-Hexane (110-54-3)	0.5 to 4
Methyl-tertiary butyl ether (MTBE) (1634-04-4)	0 to 15.0
Toluene (108-88-3)	1 to 15
1,2,4- Trimethylbenzene (95-63-6)	< 6
Xylene, mixed isomers (1330-20-7)	1 to 15

US EPA guidance documents (www.epa.gov/tri) for reporting Persistent Bioaccumulating Toxics (PBTs) indicate this product may contain the following deminimis levels of toxic chemicals subject to Section 313 reporting:

<u>INGREDIENT NAME (CAS NUMBER)</u>	<u>CONCENTRATION - Parts per million (ppm) by weight</u>
Polycyclic aromatic compounds (PACs)	17
Benzo (g,h,i) perylene (191-24-2)	2.55
Lead (7439-92-1)	0.079

AMERADAHESSCORPORATION

MATERIAL SAFETY DATA SHEET

Gasoline, All Grades

MSDS No. 9950

CANADIAN REGULATORY INFORMATION (WHMIS)

Class B, Division 2 (Flammable Liquid)

Class D, Division 2A (Very toxic by other means) and Class D, Division 2B (Toxic by other means)

16. OTHER INFORMATION (rev. Jan-04)

NFPA® HAZARD RATING HEALTH: 1 Slight
FIRE: 3 Serious
REACTIVITY: 0 Minimal

HMIS® HAZARD RATING HEALTH: 1 * Slight
FIRE: 3 Serious
REACTIVITY: 0 Minimal
* CHRONIC

SUPERSEDES MSDS DATED: 12/30/97

ABBREVIATIONS:

AP = Approximately < = Less than > = Greater than
N/A = Not Applicable N/D = Not Determined ppm = parts per million

ACRONYMS:

ACGIH	American Conference of Governmental Industrial Hygienists	NTP	National Toxicology Program
AIHA	American Industrial Hygiene Association	OPA	Oil Pollution Act of 1990
ANSI	American National Standards Institute (212)642-4900	OSHA	U.S. Occupational Safety & Health Administration
API	American Petroleum Institute (202)682-8000	PEL	Permissible Exposure Limit (OSHA)
CERCLA	Comprehensive Emergency Response, Compensation, and Liability Act	RCRA	Resource Conservation and Recovery Act
DOT	U.S. Department of Transportation [General Info: (800)467-4922]	REL	Recommended Exposure Limit (NIOSH)
EPA	U.S. Environmental Protection Agency	SARA	Superfund Amendments and Reauthorization Act of 1986 Title III
HMIS	Hazardous Materials Information System	SCBA	Self-Contained Breathing Apparatus
IARC	International Agency For Research On Cancer	SPCC	Spill Prevention, Control, and Countermeasures
MSHA	Mine Safety and Health Administration	STEL	Short-Term Exposure Limit (generally 15 minutes)
NFPA	National Fire Protection Association (617)770-3000	TLV	Threshold Limit Value (ACGIH)
NIOSH	National Institute of Occupational Safety and Health	TSCA	Toxic Substances Control Act
NOIC	Notice of Intended Change (proposed change to ACGIH TLV)	TWA	Time Weighted Average (8 hr.)
		WEEL	Workplace Environmental Exposure Level (AIHA)
		WHMIS	Workplace Hazardous Materials Information System (Canada)

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES

Information presented herein has been compiled from sources considered to be dependable, and is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. Since conditions of use are beyond our control, we make no warranties, expressed or implied, except those that may be contained in our written contract of sale or acknowledgment.

Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material, even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in their use of the material.

Attachment 8
State Spill Reporting Procedures/ Spill Reporting Card

This page intentionally left blank

NOTES

Spill Reporting and Initial Notification Requirements

GUIDANCE SUMMARY AT-A-GLANCE

- Reporting spills is a crucial first step in the response process.
- You should understand the spill reporting requirements to be able to inform the spillers of their responsibilities.
- Several different state, local, and federal laws and regulations require spillers to report petroleum and hazardous materials spills.
- The state and federal reporting requirements are summarized in Exhibit 1.1-1.
- Petroleum spills must be reported to DEC unless they meet all of the following criteria:
 - The spill is known to be less than 5 gallons; and
 - The spill is contained and under the control of the spiller; and
 - The spill has not and will not reach the State's water or any land; and
 - The spill is cleaned up within 2 hours of discovery.

All reportable petroleum spills and most hazardous materials spills must be reported to DEC hotline (1-800-457-7362) within New York State; and (1-518 457-7362) from outside New York State. For spills not deemed reportable, it is strongly recommended that the facts concerning the incident be documented by the spiller and a record maintained for one year.

- Inform the spiller to report the spill to other federal or local authorities, if required.
- Report yourself those spills for which you are unable to locate the responsible spiller.
- Make note of other agencies' emergency response telephone numbers in case you require their on-scene assistance, or if the response is their responsibility and not BSPR's.

Exhibit 1.1-1

State and Federal Reporting Requirements for Petroleum Spills, Leaks, and Discharges

Materials Covered	Act or Regulation	Agency to Notify	What Must Be Reported and When	Who Must Report
Petroleum from any source	Navigation Law Article 12; 17 NYCRR 32.3 and 32.4	DEC Hotline 1-800-457-7362	<p>The notification of a discharge must be immediate, but in no case later than two hours after discharge.</p> <ol style="list-style-type: none"> Name of person making report and his relationship to any person which might be responsible for causing the discharge. Time and date of discharge. Probable source of discharge. The location of the discharge, both geographic and with respect to bodies of water. Type of petroleum discharges. Possible health or fire hazards resulting from the discharge. Amount of petroleum discharged. All actions that are being taken to clean up and remove the discharge. The personnel presently on the scene. Other government agencies that have been or will be notified. 	Any person causing discharge of petroleum. Owner or person in actual or constructive control must notify DEC unless that person has adequate assurance that such notice has already been given.
All aboveground petroleum and underground storage facilities with a combined storage capacity of over 1100 gallons.	ECL §17-1007; 6 NYCRR §613.8	DEC Hotline 1-800-457-7362	<ol style="list-style-type: none"> Report spill incident within two hours of discovery. Also when results of any inventory, record, test, or inspection shows a facility is leaking, that fact must be reported within two hours of discovery. 	Any person with knowledge of a spill, leak, or discharge.
Petroleum contaminated with PCB.	Chemical Bulk Storage Act 6 NYCRR Parts 595, 596, 597	DEC Hotline 1-800-457-7362	Releases of a reportable quantity of PCB oil.	Owner or person in actual or constructive possession or control of the substance, or a person in contractual relationship, who inspects, tests, or repairs for owner.

Exhibit 1.1-1

**State and Federal Reporting Requirements for Petroleum Spills, Leaks, and Discharges
(continued)**

Materials Covered	Act or Regulation	Agency to Notify	What Must Be Reported and When	Who Must Report
Any liquid (petroleum included) that if released would be likely to pollute lands or waters of the state.	ECL §17-1743	DEC Hotline 1-800-457-7362	Immediate notification that a spill, release, or discharge of any amount has occurred. Owner or person in actual or constructive possession or control of more than 1,100 gallons of the liquid.	
Petroleum Discharge in violation of §311(b)(3) of the Clean Water Act	40 CFR §110.10 (Clean Water Act)	<ol style="list-style-type: none"> National Response Center (NRC) 1-800-424-8802. If not possible to notify NRC, notify Coast Guard or pre-designated on-scene coordinator. If not possible to notify either 1 or 2, reports may be made immediately to nearest Coast Guard units, provided NRC notified as soon as possible. 	Immediate notification as soon as there is knowledge of an oil discharge that violates water quality standards or causes sheen on navigable waters. Procedures for notice are set forth in 33 CFR Part 153, Subpart B, and in the National Oil and Hazardous Substances Pollution Contingency Plan, 40 CFR Part 300, Subpart E.	Person in charge of vessel or on-shore or off-shore facility.
Petroleum, petroleum by-products or other dangerous liquid commodities that may create a hazardous or toxic condition spilled into navigable waters.	33 CFR 126.29 (Ports and Waters Safety Act)	Captain of the Port or District Commander	As soon as discharge occurs, owner or master of vessel must immediately report that a discharge has occurred.	Owner or master of vessel or owner or operator of the facility at which the discharge occurred.

Exhibit 1.1-2

State and Federal Reporting Requirements for Hazardous Substance Spills, Leaks, and Discharges

Materials Covered	Act or Regulation	Agency to Notify	What Must Be Reported and When	Who Must Report
Any hazardous substance pursuant to Article 37. Does not include petroleum.	Chemical Bulk Storage Act 6 NYCRR Parts 595, 596, 597; ECL 40-0113(d)	DEC Hotline 1-800-457-7362	Releases of a reportable quantity of a hazardous substance.	Owner or person in actual or constructive possession or control of the substance, or a person in contractual relationship, who inspects, tests, or repairs for owner.
Hazardous materials or substances as defined in 49 CFR §171.8 that are transported. (See federal reporting requirements.)	Transportation Law 14(f); 17 NYCRR 507.4(b)	Local fire department or police department or local municipality	Immediate notification must be given of incident in which any of the following occurs as a direct result of a spill of hazardous materials: <ol style="list-style-type: none"> 1. Person is killed. 2. Person receives injuries requiring hospitalization. 3. Estimated damage to carrier or other property exceeds \$50,000. 4. Fire, breakage, spillage, or suspected contamination due to radioactive materials. 5. Fire, breakage, spillage, or suspected contamination involving etiologic agents. 6. Situation is such that, in the judgment of the carrier, a continuing danger to life or property exists at the scene of the incident. 	All persons and carriers engaged in the transportation of hazardous materials.