1376

# Final Work Plan

## Geophysical Investigation
## Munitions Destruction Areas SEAD's 46 & 57
## Seneca Army Depot Activity
## Romulus, New York

**Contract No. DACA45-98-D-0003**
**Task Order No. 150**

*Prepared for:*
**U.S. Army Corps of Engineers**
Omaha District Rapid Response
Building 525 Castle Hall
Offutt Air Force Base, Nebraska 68113

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Shaw Project No. 845734

*Signed:*

Steve Treadway

Steve Treadway, Director Quality Assurance/Quality Control

*October 2003*

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## *Acronyms and Abbreviations*

| | |
|---|---|
| AEDA | Ammunition, Explosives, & Dangerous Articles |
| ATV | all-terrain vehicle |
| bgs | below ground surface |
| BRAC | Base Realignment and Closure |
| CFR | Code of Federal Regulations |
| cm | centimeter |
| CPR | Cost and Performance Report |
| CQC/CDQMP | Contractor Quality Control/Chemical Data Quality Management Plan |
| CQCM | Contract Quality Control Manager |
| DAS | Data Analysis System |
| DCAA | Defense Contract Audit Agency |
| DGM | Digital Geophysical Mapping |
| DID | Data Item Description |
| DOD | Department of Defense |
| DQO | Data Quality Objective |
| EM | electromagnetic |
| EOD | explosive ordnance disposal |
| EPP | Environmental Protection Plan |
| ESS | Explosives Safety Submission |
| FAR | Federal Acquisitions Regulation |
| FGDC | Federal Geographic Data Committee |
| ft | foot/feet |
| GIS | Geographical Information System |
| GFP | government-furnished property |
| GPO | Geophysical Prove-out |
| GPS | Global Positioning System |
| HTRW | hazardous, toxic, radioactive waste |
| Hz | Hertz |
| IDWP | Investigation Derived Waste Plan |
| mm | millimeter |
| mph | miles per hour |
| MPM | Most Probable Munition |
| mV | millivolts |
| NAD83 | North American Datum, 1983 |
| NAVD88 | North American Vertical Datum, 1988 |

## Acronyms and Abbreviations (continued)

| | |
|---|---|
| OE | ordnance and explosives |
| PGP | Project Geophysicist |
| PM | Project Manager |
| QA | quality assurance |
| QC | quality control |
| QCP | Quality Control Plan |
| QRP | Qualified Recycling Programs |
| RTS | Robotic Total Station |
| SDS | Spatial Data Standards for Facilities, Infrastructure, and Environment |
| SEAD | Seneca Army Depot |
| SEDA | Seneca Army Depot Activity |
| SNR | signal-to-noise-ratio |
| SOP | Standard Operating Procedure |
| SOW | Scope of Work |
| SUXOS | Senior Unexploded Ordnance Supervisor |
| TDEM | Time-Domain Electromagnetic |
| TEU | Technical Escort Unit |
| TIN | triangulated irregular network |
| U.S.C. | United States Code |
| USACE | U.S. Army Corps of Engineers |
| USAESCH | U.S. Army Engineering Supply Center, Huntsville |
| UXO | unexploded ordnance |
| UXOCSWP | Unexploded Ordnance Construction Support Work Plan |
| UXOQCS | Unexploded Ordnance Quality Control Supervisor |
| UXOSO | Unexploded Ordnance Safety Officer |

FINAL WORK PLAN
MUNITIONS DESTRUCTION AREAS SEAD'S 46 & 57
SENECA ARMY DEPOT ACTIVITY
ROMULUS, NEW YORK

Contract No. DACA45-98-D-0003
Task Order No. 150

# SECTION 1.0

# INTRODUCTION

Prepared for:
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# 1.0 Introduction

## 1.1 General

This Work Plan has been prepared to detail the requirements necessary to perform a geophysical investigation at the Seneca Army Depot Activity (SEDA) in Romulus, New York. The geophysical investigation is intended to provide detailed mapping of potential OE on the Munitions Destruction Areas SEAD 46 and 57 for removal actions at a later date.

The work will be performed by Shaw Environmental under the Rapid Response Contract No. DACA45-98-D-0003, Task Order No. 150.

## 1.2 Site Location

The Seneca Army Depot is a U.S. Army Facility located in Seneca County, New York near the town of Romulus (Figure 1-1). The site is situated approximately 40 miles south of Lake Ontario. Sparsely populated farmland covers most of the surrounding area. New York State Highways 96 and 96A adjoin SEDA on the east and west boundaries, respectively. SEDA occupies approximately 10,600 acres.

## 1.3 Site History

Construction of the Seneca Ordnance Depot began in June 1941, and two years later, in 1943, the Depot began its mission of receipt, storage, maintenance, and supply of military items, including munitions and equipment. As the amount of ammunition on base increased following World War II, the mission of the base shifted from the supply of ordnance to the storage and disposal of it.

SEAD-46 (3.5" Rocket Range) covers approximately 45 acres situated to the northeast of the center of the Depot (Figure 1-2), due east of the Ammunition Storage Area. Aerial photos taken in 1954 show the site as a long open area in which 3.5" rockets were apparently fired. It is believed that a large berm at the north end of the area was a target berm, into which the rockets were fired. Subsequent to Army use of SEAD 46, a number of small trees have grown up in the area.

SEAD-57 covers approximately 61 acres at the northern end of the Depot immediately adjacent and south of the Open Burning/Open Detonation Grounds (Figure 1-2). The area was used during the 1970's and until 1984 for the disposal of munitions and homemade explosive devices that were collected from federal, state and police agencies within an assigned geographical area in the Northeastern United States. Training of EOD specialists assigned to the unit also took place at this location. After 1984, transportation of OE material to Seneca Army Depot was prohibited and OE disposal was conducted at appropriate locations within the jurisdiction of the requesting authorities.

The Depot's mission changed in early 1995 when the Department of Defense (DOD) recommended closure of SEDA under its Base Realignment and Closure (BRAC) process. Congress approved this recommendation on September 28, 1995 and the Depot was officially closed in July 2000.

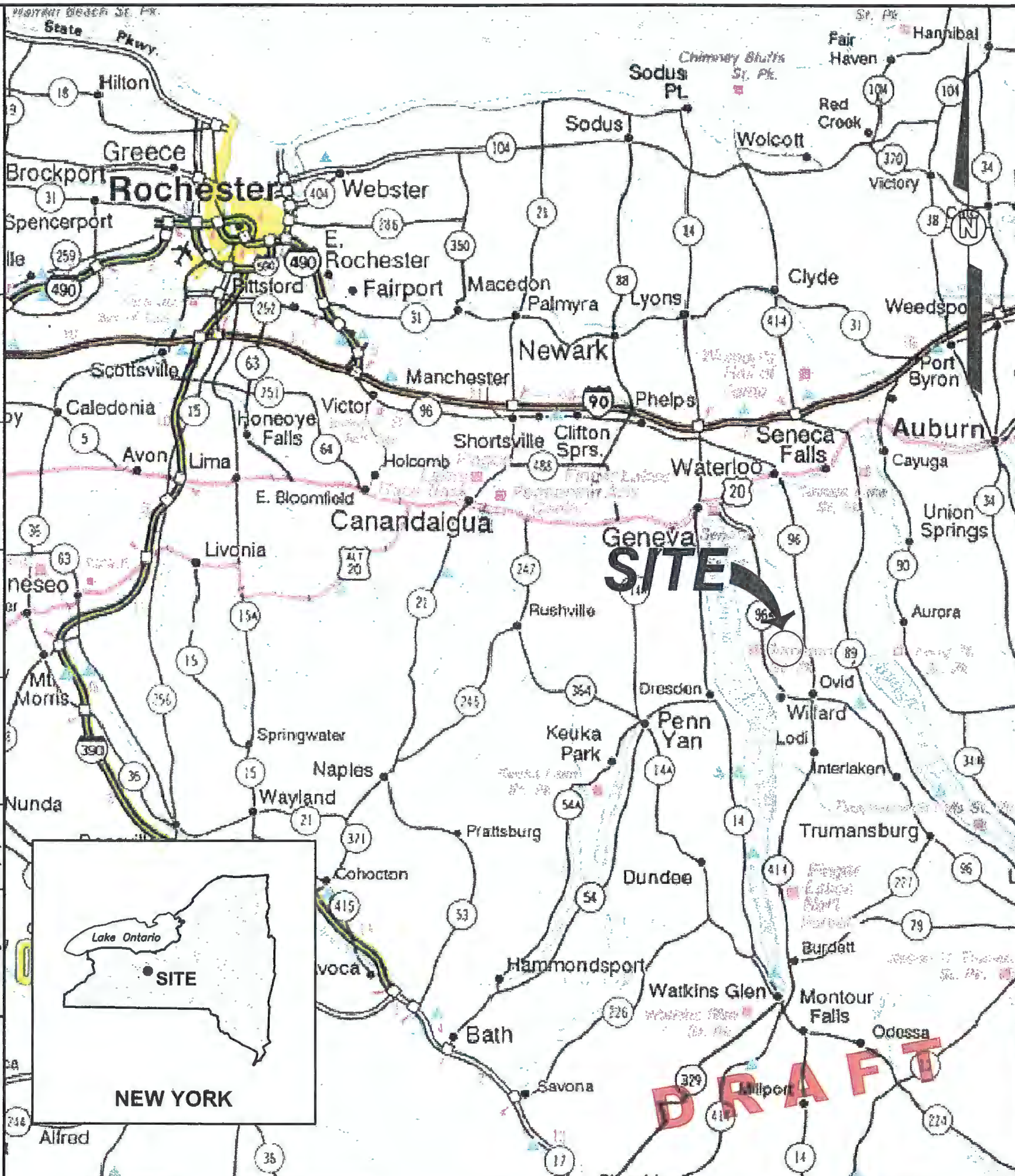
## *1.4 Topography*

SEDA consists mostly of former farmland that has been overgrown by dense underbrush between buildings and within the igloo area. Woodland predominate in most of the areas that are not immediately associated with a former facility or building complex. There is a slight change in topographic relief trending toward Seneca Lake to the west.

## *1.5 Climate*

The State of New York, like all of the northeastern states, experiences the four seasons. Summers are generally mild and pleasant, with warmer conditions south and southeast. Winters statewide are cold and snowy, and lakes do freeze, central and north.

Snow fall is significant in the Adirondack Mountains, and on the eastern shore of Lake Ontario, more snow falls than anywhere east of the Rockies (over 200 yearly inches is common). Mid-state, the average high temperature in July is near 70 degrees, while in January, high temperatures are near 20 degrees. Statewide, rainfall approaches 35 inches per year, with higher amounts in the upstate mountains, and in the southeast.

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| APPROVED BY | -- |
| CHECKED BY | T. Mathison |
| DRAWN BY | A. Smith |
| DESIGNED BY | -- |
| DATE | 9/5/03 |
| OFFICE | Pittsburgh, PA |

REFERENCE:

UNITED STATES ROAD ATLAS.

Shaw Environmental, Inc.

U.S. ARMY CORPS OF ENGINEERS
OMAHA DISTRICT

FIGURE 1-1

SITE LOCATION MAP

SENECA ARMY DEPOT
ROMULUS, NEW YORK

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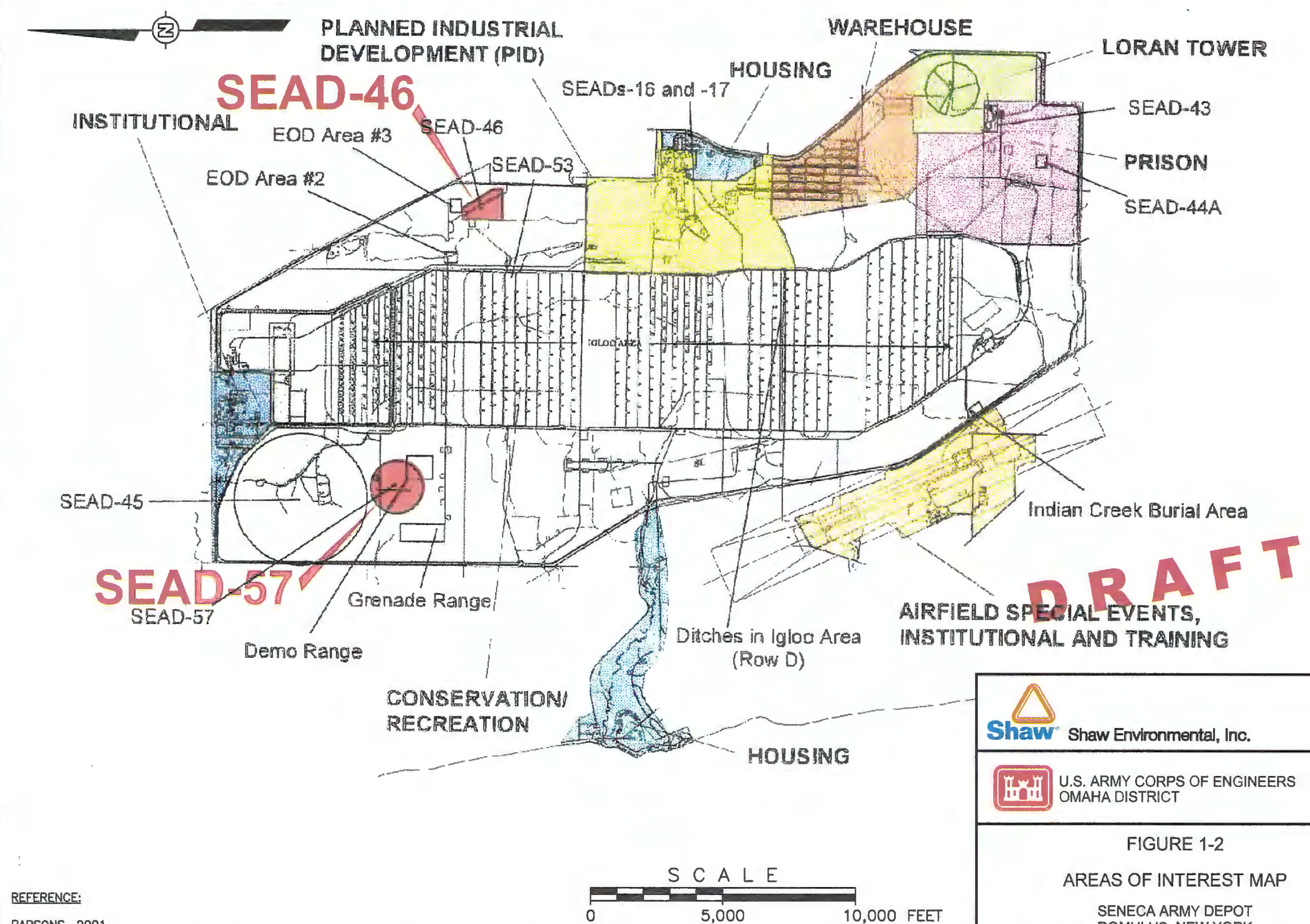


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PARSONS, 2001

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U.S. ARMY CORPS OF ENGINEERS
OMAHA DISTRICT

FIGURE 1-2

AREAS OF INTEREST MAP

SENECA ARMY DEPOT
ROMULUS, NEW YORK

# 2.0 Technical Management Plan

This Technical Management Plan identifies the approach, methods, and operational procedures to be employed during a time sensitive geophysical investigation at Seneca Army Depot. Ordnance and explosives (OE) exist on the property. The purpose of this geophysical investigation is to provide detailed mapping of potential OE for removal actions at a later date. This plan was developed in accordance with the Army Corps of Engineers Huntsville OE Mandatory Center of Expertise (MCX) Data Item Description (DID) OE-005-1.01, Type II Work Plan.

## 2.1 General Requirements

This section presents the general requirements for unexploded ordnance (UXO) investigation activities at the Seneca Army Depot.

### 2.1.1 Regulatory Guidance

A list of laws, regulations, policies, and procedures that are applicable or potentially applicable during implementation of geophysical investigation support activities at Seneca Army Depot is included in Section 11.1.6 of this Work Plan. These resources will be followed during the execution of this project.

The Data Item Descriptions developed by the MCX describes requirements for various aspects of OE work utilized during the preparation of this document. Ordnance and Explosives MCX DIDs for OE work are distinguished by the number OE-xx. Shaw E & I will comply with the OE MCX DIDs. If an OE MCX DID is revised, Shaw E & I will notify USACE of significant changes and will request guidance from the Contracting Officer (COR) as to whether to implement the change.

### 2.1.2 Chemical Warfare Materiel

Chemical warfare materiel (CWM) is not expected to be encountered at the site based on historical research and previous investigations. However, in the event that suspected CWM is encountered, the following standard procedures will be followed:

- The discoverer will immediately notify the UXO Technician III.
- The UXO Technician III will immediately direct the work team to stop work and evacuate the site along cleared paths in an upwind direction. The initial exclusion zone for CWM is 450 feet upwind.

- The UXO Technician III should note the location of the suspected CWM to help with its identification and relocation.
- The UXO Technician III will designate a minimum of two UXO qualified individuals to position themselves upwind as far as possible to prevent unauthorized personnel from accidental exposure.
- The UXO Technician III will immediately notify the UXO Safety Officer (UXOSO) and Senior UXO Supervisor (SUXOS), who will in turn immediately notify the on-site U.S. Army Corps of Engineers (USACE) OE Safety Specialist and the Contracting Officer. If a USACE OE Safety Specialist is not present, the SUXOS will contact the Design Center's OE Safety Manager and OE Quality Manager. The USACE will initiate notification for CWM response. The USACE contact numbers are below:
  - USACE OE Safety Manager
    Frank Manger
    607-869-1912 [410-320-9495 cell]
  - USACE Quality Manager
    Rick Grabowski
    402-221-7784
- The SUXOS will account for all field personnel and notify Shaw E & I OE Project Manager or Senior Project Manager.
- The SUXOS will ensure the area is secured until properly relieved by active duty Explosives Ordnance Disposal (EOD) personnel, TEU, or local authority. The SUXOS will direct Shaw E & I personnel to support such personnel as appropriate.
- The SUXOS will submit a Suspect CWM report to the USACE OE Safety Specialist that contains the following information: date and time of event; location; preliminary identification of suspect CWM including quantity and type of munition(s) or container(s); description of what happened; description of any property damage, personnel casualties and/or injuries; description of whether medical services or facilities were required; list of immediate notification and support requirements identified during initial emergency response assessment; and any other pertinent information.
- Before work can resume, the site plans will be reviewed for adequacy in consideration of this newly discovered hazard.

### *2.1.3 Procedures When Ordnance and Explosives Cannot be Disposed or Ordnance and Explosives are Unidentified*

In the event that OE is encountered requiring active duty military response, the on-site USACE OE Safety Specialist will be notified. If a USACE OE Safety Specialist is not present the Design Center's OE Safety Manager and OE Quality Manager will be notified. The USACE will initiate notification of the nearest appropriate EOD response to the site for handling and disposal of the OE.

### *2.1.4 Technical Scope*

Two areas will be investigated during this project: the Former 3.5 inch Rocket Range (SEAD 46), and the Former EOD Range (SEAD 57).

The Former 3.5-inch Rocket Range (SEAD 46) consists of approximately 46 acres on the North side of the depot due East of the Ammunition Storage Area. The majority of ordnance found during an OE EE/CA completed in 2000 included 40mm practice grenades and other items that probably reflects the site's use as a local training area during the 1980's and 1990's. A single 3.5-inch Rocket, M28A2, HEAT, was also found on the surface West of the hill at SEAD 46. Based on the results of the OE EE/CA, the M28A2 Projectile is designated as the Most Probable Munition (MPM) for this area.

The Former EOD Range (SEAD 57) consists of approximately 61 acres at the northern end of the Depot immediately adjacent and South of the Open Burning/Open Detonation Grounds. The 143d EOD Detachment performed demolition activities in this general area for more than 20 years. Based on the results of the OE EE/CA, the 37mm MK II projectile is designated as the MPM for this area.

The geophysical investigation for these areas will require the following UXO tasks:

- UXO support during brush clearance operations
- Area preparation to include the removal of large items of metallic scrap
- UXO support during geophysical survey operations
- Anomaly investigation and UXO resolution

### *2.1.5 Expected Number of Excavations*

The expected number of excavations to verify the accuracy of the geophysical mapping is estimated at 500 (approximately 5 excavations per acre) intrusive digs to support the anomaly reacquisition.

## 2.2 Project Personnel, Organization, Communication and Reporting

Shaw E & I's organizational structure for the time sensitive geophysical investigation is depicted in Figure 2-1 showing primary Shaw E & I management and supervisory staff. The duties and responsibilities of members of the project organization are described below.

### 2.2.1 Key Personnel

The following positions will be regarded as key personnel:

- Senior UXO Supervisor
- UXO Quality Control Specialist
- UXO Safety Officer
- Project Geophysicist
- Site Geophysicist
- QC Geophysicist
- Geographic Information System (GIS) Manager

Resumes and/or CEHNC Resume Database number for UXO and other project individuals currently assigned to the project are provided in Appendix H.

#### 2.2.1.1 Senior Unexploded Ordnance Supervisor (SUXOS)

The SUXOS is the most senior UXO Technician on-site. He directly controls the operations of all field teams performing OE activities and will spend most of the day in the field monitoring their performance and assisting them in achieving maximum operational safety and efficiency. He reports directly to the OE Project Manager and receives guidance from the Shaw E & I OE Service Center concerning technical UXO and operational issues. He will implement the approved plans in the field and must review and approve any changes to the approved UXO plans. He will supervise all UXO teams on a project, not to exceed a total of 10. The SUXOS has the authority to temporarily stop work to correct an unsafe condition or procedure.

The SUXOS is Tim Mathisen. Mr. Mathisen's experience exceeds the requirements of DID OE-025.01.

#### 2.2.1.2 Unexploded Ordnance Quality Control Specialist (UXOQCS)

The Unexploded Ordnance Quality Control (QC) Specialist (UXOQCS) will implement OE-related sections of the Quality Control Plan (QCP), conduct QC inspections of all UXO and explosives operations for compliance with established procedures, and direct and approve all corrective actions to ensure all OE-related work complies with contractual requirements. The UXOQCS has the authority to temporarily stop work to correct an unsafe condition or procedure. The UXOQCS will report independent of project management to the Program Quality Control Manager.

#### *2.2.1.3 Unexploded Ordnance Safety Officer (UXOSO)*

The UXOSO will be responsible for implementing the Site Safety and Health Plan (SSHP) for activities at OE sites and will verify compliance with applicable safety and health requirements, presented as Appendix D. The UXOSO will report independent of project management to the Program Certified Industrial Hygienist (CIH). The UXOSO will implement the approved explosives and UXO safety program in compliance with all Department of Defense (DoD), federal, state, and local statutes and codes; analyze UXO and explosives operational risks, hazards, and safety requirements; establish and ensure compliance with all site-specific safety requirements for UXO and explosives operations; enforce personnel limits and safety exclusion zones (EZs) for UXO operations, UXO and explosives transportation, storage, and destruction; conduct safety inspections to ensure compliance with UXO and explosives safety codes; and operate and maintain air monitoring equipment required at site for airborne contaminants. The UXOSO has the authority to temporarily stop work to correct an unsafe condition or procedure.

The UXOSO for this project will be dual-hatted as the UXOQCS and UXOSO.

#### *2.2.1.4 Project Geophysicist*

The Project Geophysicist has the responsibility for the design, implementation and management the geophysical portion of activities at Seneca Army Depot. The Project Geophysicist will be responsible for approval of the geophysical methods and procedures used during the field activities to obtain the required data and will be present on-site full time. The Project Geophysicist will report directly to the Project Manager and will be the geophysicist-of-record for the project.

The Project Geophysicist is Kent Boler. Mr. Boler's experience exceeds the requirements of DID OE-025.01.

#### *2.2.1.5 Site Geophysicist*

The Site Geophysicist has the responsibility for managing the day-to-day geophysical operations of the site geophysical investigations at Seneca Army Depot. The Site Geophysicist will also be responsible for providing QC during the anomaly selection process. The Site Geophysicist will assist in providing solutions to geophysical problems encountered in the field in order to meet the required geophysical objectives of the project.

The Site Geophysicist will be dual-hatted as the Project Geophysicist.

#### *2.2.1.6 QC Geophysicist*

The Site Geophysicist has the responsibility for managing the geophysical portion of OE-related activities at Seneca Army Depot. The QC geophysicist is responsible for overall geophysical survey quality control. The QC geophysicist will have a degree in geology, geological engineering, or a closely related field and a minimum of five years of directly related geophysical experience. The QC geophysicist will check all activities associated with the collection, processing, and analysis of geophysical sensor and navigation data as well as target selection to insure data completeness and quality. The QC geophysicist will review data processing steps, filtering procedures and data modeling results.

The QC Geophysicist is Ji Ma. Mr. Ma's experience exceeds the requirements of DID OE-025.01 for a Site Geophysicist.

#### *2.2.1.7 Geographic Information System Manager*

The GIS Manager will be responsible for developing and managing all aspects of data management, including the geographic information database. The GIS manager will ensure that all field data are collected in a consistent manner for incorporation into the Seneca project database. The GIS Manager will interface extensively with USACE and the Project Manager.

### *2.2.2 Composition and Management of UXO Teams*

**UXO Personnel, Responsibilities and Authorities.** This plan has been developed to address all potential scenarios for encountering OE/UXO. Shaw E & I will mobilize UXO qualified individuals. Staffing will include a Senior UXO Supervisor (SUXOS), a UXO Safety Officer (UXOSO), a UXO QC Specialist (dual hatted with the UXOSO) and UXO Technician III and UXO Technician II personnel as required for the various phases of the project. Staffing of UXO personnel will be in accordance with DID OE-025.01. Specific responsibilities are delineated below:

**Senior UXO Supervisor (SUXOS**). The SUXOS takes policy direction from the OE Service Center; operational tasking is provided by Shaw E & I site superintendent. The SUXOS is the senior UXO technician on site and plans, coordinates, and directs all UXO activities.

**UXO Technician III** personnel, also referred to as field team leaders, are responsible for the safety and efficiency of the performance of their assigned field team, and report directly to the SUXOS. The UXO Technician III can temporarily stop work in order to bring an unsafe condition or procedure to the attention of the SUXOS. The UXO Technician III directs the actions of a project UXO team in accordance with an approved work plan or UXO site safety plan and daily verbal direction of the Senior UXO Supervisor. The responsibilities of the UXO Technician III include, but are not limited to, the following:

- Has the authority to stop work.
- Consult with and coordinate with the Site Safety and Health Officer (SSHO) regarding any modification to project documentation.
- Compliance with all Federal and State regulations.
- Equipment and on-site vehicles.
- Explosive Safety.
- The daily inspection of emergency equipment.
- Supervision and direction of OE/UXO field activities for assigned tasks.

**UXO Technician II** personnel report directly to their assigned UXO Technician III and are responsible for the safe and efficient performance of specific field tasks as assigned by the UXO Technician III. They are also responsible for complete familiarity with the approved plans and for adherence to the procedures described in the plans. UXO Technician II has the authority to temporarily stop work in order to bring an unsafe condition or procedure to the attention of their assigned UXO Technician III. This individual has stop work authority. Responsibilities include, but are not limited to, the following:

- Compliance with all safety and work related documentation.
- Work under the supervision of the UXO Technician III.
- Operates UXO detection equipment.
- Assists in the identification of UXO items.
- Prepares explosive charges for Blow in Place procedures.
- Monitors excavation operations to ensure that the sampling sites are safe in regard to UXO items.
- Has stop work authority.

Qualifications for UXO technicians will meet or exceed the requirements of DID OE-025.01. Unexploded ordnance personnel new to the site must be pre-approved by the Contracting Officer or Contracting Officer's Representative prior to mobilization of the personnel.

### 2.2.3 Other Rapid Response Contract Personnel

Other personnel in addition to those designated as key personnel for UXO operations will play important roles in the management of this project.

#### 2.2.3.1 Program Manager

The Program Manager, Mr. Al Meyers, has complete management authority and responsibility for all work performed. The Program Manager directs the program management organization as a central resource for management, continuity, and control of all program activities. The centralized program management is organized to facilitate communication with and reporting to USACE and to expedite and support project execution. The Program Manager has total authority, responsibility, and accountability for managing the contract. He will be involved in the decision-making process, and oversight of the management of the project.

#### 2.2.3.2 Senior Project Manager

The Senior Project Manager, Mr. Tom Mathison, reports to the Program Manager. He is responsible for ensuring that all activities performed by Shaw E & I at Seneca Army Depot are conducted in accordance with contractual specifications and approved work plans. The Senior Project Manager will also coordinate with the USACE Project Manager. The Senior Project Manager is responsible for management of all operations conducted for the project and for coordination between OE and geophysical activities. The Senior Project Manager is responsible for overall cost and schedule performance and contract compliance and will monitor the budget and schedule to ensure availability of necessary personnel, equipment, subcontractors, and services. He will participate in the development of the field program, evaluation of data, and reporting.

#### 2.2.3.3 Program Certified Industrial Hygienist

Mr. Dave Duncan, CIH, will oversee the development and implementation of the SSHP to ensure that it meets all specific needs of the project and that appropriate health and safety requirements are defined.

#### 2.2.3.4 Quality Control Manager

The Program Contract Quality Control Manager (CQCM). Mr. David Rohm is responsible for ensuring that the overall QC procedures and objectives of the project are met. The CQCM will review and ensure that the Quality Control Plan addresses all project specific QC needs and that all appropriate QC requirements are covered. Mr. Martin Miele, RGP, will provide oversight for geophysical specific activities.

### 2.2.4 Project Administration

The Senior Project Manager will oversee contract administration and project management for this project. The administrative staff in various Shaw offices will coordinate with the site and home office administrative functions located in Monroeville, PA.

### 2.2.5 Roles and Responsibilities of Subcontractors

Shaw E & I may use subcontractors for portions of the work. When this work is subcontracted, it will be done in accordance with the Rapid Response contract requirements. Anticipated subcontracted work includes surveying and brush clearing tasks. Points of contact will be provided upon selection of these vendors.

## 2.3 Pre-Mobilization/ Mobilization/Demobilization and Project Setup

This section presents the requirements for mobilization, demobilization, and project setup.

### 2.3.1 Pre-Mobilization

Prior to mobilization, the following actions are required:

- Finalize procurement actions for items and services needed during the mobilization;
- Coordinate with the USACE OE Safety Specialist for approvals or notifications to other agencies:
    - Ensure accuracy of route maps for emergency facilities
    - Local response agencies (fire department, hospital) of upcoming project activities
- Submit and obtain approval of all UXO resumes.

### 2.3.2 Mobilization

A mobilization period will be necessary to mobilize, organize, and train the staff, and mobilize, inventory, and test equipment. Mobilization activities will include:

- Transport and assembly of the work force at Seneca Army Depot
- Conduct site-specific training on the work plan, SSHP, and OE procedures and hazards
- Ship and inventory project equipment including geophysical detection equipment, hand tools and supplies, portable toilets, backhoes, vegetation clearance equipment, etc.
- Coordinate with local agencies including police, hospital, and fire department, as appropriate
- Organize support facilities and test communication equipment
- Test and inspect equipment

#### *2.3.2.1 Field Office*

Shaw E & I will maintain a field office at the project site. This field office will be the central command location for direction and coordination of geophysical mapping and OE activities. Personnel will report to the field office at the beginning of each workday for the daily health and safety briefing. The field office will be the central point of communications for the project. Health and safety records will also be maintained in the field office.

#### *2.3.2.2 Preparatory Phase Inspection*

A preparatory phase inspection is performed prior to beginning each definable feature of work as part of the three-phase inspection process. The purposes are to review applicable work plans, processes, and specifications and verify that the necessary resources, conditions, and controls are in place and compliant before the start of work activities. The UXOQCS is to verify that lessons learned during previous, similar work have been incorporated, as appropriate, into the project procedures to prevent recurrence of past problems. The UXOQCS shall generate and use a Preparatory Inspection Checklist provided in Appendix F, and designed to fit the specific scope of work and site conditions. Work plans and operating procedures are to be reviewed by the UXOQCS to ensure they describe pre-qualifying requirements or conditions, equipment and materials, appropriate work sequences, methodology, hold/witness points, and QC provisions. The UXOQCS shall verify that:

- The required plans and procedures have been prepared and approved and are available to the field staff
- Construction materials meet required specifications
- Field equipment is appropriate for intended use, available, functional, and calibrated
- Work responsibilities have been assigned and communicated
- Field staff have the necessary qualifications, knowledge, expertise, and information to perform their jobs
- Arrangements for support services (such as on-site testing and off-site testing laboratories)
- Prerequisite site work has been completed

Discrepancies between existing conditions and approved plans/procedures are to be resolved. Corrective actions for unsatisfactory and nonconforming conditions identified during a preparatory inspection are to be verified by the UXOQCS or designee prior to granting approval to begin work.

USACE notification is required at least 48 hours prior to conducting preparatory inspections. Results are to be documented on the Preparatory Inspection Checklist, entered in the QC log, and summarized in the Daily QC Report.

#### 2.3.2.3 Kickoff/Safety Meeting

During mobilization, a kickoff/site safety meeting will be conducted which will include a review of the work plan and the review and acknowledgment of the SSHP by all site personnel.

### 2.3.3 Demobilization

Demobilization may occur for several reasons: (1) the project may be completed with all work accomplished; (2) the project may be incomplete, but the contractor has expended most of the contract funds; (3) weather conditions may lead to demobilization; or (4) conflicts with endangered species. Whatever the reason, the Government, through its Contracting Officer, must convey officially to the contractor its decision to demobilize from the project site.

#### 2.3.3.1 Demobilization Upon Project Completion

Full demobilization will occur when the project is completed with appropriate QA/QC checks performed. During final demobilization, personnel will be retained only as long as necessary. All personnel no longer required will be demobilized. The following will occur prior to demobilization:

- Verification that all areas to be investigated/cleared are completed to the Government's satisfaction
- Identification of all areas that could not be investigated/cleared
- Verification that site restoration has been performed to an appropriate level
- Ultimate disposition of property used during the project has been performed according to Section 9.0, Property Management Plan

#### 2.3.3.2 Unscheduled Demobilizations

Due to the high cost of demobilizations and remobilizations, the Project Manager will closely monitor the rate of expenditures versus the rate of progress to determine whether the work can be completed within the allocated funds, and if not, request additional funding to avoid unscheduled demobilizations.

If weather conditions threaten to force an unscheduled demobilization, the decision to demobilize will be based on an analysis of the cost to stay on the project until the weather clears versus cost to demobilize. If the number of predicted productive days during the poor weather conditions is sufficient enough to show a benefit by staying on-site, the work can continue.

### 2.4 Surface UXO Clearance/Area Preparation

Once the area of investigation is delineated, the sites will be cleared of obstructions prior to conducting the geophysical survey. A UXO team will walk lanes to visually identify any surface UXO that could damage other project equipment used to clear the vegetation. The UXO team will utilize hand held magnetometers to assist in this survey. Hand held magnetometers used on this site will be the Schonstedt GA-72 type magnetometer. This operation will also identify and mark any other non-UXO features below the height of the foliage that could result in machinery damage, i.e. cables, parts of vehicles. UXO-related remnants, target materials, and non-UXO related materials that may interfere with a subsurface geophysical survey will be removed from the surface of the work area and staged for later disposition.

If an OE item is found during the survey, the location will be conspicuously marked with a red pin flag. Additionally, UXO personnel will complete the Shaw E & I Unexploded Ordnance Information Form (Form 2-1). Subsurface anomalies will be marked with a yellow flag.

Metal Detectors may be used as required to assist in identifying non-ferrous and ferrous materials. All equipment will be operated as specified in the appropriate operator's manual. All equipment will be function tested in the geophysical test plot prior to each daily use in accordance with the operator's instructions.

#### 2.4.1 Geophysical Test Plots.

Based on the results of the OE EE/CA and the on-going Open Burning Grounds Removal Action, the EM-61 MK2 survey instrument, in a towed array configuration, has been pre-selected as the most appropriate geophysical survey mapping technology. In general, the mapping objectives of any geophysical survey are to detect and locate all subsurface anomalies that may be UXO. However, prior to conducting the geophysical investigations at SEAD 46 and SEAD 57, a prove-out will be conducted at three existing geophysical prove-out test plots to document that the sensor platform to be deployed can meet the project data quality objectives and to document what degree of success is expected from the survey. There are three components of the survey technology to be evaluated. These include sensors, navigation technologies, and deployment form factors.

At Seneca Army Depot the targets of concern are 20 and 37mm projectiles, 40mm, MK 2 and CS grenades; and the 3.5-inch rockets. These items are composed of both steel and aluminum.

### 2.4.2 Sensor and Navigation Technology Selection

As specified in the Scope of work, a towed array of Geonics EM-61 MK2 instruments will be utilized. A decision process regarding the selection of sensor type is provided in this section.

A Leica TSP1100 Robotic Total Station (RTS) system will be used for navigation and location control.

The deployment form factor will be a towed non-metallic sled, utilizing existing USACE skids if possible, upon which 3 EM-61 MK2 instruments will be mounted. If the USACE skids are not utilized, a 4$^{th}$ EM61 MK2 will be considered for addition on the towed array. A RTS prism will be mounted above the center of the sled. The sled will be towed by a "John Deere Gator" or similar all-terrain tow vehicle, which will also be used to carry the EM-61 MK2 electronics, batteries, data-loggers, and multi-unit control console.

### 2.4.3 Prove Out Test Areas

Three existing geophysical test areas at Seneca Army Depot will be utilized for the Prove-out. The south and west geophysical prove-out (GPO) grids will serve as unknown areas. The East geophysical prove-out grid will serve a known area. The terrain in each area is generally flat and open which is representative of the terrain conditions of the SEAD 46 and SEAD 57 sites.

- East GPO grid: The East GPO Grid is located in "Q" area. It is 100x200-feet in size and contains a variety of known and blind items ranging in size from 20mm to 105mm. Burial depths range from about 6-inches to 4-feet. A location control monument is present in this area and the corner locations of the grid are staked. Prior to the survey, USACE will provide the control point coordinates and a list of the locations, types, orientations, and depths of 80-90% of the buried control items.
- South GPO grid: The South GPO Grid is located adjacent to SEAD 57. It is 100x200-feet in size (long axis oriented east-west). The corners of the grid are staked and USACE will provide a list of the coordinates of the grid corner stakes. The grid contains a variety of sizes of actual and simulated items buried from about 6-inches to 4-feet. The test items are described as small medium, and large, as follows:
  - Small items: training grenades and simulated 20mm projectiles
  - Medium items: 75mm projectiles
  - Large items: sections of pipe and 3.5-inch Stokes mortars
- West GPO grid: The West GPO Grid is located just inside the west boundary of the OD area. It is 100x300-feet in size (long axis oriented north-south) and contains the same variety of test items and burial depths found in the South GPO Grid. The corners of the grid are staked and USACE will provide a list of the coordinates of the grid corner stakes.

### 2.4.4 Prove Out Field Activities

Proof of performance geophysical surveys will be executed over each of the three prove-out plots as indicated in Sections 5.0 "Geophysical Prove-out" A towed array of three or four EM-61 MK2 time domain geophysical sensors in the 1x0.5 meter coil configuration will be used for the Prove-out. A Leica TSP1100 RTS with a prism mounted on the towed array will be used for navigation control. The proper form factors for positional control will be applied in Shaw E & I's custom in-house software (ProData). The EM61 MK2 will be deployed as per the manufacturers design.

Each geophysical sensor will be calibrated prior to obtaining the test plot data. These tests will include the personnel test, static test, static spike test, cable shake test, and 3-point navigation function tests. The calibration and testing procedure document the proper functioning of the instruments and will adjust for instrument time lag to accurately merge the RTS and sensor data.

The East (known) GPO grid will be geophysically mapped first. After successful completion of the East GPO grid, the South and West GPO grids will be geophysically mapped.

### 2.4.5 Prove-out Analysis and Reporting Activities

The test plot data will first be downloaded in the field to assure that all data has been collected and downloaded properly. The downloading process will be executed with Geonics DAT61 software. The data merging process will be conducted with Shaw E & I software (ProData). ProData will merge the geophysical and RTS data accurately and will correct for latency as well as RTS and sensor coordination and calibration.

Shaw E & I standard data processing (prior to target selection) includes data leveling, statistical data assessment, grid generation, and data filtering to accentuate target signatures. Shaw E & I uses several software packages including: software from the sensor manufacturers, in-house software, and Geosoft's Oasis Montage and UX-Detect Software to complete all tasks. A discussion regarding the Shaw E & I geophysical data processing procedures is included in Section 6.0 "Geophysical Investigation Plan."

Each data set will first be processed separately in accordance with Shaw E & I procedures. A target list will then be generated from each data set. At this point an assessment will be made regarding the EM data sets. The EM-61 MK2 data will be examined and compared to the results of the items in the known prove-out plot. The higher quality data set will be selected. The superior quality data set will address issues regarding detection, signal strength, and resolution. Another factor regarding data quality is a comparison of the EM target locations (target picks) to the actual locations of the buried simulated targets. All of the above criteria will be considered.

A memo report of the results of the survey will be provided to the USACE within one week after execution of the prove-out test plot surveys. The memo report will include a description of the equipment utilized, processing procedures applied to the data, target results, and recommendations. Additionally, all collected data will be provided for USACE evaluation and review.

### *2.4.6 Cultural Feature Removal*

To allow for adequate geophysical surveying of areas, removal of metallic cultural features may be necessary.

### *2.4.7 Vegetation Removal*

In order to facilitate the geophysical investigation, vegetation clearance may be necessary to allow access and thorough searching of the OE areas in a safe and efficient manner. Minimal work is expected since most of the project areas have been routinely cleared with a Bush Hog. Manual clearance methods consist of personnel on the ground using hand or power tools such as powered weed cutters will be used around larger features. A team of UXO qualified personnel will perform manual clearance operations.

**Initial Sweep.** As the first step, the UXO technicians will carefully inspect all areas of the grid with the aid of a magnetometer/metal detector. The UXO Technicians will mark any OE or other hazards by encircling the hazard with red flagging tape. If UXO is discovered on the surface, mechanical equipment will not be used unless the area can first be effectively swept of all surface UXO.

**Vegetation Disposal.** The cut vegetation will be disposed of in accordance with this work plan. The method of vegetation disposal is presented in chapter 12, which is to spread over the area just outside the surveyed area to serve as seeding of native plants, ground cover and soil nutrient.

**Grass and Brush Clearance.** Grass or brush clearance will be accomplished by depot personnel utilizing a tractor equipped with a bush hog mower. The brush will be cut to a height of no greater than 6 inches above ground surface to eliminate interference with UXO detection or survey activities.

**Tree Trimming or Removal.** In order to perform the geophysical survey in the heavily wooded areas on the perimeter of the SEAD 46 and 57 sites, 10 foot wide transects will be cleared of trees and bushes. The trees will be cut using either hydraulic axes or chain saws, depending on the density of the area. The trees will be cut to a height of no greater than 6 inches above the ground surface. These transects will be cut on approximately 50 foot centers for the heavily wooded areas to be surveyed.

**Safety Hazards.** Appropriate PPE will be worn according to the Site Safety and Health Plan.

### 2.4.8 Utility Clearance

Prior to intrusive activity, a utility clearance will be necessary to identify underground service lines within or near the excavation sites. Although many utilities will be evident from geophysical maps, some utilities such as fiber optic cables, plastic gas lines, and plastic water pipes will probably not be detected unless tracer lines were installed. Prior to any intrusive activity, the following utility clearance process will be followed:

- **Public Utilities.** At least two days prior to intrusive activity in a given area, Dig Safely New York 1-800-962-7962 will be contacted. This "one-call" service contacts all local utility companies, who in turn will mark their own underground utilities at the project site.
- **Army Utilities.** As a precaution, Shaw E & I will review whatever utility maps are readily available prior to initiating intrusive activities.

As appropriate, geophysical investigations and hand excavation methods will be used to locate utilities prior to the use of mechanical excavators.

## 2.5 Statistical Sampling

No statistical sampling of OE is planned under this scope of work at the Seneca Army Depot.

## 2.6 Unexploded Ordnance Procedures

This section discusses the procedures that will be performed by UXO-qualified personnel during geophysical support operations. This section includes procedures for excavating anomalies, identifying UXO, transportation and demolition of UXO, and required engineering controls.

### 2.6.1 Responsibilities of Personnel

General responsibilities of personnel are discussed in Section 2.2 of this document.

### 2.6.2 Overall Safety Precautions

The general work practices defined by USACE will be followed. This includes limiting the work periods for field UXO personnel to 10 hours per day and 40 hours per week. Exceptions to this requirement will only be made in the event that public safety is at imminent risk and with the concurrence of the USACE OE Safety Specialist and Contracting Officer.

### 2.6.3 Geophysical Investigations

Detailed geophysical procedures are provided in Section 6.0, Geophysical Investigation Plan.

### 2.6.4 Anomaly Excavation

The UXO Team will excavate anomalies identified from geophysical surveys. The UXO Technician III will assign UXO Technicians one or more anomalies to investigate. Anomaly excavation for this project will be performed to the depth of detection. If the UXO team has dug to a depth of four feet and still not uncovered the anomaly, they will backfill the hole, mark the location and record the fact that the anomaly was deeper than 4 feet. A two-person team of UXO Technicians using excavation equipment ranging from small hand excavation tools to earth moving machinery (EMM) will perform excavation of anomalies. Earth moving machinery operators are not required to be UXO technicians but must operate under the supervision of a UXO Technician III.

#### 2.6.4.1 Hand Excavation Tools

Small hand tools such as shovels, spades, trowels, and pry bars will be used to access potential UXO. Hand tools will be used for the majority of items, which are generally found near the surface. The following basic technique will be used for anomaly excavation:

1. The UXO Technician will locate the anomaly with a metal detector.

2. Until the anomaly is otherwise identified, it will be assumed that the anomaly is UXO. Excavation will be initiated adjacent to the anomaly. The excavation will continue down until the excavated area has reached a depth below the top of the anomaly as determined by frequent inspection with a metal detector, or until the maximum depth of excavation required by the work plan is reached.

3. Using progressively smaller and more delicate tools to carefully remove the soil, the excavation team will expand the sidewall to expose the metallic item in the wall of the excavation for inspection and identification without moving or disturbing the item.

4. Once the item is exposed for inspection, the excavation team will determine if it is UXO. If the item is not UXO, it will be removed and the area will be rechecked with the metal detector to ensure that a UXO is not hidden beneath it. The excavation team will then annotate the results of the excavation on the anomaly-tracking sheet and move on to the next marked subsurface anomaly.

#### 2.6.4.2 Earth Moving Machinery Excavation

A commercial backhoe may be used by the UXO team to carefully excavate anomalies if believed to be at a greater depth than can be efficiently hand excavated. The EMM will be used no closer than 1 foot to anomalies located during excavation. A team consisting of at least a UXO Technician and an equipment operator will perform the anomaly excavation with EMM. The UXO Technician III may assign additional workers to assist with the excavation if deemed necessary. The EMM excavation will be conducted similarly to hand excavation.

1. Upon arrival at the anomaly site, the excavation team will reacquire the anomaly using a metal detector, and the equipment operator will begin the excavation under the direction of the UXO Technician. The equipment operator will excavate near the location, but not directly on top of the anomaly.

2. To prevent contacting the anomaly with the backhoe, the UXO Technician will frequently monitor the excavation to ensure that the equipment operator does not dig directly over the anomaly. The objective of the direction by the UXO Technician is to remove the soil from a selected area adjacent to the anomaly, while ensuring that the backhoe bucket does not disturb the anomaly.

3. The UXO Technician will direct the equipment operator to stop excavation when the soil has been removed to within 1 foot of the anomaly as estimated by the response from the metal detector or the post-processed geophysical data.

4. The backhoe will then be shut down, and the excavation will be completed using hand tools as previously described for hand excavation.

### 2.6.5 Unexploded Ordnance Discovery, Notification, and Reporting

It is essential that the discovery of all UXO is immediately reported to the appropriate on-site personnel, accurately documented and communicated to the USACE. In the event that UXO is discovered at any time on or adjacent to Seneca Army Depot property, the following procedures will be employed:

- The USACE OE Safety Specialist, and the Shaw E & I SUXOS and UXOSO will immediately be notified.
- Shaw E & I has the on-site capabilities for disposal (UXO personnel, explosives, equipment). The SUXOS will begin coordinating with the USACE for same day disposal if possible.

- A UXO Reporting Form will be filled out for each UXO found. The UXO Reporting Form will be attached to daily reports, and the UXO will be documented in weekly and monthly reports.

### 2.6.6 Exclusion Zone

For SEAD 46 the MPM is the 3.5-inch Rocket, M28A2, HEAT. The Net Explosive Weight (NEW) for this item is 1.82 lbs of Composition B. The Public Withdrawal Distance (PWD) for this item is 1,420 feet. This distance was computed using HNC-ED-CS-S-98-1 (approved by DDESB on 6 April 1998) by Sherene Opinhka, USAESC, Huntsville Engineering Division, Structures Branch, 9 May 2003.

The MPM for SEAD 57 is the 37mm MK II projectile. The NEW for this item is 0.527 lbs of TNT and the Public Withdrawal Distance (PWD) is 1,181 feet. This distance was computed using HNC-ED-CS-S-98-1 (approved by DDESB on 6 April 1998) by Dr. Michelle Crull, USAESC, Huntsville Engineering Division, Structures Branch, 10 April 1998.

If a larger item is discovered at these sites, withdrawal distances will be determined in accordance with 98-01 and adjustments made accordingly. Until the appropriate distances are determined, the default distances in DoD 6055.9-STD (Chapter 5, paragraph E.4.a) will be used.

If ordnance is found which requires a blow in place procedure, the exclusion zone will be established based on the K328 value for the quantity of the explosives used.

### 2.6.7 Unexploded Ordnance Identification

UXO Technicians will make every effort to identify UXO through visual examination of the item for markings and other identifying features such as shape, size, and external fittings. Items will not be moved during the inspection/identification until the fuze condition can be ascertained. If the condition is questionable, consider the fuze to be armed. The fuze is considered the most hazardous component of a UXO, regardless of type or condition. The SUXOS and the USACE OE Safety Specialist will agree on the positive identification of the item and the disposition of the item prior to implementing any disposal operations. The following general ordnance safety guidelines should be followed:

- In general, a projectile containing a base-detonating fuze is to be considered armed if the projectile has been fired.
- Arming wires and pop out pins on unarmed fuzes should be secured by taping in place prior to movement.

- Do not rely on the color-coding of UXO for positive identification of contents. Munitions having incomplete or improper color-coding have been encountered. (This is especially true with regard to the 40 mm family of ordnance)
- Avoid the area forward of the nose of a munition until it can be ascertained the item does not contain a shaped charge. The explosive jet can be fatal at great distances forward of the longitudinal axis of the item. Assume any shaped charge munitions to contain a piezoelectric (PZ) fuzing system until the fuzing system is positively identified. A PZ fuze is extremely sensitive, can function at the slightest physical change, and may remain hazardous for an indefinite period of time.
- Examine a projectile for the presence or absence of an unfired tracer. Also examine the item for the presence or absence of a rotating band and its condition.
- Assume a practice UXO contains a live charge until it can be determined otherwise. Expended pyrotechnic/practice devices may contain red/white phosphorus residue. Due to incomplete combustion, phosphorous may be present and re-ignite spontaneously if subjected to friction or the crust is broken and the contents exposed to air.
- Do not approach smoking white phosphorus (WP) UXO. Burning WP may detonate the burster or dispersal explosive charge at any time.
- Procedures in Chapter 13, Technical Manual ™ 9-1300-214, *Military Explosives*, or other approved explosives analysis shall be used to identify the explosives.

### 2.6.8 Transportation

It is not anticipated that there will be any movement or transportation of ordnance found on this site.

### 2.6.9 Demolition Operations

The safest and most expeditious methods of disposal will be utilized in every case. The UXO Technician III will present a proposed course of action to the SUXOS. If the SUXOS and the USACE OE Safety Specialist approve the plan, the UXO Technician III will then implement the plan. The usual and normal method of UXO disposal will be BIP. If the area cannot withstand a high-order detonation and the UXO is not safe to be moved, render safe procedures by military EOD may or may not be an option. If render safe or movement is not an option, then design and implementation of engineering controls to mitigate the effects of a high-order detonation must be effected. Coordination with and approval by the USACE OE Safety Specialist is required before detonating a UXO under such circumstances.

#### 2.6.9.1 Seneca Army Depot Detonation Notification Procedure

Prior to any detonation, the appropriate notification procedure will be initiated.

As soon as it is determined that a detonation will be required, the SUXOS will initiate this procedure. The SUXOS will schedule the demolition to allow sufficient time to complete all notifications and approvals.

#### 2.6.9.2 Consolidated Shots

Consolidated shots will not be performed since no OE item will be moved.

#### 2.6.9.3 Demolition Procedures

During demolition activities, the SUXOS will have overall control of the site. An EZ will be established around the demolition-site. Only the SUXOS, the UXO Team, and UXO qualified safety personnel will be allowed within the EZ once the disposal operations have begun. The UXOSO and UXO Safety personnel will ensure safe work practices are observed, and the UXO Technician III will perform the necessary steps to safely dispose the UXO. The following general procedures will be followed for all disposals by detonation:

- The UXO Disposal Checklist (Form 2-4) will be completed for each disposal operation.
- Explosive materials will be ordered from the local explosive vendor and delivered to the site for use on the day designated.
- The USACE OE Safety Specialist will contact the FAA for air clearance and will hold on line until the shot is fired.
- The UXO Team comprised of the UXO Technician III and a UXO Technician II will inspect the location, condition, and net explosive weight of the UXO to be disposed of.
- The UXO Technician III will ensure that permission to detonate explosives has been obtained from the SUXOS and coordinated with the USACE OE Safety Specialist.
- It is the responsibility of the SUXOS to schedule the detonations and to ensure that all project personnel are accounted for before disposal operations begin.
- The UXO Team will then prepare enough explosive charges and shock tube initiating systems materials to perform the planned detonations. The transportation vehicle will then be loaded with the explosives, shock tubing initiating systems, and other equipment required.
- Unless otherwise approved by the USACE OE Safety Specialist, all demolitions will be tamped, except 40mm grenades. Initiators will always be transported in a separate container from the main-charge explosives.
- A minimum separation distance of 50 feet will be observed for initiators and main-charge explosives while at the disposal site.
- If several UXO are located in close proximity to each other a mainline/branchline shot may be used to destroy these UXO simultaneously to increase the efficiency of the operation.

- The UXO Technician III will observe the UXO Technician II position the explosive charge against the UXO. The disposal shot may be tamped, except for 40mm grenades, to minimize the effects of the detonation. However, never bury the initiators (caps).
- The UXO Technician III will then inspect the disposal shot and return to the safe firing point.
- Prior to initiation, the UXO Technician III will ensure that guards are stationed at the roadblocks, scan the EZ for personnel, and sound three distinct blasts on an air or vehicle horn. He will then scan the area again and initiate the demolition charge if all is clear.
- In the event of a misfire, a 60-minute wait time for Shock Tube Initiating Systems and a 60 minute wait time for electric misfires. A Misfire Checklist (Form 2-5), included at the end of this section, will be completed by the UXO Technician III and filed with the daily logs.

### 2.6.10 Post-Demolition Operations

After successful initiation of the explosive charge and then a 5 minute wait time, the SUXOS or UXOSO with assistance of an additional UXO technician (safety observer) will conduct an inspection of the shot to ensure complete destruction of the UXO. After verification that no more detonations will be required, an "all clear" notification will be sent out to all parties on the notification list.

The UXO Team will collect for disposal all sandbag fragments, large munition fragments, and other debris, and generally clean and restore the site.

### 2.6.11 Engineering Controls

Due to the space available at this site, engineering controls are not anticipated.

## 2.7 Disposition of Ordnance and Explosives Scrap

This section is intended to guide Shaw E & I UXO Technicians in the safe and efficient handling and disposal of OE-related scrap metal found at Seneca Army Depot. The term "range residue" has been adopted by the DoD to refer to material recovered from ranges. During excavation and investigation operations, UXO Technicians will encounter the following types of range residue: UXO items; ordnance related scrap that is contaminated with explosives or other hazardous materials; non-hazardous ordnance related scrap metal; small arms ammunition (.50 caliber and below) and general metallic debris. Figure 2-2 contains a Logic Diagram for the Disposition of Range Residue. Because the metal scrap recovered will ultimately be disposed of off-site, it is imperative that procedures be established to preclude live ordnance or hazardous materials from becoming intermingled with other non-hazardous metal scrap. The inherently dangerous characteristics of Ammunition Explosives Dangerous Articles (AEDA) dictate that special precaution be taken to ensure that demilitarization is performed only by properly trained and technically qualified personnel.

The following paragraphs provide procedures and guidance for management, demilitarization, and preparation of range residue for ultimate sale by the DRMS.

### 2.7.1 *Regulatory Guidance*

The following references provide the regulatory framework for processing and disposal of OE scrap recovered from active or former military ranges.

- DoD 4160.21-M: Defense Materiel Disposition Manual
- DoD 4160.21-M-1: Defense Demilitarization and Trade Security Control Manual
- U.S. Army Corps of Engineers EP 75-1-1 Methods and Procedures for Processing Ammunitions, Explosives, and Dangerous Articles (AEDA)

### 2.7.2 *Range Residue Groups*

According to DoD 4160.21-M, range residue is classified as either Group 1 (further subdivided into Group 1a and Group 1b) or Group 2.

#### 2.7.2.1 *Group 1 Range Residue*

Group 1 includes property that previously contained explosives or that does not contain items of a dangerous nature and can be certified inert and/or free of explosives or other dangerous materials such as targets, certain expended ordnance, etc. Group 1 range residue is subdivided into Group 1a and Group 1b.

- **Group 1a Range Residue** includes firing range expended small arms cartridge and inert metals gleaned from range clean up. Metals gleaned include material for which the only use is for its basic material content (e.g., clean shrapnel, target metal, etc.) and does not include material with any residual utility or capability or that is considered to be Munitions List Items or Commerce Control List Items. Such material is eligible under the Resource Recovery and Recycling Program for disposition by a Qualified Recycling Programs (QRP) in accordance with DoD 7514.1, Pollution Prevention. DoD Components may exercise direct sale authority for firing range expended small arms cartridge cases provided that it is crushed, shredded or otherwise destroyed prior to release from DoD control.
- **Group 1b Range Residue** includes any certifiable material or item not meeting the criteria of Group 1a above. A determination shall be made as to whether the material/item requires demilitarization. Damaged sustained does not necessarily constitute demilitarization. Destruction shall, at a minimum, satisfy the provisions of DoD 4160.21-M-1. This material is not eligible for a QRP.

#### 2.7.2.2 *Group 2 Range Residue*

Group 2 includes inherently dangerous items that may potentially contain munitions residue and cannot be certified as inert, such as practice bombs (that is, "duds", UXO, BDU-33, MK-106, etc.)

### *2.7.3 Collection and Segregation Procedures*

Shaw E & I will use a systematic approach for collecting and inspecting metal scrap. The approach is designed to ensure that the materials undergo a continual evaluation/inspection process from the time acquired until finally removed from the site.

At the operating site, Shaw E & I will position two scrap metal containers. One container will be marked "Non-OE Scrap Metal" and will be used to collect general metal debris. The other container will be marked "OE Scrap Metal" and will be used to collect non-hazardous ordnance related scrap metal (i.e., Metal components that do not contain any explosives or other hazardous materials).

Collection procedures begin at the time the item is discovered by the UXO Technician. At this point the UXO Technician makes a preliminary determination as to the classification of the item. If the item is identified as non-ordnance related scrap it is placed in the Non-OE scrap container located at the current operating grid. If the item is identified as ordnance related scrap, it is placed in the OE scrap container.

### *2.7.4 Segregation of Scrap Metal for Disposal*

At the completion of the grid or at the end of the working day, the UXO team will collect the scrap, perform an inspection to confirm that segregation of the OE-related scrap had been done correctly and that no live UXO has been placed in the OE scrap pile. The UXO Technician III will then segregate ordnance and explosives scrap for the purposes of disposal. The OE scrap will be defined as either Group 1a or Group 1b according to DoD 4160.21-M.

The OE scrap will then be transferred to a centralized, secured storage location for later disposition of the Non-OE scrap.

At the centralized OE scrap storage location, the Group 1a range residue will be stored separately from the Group 1b range residue.

### *2.7.5 Demilitarization Requirements*

Shaw E & I, as required, will perform demilitarization, unless otherwise directed by the Contacting Officer. Guidance for the method and degree of required demilitarization for most types of OE items can be found in DoD 4160.21-M-1.

For inert loaded items (concrete, sand, plaster) a potential explosive safety hazard exists when the internal filler is not exposed or unconfined during burning, melting, or cutting. Heat generated from a demilitarization process can cause the filler, moisture and air to expand and burst sealed casings. For this reason, Defense Reutilization Marketing Office (DRMOs) will not accept inert loaded items unless the internal filler is exposed and unconfined. The internal filler may be exposed by removal of the fuze well from the cavity, removal of base plates, or by puncturing/drilling holes in the bomb casing.

Prior and current practices have taken this to mean that if the OE item is intact and resembles a piece of military ordnance, such as a 105mm HEAT (Practice) projectile, it should have a hole punched through the side to expose the filler as non-explosive. This is typically accomplished through the use of a shape charge attack. The explosively created hole exposes the filler and disfigures the projectile so that it could not be used again. For a 105mm HEAT (Practice) round this approach is sufficient because the projectile never contained any explosives or energetic material used as a spotting charge. For a MK- 82 LDGP Bomb (Practice) this approach may not be sufficient because the bomb can contain various types of explosively activated spotting charges that have the capability to cause injury or death if exposed to the right elements such as flame from a cutting torch. Also, there is always the possibility that a shape charge attack may punch a hole in an explosive ordnance item exposing the filler but not causing a detonation. Because some explosive fillers look like inert fillers the possibility for mis-identification and improper certification is real.

Unexploded ordnance known or suspected to be inert (filled with an inert substance to simulate the weight of an explosive filler) will be explosively vented with conical-shaped charges. For the purpose of determining the fragmentation hazard area for explosive venting, it will be assumed that the UXO has an explosive filler and that a high-order detonation will occur. Venting will be considered successful when the filler is exposed and positively identified as inert material. The vented inert ordnance item can be treated and disposed of as scrap after the venting and demilitarization process is complete.

### 2.7.6 Certification/Disposal of Scrap Metal

The generating activity will ensure that the quantities of demilitarized property submitted for "in-place sales service" are accurate and that these quantities are readily verifiable by the DRMS. The DRMS will not accept any property unless the DD Form 1348-1A contains the demilitarization code or clear text statement of the demilitarization required. The generating activity is responsible for issuing a letter specifying who is authorized to sign the statement of inert certification. This letter will be kept in the project files, at the DRMS, and with the generating activity. It must be updated as needed.

All material generated from the firing and/or demilitarization of AEDA will be rendered free from explosives before being referred to the DRMS for sale. All scrap metal, generated at the site, will be transferred using DD Form 1348-1A. Prior to release of the material, the SUXOS will physically inspect the material in the containers to ensure that they are free of dangerous items. The SUXOS will sign the certificate, typed on the DD Form 1348-1A, which states:

"This certifies and verifies that the AEDA residue, Range Residue and/or Explosive Contaminated property listed has been 100 percent properly inspected by us and to the best of our knowledge and belief, are inert and/or free of explosives or other dangerous materials."

The certification will be verified (countersigned) by a technically qualified U.S. government representative (U.S. citizen) designated by the responsible commander/generating activity.

Scrap will be segregated into like metals (mainly steel, aluminum, and mixed metal) and placed into palletized wooden or metal shipping boxes. Each item placed into an inert-certified box will be inspected. The boxes will be filled, the covers will be secured, and a lead seal will be affixed. A Statement of Inert Certification will then be attached to the box. The box will then be delivered or picked up by the DRMO or if directed by the DRMO, to a local scrap yard for disposal or recycling.

Using these procedures, Shaw E & I ensures that the collected scrap metal is properly inspected and classified. Our method includes three distinct inspections, which are performed by persons of increasing levels of responsibility. A qualified UXO Technician performs the first inspection at the operating grid; the supervisor responsible for the operating grid performs the second; and the final inspection is performed by the SUXOS who is vested with overall responsibility.

## 2.8 Data Collection

For OE investigations , the collection of accurate and detailed data is essential to document the clearance for future reference. Data regarding each metallic anomaly investigated will be recorded in the field as OE removal actions are performed. Data will be recorded electronically on portable field computers, or by hand (pen and paper) if determined to be the most effective approach.

Approval from the USACE OE Safety Specialist is required to stop digging for anomalies, even if the planned depth of excavation has been reached. If any anomalies are not excavated, accurate location and depth information must be recorded.

A grid data packet will be created for each new grid. The UXO Technician III will retain the packet in the grid during anomaly investigation activities. Each packet will contain a map showing the location of the grid and the following forms;

- Grid Summary Sheet (Form 2-6) identifying grid summary information including:
  - Grid Name or ID
  - Southwest Grid Corner Coordinates
  - Grid Dimensions and Acreage
  - UXO Team Personnel
  - Number of Anomalies Detected and Excavated
  - Number of QA Anomalies Excavated
  - Total Number of UXO Found
  - Total Weight of OE Scrap Removed
  - Total Weight of Non-OE Scrap Removed
  - Hours Worked Each Day Performing Various Tasks
  - Team Leader/SUXOS/UXOQCS/USACE Signature Blocks
- Anomaly Tracking Sheet (Form 2-2) listing individual anomaly information including:

  ***To Be Entered By The Geophysical Analysis Team:***
  - Anomaly Number – A unique anomaly number will be assigned for each anomaly. The anomaly number will include the grid ID, anomaly type digital geophysical mapping (DGM) or mag and flag, and sequential three-digit anomaly beginning with 001. For example, the fourth DGM anomaly in grid 152 would have the following unique ID: 152DGM004. All QA anomalies will also be numbered starting with 001, however, the letters QA will be inserted as shown: 152-QA-001.
  - Survey Coordinates – Based on the original survey data, the predicted location of the anomaly in New York State Plane coordinates (feet).
  - Reading – The EM-61 MK2 maximum time gate 3 electromagnetic response in millivolts (mV) for the anomaly.

- Comments – Any information that should be noted. For instance, it may be useful to note that the anomaly is small in comparison to local background readings due to nearby cultural influence (utility) or other anomalies.

***To Be Entered By The Geophysical Reacquisition Team:***

- Reacquire Offset Easting – Based on reacquisition, the eastern distance of the metallic item from the DGM target coordinates in feet.

- Reacquire Offset Northing – Based on reacquisition, the northern distance of the metallic item from the DGM target coordinates in feet.

- Reacquire Comments – Any observations of importance during reacquisition such as "no peak was observed" or "multiple peaks were observed". This will provide information that may be useful in the excavation/completion process.

- Pre-Dig Reading – The EM-61 MK2 time gate 3 response in mV on the reacquire coordinate. This value should be similar to the original survey The reading provides a check that the correct anomaly has been reacquired. This value also provides a "before" value for comparison.

- Post-Dig Reading – The EM-61 MK2 time gate 3 response in mV on the reacquired coordinate after the anomaly has been excavated. This "after" value is used for comparison to the Pre-Dig Reading to justify dig completion.

- Post-Dig Completion Comments – Provides rationale for considering the dig to be complete. One of the following criteria should be met:

  a. At least 90% of the observed peak above background in the EM readings that caused the anomaly to be selected has been removed from the signal.

  b. A large metallic item has been identified in the hole but is too large to remove (large reinforced concrete items, utilities, etc.).

  c. The hole has reached 4 feet and the EM readings indicate the item is below 4 feet; or

  d. Other justification (specify).

- Initial when dig is considered complete – The Geophysical Team initials when the dig has been tested and is determined to be complete.

***To Be Entered by the UXO Team:***

- Nature – The nature of the anomaly will be one of the following three potential entries:

  U – Stands for UXO and requires this item to be listed on the UXO Tracking Sheet;

  F – Stands for "frag", but could be any non-UXO OE-related item; or

  O – Stands for other and is considered to be any item other than OE-related items.

- Depth – The depth to the top of the item in inches.
- Orientation – For elongated items similar to munitions, the approximate degrees from horizontal.
- Item Description – A brief description of what was found.

• UXO Reporting Form (Form 2-3) listing data for each UXO encountered including:

  - Unique Anomaly Number – The corresponding anomaly number as shown on the anomaly tracking sheet
  - Easting Coordinate – This is the coordinate where the actual UXO was found and may not necessarily be the Reacquire Easting
  - Northing Coordinate – This is the coordinate where the actual UXO was found and may not necessarily be the Reacquire Northing
  - Depth to Tip – The depth to the nose of the item in inches
  - Depth to Tail – The depth to the tail of the item in inches
  - Orientation – The geographical direction (N,S,E,W) of the item is pointing, unless vertical
  - Type – The type of ordnance as specific as possible
  - Filler – The type of filler such as none, inert, high explosive, WP, illumination, incendiary, chemical, smoke, etc.

- Fuze – The type of fuze such as none, inert, point detonating, electric, powder train, base-detonating, etc.
- Date Found – The date on which the UXO was found
- Disposal – The disposal status, for example blow-in-place, picked up and carried away for demolition, EOD response, etc.
- Date Disposed – The date on which the UXO was disposed
- Comments – Any comments of note

### 2.9 Community Relations

The OE project team will only perform community relations when requested by the Contracting Officer. When approached by any person or entity requesting information about a project, site personnel will defer to the USACE on-site representative and/or installation representative as appropriate. Shaw E & I will not make available or publicly disclose any data generated or reviewed under this contract or any subcontract unless specifically authorized by the Contracting Officer. Reports and data generated under this task order will become the property of the Government and distribution to any other source is prohibited unless authorized by the Contracting Officer.

During the implementation of actions under this contract, the Army will implement community relations activities based on the assessed level of community interest at Seneca Army Depot.

### 2.10 Final Report

At the completion of all OE support activities, a site-specific removal report to document all operations and activities will be developed and submitted. The site-specific removal report will consist of the following:

- Detailed accounting of all UXO and OE-related materials located and destroyed.
- Detailed information on the depths, densities, and distribution of OE in the area.
- A system of daily journals of all activities associated with this SOW. A daily journal for the site will be opened upon first arrival for field operations and closed after demobilization from the project site.
- A recapitulation of exposure data. This will include total number of man-hours worked on-site in OE-related activities, total motor vehicle mileage, number of aircraft flights, and total of man-hours flown to support the project, and any information from accident/incident reports.

- All QC documentation.
- All scrap turn-in documentation.
- Color digital pictures of sufficient quality to allow easy identification of the item being photographed. This will include pictures of selected UXO located during the clearance action, all demolition shots (before and after detonation), and any significant events during the course of the fieldwork. The digital pictures will include the anomaly number in the file name for each picture. The pictures will be imported into the text of the removal report.
- Detailed UXO maps, which provide accurate information of all UXO and OE encountered and to what depths. The maps will be developed on the previously prepared survey. The maps should be sufficiently detailed so that they will serve as a permanent record of the extent of all UXO encountered.
- Detailed DGM maps, which provide accurate information of all EM mapping and all EM targets selected and reacquired. The maps will be developed on the previously prepared survey drawings to clearly show areas that were not cleared due to the presence of existing buildings, pavement, utilities, or other features. All boundaries shown between mapped and unmapped areas will include sufficient survey information so that they can be determined in the field at any future date. The maps should be sufficiently detailed so that they will serve as a permanent record of the extent of all DGM of the property in the event that existing buildings or other reference features are removed in the future.

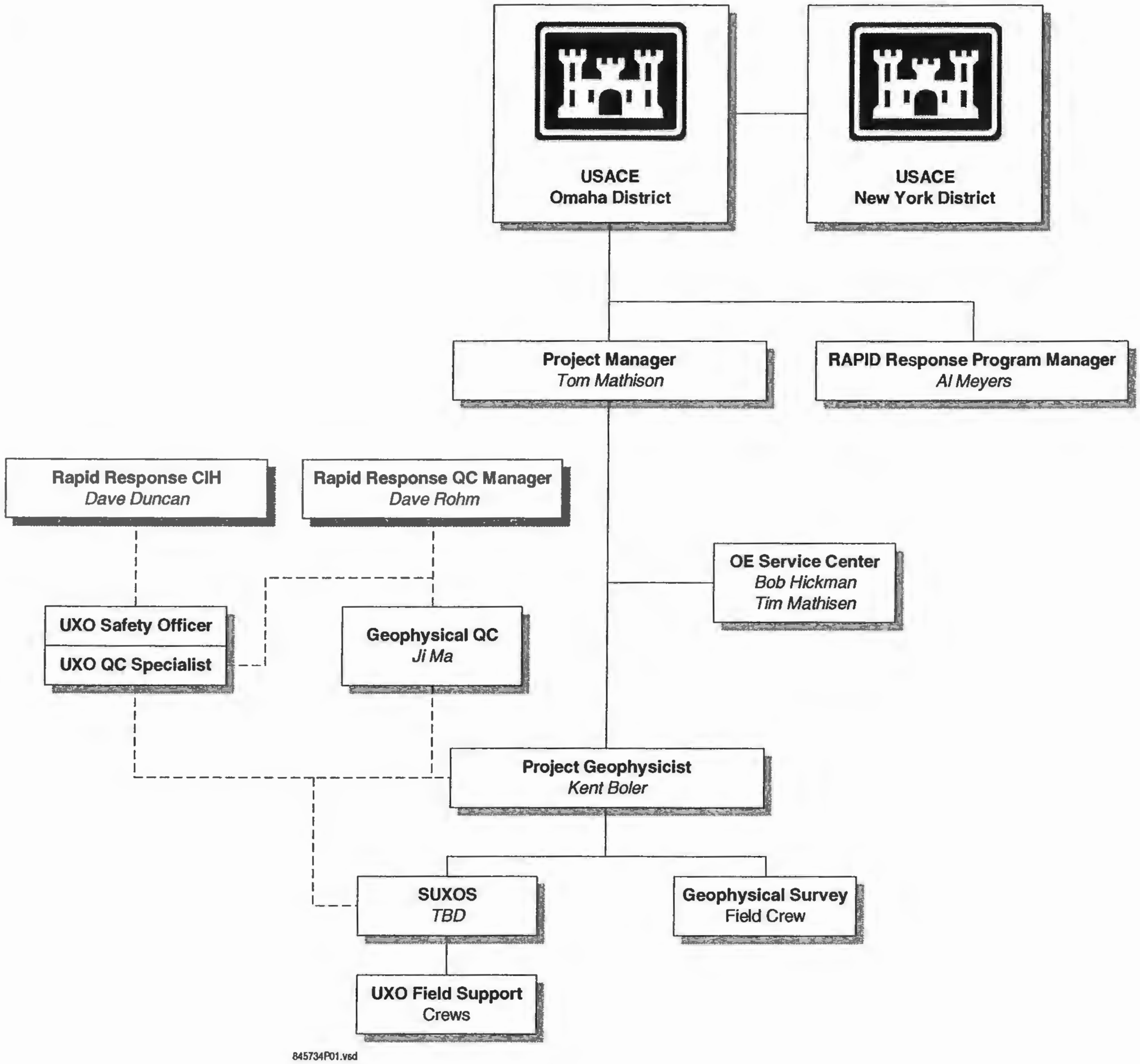



**Figure 2-1**
**Seneca Army Depot**
**SEAD's 46 and 57**
**Organization Chart**

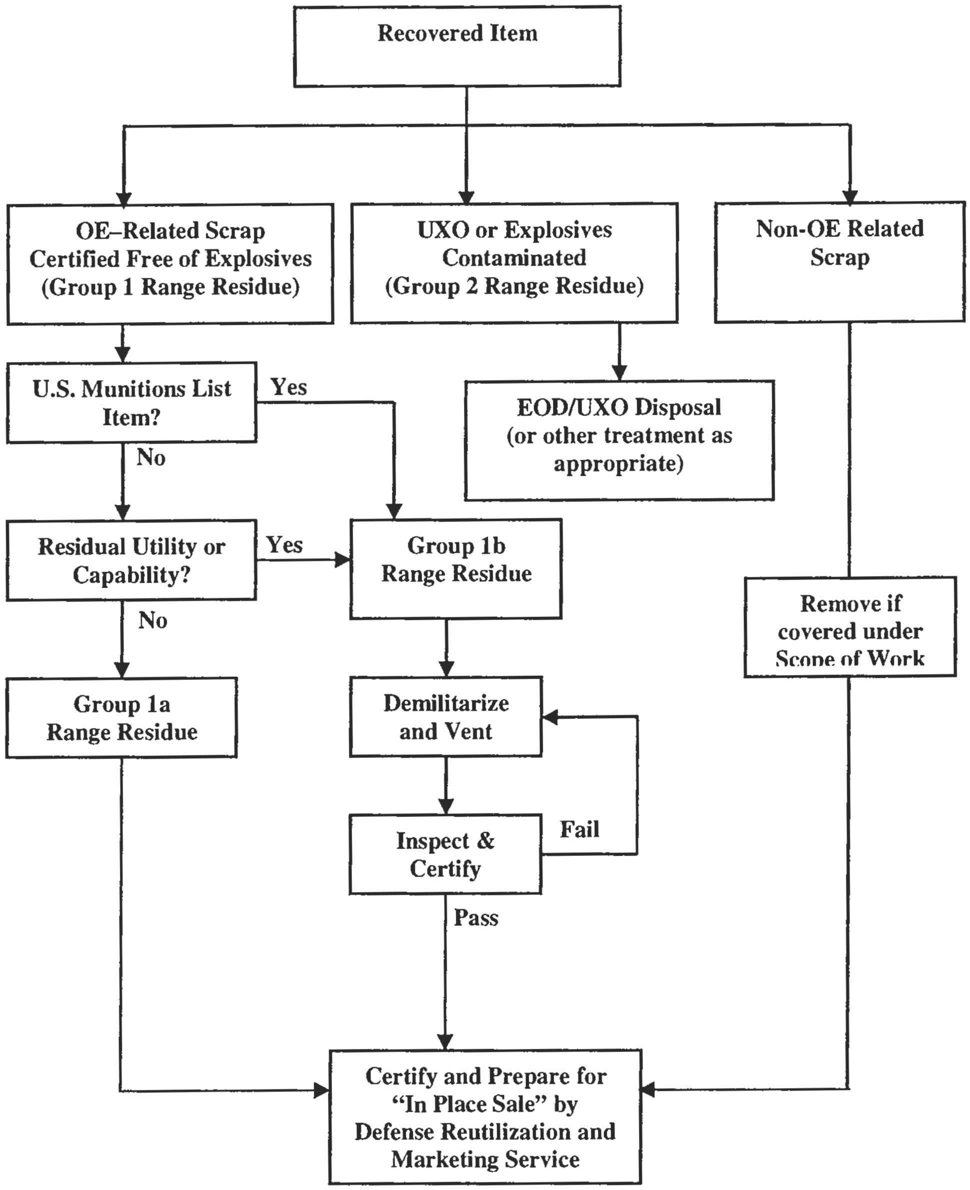



**Figure 2-2. Logic Diagram for the Disposition of Range Residue**

# 3.0 Explosives Management Plan

This Explosives Management Plan provides details for management of explosives at Seneca Army Depot, NY to support geophysical investigation activities. This plan was developed in accordance with OE Mandatory Center of Expertise (MCX) Data Item Description OE-005-03.01, Federal Acquisition Regulation 45.5, local and state laws and regulations, Alcohol, Tobacco, and Firearms (ATF) P 5400.7, Department of Defense (DOD) 6055.9-STD, U.S. Department of Transportation (DOT) regulations, and Army Regulation 190-11.

## 3.1 Acquisition

Shaw Environmental, Inc. will acquire commercial explosives from a local vendor or vendors who will deliver the materials to the project site. Shaw maintains a valid Bureau of Alcohol, Tobacco and Firearms (BATF) user of high explosives permit. Explosives vendors with a valid dealer BATF license will be utilized. A copy of the BATF dealer license and the Shaw user permit will be maintained at the project site, and upon request, will be made available to any local, state, or federal authority.

Types and estimated quantities of explosives and their intended use during this project are specified below. The commercial explosives vendor identified for this project is St Lawrence Explosives, POC: Hank Dise, (315) 771-9856. An alternate source for explosives is Hilltop Energy, POC: Lisa Parks, (585) 768-4860. Typically, the following explosives will be used for disposal of UXO or venting of inert munitions:

- One-half pound Cast Boosters will be used to detonate the UXO.
- Detonating cord will be used to construct mainline-branch line shots, to link multiple shots together, or to transmit the explosive train to the main charge explosive when the main charge is buried (tamped), underwater, or otherwise inaccessible.
- NONEL Initiators will be used to initiate the explosive train. NONEL tubing will be used to transmit the explosive train from the igniter to the demolition devices. Shock tube priming of explosives offer the instantaneous action of electric detonation without risk of accidental initiation of the blasting cap (and the charge) by radio transmitters in the area, or by static electricity discharge. The explosion of the shock tube is entirely contained within the plastic tubing.

## 3.2 Initial Receipt

The explosive vendor will deliver the explosive materials to the project site on an as-required basis. An initial receipt inventory will then be conducted. Explosives in unsealed boxes containing partial lots will be opened, and the contents of the box will be counted. Any discrepancies between the actual type and quantity of explosives received and the shipping documentation will be noted on the shipping documentation with the signatures of both the delivery driver and the individual authorized to receive such explosives. A legible copy will be filed on site. The authorized individual receiving the explosives will immediately inform the Senior UXO Supervisor (SUXOS) of the discrepancy, who will in turn notify the U.S. Army Corps of Engineers (USACE) OE Safety Specialist and Project Manager. The informed managers will take the appropriate action as described in Section 3.7, "Lost, Stolen, or Unauthorized Use."

The quantities received will be consumed on the day delivered or returned to the vendor. Explosive materials will not be stored on site. A copy of the receipt documentation will be filed at the on-site office and placed in the project's permanent archive file.

## 3.3 Storage

Since no explosives will be stored on this site, the establishment of an explosive storage facility is not required.

## 3.4 Transportation

This section presents the vehicle requirements and on-site transportation procedures for explosives at Seneca Army Depot.

### 3.4.1 On-Site Transportation Procedures

Explosives will be delivered to the project by a licensed and permitted commercial explosives vendor. When explosives are required at the work site, Shaw personnel will transport the explosives in an appropriately placarded vehicle following the procedures stated in this section to the designated area when demolition activities are planned.

Recovered UXO will not be moved unless safe to do so and only with the specific permission of the USACE OE Safety Specialist on site. Movement of UXO is the last consideration and will only be performed when a UXO Technician can make a positive identification that the munition is unfuzed and safe to move. Identification must be verified by at least one other UXO Technician prior to movement. The USACE OE Safety Specialist may require additional measures and inspection before movement and preparation for transportation.

On-site transportation procedures will include the following safeguards:

- The driver of any explosive-laden vehicle will ensure that the load is properly braced and that the initiators are carried separately from main charge explosives.
- The SUXOS or in-charge authorized individual of the explosives movement will ensure that the driver and any passengers are not carrying any smoking products or flame producing devices. Smoking will be strictly forbidden among all personnel involved in the handling or transportation of explosives.
- If loose pyrotechnic, tracer, flare, or similar mixtures are to be transported, they will be placed in #10 mineral oil or equivalent to minimize fire and explosion hazards.
- If an unfired rocket motor must be transported, it shall be positioned in such a manner as to offer the maximum protection to personnel in the event of an accident.
- If base-ejection type projectiles must be transported to a disposal area or collection point, the base will be oriented to the rear of the vehicle and the projectile secured, in the event the ejection charge detonates in route.
- All UXO items will be positively identified, as to the type of munition, filler, and condition of the fuzing prior to any movement.
- If a UXO, with exposed hazardous filler (high explosives, etc), has to be moved to a disposal area, the item will be placed in an appropriate container with packing materials to prevent migration of the hazardous filler. Padding will also be added to protect the exposed filler from heat, shock, and friction.

### 3.4.2 Vehicle Requirements

Vehicles transporting explosives on the project site will comply with the following requirements:

- Vehicles transporting explosives will be placarded when carrying any Class 1 explosives.
- All vehicles transporting explosives will be equipped with reliable communications, a first aid kit, and two 10-pound BC fire extinguishers. One extinguisher will be located in the driver's compartment and the other located in the cargo compartment.
- Vehicles transporting explosives will be inspected daily when in use, and the inspections will be documented on a Explosives Transportation Vehicle Safety Checklist (Form 3-1, Appendix F).
- The vehicle used to transport the explosives will have a non-sparking bed liner, and all explosive loads will be covered prior to departure.

## 3.5 Receipt Procedures

This section describes the procedures that Shaw Environmental, Inc. will use to maintain records of explosives inventories at Seneca Army Depot.

### 3.5.1 Inventory Control and Records Management

An accurate running inventory of all explosives on site will be maintained. Copies of all paperwork pertaining to explosives delivery will be maintained by the SUXOS in the field office.

### 3.5.2 Authorized Individuals

The SUXOS will be responsible for the proper receipt and issue of explosives for detonation purposes. He or she may authorize other specific individuals to perform the receipt and initial inventory of the explosives, but cannot delegate the responsibility for ensuring that the inventory, receipt, daily storage, and handling of the explosives is performed in accordance with the requirements of this plan. Any individual authorized to receive explosives will be at least a UXO Technician III.

### 3.5.3 End User Certification

The SUXOS or UXO Technician III, as the end user of explosives, will certify in writing that the explosives were used for their intended purpose. This information is tracked on the Explosives Usage Record (Form 3-2, Appendix F) and is included with daily reporting.

### 3.5.4 Reconciling Discrepancies

In the event that there is a discrepancy with any aspect of the management of explosives, the SUXOS will be immediately notified. The SUXOS, together with the UXO Safety Officer and UXO Quality Control Specialist, will review documentation to determine whether the discrepancy is a paperwork error or whether explosives have been lost or stolen. If it is concluded that explosives have been lost or stolen, the USACE OE Safety Specialist will be notified and the procedures specified in Section 3.7 will be implemented.

## 3.6 Inventory

Since no explosives will be stored on this project site, the inventory of explosives refers only the receipt and expenditure of the explosives ordered for a single day's activity.

## 3.7 Lost, Stolen, or Unauthorized Use of Explosives

If explosives are discovered to be lost, stolen, or used without authorization, the incident will be immediately reported to the SUXOS, who in turn, will inform the USACE OE Safety Specialist, Shaw Project Manager, and Shaw OE Service Center.

As the federal licensee, Shaw is required by law (27 CFR 55.30) to report the theft or loss of explosives to the BATF within 24 hours. In the event of such an occurrence, the following procedures will be followed:

- Shaw will make the appropriate notifications in accordance with 27 CFR 55.30. These include calling BATF (800-424-9555) and the local law enforcement authorities.
- Shaw will be responsible for completing and forwarding BATF Form 5400.5 (Form 3-3). This form will be completed by the SUXOS, and a copy will be provided to the USACE OE Safety Specialist.

## 3.8 Disposal of Explosives

All explosives used for this project will be ordered and consumed. There will be no storage of explosives on site.

# 4.0 Explosives Siting Plan

This plan for siting explosives operations conforms with the requirements of CEHNC Data Identification Description (DID) OE-005-04.01. It is intended to ensure the safety and security of explosive operations during geophysical investigation operations at Seneca Army Depot, NY.

## 4.1 Exclusions Areas and Minimum Separation Distances

For SEAD 46 the MPM is the 3.5-inch Rocket, M28A2, HEAT. The Net Explosive Weight (NEW) for this item is 1.82 lbs of Composition B. The Public Withdrawal Distance (PWD) for this item is 1,420 feet. This distance was computed using HNC-ED-CS-S-98-1 (approved by DDESB on 6 April 1998) by Sherene Opinhka, USAESC, Huntsville Engineering Division, Structures Branch, 9 May 2003.

The MPM for SEAD 57 is the 37mm MK II projectile. The NEW for this item is 0.527 lbs of TNT and the Public Withdrawal Distance (PWD) is 1,181 feet. This distance was computed using HNC-ED-CS-S-98-1 (approved by DDESB on 6 April 1998) by Dr. Michelle Crull, USAESC, Huntsville Engineering Division, Structures Branch, 10 April 1998.

If a larger item is discovered at these sites, withdrawal distances will be determined in accordance with 98-01 and adjustments made accordingly. Unitl the appropriate distances are determined, the default distances in DoD 6055.9-STD (Chapter 5, paragraph E.4.a) will be used.

If ordnance is found which requires a blow in place procedure, the exclusion zone will be established based on the K328 value for the quantity of the explosives used.

Only personnel essential to the project will be permitted access into this area. Essential personnel will include UXO-qualified personnel and key personnel designated by the Project Manager. All non-essential personnel who require entry into the exclusion zone will require a UXO escort. A distance of 200 feet will also be used as the team separation distance for this project.

## 4.2 Explosive Storage and Planned Demolition

This work is expected to involve only a small quantity of UXO that will require destruction by detonation; therefore, explosives will not be stored at the site. Instead, the explosives vendor will be contacted and requested to deliver the small amount of demolition material needed for conducting the Blow-in-Place (BIP) operation for a given day. Once the Senior UXO Supervisor

(SUXOS) has signed the receipt for the explosives, he/she will direct the demolition crew to commence the BIP operation as expeditiously as safety will permit in order to reduce any security concerns over explosives. If explosive operations are to be performed, an exclusion zone will be established based on the amount of the explosive to be used during the demolition activities. This distance will be computed as the K328 distance for the maximum quantity of explosives to be used.

# 5.0 Geophysical Prove-out Plan and Report

This section details the Geophysical Prove-out Plan and report supporting Ordnance and Explosives (OE) and Unexploded Ordnance (UXO) removal at the Seneca Army Depot Activity (SEDA). The potential methods and instrumentation to be utilized during the full-scale investigation of the former munitions disposal areas SEAD 46 (3.5-inch Rocket Range) and SEAD 57 (Former EOD Range) will be demonstrated during the geophysical prove-out (GPO). Data collected during the GPO will be used to produce an anomaly Target Dig List and to demonstrate the performance of the equipment and personnel that will be used for performing the full-scale DGM investigation and subsequent removal actions. This plan was developed in accordance with the U.S. Army Engineering Support Center, Huntsville (USAESCH) Data Item Description (DID) OE-005-05A.01.

## 5.1 Geophysical Prove-out Objectives

The performance goals for OE detection are based upon proper execution of the most appropriate geophysical technology deployed at the site. A towed array of Geonics EM-61 MK2 time domain electromagnetic (TDEM) sensors is specified for the surveys in the Scope of Work. The performance objective is to locate all 20-mm and larger OE and OE-like targets to the demonstrated depth of detection.

The selection of the most appropriate technology is dependent on site conditions related to vegetation, topography, soil type, proximity to structures, degree and type of metallic debris, as well as type, distribution, and number of UXO. The performance capability of selected field equipment will be measured and documented through on-site prove-out verification as described in the Geophysical Prove-out Report.

Actual detection depths may vary within the site based on specific circumstances, such as the following:

- Item orientation
- Site background/noise levels
- Masking effects from adjacent metallic items
- Item shape
- Material composition of buried targets
- Weathering effects on the magnetic/conductivity response of target items.

## 5.2 GPO Test Grids

Three existing geophysical test areas at Seneca Army Depot will be utilized for the Prove-out. The South and West geophysical prove-out (GPO) grids will serve as unknown areas. The East GPO grid will serve a known area. The terrain in each area is generally flat and open which is representative of the terrain conditions of the SEAD 46 and SEAD 57 sites.

- East GPO grid: The East GPO Grid is located in "Q" area. It is 50x200-feet in size and contains a variety of known and blind items ranging in size from 20mm to 105mm. Burial depths range from about 6-inches to 4-feet. A location control monument is present in this area and the corner locations of the grid are staked. Prior to the survey, USACE will provide the control point coordinates and a list of the locations, types, orientations, and depths of 80-90% of the buried control items. The east GPO grid will be used to optimize equipment configuration, survey parameters, and data handling and processing techniques prior to surveying the South and West GPO grids.

- South GPO grid: The South GPO Grid is located adjacent to SEAD 57. It is 100x200-feet in size (long axis oriented east-west). The corners of the grid are staked and USACE will provide a list of the coordinates of the grid corner stakes. The grid contains a variety of sizes of actual and simulated items buried from about 6-inches to 4-feet. The test items are described as small medium, and large, as follows:
  - Small items: training grenades and simulated 20mm projectiles
  - Medium items: 75mm projectiles
  - Large items: sections of pipe and 3.5-inch Stokes mortars

- West GPO grid: The West GPO Grid is located just inside the west boundary of the Open Detonation area. It is 100x300-feet in size (long axis oriented north-south) and contains the same variety of test items and burial depths found in the South GPO Grid. The corners of the grid are staked and USACE will provide a list of the coordinates of the grid corner stakes.

## 5.3 GPO Site Conditions

### 5.3.1 Topography

Topography affects the applicability of different geophysical sensor deployment form-factors (i.e., the specific configuration of sensors, navigation, and deployment platforms). The terrain in each GPO area is generally flat and open which is representative of the terrain conditions of the SEAD 46 and SEAD 57 sites.

### 5.3.2 Vegetation

The majority of SEAD 46 and SEAD 57 is flat, open areas covered with scrub growth and grass. These areas have historically been mown with a "bush-hog" or similar equipment will be mown immediately prior to the geophysical mapping. The GPO plots are representative of these areas. .

### 5.3.3 Geologic and Geophysical Conditions

SEDA is directly underlain by generally fine-grained glacial tills. Local areas of artificial fill and Quaternary alluvium are also present. In general, these types of materials are not expected to pose major interference problems for collecting of quality geophysical data.

A suite of physical site characteristics describing subsurface, surface, and above-surface conditions dictates the geophysical conditions at the site. The effectiveness of geophysical surveys is dependent on three main factors that are influenced by the site conditions: (1) complete coverage with geophysical sensors, (2) high fidelity of appropriate sensor data, and (3) accurate navigation.

First, as discussed above, topographic and vegetation conditions should allow complete coverage of the site. Second, based on prevailing soil conditions and previously executed geophysical surveys, the use of electromagnetic devices at the site should provide adequate sensor data. Third, site conditions and sightlines will allow the use of either total station or Global Positioning System (GPS) technology for sensor positioning.

### 5.3.4 Shallow Groundwater Conditions

The presence of groundwater affects the performance capabilities of geophysical mapping methods to varying degrees, depending on geophysical sensor phenomenology. Since the TDEM method is being used, shallow groundwater conditions are not significant at this site.

### 5.3.5 Site Utilities

No subsurface utilities are expected at the GPO Test Grids. No subsurface utilities are believed to be present at either SEAD 46 or SEAD 57. Overhead low-voltage power and phone lines along the major site roads are the only utilities anticipated.

### *5.3.6 Human-Made Features Potentially Affecting Geophysical Investigations*

Human-made features existing within, or in close proximity to, the site negatively impact geophysical investigations. These features include fences, buildings, signs, monitoring wells, berms, and equipment. The effects of human-made structures and items will be mitigated using the following procedure:

Small individual pieces of OE scrap and other metallic scrap that would not likely mask a subsurface anomaly may be left in place but must be documented and incorporated into the GIS database. Large individual items of OE scrap or other metallic scrap that could potentially mask any subsurface anomalies shall be removed. All trash pits or other concentrations of metallic surface scrap shall be left undisturbed and their boundaries surveyed and incorporated into the GIS database. All surface UXO or OE that pose a safety hazard shall be collected, documented, and properly disposed of from the geophysical mapping paths or areas.

### *5.3.7 Site-Specific Dynamic Events Affecting Geophysical Investigations*

Dynamic events (rain, lightning, solar flares, etc.) may temporarily impact geophysical data collection and/or data quality. Procedures for these anticipated events are as follows:

- Rain—Depending on its intensity, rain can be a significant impediment to survey operations. The site geophysicist will assess the intensity of rainfall and its effects on survey instrumentation and safety (slip, trip, fall) considerations to determine when or how to proceed. General guidance for common conditions is as follows:
  - Drizzle or Intermittent Light Rain—Tape plastic around instrument electronics and continue.
  - Thunderstorm—Take cover and cease operation until the storm passes.
  - Continuous Medium or Heavy Rain—Take covers and cease operations until conditions improve.
- Lightning—Because most geophysical instruments contain sufficient metal and geometry to pose a preferred pathway for electrical discharge (lightning rod effect), observed lightning in the area will be deemed a safety hazard and will be cause for the cessation of survey activities until the lightning activity has ceased. Site personnel and equipment will shelter in a safe area. The Unexploded Ordnance Safety Officer (UXOSO) will make the determination that lightning is present and will log the times when site survey activities are shut down and resumed.
- Solar Flares—Solar flares are sun-generated atmospheric phenomena, which may temporarily generate sufficient high magnitude magnetic noise so as to make magnetometers, and occasionally electromagnetic sensors unusable for the duration of the event. Solar flares are typically readily observable by the instrument operators (throughout the area) as rapidly fluctuating signal readings with no

apparent cultural or survey source. The site geophysicist will be alert to solar flares and temporarily cease data collection until static testing shows a cessation of the solar activity.

### 5.3.8 Overall Accessibility and Impediments

No significant site impediments are anticipated. Because the three GPO sites are located in different areas at SEDA, a trailer will be provided for transporting the towed array and support equipment.

### 5.3.9 Potential Worker Hazards

All site personnel will adhere to the practices, procedures, and training and monitoring requirements mandated by Appendix D, "Site Safety and Health Plan." Because of the potential UXO hazard, qualified UXO personnel will perform a surface sweep of the geophysical survey and support areas prior to initiation of geophysical survey activities at a site, such that instrument operators may proceed with survey activities without requiring active UXO escort in most areas.

## 5.4 DGM Equipment

The Geonics EM-61 MKII TDEM sensors in a towed array form factor are specified in the Scope of Work. The sensor technology is presented below.

### 5.4.1 Geonics EM-61 MK2 TDEM Sensor

TDEM sensors are designed to detect shallow ferrous and non-ferrous metallic objects with good spatial resolution and minimal interference from adjacent metallic features. The Geonics EM-61 MK2 will be the primary EM device.

An EM transmitter generates a pulsed primary magnetic field in the earth, which induces eddy currents in nearby metallic objects. The eddy current decay produces a secondary magnetic field measured by the receiver coil of the EM-61 MK2. Measurements are taken a relatively long time after the primary pulse, allowing the current induced in the ground to have dissipated, leaving only the current in the metal to still produce a significant secondary field. The responses are recorded and displayed by an integrated data logger.

The EM-61 MK2 consists of two air-cored, 1-meter by 0.5-meter rectangular coils. Secondary voltages induced in both coils are measured in millivolts (mV). The coils are stacked 40 cm apart, with the source/receiver coil located below a second receiver coil. The EM-61 MK2 records a voltage output from both coils as well as a differential that is the calculated voltage difference between the two coils. The bottom coil data is generally most useful for detecting ordnance-sized buried metallic objects.

### 5.4.2 Towed Array Form Factor

The EM-61 MK-2 will be deployed in a three-sensor system likely using the USACE supplied skids, with the coils ganged into an array for high-productivity coverage. The sled will be towed by a "John Deere Gator" or similar all-terrain tow vehicle, which will also be used to carry the EM-61 MK2 electronics, batteries, and control box. Spatial positioning of the EM-61 MK2 towed array data will be achieved via a Leica TSP 1100 Robotic Total Station (RTS) system (see below). A RTS prism will be mounted above the center of the sled. RTS coordinates are logged at 4 samples per second (Hz) which capture the location of the prism mounted above the center of towed array. The EM-61 MK2 data will be collected at the maximum effective rate, which is anticipated to be about 9-10 Hz for a 3-unit array.

### 5.4.3 Robotic Total Station Navigation

The Leica TSP1100 is a motorized robotic total station that uses automatic target recognition to track the location of the prism and has a highly accurate distance/azimuth measurement system to produce +/-5mm +2ppm accuracy.

The RTS system hardware consists of three integrated components; 1) the Leica TPS1100 dual laser robotic total station; and 2) the RTS rover remote link control panel; and 3) a survey prism which is tracked by the RTS base station.

Three software components are integrated within the demonstrated technology. First, modified firmware is used on the RTS base station to track the roving prism. This firmware was developed specifically for this application, and allows for rapid collection of data at rates up to 4 Hz, and serial output of solutions on both the base station and rover computing units. The new firmware also enables the user to optimize the prism tracking parameters for rapid recovery of lock if obstructed by trees during a survey. Second, time synchronization software was developed by Shaw for determining precise clock slews between the RTS and sensor clock, ensuring accurate time representation of all collected data. Third, Shaw data-merge software is used to allow definition of the sensor geometry during collection. This software provides a robust framework to spatially configure sensors relative to each other and with respect to the prism location, resulting in accurate spatial representation of all collected data.

The demonstrated RTS technology has several strengths and advantages compared to conventional GPS navigation techniques. These include:

- Fast set-up time: typically 10 minutes or less is required on a simple grid;

- Limited operational constraints: all daylight hours are available for surveying. This capability eliminates constraining outside factors such as satellite availability to execute a survey;
- Modest capital costs: at approximately $23K for all hardware and software, this is far less expensive than RTK GPS, while providing additional capabilities for geophysical surveying;
- Extensive survey range: demonstrated range of at least 1400 feet, this means under ideal conditions the effective survey area under with a single setup is over 140 acres;
- High precision: at +/-5mm (0.2 in) + 2ppm, the RTS provides accuracy of better that 0.25 inches at distances of up to 1,400 feet. This is significantly better than any realtime GPS accuracy;
- Elevation data: RTS accuracy is circular, providing Z elevations as accurate as XY locations. This is significantly different than GPS solutions that are highly ellipsoidal;
- Non-interference: cell phones and radios have no effect on the operation of the system. These are prohibited from close proximity to GPS units;
- In the tree capability: the RTS is usable in wooded conditions provided continuous or intermittent line of sight. RTK GPS fails in wooded areas, and single-frequency GPS provides sporadic 1-2 meter accuracy under good conditions;
- No regulatory issues: no FCC licenses are need to use this equipment, which often complicates use of GPS base station systems;
- Light weight: the prism unit is less than 1 pound, easy to mount on a sensor platform, and adds limited power requirement to the system;
- Well developed support: Leica supports this product and is available through distributors across the nation;
- Well developed RTS software. This allows for easy integration with CADD or GIS; and
- Realtime position data: available on both the base and the rover.

Weaknesses of this system include:

- Required survey control: two control points are needed to define a baseline in absolute coordinates. If unavailable, local coordinates can be established; and
- Line of sight required: the unit determines a location when it sees the prism. While it can survey in areas of intermittent obstructions (such as wooded areas), it cannot survey around corners of building, or around walled canyons without moving the base station.

In addition to mapping geophysical data, The RTS will be used for other location tasks including the following:

- <u>Feature Identification</u>—The RTS will be used to augment geophysical data and improve geophysical mapping through capture of visual observations made during site walk-over. During this process, RTS will be used for position-stamping debris piles, unidentified fences, soil changes, vegetation, burn areas, craters, etc.

- Target Relocation—RTS will be used for target relocation. Shaw has streamlined the process of taking targets from the GIS and loading them into the RTS control unit. The "Waypoint-Mode" facilitates quick and reliable relocation.

## 5.5 Survey Procedures

Several survey modes can be used to collect geophysical data for the detection, location, and characterization of UXO. For the GPO, a full survey over each test plot will be executed. Full coverage will be achieved through deployment of the sensor system through the collection of sub-parallel survey lines or swaths. All data traverses will be brought into the GIS for verification of full coverage.

### 5.5.1 Deployment Form Factor

A towed array of EM-61 MK2 sensors was specified in the SOW. Based on scoping discussions with USACE, the deployment form factor will consist of 3 EM-61 MK2 sensors mounted on a non-metallic platform to be towed behind a "Gator" or similar all-terrain vehicle (ATV). The sensor platform will be mounted on existing USACE skids present at the site if practical. If the USACE skids are not utilized, a 4$^{th}$ EM-61 MK2 will be considered for addition to the towed array. A non-metallic RTS prism will be mounted on the array, centered above the sensors.

### 5.5.2 Sampling Frequency

For the GPO and full-scale DGM surveys, the sampling frequency will be no less than 2 Hz for the navigation data stream and 4 Hz for the EM-61 MK2 data. As specified in the DQOs, along track sampling densities will be less than or equal to 0.5 feet and across track sampling densities will be less than or equal to 3 feet. A maximum of 0.1 acres of random data gaps for digitally mapped areas in both sites, will be acceptable. Exception will be taken where physical obstructions (trees, wells, etc.) are encountered in the field.

### 5.5.3 Full Coverage Mode Surveying

Procedures for Full Coverage Survey Mode include the following:

- Define the bounds of the site that requires full coverage. This is accomplished by reviewing the topographic, vegetative, or access conditions of the parcel via the GIS and identifying issues that may affect the selection of the most appropriate technology.

- Review the site. The area requiring full coverage will be reviewed through a site walk-over during which the geophysical survey conditions will be reviewed by the site geophysicist.

- Set up the RTS at a convenient control point of known location. Confirm location control via checkshots to at least one other control point of known location.

- Place temporary location control QC items in the survey area using the RTS as needed to document navigation precision. At least one location QC item (either temporary items or semi-permanent grid hubs) will be present in each data set. At least one location control item will be present in every five acres surveyed. A 2 x 2 ft area for the location control QC item will be determined to be anomaly free by manual use of an EM-61 MK2 or by a Schonstedt sweep by UXO support personnel.

- Set up a replicate data line location and collect the pre-survey data line.

- Systematically survey the site in the most effective pattern. The survey pattern will consist of consecutive multi-sensor passes with some overlap between passes. To ensure that full, overlapping coverage is obtained over the entire survey area, the vehicle will navigate through several methods, including 1) observing the tracks of previous lines and offsetting the new line to obtain overlapping coverage; or 2) the use of spray paint or portable markers to mark the position of lines and then offsetting the new lines.

- The sensor array is towed at a mean speed less than 2.5 mph or the maximum speed successfully demonstrated in the GPO (to be verified by analysis of the navigation data for each data set) to minimize sensor bounce and sway.

- Collect the post-survey replicate data line.

- Collect and maintain field logs to document the conditions of the data collections. The field logs will include information and observations of the data collection area, field conditions, data acquisition parameters, QC performed.

- Field geophysical data and RTS navigation data will be periodically downloaded throughout the data to a field PC. The electronic files will be organized on an office PC dedicated to geophysical investigation management.

- Review all traverse data and overlay on the survey grid layout as QC and to identify any missed areas. Per the DQOs, a total of up to 0.1 acres of random coverage gaps exclusive of excluded or obstructed areas will be allowed for each site. A Survey Rework Form (Form 6-3) will be filled out whenever any survey has resulted in a significant missed area.

## 5.6 DGM Quality Control Checks

The following QC checks and procedures will be performed in the field to document the correct functioning of the survey equipment and monitor the instruments for noise, stability, and repeatability.

### 5.6.1 Calibration Test Area

A calibration test area will be established at a convenient location. The calibration site will consist of the following marked, reference areas where calibration and QC tests will be performed:

- Null Test Area – an area of known EM response where no anomalies are present where all static QC tests will be performed..
- 3-Point Navigation Function Test Area – an area with three buried calibration items with known locations set up along fixed north-south and east-west towed array traverse paths such that each EM-61 MK2 sensor passes over a known item on each pass.

### 5.6.2 Equipment Warm-Up

Most instruments require a few minutes to warm up before data collection begins to minimize sensor drift due to thermal stabilization effects. All instruments will be allowed to warm up for at least 5 minutes before data collection. This procedure will be followed each time the instrument is powered up (e.g. at the start of the day, after breaks, etc.).

### 5.6.3 Record Sensor Position

At the beginning of the survey, and thereafter at any changes in configuration of the towed array, the relative positions of the sensors and the sensor heights off the ground will be measured and recorded.

### 5.6.4 Static Background and Spike Test

The Static Background Test and Spike Test monitors the instrument background readings, monitor for electronic drift, identify potential interference, and determine the impulse response and repeatability of measurements over a standard test item. The standard test item is a standard 2-inch diameter steel trailer hitch ball. For the towed array system, the tow vehicle will be turned on during the test. The static tests will be conducted on one coil at a time since there can be some interference between adjacent arrayed coils. With the instrument held in static position, measurements are recorded for a period of at least 3 minutes. A standard test item is then placed under the center of each coil and an additional minute of data is recorded. The DQO is that the mean sum of the data channels will be less than 3.25 mV, with a standard deviation of less than 2.0. Readings for the response of the standard test item should be within 20% after subtraction of the sensor baseline response. The test is performed twice daily, prior to collecting data and after completion of data collection. The results of the Static Background and Spike Tests are documented on the Sensor QC Verification Form (Form 6-1).

### 5.6.5 Personnel Test

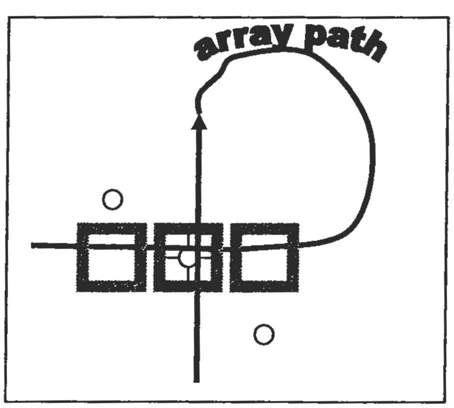
The Personnel Test is performed to check the influence of personnel carried metallic items (e.g. keys, boots, belt buckles, etc.) on the sensors. With the instrument held in static position, the operator(s) walk around the sensors while measurements are being recorded for a period of at least 1 minute. In general, the EM-61-MK2 should remain within 2 mV of background. For a towed array system, the tow vehicle will be turned on in the middle of the test and the engine rpm's will be varied to simulate changing engine speeds. The test will identify any potential electrical field interference sources from the ignition system that may need to be attenuated. The test is performed twice daily, prior to collecting data and after completion of data collection. The Personnel Test will be included in the Static Background Test. The Personnel and Cable Shake Tests both are collected simultaneously.

### 5.6.6 Cable Shake Test

The cable shake test is performed for each sensor at the beginning and end of each day to document any cable or connection problems. With the instrument motionless and recording, each data cable is shaken to test for shorts or bad connections. Data collected during the Cable Shake Test should be free from spikes or variations. Cable problems generally require replacement. Connection problems are generally fixed either by cleaning or reconnection. The results of the Cable Shake Tests are documented on the Sensor QC Verification Form (Form 6-1).

### 5.6.7 3-Point Navigation Function Test

The 3-Point Navigation Function Test is designed to document the function and accuracy of the navigation control system. The towed array is towed along the fixed north-south and east-west towed array traverse paths in both directions such that each EM-61 MK2 sensor passes over a known item of known location on each pass with the test items offset from each other as indicated in **Figure 5-1**. The standard responses can be compared for each sensor, navigation



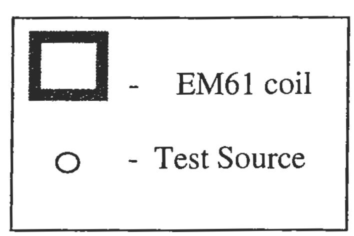




**Figure 5-1 Array Path**

precision can be checked, and instrument latency can be calculated. The test is performed twice daily, prior to collecting data and after completion of data collection. The results of the 3-Point Navigation Function Tests are documented on the Navigation QC Verification Form (Form 6-2).

### *5.6.8 Repeat Data*

The repeatability of geophysical mapping data is monitored by the collection of replicate data. Replicate data will be collected for each data set. Generally, a replicate data line is established about 10 feet outside of the area to be surveyed, 50-foot long and oriented in the general direction of planned traverses. Start and endpoints of the line are marked with pin-flags and a 50-foot tape line to guide the tow vehicle. A standard test item (2-inch trailer hitch balls) is placed at the center of the line. The line is recorded at the start and again at the completion of each data set. The amplitudes of the standard test items should be within 20% and the location accuracy should be within 1 foot.

### *5.6.9 Standardization Logs*

Standardization for geophysical mapping is ensured through adherence to standard procedures and full documentation. The following logs are used to maximize standardization, repeatability, and control of mapping activities:

- **Sensor QC Verification Log**—This log (Form 6-1) will document the daily response of each field sensor. This form documents the results and analysis of the pre- and post-survey Static Test, Static Spike Tests, and Cable Shake Test.
- **Navigation QC Verification Log**—This log (Form 6-2) will document daily calibration of the RTS Navigation system. Pre-and post-survey results of the 3-Point Navigation Function Test, summary data sampling parameters, and detection of blind seed items are documented.
- **Survey Rework Log**—This log (Form 6-3) will document any data recollection necessary and the reasons why.
- **Example Dig Sheet**—Form 6-4: Sample Dig Sheet
- **Data Processing Log**—All magnetometer data from the field will be run through a standard data-processing procedure. This procedure will be the same for all data and will be tracked with the Data Processing Log (Form 6-5). This log documents all coordinate transformations, visual data-quality checks, statistical data-quality checks, survey-coverage statistics, interpolation parameters, etc.
- **Crew Deployment Log**—This log (Form 6-6) will be used to identify the location of each geophysical survey crew on a daily basis. The log tracks crew members, equipment, and expected areas to be surveyed. Attached to this daily log will be

maps of the areas to be surveyed containing the coordinates of benchmarks in the areas as well as the coordinates of each quadrant corner.

- **Field Activity Log**—This log (Form 6-7) will be filled out by each crew chief and will detail all activities of the survey. This is a daily log and contains observations about crew performance, sensor performance, site conditions, and weather changes.

## 5.7 Data Processing, Corrections, and Analysis

Shaw's standard data processing includes data leveling, statistical data assessment, grid generation, and non-customized data filtering to accentuate target signatures. Shaw will use software from the equipment manufacturers, in-house software, and Geosoft's Oasis Montage and UX-Detect Software to complete all tasks. Subsequent to the processing and review of the data, all data grids and target detections will be loaded into the SEDA GIS.

Collected field data downloaded in the field directly from the data-logger to a laptop computer for processing. Appropriate vendor software (e.g., Geonics DAT61) will be used to download the data. The vendor software will also be used for initial review and editing of the data as necessary, for generation of profile lines, and for conversion of the survey line data to (X, Y) coordinates for contouring and analysis. The initial steps taken in the data processing flow will include the following:

### 5.7.1 Data Pre-Processing and Review of Data Sets

The data interpretation process begins by verifying the validity of the collected data sets. This will be accomplished by reviewing the QC data associated with the data. Insuring that the sensor and navigation equipment is functioning properly, that the data are accurately positioned along the predetermined survey lines, that they match the site dimensions, and properly fit within the predefined survey site. All validation results will be noted in the Data Processing Log (Form 6-5).

#### 5.7.1.1 Review of QC Data

Vendor-supplied software will be used to make initial review of the data. This step validates that the data collected fall within prescribed recording ranges, and that no data outliers or null-values are present. Data statistics will be developed to measure compliance with the DQOs.

- **Review of Sensor QC Data:** Sensor QC test results (equipment warm-up, sensor position, static background and spike tests, cable shake test, personnel test) will be reviewed to ensure proper sensor function. Geonics and Geosoft supplied software will be used to make initial review of the data. This step validates that the data collected fall within prescribed recording ranges, background noise and signal-to-noise-ratios fall within acceptable ranges, and that standard responses to known items are consistent with known values. Minimum, maximum, mean, and standard deviations of the pre and post survey Sensor QC tests will be calculated, compared to the DQO standards and reported. For background noise, the mean of the Sum Channel must be < 3.25 mV with a standard deviation < 2 mV. The data will be clipped such that any measurements that are well above the background noise will not be included in these statistics. The clipping value(s) will be recorded. Sensor QC data parameters will be entered into the Sensor QC Verification Log (Form 6-1).

- **Review of Navigation QC Data:** Vendor-supplied software will be used to make initial review of the navigation QC and to ensure that the navigation system is functioning properly. Geonics, Leica and Geosoft supplied software will be used to make initial review of the data. The 3-point Navigation Function Test data will be reviewed. Navigation offset distances and latency factors will be calculated based on the test results and compared to the DQO objectives. Positioning errors are not to exceed 1.0 feet. Navigation QC data parameters will be entered into the Navigation QC Verification Log (Form 6-2).

#### *5.7.1.2 Initial Data Review and Preprocessing*

The site geophysicist will review sensor and navigation data for accuracy, completeness, and data fidelity. The geophysicist will also verify that the data are complete and fall within the prescribed survey area.

The operator will examine the quality of the data and define additional filtering or reprocessing of the data that may be necessary. Additionally, one-dimensional line data will be reviewed in Geosoft's Oasis Montage UX Detect software that has a profile display mode. All observations related to data review will be fully documented in the Data Processing Log (Form 6-5).

The vendor software will also be used for initial review and editing of the data as necessary, for generation of profile lines, and for conversion of the survey line data to (X, Y) coordinates for contouring and analysis. Each sensor record has an associated time stamp. Preprocessing involves synchronization of the RTS navigation data stream coordinates with the sensor output data streams. All data will be converted into XYZ files in NAD83, New York State Plane Central Zone coordinates in U.S. Survey Feet. All activities will be documented on the Data Processing Log (Form 6-5). The initial steps taken in the data processing flow will include the following:

- **Initial Review of Collected Data:** Vendor-supplied software will be used to make initial review of the data. This step validates that the data collected fall within prescribed recording ranges, and that no data outliers or null-values are present. During this step, all data collection and downloading parameters will be entered into the Data Processing Log.

- **RTS Navigation Data Review:** Positional information collected via RTS is designed to provide real-time XYZ location solutions at up to 4 times per second, concurrent with collection of the sensor data. However, circumstances can arise where the RTS data require post-processing to remove errors in coordinate locations. These errors can be caused by the loss of line-of-sight between the RTS and the prism due to intervening objects, or to inaccurate entry of coordinates for base station reference locations. If positional errors are detected, they will be documented in the Data Processing Log (Form 6-5). If post-processing is required, the base station GPS unit will be utilized within the Leica software to recalculate the RTS solutions. Subsequently, these RTS position data will be used in the data-merging step to create XYZ files.

- **Data Merge:** During this step, the sensor data will be integrated with navigation data to create sensor data files with coordinate positions using Shaw's ProData software. Form factor adjustments of each sensor location (offset) with respect to the RTS prism are made. Latency corrections based on the navigation QC data are also performed. For the latency correction, the DQO specifies no visible chevron effects in the data or pseudo-color plots. The use of appropriate color scaling will be maintained throughout the project. This step creates ASCII XYZ data files containing Easting, Northing, and Sensor values in column format as described above. These files are similar to the USAESCH ASCII Data File, and conversion to the ASCII Data File format with a "Readme.txt" text file attached describing the files and column headers will be included.

- **Coverage Assessment:** To verify that complete coverage has been achieved during survey activities, all navigation traverses will be reviewed and documented during the data processing and analysis steps. If missed areas are present, Survey Rework Form (Form 6-3) will be completed and provided to the site geophysicist.

- **Deletion of Extra or Erroneous Data:** Extra or erroneous data such as instrument run-ons at the ends of lines, data collected in turnaround areas, data spike, nulls, etc. will be deleted.

- **Site Feature Check:** Additionally, the geophysicist will to examine the data with respect to site cultural or natural features (wells, trees, utilities, etc.) observed on site or mapped in the GIS.

- **Analysis of Data Sampling:** Data sampling statistics will be calculated in Geosoft and entered on the Navigation QC Verification Log (Form 6-2). These statistic include: tow velocity, along-track and across-track data spacing, area surveyed, and area of data gaps. The tow vehicle will maintain a mean speed < 2.5 mph. Along-track sampling error will be < 0.5 feet. Across-track sampling error will be < 3.0 feet excluding data gaps due to trees or other obstacles that preclude the survey platform from providing complete coverage. This metric is intended to control data gaps associated with inconsistent track plots that are not associated with trees or other obstructions. For the purposes of this project, minor occurrences will be accepted but will not be accepted if they exceed 0.5 feet.

- **Analysis of Replicate Data:** The pre-and post-survey replicate data lines will be reviewed for each data set. Data sampling statistics will be calculated in Geosoft and entered on the Navigation QC Verification Log (Form 6-1). The amplitudes of the responses over standard test items should be within 20%, the location accuracy should be within 1 foot, and the latency calculation should check with the 3-Point Navigation Function Test results.

#### 5.7.1.3 Data Processing

UXO geophysical data analysis will begin after execution of standard data pre-processing steps (discussed above in Section 5.7.1.2) where field data are verified, cataloged, reviewed, and converted into XYZ files in NAD83, New York State Plane Central Zone coordinates in U.S. Survey Feet. All activities will be documented on the Data Processing Log (Form 6-5)

The digital data will be an ASCII-delimited XYZ file suitable for input into the Geosoft programs. Successive data processing steps include:

- **Statistical Analysis:** All XYZ files will be processed to calculate statistics describing survey coordinates and sensor values. These statistics will be calculated to assist the site geophysicist in the assessment of data quality.
- **Data Leveling:** Based on the initial review of the data, the statistical assessment results, and the calibration data, data leveling will be applied to the data. Consistent parameters and processing methods will be used for all channels within each dataset. Consistent processing routines will be used for all datasets throughout the project.
- **Data Cataloging:** After leveling of the XYZ files is completed, all XYZ's will be cataloged into an Access database. Information in the database will document the sensor types, deployment configurations, navigation methods, crew members, statistical analysis results, etc.
- **Data Gridding:** XYZ files will be interpolated onto right-rectangular, evenly spaced grids. Gridding will initially be performed using the Geosoft minimum curvature function using a search radius of 2 feet, a starting grid value of 2, and an initial grid cell size of 0.25. Interpolated grids will be reviewed by the data processor to determine the completeness and accuracy of prior data manipulation steps. Gridding parameters will be adjusted based on the sampling intervals actually achieved in the data.
- **Data Filtering:** Initial assessment of the data will be performed on grids with no filtering applied to the data. However, a suite of simple data filters is available to enhance target signatures by reducing the effects of high frequency and/or low frequency noise sources. Data processing will not alter the SNR by more than 5% or 5 mV, whichever is less. This will be evaluated by measuring the SNRs of three low-amplitude anomalies (less than 100 mV) and three high-amplitude anomalies (greater than 100 mV) and comparing those SNR levels in both the pre-processed

data and post-processed data. These comparisons will be performed for each dataset collected.

The raw data, digital records, and field notes for each data set will be provided by the Site Geophysicist to the USACE within five days of collection for independent interpretation/evaluation.

### 5.7.2 Target Detection

Targets are detected in a two-step process: (1) initial automated detection, and (2) operator-aided detection by a qualified geophysicist. The first step is automated target detection based on threshold analyses. Geosoft's UX Detect will be used for simple threshold detection and will be augmented by in-house methods utilizing a region-growing algorithm for more sophisticated auto-detection and feature extraction. Parameters controlling the selection of targets include proximity of adjacent targets, signal power density, collocation of targets on other channels of data, area size, and distribution of anomaly amplitudes.

The second step is manual detection of targets based on systematic visual search of raw and filtered data, on single or multiple channels. This will be accomplished within the Oasis Montage/UX-Detect software system. At this stage, automatic target detections will be modified, deleted, and/or added by the operator. The automated and operator target detection steps will result in a target list and a set of target parameters, including X, Y, area, semi-major length, semi-minor axis length, proximity to other targets, and signal strength statistics.

The steps of the target detection process are documented in the Data Processing Log (Form 6-5) (as well as in the headers of the affected files) to facilitate replication of the target analysis results during QC.

## 5.8 Anomaly Selection and Decision Criteria

For each data set, Site Geophysicist will assess each of the following factors prior to generating an anomaly list:

- The local background conditions of the EM response. The threshold values used for target detection will be based on the minimum signals recorded as part of geophysical prove-out.
- Data completeness and accuracy.
- Data quality.
- Field notes on site and survey conditions and observations.

- The boundary conditions, utilities and/or other cultural features present, and unsurveyable areas (beneath roads, trees, buildings, etc.); and
- The shape and amplitude of the response of known targets buried in the geophysical prove-out test plots.
- The shape and amplitude of the response of relevant anomalies encountered in previous OE removal grids
- The extent and boundaries of metal-rich landfill areas, if any.

The Site Geophysicist will perform an automatic anomaly selection based on the normalized sum of the 4 data channels (time gates 1-4) using the UX Detect Blakely Test. Typically, GX parameters will be refined to produce anomaly selections of all signals above the mean plus 2.5-3.0 times the standard deviation of the background data. Alternative levels may be required for some data and will be documented on a case-by-case basis. A review of all channel decay profiles will be performed at all suspect and/or low amplitude anomalies to remove anomalies not exhibiting the response characteristics of buried metallic objects. A manual review of the remaining anomalies will be performed to optimally locate the target location on the anomaly as needed.

## 5.9 Dig Sheet Development

The target analysis process culminates in the creation of Dig Sheets (Form 6-4), which contain target location, depth, and weight estimates. The Dig Sheets will also contain listings of the peak raw EM-61 MK2 time gate 3 amplitudes recorded on sensors. These amplitude values are used to verify that the correct target is excavated. Following the identification of potential target anomalies from the geophysical data evaluation, the anomalies will be assigned to the appropriate 125x125-foot grid for development of the grid dig sheets.

### 5.9.1 Dig Sheet

The grid dig sheet will contain the following information:

- Facility (SEDA)
- Site (SEAD 46 or SEAD 57)
- Responsible geophysicist
- Geophysical data sets utilized
- Grid identification
- Grid corner locations in NAD83, New York State Plane Central Zone coordinates in U.S. Survey Feet
- Grid background response levels
- Unique anomaly identification numbers

- Predicted anomaly easting and northing in both local grid (relative) coordinates and in NAD83, New York State Plane Central Zone coordinates in U.S. Survey Feet
- QC target anomalies
- EM-61 MK2 Time Gate 3 peak value for each target anomaly

## 5.10 Quality Control

Geophysical mapping QC at the SEDA site will ensure proper execution of all components of the work performed to detect, locate, and reacquire targets. The QC program is described in Section 10.0, Quality Control Plan.

## 5.11 Data Quality Objectives

The following DQOs are believed to provide sufficient metrics to quantify the quality of the data collected in association with the SEAD 46 and SEAD 57 DGM project. These DQOs were derived from the analysis of data collected from three GPO plots located on Seneca Army Depot in association with the Open Detonation Grounds DGM Project. It is stressed that these DQOs are intended as objectives only, and will be used to monitor and evaluate the quality of data collected.

- **Background Noise:** Mean of the Sum Channel must be < 3.25 mV with a standard deviation < 2 mV. The data will be clipped such that any measurements that are well above the background noise will not be included in these statistics. The clipping value(s) will be recorded.
- **Mean Speed:** Maintain mean speed < 2.5 mph. The mean speed will be documented along with the standard deviation of the mean speed.
- **Along Track Sampling:** < 0.5 feet.
- **Across Track Sampling:** < 3.0 feet, excluding data gaps due to trees or other obstacles that preclude the survey platform from providing complete coverage. This metric is intended to control data gaps associated with inconsistent track plots that are not associated with trees or other obstructions. For the purposes of this project, minor occurrences will be accepted but will not be accepted if they exceed 0.5 feet. The total acreage associated with such data gaps will not exceed 0.1 acres throughout those portions of the project site that are mapped using the DGM towed platform system.
- **Latency Correction:** No visible chevron effects in the data or pseudo-color plots. The use of appropriate color scaling will be maintained throughout the project.
- **Data Leveling:** Consistent parameters and processing methods will be used for all channels within each dataset. Consistent processing routines will be used for all datasets throughout the project.

- **Signal to Noise Ratio Variances:** Data processing will not alter the SNR by more than 5% or 5 mV, whichever is less. This will be evaluated by measuring the SNRs of three low-amplitude anomalies (less than 100 mV) and three high-amplitude anomalies (greater than 100 mV) and comparing those SNR levels in both the pre-processed data and post-processed data. These comparisons will be performed for each dataset collected.

- **Anomaly Selection:** The anomaly selections will be accepted by the project geophysicist or his/her designated assistants. These individuals will verify that all anomaly selections for a given dataset are reasonable and should identify all buried metal ranging from 20mm rounds (intact with casings) buried at 6 inches to 105mm projectiles or larger buried at 48 inches.

- **Positioning Errors:** Positioning errors are not to exceed 1.0 feet. A functionality test will be performed each morning and evening to quantify the accuracy of the positioning/navigation system.

- **Reacquisition:** Anomaly reacquisition will be performed on selected anomalies throughout the duration of the project. It is anticipated that reacquisition for selected anomalies will occur on at least a weekly basis. Shaw will provide a list of anomalies and the USACE will select the targets to be reacquired, and the reacquisition of those anomalies must be successful to within 2 feet of their interpreted location. Reacquisition will be performed using an EM-61 MK2 operated in manual mode using the RTS for point navigation. Mapping personnel will also be used as for reacquisition.

- **Blind/Seed QA Items:** All USACE blind seed items must be detected to within 2 feet of their known locations. These items will be buried to the lesser of the depths that were reliably detected during the GPO for the Open Detonation Grounds DGM Project, or to the top of weathered shale underlying the till. Blind QA items will not be smaller or buried deeper than those emplaced during the GPO.

In addition, the applicable DIDs referenced in the SOW shall also be adhered to.

## *5.12 Corrective Measures*

The objectives of the geophysical investigations are to accurately locate and record the location of anomalies (potential UXO). In the event of a DQO failure, Shaw's Project Geophysicist and QC Geophysicist will perform a root-cause analysis to identify the reason for the failure, to identify how much data has been affected, and whether corrective actions can be taken to correct, mitigate or eliminate the cause of the failure. This will include examining the ability to meet the metric for any DQO given the site conditions where the data was collected. The root-cause analysis will be submitted to the USACE Geophysicist by the end of the next working day.

In the event that a particular geophysical method, instrument, or procedure is not generating meaningful results or advancing the project goals, Shaw will convene a review team consisting of the Shaw's PM, Project Geophysicist, and QC Geophysicist and USACE's COR, Design Manager, and Geophysicist by the next working day to investigate the cause and recommend corrective action.

Specific corrective measures are dependent on the type of geophysical equipment used during an operation and will be developed on a site-specific basis. However, the following are the basic corrective measures Shaw will employ for digital geophysical mapping:

- Replacement of sensors if they fail to meet calibration requirements.
- Replacement of navigation equipment if daily check of location accuracy is not met.
- Re-survey grids when data quality specifications are not met.
- Reprocess all geophysical data collected during a survey day if 10 percent reprocessing procedures (10% of the data sets will be independently reprocessed and picked, then composed to the initial results) results in detection of additional valid targets.
- Re-excavation of targets if site geophysicist determines that the excavated targets are not associated with the initial target anomaly.

Basic corrective measures will be implemented as part of day-to-day activities (i.e., replacing faulty equipment). USACE will receive written notification of all actions taken. If an instrument or process cannot be corrected to meet a DQO, Shaw will cease using that instrument or process and make recommendations to USACE. These recommendations may include modifications to the Geophysical Investigation plan. Shaw will implement the amended plan upon approval from USACE.

## 5.13 Records Management

The geophysical records management plan includes three components: field survey records management, DGM (EM-61 MK2 and RTS survey data) data management, GIS records management, and data processing/analysis records management.

### 5.13.1 Field Survey Records Management

All data files and field logs generated during the field operation will be managed by the Site Geophysicist and provided to the USACE on a monthly basis. Paper files will be organized in the office trailer and be filed by individual day. Photocopies of all paper documents will be made and filed at an off-site location. Paper documents with significant information not captured digitally will be scanned and archived. Electronic files and forms will be organized on an office PC dedicated to geophysical investigation management. File directory structures for field data will be organized by day of year, with subdirectories for specific field activities (navigation data, survey data, etc.). All directories will also have README files describing directory contents and chain of custody history. All field data will be backed up onto CD ROM on a daily basis. Backup data will be transferred to an off-site Shaw location on a twice-a-week basis.

### 5.13.2 DGM Data Management

Field geophysical data and RTS navigation data will be periodically downloaded throughout the data to a field PC. The electronic files will be organized on an office PC dedicated to geophysical investigation management. Electronic files include, but are not limited to, EM-61 MK2 data files, RTS files, sensor calibration files, and QC test data files. Standardized file naming conventions and directory names will be used. File directory structures for field data will be organized by day of year, with subdirectories for specific field activities (navigation data, survey data, etc.). All directories will also have README files describing directory contents and chain of custody history. All field data will be backed up onto CD ROM on a daily basis. Backup data will be transferred to an off-site Shaw location on a twice-a-week basis.

### 5.13.3 GIS Records Management

All generated and developed GIS files will be managed by the GIS Manager and stored on an off-site GIS PC. The data will be stored within the standard GIS subdirectory structure with README files in each directory containing a description of the contained files. All GIS data will be backed up onto CD ROM or tape on a daily basis as well as transferred to an off-site Shaw server location. Data on the off-site server will be backed-up onto tape as part of the data server archiving process. The GIS record management QC is discussed in Section 13.0, "GIS Plan."

### 5.13.4 Data Processing and Analysis Record Management

All data files and Data Processing Logs (Form 6-5) generated during the processing and analysis of geophysical field data will be managed by the Site Geophysicist. Paper files will be organized in the office trailer and will be filed by individual day. Photocopies of all paper documents will be made and filed at an off-site location. Electronic files will be organized on an office PC dedicated to geophysical investigation management. File directory structures will be organized by day-of-year, with subdirectories for specific field activities (navigation data, survey data, QC data etc.). All field data will be backed up onto CD-ROM on a daily basis as well as transferred to an off-site Shaw location.

All data, (field data, geophysical processing and analysis data) will be backed up as a complete system on a twice-weekly basis onto CD. Two copies of the CD will be created with one copy stored in the office trailer and one copy sent to the off-site GIS Manager.

### *5.13.5 Prove-out Analysis and Reporting Activities*

The prove-out data will first be downloaded in the field to ensure that all data has been collected and downloaded properly. The downloading process will be executed with vendor software. The data merging process will be conducted with Shaw's preferential software (ProData). ProData will merge the geophysical and navigation data accurately and will correct for the sensor offset form factor and latency.

Shaw's standard data processing (prior to target selection) includes data leveling, statistical data assessment, grid generation, and data filtering to accentuate target signatures. Shaw uses several software packages, including software from the sensor manufacturers, preferential in-house software, and Geosoft's Oasis Montage and UX-Detect Software to complete all tasks. A detailed discussion regarding the Shaw geophysical data processing procedures is provided in Sections 5.7.1.2 and 5.7.1.3.

Each data set will first be processed separately in accordance with Shaw procedures. A target list will then be generated from each data set. At this point, an assessment will be made regarding the EM data sets. The EM-61 MK2 data will be examined and compared. The higher quality data set will be selected. The superior quality data set will address issues regarding detection, signal strength, and resolution. Data quality will also be assessed by comparing the EM target locations (target picks) to the actual locations of the buried simulated targets. The better data set of the two will be recommended for the site geophysical survey. All of the above criteria will be considered.

A memo report of the results of the survey will be provided to USACE within one week after execution of the prove-out test plot survey. The memo report will include a description of the equipment utilized, processing procedures applied to the data, target results, and recommendations. Additionally, all collected data will be provided for USACE evaluation and review.

# 6.0 Geophysical Investigation Plan

This section details the Geophysical Investigation Plan supporting geophysical surveys for Unexploded Ordnance (UXO) and Ordnance and Explosives (OE) investigations at Seneca Army Depot Activity (SEDA) areas SEAD 46 and SEAD 57. As specified in the Scope of Work (SOW), a towed-array of EM-61 MK2 has been selected as the most appropriate technology to perform digital geophysical mapping (DGM). This plan was developed in accordance with the U.S. Army Engineering Support Center, Huntsville (USAESCH) Data Item Description (DID) OE-005-05.01.

## 6.1 Site Description

The specific areas to be investigated under the Scope of Work (SOW) are divided into the SEAD 46 (3.5-inch Rocket Range) and SEAD 57 (Former EOD Range).

### 6.1.1 Geophysical Investigation Program Objectives

A geophysical prove-out (GPO) utilizing a EM-61 MK2 towed array, will be initially performed over three existing non-contiguous USACE prove-out grids as described in Section 5.0 "Geophysical Prove-out) to demonstrate the sufficiency of the equipment, survey techniques, and data management, processing, and interpretation. Following completion of the GPO, DGM will be conducted at SEAD 46 and SEAD 57 using the mapping techniques demonstrated in the GPO.

Geophysical mapping, using a towed array of EM-61 MK2 instruments, will be performed for the purpose of locating, marking, and creating a database of all potential OE/UXO and OE-related scrap in the open areas of SEAD 46 and SEAD 57. These will be full coverage geophysical surveys less inaccessible, obstructed, or excluded areas. Approximately 20% of the remaining areas at these sites, which are heavily wooded, will be characterized by "mag & flag" techniques. This information will be used to perform a removal action at a later date. This information will be also be used to refine the final acreage estimates for the different remedial zones as outlined in the EE/CA, and to provide an accurate cost estimate for the full-scale remediation. Intrusive characterization of a limited number of subsurface anomalies for quality assurance/quality control (QA/QC) purposes will also be performed.

The objective of this geophysical mapping is to locate all OE 20-millimeter (mm) and larger to the demonstrated depth of detection while developing a clear, complete, and defensible administrative record. The administrative record shall contain all geophysical data (raw and processed), maps, reports, field sheets, databases, and all other ancillary data used to develop all geophysical results.

#### 6.1.1.1 Ordnance and Explosives Detection

The performance goals for OE detection are based upon proper execution of the most appropriate geophysical technology deployed at the site. A towed array of Geonics EM-61 MK2 time domain electromagnetic (TDEM) sensors is specified for the surveys in the SOW. The performance objective is to locate all 20-mm and larger OE and OE-like targets to the demonstrated depth of detection.

The selection of the most appropriate technology is dependent on site conditions related to vegetation, topography, soil type, proximity to structures, degree and type of metallic debris, as well as type, distribution, and number of UXO. The performance capability of selected field equipment will be measured and documented through on-site prove-out verification as described in the Geophysical Prove-out Report.

Actual detection depths may vary within the site based on specific circumstances, such as the following:

- Item orientation
- Site background/noise levels
- Masking effects from adjacent metallic items
- Item shape
- Material composition of buried targets
- Weathering effects on the magnetic conductivity of item materials

### 6.1.2 Specific Area To Be Investigated

#### 6.1.2.1 SEAD 46 Area (Former 3.5-inch Rocket Range)

SEAD 46, the former 3.5-inch Rocket Range, consists of approximately 45 acres on the north side of the depot, due east of the Ammunition Storage Area. The 45 acres consist of approximately 35 acres of open grassy area and 10 acres of heavily wooded area around the perimeter. DGM will be performed over the open areas of the site exclusive of a man-made "hill" located near the north end of the site. The hill, which is steep and heavily vegetated, will be screened for geophysical anomalies along 10 3-foot wide transects using a single EM-61 MK2. The transects will be approximately 30 feet long and arranged 5 on the front (south) side of the hill and 5 on the back (north) side of the hill. Approximately 20% of the heavily wooded areas will be cleared of vegetation along 10-foot wide transects spaced approximately 50-feet apart and characterized using mag & flag techniques.

#### 6.1.2.2 SEAD 57 Area (Former EOD Range)

SEAD 57 (former EOD Range) consists of approximately 61 acres at the northern end of the depot, located immediately adjacent and south of the Open Detonation Area. The 61 acres consist of approximately 40 acres of open grassy area and 21 acres of heavily wooded area. A small bermed (former) demolition pit is located in the center of the open areas. DGM will be performed over the open areas lying between 400-feet and 1000-feet radially out from the demolition pit berm. The area from the berm out to 400-feet is assumed to be saturated with potential anomalies associated with UXO, OE, and ordnance related scrap which would render DGM ineffective for identifying anomaly items. Approximately 20% of the heavily wooded areas will be cleared of vegetation along 10-foot wide transects spaced approximately 50-feet apart and characterized using mag & flag techniques.

### 6.1.3 Anticipated UXO Type, Composition, and Quantity

Anticipated UXO type, composition, and quantity are discussed in Section 2.0 "Technical Management Plan". For this Geophysical Investigation Plan, the following items recovered during the EE/CA (Parsons, 1991) from SEAD 46 and SEAD 57 have been considered as anticipated targets:

#### 6.1.3.1 UXO and OE at SEAD 46

At SEAD 46, 75 100 x100-ft grids were surveyed using an EM-61 during the OE EE/CA. A total of 43% of the area (45 acres) was characterized. Of the 1,291 anomalies identified, 1,155 anomalies were intrusively investigated. OE-related items were recovered from 478 of the anomalies investigated and of these 10 were classified as UXO. Other than one 3.5-inch rocket M28A2 HEAT found on the surface, no rockets or rocket motors were found during in EE/CA. The majority of the OE encountered were related to 40mm rifle grenades and slap flares. Primary anticipated targets for this area are 40mm practice rifle grenades and MK 2 grenades, although 20mm projectiles will also be screened for. Both iron/steel and aluminum composition primary targets are present and weigh less than 1.5 pounds. Per the Explosives Safety Submission, the most probable munitions (MPM) is the 3.5-inch rocket M28A2 HEAT. The expected UXO density is low.

#### 6.1.3.2 UXO and OE at SEAD 57

At SEAD 57, 61 100x100-ft grids were surveyed using an EM-61 during the OE EE/CA. Approximately 23% of the area (61 acres) was characterized. Of the 2,951 anomalies identified, 2,117 were intrusively investigated. OE-related items were recovered from 1152 of the anomalies investigated and of these 3 (a grenade and 2 20mm rounds) were classified as UXO. OE frag from a 105mm was by far the largest UXO or OE item encountered in either area.

Primary anticipated targets for this area are 20mm and 37mm projectiles and MK 2 and CS grenades. Both iron/steel and aluminum composition primary targets are present and weigh less than 2 pounds. Abundant frag is present in and around the former demolition pit area, with the density of frag falling off with distance. Per the Explosives Safety Submission, the MPM is the 37mm MKII projectile. The expected UXO density is low.

### 6.1.4 Depth Anticipated

OE recovery depths in the EE/CA ranged from the surface to 1-foot for SEAD 46 and from the surface to 6-inches for SEAD 57. This geophysical survey will be optimized to detect smaller targets (20mm, 37mm, grenades) to their maximum detection depth. The clearance depth of the future removal action is anticipated to be 4 feet. The capability of the geophysical technology will be documented during the geophysical prove-out (Section 5.0).

### 6.1.5 Topography

Topography affects the applicability of different geophysical sensor deployment form-factors (i.e., the specific configuration of sensors, navigation, and deployment platforms). Form-factors include systems deployed as backpack/handheld, cart-based, and vehicle-towed configurations. At SEAD 46 and SEAD 57, the topography does not pose significant complications other than small undulations, ditches, and ruts. Other than the earthen "hill" at the north end of SEAD 46 and the former demolition area berm at SEAD 57 which will not be geophysically mapped, no predominant topographic conditions at the site are expected to affect the geophysical survey.

### 6.1.6 Vegetation

The majority of SEAD 46 and SEAD 57 is flat, open areas covered with scrub growth and grass. These areas have historically been mown with a "bush-hog" or similar equipment will be mown immediately prior to the geophysical mapping. For approximately 10 acres of heavily woods in the perimeter areas of SEAD 46 and 31 acres of heavy woods in the perimeter areas of SEAD 57, 10-foot transects every 50 feet will be cleared by "hydro-axe" or similar equipment for mag & flag characterization. Only trees less than 6-inches in diameter will be removed. Vegetation clearance activities are described in Section 2.0 "Technical Management Plan."

### 6.1.7 Geologic and Geophysical Conditions

SEDA is directly underlain by generally fine-grained glacial tills. Local areas of artificial fill and Quaternary alluvium are also present. In general, these types of materials are not expected to pose major interference problems for collecting of quality geophysical data.

A suite of physical site characteristics describing subsurface, surface, and above-surface conditions dictates the geophysical conditions at the site. The effectiveness of geophysical surveys is dependent on three main factors that are influenced by the site conditions: (1) complete coverage with geophysical sensors, (2) high fidelity of appropriate sensor data, and (3) accurate navigation.

First, as discussed above, topographic and vegetation conditions should allow complete coverage of the site. Second, based on prevailing soil conditions and previously executed geophysical surveys, the use of electromagnetic devices at the site should provide adequate sensor data. Third, site conditions and sightlines will allow the use of either total station or Global Positioning System (GPS) technology for sensor positioning.

### 6.1.8 Shallow Groundwater Conditions

The presence of groundwater affects the performance capabilities of geophysical mapping methods to varying degrees, depending on geophysical sensor phenomenology. For example, groundwater has minimal effect on magnetic and time-domain electromagnetic (TDEM) sensors, but can have an extreme effect on ground-penetrating radar and frequency-domain electromagnetic methods. Since the TDEM method is being used, shallow groundwater conditions are not significant at this site.

### 6.1.9 Site Utilities

No subsurface utilities are expected at either SEAD 46 or SEAD 57. Overhead low-voltage power and phone lines along the site roads are the only utilities anticipated. The effects of any observed site utilities will be mitigated by using the following procedure:

1. Review available documented utility locations via the site GIS.
2. Examine the area during the site walkover whereby visual observations are mapped with and incorporated into GIS.
3. Evaluate utility effects on geophysical mapping effectiveness.
4. Recommend appropriate field technologies.
5. Document decisions in interim/Final reports.

After data are collected, the effects of surface and subsurface utilities are routinely identifiable in the data, and manifest as linear, curved, and overlapping anomalies. The magnitude of the anomalies is highly variable and dependent upon the type, composition, age, and depth of the materials. In some cases, the effects of utilities can be mitigated during the processing of the data (see below); however, in many cases the areas where utilities are present require either removal and resurveying, or demarcation as areas where UXO has not been cleared.

### 6.1.10 Human-Made Features Potentially Affecting Geophysical Investigations

Human-made features existing within, or in close proximity to, the site negatively impact geophysical investigations. These features include fences, buildings, signs, monitoring wells, berms, and equipment. The effects of human-made structures and items will be mitigated using the following procedure:

Small individual pieces of OE scrap and other metallic scrap that would not likely mask a subsurface anomaly may be left in place but must be documented and incorporated into the GIS database. Large individual items of OE scrap or other metallic scrap that could potentially mask any subsurface anomalies shall be removed. All trash pits or other concentrations of metallic surface scrap shall be left undisturbed and their boundaries surveyed and incorporated into the GIS database. All surface UXO or OE that pose a safety hazard shall be collected, documented, and properly disposed of from the geophysical mapping paths or areas.

### 6.1.11 Site-Specific Dynamic Events Affecting Geophysical Investigations

Dynamic events (rain, lightning, solar flares, etc.) may temporarily impact geophysical data collection and/or data quality. Procedures for these anticipated events are as follows:

- Rain—Depending on its intensity, rain can be a significant impediment to survey operations. The site geophysicist will assess the intensity of rainfall and its effects on survey instrumentation and safety (slip, trip, fall) considerations to determine when or how to proceed. General guidance for common conditions is as follows:
  - Drizzle or Intermittent Light Rain—Tape plastic around instrument electronics and continue.
  - Thunderstorm—Take cover and cease operation until the storm passes.
  - Continuous Medium or Heavy Rain—Take cover and cease operations until conditions improve.
- Lightning—Because most geophysical instruments contain sufficient metal and geometry to pose a preferred pathway for electrical discharge (lightning rod effect), observed lightning in the area will be deemed a safety hazard and will be cause for the cessation of survey activities until the lightning activity has ceased. Site personnel and equipment will shelter in a safe area. The Unexploded Ordnance Safety Officer (UXOSO) will make the determination that lightning is present and will log the times when site survey activities are shut down and resumed.

- Solar Flares—Solar flares are sun-generated atmospheric phenomena, typically occurring in the afternoon, which may temporarily generate sufficient high magnitude magnetic noise so as to make magnetometers, often gradiometers, and occasionally electromagnetic sensors unusable for the duration of the event. Solar flares are typically readily observable by the instrument operators (throughout the area) as rapidly fluctuating signal readings with no apparent cultural or survey source. The site geophysicist will be alert to solar flares and temporarily cease data collection until static testing shows a cessation of the solar activity.

### 6.1.12 Overall Accessibility and Impediments

Site conditions at the SEDA site may pose challenges in terms of site accessibility and system deployment impediments. The following conditions and remedies are expected:

- Wooded Areas (approximately 31 Acres)—The heavily wooded perimeter areas of SEAD 46 and SEAD 57 will be investigated using "mag & flag" technique along transects that are 10 feet wide and spaced approximately every 50 feet. These transects will be cleared of vegetation by "hydro-axe" or similar equipment.

- SEDA 46 "Hill"—The earthen man-made "hill" on the northern side of SEAD 46 will be geophysically screened. Ten 3-foot wide survey lanes, each approximately 30 feet long, will be laid out around the front and back of the "hill." After the lanes have been manually cleared of vegetation, a single EM-61 MK2 in cart or man-portable form will be used to collect screening level data along each lane. The lane start/end locations will be marked with surveyor's flags and documented with the total station or GPS.

- SEDA 57 Berm Area—The area within 400 feet of the former demolition berm will not be geophysically surveyed as part of this investigation. The area from the berm out to 400-feet is assumed to be saturated with potential anomalies associated with UXO, OE, and ordnance related scrap which would render DGM ineffective for identifying anomaly items.

### 6.1.13 Potential Worker Hazards

All site personnel will adhere to the practices, procedures, and training and monitoring requirements mandated by Section 7.0, "Site Safety and Health Plan." Because of the potential UXO hazard, qualified UXO personnel will perform a surface sweep of the geophysical survey and support areas prior to initiation of geophysical survey activities at a site, such that instrument operators may proceed with survey activities without requiring active UXO escort in most areas.

## 6.2 Geophysical Investigation Methods

As specified in the SOW, a towed-array of EM-61 MK2 sensors has been selected as the most appropriate technology to perform DGM. The geophysical technology utilized on this site has three main components: sensors, navigation, and deployment system. The system will be positioned with a Leica TSP1100 RTS. Technical aspects of these components are discussed below.

### 6.2.1 Survey Platform

A towed array of EM-61 MK2 sensors was specified in the SOW. Based on scoping discussions with USACE, the deployment form factor will consist of 3 EM-61 MK2 sensors mounted on a non-metallic platform to be towed behind a "Gator" or similar all-terrain vehicle (ATV). The sensor platform will be mounted on existing USACE skids present at the site if practical. A non-metallic RTS prism will be mounted on the array, centered above the sensors. The prove-out test results will provide site-specific data to support the final deployment form factor to be used on the entire site in terms of sensor implementation and to achieve optimal results of the geophysical investigation..

### 6.2.2 EM-61 MK2 Geophysical Sensor

The Geonics EM-61 MK2 is a 4-channel high-sensitivity time domain EM (TDEM) sensor designed to detect shallow ferrous and non-ferrous metallic objects with good spatial resolution and minimal interference from adjacent metallic features. TDEM sensors work by utilizing an EM transmitter which generates a pulsed primary magnetic field in the earth, which induces eddy currents in nearby metallic objects. The eddy current decay produces a secondary magnetic field measured by the receiver coil of the EM-61 MK2. Measurements are taken a relatively long time after the primary pulse at specified time gates which allows the current induced in the ground to have dissipated, leaving only the current in the metal to still produce a significant secondary field.

The EM-61 MK2 consists of two air-cored, 1-meter by 0.5-meter rectangular coils. Secondary voltages induced in both coils are measured in millivolts (mV). The coils are stacked 40 cm apart, with the source/receiver coil located below a second receiver coil. The EM-61 MK2 records a voltage output from both coils as well as a differential that is the calculated voltage difference between the two coils. The responses at four specified time gates are recorded and displayed by an integrated data logger. The EM-61 MK2 will be likely be deployed in a three-sensor system, with the coils ganged into an array for high-productivity coverage.

A multi-channel serial input control box will be utilized along with Geonics software for recording multiple EM-61 MK2 input data streams.

Spatial positioning of the EM-61 MK2 towed array data will be achieved via a Leica TSP 1100 Robotic Total Station (RTS) system (see below). RTS coordinates are logged at 4 samples per second (Hz) which capture the location of the prism mounted above the center of towed array. The EM-61 MK2 data will be collected at the maximum effective rate, which is anticipated to be about 9-10 Hz for a 3-unit array.

### 6.2.3 Geophysical Navigation Methods

The Leica TSP1100 is a motorized robotic total station (RTS) that uses automatic target recognition to track the location of the prism and has a highly accurate distance/azimuth measurement system to produce +/-5mm +2ppm accuracy.

The RTS system hardware consists of three integrated components; 1) the Leica TPS1100 dual laser robotic total station; and 2) the RTS rover remote link control panel; and 3) a survey prism which is tracked by the RTS base station. Navigation data is recorded and stored onto a PCMIA data storage card on the RTS. The PCMIA data storage card is used to transfer navigation data between the RTS and field computers.

Three software components are integrated within the demonstrated technology. First, modified firmware is used on the RTS base station to track the roving prism. This firmware was developed specifically for this application, and allows for rapid collection of data at rates up to 4 Hz, and serial output of solutions on both the base station and rover computing units. The firmware also enables the user to optimize the prism tracking parameters for rapid recovery of lock if obstructed by trees during a survey. Second, time synchronization software was developed by Shaw for determining precise clock slews between the RTS and sensor clock, ensuring accurate time representation of all collected data. Third, Shaw ProData data-merge software is used to allow definition of the sensor geometry during collection. This software provides a robust framework to spatially configure sensors relative to each other and with respect to the prism location, resulting in accurate spatial representation of all collected data.

The RTS technology has several strengths and advantages compared to conventional GPS navigation techniques. These include:

- Fast set-up time: typically 10 minutes or less is required on a simple grid;
- Limited operational constraints: all daylight hours are available for surveying. This capability eliminates constraining outside factors such as satellite availability to execute a survey;
- Modest capital costs: at approximately $23K for all hardware and software, this is far less expensive than RTK GPS, while providing additional capabilities for geophysical surveying;

- Extensive survey range: demonstrated range of at least 1400 feet, this means under ideal conditions the effective survey area under with a single setup is over 140 acres;
- High precision: at +/-5mm (0.2 in) + 2ppm, the RTS provides accuracy of better that 0.25 inches at distances of up to 1,400 feet. This is significantly better than any real-time GPS accuracy;
- Elevation data: RTS accuracy is circular, providing Z elevations as accurate as XY locations. This is significantly different than GPS solutions that are highly ellipsoidal;
- Non-interference: cell phones and radios have no effect on the operation of the system. These are prohibited from close proximity to GPS units;
- In the tree capability: the RTS is usable in wooded conditions provided continuous or intermittent line of sight. RTK GPS fails in wooded areas, and single-frequency GPS provides sporadic 1-2 meter accuracy under good conditions;
- No regulatory issues: no FCC licenses are need to use this equipment, which often complicates use of GPS base station systems;
- Light weight: the prism unit is less than 1 pound, easy to mount on a sensor platform, and adds limited power requirement to the system;
- Well developed support: Leica supports this product and is available through distributors across the nation;
- Well developed RTS software. This allows for easy integration with CAD or GIS; and
- Real time position data: available on both the base and the rover.

Weaknesses of this system include:

- Required survey control: two control points are needed to define a baseline in absolute coordinates. If unavailable, local coordinates can be established; and
- Line of sight required: the unit determines a location when it sees the prism. While it can survey in areas of intermittent obstructions (such as wooded areas), it cannot survey around corners of building, or around walled canyons without moving the base station.

In addition to mapping geophysical data, The RTS will be used for other location tasks including the following:

- Feature Identification—The RTS will be used to augment geophysical data and improve geophysical mapping through capture of visual observations made during site walk-over. During this process, RTS will be used for position-stamping debris piles, unidentified fences, soil changes, vegetation, burn areas, craters, etc.
- Target Relocation—RTS will be used for target relocation. Shaw has streamlined the process of taking coordinates targets from the GIS or ASCII XY files and loading them into the RTS control unit. The "Waypoint-Mode" facilitates quick and reliable relocation.

The Data Quality Objective (DQO) defines the horizontal accuracy of the system. For the SEAD 46 and SEAD 57 surveys, horizontal accuracy will be equivalent to the "sum of the differences" that are inherent in the system as discussed in Section 6.11. Navigational data will be presented in NAD83 New York State Plane Central Zone coordinates in U.S. Survey Feet units.

### *6.2.4 Data Processing System*

The raw field data will be downloaded to field PCs using Geonics DAT61 software then imported, along with the RTS navigation data into Shaw's ProData data merge software for pre-processing. This software provides a robust framework to spatially configure sensors relative to each other and with respect to the prism location, resulting in accurate spatial representation of all collected data. This software is used for merging the sensor and navigation data, determining precise clock slews between the RTS and sensor clock from calibration data, making latency corrections, and generating accurate XYZ data output files. Customized Leica software/firmware for the TSP1100 RTS may be utilized for surveying tasks and review of survey navigation data.

Geosoft Oasis Montage and UX-Detect software will be utilized for most data processing tasks and to perform review and QC checks on the DGM and QC data. Shaw has also developed Matlab based routines for specialized data processing and analysis techniques which may be utilized. Data processing and analysis methods are provided in Section 6.4.

### *6.2.5 Sampling Frequency*

For the GPO and full-scale DGM surveys, the sampling frequency will be no less than 2 Hz for the navigation data stream and 4 Hz for the EM-61 MK2 data. As specified in the DQOs, along track sampling densities will be less than or equal to 0.5 feet and across track sampling densities will be less than or equal to 3 feet. A maximum of 0.1 acre of random data gaps for digitally mapped areas in both sites will be acceptable. Exception will be taken where physical obstructions (trees, wells, etc.) are encountered in the field.

### *6.2.6 Geophysical Survey Modes*

Several survey modes can be used to collect geophysical data for the detection, location, and characterization of UXO. These modes include full surveys, grid surveys, transects, and meandering paths. Given the objectives of the SEAD 46 and SEAD 57 project, a full survey will be executed. Full coverage will be achieved through deployment of the sensor system through the collection of sub-parallel survey lines or swaths. All data traverses will be brought into the GIS for verification of full coverage.

Procedures for Full Coverage Survey Mode include the following:

- Define the bounds of the site that requires full coverage. This is accomplished by reviewing the topographic, vegetative, or access conditions of the parcel via the GIS and identifying issues that may affect the selection of the most appropriate technology.
- Review the site. The area requiring full coverage will be reviewed through a site walk-over during which the geophysical survey conditions will be reviewed by the site geophysicist.
- Set up the RTS at a convenient control point of known location. Confirm location control via checkshots to at least one other control point of known location.
- Place temporary location control QC items in the survey area using the RTS as needed to document navigation precision. At least one location QC item (either temporary items or semi-permanent grid hubs) will be present in each data set. At least one location control item will be present in every five acres surveyed.
- Set up a replicate data line location and collect the pre-survey data line.
- Systematically survey the site in the most effective pattern. The survey pattern will consist of consecutive multi-sensor passes with some overlap between passes. To ensure that full, overlapping coverage is obtained over the entire survey area, the vehicle will navigate through several methods, including 1) observing the tracks of previous lines and offsetting the new line to obtain overlapping coverage; or 2) the use of spray paint or portable markers to mark the position of lines and then offsetting the new lines.
- The sensor array is towed at a mean speed less than 2.5 mph or the maximum speed successfully demonstrated in the GPO (to be verified by analysis of the navigation data for each data set) to minimize sensor bounce and sway.
- Collect the post-survey replicate data line.
- Collect and maintain field logs to document the conditions of the data collections. The field logs will include information and observations of the data collection area, field conditions, data acquisition parameters, and QC performed.
- Field geophysical data and RTS navigation data will be periodically downloaded throughout the data to a field PC. The electronic files will be organized on an office PC dedicated to geophysical investigation management.
- Review all traverse data and overlay on the survey grid layout as QC and to identify any missed areas. Per the DQOs, a total of up to 0.1 acres of random data gaps for digitally mapped areas in both sites will be acceptable. A Survey Rework Form (Form 6-3) will be filled out whenever any survey has resulted in a significant missed area.

### *6.2.7 Instrument Standardization*

Instrument standardization procedures are implemented to ensure accuracy and repeatability of all collected field data. Requirements for instrument standardization, minimum test frequency, and acceptance criteria are outlined in Attachment B of USACE DID OE-005-05.01.

#### *6.2.7.1 Equipment Function Verification*

Equipment function verification will be performed at the site to ensure that the geophysical survey equipment is working according to manufacturer's specification and is appropriate for the intended survey activities. The Site Geophysicist or the QC Geophysicist will review and approve each Sensor QC Verification Log (Form 6-1) and Navigation QC Verification Log (Form 6-2) daily to document the proper equipment function. Additionally, the UXOQCS will review the Equipment Verification Log forms as part of the QC program.

#### *6.2.7.2 Calibration Site Establishment*

A calibration test area will be established at a convenient location at each of areas SEAD 46 and SEAD 57. Each calibration site will consist of the following marked, reference areas where calibration and QC tests will be performed:

- Null Test Area – an area of known EM response where no anomalies are present.
- 3-Point Function Test Area – an area with three buried calibration items with known locations set up along fixed north-south and east-west towed array traverse paths such that each EM-61 MK2 sensor passes over a known item on each pass. .

To verify instrument accuracy, each EM-61 MK2 will be checked at the beginning and end of each work day for the following the QC checks:

- **Equipment Warm-Up**: Most instruments require a few minutes to warm up before data collection begins to minimize sensor drift due to thermal stabilization effects. All instruments will be allowed to warm up for at least 5 minutes before data collection. This procedure will be followed each time the instrument is powered up (e.g. at the start of the day, after breaks, etc.). .
- **Record Sensor Position**: At the beginning of the survey, and thereafter at any changes in configuration of the towed array, the relative positions of the sensors and the sensor heights off the ground will be measured and recorded.
- **Static Background and Spike Test**: The Static Background Test and Spike Test monitors the instrument background readings, monitor for electronic drift, identify potential interference, and determine the impulse response and repeatability of measurements over a standard test item. The standard test item is a standard 2-inch diameter steel trailer hitch ball. For the towed array system, the tow vehicle will be turned on during the test. With the instrument held in static position, measurements

are recorded for a period of at least 3 minutes. A standard test item is then placed under the center of each coil and an additional minute of data is recorded. Static background readings for the EM-61 MK2 should remain within 2.5 mV of background. Readings for the response of the standard test item should be within 20% after subtraction of the sensor baseline response. The test is performed twice daily, prior to collecting data and after completion of data collection. The results of the Static Background and Spike Tests are documented on the Sensor QC Verification Form (Form 6-1).

- **Personnel Test**: The Personnel Test is performed to check the influence of personnel carried metallic items (e.g. keys, boots, belt buckles, etc.) on the sensors. For a towed array system, the tow vehicle will be turned on during the test. With the instrument held in static position, the operator(s) walk around the sensors while measurements are being recorded for a period of at least 1 minute. In general, the EM-61-MK2 should remain within 2 mV of background. The test is performed twice daily, prior to collecting data and after completion of data collection. The Personnel Test will be included in the Static Background Test.

- **Cable Shake Test**: The cable shake test is performed for each sensor at the beginning and end of each day to document any cable or connection problems. With the instrument motionless and recording, each data cable is shaken to test for shorts or bad connections. Data collected during the Cable Shake Test should be free from spikes or variations. Cable problems generally require replacement. Connection problems are generally fixed either by cleaning or reconnection. The results of the Cable Shake Tests are documented on the Sensor QC Verification Form (Form 6-1).

- **3-Point Navigation Function Test**: The 3-Point Navigation Function Test is designed to document the function and accuracy of the navigation control system. The towed array is towed along the fixed north-south and east-west towed array traverse paths in both directions such that each EM-61 MK2 sensor passes over a known item of known location on each pass. The standard responses can be compared for each sensor, navigation precision can be checked, and instrument latency can be calculated. The test is performed twice daily, prior to collecting data and after completion of data collection. The results of the 3-Point Navigation Function Tests are documented on the Navigation QC Verification Form (Form 6-2).

- **Repeat Data**: The repeatability of geophysical mapping data is monitored by the collection of replicate data. Replicate data will be collected for each data set. Generally, a replicate data line is established about 10 feet outside of the area to be surveyed, 50-foot long and oriented in the general direction of planned traverses. Start and endpoints of the line are marked with pin-flags and a 50-foot tape line to guide the tow vehicle. Three standard test items (2-inch trailer hitch balls) are placed at the center of the line located such that each sensor will pass over one. The line is recorded at the start and again at the completion of each data set. The amplitudes of the standard test items should be within 20% and the location accuracy should be within 1 foot.

### 6.2.8 Standardization Logs

Standardization for geophysical mapping is ensured through adherence to standard procedures and full documentation. The following logs are used to maximize standardization, repeatability, and control of mapping activities:

- **Sensor QC Verification Log**—This log (Form 6-1) will document the daily calibration of each field sensor. This form documents the results and analysis of the pre- and post-survey Static Test, Static Spike Tests, and Cable Shake Test.
- **Navigation QC Verification Log**—This log (Form 6-2) will document daily calibration of the RTS Navigation system. Pre-and post-survey results of the 3-Point Navigation Function Test, summary data sampling parameters, and detection of blind seed items are documented.
- **Survey Rework Log**—This log (Form 6-3) will document any data recollection necessary and the reasons why.
- **Example Dig Sheet**—Form 6-4: Sample Dig Sheet
- **Data Processing Log**—All magnetometer data from the field will be run through a standard data-processing procedure. This procedure will be the same for all data and will be tracked with the Data Processing Log (Form 6-5). This log documents all coordinate transformations, visual data-quality checks, statistical data-quality checks, survey-coverage statistics, interpolation parameters, etc.
- **Crew Deployment Log**—This log (Form 6-6) will be used to identify the location of each geophysical survey crew on a daily basis. The log tracks crew members, equipment, and expected areas to be surveyed. Attached to this daily log will be maps of the areas to be surveyed containing the coordinates of benchmarks in the areas as well as the coordinates of each quadrant corner.
- **Field Activity Log**—This log (Form 6-7) will be filled out by each crew chief and will detail all activities of the survey. This is a daily log and contains observations about crew performance, sensor performance, site conditions, and weather changes.
- **Excavation Log Sheet**—This log, also referred to as an Anomaly Tracking Sheet, (Form 2-2) will document the relocation and intrusive verification of anomalies.
- **False Negative Report Form**—This log (Form 6-9) is utilized to document a false positive event, e.g. the intrusive excavation does not result in an apparent geophysical target.

Additional function tests may be performed as the operator deems necessary. The data from each sensor will be compared with the data collected on previous days. If there is a significant change in results, the instrument will be rechecked. If the difference in data cannot be accounted for, the instrument will be taken out of service until repaired. In the event that a significant change is made to the towed-array system, a GPO survey will be required prior to approving the system for full-scale mapping.

### 6.2.9 Location Surveying

As discussed in Section 07 "Survey Plan," in order to establish location control for areas SEAD 46 and SEAD 57 permanent concrete monuments and semi-permanent survey pins and caps will be installed by a New York Licensed Professional Land Surveyor.

Approximately 5 permanent first order control points (survey monuments) will be located and installed as reference locations for location control such that at least two accessible monuments are present at each of areas SEAD 46 and SEAD 57. Once the permanent control points are established, a 250-foot grid of semi-permanent rebar pins with survey caps will be installed across the open areas of SEAD 46 and SEAD 57. These semi-permanent control points will be used for the purpose of locating individual survey and clearance grids, for providing known location RTS set-up points, and for use as QC anomalies for navigation location control.

RTS based location/navigation control for geophysical mapping, anomaly relocation, feature mapping and location, and establishment of interim location control points will utilize these permanent and semi-permanent location control points for location control and navigation calibration. All sensor data will be correlated with navigational data based upon a local first-order control point.

A grid system will be established across the DGM area for each site. The grid pattern will utilize a 125x125-foot grid system. Semi-permanent control points will be established every 250x250-foot. The number, location, and spacing of these grids will be established prior to the full-scale DGM. All 125x125-foot grid boundaries will be established electronically and will be used to reference the DGM data collected. Any changes made to the proposed grid sizes, locations, or orientations will be coordinated with the USACE. NAD83, New York State Plane Central Zone coordinates in U.S. Survey Feet will be used.

### 6.2.10 Personnel

All geophysical investigations will be managed by qualified personnel. The organizational structure of the site personnel is provided in Section 2.0, "Technical Management Plan."

#### 6.2.10.1 Project Geophysicist/Site Geophysicist

The Project Geophysicist/Site Geophysicist will be Mr. Kent Boler. He has overall responsibility for design, implementation, and management of all geophysical investigations required for the work effort and will be on site full time during the geophysical survey. He has degrees in geology and geophysics and a minimum of five years of directly related geophysical experience. Mr. Boler will be the project geophysicist-of-record. The site geophysicist will be on site and will coordinate all activities associated with the collection, processing, and analysis of geophysical sensor and navigation data. He will also coordinate the detection of targets, creation of dig sheets, and relocation of anomalies. The site geophysicist will review all data processing steps, filtering procedures, data modeling results, and intrusive sampling results.

#### 6.2.10.2 Quality Control Geophysicist

The QC geophysicist, Mr. Ji Ma, is responsible for overall geophysical survey quality control. He has a degree in geophysics and a minimum of five years of directly related geophysical experience. The QC geophysicist will check all activities associated with the collection, processing, and analysis of geophysical sensor and navigation data as well as target selection to insure data completeness and quality. The QC geophysicist will review data processing steps, filtering procedures and data modeling results.

### 6.2.11 Production Rates

Geophysical mapping production rates are highly variable and depend on several factors, including topography, vegetation, site access, proximity of survey area, and weather conditions. Additionally, the selection of the sensor suite (sensor type and array configuration), defined during the geophysical prove-out, affects productivity.

- **Vehicle Towed-Array of EM-61 MK2s.** It is anticipated that the towed array EM-61 MKII system will achieve approximately 4 to 8 acres per day depending on field conditions.
- **Single EM-61 MK2.** Obstructed areas, margins of the heavily wooded areas not accessible to the towed array, and certain data gap recollects may be digitally mapped as necessary using a single hand-towed EM-61 MK2 using RTS navigation. In these areas, mapping may be reduced to 1-2 acres per day per team.
- **Mag and Flag.** Heavily wooded areas will be 20% characterized on 10-foot wide transects spaced approximately 50 feet apart using traditional mag and flag methods. Mag and flag productions rates will vary significantly based on the amount of vegetation removal required and the anomaly density encountered.

## 6.3 Location Surveying, Mapping, and Navigation

As discussed in Section 7 "Location Surveys and Mapping Plan," in order to establish location control for areas SEAD 46 and SEAD 57 permanent concrete monuments and semi-permanent survey pins and caps will be installed by a New York Licensed Professional Land Surveyor.

Approximately 5 permanent first order control points (survey monuments) will be located and installed as reference locations for location control such that at least two accessible monuments are present at each of areas SEAD 46 and SEAD 57. Once the permanent control points are established, a 250-foot grid of semi-permanent rebar pins with survey caps will be installed across the open areas of SEAD 46 and SEAD 57. These semi-permanent control points will be used for the purpose of locating individual survey and clearance grids, for providing known location RTS set-up points, and for use as QC anomalies for navigation location control.

RTS based location/navigation control for geophysical mapping, anomaly relocation, feature mapping and location, and establishment of interim location control points will utilize these permanent and semi-permanent location control points for location control and navigation calibration. All sensor data will be correlated with navigational data based upon a local first-order control point.

A grid system will be established across the DGM area for each site. The grid pattern will utilize a 125x125-foot grid system. Semi-permanent control points will be established every 250x250-foot. The number, location, and spacing of these grids will be established prior to the full-scale DGM. All 125x125-foot grid boundaries will be established electronically and will be used to reference the DGM data collected. Any changes made to the proposed grid sizes, locations, or orientations will be coordinated with the USACE. All coordinates will be in NAD83, New York State Plane Central Zone coordinates in U.S. Survey Feet.

## 6.4 Geophysical Data Processing

Shaw's standard data processing includes data leveling, statistical data assessment, grid generation, and non-customized data filtering to accentuate target signatures. Shaw will use software from the equipment manufacturers, in-house software, and Geosoft's Oasis Montage and UX-Detect Software to complete all tasks. Subsequent to the processing and review of the data, all data grids and target detections will be loaded into the GIS.

Collected field data downloaded in the field directly from the data-logger to a laptop computer for processing. Appropriate vendor software (e.g., Geonics DAT61) will be used to download the data. The vendor software will also be used for initial review and editing of the data as necessary, for generation of profile lines, and for conversion of the survey line data to (X, Y) coordinates for contouring and analysis. The initial steps taken in the data processing flow will include the following:

### 6.4.1 Data Pre-Processing and Review of Data Sets

The data interpretation process begins by verifying the validity of the collected data sets. This will be accomplished by reviewing the QC data associated with the data. Insuring that the sensor and navigation equipment is functioning properly, that the data are accurately positioned along the predetermined survey lines, that they match the site dimensions, and properly fit within the predefined survey site. All validation results will be noted in the Data Processing Log (Form 6-5).

#### 6.4.1.1 Review of QC Data

Vendor-supplied software will be used to make initial review of the data. This step validates that the data collected fall within prescribed recording ranges, and that no data outliers or null-values are present. Data statistics will be developed to measure compliance with the DQOs.

- **Review of Sensor QC Data:** Sensor QC test results (equipment warm-up, sensor position, static background and spike tests, cable shake test, personnel test) will be reviewed to ensure proper sensor function. Geonics and Geosoft supplied software will be used to make initial review of the data. This step validates that the data collected fall within prescribed recording ranges, background noise and signal-to-noise-ratios fall within acceptable ranges, and that standard responses to known items are consistent with known values. Minimum, maximum, mean, and standard deviations of the pre and post survey Sensor QC tests will be calculated, compared to the DQO standards and reported. For background noise, the mean of the Sum Channel must be < 3.25 mV with a standard deviation < 2 mV. The data will be clipped such that any measurements that are well above the background noise will not be included in these statistics. The clipping value(s) will be recorded. Sensor QC data parameters will be entered into the Sensor QC Verification Log (Form 6-1).
- **Review of Navigation QC Data:** Vendor-supplied software will be used to make initial review of the navigation QC and to ensure that the navigation system is functioning properly. Geonics, Leica and Geosoft supplied software will be used to make initial review of the data. The 3-point Navigation Function Test data will be reviewed. Navigation offset distances and latency factors will be calculated based on the test results and compared to the DQO objectives. Positioning errors are not

to exceed 1.0 feet. Navigation QC data parameters will be entered into the Navigation QC Verification Log (Form 6-2).

#### *6.4.1.2 Initial Data Review and Preprocessing*

The Site Geophysicist will review sensor and navigation data for accuracy, completeness, and data fidelity. The geophysicist will also verify that the data are complete and fall within the prescribed survey area.

The operator will examine the quality of the data and define additional filtering or reprocessing of the data that may be necessary. Additionally, one-dimensional line data will be reviewed in Geosoft's Oasis Montage UX Detect software that has a profile display mode. All observations related to data review will be fully documented in the Data Processing Log (Form 6-5).

The vendor software will also be used for initial review and editing of the data as necessary, for generation of profile lines, and for conversion of the survey line data to (X, Y) coordinates for contouring and analysis. Each sensor record has an associated time stamp. Preprocessing involves synchronization of the RTS navigation data stream coordinates with the sensor output data streams. All data will be converted into XYZ files in NAD83, New York State Plane Central Zone coordinates in U.S. Survey Feet. All activities will be documented on the Data Processing Log (Form 6-5). The initial steps taken in the data processing flow will include the following:

- **Initial Review of Collected Data:** Vendor-supplied software will be used to make initial review of the data. This step validates that the data collected fall within prescribed recording ranges, and that no data outliers or null-values are present. During this step, all data collection and downloading parameters will be entered into the Data Processing Log (Form 6-5).
- **RTS Navigation Data Review:** Positional information collected via RTS is designed to provide real-time XYZ location solutions at up to 4 times per second, concurrent with collection of the sensor data. However, circumstances can arise where the RTS data require post-processing to remove errors in coordinate locations. These errors can be caused by the loss of line-of-sight between the RTS and the prism due to intervening objects, or to inaccurate entry of coordinates for base station reference locations. If positional errors are detected, they will be documented in the Data Processing Log (Form 6-5). If post-processing is required, the base station GPS unit will be utilized within the Leica software to recalculate the RTS solutions. Subsequently, these RTS position data will be used in the data-merging step to create XYZ files.
- **Data Merge:** During this step, the sensor data will be integrated with navigation data to create sensor data files with coordinate positions using Shaw's ProData

software. Form factor adjustments of each sensor location (offset) with respect to the RTS prism are made. Latency corrections based on the navigation QC data are also performed. For the latency correction, the DQO specifies no visible chevron effects in the data or pseudo-color plots. The use of appropriate color scaling will be maintained throughout the project. This step creates ASCII XYZ data files containing Easting, Northing, and Sensor values in column format as described above. These files are similar to the USAESCH ASCII Data File, and conversion to the ASCII Data File format can be performed upon request.

- **Coverage Assessment:** To verify that complete coverage has been achieved during survey activities, all navigation traverses will be reviewed and documented during the data processing and analysis steps on the. The areas surveyed and areas missed will be calculated and documented on the Navigation QC Verification Log (Form 6-2). If missed areas are present, Survey Rework Form (Form 6-3) will be completed and provided to the Site Geophysicist.

- **Deletion of Extra or Erroneous Data:** Extra or erroneous data such as instrument run-ons at the ends of lines, data collected in turnaround areas, data spike, nulls, etc. will be deleted.

- **Site Feature Check:** Additionally, the geophysicist will to examine the data with respect to site cultural or natural features (wells, trees, utilities, etc.) observed on site or mapped in the GIS.

- **Analysis of Data Sampling:** Data sampling statistics will be calculated in Geosoft and entered on the Navigation QC Verification Log (Form 6-2). These statistic include: tow velocity, along-track and across-track data spacing, area surveyed, and area of data gaps. The tow vehicle will maintain a mean speed < 2.5 mph. Along-track sampling error will be < 0.5 feet. Across-track sampling error will be < 3.0 feet excluding data gaps due to trees or other obstacles that preclude the survey platform from providing complete coverage. This metric is intended to control data gaps associated with inconsistent track plots that are not associated with trees or other obstructions. For the purposes of this project, minor occurrences will be accepted but will not be accepted if they exceed 0.5 feet.

- **Analysis of Replicate Data:** The pre-and post-survey replicate data lines will be reviewed for each data set. Data sampling statistics will be calculated in Geosoft and entered on the Navigation QC Verification Log (Form 6-2). The amplitudes of the responses over standard test items should be within 20%, the location accuracy should be within 1 foot, and the latency calculation should check with the 3-Point Navigation Function Test results.

#### *6.4.1.3 Data Processing*

UXO geophysical data analysis will begin after execution of standard data pre-processing steps (discussed above in Section 6.4.1.2) where field data are verified, cataloged, reviewed, and converted into XYZ files in NAD83, New York State Plane Central Zone coordinates in U.S. Survey Feet. All activities will be documented on the Data Processing Log (Form 6-5)

The digital data will be an ASCII-delimited XYZ file suitable for input into the Geosoft programs. Successive data processing steps include:

- **Statistical Analysis:** All XYZ files will be processed to calculate statistics describing survey coordinates and sensor values. These statistics will be calculated to assist the site geophysicist in the assessment of data quality.
- **Data Leveling:** Based on the initial review of the data, the statistical assessment results, and the calibration data, data leveling will be applied to the data. Consistent parameters and processing methods will be used for all channels within each dataset. Consistent processing routines will be used for all datasets throughout the project.
- **Data Cataloging:** After leveling of the XYZ files is completed, all XYZ's will be cataloged into an Access database. Information in the database will document the sensor types, deployment configurations, navigation methods, crew members, statistical analysis results, etc.
- **Data Gridding:** XYZ files will be interpolated onto right-rectangular, evenly spaced grids. Gridding will initially be performed using the Geosoft minimum curvature function using a search radius of 2, a starting grid value of 2, and an initial grid cell size of 0.25. Interpolated grids will be reviewed by the data processor to determine the completeness and accuracy of prior data manipulation steps. Gridding parameters will be adjusted based on the sampling intervals actually achieved in the data.
- **Data Filtering:** Initial assessment of the data will be performed on grids with no filtering applied to the data. However, a suite of simple data filters is available to enhance target signatures by reducing the effects of high frequency and/or low frequency noise sources. Data processing will not alter the signal-to-noise-ratio (SNR) by more than 5% or 5 mV, whichever is less. This will be evaluated by measuring the SNRs of three low-amplitude anomalies (less than 100 mV) and three high-amplitude anomalies (greater than 100 mV) and comparing those SNR levels in both the pre-processed data and post-processed data. These comparisons will be performed for each dataset collected.

The raw data, digital records, and field notes for each data set will be provided by the Site Geophysicist to the USACE within five days of collection for independent interpretation/evaluation.

### 6.4.2 Target Detection

Targets are detected in a two-step process: (1) initial automated detection, and (2) operator-aided detection by a qualified geophysicist. The first step is automated target detection based on threshold analyses. Geosoft's UX Detect will be used for simple threshold detection and will be augmented by in-house methods utilizing a region-growing algorithm for more sophisticated auto-detection and feature extraction. Parameters controlling the selection of targets include proximity of adjacent targets, signal power density, collocation of targets on other channels of data, area size, and distribution of anomaly amplitudes.

The second step is manual detection of targets based on systematic visual search of raw and filtered data, on single or multiple channels. This will be accomplished within the Oasis Montage/UX-Detect software system. At this stage, automatic target detections will be modified, deleted, and/or added by the operator. The automated and operator target detection steps will result in a target list and a set of target parameters, including X, Y, area, proximity to other targets, and signal strength statistics.

The steps of the target detection process are documented in the Data Processing Log (Form 6-5) (as well as in the headers of the affected files) to facilitate replication of the target analysis results during QC.

## 6.5 Anomaly Selection and Decision Criteria

For each data set, Site Geophysicist will assess each of the following factors prior to generating an anomaly list:

- The local background conditions of the EM response. The threshold values used for target detection will be based on the minimum signals recorded as part of geophysical prove-out.
- Data completeness and accuracy.
- Data quality.
- Field notes on site and survey conditions and observations.
- The boundary conditions, utilities and/or other cultural features present, and unsurveyable areas (beneath roads, trees, buildings, etc.); and
- The shape and amplitude of the response of known targets buried in the geophysical prove-out test plots.
- The shape and amplitude of the response of relevant anomalies encountered in previous OE removal grids

- The extent and boundaries of metal-rich landfill areas, if any.

The Site Geophysicist will perform an automatic anomaly selection based on the normalized sum of the 4 data channels (time gates 1-4) using the UX Detect Blakely Test. Typically, GX parameters will be refined to produce anomaly selections of all signals above the mean plus 2.5-3.0 times the standard deviation of the background data. Alternative levels may be required for some data and will be documented on a case-by-case basis. A review of all channel decay profiles will be performed at all suspect and/or low amplitude anomalies to remove anomalies not exhibiting the response characteristics of buried metallic objects. A manual review of the remaining anomalies will be performed to optimally locate the target location on the anomaly as needed.

## 6.6 Dig Sheet Development

The target analysis process culminates in the creation of Dig Sheets (Form 6-4), which contain target location, depth, and weight estimates. The Dig Sheets will also contain listings of the peak raw EM-61 MK2 time gate 3 amplitudes recorded on sensors. These amplitude values are used to verify that the correct target is excavated. Following the identification of potential target anomalies from the geophysical data evaluation, the anomalies will be assigned to the appropriate 125x125-foot grid for development of the grid dig sheets.

### 6.6.1 Dig Sheet

The grid dig sheet will contain the following information:

- Facility (SEDA)
- Site (SEAD 46 or SEAD 57)
- Responsible geophysicist
- Geophysical data sets utilized
- Grid identification
- Grid corner locations in NAD83, New York State Plane Central Zone coordinates in U.S. Survey Feet
- Grid background response levels
- Unique anomaly identification numbers
- Predicted anomaly easting and northing in both local grid (relative) coordinates and in NAD83, New York State Plane Central Zone coordinates in U.S. Survey Feet
- QC target anomalies
- EM-61 MK2 Time Gate 3 peak value for each target anomaly

### 6.6.2 QC Items

As part of the QC program, location QC items will be placed within the survey areas at locations that are known to within +/-1foot. The frequency of the location QC items shall be one per data set or one per 5 acres of contiguously surveyed area. Two types of location QC items will be used: 1) semi-permanent location control rebar pins with survey caps; and 2) temporary items (hubcaps) placed on the ground surface. A QC failure shall result if the Contractor does not detect this item or is not detected within 2 feet of its known location during the geophysical mapping and evaluation.

### 6.6.3 Blind QA Items

As part of USACE's QA program, USACE will plant "blind" seeded items at known locations below the surface prior to the performance of the DGM. These items will be buried to the lesser of the depths that were reliably detected during the GPO for the Open Detonation Grounds DGM Project, or to the top of weathered shale underlying the till. Blind QA items will not be smaller or buried deeper than those emplaced during the GPO. The frequency of QA items shall be the same as the location QC items - one (1) per data set or one per 5 acres of contiguously surveyed area. The USACE will review the final data and dig sheets to confirm that the QA target(s) have been acquired. A QA failure shall result if the Contractor does not detect this item, or is not detected within 2 feet of its known location, or is not selected as an anomaly, during the geophysical mapping and evaluation. The USACE QA program may be revised based on site conditions, data quality, or other site-defined parameters.

### 6.6.4 Anomaly Selection for Verification

As part of USACE's QA process, USACE may designate up to 2 dig sheet items peracre for contractor anomaly reacquisition and intrusive verification. The anomalies to be reacquired shall be identified by the government and the reacquisition shall be coordinated between the Contractor and the USACE such that this activity minimally impacts the Contractor's schedule. The Contractor's reacquisition methodology shall confirm and document that the selected anomalies in the dig sheets have been reacquired. Any anomalies where the reacquisition is ambiguous or uncertain shall be flagged as such.

## 6.7 Anomaly Location Reacquisition

Before intrusive activities can be performed, the geophysical anomalies identified on the digital geophysical surveys must be reacquired. Anomaly reacquisition is a two-step process. The first step is to locate the ground position of the anomaly coordinates as specified on the Dig Sheet (Form 6-4). This will be performed using the RTS in Waypoint Location mode. A white non-metallic pin flag, labeled with the unique anomaly number, will be placed in the ground at the indicated grid coordinates.

The second step is to use the EM-61 MK2 (the same instrument used to detect the target) to identify the Time Gate 3 peak location of the anomaly, i.e., the precise location on the ground where the excavation should occur. The sensor will be moved back and forth over the general area of the anomaly coordinates until the peak value of the anomaly is located. If more than one peak is located, the peak with the highest amplitude will be selected. If no unique peak value is present (i.e., the same peak value is measured over an area), the center of the maxim area will be selected. If no peak value is located at the indicated location, the white anomaly location flag will be left in place, and the site geophysicist will be consulted.

The requisition team will be provided an image plot of each target to assist in the localization of the center of the target. This will assist in area where multiple anomalies are present or where the target is a compound anomaly comprised of multiple sub-anomalies.

The peak value measured over the anomaly will then be recorded and the dig location will be marked with a colored flag labeled with the anomaly number. The specified relocation process serves three purposes:

- It focuses the excavation over the actual anomaly peak, instead of an interpolated location between the survey measurement points.
- It reduces measurement errors.
- It provides a QC ground check for the dig locations.

## 6.8 Intrusive Anomaly Verification

After anomaly locations have been reacquired, the flowing procedures will be utilized for the intrusive verification and reporting of the selected target anomalies. The Site Geophysicist will report the anomalies to the Senior UXO Supervisor (SUXOS) as ready for excavation and identification. The SUXOS will assign a UXO team to excavate and identify the anomaly and record the required information in the Excavation Log Sheet per attachment C of USACE DID 005-05,01.

An Excavation Log Sheet will be used to record discrepancies between the dig sheet location and the actual reacquired location, and to note any anomalies that could not be reacquired. The reacquisition location will be measured and logged. The reacquisition coordinates will be used as the official dig location for location QC assessment.

After the UXO team has completed the excavation the geophysical reacquisition team will return to the excavation location and record the post-excavation peak EM-61 MK2 Time Gate 3 value for the anomaly to confirm that the source of the anomaly has been removed. If the anomaly peak amplitude at the reacquired target location has not been decreased by 80% or to within 2 mV of local background and the dig has not reached 4 feet bgs, the Site Geophysicist may require the SUXOS to have the UXO team continue excavation until these criteria are met.

### 6.8.1 Horizontal Accuracy

Positioning errors shall not exceed 1.0 foot. A navigation functionality test will be performed each morning and evening to quantify the accuracy of the positioning system. All location QC items and USACE blind seed items will be detected to within 2.0 feet of their known locations.

### 6.8.2 False Positives and Negatives

False positives are anomalies reacquired by the contractor that result in no detectable metallic material during excavations. These targets would be logged on the Dig Sheets (Form 6-4), but upon reacquisition resulted in no evidence, either by instrumentation or excavation, of an OE-related target. False positives result from effects in the data caused by topographic conditions, low amplitude signals associated with background noise, and subsurface soil conditions. False positives will be minimized to the extent possible through use of the best available geophysical practices executed by qualified staff.

False positive excavations are different from "False Alarms," which result when an anomaly is detected at a given location and posted to a Dig Sheet, and the intrusive activity results in a target that is not an apparent OE item (UXO or scrap). The objective at this site is to minimize false positives while achieving the OE detection specifications.

A false negative is defined as a target not detected or listed on the Dig Sheet. These "missed targets" are those that fall within the detection limits of the deployed geophysical sensor systems and therefore, should be detected and included in the dig list. False negatives can be caused by operator error, instrument error, navigation inaccuracy, or procedural errors where data are lost, distorted, or made inaccurate through erroneous manipulation. False negatives will be assessed via the use of QC targets and USACE blind seed QA targets.

False negatives are difficult to identify, as they are undetected targets. These targets can be identified during reacquisition where new anomalous signatures are identified in the field. Additionally, false negatives can be identified during execution of other site activities such as

UXO removals and other excavation activities. In any of these cases, the following procedures will be executed:

## 6.9 Feedback Process

The feedback of ground-truth excavation data via the Excavation Log Sheets is one of the most important ways to ensure effective geophysical mapping. Excavation data collected during each intrusive activity will be captured to document the item location, weight, shape, orientation, and depth. This data will be electronically entered into a ground-truth database, reviewed by the QC specialist, and incorporated within the UXO/OE item database (see Section 13.0, - "GIS Plan").

Excavation results for each OE removal grid will be reported to USACE within three working days of grid completion. The Site Geophysicist or designate will review the excavation results with respect to the anomaly selection criteria, QC dig results, actual UXO encountered, and any DQO performance criteria failures and provide a weekly progress report with recommendations to the USACE.

## 6.10 Quality Control

Geophysical mapping QC at the SEAD 46 and SEAD 57 site will ensure proper execution of all components of the work performed to detect, locate, and reacquire targets. The QC program is described in Section 10.0, Quality Control Plan.

## 6.11 Data Quality Objectives

The following DQOs are believed to provide sufficient metrics to quantify the quality of the data collected in association with the SEAD 46 and SEAD 57 DGM project. These DQOs were derived from the analysis of data collected from three GPO plots located on Seneca Army Depot in association with the Open Detonation Grounds DGM Project. It is stressed that these DQOs are intended as objectives only, and will be used to monitor and evaluate the quality of data collected.

- **Background Noise:** Mean of the Sum Channel must be < 3.25 mV with a standard deviation < 2 mV. The data will be clipped such that any measurements that are well above the background noise will not be included in these statistics. The clipping value(s) will be recorded.
- **Mean Speed:** Maintain mean speed < 2.5 mph. The mean speed will be documented along with the standard deviation of the mean speed.
- **Along Track Sampling:** < 0.5 feet.

- **Across Track Sampling:** < 3.0 feet, excluding data gaps due to trees or other obstacles that preclude the survey platform from providing complete coverage. This metric is intended to control data gaps associated with inconsistent track plots that are not associated with trees or other obstructions. For the purposes of this project, minor occurrences will be accepted but will not be accepted if they exceed 0.5 feet. The total acreage associated with such data gaps will not exceed 0.1 acres throughout those portions of the project site that are mapped using the DGM towed platform system.

- **Latency Correction:** No visible chevron effects in the data or pseudo-color plots. The use of appropriate color scaling will be maintained throughout the project.

- **Data Leveling:** Consistent parameters and processing methods will be used for all channels within each dataset. Consistent processing routines will be used for all datasets throughout the project.

- **Signal to Noise Ratio Variances:** Data processing will not alter the SNR by more than 5% or 5mV, whichever is less. This will be evaluated by measuring the SNRs of three low-amplitude anomalies (less than 100 mV) and three high-amplitude anomalies (greater than 100 mV) and comparing those SNR levels in both the pre-processed data and post-processed data. These comparisons will be performed for each dataset collected.

- **Anomaly Selection:** The anomaly selections will be accepted by the project geophysicist or his/her designated assistants. These individuals will verify that all anomaly selections for a given dataset are reasonable and should identify all buried metal ranging from 20mm rounds (intact with casings) buried at 6 inches to 105mm projectiles or larger buried at 48 inches.

- **Positioning Errors:** Positioning errors are not to exceed 1.0 feet. A functionality test will be performed each morning and evening to quantify the accuracy of the positioning/navigation system.

- **Reacquisition:** Anomaly reacquisition will be performed on selected anomalies throughout the duration of the project. It is anticipated that reacquisition for selected anomalies will occur on at least a weekly basis. USACE will provide a list of anomalies to be reacquired, and the reacquisition of those anomalies must be successful to within 2 feet of their interpreted location.

- **Blind/Seed QA Items:** All USACE blind seed items must be detected to within 2 feet of their known locations. These items will be buried to the lesser of the depths that were reliably detected during the GPO for the Open Detonation Grounds DGM Project, or to the top of weathered shale underlying the till. Blind QA items will not be smaller or buried deeper than those emplaced during the GPO.

In addition, the applicable DIDs referenced in the SOW shall also be adhered to.

## 6.12 Corrective Measures

The objectives of the geophysical investigations are to accurately locate and record the location of anomalies (potential UXO). In the event of a DQO failure, Shaw's Project Geophysicist and QC Geophysicist will perform a root-cause analysis to identify the reason for the failure, to identify how much data has been affected, and whether corrective actions can be taken to correct, mitigate or eliminate the cause of the failure. This will include examining the ability to meet the metric for any DQO given the site conditions where the data was collected. The root-cause analysis will be submitted to the USACE Geophysicist by the end of the next working day.

In the event that a particular geophysical method, instrument, or procedure is not generating meaningful results or advancing the project goals, Shaw will convene a review team consisting of the Shaw's PM, Project Geophysicist, and QC Geophysicist and USACE's COR, Design Manager, and Geophysicist by the next working day to investigate the cause and recommend corrective action.

Specific corrective measures are dependent on the type of geophysical equipment used during an operation and will be developed on a site-specific basis. However, the following are the basic corrective measures Shaw will employ for digital geophysical mapping:

- Replacement of sensors if they fail to meet calibration requirements.
- Replacement of navigation equipment if daily check of location accuracy is not met.
- Re-survey grids when data quality specifications are not met.
- Reprocess all geophysical data collected during a survey day if 10 percent reprocessing procedures results in detection of additional valid targets.
- Re-excavation of targets if site geophysicist determines that the excavated targets are not associated with the initial target anomaly.

Basic corrective measures will be implemented as part of day-to-day activities (i.e., replacing faulty equipment). USACE will receive written notification of all actions taken. If an instrument or process cannot be corrected to meet a DQO, Shaw will cease using that instrument or process and make recommendations to USACE. These recommendations may include modifications to the Geophysical Investigation plan. Shaw will implement the amended plan upon approval from USACE.

## 6.13 Records Management

The geophysical records management plan includes three components: field survey records management, DGM (EM-61 MK2 and RTS survey data) data management, GIS records management, and data processing/analysis records management.

### 6.13.1 Field Survey Records Management

All data files and field logs generated during the field operation will be managed by the Site Geophysicist and provided to the USACE on a monthly basis. Paper files will be organized in the office trailer and be filed by individual day. Photocopies of all paper documents will be made and filed at an off-site location. Paper documents with significant information not captured digitally will be scanned and archived. Electronic files and forms will be organized on an office PC dedicated to geophysical investigation management. File directory structures for field data will be organized by day of year, with subdirectories for specific field activities (navigation data, survey data, etc.). All directories will also have README files describing directory contents and chain of custody history. All field data will be backed up onto CD ROM on a daily basis. Backup data will be transferred to an off-site Shaw location on a twice-a-week basis.

### 6.13.2 DGM Data Management

Field geophysical data and RTS navigation data will be periodically downloaded throughout the data to a field PC. The electronic files will be organized on an office PC dedicated to geophysical investigation management. Electronic files include, but are not limited to, EM-61 MK2 data files, RTS files, sensor calibration files, and QC test data files. Standardized file naming conventions and directory names will be used. File directory structures for field data will be organized by day of year, with subdirectories for specific field activities (navigation data, survey data, etc.). All directories will also have README files describing directory contents and chain of custody history. All field data will be backed up onto CD ROM on a daily basis. Backup data will be transferred to an off-site Shaw location on a twice-a-week basis.

### 6.13.3 GIS Records Management

All generated and developed GIS files will be managed by the GIS Manager and stored on an off-site GIS PC. The data will be stored within the standard GIS subdirectory structure with README files in each directory containing a description of the contained files. All GIS data will be backed up onto CD ROM or tape on a daily basis as well as transferred to an off-site Shaw server location. Data on the off-site server will be backed-up onto tape as part of the data server archiving process. The GIS record management QC is discussed in Section 13.0, "GIS Plan."

### 6.13.4 Data Processing and Analysis Record Management

All data files and Data Processing Logs (Form 6-5) generated during the processing and analysis of geophysical field data will be managed by the Site Geophysicist. Paper files will be organized in the office trailer and will be filed by individual day. Photocopies of all paper documents will be made and filed at an off-site location. Electronic files will be organized on an office PC dedicated to geophysical investigation management. File directory structures will be organized by day-of-year, with subdirectories for specific field activities (navigation data, survey data, QC data etc.). All field data will be backed up onto CD-ROM on a daily basis as well as transferred to an off-site Shaw location.

All data, (field data, geophysical processing and analysis data) will be backed up as a complete system on a twice-weekly basis onto CD. Two copies of the CD will be created with one copy stored in the office trailer and one copy sent to the off-site GIS Manager.

## 6.14 Interim Reporting and Submittals

Access to interim geophysical survey and navigation data will be provided weekly. All digital data will be provided in formats compatible with the USACE computer systems. Interim data will include the following:

- Draft and final geophysical data for all data sets
- All raw, interim, and processed XYZ and grids files, with associated README files
- Grid data and QC reports for all OE removal grids in Word format
- Draft and final anomaly lists for all OE removal grids in Excel format
- Dig lists and relocation coordinates for all OE removal grids in Excel format
- Anomaly excavation reports for all OE removal grids in Excel format
- QA dig lists and excavation reports for all OE removal grids in Excel format

Interim GIS data will be provided in formats compatible with the USACE computer systems on a monthly basis. Interim GISdata will include the following:

- Electronic base and topographic maps for all OE removal grids, with grid control points, in ArcView format.

## 6.15 Final Reports and Maps

Finalized DGM data will be transmitted by Shaw to USACE within seven working days, along with a letter of transmittal conveying explanations and pertinent information, and will include all QC reports, summaries, and supporting data.

All sensor data will be preprocessed for sensor offsets, latency effects, etc., and correlated with navigation data. The geophysical mapping technology will digitally capture the instrument readings into a file coincident with in NAD83 New York State Plane Central Zone coordinates, in U.S. Survey Feet. This field data will be checked, corrected, and processed into ASCII files in the XYZ file format. Corrections such as for navigation and instrument bias will be applied, but there will be no filtering or normalization of the data. All corrections will be documented.

The data will be presented in delineated fields as X, Y, Z1, Z2, Z3, Z4, and Z5; where X and Y are State Plane Coordinates in East and North and Z1, Z2, Z3, and Z4 are the instrument readings for the four time gates, and Z5 is the normalized sum of the time gates. Each of the fields will be separated by a space (not a comma). Geophysical field data will consist of files in column format, with the Z component the EM voltage reading in the same file. Header information will be included in each file. Each grid of data will be logically and sequentially named so that the file name can be easily correlated with the grid name used by other project personnel.

A digital planimetric map of each geophysical survey grid will be prepared in ArcView format as part of the final deliverable. These maps will reflect the current site conditions after site preparation work (removal of vegetation, fencing, dumpsters, debris, etc.) has been completed. ArcView format GIS maps will be provided including the locations of all targets and excavation results. Geophysical image maps will be provided for each grid with the geophysical data displayed in color with overlaid target data. These maps will be in New York State Plane, Central Zone coordinates in U.S. Survey Feet, and will be coincident with the location of the geophysical survey data.

The geophysical data for each OE removal grid will be accompanied by a Microsoft Word file documenting the field activities associated with the data collection, the data processing performed including a detailed discussion of the data filtering procedure, and the results of the Shaw QC review.

## 6.16 Site Restoration and Demobilization

Upon completion of the DGM investigation and related activities, all equipment, temporary structures, and other items utilized during fieldwork will be removed from the project site. Site restoration is not anticipated during this phase of work since the nature of the project is geophysical investigation with limited intrusive activities.

# 7.0 Location Surveys and Mapping Plan

This Location Surveys and Mapping Plan describes the site-specific methods, resources, and accuracy requirements for location surveys and mapping supporting geophysical surveys and ordnance and explosives (OE) and unexploded ordnance (UXO) investigations at Seneca Army Depot Activity (SEDA) former munitions destruction areas SEAD 46 and SEAD 57. This plan was developed in accordance with the U.S. Army Engineering Support Center, Huntsville (USAESCH) Data Item Description (DID) OE-005-07.01.

## 7.1 General

Survey, mapping, and aerial photography tasks are key components of the OE investigations to accurately identify the location of each OE and UXO component in the field, for reporting the location of these components on maps, for documenting spatial information in the Geographical Information System (GIS), and for conducting spatial analyses of OE and UXO components. Specifying the survey and mapping requirements for each project will ensure that this information is accurate, consistent, and can be re-used for subsequent tasks.

In order to establish location and elevation control for areas SEAD 46 and SEAD 57, surveying and mapping will be performed according to this plan. Two types of control points will be installed: permanent concrete monuments to mark the reference locations for each area for long term use, and semi-permanent survey pins and caps for locating individual survey and clearance grids. Approximately 5 permanent control points (survey monuments) will be located and installed as reference locations for location control at areas SEAD 46 and SEAD 57. Once the permanent control points are established, semi-permanent control points will be established across each area for to be used for establishing the locations of UXO survey and clearance grids.

### 7.1.1 Unexploded Ordnance Safety Provision

Survey crews will be required to conduct fieldwork in areas containing potential UXO components. A UXO Technician II will accompany the survey crew during initial work conducted in such areas and all subsequent work that may require intrusive field activities. Primary activities conducted by the UXO Technician II will consist of conducting a visual surface survey and a magnetometer survey at each location where intrusive activities will occur to ensure the site is anomaly-free prior to the surveying crew setting monuments or driving stakes. Intrusive activities include driving stakes, placing monuments, setting control points, placing iron pins, and any other field activity that penetrates the soil surface. The UXO Technician II may not be required after an area has been cleared or if intrusive activities are not required. The UXO Technician II will not be assigned additional survey tasks that would interfere with the OE safety aspects of clearing the area to conduct these activities.

### 7.1.2 Permanent Control Points

Permanent control points (survey monuments) will be concrete with 3-1/4 to 3-1/2 inch domed brass, bronze, or aluminum alloy survey markers with the necessary witness posts at each site. The monuments will be located within the specific project limits, set 30 feet from the edge of any existing road within the interior of the project limits, and spaced a minimum of 1000 feet apart. The top will be set flush with the ground surface. Each new monument cap will be stamped in a consecutively numbered sequence and include the project identification and name provided with the project task order as follows:

| | | |
|---|---|---|
| SEDA-1-2003 | SEDA-2-2003 | SEDA-3-2003 |
| USACE | USACE | USACE |

Dies used to stamp numbers on the monument caps will be 1/8 to 3/16 of an inch in size. All stated coordinates and elevations will be shown to the closest one-hundredth of a foot (0.01 ft). The locations of these points will also be marked by temporary 3-foot wooden witness stakes with high-visibility flagging tape.

### 7.1.3 Semi-permanent Control Points

A 250-foot grid of semi-permanent survey caps will be installed across the open areas of SEAD-46 and SEAD-57 for the purpose of locating individual survey and clearance grids. These points will be marked by a high-visibility colored plastic survey cap attached to approximately 1 foot of rebar. The cap will be mounted flush with the ground to allow lawn mowers to pass over top. The cap will be engraved with the coordinates to one-tenth of a foot. The locations of these points will also be marked by temporary 3-foot wooden witness stakes with high-visibility flagging tape. The coordinates will be written on the stake. **Figure 7-1** shows the locations of all existing control points in or near the clearance area. **Table 7-1** lists the coordinates of each survey point on Figure 7-1. ***(To be provided when we get the information.)***

### 7.1.4 Accuracy

Horizontal and vertical control of "Class I, Third Order" or better will be established for the network of monuments that are added as part of each new task order. Horizontal control will be based on the English system. Existing site coordinates and base maps are referenced to the 1983 North American Datum (NAD 83), New York State Plane Coordinate System, Central Zone, Feet. All new location surveys conducted as part of the removal actions will conform to these requirements. Vertical control will be referenced to the 1988 North American Vertical Datum (NAVD 88) in decimal feet to at least the closest one-hundredth of a foot (0.01 foot [ft]). Aerial photographs that may be used as part of the survey will comply with the same horizontal and vertical accuracy requirements. A New York State licensed Professional Land Surveyor shall certify all surveying requirements to include all control points, transect points, and boundaries as requires by the project.

### 7.1.5 Plotting

All location survey control points (including monuments, grid corners, aerial targets, and property corners) established for each area will be plotted at the corresponding coordinate point on a digital base map that can be reproduced at scales established for the project or at a scale appropriate for the parcel being described. Area maps will be provided for both SEAD 46 and SEAD 57 and will show sheet breakdowns for any subsequent sheets required for the set.

### 7.1.6 Mapping

All control points and their corresponding location, identification, coordinates, and elevations will be stored digitally and will be reproducible for accurate plotting on planimetric or topographic maps. Each control point will be identified on the digital map by its name and number and will include the final adjusted coordinates and elevation (to the nearest 0.01 ft). Fractional increments of feet will be reported in decimal units, not inches. Unless otherwise requested, each map will include a north arrow (grid, true and magnetic) with the differences between them in minutes and seconds posted. Grid lines or tic marks posted at systematic intervals with their corresponding grid values will be shown on the edges of the maps. The legend will include standard symbols used on the map and a map index showing the relationship of the map to the overall project or site boundary. NAD 83, New York State Plane Coordinate System, Central Zone coordinates will be established for the corners of each grid area investigated.

The horizontal location of each OE component encountered will be measured to at least the nearest 1 foot. The depth of all OE components will be measured by tape measure from the surface to the top of the item. Measurements may be made utilizing a measuring tapes, total station, or GPS technology as appropriate to locate OE components so long as accuracy requirements are satisfied. The location information for each OE item that can be reproduced on a map from the GIS and associated database includes the Cartesian coordinates, New York State Plane coordinates, depth, type, and disposition. Note – accuracies for the location of anomalies and suspected UXO may be greater for the geophysical mapping requirements which are laid out in Sections 5 and 6.

## 7.2 Digital Data

This section presents a discussion on the general file requirements for submittals of Location surveys and mapping submittals. Geophysical mapping and GIS related file standards and requirements are discussed in Sections 6 and 13, respectively.

### 7.2.1 General File Requirements

ArcView v3.2 or higher will be the primary GIS software used to manage the GIS. Microsoft Office Professional v2000 or higher (Word, Excel, Access) will be the primary workstation application to manage text, spreadsheet and database information. Adobe Acrobat document format (.pdf) will be utilized to publish electronic deliverables on CDs and the web.

All location survey information, including control points, grid corner points, grid polygons, OE site polygons, inert and live OE points, will be provided in ArcView (v3.2 or higher) .shp file format. All GIS applications will be delivered as complete ArcView project files or .apr file. All associated coverages, metadata, and related data files should accompany the .apr file and conform to the Spatial Data Standards for Facilities, Infrastructure, and Environment (SDS) file structure and naming convention. Topographic data and associated submittals are not required for this task order.

### 7.2.2 Plot Size

Plot sizes for maps and drawings will be standard A (8.5x11 inches), B (11x17 inches), and/or D-size plots (36x24 inches) at appropriate scales as requested by USACE. Each sheet will have standard borders and will include a revision block; title block; complete index sheet layout; bar scale; legend; grid lines or grid tic layout in feet; a True North, Magnetic North, and grid North arrow with their differences shown

### 7.2.3 Digital Data Compatibility

All digital data files and application will be developed and delivered in a format compatible with systems actively in use by USACE. No proprietary software will be used to prepare these applications. This ensures that data will be readily accessible by all members of the project team authorized to use these data. This also ensures that the data is portable should it be necessary to transfer each project GIS and associated databases to other servers and workstations. Deviations or changes to project standards will be done only at the request of USACE.

## 7.3 Digital Format for Survey/Mapping Data

This section presents the data and source standards that will be used at the SEDA.

### 7.3.1 Data Standards

All data will conform to the SDS. At the SEDA, the first entity set in the SDS will be followed to allow organization of the major GIS layers. USACE will provide direction as to which portions of the SDS are to be used.

## 7.4 Computer Files

Widely used and commercially available hardware and software will be utilized in the development and maintenance of the GIS. Applications will be developed for software running under the Microsoft 2000 or XP operating systems. ArcView v3.2 or higher will be the primary GIS software used to manage the GIS. Microsoft Office Professional v2000 or higher (Word, Excel, Access) will be the primary workstation application to manage text, spreadsheet and database information. Adobe Acrobat document format (pdf) will be utilized to publish electronic deliverables on CDs and the web. The shareware pdf viewer will be provided along with the pdf documents. The interrelationships between these applications, their associated data sources, and intended output will be documented in the site-specific GIS Users Manual.

All location survey data, digital maps, GIS, associated database and CAD files, and digitized aerial photographs will be provided in common, transportable formats that can be copied to portable media for archiving or transfer to other team members. Submittals will be delivered on PC CD ROM media. As appropriate, digital files will also be available through ftp connections or on other media with USACE approval.

## 7.5 Items and Data

Each of the following deliverable items and data will be specified as required per the task order submittal requirements.

### 7.5.1 Control Points

A tabulated list and location description in digital format will be prepared to document all surveyed location control points established for SEAD 46 and SEAD 57 showing the coordinates and elevations (if applicable). These data will be part of the project database and will be submitted in tabular format.

### 7.5.2 Description Cards

A location description card will be prepared to document each permanent control points (survey monument) established for SEAD 46 and SEAD 57. Components of the digital description cards will include a north arrow, sketch showing the relative location of the monument in relation to reference marks, unique natural and cultural features (such as buildings, railroads, towers, utilities, trees), a description telling how to locate the monument from known mapped features, the monument's name and identification number, the final posted coordinates and elevation.

### 7.5.3 Aerial Photographs

All utilized aerial photographs used as part of the project will be delivered in digital format (.tif with associated world or georeference file) as part of the GIS submittals.

### 7.5.4 Unexploded Ordnance Items

A tabular list of all OE and UXO components with associated location, anomalies, and descriptions will be provided. All survey coordinates and UXO-related digital information will be stored as part of the project database and will be reported in digital and hard copy format.

### 7.5.5 Maps and Drawings

Paper and digital maps will be provided at the scale and size required by the project and as requested by the USACE.

# 8.0 Work, Data, and Cost Management Plan

This Work, Data, and Cost Management Plan describes procedures for the management and control of work and costs for the geophysical investigation work in SEAD's 46 and 57 at the Seneca Army Depot. This plan was developed in accordance with U.S. Army Engineering Support Center, Huntsville (USAESCH) Data Item Description (DID) OE-005-08.01.

## 8.1 Approach

For this project, Shaw Environmental, Inc. will establish a management team to ensure that all work is performed in a timely manner and that procedures and plans are followed. The management team will include the Project Manager (PM), Project Geophysicist (PGP), and the Ordnance and Explosives Technical Manager (OETM). The team may include other personnel/disciplines as appropriate. These team members will oversee the planning, field, and/or reporting phases of the project. Weekly management team project review meetings will be conducted to ensure that the geophysical and related UXO work is being performed efficiently and safely. The overall project organization and reporting structure is presented in Section 2.0, "Technical Management Plan." An organizational chart for the Seneca Army Depot project team is presented as Figure 2-1.

The PM has overall responsibility for project implementation. In turn, the PM and PGP will involve the Shaw Environmental, Inc. OE Service Center to help ensure that the correct procedures are in place during the planning phase of operations. They will also ensure that these procedures are carried out in the field to protect the safety of field personnel and the public and the efficiency of activities. During the implementation of field operations, the OE Service Center will supply the necessary technical and safety support on an as needed basis. Representatives of the OE Service Center will also visit the site during the project to review and audit field activities and provide subsequent input on performance to the PM.

The PM will be responsible for overall performance of the geophysical and OE tasks including ensuring that the work is being performed efficiently and that approved procedures are being followed. The PM will oversee and track project tasks both from a schedule (see Section 8.2) and cost (see Section 8.3) perspective. The PM is integral in establishing the project schedule, and will track the progress of field operations on a daily, weekly, and monthly basis to ensure operations are completed in accordance with contractual requirements. If activities are running behind or ahead of schedule, the PM will be responsible for reporting schedule variances to the U.S. Army Corps of Engineers (USACE) Project Manager as they become apparent. During field operations, the PM will communicate daily or as needed with the LGP, OETM or the SUXOS, to ensure that operations are being performed in an efficient manner and, if efficiency becomes a concern, the PM will be the primary driver for corrective measures.

The SUXOS will be in charge of all UXO personnel on site. The SUXOS will manage the UXO support teams to optimize the geophysical investigation progress while maintaining a safe work environment for team members as well as the public. During the project, the SUXOS will have full authority and responsibility for UXO field operations. However, the SUXOS and LGP will coordinate daily to ensure the optimum use of project resources and the safe execution of all work. The SUXOS will report to the OE Technical Manager on progress of activities and will maintain open communications with the OE Service Center to discuss any technical issues. The SUXOS will ensure that all UXO operations in the field are being conducted in accordance with the work plan.

The PGP will be in charge of the Shaw safety program for the geophysical investigative activities. The PGP, with the assistance of the SUXOS will ensure that safety requirements are being conducted in accordance with the Site Safety and Health Plan. The PGP or the UXO techs at the site will have the authority to stop operations on-site if a safety concern arises. The PGP will communicate with the OETM on the status of safety as the project is performed. To help ensure a safe and healthful work environment, all on site personnel will attend joint daily tailgate-safety meetings.

The PGP will ensure that all work is being performed in accordance with site-specific work plans, as appropriate. The PGP will communicate with the PM and the OETM on the status of quality of operations as the geophysical investigation is performed. The PGP will be responsible to complete the Rapid Response Quality Control Daily Report which details the task performed for the day as well as any QC issues that arise. The PGP will be responsible for overseeing any corrective actions that take place during the project.

## 8.2 Schedule

A project schedule has been prepared (Figure 8-1) for this geophysical investigation and OE-related action. The schedule will address the planning, field operation, and reporting phases of the project. The schedule will be created using Microsoft Project. This software will enable Shaw to track both schedule and progress.

The schedule will identify the project components in the different phases of work in the appropriate chronology, including deliverables and important project milestones. For both planning and reporting documents, review periods will be established.

The project progress will be tracked weekly on the schedule to show actual project status compared to the initial project schedule to show variance and impact on project duration.

## 8.3 Cost Control and Tracking

Project costs will be tracked weekly by the Project Business Administrator/Cost Engineer (PBA) using Shaw's InSite 2000 cost tracking program. In order to track weekly costs, daily labor, equipment, subcontractors, supplies, etc. utilized or purchased in the field will be tracked by the LGP and submitted to the PBA. The PBA will input the costs into the InSite program and will forward the cost reports to the USACE PM for review and approval. The reports will include cost tables detailing the weekly expenditures with the appropriate backup information, the total expenditures to date, committed costs, estimate to complete, budget, and variance information.

## 8.4 Recurring Deliverables

Over the course of the project, three deliverables will be submitted regularly to USACE that discuss the project performance and/or cost management. These deliverables include the Rapid Response Quality Control Daily report, the weekly cost report, and the project Weekly Report.

### 8.4.1 Rapid Response Quality Control Daily Report

As stated above, the LGP will prepare daily QC reports, including geophysical reports, for each day that work is performed on site. Details of the report are discussed in Section 10.0, "Quality Control Plan." The Quality Control Plan section of this Work Plan has been written to address the geophysical and OE related Quality Control issues. The daily QC report will be submitted to the on-site USACE on-site representative the morning of the day after the reporting date.

### 8.4.2 Weekly Cost Report

The PBA will prepare the weekly cost report utilizing Shaw's InSite 2000 program. This report will summarize the project costs incurred for the week and the total costs to date. The summary report will detail the variance of each task versus the established budget for the task. This report will be submitted to the USACE on-site representative and the USACE PM for review.

### 8.4.3 Weekly Report

Each week, the PM will prepare and submit to the USACE PM a report which provides a summary of the tasks completed for the previous week activities. The report will include discussion of the progress made for the geophysical investigation, any OE issues which were encountered, discussion of any safety issues, and other project related issues. The weekly report will be submitted by Tuesday of the following week for the previous week's activities.

## 8.5 Records Management

Shaw Environmental, Inc. will maintain records of all geophysical data and related files as required to provide a complete history of the project activities. All geophysical files, including data, lists, excavation results, photographs, and maps, will be organized by data set, day, or grid. All reports and memos will additionally have a unique Shaw document control number.

The master repository of the electronic files documenting the geophysical mapping activities will be maintained in a Geographic Information System database. This data will be backed up on a daily basis. Electronic files of final geophysical investigative grid data, maps, quality assurance/QC data, anomaly lists, dig lists, and clearance areas will be archived to CD-ROM. Reports and submittals will be provided to the USACE Omaha District.

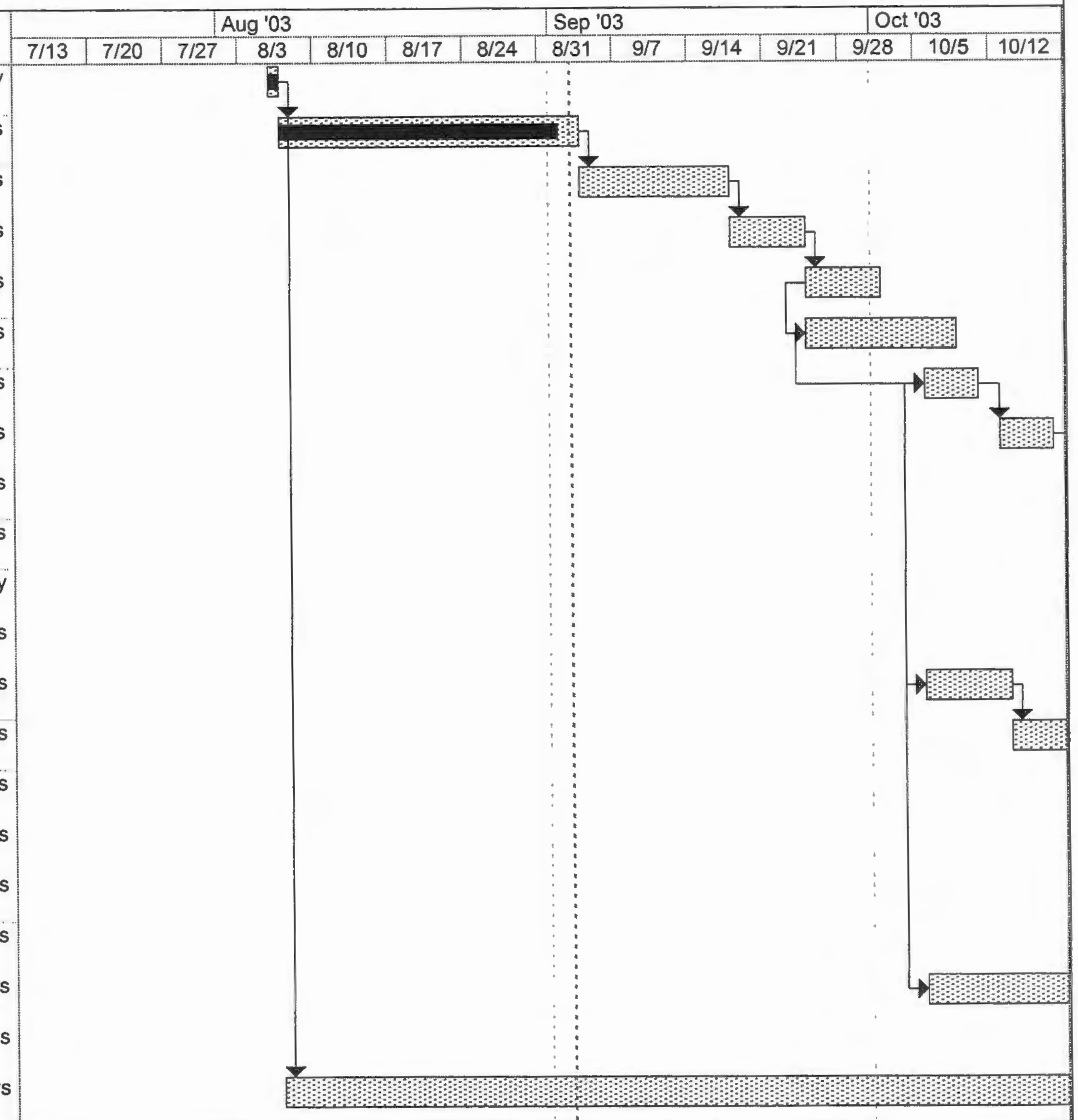
## 8.6 Subcontractors

Shaw's Defense Contract Audit Agency (DCAA)-approved purchasing system will be utilized for the acquisition of all materials and supplies in support of contract requirements. Shaw's procurement approach strongly favors competitive, fixed-price subcontracting among qualified small and disadvantaged businesses. Shaw places added emphasis on the use of qualified subcontractors and suppliers who have a local presence and firms emphasizing local hiring.

For this task order, the subcontractors anticipated to be utilized include a clearing subcontractor and a surveyor. Competitively awarded subcontracts, with detailed scopes of work that designate the services to be provided, will be used to acquire and manage these subcontracted services.

Figure 8-1
Seneca Army Depot
Geophysical Investigation

| ID | | Task Name | Duration |
|---|---|---|---|
| 1 | ✓ | Task Order Award | 1 day |
| 2 | | Work Plan Preparation | 20 days |
| 3 | | USACE review of Work Plans | 10 days |
| 4 | | Incorporate Comments to Work Plan | 5 days |
| 5 | | Final Approval of Work Plans | 5 days |
| 6 | | Site Set-up/Planning | 10 days |
| 7 | | Geophysical Prove Out | 5 days |
| 8 | | Prepare Report of GPO | 5 days |
| 9 | | USACE Review of GPO Report | 5 days |
| 10 | | Incorprate Comments/Final Approval GPO Report | 5 days |
| 11 | | Mobilization | 1 day |
| 12 | | Geophysical Mapping (Open) | 13 days |
| 13 | | Clearing of Wooded Areas | 6 days |
| 14 | | Mag & Flag (Wooded Areas) | 8 days |
| 15 | | Mag & Flag DGM area | 5 days |
| 16 | | Data Review and QC | 13 days |
| 17 | | Re-Aquiring Anomolies (DGM) | 5 days |
| 18 | | Re-Acquiring Anomolies (Intusive) | 12 days |
| 19 | | Site Administration | 55 days |
| 20 | | Final Project Report | 20 days |
| 21 | | Project Support | 95 days |




Project: SenecaSch9-4-03
Date: Wed 9/3/03

Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline

Figure 8-1
Seneca Army Depot
Geophysical Investigation

| ID | | Task Name | Duration |
|---|---|---|---|
| 1 | ✓ | Task Order Award | 1 day |
| 2 | | Work Plan Preparation | 20 days |
| 3 | | USACE review of Work Plans | 10 days |
| 4 | | Incorporate Comments to Work Plan | 5 days |
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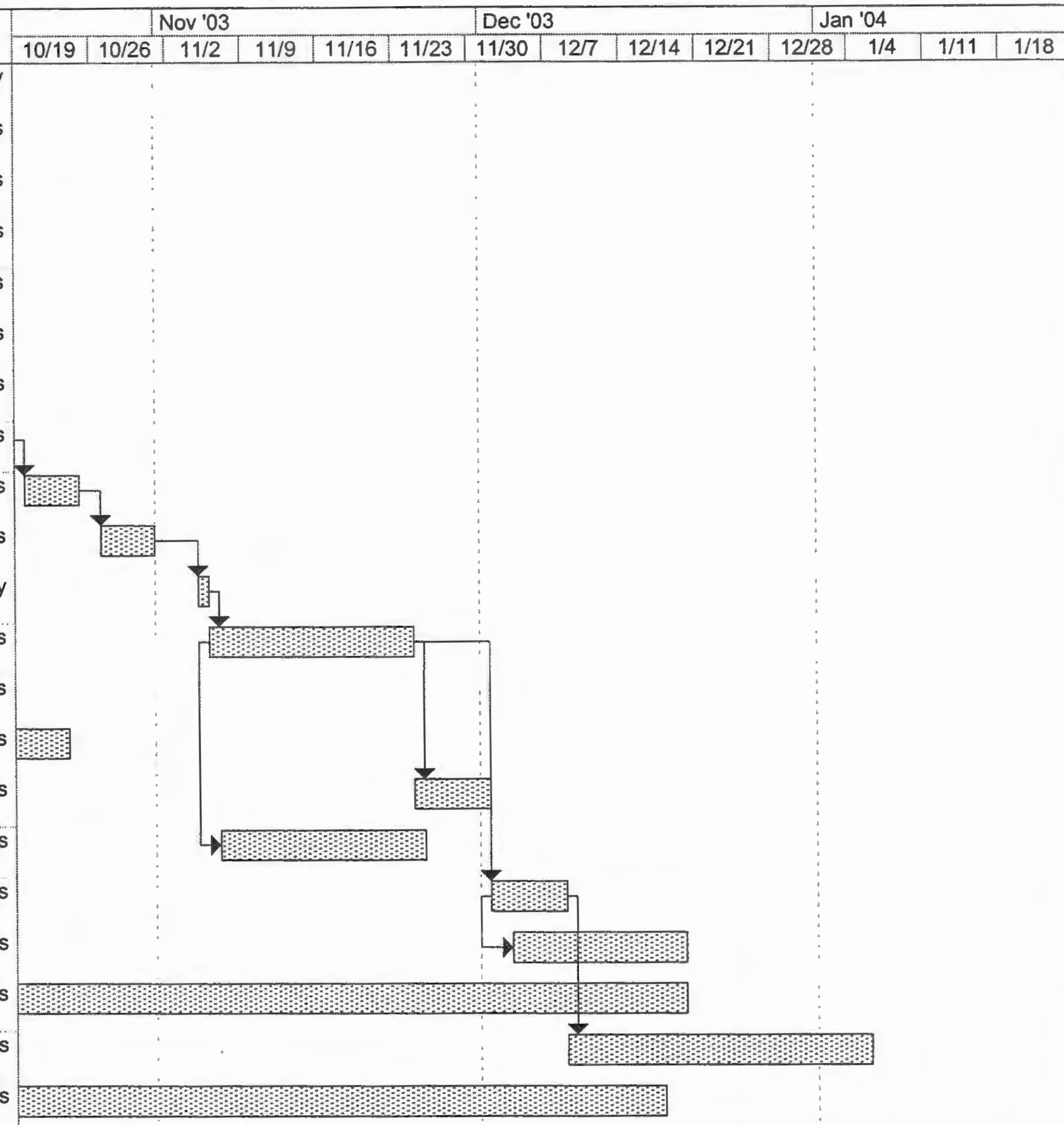


Project: SenecaSch9-4-03
Date: Wed 9/3/03

| | | |
|---|---|---|
| Task | Milestone | External Tasks |
| Split | Summary | External Milestone |
| Progress | Project Summary | Deadline |

# 9.0 Property Management Plan

This Property Management Plan describes how property management will be performed for work implemented under this Geophysical Investigation Work Plan. This plan was developed in accordance with U.S. Army Engineering Supply Center, Huntsville (USAESCH) Data Item Description (DID) OE-005-09.01. In addition to this plan, Shaw will manage government property in a manner consistent with PR028, Government Property Procedures.

## 9.1 Property

Property used on this project will be will be purchased specifically for this project. In most cases, Shaw will utilize Shaw-owned or rental equipment during the execution of this task order and government property will not be purchased. The following three subsections provide a description of the types of equipment and materials that will be used during this geophysical investigative project on SEAD's 46 & 57.

## 9.2 Field Equipment

The following field equipment will be required (purchase/rented) for this geophysical investigation:

| Equipment | Estimated Quantity |
|---|---|
| **Survey Equipment** | |
| Leica Total Station | 1 |
| GPS | 1 |
| Stakes | TBD |
| Marking paint | TBD |
| Survey flagging | TBD |
| Survey tape - 200 feet | 1 |
| Field book | 1 |
| **Search Equipment** | |
| Schonstedt Magnatometers | 3 |
| EM-61MK2 | 4 |
| Other search equipment | TBD |
| Pin Flags | TBD |
| Stakes | TBD |
| EM-61 Batteries | TBD |
| Software | TBD |
| Control Console | TBD |
| Cables | TBD |
| Poly line | TBD |
| **Other Equipment** | |
| Office Trailer | 1 |
| Pick-up Truck | 1 |
| Rental Car | 2 |
| Gator ATV | 1 |
| Gator Trailer | 1 |
| Video Camera | 1 |
| Digital Camera | 1 |
| Cell Phones | 2 |
| Radios | 3 |
| Batteries - 9 volt | As Needed |
| **Safety Equipment** | |
| Yellow caution tape | TBD |

| Equipment | Estimated Quantity |
|---|---|
| First aid kits | 4 |
| Eyewash stations | 1 |
| Fire extinguishers | 4 |
| Insect repellent | TBD |
| Rain suit | TBD |
| Ear plugs | TBD |
| Safety glasses | TBD |
| Leather gloves | TBD |
| Shin guards | TBD |
| Port-a-Johns | 2 |
| Plastic Sheeting | TBD |
| Duct Tape | TBD |
| Long handle shovel | TBD |
| 100 ft Extension Cord | TBD |
| **Explosives Materials** | |
| Portable Magazines | TBD |
| Sand Bags | TBD |
| Sand | TBD |
| Jet Perforators | TBD |
| NONEL Shock Tube | TBD |
| NONEL Mushroom starter | TBD |
| Blasting Caps | TBD |
| Detonating Cord | TBD |
| Explosive placards (vehicle & storage) | TBD |

## 9.3 Office Equipment

The following office equipment may be acquired/rented for this geophysical investigation:

| Equipment | Quantity |
|---|---|
| Computer/Printer | TBD |
| Copier | TBD |
| Fax Machine | TBD |

| | |
|---|---|
| Scanner | TBD |
| Desks | TBD |
| Chairs | TBD |
| Tables | TBD |
| Filing cabinets | TBD |

## 9.4 Consumable Supplies

The following consumable supplies may be acquired for during this geophysical investigation project:

| Supply | Quantity |
|---|---|
| Copy Paper | TBD |
| Ink cartridges | TBD |
| Miscellaneous Pens/Pencils | TBD |
| Clip Boards | TBD |
| Field Log Books | TBD |
| Surge Suppressor | TBD |
| Staplers | TBD |
| Miscellaneous paper clips, thumb tacks, multiple binder clips, etc. | TBD |
| Broom | TBD |
| Mop | TBD |
| Trash bags | TBD |
| File folders, CD's, Disks | TBD |

## 9.5 Purchase Requisition Procedures

Acquisitions will be carefully managed in accordance with the Federal Acquisitions Regulation (FAR) for the actions taken during this project. A minimum of three quotations for each item to be purchased over $2500 is planned and a comparison of rental versus purchase cost for each item will be performed. The reason for a minimum of three bidders is to ensure that adequate competition for materials/supplies is achieved and subsequent best value for these supplies is established.

## 9.6 Field Vehicles

Field vehicles are likely to be required for actions implemented under this plan. Such vehicles may include full-size pickup trucks, rental cars, and other project-specific required vehicles such as all-terrain vehicles (ATVs) or Gators. As available, these vehicles will be obtained from the existing Shaw vehicle pool or they will be rented from local vendors. The pickup trucks will be used to transport instruments and supplies for the project, and the rental cars will be primarily used to move personnel around the project site as well as to off-site living quarters. Vehicles such as ATVs or Gators will be used for towing the geophysical equipment during the project.

## 9.7 Government Property and Low Value Equipment

Depending on its purpose and value, property obtained for project use may be classified as government-furnished property (GFP), consumable, or low-value equipment. The PBA is responsible for classifying property in accordance with Rapid Response contract requirements and Shaw policy. Low-value equipment is not purchased directly by the Government and is the property of Shaw. All means will be taken to avoid acquiring any Government property during this task order.

## 9.8 Storage Plan

Property will be stored in a controlled-access area, the office trailer, or a building at the Seneca Army Depot. Consumables and low value equipment will be under the control of the Senior Geophysicist or the UXO technicians, depending on the property.

## 9.9 Ultimate Disposition Plan

All procured items on this project will become GFP. As directed by the Contracting Officer, the non-consumable materials and supplies that have not been lost or destroyed will be turned over to USACE for storage or transferred to another project at the completion of this project.

## 9.10 Property Tracking

Property will be tracked by the PBA to ensure that all items purchased are accounted for. As required, a property tracking report will be submitted to the USACE Contracting Officer. The report will list the GFP that was directly charged to the project. Specifically, this report will detail the following:

- Vendor
- Item description
- Purchase quantity
- Quantity on hand
- Any lost, damaged, or destroyed equipment
- Unit price
- Type (consumable, expendable, etc.)
- Bar code/identification number and/or serial number
- Location
- Last inventory date

## 9.11 Notification of Loss, Damage, or Destruction

Government property that is lost, damaged, or destroyed during any action taken under this plan will be identified and reported to the Contracting Officer. The property will be replaced immediately if still necessary to the project.

# 10.0 Quality Control Plan

This unexploded ordnance (UXO) Quality Control Plan (QCP) identifies the approach, methods, and operational procedures to be employed to perform quality control (QC) during UXO activities at Seneca Army Depot. This plan was developed in accordance with Huntsville Mandatory Center of Expertise Data Item Description (DID) OE-005-11.01.

## 10.1 Introduction

Shaw Environmental, Inc. will implement the procedures described in this plan as required by the U.S. Army Corps of Engineers in the conduct of UXO activities at Seneca Army Depot. The objectives of this plan are as follows:

- Identify the project QC organization and define each individual's authority, responsibilities, and qualifications.
- Define project communications, documentation, and record keeping procedures.
- Establish QC procedures, including the necessary supervision and tests, to ensure that the work meets applicable specifications and drawings.

## 10.2 Project Background

The overall scope of work for this project involves procedures to be employed during a time sensitive geophysical investigation at an area known to contain OE materials. The purpose of the geophysical investigation is to provide detailed mapping of potential OE for removal actions at a later date.

## 10.3 Project Scope of Work

Two areas will be investigated during this project: the Former 3.5 inch Rocket Range (SEAD 46), and the Former EOD Range (SEAD 57).

The Former 3.5-inch Rocket Range (SEAD 46) consists of approximately 46 acres on the North side of the depot due east of the Ammunition Storage Area. The majority of ordnance found during an OE EE/CA completed in 1992 included 40mm practice grenades and other items that probably reflects the site's use as a local training area during the 1980's and 1990's. A single 3.5-inch Rocket, M28A2, HEAT, was also found on the surface West of the hill at SEAD 46. Based on the results of the OE EE/CA, the M28A2 Projectile is designated as the Most Probable Munition (MPM) for this area.

The Former EOD Range (SEAD 57) consists of approximately 61 acres at the northern end of the Depot immediately adjacent and south of the Open Burning/Open Detonation Grounds. The 143'd EOD Detachment performed demolition activities in this general area for more than 20 years. Based on the results of the OE EE/CA, the 37mm MK II projectile is designated as the MPM for this area.

The geophysical investigation for these areas will require the following UXO tasks:

- UXO support during brush clearance operations
- Area preparation to include the removal of large items of metallic scrap
- UXO support during geophysical survey operations
- Anomaly investigation and UXO resolution

## 10.4 QC Personnel Organization and Responsibilities

The overall project organization and reporting structure are included in the Technical Management Plan, Section 2.0. This section addresses QC personnel, organization, qualifications, and responsibilities.

### 10.4.1 UXO Quality Control Specialist

The Unexploded Ordnance Quality Control Specialist (UXOQCS) has authority to enforce the procedures detailed in this plan, including authority to stop work. This authority applies equally to all project activities, whether performed by Shaw or a subcontractor or supplier.

The UXOQCS is responsible for planning and executing QC oversight of project conditions and ensuring compliance with specified QC requirements. Specifically, the UXOQCS is responsible for the following:

- Developing, assessing the effectiveness of, and maintaining this QCP and related procedures
- Reviewing and approving the qualifications of proposed technical staff and subcontractors
- Planning and ensuring the performance of preparatory, initial, follow-up, and completion inspections for each definable feature of work
- Identifying quality problems and verifying that appropriate corrective actions are implemented
- Ensuring that the requisite QC records, including submittals, are generated and retained as prescribed

The UXOQCS will be physically on site whenever project-related work is in progress. If the UXOQCS is absent from the site, an alternative UXOQCS will be designated and will be given equivalent responsibilities and authority.

The UXOQCS will report independent of project management to the Program Quality Control Manager. The Rapid Response Contract Program Contract Quality Control Manager, Mr. Dave Rohm, is responsible for ensuring that the overall QC procedures and objectives of the project are met.

### 10.4.2 Personnel Qualifications and Training

Project staff will be qualified to perform their assigned tasks in accordance with terms outlined by the contract and USAESCH DID OE-025.01. Resumes and/or UXO Data Base Numbers for proposed personnel are included in Appendix H.

### 10.4.3 Documentation of Qualification and Training

The UXOQCS will maintain records documenting the required qualifications and training for each site worker. The UXOQCS will monitor expiration dates in order to advise employees of the need for refresher training or other requirements. The UXOQCS will maintain training records for personnel and visitors, as required by this plan. All required records will be maintained on site for audit purposes. A field QC logbook will be maintained by the UXOQCS to document details of field activities during QC monitoring activities.

## 10.5 Submittal Management

The Project Manager is responsible for overall management and control of project submittals.

The UXOQCS is responsible for ensuring that submittals are in compliance with applicable contract specifications. The UXOQCS is also responsible for ensuring that a project file is established and maintained and those accountable documents in accordance with the contract.

## 10.6 QC Inspections

The UXOQCS is responsible for verifying compliance with this QCP through implementation of a three-phase process. This section specifies the minimum requirements that must be met and to what extent QC monitoring must be conducted by the UXOQCS.

### 10.6.1 Preparatory Phase Inspection

The UXOQCS or designee will perform a preparatory phase inspection prior to beginning each definable feature of work. The purposes of this inspection are to review applicable specifications and to verify that the necessary resources, conditions, and controls are in place and compliant before the start of work activities. The UXOQCS will document this inspection on the Daily QC Report.

The UXOQCS will review work plans and operating procedures to ensure that they describe pre-qualifying requirements or conditions, equipment and materials, appropriate sequence, methodology, hold/witness points, and QC provisions. He will verify that the required plans and procedures have been prepared and approved and are available to the field staff; field equipment is appropriate for its intended use, available, functional, and properly calibrated; staff responsibilities have been assigned and communicated; staff have the necessary knowledge, expertise, and information to perform their jobs; arrangements for support services (such as test laboratories) have been made; and prerequisite site work has been completed. As part of the preparatory phase inspection, the UXOQCS will verify that lessons learned during previous similar work have been incorporated as appropriate into the project procedures to prevent recurrence of past problems.

Project staff must correct or resolve discrepancies between existing conditions and the approved plans/procedures identified by the UXOQCS during a preparatory phase inspection. The UXOQCS must then verify that unsatisfactory and nonconforming conditions have been corrected prior to granting approval to begin work. Client notification is required at least 24 hours in advance. Results will be documented in the Daily QC Report.

### *10.6.2 Initial Phase Inspection*

The UXOQCS is to perform an initial phase inspection the first time a definable feature of work is performed. The UXOQCS will utilize the Daily QC Report, included Appendix D as Form 11-1, to check preliminary work for compliance with procedures and processes and resolve differences of interpretation. Initial inspection results will be documented by the UXOQCS in the QC log and summarized in the Daily QC Report. Discrepancies between site practices and approved plans/procedures are to be resolved and corrective actions for unsatisfactory and nonconforming conditions or practices are to be verified by the UXOQCS prior to granting approval to proceed.

### *10.6.3 Follow-up Phase Inspection*

The UXOQCS will perform a follow-up inspection each day a definable feature of work is performed. The purpose of the follow-up inspections is to ensure compliance with work standards. The follow-up inspections will be recorded on the Daily QC Report and in the UXOQCS logbook. He is also responsible for verifying that a daily health and safety inspection is performed and documented as prescribed in the Site Safety and Health Plan.

### 10.6.4 Additional Inspections

Additional inspections may be performed on the same definable feature of work at the discretion of the client or the UXOQCS with approval by the client. Completion and acceptance inspections will also be performed to verify that project requirements relevant to the feature of work are satisfied.

## 10.7 QC Verification of Geophysical Mapping

QC verification will be performed to ensure that the geophysical mapping is being performed according to the performance standards of this project. QC verification will be performed at two anomaly locations in each grid to be selected by the USACE, according to the following procedures.

A white pin-flag will be placed at the coordinates of each geophysical mapping anomaly to be verified. The EM-61 MK2, which was used to obtain the geophysical data and generate geophysical maps and target lists, will be used to manually relocate the central peak of each anomaly for the geophysical QC testing. After each anomaly is excavated and categorized within a given grid, the EM-61 MK2 will be used to QC each target anomaly excavation.

After the excavation is completed, the EM-61 MK2 will be used to survey each excavation location. EM data will be obtained in real-time and the sensor data will be noted and recorded on a QC form (hard copy or electronic). The entire excavation will be surveyed. The sensor data must be within background range, as determined by the Site Geophysicist. Background values for each grid will be determined from the original geophysical map or profile.

If the sensor data are determined to be within background range, the QC test is completed and the excavation can be backfilled. If the sensor data is determined to be above background range, the excavation will continue down to a maximum depth of four feet below ground surface.

## 10.8 Calibration and Maintenance

Calibration/maintenance of geophysical instruments, radios/cell phones, vehicles/machinery, and other project equipment will be performed per manufacture's specifications. Geophysical detection equipment will be tested daily on the test plot as described in Section 6.0 (Geophysical Investigation Plan). Records of these activities will be maintained by the UXOQCS.

## 10.9 Geophysical Data Collection

The QC Geophysicist will verify and document that the geophysical data collection requirements as specified in the Geophysical Investigation Plan are met. Included are reviewing data for instrument functionality, instrument noise, missing survey lines, data "gaps" along survey lines, number of data spikes, navigation control, and equipment calibration.

## 10.10 Geophysical Data Processing, Interpretation and Anomaly Selection

This includes review of data manipulation and evaluation by the QC Geophysicist after the data collection is completed. The processed data and resulting dig lists will be reviewed by the QC geophysicist. The processed data will be reviewed for leveling, completeness, processing procedures, data presentation and overall data quality. The dig list review may include the additional selection of targets above and below the cut line, the rejection of select targets, correct grid information and additional notes.

# 11.0 Environmental Protection Plan

This Environmental Protection Plan (EPP) describes the approach, methods, and procedures that Shaw Environmental, Inc. will employ to protect the natural environment during the geophysical mapping activities at SEAD 46 & 57 at the Seneca Army Depot. This plan was developed in accordance with U.S. Army Engineering Support Center, Huntsville (USAESCH) Data Item Description (DID) OE-005-12.01

## 11.1 Endangered/Threatened Species within the Project Site

Shaw investigated the U.S. Fish and Wildlife Service Threatened and Endangered Species System (TESS) for the State of New York. The list (see Table 11-1) includes approximately 20 animals and 6 plants which are considered threatened or endangered. Many of these listed are marine animals which will not be present at the site. Upon further review of the nearby Montezuma National Wildlife Refuge, only the Bald Eagle and the Peregrine Falcon are listed as threatened or endangered.

While it not anticipated that any endangered species will be encountered during the site activities, Shaw will immediately notify the USACE if any are discovered and work will not proceed until authorized.

### 11.1.1 Cultural and Archaeological Resources

The areas of where the geophysical mapping will be conducted, SEAD 46 & 57 have been utilized by the Army since their inception and it is likely they have a low archaeological sensitivity.

There are no buildings on the sites where the geophysical mapping is to be perfromed.

### 11.1.2 Water Resources within the Project Site

There are no surface water resources within the limits of either SEAD 46 or 57.

The work for this phase of the project includes only surface mapping and minor excavation to re-acquire anomalies and groundwater will not be encountered.

### 11.1.3 Coastal Zones within the Project Site

The project site not located adjacent to any coastal zones.

### *11.1.4 Trees and Shrubs that will be Removed within the Project Site*

Grassland has developed on a significant portion the SEAD's 46 & 57. As described in Section 2.4, the grasses and shrubs in the areas of concern will be mowed or cut by depot personnel to facilitate the geophysical survey.

In the perimeter areas of SEAD 46 and 57, 10-foot wide transects will be cleared of the vegetation in order to perform the geophysical mapping by a "mag and flag" technique. These areas consist of small trees and native brush and will be cleared using a hydraulic ax or similar type equipment. The cleared vegetation will be moved to the side of the transects or removed to more open areas if required to obtain access to the cleared areas.

### *11.1.5 Existing Waste Disposal Sites within the Project Site*

There are no known waste disposal sites with the SEAD 46 or 57 sites.

### *11.1.6 Compliance with Applicable or Relevant and Appropriate Requirements*

Shaw Environmental, Inc. will follow all applicable regulations and obtain all necessary permits concerning environmental protection, pollution control, and abatement for the proposed field operations.

Applicable regulations include, but are not limited to the following:

- Chemical-Specific ARARs
  - Resource Conservation and Recovery Act (RCRA), Groundwater Protection Standards and Maximum Concentration Limits (40 CFR 264, Subpart F).
  - New York State Codes, Rules and Regulations (NYCRR) Title 6, Chapter X.
  - New York State Department of Environmental Conservation, Division of Hazardous Waste Remediation, Technical and Operational Guidance Series, Technical and Administrative Guidance Memorandum: Determination of Soil Cleanup Objectives and Cleanup Levels, HWR-94-4046 (TAGM 4046).
  - New York State Department of Environment Conservation, Division of Fish and Wildlife, Division of Marine Resources, Technical Guidance for Screening Contaminated Sediments, July 1994.
  - Declaration of Policy, Article 1 Environmental Conservation Law (CEL).
- Location-Specific ARARs
  - Endangered Species Act (16 USC 1531).
  - Fish and Wildlife Coordination Act (16 USC 661).

- New York State Freshwater Wetlands Law (ECL Article 24, 71 in Title 23).
- New York State Freshwater Wetlands Permit Requirements and Classification (6 NYCRR 663 and 664).
- New York State Floodplain Management Act and Regulations (ECL Article 36 and 6 NYCRR 500).
- Endangered and Threatened Species of Fish and Wildlife Requirements (6 NYCRR 182).
- New York State Flood Hazard Area Construction Standards.

• Action-Specific ARARs
  - RCRA Generator Requirements for Manifesting Waste for Off-site Disposal (40 CFR 262).
  - RCRA Transporter Requirements for Off-site Disposal (40 CFR 263).
  - RCRA, Subtitle D, Non-hazardous Waste Management Standards (40 CFR 257).
  - DOT Rules for Hazardous Materials Transport (49 CFR 107, 171.1-171.500).
  - Occupational Safety and Health Standards for Hazardous Responses and General Construction Activities (29 CFR 1904, 1910, 1926).
  - OSHA (29 CFR 1910.120).
  - New York State RCRA Generator and Transporter Requirements for Manifesting Waste for Off-site Disposal (6 NYCRR 364 and 372).

• To Be Considered Criteria
  - Three action-specific To Be Considered Criteria (TBCs) have been identified for any potential OE removal actions at SEDA. The first action-specific TBC, AR 200-1, requires Army compliance with all environmental statutes and regulations and requires Army consultation with federal, state, and local regulatory agencies. The second action-specific TBC, AR 385-64, requires that safety measures be taken for the handling of explosive ordnance. The final action-specific TBC, DOD 6055.9-STD, requires that specialized personnel be employed to detect, remove, and dispose of ordnance. This standard defines the safety precautions and procedures for the detonation or disposal of ordnance.

## 11.2 Mitigation Measures for Field Activities

The following sections present the mitigation measures to be implemented while conducting field activities at the Seneca Army Depot.

### 11.2.1 Waste Disposal

The only type of waste material anticipated during the geophysical mapping is the OE and non-OE-related materials excavated during the anomaly re-acquiring. Waste disposal activities for OE and non-OE scrap will be performed in accordance Section 2.0, "Technical Management Plan."

### 11.2.2 Burning Activities

There are no burning activities anticipated during this task order.

### 11.2.3 Dust and Emissions Control

During intrusive and detonation activities, water will be used as a general dust suppressant, if required. Due to the sufficient vegetation at both the sites to be addressed during this task order, dust is not anticipated to be a problem. Shaw will monitor the site on a regular basis and determine if dust suppression activities are required.

### 11.2.4 Spill Control and Prevention

No hazardous substances or materials are expected to be on site that would potentially pose a spill concern. Gasoline and diesel fuel may be stored in cans of less than 5 gallons. As a precaution, spill containment equipment will be stored in the field equipment office. If a spill occurs, preventive measures will be implemented in accordance with Section 6.0, "Site Safety and Health Plan."

### 11.2.5 Storage Areas

The establishment of any storage or stockpile area for OE scrap will be coordinated with the Depot OE Safety Specialist and USACE to determine the most suitable location that will not impact any of the resources.

### 11.2.6 Access Routes

Outside of designated work areas, all personnel and subcontractor equipment and vehicles will remain on established or paved roadways in order to prevent damage to resources and to limit the amount of mud transported onto Depot and public roadways.

Locations where vehicles enter or exit the sites shall be inspected for evidence of sediment tracking.

### 11.2.7 Erosion Control

Due to the relatively flat contours of both of the sites to be geophysically mapped during this task order and the minimal intrusive activities, erosion control is not anticipated to be an issue.

However, should disturbed areas be identified which may present an erosion problem, silt fence will be installed to prevent migration of soils. In addition, if water run-on is a concern in a certain area, hay bales or other means will be utilized to minimize the impacts.

### *11.2.8 Transportation of Equipment or Materials*

Vehicles used to transport equipment or materials will remain on established or paved roadways in order to prevent damage to resources as well as to limit the amount of mud transported onto the depot and public roadways.

### *11.2.9 Temporary Facilities*

Temporary facilities, including office trailers and porta johns, and all other signs of activity will be removed from the staging area at the end of the work activities. Trash will be collected, and dumpsters will be removed as appropriate.

#### *11.2.9.1 Decontamination*

Vehicles and equipment shall be appropriately decontaminated to limit the amount of sediment, soil, or mud transported onto depot and public roadways.

#### *11.2.9.2 Disturbed Areas*

All areas of soil disturbance will be restored as closely to grade as possible to pre-activity condition.

## *11.3 Restoration Activities*

Areas excavated during intrusive activities will be graded to "make safe" and to provide adequate drainage after the excavation has been completed.

Site restoration will consist of backfilling the anomaly excavation areas using a shovel to blend excavated areas with the surrounding topography. All holes will be filled completely so as to avoid any depressions. The disturbed areas will <u>not</u> be re-vegetated, unless otherwise directed by the USACE.

**Table 11-1 Common Threatened and Endangered Species**

**Animals**

| *Status* | *Listing* |
|---|---|
| E | Bat, Indiana ( Myotis sodalis) |
| E | Butterfly, Karner blue ( Lycaeides melissa samuelis) |
| T | Eagle, bald (lower 48 States) ( Haliaeetus leucocephalus) |
| E | Plover, piping (Great Lakes watershed) ( Charadrius melodus) |
| T | Plover, piping (except Great Lakes watershed) ( Charadrius melodus) |
| E | Puma (=cougar), eastern ( Puma (=Felis) concolor couguar) |
| T | Sea turtle, green (except where endangered) ( Chelonia mydas) |
| E | Sea turtle, hawksbill ( Eretmochelys imbricata) |
| E | Sea turtle, Kemp's ridley ( Lepidochelys kempii) |
| E | Sea turtle, leatherback ( Dermochelys coriacea) |
| T | Sea turtle, loggerhead ( Caretta caretta) |
| T | Snail, Chittenango ovate amber ( Succinea chittenangoensis) |
| E | Sturgeon, shortnose ( Acipenser brevirostrum) |
| E | Tern, roseate (northeast U.S. nesting pop.) ( Sterna dougallii dougallii) |
| T | Turtle, bog (=Muhlenberg) (northern) ( Clemmys muhlenbergii) |
| E | Wedgemussel, dwarf ( Alasmidonta heterodon) |
| E | Whale, finback ( Balaenoptera physalus) |
| E | Whale, humpback ( Megaptera novaeangliae) |
| E | Whale, right ( Balaena glacialis (incl. australis)) |
| T | Wolf, gray Eastern Distinct Population Segment ( Canis lupus) |

**Plants**

| *Status* | *Listing* |
|---|---|
| T | Monkshood, northern wild ( Aconitum noveboracense) |
| E | Gerardia, sandplain ( Agalinis acuta) |
| T | Amaranth, seabeach ( Amaranthus pumilus) |
| T | Fern, American hart's-tongue ( Asplenium scolopendrium var. americanum) |
| T | Roseroot, Leedy's ( Sedum integrifolium ssp. leedyi) |
| T | Goldenrod, Houghton's ( Solidago houghtonii) |

# 12.0 Investigation Derived Waste Plan

This Investigation Derived Waste Plan (IDWP) describes the handling of materials during the geophysical mapping activities for SEAD 46 & 57 at the Seneca Army Depot. Two general types of materials are anticipated to be generated during the geophysical investigative activities, OE and non-OE-related materials. This IDWP was developed in accordance with Data Item Description OE-005-13.01.

## 12.1 Non-Ordnance Related Debris Disposal

The following procedures apply to non-OE-related scrap or debris removed from the sites:

- Non-recyclable material and other debris, such as tires, plastic, wood, personal protective equipment, and metal that is not considered recyclable, will be collected and stockpiled or delivered to an appropriate facility. Disposition of non-recyclable waste will be coordinated with the USACE.

## 12.2 Ordnance Related Materials Disposal

Procedures for disposal of OE materials, including UXO, will be in accordance with the guidance presented in the following guidance documents:

- Department of Defense (DOD) 4160.21-M-1
- U.S. Army Corps of Engineers EP 75-1-1, 11 December 1998

Detailed discussion on the disposition of OE is presented in Section 2.0, "Technical Management Plan."

## 12.3 Clearing and Grubbing

Vegetation will be removed as required to support the geophysical mapping activities, according to Section 2.0, "Technical Management Plan." Brush, grass, and small trees may be cut before implementing the activity. Vegetative material will be cut by a hydraulic ax and the resulting vegetation will be placed to the side or moved to open areas for natural decay.

## 12.4 Hazardous Waste

Hazardous wastes are not expected to be encountered or generated during the geophysical mapping activities. If hazardous wastes are encountered during OE removal activities, disposal will be provided in accordance with applicable and relevant requirements.

## *12.5 Transportation*

Transport of encountered OE-related material, including UXO, will be in accordance with Section 2.0, "Technical Management Plan."

# 13.0 Geographical Information System Plan

This Geographical Information System (GIS) Plan describes the methods, resources, and accuracy necessary to successfully document the location of geophysical survey data, location control data, and ordnance and explosives (OE) and unexploded ordnance (UXO) components in project databases; to reproduce the location of these items on digital maps; and to integrate these data in a project GIS. This plan is intended to apply to the geophysical surveys and OE investigations at Seneca Army Depot Activity (SEDA) areas SEAD 46 and SEAD 57. This plan was developed in accordance with U.S. Army Engineering Support Center, Huntsville (USACESH) Data Item Description (DID) OE-005-14.01.

## 13.1 General

A GIS and associated databases will be established to track and manage the data generated during the course of the SEDA project. The hardware and software tools to be used have been specifically chosen to provide a flexible system that allows effective and timely data management, long-term storage and archival of data, and expansion of the database to include new information that can readily be integrated into the existing database as appropriate. The databases and GIS are also designed to be compatible with existing project applications developed for SEDA. This will provide an efficient mechanism for retrieving the geophysical data, location data, and OE and UXO-related information for technical evaluation, removal efforts, and reporting. The databases for project data will be maintained and operated on-site. The project GIS analyst will operate and maintain the GIS at an off-site Shaw Office location.

### 13.1.1 Sources and Standards

All spatial data will conform to the USAESCH OE-GIS standard, which is a subset of the CADD/GIS Technology Center Spatial Data Standards for Facilities, Infrastructure, and Environment (SDS). Metadata will be compliant with Federal Geographic Data Committee (FGDC) metadata standards. The SDS have been developed by the CADD/GIS Technology Center to provide data in an accessible and predictable format that can be used in standard, readily available GIS and CAD applications by other surveying firms, Government contractors, and customers. All data will conform to the SDS. At the SEDA, the first entity set in the SDS will be followed to allow organization of the major GIS layers. The USACE will provide direction as to which portions of the SDS are to be used. Deviations from these standards will be allowed only with the concurrence of the USACE.

### 13.1.2 General File Requirements

The primary digital data that will be managed as part of OE removal actions include raw and processed geophysical data, location survey information, and descriptive and location data on any inert or live OE encountered. The data work flow and relationship between all primary components of the digital record will be documented to facilitate the use of these data by all interested parties.

Raw and processed geophysical data will be provided in both text (ASCII) and database (.dbf) format. Data fields will be space delimited (not separated by a comma). A header will be included describing the type of data, when collected, where collected, collection interval, and line spacing. The x and y columns will be the New York State Plane easting and northing coordinates. The z column(s) will be the instrument reading(s) and the number of columns present will be instrumentation dependent. For the EM61-MK2 data, a z column will be dedicated for each of the 4 time gates collected. All field names will be standardized and integrated with the project database. At a minimum, data fields will include the date, team (name, number, and/or description), area name, OE site and OE items found, as appropriate.

All location survey information, including control points, grid corner points, grid polygons, OE site polygons, inert and live OE points, will be provided in the project database and in ArcView .shp file format. All GIS applications will be delivered as complete ArcView project files or .apr file. All associated coverages, metadata, and related data files should accompany the .apr file and conform to the SDS file structure and naming convention. Topographic data and associated submittals are not required for this task order.

### 13.1.3 Digital Data Compatibility

All digital data files and application will be developed and delivered in a format compatible with systems actively in use by USACE. No proprietary software will be used to prepare these applications. This ensures that data will be readily accessible by all members of the project team authorized to use these data. This also ensures that the data is portable should it be necessary to transfer each project GIS and associated databases to other servers and workstations. Deviations or changes to project standards will be done only at the request of USACE.

### 13.1.4 Plot Size

The default size for each sheet that is plotted will be standard A-size (8.5x11 inches), B-size (11x17 inches), and/or D-size plots (36x24 inches.) Each sheet will have standard borders as dictated by the project and will include a revision block; title block; complete index sheet layout; bar scale; legend; grid lines or grid tic layout in feet; a True North, Magnetic North, and grid

North arrow with their differences shown in minutes and seconds; and the computer file path location where the digital map is stored.

### 13.1.5 Geographical Information System Users Manual

A site-specific users manual will be prepared to document standard operating procedures, the overall work flow (graphical) depicting how the GIS fits into the data management cycle of the project, computer file structure, back up procedures, technical tips and fixes, symbology standards, scaling guides, examples, and pointers to other reference materials. The manual will include the necessary information for a third party to recreate the products. The users manual will be provided in Microsoft Word and Adobe Acrobat .pdf formats. Appropriate sections of the manual will be included as a 'readme.txt' file with distributed digital data.

## 13.2 Project Databases

Project databases will be developed to capture and manage the geophysical data

### 13.2.1 Geophysical Survey Data Database

A geophysical survey database will be developed to capture and manage the geophysical mapping and QA/QC data developed for the investigations. Data managed, analyzed, and reported by the project GIS Analyst will be closely coordinated with the Project Manager to properly control data quality and differential between preliminary and final data.

Microsoft Access 2000 will be the primary database software used to manage the geophysical data. Establishment of this database includes developing the database schema, preparing electronic data entry forms to facilitate data entry, conducting quality assurance (QA)/quality control (QC) audits of the data, and transferring data to the GIS.

The GIS will not be used to store all raw data generated during the OE and UXO investigations. For example, data points collected by geophysical instruments, gridded data used by modeling programs to generate contour maps, and similar types of backup data will likely be archived as separate tables in the database or as independent databases. An attribute field will be added to the GIS coverage that identifies a file location or similar reference to document these data. However, the interpreted results of analysis (such as interpreted geophysical results) will be included in the GIS.

Geophysical data and data flow are discussed in Section 6.0 "Geophysical Investigation Plan". However, the process is similar to that for the Ordnance and Explosives Database discussed in Section 13.2.2 below.

### 13.2.2 Ordnance and Explosives Database

An OE and UXO database will be developed to capture and manage all OE and UXO items encountered as part of the OE investigation. Data managed, analyzed, and reported by the project GIS Analyst will be closely coordinated with the Project Manager to properly control data quality and differential between preliminary and final data.

Microsoft Access 2000 will be the primary database software used to manage the OE data. Establishment of this database includes developing the database schema, preparing electronic data entry forms to facilitate data entry, conducting quality assurance (QA)/quality control (QC) audits of the data, and transferring data to the GIS.

All field data collected as part of the SEDA investigations will be managed in and integrated within the relational database. The data fields in field forms and field data collection equipment will be formatted to be consistent with the data fields that are used in the database. Naming conventions will be developed so all field observations and measurements are consistent. Attributes specific to the OE investigation will be stored and managed in tables separate from other database tables. Several types of information will be used to join tables, including the following:

- OE Site Name—SEAD 46 or SEAD 57
- Grid number—Unique number of geophysical survey grid.
- Identification number—Unique identification number assigned by the field team to each observation, UXO or OE component, or explosion pit

Ordnance and explosives spatial data will be entered into the database as point data and identified by a unique northing and easting coordinate pair. In the event that multiple OE items encountered in the field are grouped and classified as a cluster, the cluster location will be entered into the GIS as a single point. A field in the OE point attribute table will identify such clusters. A separate table with cluster attribute data (size, area, number of OE items, etc.) will be related to the OE point table to provide a detailed description of the cluster as appropriate.

Attribute data includes both qualitative and quantitative sample information such as ordnance type, quantity, and status.

The general workflow for transferring the field data to the database is summarized below.

1. Field observations are recorded either on pre-printed filed forms (hardcopy) or electronically (laptop/palmtop system, or data logger). Electronic data collection

systems will have pre-defined data dictionaries with drop down boxes to simplify and standardize recording of field data.

2. At the end of the field day, data on field forms are verified for completeness and accuracy (i.e., number of observations made match the number of observations recorded). Copies of the field forms are made and hard copies of the electronic forms are printed for the field office.

3. Data from field forms are entered into OE database loading tables. These tables are then loaded into the SEDA GIS and database.

4. Quality control of the data will be monitored by comparing hard copy of the electronic data with the field forms. In addition, built-in QC mechanisms will verify that the data are entered correctly. For example, ordnance type information cannot be entered unless an ordnance sampling location has been properly defined.

5. After data tables are loaded, the database is ready for use for data analysis and reporting, uploading to the GIS, and generation of field maps.

6. A copy of the database will be electronically sent off-site twice a week to the off-site GIS. Backups will be systematically numbered to facilitate tracking and restoration of the data in the event of a database or system error.

To facilitate data entry, minimize errors, and allow tracking of the data, data entry fields on the paper and electronic forms will match the field names in the OE database. This will allow the project team to track the flow of OE information from data collection through processing, analysis, storage, and archiving.

The OE database will also be used to store and track inventory information related to field disposal. For example, the type, quantity, and weight of charges, fusing, and other items delivered and used on site will be maintained in a database table. If UXO is moved and detonated on site, this information will also be included in the GIS.

### *13.2.3 Optional Data*

If chemical and other environmental data is collected during the course of the removal action, such additional chemical data can be accommodated in the database by adding separate tables as necessary; these data tables will be related to the OE data tables, as appropriate. Additional data will be incorporated as necessary into the on-site GIS as coverages. These coverages consist of pre-existing data, or other non-OE data collected during the OE investigation. Sources for such data include existing CAD files, published data, and output from other software applications (such as Geosoft or computer gridding or contouring programs). Examples of these coverages include existing anomaly data, spatial and attribute data collected and mapped by previous investigators, if available.

## *13.3 Geographic Information System*

The purpose of the GIS technology is to effectively manage and integrate all pertinent data collected as part of the SEAD 46 and SEAD 57 OE investigation activities so that the information can be effectively analyzed and utilized to manage the project. The GIS will organize and display the detailed geophysical mapping data required to support follow-on removal action activities. Where appropriate, GIS applications will be developed and used to integrate spatial data (maps) with tabulated data stored in databases (such as cultural features, geophysical anomalies, grid boundaries, QA and QC targets, excavation targets, and OE and UXO type, location, and status). The Contractor will follow standards established by the USACE.

The Contractor will maintain a database of SEDA-compliant metadata for each GIS layer, including information such as the name of the GIS Analyst, when it was made, each and all updates, dates of updates, and what was changed. This GIS data management system will also include the location of SDS compliant layers and all known metadata (using the National Geospatial Data Standards as a guide) for each layer and will be capable of providing tabular reports of each GIS layer. This information will be tracked in a Microsoft Access database.

The GIS will not be used to store all raw geophysical data generated during the OE and UXO investigations. For example, data points collected by geophysical instruments, gridded data used by modeling programs to generate contour maps, and similar types of backup data will likely be archived as separate tables in the database or as independent databases. An attribute field will be added to the GIS coverage that identifies a file location or similar reference to document these data. However, the interpreted results of analysis (such as interpreted geophysical results) will be included in the GIS.

A GIS Analyst will be responsible for the set-up, operation, and maintenance of the GIS. A position description and description of skill required for providing this support is listed below.

**Geographic Information System Analyst.** This individual shall have a minimum of one-year direct experience with ESRI Arcview/Arc Info GIS software. The GIS Analyst shall perform the following duties: Be able to take queries from team members, create projects and print maps and reports from Arcview or Arc/INFO. Be able to perform a vast array of spatial and tabular queries using the available tools in the GIS software. Be able to import and export any spatial and/or tabular data with the GIS software. Be able to identify, categorize, and update the major GIS coverages. Be able to manipulate and edit in AutoCAD Map GIS software. Keep a database of all major GIS coverages, each coverage's metadata (by FGDC standard), and all GIS projects. Assist in the development of a site-specific GIS Users Manual.

## 13.4 Computer Files

Widely used and commercially available hardware and software will be utilized in the development and maintenance of the OE database and GIS. Applications will be developed for software running under the Microsoft 2000 or XP operating system. ArcView v3.2 or higher will be the primary GIS software used to manage the GIS. Microsoft Office Professional v2000 or higher (Word, Excel, Access) will be the primary workstation application to manage text, spreadsheet and database information. Adobe Acrobat document format (.pdf) will be utilized to publish electronic deliverables on CDs. The shareware pdf viewer will be provided along with the pdf documents. The interrelationships between these applications, their associated data sources, and intended output will be documented in the site-specific GIS Users Manual.

All location survey data, digital maps, GIS, associated database and CAD files, and digitized aerial photographs will be provided in common, transportable formats that can be copied to portable media for archiving or transfer to other team members. Submittals will be delivered on PC CD ROM media. As appropriate, digital files will also be available through ftp connections or on other media with USACE approval.

## 13.5 Items and Data

Each of the following deliverable items and data will be specified as required in the task order and submitted to USACE. A secure, password protected website or ftp site will be established for all project-related submittals and project correspondence.

### 13.5.1 Geophysical Data

Geophysical survey and QC/QC data will be submitted in georeferenced tabular form provided in a Microsoft Access 2000 compatible format.

### 13.5.2 Aerial Photographs

All utilized aerial photographs/raster data used as part of the project will be delivered in digital format (.tif with associated world or georeference file) as part of the GIS submittals.

### 13.5.3 OE/UXO Items

A tabular list of all OE and UXO components with associated location, anomalies, and descriptions will be provided. All survey coordinates and UXO-related digital information will be stored as part of the project database and reported in digital and hard copy format.

### *13.5.4 Maps and Geographical Information System*

Paper and digital maps will be provided at the scale and size required by the project and as requested by the USACE. The GIS applications will be delivered as complete, documented (readme files) electronic deliverables that are capable of running on USACE/USACESH GIS workstations. A CD with all GIS data and updates will be submitted with each monthly report.

### *13.5.5 Database and Geographical Information System Users Manual*

A Users Manual will be provided and will include the necessary information to manage and use the geophysical survey and navigation data, the OE and UXO data, and the GIS. This manual will be submitted as both a Microsoft Word and .pdf document.

## 14.0 Interim Holding Facility Siting Plan

Not Applicable.

## 15.0 Physical Security Plan for RCWM Projects

Not Applicable.

# 16.0 References

Shaw Corporation, 1998, PR 028, Government Property Procedures, Procedure Number 028.

Parsons Engineering Science, Inc., 2001, Ordnance and Explosives Engineering Evaluation/Cost Analysis Report

U.S. Army Corps of Engineers, 1998, EP 75-1-1, December 11.

U.S. Army Corps of Engineers, 1999, DID

U.S. Army Corps of Engineers, 2000, *Engineering and Design–Ordnance and Explosives Response (EP 1110-1-18)*, April 24.

U.S. Army Corps of Engineers, 2000, *EP 75-1-2, Unexploded Ordnance (UXO) Support During Hazardous, Toxic, and Radioactive Waste (HTRW) and Construction Activities*, November 20.

U.S. Army Engineering Service Center, Huntsville, 2000, *Basic Safety Concepts and Considerations for Ordnance and Explosives Operations (EP 385-1-95a).*

U.S. Army Engineering Support Center, Huntsville, 2000, *Engineer Pamphlet 1110-1-18.* (Section 8.0)

# Appendix A
# Scope of Work

**Geophysical Investigation**
**Munitions Destruction Areas SEAD's 46 & 57**
**Seneca Army Depot Activity**
**Romulus, New York**

**Contract No. DACA45-98-D-0003**
**Task Order No. 150**

# Appendix A

# TASK ORDER SCOPE OF WORK

**Revision A**

**August 2003**

# U.S. ARMY
# CORPS OF ENGINEERS

**Omaha District Rapid Response**

Scope of Work

for

Contract No. DACA45-98-D-0003
Task Order #0150

Rapid Response Program

Geophysical Investigation
Munitions Destruction Areas
SEAD's 46 & 57
at
Seneca Army Depot Activity
Romulus, New York

**15 July 2003**

**Scope of Work**
**for**
**Rapid Response Action**

**Geophysical Investigation**
**Munitions Destruction Areas**
**SEAD's 46 & 57**
**at**
**Seneca Army Depot Activity**
**Romulus, New York**

Contract Number DACA45-98-D-0003
Task Order #0150

11 July 2003

## 1. Introduction.

**1.1. General.** This Rapid Response project executes a time sensitive geophysical investigation at the Seneca Army Depot Activity (SEDA), Romulus, New York. Ordnance and explosives (OE) exist on the property. This geophysical investigation is intended to provide detailed mapping of potential OE on the Munitions Destruction Areas (SEAD's 46 & 57) for removal actions at a later date. The general project requirements include development of detailed project work plans, site clearing as necessary, general site security (as required), performance of appropriate geophysical investigations, and preparation of project reports including surveys and mapping. Significant intrusive work will not be required under this Scope of Work (SOW), however the Contractor will be required to process a limited number of subsurface anomalies for identification and correlation with the digital mapping results. This task order will be a cost plus fixed fee service contract.

**1.2. Project Request.** The U.S. Army Corps of Engineers, New York District has requested the Omaha District Rapid Response to execute the geophysical investigations for this time sensitive support action. This action by the Omaha District Corps of Engineers, through use of the Rapid Response Program, is in support to the New York District execution of mission. This Scope of Work (SOW) specifies the project plans, anticipated field work requirements, management support and necessary documentation required to complete this action under the Rapid Response Contract DACA45-98-D-0003, Task Order No. 0150. A cost reimbursable- fixed fee service task order will be issued to Shaw Environmental & Infrastructure to accomplish this work. Project site work shall comply with all Federal, State, and local laws and regulations.

**1.3. Background.** The work required under this scope of work falls under the Base Realignment and Closure (BRAC) program. OE is a safety hazard and may constitute danger to site personnel and the local population if improperly managed. All activities involving work in areas potentially containing unexploded ordnance (UXO) hazards shall be conducted in full compliance with

USACE, DA and DoD requirements regarding personnel, equipment, and safety procedures. 29 CFR 1910.120 shall apply to on-site activities.

**1.4. Location.** The Seneca Army Depot is a US Army Facility located in Seneca County, New York near the town of Romulus. SEDA occupies approximately 10,600 acres. The area surrounding SEDA is generally used for farming. See Appendix A – Site Location Map.

**2. Specific Project Requirements.** The objective for this task order is to develop detailed geophysical surveys, mapping and database development as described in Appendix B – Geophysical Investigation Requirements. The Contractor shall identify and adhere to all legally applicable or relevant and appropriate requirements (ARAR's) for this geophysical investigation. In addition, the Contractor shall be required to review and adhere to the applicable OE regulations and procedural documents that are listed on the USACE, Huntsville Center, Ordnance and Explosives Mandatory Center of Expertise web page including Engineering Regulations, Pamphlets, Manuals and Data Item Descriptions (DID's). The Contractor shall assess all applicable data and documents, develop all work plans, provide all performance specifications (as required), submit cost proposals and perform all related work based on the following tasks:

**2.1. Task I - Site Visit and Document Review.** The Contractor shall perform a site visit, as necessary, and review all pertinent documentation including the Ordnance and Explosives – Engineering Evaluation/Cost Analysis Report for Seneca Army Depot, prepared by Parsons Engineering Science, Inc (see Section 8 for other Applicable Publications) and the Explosive Safety Submission for each site. The purpose of this task is for the Contractor to gain additional information about specific site conditions and prior investigative activities. All documentation shall be thoroughly reviewed prior to commencement of any field activities. Preceding on-site activities, the Contractor must obtain prior approval from the Contracting Officer Representative and assure coordination with the USACE Site OE Safety Specialist.

**2.1.1 Geophysical Investigation - Areas of Consideration.** As previously determined, the Munitions Destruction Areas to be mapped by geophysics consist of the following:

- SEAD – 46 (3.5" Rocket Range) consists of approximately 45 acres on the north side of the depot, due east of the Ammunition Storage Area.
- SEAD – 57 (Former EOD Range) consists of approximately 61 acres at the northern end of the depot, immediately adjacent and south of the Open Detonation Area. The 61 acres consists of approximately 40 acres of open grassy area and 21 acres of heavily wooded area. Approximately 20% of the heavily wooded area will be mapped using hand-held equipment. This site will be surveyed between 400 ft radius from the "berm out to a distance of 1,000 ft.

**2.2. Task II – Project Work Plans.** The Contractor shall prepare the following project work plans. These plans shall include a detailed discussion of the technical approach the Contractor plans to use to implement the requirements specified herein and in accordance with Contract Number DACA45-98-D-0003, including applicable Advanced Agreements to this contract. The work plan shall follow the general outline described in Data Item Descriptions OE-005-01 for Type II Work Plans. The plan must be reviewed and approved by the USACE prior to commencement of any site work.

**2.2.1. Geophysical Investigation Work Plan.** The Contractor shall prepare the Geophysical Investigation Work Plans (WP), which shall discuss each specific task required by this Scope of Work (SOW) and explains how the Contractor plans to implement its resources to fulfill all the requirements herein. Specific geophysical requirements are detailed in Appendix B – Geophysical Investigation Requirements. This portion of the work plan will provide the operational plan necessary to successfully complete this project.

**2.2.1.1.** The WP shall outline in detail the methods used for all site clearing activities and procedures used for site safety, traffic management, erosion control, and site maintenance activities. This portion of the work plan shall also include detailed maps of the areas of consideration and how the contractor proposes use of equipment in each distinct area, such as open areas versus wooded areas.

**2.2.1.2.** The WP shall contain a section outlining key personnel (including their resumes) to be used on the project and their responsibilities. Key personnel shall be defined as all salaried professionals (both on-site and home office), the site supervisor, and any field personnel key to the execution of this task order. The Contractor shall notify the USACE Contracting Officer Representative, in writing, of any changes in key personnel during the course of the execution of this task order within 24 hours of such change.

**2.2.1.3.** A detailed project schedule shall be included in the WP, which incorporates this SOW and presents the length of each individual task and subtasks, interrelationship between each task and other key milestones. The WP shall discuss all permits, licenses, and certificates required for this investigation.

**2.2.2. Site Safety and Health Plan (SSHP).** The Contractor shall prepare a project specific SSHP in accordance with the requirements specified in Appendix C – Health and Safety Requirements, the Explosive Safety Submissions for each site (ESS), applicable site investigation reports and DID-OE-005-06.01. This section of the work plan shall also include monitoring requirements established for the project.

**2.2.3. Emergency Contingency Plan.** The contractor will be required to prepare an Emergency Contingency Plan to include OE hazard identifications and potential exposure to OE hazards and chemicals, actions to be taken to prevent exposure, site monitoring, emergency notification procedures, personnel responsibilities, emergency phone numbers, and a map indicating directions to the nearest hospital.

**2.2.4. Site Specific Advanced Agreements (SSAA).** The Contractor shall specify relevant Site-Specific Advanced Agreements, to be included in the Cost Proposal, and agreed upon by the Government and the Contractor. Only those relevant SSAA's applicable to this project shall be considered part of this Scope of Work. The costs associated with developing and negotiating the Site-Specific Advanced Agreements are not cost reimbursable.

**2.3. Task III - Mobilization/Demobilization.**

**2.3.1. Mobilization.** The Contractor shall mobilize all necessary equipment, personnel and materials to the project site as needed to successfully complete the requirements of this SOW and other contract documents. The Contractor shall specify the equipment, personnel, and their respective location from which mobilization will occur, anticipated travel time, and material requirements in the Work Plan.

**2.3.2. Demobilization.** The Contractor shall demobilize all Contractor personnel, equipment and materials from the project site following completion of all field investigative work. All materials and equipment used on this project shall be documented in the final report.

**2.4. Task IV – Surface Preparation, Clearing, and OE Identification / Avoidance / Removal.** The Contractor shall provide all necessary qualified personnel and equipment to perform surface preparation, surface OE identification, surface OE avoidance, site clearing and any OE removal as required for surface OE or UXO, as appropriate. Site preparation shall include all support areas, staging areas, access routes/paths, and storage areas, as required.

**2.4.1. Site Utilities and Permits.** The Contractor shall be responsible for supplying all utilities, clearances, site offices and other equipment and incidentals thereto, that have not been previously coordinated. The Contractor shall also obtain all necessary permits (as applicable) and licenses required for this project. Although no specific permits are actually required for this facility, the substantive requirements shall be completed.

**2.4.2. Equipment and Materials.** The Contractor shall provide for all staging and storage of materials and equipment and coordinate in advance with the USACE on-site Construction Representative (CR) or Contracting Officer Representative (COR). The proposed locations shall be documented and approved in the Final Work Plans.

**2.4.3. Surface Clearing.** The Contractor shall perform the minimal amount of work necessary to clear the areas of vegetation, surface OE and OE scrap where these impede the progress, effectiveness or safety of the geophysical investigation. All OE related activities shall be performed in accordance to the approved work plans. The estimated quantity of surface preparation for SEAD-46 is 45 acres and SEAD-57 is 61 acres. See Appendix B for additional clearing requirements.

**2.4.4. Damaged Property.** The Contractor shall immediately repair any damage incurred to the facility property and shall notify the USACE on-site Construction Representative (CR) and COR of the damages. Damages incurred as a result of Contractor negligence shall not be reimbursed. All damages incurred (whether negligent or not), how they were repaired, and any downtime or lost labor resulting from such loss shall be reported in writing to the COR within 24 hours of the incident.

**2.5. Task V – Geophysical Test Plot.** The Contractor may test various geophysical methods, equipment, and personnel on geophysical test plots previously established at the site, in order to determine the best suited methods and procedures. Prior to implementing full-scale geophysics, the

Contractor will be required to perform mapping on the established GPO test plots, which shall be evaluated by the government. If the contractor fails the GPO test plots, the government reserves the right to terminate the full-scale mapping activities. See Appendix B – Geophysical Investigation Requirements.

**2.6. Task VI – Geophysical Investigation, Mapping and Evaluation.** The contractor shall describe in the work plan all the elements required for geophysical investigations, mapping and evaluations, which shall include all personnel and associated equipment, materials, and miscellaneous items. The contractor shall also provide the estimated number of acres mapped each day and the type of documentation provided. See Appendix B for specific geophysical investigation requirements.

**2.7. Task VII – Location Surveys and Mapping.** The Contractor shall perform topographic and location/mapping surveys as described in the Work Plans. See Appendix B for specific requirements.

**2.8 Task VIII – Re-acquiring Anomalies.** After commencement of the full-scale geophysical mapping activities, the Contractor shall re-acquire up to 250 anomalies on each site to correlate the digital mapping data with the actual field anomalies.

**2.9. Task IX - Site Security.** The Contractor shall provide site security, as necessary, for any work activity accomplished in accordance to this Scope of Work. Requirements include labor, rentals, and other miscellaneous materials or fencing, including all installation costs, as required.

**2.10. Task X - Project Reporting**. The Contractor shall prepare and submit a Draft Project Report documenting all field work and subsequent evaluations and recommendations within 6 weeks of completion of on-site work for this task order, unless otherwise determined by the USACE Project Manager. The reporting documentation shall be prepared following the requirements as specified in Data Item Description OE-030.01, Site Specific Final Report. Any OE surface materials collected and/or disposed, treatment, or monitoring completed as part of this task order shall be included in the report. The Final Project Report shall be completed and submitted within 21 days of receiving the Draft-Final Report comments.

**2.11. Task XI – Site/Field Support.** The Contractor shall submit and document Project Field Support costs in detail. These project cost shall be tracked daily by the cost administrator and submitted weekly for review. The cost shall relate directly or indirectly to the project during its entirety. Field Project Support shall reveal any cost, which is not task specific (ie. supervisor, site safety officer, cost administrators). Site indirect cost shall also include all equipment or materials, which are not task specific.

**2.11.1. Site Administration**. The Contractor shall include all site administration costs as part of the site support cost. These costs include all labor, equipment and materials, which are required for site administration of the project. The Contractor shall describe in the Work Plan all elements required for site administration, including personnel and their functions, associated equipment, materials and incidental items. Site administration shall include submittals of weekly progress reports and applicable weekly cost reports with cost variance analysis.

**2.12. Task XII - Project Support.** The Contractor shall describe in the Work Plan all elements required for the proposed project support, which shall include all home office and management personnel and their functions, associated equipment, materials, and miscellaneous items required for the management of on-site activities.

**2.12.1. Project Management**. The Contractor shall designate a project manager for the duration of the project. The project manager shall be responsible for all project documentation and to coordinate all project requirements through the USACE Project Engineer. The project manager shall assure all reporting requirements are completed on schedule and in accordance with this scope of work.

**2.12.2. Home Office Support**. Home Office Support costs shall include all technical and administrative support necessary to effectively complete this delivery order. All home office support costs expended shall be documented in the weekly status reports. The weekly status reports shall also document any projected cost for the proceeding week or as required to complete project tasks.

**2.13. Cost Proposal.** The Contractor shall develop and submit the initial cost proposal within 2 weeks of receipt of this scope of work. The Contractor shall not be reimbursed for expenditures incurred during the Cost Proposal's preparation and negotiation. These task order costs shall be prepared based on this Scope of Work. The Cost Proposal shall provide a time-phased breakdown for each "TASK" based on Direct Costs including labor, equipment, materials, subcontracts, and indirect costs including overhead and G&A expenses. At a minimum, for subcontracts greater than $10,000, the Contractor shall provide three independent quotes and justification for selection.

**3. Submittals.** Documents submitted in performance of this Task Order shall be prepared on commercial grade bond paper. Documents shall be mailed via a carrier service that will provide overnight service, such as Express Mail, unless otherwise noted. The Contractor shall monitor one week prior to the submittal date for changes to the submittals with the U. S. Army Corps of Engineers Project Manager. The Contractor shall prepare and submit the following documents.

**3.1. Draft Project Work Plans.** Submit the following documents in accordance with the submittal register. All work plans shall be submitted as one document and in accordance to applicable data item descriptions.

- **Geophysical Investigation Work Plans**
- **Site Safety and Health Plan (SSHP)**
- **Emergency Contingency Plan**
- **Site-Specific Advanced Agreements (SSAA)**

**3.2. Final Project Work Plans.** Upon conclusion of negotiations and review, the Contractor shall submit the Final Project Work Plans which shall incorporate all the above work plans, review comments, and any changes determined during the contract negotiations, within 5 days upon conclusion of negotiations, or as otherwise determined by the USACE Project Manager. Procedures for revisions are discussed in paragraph, "REVISIONS AND ADDENDA."

**3.3. Daily Reports.** The Contractor shall document daily reports including all field log's. All daily reports shall be available for electronic transmittal to the Omaha District Offices at the close of each business day. Daily reports shall be submitted on a weekly basis and included in the weekly status reports. Daily reports include the following:

- Rapid Response Quality Control Daily Report.

**3.4. Weekly Status Report.** The Contractor shall submit a weekly status report no later than 10:00 A.M. Eastern Standard Time the following Tuesday after the week being reported on. The reports shall be transmitted to the locations specified in the Submittal Register and then a hard copy of the report shall be sent via regular mail to the USACE Project Manager. The Weekly Status Report shall be transmitted weekly from delivery order award until demobilization. At that time, the report shall be transmitted bi-weekly or as determined by the USACE Project Manager, until final payment is made. The Weekly Status Report will include the following information:

- Project name.
- Date of report and reporting period.
- Name, title, telephone and fax numbers, address, and company name of the person completing the report.
- Summary of work performed for the project during the reporting period, both on site and off site.
- Explanation of any deviations from the scope of work and/or the Work Plan (including modifications and schedule changes).
- Discussion of all problems encountered.
- Recommendations.
- Key personnel changes.
- Work anticipated to be performed during the upcoming 2-weeks.
- Percent of field work complete <u>and costs.</u>
- Percent of project completed <u>and costs expended.</u>
- Conversation records with regulatory agencies.
- Tabulated waste handling information including samples taken, results, transportation plans, disposal facility, etc; if applicable.
- Submittal of Hazardous Waste Manifests, Waste Profile Sheets, and Land Disposal Restriction forms that were signed and submitted to the laboratories, disposal facilities or transporters during the week.
- Weekly - Rapid Response Work Order/Authorization.
- Submittal of all daily reports for the period being reported on.

**3.5. Monthly Progress Reports.** The Contractor shall prepare Monthly Progress Reports, as required by the Seneca Army Depot Facility.

**3.6. Site Specific Final Report.** Draft and Final copies of the Site Specific Project Report shall be submitted. While all submittals should be error-free, an extra effort shall be made to provide an error-free Final Project Report. The Final Site Specific Project Report shall be structured as stated in DID-OE-030.01 and include, but not limited to, the following sections:

- **Cover Page.**
- **Table of Contents.**
- **Executive Summary.**
- **Report Text.**
- **Appendices.**

**3.7. Partial Submittals.** Partial submittals will not be accepted unless prior approval is given.

**3.8. Cover Letters.** A cover letter should accompany each document and indicate the project, project phase, the date comments are due, to whom comments are to be submitted, the date and location of the review conference, etc., as appropriate. (Note that, depending on the recipient, not all letters will contain the same information.) The contents of the cover letters should be coordinated with the USACE-PE prior to the submittal date. The cover letter shall not be bound into the document.

**3.8.1. Covers.** The report covers shall be durable binders, which hold pages firmly while allowing easy removal, addition, or deletion of pages. A report title page shall identify the report title, the Corps of Engineers, the Environmental Protection Agency, Project Number, and date, etc.

**3.9. Submittal Requirements.** See Submittal Register, attached as Appendix F.

**4. <u>Revisions and Addenda.</u>** Review comments issued prior to Government approval shall be incorporated by revising and reissuing affected pages. If major revisions are necessary, the entire document shall be resubmitted. Minor changes affecting only a few pages may be made by addenda sheets. The affected pages shall have the revision number and date of correction on the bottom-right hand corner of the page.

**4.1.** Any changes to the project work plans shall be accompanied by a cover sheet with a list of pages that have been revised. The revised pages that the Contractor issues shall cover any additions or changes to the plans or reports. The addendum for the project plan shall be issued prior to the commencement of work for that phase.

**5. <u>Project Management.</u>** The Contractor shall assign an employee who will serve as the Project Manager (PM). This individual will oversee the coordination of the entire project, administer all instructions from authorized USACE personnel and obtain answers to all questions during and after the performance of work. The PM will be named by the Contractor and approved by the USACE in accordance with the Advance Agreement No. 8 - Key Personnel.

6. **Review of Progress and Technical Adequacy.** At any appropriate time, representatives of the Contracting Officer (CO) may review the progress and technical adequacy of the Contractor's work. Such review shall not relieve the Contractor from performing all contract requirements, except as may be waived by written instructions. The Contractor, under this contract, will interpose no objection or restriction to the Contracting Officer's designation of a Contractor for the purpose of reviewing the adequacy and corrections of the work performed under this contract.

7. **Meeting Minutes, Confirmation Notices and Annotated Comments.**

**7.1. Meeting Minutes.** The Contractor shall be responsible for taking notes and preparing the reports of all meetings and conferences, as required. Meeting minutes shall be prepared in typed form and the original furnished this office (within seven (7) work days after the date of meeting or conference) for concurrence and distribution to all attendees. This report shall include the following items as a minimum.

- The date and place the meeting or conference was held with a list of attendees. The list of attendees shall include at least the name, organization, and telephone number.
- Comments made during the meeting or conference, decisions affecting criteria changes must be recorded in the basic notes. Any augmentation of written comments shall be documented.

**7.2. Confirmation Notices.** The Contractor shall be required to provide a weekly record of all discussions, verbal directions, and telephone conversations participated in on all matters relative to this delivery order. These records, entitled "Confirmation Notices" shall be numbered sequentially and fully identify the participating personnel, subjects discussed and conclusions. The Contractor shall forward one reproducible copy of confirmation notices in each weekly status report.

**7.3. Annotated Comments.** Written comments presented by the reviewers of the project submittals shall be formally addressed and annotated by the Contractor. Annotated comment action shall be "A" for an Approved comment, "D" for a Disapproved comment, "W" for a comment that has been Withdrawn, and "E" for a comment that has an Exception noted. In addition, brief written responses to comments shall be added where appropriate. Annotated comments shall be submitted as an attachment to the cover letter transmitting the revised submittal or included as an appendix to the revised submittal.

8. **Applicable Publications.** This geophysical investigation shall be performed consistent with this Scope of Work and fully comply with the following guidelines and references, and in compliance with all applicable regulations and standards, including but not limited to, those listed below. In the case that these requirements are conflicting, the Contractor shall immediately notify the USACE Project Manager and implement the one which offers the greatest level of protection.

**8.1.** U.S. Army Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1, issued 3 September 1996.

**8.2.** Occupational Health and Safety Requirements, Standard 29 CFR-1910 and Construction Industry Standards, 29 CFR-1926.

**8.3.** Applicable OE Regulations and Procedural Documents including Engineering Regulations, Pamphlets and Manuals that are listed on the USACE, Huntsville District, Ordnance and Explosives Mandatory Center of Expertise web page.

**8.4.** Applicable Data Item Descriptions (DID's) that are listed on the USACE, Huntsville District, Ordnance and Explosives Mandatory Center of Expertise web page. See attached Table 1 for a listing of specific Data Item Descriptions.

**8.5.** Explosive Safety Submission (ESS), Ordnance and Explosives Removal at the Former 3.5-inch Rocket Range (SEAD 46), Seneca Army Depot Activity, May 2003, USACE.

**8.6.** Explosive Safety Submission (ESS), Ordnance and Explosives Removal at the Former EOD Range (SEAD 57), Seneca Army Depot Activity, May 2003, USACE.

**8.7.** Ordnance and Explosives Engineering Evaluation/Cost Analysis Report, Seneca Army Depot, Romulus, Seneca County, New York, Parsons Engineering Science, Inc, September 2001.

**9. Attached Requirements.** All field, laboratory, and reporting requirements associated with this task order shall be completed in accordance with this Scope of Work (SOW) and the appendices attached hereto. If conflicts in specifications or methodology exist between the attached requirements, the Contractor shall immediately notify the USACE Project Engineer for clarification. Conflicts between this SOW and those desired by the Contractor shall be brought to the attention of the USACE Project Engineer for clarification and approval, prior to implementation.

**Note: Applicable OE Regulations, Procedural Documents and Data Item Descriptions can be obtained at the Huntsville Center web page: http://www.hnd.usace.army.mil/oew/index.asp.**

# Table 1

## Data Item Description Index

| Old Number | Date | Title/New Title | New Number | Revision Date |
|---|---|---|---|---|
| OE-001 | 000303 | Type I Work Plan/Type I (EE/CA) Work Plan | OE-001.01 | 021001 |
| OE-010 | 000303 | EE/CA Report | OE-010.01 | 021001 |
| OE-005-01 | 000303 | Type II Work Plan | OE-005-01.01 | 021001 |
| OE-005-02 | 000303 | Technical Management Plan | OE-005-02.01 | 021001 |
| OE-005-03 | 990825 | Explosives Management Plan | OE-005-03.01 | 021001 |
| OE-005-04 | 000303 | Explosives Siting Plan | OE-005-04.01 | 021001 |
| OE-005-05 | 000303 | Geophysical Investigation Plan | OE-005-05.01 | 021001 |
| | | Geophysical Prove-out (GPO) Plan and Report | OE-005-05A.01 | |
| OE-005-06 | 000303 | Site Safety and Health Plan | OE-005-06.01 | 021001 |
| OE-005-07 | 000303 | Location Surveys and Mapping Plan | OE-005-07.01 | 021001 |
| OE-005-08 | 000303 | Work, Data, and Cost Management Plan | OE-005-08.01 | 021001 |
| OE-005-09 | 000303 | Property Management Plan | OE-005-09.01 | 021001 |
| OE-005-10 | 000303 | Sampling and Analysis Plan/Environmental Sampling and Analysis Plan | OE-005-10.01 | 021001 |
| OE-005-11 | 000303 | Quality Control Plan | OE-005-11.01 | 021001 |
| OE-005-12 | 000303 | Environmental Protection Plan | OE-005-12.01 | 021001 |
| OE-005-13 | 000303 | Investigative Derived Waste Plan | OE-005-13.01 | 021001 |
| OE-005-14 | 000320 | Geographical Information System Plan | OE-005-14.01 | 021001 |
| | | Site Safety and Health Plan for Recovered Chemical Warfare Materiel (RCWM) Sites | OE-005-15.01 | 021001 |
| | | Interim Holding Facility Siting Plan for Recovered Chemical Warfare Materiel (RCWM) Projects | OE-005-16.01 | 021001 |
| | | Physical Security Plan for Recovered Chemical Warfare Materiel (RCWM) Project Sites | OE-005-17.01 | 021001 |
| OE-015 | 000303 | Accident/Incident Reports | OE-015.01 | 021001 |
| OE-025 | 000303 | Personnel/Work Standards | OE-025.01 | 021001 |
| OE-030 | 000303 | Site Specific Final Report | OE-030.01 | 021001 |
| OE-040 | 000303 | Disposal Feasibility Report | OE-040.01 | 021001 |
| OE-045 | 000303 | Report/Minutes, Record of Meetings | OE-045.01 | 021001 |
| OE-055 | 000303 | Telephone Conservation/ Correspondence Records | OE-055.01 | 021001 |
| OE-060 | 000303 | Conventional Explosives Safety Submission | OE-060.01 | 021001 |
| | | Recovered Chemical Warfare Materiel (RCWM) Conceptual Site Plan | OE-065.01 | 021001 |
| | | Recovered Chemical Warfare Materiel Safety Submission (CSS) | OE-070.01 | 021001 |
| OE-080 | 000303 | Monthly Status Report | OE-080.01 | 021001 |
| OE-085 | 000303 | Weekly Status Report/Project Status Report | OE-085.01 | 021001 |
| OE-100 | 000303 | Analysis of Institutional Controls/Institutional Analysis and Institutional Control Plan | OE-100.01 | 021001 |
| | | Recurring Review Plan | OE-110.01 | 021001 |

## LIST OF APPENDICES

# SUBMITTAL REGISTER

Seneca Army Depot Activity
Open Detonation Grounds
Romulus, NY

| All Documents shall be shipped as Overnight Mail, unless Otherwise Noted | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Name/Address** | **Draft Project Work Plans** | **Final Project Work Plans** | **Draft Cost Proposal** | **Final Cost Proposal** | **Confirm Notices** | **Weekly Status Report** | **Daily QC Reports** | **Draft Project Report** | **Final Project Report** | **HWM, WPS, LDRN** |
| Seneca Army Depot Activity<br>Attn: Mr. Stephen M. Absolum<br>Commanders Representative/BEC<br>Building 123<br>5786 NYS Route 96<br>Romulus, NY 14541<br>Phone: (607) 869-1309 | 2 | 2 | 0 | 0 | 1 | 1 | 1 | 2 | 3 | 1 |
| U.S. Army Corps of Engineers<br>Attn: CENWO-CT-C (Ginger Gruber)<br>106 S. 15th Street<br>Omaha, Nebraska 68102-4978<br>Phone: (402) 221-4103 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| U.S. Army Corps of Engineers<br>Attn: CENWO-CD-RR (Westenburg)<br>26 High Meadow Dr.<br>Drums, PA 18222<br>Phone: (402) 880-7329<br>FAX: (570) 788-7216 | 3 | 3 | 0 | 1 | 1 | 1 | 0 | 2 | 3 | 1* |
| U.S. Army Corps of Engineers<br>Attn: CENAN-CO-WO (T. Battaglia)<br>Seneca Project Office<br>5786 NYS Route 96<br>Romulus, NY 14541<br>Phone: (607) 869-1353 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

Attachment 1

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| U. S. Army Corps of Engineers<br>ATTN: CENAN-PP-E (R. Battaglia)<br>Seneca Project Office<br>5786 NYS Route 96<br>Romulus, NY 14541<br>Phone: (607) 869-1523 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 3 | 0 |
| Total - Other Required Distributions | 4 | 4 | 0 | 0 | 4 | 4 | 4 | 4 | 4 | 2 |

Note: The number of submittals for "Total – Other Required Distributions" is provided for planning purposes. Additional distribution names and addresses will be provided at a later date as needed.

# SUBMITTAL REGISTER

Seneca Army Depot Activity
Open Detonation Grounds
Romulus, NY

| All Documents shall be shipped as Overnight Mail, unless Otherwise Noted | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Name/Address** | **Draft Project Work Plans** | **Final Project Work Plans** | **Draft Cost Proposal** | **Final Cost Proposal** | **Confirm Notices** | **Weekly Status Report** | **Daily QC Reports** | **Draft Project Report** | **Final Project Report** | **HWM, WPS, LDRN** |
| Seneca Army Depot Activity<br>Attn: Mr. Stephen M. Absolum<br>Commanders Representative/BEC<br>Building 123<br>5786 NYS Route 96<br>Romulus, NY 14541<br>Phone: (607) 869-1309 | 2 | 2 | 0 | 0 | 1 | 1 | 1 | 2 | 3 | 1 |
| U.S. Army Corps of Engineers<br>Attn: CENWO-CT-C (Ginger Gruber)<br>106 S. 15th Street<br>Omaha, Nebraska 68102-4978<br>Phone: (402) 221-4103 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| U.S. Army Corps of Engineers<br>Attn: CENWO-CD-RR (Westenburg)<br>26 High Meadow Dr.<br>Drums, PA 18222<br>Phone: (402) 880-7329<br>FAX: (570) 788-7216 | 3 | 3 | 0 | 1 | 1 | 1 | 0 | 2 | 3 | 1* |
| U.S. Army Corps of Engineers<br>Attn: CENAN-CO-WO (T. Battaglia)<br>Seneca Project Office<br>5786 NYS Route 96<br>Romulus, NY 14541<br>Phone: (607) 869-1353 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

Attachment 1

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| U. S. Army Corps of Engineers<br>ATTN: CENAN-PP-E (R. Battaglia)<br>Seneca Project Office<br>5786 NYS Route 96<br>Romulus, NY 14541<br>Phone: (607) 869-1523 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 3 | 0 |
| Total - Other Required Distributions | 4 | 4 | 0 | 0 | 4 | 4 | 4 | 4 | 4 | 2 |

Note: The number of submittals for "Total – Other Required Distributions" is provided for planning purposes. Additional distribution names and addresses will be provided at a later date as needed.

**Explosives Safety Submission**

**Ordnance and Explosives Removal**

**at the Former EOD Range (SEAD 57)**

**Seneca Army Depot Activity,**

**Romulus, New York**

**May, 2003**

**Prepared by**

**US ARMY CORPS OF ENGINEERS**

## CONTENTS



**APPENDICES**

## INTRODUCTION

This Explosive Safety Submission (ESS) is for the removal of Ordnance and Explosives (OE) from the Former EOD Range (SEAD-57), Seneca Army Depot Activity (SEDA), New York. This ESS outlines the safety aspects of the plan for cleanup of Unexploded Ordnance (UXO) and OE on property that is owned by the Department Of Defense (DoD).

SEDA is a US Army facility located in Seneca County, New York. SEDA occupies approximately 10,600 acres (Appendix A). It is bounded on the west by State Route 96A and on the east by State Route 96. The cities of Geneva and Rochester are located to the northwest (14 and 50 miles, respectively); Syracuse is 53 miles to the northeast and Ithaca is 31 miles to the south. The surrounding area is generally used for farming.

SEDA was included on the Federal Facilities National Priorities List on 13 July 1989. Consequently, all work to be performed under this contract will be performed according to Comprehensive Environmental Response Compensation and Liability Act (CERCLA) and the "Federal Facility Agreement under CERCLA Section 120 in the matter of Seneca Army Depot, Romulus, New York,".

SEDA was included on the 1995 Base Realignment and Closure List and has been closed. The Seneca County Industrial Development Agency (IDA) has prepared a reuse report entitled "Seneca Army Depot Reuse Plan and Implementation Strategy". The majority of the installation will be used for housing developments, industrial development, institutional and conservation/recreation uses upon transfer. The current OD Grounds site will fall within the area designated for "Conservation/Recreation". The intended uses, which fall within the definition of "Conservation/Recreation", are wildlife habitation, wildlife viewing, hiking/walking and picnicking. Although there is currently no plan for establishing camping facilities, the IDA does not wish to restrict such a possibility in the future.

Therefore, this ESS is based upon the assumption that the clearance depth (4 ft) will be based upon the Public Access scenario (e.g. surface recreation).

## 1.0 REASON FOR OE.

### SEAD 57

SEAD 57 consists of approximately 61 acres at the northern end of Depot immediately adjacent and South of the Open Burning/Open Detonation Grounds (435 acres). The 143d Explosives Ordnance Detachment (EOD) was a Department of Army tenant organization located at Seneca Army Depot and performed ordnance and explosives (OE) disposal by detonation for more than 20 years in an assigned demolition area, known as SEAD 57, in the northwest portion of the installation.

The area was used during 1970's and until 1984 for disposal of munitions and homemade explosive devices that were collected from federal, state, and police agencies within an assigned geographical area in the Northeastern United States. Training of EOD specialists assigned to the unit also took place at this location. After November 1984, transportation to Seneca Army Depot was prohibited and OE disposal was conducted at appropriate locations within the jurisdiction of the requesting authorities. The record indicated that a ten (10) pound NEW limit was used at the site.

An OE Engineering Evaluation/Cost Analysis (EE/CA) for the area was completed in 2002. This study confirmed the existence of extensive subsurface metal objects in an area out to 400' radius from the horseshoe shaped soil "berm". The EE/CA recommended that 12,000 CY of "berm" and underlying soil be excavated to a depth of one foot and separated of metal, ORS, and OE and the remainder of the site be cleared, to the depth of detection of the EM-61, out to a 1,000 foot radius from the "berm". All identified subsurface anomalies are to be excavated and removed.

## 2.0 MAPS.

Maps detailing the location and extent of the area of concern and presenting the relevant Public Withdrawal Distances, Q-D Distances, etc., are presented in Appendix A to this submission.

## 3.0 AMOUNT AND TYPE OF OE.

As part of an installation-wide OE Engineering Evaluation/Cost Analysis (EE/CA), OE presence and density at SEAD 57 was characterized.

At SEAD 57, Sixty-one 100' by 100' grids were surveyed using an EM-61. A total of 23.3% of the area (61 acres) was characterized. A summation of the effort follows:

- Of the 2,951 anomalies identified in the EM-61 surveyed grids, 1,700 (58%) were intrusively investigated. 328 (19.3%) were false positives since no discernable metal debris was located.

- ORS was recovered from 954 (56%) of the anomalies investigated. Three (3) of these were OE.

- OE recovery depths ranged from surface to a depth of six (6) inches.

OE located at the site was listed in the EE/CA Appendix C, page C-25. (Appendix B)

Based upon the results of the EE/CA characterization, the Most Probable Munitions (MPM) was chosen for the site.

For SEAD 57 this is the 37mm MKII projectile. The Net Explosive Weight (NEW) is 0.527 lbs. of TNT. The Public Withdrawal Distance (PWD) for this MPM is 1,181 feet, which was computed using HNC-ED-CS-S-98-1 (approved by DDESB on 6 April 1998) by Dr. Michelle Crull, USAESC, Huntsville, Engineering Division, Structures Branch, 10 April 1998.

Miniature Open Front Barricade (MOFB) thickness is 1.43 inches of Aluminum. Sand bag enclosure for intentional detonations is 20 inches thick with 6 inch standoff between munition and sand bags. Sand Bag throw distance=125 ft. Minimum Separation Distances for both the MOFB and Sand Bag enclosure = 200 ft.

If, however, a larger, live or suspected live OE item is encountered at the site, its withdrawal distances will be determined in accordance with the procedures defined in 98-01 and adjustments will be made accordingly. Until the appropriate distances are determined by 98-01, the default distances in DoD 6055.9-STD (Chapter 5, Paragraph E.4.a) will be used.

## 4.0 START DATE.

Work will begin in July ***2003,*** beginning with EM-61 survey work at the site and progressing to intrusive anomaly investigation and Soil Separation of the berm material. Intrusive work should begin by August ***2003.***

## 5.0 FROST LINE DEPTH.

The design frost depth for this site is 40 inches.

## 6.0 CLEARANCE TECHNIQUES.

This section presents information concerning the techniques to be used during the removal of OE at this site.

**General Progression**. OE remediation at the SEAD 57 will take place in the following sequence:

**Phase I.**

The site will be surveyed to a distance of 1000 ft from the "berm" using EM-61-MKII towed arrays. The Geophysical Investigation Plan (DID OE-005-05) and established test plots for the ongoing OD Grounds Phase 1 & 2 OE removal will be utilized. At this time, it is anticipated that the same contractor will be used as well. No ESS is required for this Phase.

The Geophysical Mapping Prove-Out was demonstrated April 25, 2003. This effort validated the capability of detecting a variety of OE 20 mm and larger, their maximum detection depths, under actual site conditions at Seneca Army Depot. Further, positional accuracy and contractor Quality Control (QC) procedures were verified by USACE Quality Assurance personnel.

EM-61-MKII will be towed in multiple instrument arrays in the open and cleared area and the survey teams will be provided with UXO avoidance construction support. QC (known location/depth) and QA (unknown location/depth) targets will be placed in each grid prior to mapping. Identification of all QC/QA targets within a grid is required prior to USACE acceptance and the start of intrusive investigations.

OE found on the surface will be destroyed, or certified as inert ORS, on a weekly basis unless it requires Blow in Place (BIP).

**Phase II**

Upon completion of the geophysical mapping and anomaly identification obtained in Phase I, the contractor will re-acquire the targets and investigate all anomalies intrusively, and remove all subsurface OE to a depth of four (4) feet. OE encountered below this depth will also be removed, however, none is expected between 400 –1000 ft from the "berm".

OE will be destroyed, or certified as inert ORS, on a weekly basis.

**Phase III**

The soils of the "berm", the underlying soil to a depth of six inches, and the top six inches of soil out to a radius of 400 ft. will be excavated and processed by mechanical soil screening and ferrous metal separation equipment developed and proven effective on the Open Burning Grounds and SEAD 44a, OE Removals conducted from 1999 to 2002. This is necessary due to the amount of metallic interference identified during the EE/CA. The screen size will be ½ inch to remove 20mm and larger OE.

OE will be destroyed, or certified as inert ORS, on a weekly basis.

**Phase IV**

After soil excavation and processing is completed, the new surface will be geophysically surveyed out to a radius of 400 ft. Any remaining anomalies will be investigated and removed.

A final OE removal Report will be submitted. All of the data gathered from the mapping, anomaly investigation, and soil processing will be compiled to draw conclusions on the existence or non-existence of OE contamination at depth. A conclusion will be drawn regarding the existence of OE-contamination remaining at this site.

**Discussion of Project-Specific Procedures.**

All geophysical surveying and brush clearing activities will be conducted utilizing a UXO qualified escort who will provide OE avoidance services so that grid stakes/flags/QC/QA targets can be placed in the ground. The Geophysics Survey contractor will place metallic objects, at known positions and depth, in each grid for QC purposes prior to mapping. The USACE QA personnel will place inert OE, in locations and depth known only to the USACE, prior to mapping.

The contractor will be required to identify all QC/QA targets in each grid prior to acceptance by the government. Failure to identify a QC target will require a root cause investigation and rework of the deficient portion of the work. Failure to identify a QA target will require the rework of all grids mapped that day.

Upon completion of the mapping, identified subsurface anomalies will be marked and intrusively investigated using UXO qualified personnel. All anomalies will be dug to depth to determine the identity thereof. Earth moving equipment will be utilized to excavate soils one foot on each side of the marker flag. UXO techs will remove the remaining soil using hand tools. The MOFB will be available, however, the entire site is more than 1,233 ft. from the Army property line, public traffic route, or inhabited building.

During the "berm" excavation, the excavation contractor will be supervised by UXO qualified individuals. The UXO specialist will be in a protective barricade (see Appendix C) and the earth moving equipment operators will be protected by Lexan or Plexi-glass shielding of the cabs. Shield thickness has been calculated to be a minimum of 2.91 in of Plexiglass by USAESC, Huntsville. All personnel will be in constant radio contact with each other, at all times.

The excavation contractor will excavate, transport, all soils (to the soil processing plant), and remove all soil fines and separated material (oversize rock, OE, ORS and non-ORS scrap metal) from the processing plant to staging areas. Staging areas, and the screening/separation plant, will be located a minimum of 200 ft from the excavation area (and each other) and controlled and monitored by UXO specialists.

A UXO specialist will monitor the screen, the ferrous metal receptacles and the reject material. Each specialist will be in protective barricades and will have a "kill switch" capable of instantly stopping the processing plant should a potentially hazardous UXO item be detected within the screening, separation, or reject streams. The specialists will be located outside the K24 distance for the MPM (19.4 ft). The specialists shall watch for any items that may be potential UXO, any items that may become lodged or jammed in the process equipment, and malfunction or unplanned stopping of process equipment.

Once the process has been halted, the potential UXO (or lodged/jammed OE) will be inspected and identified. Those items determined to be safe to move will be removed from the process equipment and stored for later disposal. Items determined unsafe to move will be left in place and the USACE OE Safety Specialist will be notified for further instructions.

With respect to OE destruction, of specific concern are the location of explosives storage facilities and detonation operations with respect to facilities and people and any effects thereon. The contractor will provide explosives for destruction operations. It is anticipated that demolition materials and shaped charges, as appropriate, will be used. These are considered Class 1.1 and 1.4 explosives.

Explosives will be stored in the SEDA OB/OD area double igloo type, earthen-covered magazine. The existing magazine is constructed to DDESB and Army standards and is complete with the required lightning protection and current ground testing certification.. The contractor will store detonating cord, perforators and time fuse in one half of one of the magazines. In the other half of the first magazine, the contractor will store initiators. A sandbag wall (minimum two feet wide and at least as high as materials stacked on either side) will separate the two halves of this magazine. In the second of the magazines, UXO (which was located and is awaiting the weekly demolition operation) will be stored. Each of the two magazines is designed for storage of a maximum NEW not to exceed 450 pounds. At no time will the contractor store more than 100 pounds NEW in either magazine.

Magazine A0705, which is approved for up to 250,000 lbs HD 1.1 explosives, will be used to store any recovered OE that exceeds the 100 lb limit for the OB/OD service magazine.

As for security, access into the SEDA ammunition area is itself, extremely restricted. Additionally, the contractor will establish and enforce strict area and site access at the SEAD 57 site proper. Access into a work site exclusion zone will be limited to contractor personnel specifically authorized to work on site, Army Corps of Engineers safety personnel and the Corps of Engineers Contracting Officer and Contracting Officer's Representative. All other personnel will be restricted from entering the exclusion zone or be escorted by contractor or Corps personnel.

Disposal/Venting/Demilitarization operations will be carried out weekly. Items which can be moved will be consolidated in accordance with "Procedures for Demolition of Multiple Rounds (Consolidated Shots) on Ordnance and Explosives (OE) Sites", dated August 1998 and approved by DDESB on 27 October 1998. Disposal will be carried out at the "Hill" on the OD Ground. UXO will be stored in the second magazine while awaiting demo operations. Items that cannot be moved, will be blown-in-place daily, on an individual basis.

All OE scrap and range residue will be certified as explosive free and demilitarized prior to removal from the Seneca Army Depot.

All applicable OSHA, USACE (EM385-1-1), DOD (6055.9-STD), Army (385-64) safety regulations will be followed at all times, without exception. Hazard analyses and daily Safety briefings will be prepared and conducted as stated in the contractor's approved Site Safety and Health Plan (SSHP).

## 7.0 ALTERNATE TECHNIQUES.

None.

## 8.0 QUANTITY-DISTANCES.

The appropriate Quantity-Distances are shown on the SEDA Installation Explosives Q/D site map enclosed in Appendix A of this submission. For ease of review, the distances are repeated here.

The rationale for the MPM and citation for the calculation method are presented in Section 3.0 of this submission. In general, team separation distances will be determined by the greater of 200 feet or the K50 (0.9-psi overpressure) distance. The separation distance for all unrelated personnel for an accidental detonation from an OE area will be determined by the greatest of 200 feet, the K50 distance or the maximum fragment throw distance. The separation distance for all personnel (related and unrelated) for intentional detonations will be determined by the maximum of 200 feet, the K328 distance or the maximum fragment throw distance. Applying the above principles, the following distances apply:

OE Areas: Minimum of 1,181 feet (this is the maximum fragment range for the 37mm).

OD Grounds Magazines: Minimum of 658 feet (Front) and 250 feet (Rear and Sides), IAW Table 9-1 of DoD 6055.9-STD. Note that these distances are for 100 lbs. HD 1.1 explosives; therefore, they exceed the distance requirements for the 1.4 demolition materials to be stored in one of the magazines. UXO (Class 1.1) will be stored in the second magazine.

Another approved ammunition storage magazine, A0705 is available. The applicable IBD for this magazine is 3,150 ft.

Intentional Detonations: Minimum of 1,181 feet (via approved calculation).

During operations, appropriate protection will be used for site personnel and the public during situations where an intentional detonation is planned for OE found on the removal operations. Most OE will be moved to the OD "Hill" for detonation or Thermal Treatment/Certification as ORS.

**9.0 OFF-SITE DISPOSAL.**

Not applicable.

**10.0 TECHNICAL SUPPORT.**

No Chemical Warfare Materials (CWM) are suspected at this site. The contractor will positively identify all OE uncovered before items are removed or destroyed. If a suspect CWM is encountered, the Site Safety Officer will stop all operations on site and notify the on site CENAB OE Safety Specialist. The CENAB OE Safety Specialist will notify the appropriate Explosive Ordnance Disposal (EOD) Detachment (725th Ordnance Company (EOD) Fort Drum) and/or Technical Escort Unit.

**11.0 LAND USE RESTRICTIONS.**

There will be no reuse restrictions required following this action. The site will be transferred (sometime during the closure process) for use as discussed in the INTRODUCTION, above.

**12.0 PUBLIC INVOLVEMENT.**

This removal is being performed under the CERCLA umbrella since Seneca is a BRAC federal facility on the National Priorities List. Consequently, the required public involvement process is already in place (BCT, RAB, and general public involvement) with the SEDA BEC taking the lead.

**13.0 AFTER ACTION REPORT.**

Following the OE Removal Project at SEAD 57, a copy of the Final Removal Report will be provided, to all whom reviewed this ESS, for information purposes.

**13.0 AMENDMENTS AND CORRECTIONS.**

An amendment or correction discussing any changes in the procedures to be used or the conditions encountered during this removal will be provided for review and approval as warranted.

**14.0 REFERENCES.**


__General__
a. AR 385-64, Ammunition and Explosives Safety Standards, dtd 22 May 1987

b. AR 385-64 (Draft), US Army Explosives Safety Program

c. Department of Defense Explosives Safety Board, Interim Guidance on Land Clearance Planning and Removal Depth for Ammunition and Explosives. 1993.

d. DDESB, Guidance for Clearance Plans, 27 January 1998.

e. Interim Final, “Guidance for Conducting Remedial Investigations/Feasibility Studies Under CERCLA”, U.S. EPA, Office of Solid Waste and Emergency Response, October 1988.

f. "U.S. Corps of Engineers Safety and Health Requirements Manual," U.S. Army Engineering Manual No. EM-385-1-1, 3 September 1996.

g. “Safety Concepts and Basic Considerations for Unexploded Ordnance (UXO) Operations”, U. S. Army Engineering and Support Center, Huntsville, Revised 16 February 1996.

h. “Interim Guidance Documents”: http://www.hnd.usace.army.mil/oew/intguidocs.asp

i. “Regulations, Pamphlets, Manuals”: http://www.hnd.usace.army.mil/oew/erepems.asp


**Specific**

a. "Federal Facility Agreement under CERCLA Section 120 in the matter of Seneca Army Depot, Romulus, New York," Docket No. II-CERCLA-FFA-00202, USEPA, U.S. Department of the Army, and the New York State Department of Environmental Conservation, November 1990.

b. "Work Plan Architectural-Engineering Services For Performing A Remedial Investigation/Feasibility Study (RI/FS) At The Open Burning (OB) Grounds, Seneca Army Depot, Romulus, New York," Chas. T. Main, Inc., 1991.

c. "Preliminary Site Characterization Report at the Open Burning (OB) Grounds," Chas. T. Main, Inc., 1992.

d. Final, “Remedial Investigation Report at the Open Burning (OB) Grounds”, Parsons Engineering Science, Inc., September 1994.

e. Final, “Feasibility Study at the Open Burning (OB) Grounds”, Parsons Engineering Science, Inc., June 1996.

f. Draft-Final, “Superfund Proposed Plan, the Open Burning (OB) Grounds at the Seneca Army Depot Activity (SEDA), Romulus, New York.”, Parsons Engineering Science, Inc., January 1997.

g. Preliminary-Draft, “Record of Decision, Former Open Burning (OB) Grounds Site, Seneca Army Depot Activity, Romulus, New York.”, Parsons Engineering Science, Inc., March 1997.

h. Draft Final Ordnance and Explosives Engineering Evaluation/Cost Analysis, Seneca Army Depot, September 2001. OD Grounds (SEAD 45)

## 15.0 TECHNICAL SUPPORT.

No Chemical Warfare Materials (CWM) are suspected at this site. The contractor will positively identify all OE uncovered before items are removed or destroyed. If a suspect CWM is encountered, the Site Safety Officer will stop all operations on site and notify the on site CENAB OE Safety Specialist. The CENAB OE Safety Specialist will notify the appropriate Explosive Ordnance Disposal (EOD) Detachment (725th Ordnance Company (EOD) Fort Drum) and/or Technical Escort Unit.

## 16.0 LAND USE RESTRICTIONS.

There will be reuse restrictions required following this action. The site will be transferred (sometime during the closure process) for use as discussed in the INTRODUCTION, above.

## 17.0 PUBLIC INVOLVEMENT.

This removal is being performed under the CERCLA umbrella since Seneca is a BRAC federal facility on the National Priorities List. Consequently, the required public involvement process is already in place (BCT, RAB, and general public involvement) with the SEDA BEC taking the lead.

## 13.0 AFTER ACTION REPORT.

Following the OE Removal Project at the Open Detonation Grounds, a copy of the Final Removal Report will be provided, to all whom reviewed this ESS, for information purposes.

## 18.0 AMENDMENTS AND CORRECTIONS.

An amendment or correction discussing any changes in the procedures to be used or the conditions encountered during this removal will be provided for review and approval as warranted.

## 19.0 REFERENCES.


**General**

a. AR 385-64, Ammunition and Explosives Safety Standards, dtd 22 May 1987

b. AR 385-64 (Draft), US Army Explosives Safety Program

c. Department of Defense Explosives Safety Board, Interim Guidance on Land Clearance Planning and Removal Depth for Ammunition and Explosives. 1993.

d. DDESB, Guidance for Clearance Plans, 27 January 1998.

e. Interim Final, "Guidance for Conducting Remedial Investigations/Feasibility Studies Under CERCLA", U.S. EPA, Office of Solid Waste and Emergency Response, October 1988.

f. "U.S. Corps of Engineers Safety and Health Requirements Manual," U.S. Army Engineering Manual No. EM-385-1-1, 3 September 1996.

g. "Safety Concepts and Basic Considerations for Unexploded Ordnance (UXO) Operations", U. S. Army Engineering and Support Center, Huntsville, Revised 16 February 1996.

h. "Interim Guidance Documents": http://www.hnd.usace.army.mil/oew/intguidocs.asp

i. "Regulations, Pamphlets, Manuals": http://www.hnd.usace.army.mil/oew/erepems.asp

**Specific**
a. "Federal Facility Agreement under CERCLA Section 120 in the matter of Seneca Army Depot, Romulus, New York," Docket No. II-CERCLA-FFA-00202, USEPA, U.S. Department of the Army, and the New York State Department of Environmental Conservation, November 1990.

b. "Work Plan Architectural-Engineering Services For Performing A Remedial Investigation/Feasibility Study (RI/FS) At The Open Burning (OB) Grounds, Seneca Army Depot, Romulus, New York," Chas. T. Main, Inc., 1991.

c. "Preliminary Site Characterization Report at the Open Burning (OB) Grounds," Chas. T. Main, Inc., 1992.

d. Final, "Remedial Investigation Report at the Open Burning (OB) Grounds", Parsons Engineering Science, Inc., September 1994.

e. Final, "Feasibility Study at the Open Burning (OB) Grounds", Parsons Engineering Science, Inc., June 1996.

f. Draft-Final, "Superfund Proposed Plan, the Open Burning (OB) Grounds at the Seneca Army Depot Activity (SEDA), Romulus, New York.", Parsons Engineering Science, Inc., January 1997.

g. Preliminary-Draft, "Record of Decision, Former Open Burning (OB) Grounds Site, Seneca Army Depot Activity, Romulus, New York.", Parsons Engineering Science, Inc., March 1997.

h. Draft Final Ordnance and Explosives Engineering Evaluation/Cost Analysis, Seneca Army Depot, September 2001. OD Grounds (SEAD 45)

**APPENDIX A**

**MAPS**

## APPENDIX B

## Alternate Plexi-Glass Open front Barricade

**APPENDIX C**

**Anomaly Investigation Results: SEAD 45 Excerpts from EE/CA**

**Explosives Safety Submission**

**Ordnance and Explosives Removal**

**at the Former 3.5 In. Rocket Range (SEAD 46),**

**Seneca Army Depot Activity,**

**Romulus, New York**

**May, 2003**

**Prepared by**

**US ARMY CORPS OF ENGINEERS**

CONTENTS



APPENDICES

## INTRODUCTION

This Explosive Safety Submission (ESS) is for the removal of Ordnance and Explosives (OE) from the Former 3.5 in. Rocket Range (SEAD 46), Seneca Army Depot Activity (SEDA), New York. This ESS outlines the safety aspects of the plan for cleanup of Unexploded Ordnance (UXO) and OE on property that is owned by the Department Of Defense (DoD).

SEDA is a US Army facility located in Seneca County, New York. SEDA occupies approximately 10,600 acres (Appendix A). It is bounded on the west by State Route 96A and on the east by State Route 96. The cities of Geneva and Rochester are located to the northwest (14 and 50 miles, respectively); Syracuse is 53 miles to the northeast and Ithaca is 31 miles to the south. The surrounding area is generally used for farming.

SEDA was included on the Federal Facilities National Priorities List on 13 July 1989. Consequently, all work to be performed under this contract will be performed according to Comprehensive Environmental Response Compensation and Liability Act (CERCLA) and the "Federal Facility Agreement under CERCLA Section 120 in the matter of Seneca Army Depot, Romulus, New York,".

SEDA was included on the 1995 Base Realignment and Closure List and has been closed. The Seneca County Industrial Development Agency (IDA) has prepared a reuse report entitled "Seneca Army Depot Reuse Plan and Implementation Strategy". The majority of the installation will be used for housing developments, industrial development, institutional and conservation/recreation uses upon transfer. The current OD Grounds site will fall within the area designated for "Conservation/Recreation". The intended uses, which fall within the definition of "Conservation/Recreation", are wildlife habitation, wildlife viewing, hiking/walking and picnicking. Although there is currently no plan for establishing camping facilities, the IDA does not wish to restrict such a possibility in the future.

Therefore, this ESS is based upon the assumption that the clearance depth (4 ft) will be based upon the Public Access scenario (e.g. surface recreation).

## 1.0 REASON FOR OE.

### SEAD 46

SEAD 46 consists of approximately 45 acres on the North side of the Depot due East of the Ammunition Storage Area. Although the Archive Search Report (ASR) described SEAD 46 as a 3.5 inch Rocket Range, it is apparent the area had multiple uses. It includes a reputed EOD disposal site as well as a known Reserve Component Training Area. Despite this fact, it is hard to ignore the manmade earthen "hill" at the North end of the site that appears to be a backstop or perhaps a protective barricade of some sort. While this area may have been used as a firing or function test range, it is unlikely that the predominant use was as a rocket range.

An OE EE/CA for this area was also completed in 2002. Approximately half of the 45 acre site was surveyed with an EM-61. The majority of OE recovered (40mm rifle grenades,practice) were located at the South end, opposite the large hill. This probably reflects the site's use as a local training area in 1980's and 1990's.

Miscellaneous fuses, fuse igniters, slap fares, and ORS were found in the vicinity of the "hill". This probably reflects the site use as a function test or disposal range. The EE/CA recommends clearance to the depth of detection of the EM-61. All identified subsurface anomalies will be excavated and removed.

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## 2.0 MAPS.

Maps detailing the location and extent of the areas of concern and presenting the relevant Public Withdrawal Distances, Q-D Distances, etc., are presented in Appendix A to this submission.

## 3.0 AMOUNT AND TYPE OF OE.

As part of an installation-wide OE Engineering Evaluation/Cost Analysis (EE/CA), OE presence and density at SEAD 46 was characterized.

At SEAD 46, Seventy-five 100' by 100' grids were surveyed using an EM-61. A total of 43.1% of the area (45 acres) was characterized. A summation of the effort follows:

- Of 1,291 anomalies identified, 1,155 (89%) were investigated. 253 (21.2%) were false positives.
- ORS was recovered from 478 (41%) of the anomalies investigated. Ten of these were OE.
- OE recovery depths ranged from surface to a depth of twelve (12) inches.

OE located at the site are listed in Appendix C, pages C-23 through C-25. In addition, one 3.5 in. Rocket, M28A2, HEAT was found on the surface, West of the hill at SEAD 46.

Based upon the results of the EE/CA characterization, the Most Probable Munitions (MPM) was chosen for the site.

For SEAD 46 the MPM is the 3.5 in. Rocket, M28A2, HEAT. The NEW is 1.82 lbs. of Composition B. the Public Withdrawal Distance (PWD) for this MPM is 1,420 ft which was computed using HNC-ED-CS-S-98-1 (approved by DDESB on 6 April 1998) by Sherene Opinhka, USAESC, Huntsville, Engineering Division, Structures Branch, 9 May 2003.

Miniature Open Front Barricade (MOFB) thickness is 1.53 in. (Aluminum), or 0.71in. (Steel).

If, however, a larger, live or suspected live OE item is encountered at either site, its withdrawal distances will be determined in accordance with the procedures defined in 98-01 and adjustments will be made accordingly. Until the appropriate distances are determined by 98-01, the default distances in DoD 6055.9-STD (Chapter 5, Paragraph E.4.a) will be used.

## 4.0 START DATE.

Work will begin in July ***2003,*** beginning with EM-61 survey work at both sites and progressing to intrusive anomaly investigation. Intrusive work should begin by August ***2003.***

## 5.0 FROST LINE DEPTH.

The design frost depth for this site is 40 inches.

## 6.0 CLEARANCE TECHNIQUES.

This section presents information concerning the techniques to be used during the removal of OE at this site.

**General Progression**. OE remediation at SEAD 46 will take place in the following sequence:

**Phase** I.

The site will be surveyed using EM-61-MKII towed arrays. The Geophysical Investigation Plan (DID OE-005-05) and established test plots for the ongoing OD Grounds Phase 1 & 2 OE removal will be utilized. At this time, it is anticipated that the same contractor will be used as well. No ESS is required for this Phase.

The Geophysical Mapping Prove-Out was demonstrated April 25, 2003. This effort validated the capability of detecting a variety of OE 20 mm and larger, their maximum detection depths, under actual site conditions at Seneca Army Depot. Further, positional accuracy and contractor Quality Control (QC) procedures were verified by USACE Quality Assurance personnel.

EM-61-MKII will be towed in multiple instrument arrays in the open and cleared area and the survey teams will be provided with UXO avoidance construction support. QC (known location/depth) and QA (unknown location/depth) targets will be placed in each grid prior to mapping. Identification of all QC/QA targets within a grid is required prior to USACE acceptance and the start of intrusive investigations.

OE found on the surface will be destroyed, or certified as inert ORS, on a weekly basis unless it requires Blow in Place (BIP).

**Phase II**

Upon completion of the geophysical mapping and anomaly identification obtained in Phase I, the contractor will re-acquire the targets and investigate all anomalies intrusively, and remove all subsurface OE to a depth of four (4) feet. OE encountered below this depth will also be removed, however, none is expected.

OE will be destroyed, or certified as inert ORS, on a weekly basis.

**Phase III**

The soils of the "hill", the underlying soil to a depth of six inches, and the top six inches of soil out to a radius of 100 ft. will be excavated and processed by mechanical soil screening and ferrous metal separation equipment developed and proven effective on the Open Burning Grounds and SEAD 44a, OE Removals conducted from 1999 to 2002. This is necessary due to the amount of metallic interference anticipated and identified during the EE/CA. The screen size will be ½ inch to remove 20mm and larger OE.

OE will be destroyed, or certified as inert ORS, on a weekly basis.

**Phase IV**

After soil excavation and processing is completed, the new surface will be geophysically surveyed out to a radius of 100 ft. Any remaining anomalies will be investigated and removed.

A final OE removal Report will be submitted. All of the data gathered from the mapping, anomaly investigation, and soil processing will be compiled to draw conclusions on the existence or non-existence of OE contamination at depth. A conclusion will be drawn regarding the existence of OE-contamination remaining at this site.

**Discussion of Project-Specific Procedures.**

All geophysical surveying and brush clearing activities will be conducted utilizing a UXO qualified escort who will provide OE avoidance services so that grid stakes/flags/QC/QA targets can be placed in the ground. The Geophysics Survey contractor will place metallic objects, at known positions and depth, in each grid for QC purposes prior to mapping. The USACE QA personnel will place inert OE, in locations and depth known only to the USACE, prior to mapping.

The contractor will be required to identify all QC/QA targets in each grid prior to acceptance by the government. Failure to identify a QC target will require a root cause investigation and rework of the deficient portion of the work. Failure to identify a QA target will require the rework of all grids mapped that day.

Upon completion of the mapping, identified subsurface anomalies will be marked and intrusively investigated using UXO qualified personnel. All anomalies will be dug to depth to determine the identity thereof. Earth moving equipment will be utilized to excavate soils one foot on each side of the marker flag. UXO techs will remove the remaining soil using hand tools. The MOFB will be utilized whenever an intrusive OE operations are conducted within     from the Army property line, public traffic route, or inhabited building.

During the "hill" excavation, the excavation contractor will be supervised by UXO qualified individuals. The UXO specialist will be in a protective barricade (see Appendix C) and the earth moving equipment operators will be protected by Lexan or Plexi-glass shielding of the cabs. Shield thickness has been calculated to be a minimum of 2.91 in of Plexiglass by USAESC, Huntsville. All personnel will be in constant radio contact with each other, at all times.

The excavation contractor will excavate, transport, all soils (to the soil processing plant), and remove all soil fines and separated material (oversize rock, OE, ORS and non-ORS scrap metal) from the processing plant to staging areas. Staging areas, and the screening/separation plant, will be located a minimum of 200 ft from the excavation area (and each other) and controlled and monitored by UXO specialists.

A UXO specialist will monitor the screen, the ferrous metal receptacles and the reject material. Each specialist will be in protective barricades and will have a "kill switch" capable of instantly stopping the processing plant should a potentially hazardous UXO item be detected within the screening, separation, or reject streams. The specialists will be located outside the K24 distance for the MPM (19.4 ft). The specialists shall watch for any items that may be potential UXO, any items that may become lodged or jammed in the process equipment, and malfunction or unplanned stopping of process equipment.

Once the process has been halted, the potential UXO (or lodged/jammed OE) will be inspected and identified. Those items determined to be safe to move will be removed from the process equipment and stored for later disposal. Items determined unsafe to move will be left in place and the USACE OE Safety Specialist will be notified for further instructions.

With respect to OE destruction, of specific concern are the location of explosives storage facilities and detonation operations with respect to facilities and people and any effects thereon. The contractor will provide explosives for destruction operations. It is anticipated that demolition materials and shaped charges, as appropriate, will be used. These are considered Class 1.1 and 1.4 explosives.

Explosives will be stored in the SEDA OB/OD area double igloo type, earthen-covered magazine. The existing magazine is constructed to DDESB and Army standards and is complete with the required lightning protection and current ground testing certification.. The contractor will store detonating cord, perforators and time fuse in one half of one of the magazines. In the other half of the first magazine, the contractor will store initiators. A sandbag wall (minimum two feet wide and at least as high as materials stacked on either side) will separate the two halves of this magazine. In the second of the magazines, UXO (which was located and is awaiting the weekly demolition operation) will be stored. Each of the two magazines is designed for storage of a maximum NEW not to exceed 450 pounds. At no time will the contractor store more than 100 pounds NEW in either magazine.

Magazine A0705, which is approved for up to 250,000 lbs HD 1.1 explosives, will be used to store any recovered OE that exceeds the 100 lb limit for the OB/OD service magazine.

As for security, access into the SEDA ammunition area is itself, extremely restricted. Additionally, the contractor will establish and enforce strict area and site access at the SEAD 46 site proper. Access into a work site exclusion zone will be limited to contractor personnel specifically authorized to work on site, Army Corps of Engineers safety personnel and the Corps of Engineers Contracting Officer and Contracting Officer's Representative. All other personnel will be restricted from entering the exclusion zone or be escorted by contractor or Corps personnel.

Disposal/Venting/Demilitarization operations will be carried out weekly. Items which can be moved will be consolidated in accordance with "Procedures for Demolition of Multiple Rounds (Consolidated Shots) on Ordnance and Explosives (OE) Sites", dated August 1998 and approved by DDESB on 27 October 1998. Disposal will be carried out at the "Hill" on the OD Ground. UXO will be stored in the second magazine while awaiting demo operations. Items that cannot be moved, will be blown-in-place daily, on an individual basis.

All OE scrap and range residue will be certified as explosive free and demilitarized prior to removal from the Seneca Army Depot.

All applicable OSHA, USACE (EM385-1-1), DOD (6055.9-STD), Army (385-64) safety regulations will be followed at all times, without exception. Hazard analyses and daily Safety briefings will be prepared and conducted as stated in the contractor's approved Site Safety and Health Plan (SSHP).

**7.0 ALTERNATE TECHNIQUES.**

An alternative barricade to the MOFD will be designed and submitted for approval. See Appendix B.

**8.0 QUANTITY-DISTANCES.**

The appropriate Quantity-Distances are shown on the SEDA Installation Explosives Q/D site map enclosed in Appendix A of this submission. For ease of review, the distances are repeated here.

The rationale for the MPM and citation for the calculation method are presented in Section 3.0 of this submission. In general, team separation distances will be determined by the greater of 200 feet or the K50 (0.9-psi overpressure) distance. The separation distance for all unrelated personnel for an accidental detonation from an OE area will be determined by the greatest of 200 feet, the K50 distance or the maximum fragment throw distance. The separation distance for all personnel (related and unrelated) for intentional detonations will be determined by the maximum of 200 feet, the K328 distance or the maximum fragment throw distance. Applying the above principles, the following distances apply:

OE Areas: Minimum of feet (this is the maximum fragment range for the 3.5 in Rocket, M28A2).

OD Grounds Magazines: Minimum of 658 feet (Front) and 250 feet (Rear and Sides), IAW Table 9-1 of DoD 6055.9-STD. Note that these distances are for 100 lbs HD1.1 explosives; therefore, they exceed the distance requirements for the 1.4 demolition materials to be stored in one of the magazines. UXO (Class 1.1) will be stored in the second magazine.

Another approved ammunition storage magazine, A0705 is available on site. The applicable IBD is 3,150 ft.

Intentional Detonations: Minimum of feet (via approved calculation).

During operations, appropriate protection will be used for site personnel and the public during situations where an intentional detonation is planned for ordnance found on the surface during removal activities. Most OE will be moved to the OD "Hill" for detonation or Thermal Treatment/Certification as ORS.

During intrusive OE operations, a Miniature Open Front Barricade (MOFB) or approved alternate, constructed in accordance with USAESC Huntsville Engineering Drawings, and approved by Dr. Michelle Crull, USAESC, is planned for use during intrusive activities for protection against unintentional detonations.

**9.0 OFF-SITE DISPOSAL.**

Not applicable.

## 10.0 TECHNICAL SUPPORT.

No Chemical Warfare Materials (CWM) are suspected at this site. The contractor will positively identify all OE uncovered before items are removed or destroyed. If a suspect CWM is encountered, the Site Safety Officer will stop all operations on site and notify the on site CENAB OE Safety Specialist. The CENAB OE Safety Specialist will notify the appropriate Explosive Ordnance Disposal (EOD) Detachment (725th Ordnance Company (EOD) Fort Drum) and/or Technical Escort Unit.

## 11.0 LAND USE RESTRICTIONS.

There will be reuse restrictions required following this action. The site will be transferred (sometime during the closure process) for use as discussed in the INTRODUCTION, above.

## 12.0 PUBLIC INVOLVEMENT.

This removal is being performed under the CERCLA umbrella since Seneca is a BRAC federal facility on the National Priorities List. Consequently, the required public involvement process is already in place (BCT, RAB, and general public involvement) with the SEDA BEC taking the lead.

## 13.0 AFTER ACTION REPORT.

Following the OE Removal Project at SEAD 46, a copy of the Final Removal Report will be provided to all who reviewed this ESS, for information purposes.

## 13.0 AMENDMENTS AND CORRECTIONS.

An amendment or correction discussing any changes in the procedures to be used or the conditions encountered during this removal will be provided for review and approval as warranted.

## 14.0 REFERENCES.

**General**
a. AR 385-64, Ammunition and Explosives Safety Standards, dtd 22 May 1987

b. AR 385-64 (Draft), US Army Explosives Safety Program

c. Department of Defense Explosives Safety Board, Interim Guidance on Land Clearance Planning and Removal Depth for Ammunition and Explosives. 1993.

d. DDESB, Guidance for Clearance Plans, 27 January 1998.

e. Interim Final, "Guidance for Conducting Remedial Investigations/Feasibility Studies Under CERCLA", U.S. EPA, Office of Solid Waste and Emergency Response, October 1988.

f. "U.S. Corps of Engineers Safety and Health Requirements Manual," U.S. Army Engineering Manual No. EM-385-1-1, 3 September 1996.

g. "Safety Concepts and Basic Considerations for Unexploded Ordnance (UXO) Operations", U. S. Army Engineering and Support Center, Huntsville, Revised 16 February 1996.

h. "Interim Guidance Documents": http://www.hnd.usace.army.mil/oew/intguidocs.asp

i. "Regulations, Pamphlets, Manuals": http://www.hnd.usace.army.mil/oew/erepems.asp

**Specific**
a. "Federal Facility Agreement under CERCLA Section 120 in the matter of Seneca Army Depot, Romulus, New York," Docket No. II-CERCLA-FFA-00202, USEPA, U.S. Department of the Army, and the New York State Department of Environmental Conservation, November 1990.

b. "Work Plan Architectural-Engineering Services For Performing A Remedial Investigation/Feasibility Study (RI/FS) At The Open Burning (OB) Grounds, Seneca Army Depot, Romulus, New York," Chas. T. Main, Inc., 1991.

c. "Preliminary Site Characterization Report at the Open Burning (OB) Grounds," Chas. T. Main, Inc., 1992.

d. Final, "Remedial Investigation Report at the Open Burning (OB) Grounds", Parsons Engineering Science, Inc., September 1994.

e. Final, "Feasibility Study at the Open Burning (OB) Grounds", Parsons Engineering Science, Inc., June 1996.

f. Draft-Final, "Superfund Proposed Plan, the Open Burning (OB) Grounds at the Seneca Army Depot Activity (SEDA), Romulus, New York.", Parsons Engineering Science, Inc., January 1997.

g. Preliminary-Draft, "Record of Decision, Former Open Burning (OB) Grounds Site, Seneca Army Depot Activity, Romulus, New York.", Parsons Engineering Science, Inc., March 1997.

h. Draft Final Ordnance and Explosives Engineering Evaluation/Cost Analysis, Seneca Army Depot, September 2001. OD Grounds (SEAD 45)

## APPENDIX A

## MAPS

**APPENDIX B**

**Alternate Plexi-Glass Open front Barricade**

**APPENDIX C**

**Anomaly Investigation Results: SEAD 45 Excerpts from EE/CA**

**Appendix C**

**General**
**Health and Safety**
**Requirements**

**1. General.** The Rapid Response Contractor responsible for the tasks defined by this scope of work shall review all information provided and develop the necessary documents which contain the health and safety criteria, procedures, and practices sufficient to protect on-site personnel, the environment, and potential off-site receptors from the chemical and physical hazards particular to this site. The Contractor shall utilize the services of a Certified Industrial Hygienist (CIH) experienced in hazardous waste site operations to oversee the development and implementation of the health and safety documents required by this section. If the information made available is insufficient to allow the Contractor to develop these documents, a description of all additional information required shall be prepared and submitted to the Contracting Officer (CO).

**2. Regulatory Requirements.** All site investigation activities and health and safety documents required by this scope of work shall comply with and reflect the following regulations and appropriate guidance publications, as a minimum:

**2.1** Federal Acquisition Regulation, F.A.R. Clause 52.236-13: Accident Prevention.

**2.2** U.S. Army Corps of Engineers (USACE), Safety and Health Requirements Manual, EM 385-1-1 (September 1996).

**2.3** Occupational Safety and Health Administration (OSHA) Construction Industry Standards, 29 CFR 1926, and General Industry Standards, 29 CFR 1910; especially 29 CFR 1926.65 - "Hazardous Waste Operations and Emergency Response", 29 CFR 1910.1000 - "Air Contaminants", and 29 CFR 1926.650-.652 - "Excavations".

**2.4** NIOSH/OSHA/USCG/EPA, "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities", October 1985.

**2.5** Other applicable Federal, State, and local safety and health requirements.

**3. Documents.** The following health and safety documents shall be developed under this scope of work. Avoid providing material of a general nature, not specifically related to this project or site. Information readily available in standard texts should be repeated only to the extent necessary to meet the requirements of this scope. The Safety and Health Program will contain general information required by the referenced OSHA standards and EM 385-1-1 that is applicable to all hazardous waste activity efforts performed by the contractor. The Site Safety and Health Plan should be a brief document addressing only site-specific safety and health requirements and procedures based upon site-specific conditions. Duplication of the general information contained in the Safety and Health Program is unwanted.

**3.1 Safety and Health Program.** All contractors and their subcontractors performing on-site activities at hazardous waste sites are required by regulation to develop and maintain a written Safety and Health Program in compliance with OSHA standard 29 CFR 1926.65(b)(1) through (b)(4). Written certification that such a program has been prepared and implemented shall be submitted to the CO as a preface to the required Site Safety and Health Plan (SSHP). This program, including updates, shall be made available to the CO in its entirety upon request. Advanced Agreement # 19 under the Rapid Response Contract has fulfilled this requirement.

**3.2 Contractor Site Safety and Health Plan (SSHP).** The Site Safety and Health Plan required by 29 CFR 1926.65(b)(4) shall be prepared by the Contractor and submitted to the Contracting Officer for review and approval prior to the commencement of any on-site work activity to be performed by the Contractor and/or his subcontractors. This SSHP shall describe the health and safety procedures, practices, and equipment to be implemented and utilized in order to protect affected personnel from the potential hazards associated with the site-specific tasks to be performed.

The level of detail provided in the SSHP shall be tailored to the type of work, complexity of operations to be accomplished, and hazards anticipated. All topics required by OSHA standard 1926.65(b)(4), and those described below, shall be addressed in the SSHP. Where the use of a specific topic is not applicable to the project, provide a negative declaration to establish that adequate consideration was given the topic, and give a brief justification for its omission.

**3.2.1** **Site Description and Contamination Characterization.** Describe the location, topography, and approximate size of each site, the on-site jobs/tasks to be performed, and the duration of planned site activities. Compile a complete list of the contaminants found or known to be present in site areas to be impacted by the work to be performed. Include chemical names, concentration ranges, media in which found, applicable regulatory clean-up levels, locations on-site, and estimated quantities/volumes to be impacted by site work, if known.

**3.2.2** **Hazard/Risk Analysis.** Identify the chemical, physical, biological, and safety hazards of concern for each site task and/or operation to be performed. Selection of chemicals as indicators of hazard shall be based on media concentrations, toxicity, volatility or potential for air entrainment at hazardous levels, and frequency of detection. Describe chemical and physical properties of selected contaminants, sources and pathways of employee exposures, anticipated on and off-site exposure level potentials, and regulatory (including Federal, State, and local) or recommended protective exposure standards. Specify and justify "action levels" based upon potential airborne exposures and direct skin contact. Action levels for upgrades/downgrades in levels of personnel protection, implementation of engineering and/or work practice controls, emergency evacuation of on-site personnel, and for the prevention and/or minimization of public exposures to hazards created by site activities shall be identified. Air monitoring/sampling shall be performed in accordance with Paragraph 3.2.8 : "Exposure Monitoring/Air Sampling Program" below, the resulting data compared with established "action levels", and appropriate corrective actions initiated as necessary.

**3.2.3** **Accident Prevention.** The SSHP will serve as the Accident Prevention Plan (APP) and activity hazard analyses (phase plans), required by F.A.R. Clause 52.236-13, and Paragraphs 01.A.07 through 01.A.11 and Figure 1-1 (pg. 4) of USACE EM 385-1-1 (1996). The APP shall be contained in the SSHP as a separate definable section, titled "Accident Prevention Plan". Therefore a separate APP is not necessary. The activity hazard analysis is an ongoing process from initiation of plan preparation through the implementation and completion of the field work. This is especially true under the Rapid Response Contracts. Therefore, the activity hazard analysis shall consist of two specific phases, the first of which shall be detailed in the SSHP submittal process to meet the intent of 29 CFR 1926.65 and paragraph 3.2, "Contractor Site Safety and Health Plan" of this section. The phase safety plans shall be outlined and developed to the full extent possible prior to SSHP submittal. Phase two of the activity hazard analysis (phase plans) as required by the APP shall be developed on-site by the Contractor's supervisory staff prior to beginning any specific activity and incorporated into the SSHP on an ongoing basis throughout the duration of the field activities. Any additional topics required by EM 385-1-1, but not specifically covered in Paragraph 3.2. of this scope of work, shall be addressed in the Accident Prevention section of the SSHP under the phase safety field development process. Daily safety and health inspections shall be conducted to determine if operations are being performed in accordance with the SSHP, USACE and OSHA regulations, and contract requirements. In the event of an accident/incident, the Contractor shall immediately notify the CO. Within two (2) working days of any reportable accident, the Contractor shall complete and submit to the CO an Accident Report on ENG Form 3394 in accordance with AR 385-40 and USACE Supplements to that regulation.

**3.2.4** **Staff Organization, Qualifications, and Responsibilities.** Discuss the organizational structure, including lines of authority (chain of command), and overall responsibilities of the contractor and all subcontractors for site activities, including supervisor/employee relationships. Summarize the operational and health and safety responsibilities and qualifications of each key person identified. Specifically: (1) A Certified Industrial Hygienist (CIH) with experience in hazardous waste site operations shall be responsible for the development, implementation, and oversight of the Safety and Health Program and SSHP. The SSHP shall be signed and dated by the CIH prior to submittal; (2) A fully trained and experienced Site Safety and Health Officer (SSHO), responsible to the contractor and the CIH, may be delegated to implement and continually enforce the safety and health program and site-specific plan elements on-site; and (3) At least two persons certified in first aid/CPR by the Red Cross, or equivalent agency, shall be continuously present on-site during site operations.

**3.2.5 Training.** All personnel performing on-site activities shall have completed applicable training in accordance and compliance with 29 CFR 1926.65(e). In addition, site-specific training covering site hazards, procedures, and all contents of the approved SSHP shall be conducted by the SSHO for on-site employees and visitors prior to commencement of work or entering the site. The type, duration, and dates of all employee training performed shall be listed by employee name and certified in the SSHP.

**3.2.6 Personal Protective Equipment (PPE).** In accordance with 29 CFR 1926.65(g)(5), a written Personal Protective Equipment (PPE) program which addresses all the elements listed in that regulation, and which complies with respiratory protection program requirements of 29 CFR 1910.134 is to be included in the Safety and Health Program. Therefore, the SSHP shall detail the minimum PPE ensembles (including respirators) and specific materials from which the PPE components are constructed for each site-specific task/operation to be performed, based upon the hazard/risk analysis performed above. When preparing PPE ensembles for protection against highly toxic or mobile chemicals, list any pertinent material breakthrough times, as provided by the PPE manufacturer. Components of levels of protection (A, B, C, D and modifications) must be relevant to site-specific conditions, including heat stress potential and safety hazards. Include site-specific procedures for on-site fit-testing, cleaning, maintenance, inspection, and storage.

**3.2.7 Medical Surveillance.** All personnel performing on-site activities shall be participants in an ongoing medical surveillance program, meeting the requirements of 29 CFR 1926.65 and ANSI Z-88.2. A description of the general medical surveillance program is to be included in the Safety and Health Program. All medical surveillance protocols and examination results shall be reviewed by a licensed physician who is certified in Occupational Medicine by the American Board of Preventative Medicine, or who, by necessary training and experience, is Board-eligible. The SSHP shall only describe the content and frequencies of any additional medical tests, examinations, and/or consultations determined necessary by the physician due to probable site-specific conditions, potential occupational exposures, and required protective equipment. Certification of participation in the medical surveillance program, the date of last examination, and name of reviewing occupational physician shall also be included for each affected employee. The written medical opinion from the attending physician required by 29 CFR 1926.65(f)(7) shall be made available upon request to the CO for any site employee.

**3.2.8 Exposure Monitoring/Air Sampling Program (Personal and Environmental).** Where it has been determined that there may be employee exposures to and/or off-site migration potentials of hazardous airborne concentrations of hazardous substances, appropriate direct-reading (real-time) air monitoring and integrated (time-weighted average (TWA)) air sampling shall be conducted in accordance with applicable regulations (OSHA, EPA, State). Both air monitoring and air sampling must accurately represent concentrations of air contaminants encountered on and leaving the site. Sampling and analytical methods following NIOSH (for on-site personnel and site perimeter locations) and/or EPA (for site perimeter or off-site locations) criteria shall be appropriately utilized. Personnel samples shall be analyzed only by laboratories successfully participating in and meeting the requirements of the American Industrial Hygiene Association's (AIHA) Proficiency Analytical Testing (PAT) or Laboratory Accreditation programs. Meteorological monitoring shall be performed on-site as needed and used as an adjunct in determining perimeter and any off-site monitoring/sampling locations. Where perimeter monitoring/sampling is not deemed necessary, provide a suitable justification for its exclusion. Noise monitoring and radiation monitoring (alpha, beta, gamma) shall be conducted as needed, depending on the site hazard assessment. All monitoring/sampling results shall be compared to "action levels" established pursuant to Paragraph 3.2.2 : "Hazard/Risk Analysis", above, to determine acceptability and need for corrective action.

**3.2.9 Heat and Cold Stress Monitoring.** Heat and/or cold stress monitoring protocols shall be implemented, as appropriate. Work/rest schedules shall be determined based upon ambient temperature, humidity, wind speed (wind chill), solar radiation intensity, duration and intensity of work, and protective equipment ensembles. Minimum required physiological monitoring protocols that will affect work schedules shall be developed. In cases where impervious clothing is worn (full-body), the NIOSH/OSHA/USCG/EPA "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities" protocol for prevention of heat stress shall be followed, and heat stress monitoring shall commence at temperatures of **70 degrees Fahrenheit and above**. Where impervious clothing is not worn, the most current published ACGIH heat stress standard (TLV) shall be used. For cold stress monitoring to help prevent frostbite and hypothermia, the most current published ACGIH cold stress standard shall be referenced and followed, as a minimum.

**NOTE:** If either heat or cold stress is not anticipated due to the season or local climate, provide a negative declaratory statement as mentioned in section **3.2**.

**3.2.10** **Standard Operating Safety Procedures, Engineering Controls and Work Practices.** Address the following elements as a minimum: (1) Site rules/prohibitions (buddy system, eat/drink/smoking restrictions, etc.); (2) Material handling procedures (soils, liquids, radioactive materials); (3) Drum/container handling procedures and precautions (opening, sampling, overpacking); (4) Confined space entry procedures; (5) Hot-work, sources of ignition, and electrical safety (ground-fault protection, overhead power line avoidance, etc.); (6) Excavation safety; (7) Machine guarding; (8) Fall protection; (9) Illumination; (10) Sanitation; and (11) Engineering controls.

**3.2.11** **Site Control Measures.** Include site map(s) containing work zone delineation and access points. Describe on-site and off-site communications, security (physical and procedural), and general site access.

**3.2.12** **Personal Hygiene and Decontamination.** Specify necessary facilities and their locations. Detail standard operating procedures, frequencies, supplies and materials to accomplish decontamination of site personnel.

**3.2.13** **Equipment Decontamination.** Specify necessary facilities, equipment, and their locations. Detail procedures, frequencies, supplies and materials, and methods to determine adequacy for the decontamination of equipment used on-site.

**3.2.14** **Emergency Equipment and First Aid Requirements.** The following items, as appropriate, shall be immediately available for on-site use: (1) First aid equipment and supplies approved by the consulting MD; (2) Emergency eyewashes/showers (comply with ANSI Z-358.1, 1910.151(c) ); (3) Emergency respirators (worst-case appropriate); (4) Spill control materials and equipment; and (5) Fire extinguishers **(specify type- i.e., 10 B/C , size, locations).**

**3.2.15** **Emergency Response and Contingency Procedures (On-Site and Off-Site).** This section of the SSHP shall contain an Emergency Response Plan in compliance with 29 CFR 1926.65(l), which addresses the following elements, as a minimum: **(1)** Pre-emergency planning and procedures for reporting incidents to appropriate government agencies for potential chemical exposures, personal injuries, fires/explosions, environmental spills and releases, discovery of radioactive materials; **(2)** Personnel roles, lines of authority, communications; **(3)** Posted instructions and a list of emergency contacts: (physician, nearby medical facility, fire and police departments, ambulance service, federal/state/local environmental agencies, CIH, Contracting Officer);
**(4)** Emergency recognition and prevention; **(5)** Site topography, layout, and prevailing weather conditions; **(6)** Criteria and procedures for site evacuation (emergency alerting procedures/employee alarm system, emergency PPE and equipment, safe distances, places of refuge, evacuation routes, site security and control); **(7)** Specific procedures for decontamination and medical treatment of injured personnel; **(8)** Route maps to nearest pre-notified medical facility; **(9)** Criteria for initiating community alert program, contacts, and responsibilities; and **(10)** Critique of emergency responses and follow-up.

**3.3** **Logs, Reports and Recordkeeping.** The following logs, reports, and records shall be developed, maintained, and submitted to the CO at the conclusion of the site work: **(1)** Training logs (site-specific, visitor); **(2)** Daily safety inspection logs (may be part of the Daily QC Reports); **(3)** Employee/visitor register; **(4)** Environmental and personal exposure monitoring/sampling results.

4. **Document Revisions, Addenda, and Field Modifications.** Review comments issued prior to SSHP approval shall be incorporated by revising and reissuing affected pages. If major revisions are necessary, the entire Plan shall be resubmitted for review and approval. Minor changes affecting only a few pages may be made by addenda sheets and resubmitted. Once on-site, unanticipated field conditions encountered which were not addressed in the approved SSHP shall be immediately reported to the CO. Field activities in such areas shall be halted until the SSHP has been modified to reflect changed conditions and reviewed/approved by the CO.

5. **CO-Approved Visitors.** The Contractor shall continuously maintain on-site a minimum of four (4) sets of protective equipment (except for air-purifying respirators, prescription safety glasses, and safety shoes) for government visitor usage. These ensembles shall include all PPE specified in the SSHP. If protective clothing is included, at least one set shall be size X-large.

6. **Special Considerations**. (A) For OE/UXO Safety Requirements, refer to Data Item Description OE-005-06.01, Huntsville Center, Ordnance and Explosives Mandatory Center of Expertise home page.

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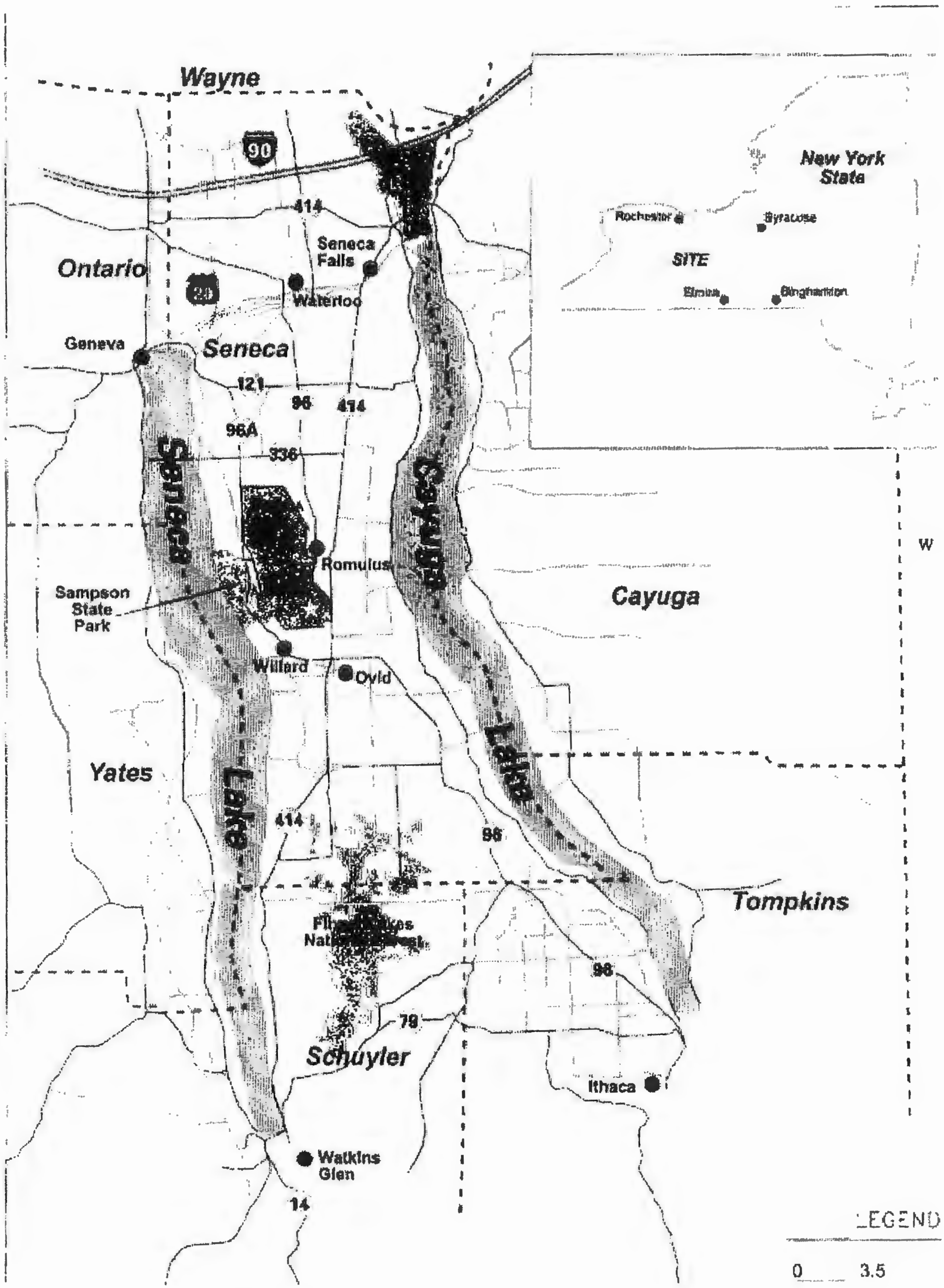

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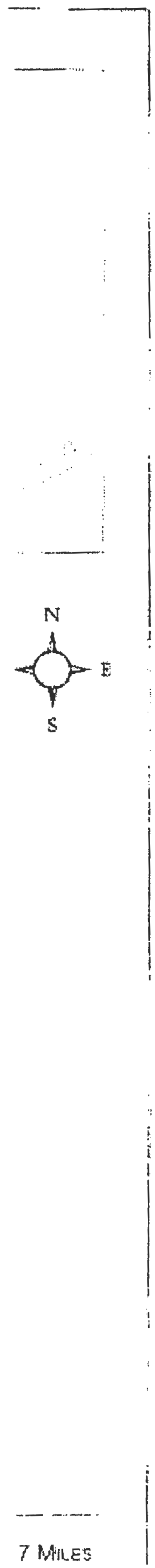
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## Appendix B

## Geophysical Investigation Requirements

### 1.0 General Requirements

The Ordnance and Explosives EE/CA for the Seneca Army Depot recommends clearance to depth of detection for the 3.5" Rocket Range (SEAD 46) and portions of the Former EOD Range (SEAD 57). Geophysical methods of mapping are required under this recommendation for the purpose of locating, marking, and creating a database of all potential OE/UXO and OE-related scrap at SEAD 46 and SEAD. This information will be used to perform a removal action at a later date. This information will be also be used to refine the final acreage estimates for the different remedial zones as outlined in the EE/CA, and to provide an accurate cost estimate for the full-scale remediation. Significant intrusive work will not be required under this Scope of Work (SOW), however the Contractor may be required to process a limited number of subsurface anomalies. If intrusive type activities are performed, the Contractor shall provide UXO construction support, avoidance and surface clearance in accordance to applicable regulations and guidance.

The Contractor's proposal shall detail the technical approach(s) that they will be using to meet the requirements of each task outlined below. The detailed cost proposal for the DGM of SEAD 46 and SEAD 57 shall be based upon a unit cost per acre.

### 2.0 Project Document Review

The Contractor shall review all pertinent project data and documentation to familiarize project staff with the project and identify any data gaps in planning a work approach for this project.

### 3.0 Geophysical Prove-Out

A Geophysical Prove-Out (GPO) shall be used to demonstrate and evaluate the skill, ability, technique, procedures and equipment for geophysical mapping and evaluation as required in this SOW. There are two primary DQOs for this project: 1) to collect digital geophysical mapping (DGM) data that will be used to accurately estimate the cost of performing a removal action at this site and 2) to use the DGM data to produce anomaly selections (dig lists) that will be used during the removal phase, which will be performed at a later date and under a separate Scope of Work. Secondary DQOs, as they pertain to DGM data collection, are listed in Attachment 1 of this SOW. Additional secondary DQOs, as well as modifications to the secondary DQOs listed in Attachment 1, may be developed based upon the results of the GPO and shall be referenced in or included in the geophysical investigation work plan. Based upon these DQOs, the Contractor shall solicit a request for proposals (RFP) from geophysical mapping firms who can provide towed-array DGM services. The Contractor must obtain government approval of the language and content of the RFP prior to its being issued. The RFP shall state that respondents are to provide a detailed technical approach and a detailed cost proposal. The detailed technical approach will be used to evaluate the respondent and will serve as a work plan for performing a GPO should the respondent be selected to demonstrate their system at this site. The technical approach must be specific on how the respondents will test and evaluate their achievement of the DQOs. The technical approach must also contain adequate text to indicate the respondents understand the governments QA/QC requirements. All respondent's proposals to the RFP shall be delivered directly to the government. Only one (1) geophysical mapping firm shall perform a GPO in accordance with (IAW) DIDs OE-005-05A.01 and OE-005-05.01. The government reserves the right to select the geophysical mapping firm to demonstrate their abilities as part of this task. The Contractor shall submit for approval a Site Safety and Health Plan (SSHP) that will be used in this GPO. The selected firm shall perform the GPO at a time and date to be determined by the government. The GPO field work shall include digital geophysical mapping of three non-contiguous prove out grids, which will be separated by at least 300 feet and up to 4000 feet. The prove-out grids will be established by the government, and each will not exceed 1 acre in size. A minimum of one survey control point located within 2 miles of the GPO sites will be provided by the government. The geophysical firm shall submit directly to the government the following deliverables within 5 business days following the completion of their GPO field work: 1) an abbreviated GPO letter report not to exceed 10 pages of written text (excluding figures and tables), 2) their final anomaly selection list, 3) their raw datasets and 4) their final processed datasets. Following the submittal of these deliverables, the Contractor may be reimburse for their cost associated with mobilizing to the GPO, performing the GPO and demobilizing from the GPO as outlined in the scope of work. The reimbursement shall be based upon an itemized invoice using the unit rates of the firm's cost proposal for the full-scale DGM effort of SEAD 46 and SEAD 57. The four deliverables listed above, along with the cost proposal submitted by the geophysical mapping firm shall be used to determine whether the firm will perform the full-scale geophysical mapping/evaluation effort. The selection of the sub-contract firm to perform the full-scale digital geophysical mapping would be contingent upon acceptance of all GPO data and procedures by the government. If a subcontractor fails to meet the government requirements for data quality and/or procedures, then the government reserves the right to select another subcontractor based upon their proposal to perform the GPO. Following the selection of the firm that will perform the DGM ofSEAD 46 and SEAD 57, the Contractor shall prepare a GPO report detailing the type(s) of equipment and procedures that were tested and which was selected to provide accurate detection of buried ordnance items for the SEAD 46 and SEAD 57 removal action. The Contractor shall submit a "Draft" and "Final" version of the GPO report. No field operations shall begin on the GPO plots or on the OD grounds until receiving Government approval. The Final GPO Report shall be included as an appendix to the Geophysical Investigation Work Plan.

## 4.0 Geophysical Investigation Work Plan

The Contractor shall prepare a detailed Geophysical Investigation Work Plan and sub-plans IAW DID OE-001.01 and associated DIDs for the work on this project. The final work plan shall include, either by reference or in the document, detailed explanations of operating procedures and processes that are based upon the methodologies demonstrated during the GPO. The registered Professional Engineer-In-Charge of the project shall sign all work plan submittals and seal the final work plan submittal. The registered Professional Engineer-In-Charge of the project shall be held directly responsible for the quality and completeness of the work plan submittals. The Contractor shall submit a "Draft", "Draft-Final" and "Final" version of the Work Plan.

## 5.0 Location Surveys and Mapping

The Contractor shall perform topographic and location surveys as described in the approved Geophysical Investigation Work Plan and in accordance with Corps of Engineers guidance contained in EM 1110-1-4009 and DID OE-005-07.01, Location Survey and Mapping Plan. A minimum of 5 (five) control monuments shall be established or identified for this site. Survey data may be submitted by CD or electronically via email and must be compatible with the GIS database. The site grid data shall include a map of the entire site showing grid locations and other pertinent features. A tabulated list shall be developed which identifies or numbers each grid and gives the state plane coordinates of grid corners. The list shall also include all network reference points used in performing all surveys. The Contractor shall furnish control cards for all benchmarks used during and established for the project. All grid corners shall be marked with a wooden stake with flagging or an approved marking technique. Survey locations shall be listed in state plane coordinates and the data submitted in Microsoft Excel 2000 or other digital format approved by the Contracting Officer (CO). All survey data shall be included in the Investigation Report and entered in the GIS database.

## 6.0 Establishment and Management of GIS

The Contractor shall use the Corps of Engineers OE GIS model, or other model as approved by the CO, and apply it to this project. The model shall be used, as a starting point to load data and create a project-specific GIS tailored for the specific OE investigative needs of this site. Further guidance can be found in EM 1110-1-4009 and DID OE-005-14.01, Geophysical Information System Plan. Spatial data, to include raster and vector data, shall be geo-referenced to the project specific coordinate system. Raster data shall be in TIF format with accompanying world reference files. Tabular data shall be provided in a Microsoft Access 2000 compatible format. All changes from the model shall be fully documented into a manual specifically tailored for this project. The Contractor shall submit a CD with all GIS data and updates with each monthly report. The Contractor shall provide a secure website for all project-related submittals and project correspondence. A password shall be required and shall be coordinated through the Corps of Engineers by the Contractor. All data generated on this project shall be incorporated into a GIS database.

## 7.0 Brush Clearing

The Contractor shall perform the minimum amount of work necessary to clear paths or areas of vegetation, which impede the progress, effectiveness or safety of the geophysical mapping team or affects the data quality. Brush-clearing requirements, procedures, and restrictions shall be evaluated and refined during the pre-proposal site visit. In the non-forested areas, all brush and trees under 6-inches in diameter shall be removed. All forested areas shall remain intact unless the Contracting Officers Representative authorizes removal. For planning purposes, the Contractor shall assume 75 acres of brush clearing based on an approximate total of 106 acres to be investigated. The Contractor shall provide to the PM and COR the total brush clearing cost and the associated unit price based on acreage cleared per day. The brush clearing acreage may be increased or decreased based upon project requirements. Pre-negotiated unit prices will be used for all quantity changes.

## 8.0 Geophysical Mapping and Evaluation

The Contractor shall implement geophysical mapping and evaluation as described in the approved Geophysical Investigation Work Plan and DID OE-005-05.01. All geophysical mapping teams shall be established from personnel who have successfully demonstrated their ability by training on the prove-out plot for skill, ability, technique and procedure. The Contractor's lead geophysicist for the project shall identify and document the composition of the project geophysical team(s) and document the proven skill, ability, and training of any new member. The lead geophysicist is responsible for the quality and performance of work from each member of the geophysical team.

Small individual pieces of OE scrap and other metallic scrap that would not likely mask a subsurface anomaly may be left in place but must be documented and incorporated into the GIS database. Large individual items of OE scrap or other metallic scrap that could potentially mask any subsurface anomalies shall be removed. All trash pits or other concentrations of metallic surface scrap shall be left undisturbed and their boundaries surveyed and incorporated into the GIS database. All surface UXO or OE that pose a safety hazard shall be collected, documented, and properly disposed of from the geophysical mapping paths or areas. The Contractor shall be prepared to perform demolition operations on a daily/weekly basis as needed.

All OE-related activities shall be performed in accordance with applicable sections of the approved Geophysical Investigation Work Plan. For planning purposes, the Contractor shall plan on investigating 75 acres using conventional digital geophysical mapping (DGM) techniques. The Contractor shall plan on investigating the remaining 31 acres (estimated) of heavily forested areas using "mag & flag" techniques along transects that are 10 feet wide and spaced approximately every 50 feet. The Contractor shall also use "mag & flag" techniques to re-investigate 5 acres of the area geophysically mapped using digital techniques in order to correlate the mag and flag anomaly data in heavily wooded areas to data collected using DGM techniques. The actual locations of areas making up this 5 acres shall be agreed upon between the Contractor and the Government following the collection of DGM data in areas bordering the wooded portions of the site. For estimating purposes, the Contractor shall plan on investigating a total of 12 acres by mag and flag techniques The Contractor shall provide a total geophysical mapping cost and the associated unit price per acre for both their DGM method and their mag and flag method. The Government reserves the right to increase or decrease the total investigated acreage.

### 8.1 Geophysical Mapping

Conventional OE investigations using digital geophysical mapping techniques shall employ a grid pattern using a 125' X 125' grid. The number, size, and location of grids may change based upon conditions encountered in the field and must be coordinated through a Corp of Engineers representative. Once final determination is made, the actual total acreage shall not increase or decrease without written approval from the Contracting Officer Representative. The smallest OE ferrous item expected is a 20 mm projectile, however all metal objects must be identified in a grid. Clearance depth is 4 feet. The Contractor shall perform Quality Control (QC) on the geophysical mapping and evaluation following the schedule in Attachment B of DID OE-005-05.01 and by placing known items on the ground surface at locations that are known to within +/-1foot. The frequency of QC items shall be one (1) per data set or one per 5 acres of contiguously surveyed area. A QC failure shall result if the Contractor does not detect this item or is not detected within 2 feet of its known location during the geophysical mapping and evaluation. The Government reserves the right to conduct Quality Assurance (QA) on the geophysical mapping by placing known items underneath the ground surface which are blind to the Contractor at the same frequency as the QC. A QA failure shall result if the Contractor does not detect this item, or is not detected within 2 feet of its known location, or is not selected as an anomaly, during the geophysical mapping and evaluation. The data gathered from the surface clearance for the geophysical mapping process shall be entered into the GIS database and the final report.

The Contractor's proposal shall include an estimate of the sum of errors in positioning for the approach(s) they will be using under this task order. If the sum of errors for the positioning of data exceeds the project defined DQOs for a given data set and the justification for such is not acceptable to the Government, all affected data will be recollected at no cost to the Government. If any changes/replacements are made to the geophysical mapping equipment or navigation equipment, the equipment shall be tested on the GPO and reviewed and accepted by the Project Geophysicist.

### 8.2 Evaluation

The Contractor's proposal shall identify the roles and functions of the personnel that will be performing data evaluation. The Contractor shall include in their proposal any costs associated with all additional or advanced processing that may be required. A letter signed by the Project Geophysicist shall accompany every data submittal verifying the quality of the data. The geophysicist shall make a professional determination regarding the identification of target anomalies at the site that meet the established selection criteria.

### 8.3 <u>Anomaly Selection</u>

The Contractor shall document the methodology and criteria for identifying and evaluating anomalies in the approved Geophysical Investigation Work Plan. The methodology and criteria will be based upon project specific data quality objectives and will be agreed upon by the project team. The dig sheet shall identify the Contractor's QC target anomalies as described in the QC plan. The Government reserves the right to select up to an average of two anomalies/acre to be reacquired by the Contractor for quality assurance. A QA failure shall result if a selected anomaly cannot be reacquired by the Contractor, the government, or a government's representative.

### 8.4 <u>Quality Control and Quality Assurance</u>

The Contractor shall immediately notify the Contracting Officer of any detected QC failure. For any QC failure or QA failure, the Contractor shall perform a root-cause analysis and determine the extent of previously performed work that may be affected by the failure. Following the root-cause analysis the Contractor shall implement corrective actions. If the corrective actions cannot remedy the QC failure or QA failure to the extent that the affected data will meet project DQOs, then the Contractor shall resurvey all affected areas at no cost to the Government.

### 8.5 <u>Anomaly Reacquisition and Marking</u>

As part of the government's QA process, the Contractor shall reacquire selected geophysical target anomalies as identified on the dig sheet. The anomalies to be reacquired shall be identified by the government and the reacquisition shall be coordinated between the Contractor and the Government such that this activity minimally impacts the Contractor's schedule. The Contractor's reacquisition methodology shall confirm and document that the selected anomalies in the dig sheets have been reacquired. Any anomalies where the reacquisition is ambiguous or uncertain shall be flagged as such. The Contractor shall provide a total anomaly reacquisition cost based upon 2 anomalies/acre and a unit cost per anomaly.

**8.6 <u>Data Quality Objectives.</u>** See Attachment 1.

Attachment 1

Seneca Army Depot Activity
SEAD 46 and SEAD 57 Digital Geophysical Mapping (DGM) Project
Data Quality Objectives (DQOs)

The following DQOs are believed to provide sufficient metrics to quantify the quality of the data collected in association with the SEAD 46 and SEAD 57 DGM project. These DQOs were derived from the analysis of data collected from three (3) GPO plots located on Seneca Army Depot in association with the Open Detonation Grounds DGM Project. It is stressed that these DQOs are intended as objectives only, and will be used to monitor and evaluate the quality of data collected. In the event of a DQO failure, a root-cause analysis will be required to identify the reason for the failure, to identify how much data has been affected, and whether corrective actions can be taken to correct, mitigate or eliminate the cause of the failure. This will include examining the ability to meet the metric for any DQO given the site conditions where the data was collected.

1. **Background Noise:** Mean of the Sum Channel must be < 3.25 mV with a standard deviation < 2 mV. The data will be clipped such that any measurements that are well above the background noise will not be included in these statistics. The clipping value(s) will be recorded.
2. **Mean Speed:** Maintain mean speed < 2.5 mph. The mean speed will be documented along with the standard deviation of the mean speed.
3. **Along Track Sampling:** < 0.5 feet.
4. **Across Track Sampling:** < 3.0 feet, excluding data gaps due to trees or other obstacles that preclude the survey platform from providing complete coverage. This metric is intended to control data gaps associated with inconsistent track plots that are not associated with trees or other obstructions. For the purposes of this project, minor occurrences will be accepted but will not be accepted if they exceed 0.5 feet. The total acreage associated with such data gaps will not exceed 0.1 acres throughout those portions of the project site that are mapped using the DGM towed platform system.
5. **Latency Correction:** No visible chevron effects in the data or pseudo-color plots. The use of appropriate color scaling will be maintained throughout the project.
6. **Data Leveling:** Consistent parameters and processing methods will be used for all channels within each dataset. Consistent processing routines will be used for all datasets throughout the project.
7. **Signal to Noise Ratio Variances:** Data processing will not alter the SNR by more than 5% or 5mV, whichever is less. This will be evaluated by measuring the SNRs of three low-amplitude anomalies (less than 100mV) and three high-amplitude anomalies (greater than 100mV) and comparing those SNR levels in both the pre-processed data and post-processed data. These comparisons will be performed for each dataset collected.
8. **Anomaly Selection:** The anomaly selections will be accepted by the project geophysicist or his/her designated assistants. These individuals will verify that all anomaly selections for a given dataset are reasonable and should identify all buried metal ranging from 20mm rounds (intact with casings) buried at 6 inches to 105mm projectiles or larger buried at 48 inches.

9. **Positioning Errors:** Positioning errors are not to exceed 1.0 feet. A functionality test will be performed each morning and evening to quantify the accuracy of the positioning/navigation system.
10. **Reacquisition:** Anomaly reacquisition will be performed on selected anomalies throughout the duration of the project. USACE will provide a list of anomalies to be reacquired, and the reacquisition of those anomalies must be successful to within 2 feet of their interpreted location.
11. **Blind/Seed QA Items:** All USACE blind seed items must be detected to within 2 feet of their known locations. These items will be buried to the lesser of the depths that were reliably detected during the GPO for the Open Detonation Grounds DGM Project, or to the top of weathered shale underlying the till. Blind QA items will not be smaller or buried deeper than those emplaced during the GPO.

In addition, all DQOs stated in the Scope of Work for DGM activities at SEAD 46 and 57, and the DIDs referenced within this Scope shall also be adhered to.

# Appendix C
# Local Points of Contact

Geophysical Investigation
Munitions Destruction Areas SEAD's 46 & 57
Seneca Army Depot Activity
Romulus, New York

Contract No. DACA45-98-D-0003
Task Order No. 150

# Appendix C

# LOCAL POINTS OF CONTACT

October 2003

| | |
|---|---|
| USACE – New York District | Thomas Battaglia<br>Project Engineer<br>5786 St. RT. 96<br>Romulus, NY 14541<br>607-869-1353<br>607-869-1157 Fax<br>thomas.c.battaglia@usace.army.mil |
| USACE – Omaha District | Tom Westenburg<br>Project Manager<br><br><br>402-980-7329 cell<br>570-788-7216 fax<br>Thomas.w.westenburg@nwo02.usace.army.mil |
| Shaw Environmental, Inc. | Tom Mathison<br>Project Manager<br>2790 Mosside Blvd.<br>Monroeville, PA 15146<br>412-380-6207<br>412-374-1486 Fax<br>tom.mathison@shawgrp.com |
| Shaw Environmental, Inc. | Kent Boler<br>Lead Geophysicist<br>2113 Emmorton Park Road<br>Edgewood, MD 21040-1037<br>410-612-6365<br>kent.boler@shawgrp.com |
| Shaw Environmental, Inc. | Tim Mathisen<br>Sr. UXO Supervisor<br>5700 Thurston Avenue, Suite 116<br>Virginia Beach, VA 23455-3302<br>775-867-5406<br>757-363-7222 Fax<br>tim.mathisen@shawgrp.com |

# Appendix D
# Site Safety & Health Plan

**Geophysical Investigation**
**Munitions Destruction Areas SEAD's 46 & 57**
**Seneca Army Depot Activity**
**Romulus, New York**

**Contract No. DACA45-98-D-0003**
**Task Order No. 150**

**Appendix D**
**Site Safety & Health Plan**

**Revision A**

**September 2003**

**APPROVALS:**

| | | |
|---|---|---|
| Tom Mathison | | |
| Project Manager, Shaw Environmental, Inc. | Signature | Date |
| David H Duncan, CIH CSP CHMM | | |
| Program CIH, Shaw Environmental, Inc. | Signature | Date |
| Robert Hickman | | |
| Ordnance & Explosive Supervisor<br>Shaw Environmental, Inc. | Signature | Date |

# Table of Contents

## List of Tables

## List of Appendices

## WORKER ACKNOWLEDGEMENT TO HEALTH-AND-SAFETY PLAN AND SITE ORIENTATION

I have read this Environmental Safety and Health Plan, I understand the contents, and I agree to abide by its requirements. I also have been properly trained, medically monitored, and fit-tested as required for the work that I am to perform. Documentation will be placed in the Project Records.

| Printed Name | Signature | Date |
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## Acronyms and Abbreviations

| | |
|---|---|
| °F | degrees Fahrenheit |
| ABC | adequate airway, breathing, and circulation |
| ABIH | American Board of Industrial Hygiene |
| AHA | Activity Hazard Analysis |
| ANSI | American National Standards Institute |
| APP | Accident Prevention Plan |
| APR | air purifying respirator |
| BBL | barrel |
| BP | blood pressure |
| BZ | breathing zone |
| CBC | complete blood count |
| CFR | Code of Federal Regulations |
| CIH | Certified Industrial Hygienist |
| CO | Contracting Officer |
| CPR | cardiopulmonary resuscitation |
| dB(A) | Decibel using A-weighted scale |
| EKG | electrocardiogram |
| EPA | U.S. Environmental Protection Agency |
| eV | electron volt |
| GFCI | ground fault circuit interrupter |
| IDLH | immediately dangerous to life or health |
| kV | kilovolt |
| LEL | lower explosive limit |
| MSDS | Material Safety Data Sheet |
| MSHA | Mine Safety and Health Administration |
| NIOSH | National Institute for Occupational Safety and Health |
| NRR | Noise Reduction Rating |
| OE | Ordnance and Explosives |
| OSHA | Occupational Safety and Health Administration |
| PEL | permissible exposure limit |
| PID | photoionization detector |
| Pgm CIH | Program Certified Industrial Hygienist |
| PM | Project Manager |
| PPE | personal protective equipment |
| ppm | parts per million |
| S&H | safety and health |
| Shaw E & I | Shaw Environmental & Infrastructure |
| SHM | Safety and Health Manager |
| SMAC | Sequential Multiple Analyzer Computer |
| SS | Site Supervisor |
| SSHO | Site Safety and Health Officer |
| SSHP | Site Safety and Health Plan |
| TLV | threshold limit value |

| | |
|---|---|
| TWA | time-weighted average |
| UXO | Unexploded Ordnance |
| USACE | U.S. Army Corps of Engineers |
| USCG | U.S. Coast Guard |
| VOC | volatile organic compound |

# 1.0 Introduction

## 1.1 Objective

This document describes the safety and health (S&H) guidelines developed to protect on-site personnel, visitors, and the public from hazards encountered during geophysical investigation activities at the Seneca Army Depot Romulus, New York. The procedures and guidelines contained herein were based upon the best available information at the time of the plan's preparation. Specific requirements may be revised if new information is received or conditions change. Written amendments will document any changes made to the plan and will be included in Attachment D.

## 1.2 Site Location & Description

The Seneca Army Depot is a US Army Facility located in Seneca County, New York near the town of Romulus. SEDA occupies approximately 10,600 acres. It is bounded on the west by State Route 96A and on the east by State Route 96. The cities of Geneva and Rochester are located to the northwest (14 and 50 miles, respectively); Syracuse is 53 miles to the northeast and Ithaca is 31 miles to the south. The area surrounding SEDA is generally used for farming. The geophysical areas of consideration are SEAD 46 and SEAD 57. SEAD 46 was a 3.5" rocket range consisting of approximately 45 acres on the north side of the depot, due east of the Ammunition Storage Area, and SEAD 57 was a former EOD range consisting of approximately 61 acres at the northern end of the depot, immediately adjacent and south of the Open Detonation Area. The 61 acres of SEAD 57 consists of approximately 40 acres of open grassy area and 21 acres of heavily wooded area. Approximately 20% of the heavily wooded area will be mapped using hand-held equipment. This site will be surveyed between 400 ft radius from the "berm out to a distance of 1,000 ft.

## 1.3 Policy Statement

The policy of Shaw Environmental, Inc. (Shaw) is to provide a safe and healthful work environment for all employees. Shaw considers no phase of operations or administration to be of greater importance than injury and illness prevention. Safety takes precedence over expediency and shortcuts. At Shaw, it is believed all accidents and injuries are preventable. Shaw will take every reasonable step to reduce the possibility of injury, illness, or accident.

This Site Safety and Health Plan (SSHP) describes the procedures that must be followed during referenced site activities except for those activities specifically related to Ordnance and Explosives (OE) and Unexploded Ordnance (UXO). OE and UXO issues will be addressed in a separate site specific OE SSHP (see Appendix F). Operational changes that could affect the health and safety of personnel, the community, or the environment will not be made without the prior approval of the Project Manager and the Program Certified Industrial Hygienist (Pgm CIH), with involvement of the Senior UXO Supervisor as required.

The provisions of this plan are mandatory for all personnel and subcontractors assigned to the project. All visitors to the work site must abide by the requirements of the plan. Additionally, the S&H requirements of the USACE shall take precedence provided their requirements exceed those of Shaw and OSHA.

**DISCLAIMER:** This SSHP has been designed for the methods presently contemplated or currently in use by Shaw for execution of work. Therefore, the SSHP may not be appropriate if the work is not performed by or using the methods presently contemplated by Shaw. In addition, as the work is performed, conditions different from those anticipated might be encountered and the SSHP may have to be modified. Therefore, Shaw only makes representations or warranties as to the adequacy of the SSHP for methods presently contemplated or currently in use by Shaw for execution of work.

## 1.4 References


- *Safety and Health Requirements Manual*, EM 385-1-1, U.S. Army Corps of Engineers, May 3, 1999.
- Engineer Regulation 385-1-92, *Safety and Occupational Health t Requirements for Hazardous, Toxic and Radioactive Waste (HTRW)* (USACE, 2000)
- *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, NIOSH/OSHA/USCG/EPA, publication No. 85-115, October 1985.
- *Pocket Guide to Chemical Hazards*, National Institute for Occupational Safety and Health (NIOSH), Publication No. 90-117, Revised 1997.
- Material Safety Data Sheet Collection, Genium Publishing Corp., Schenectady, New York, March 1992.
- Shaw Health and Safety Procedures, HS 001 through HS 823

# 2.0 Organization, Qualifications, and Responsibilities

## 2.1 All Personnel

### 2.1.1 Stop Work Authority

According to Shaw policy HS040, **all** employees have the right and duty to stop work when conditions are unsafe, or when established safety procedures are being disregarded. Whenever an employee determines that workplace conditions present an immediate uncontrolled risk of injury or illness, immediate resolution with the appropriate supervisor shall be sought. Should the supervisor be unable or unwilling to correct the unsafe conditions, the employee is authorized and required to issue a Stop Work Order. The specific activity or operation in question shall be discontinued until the issue is resolved.

Upon issuance of a Stop Work Order, the supervisor shall contact the project/location manager and the project/location H&S representative and request their assistance in assessing the situation or conditions that lead to the Stop Work Order. If the project manager and the H&S representative are unable to agree on the necessary corrective actions, or the appropriateness of the Stop Work Order, the issue shall be referred to the business line/program manager and the business line Health and Safety Manager.

Resumption of safe operations is the primary objective; however, operations shall not resume until an H&S representative has given approval that workplace conditions now meet acceptable safety standards. Any supervisor or manager responsible for resuming operations without H&S approval, thereby endangering project personnel, shall be subject to termination.

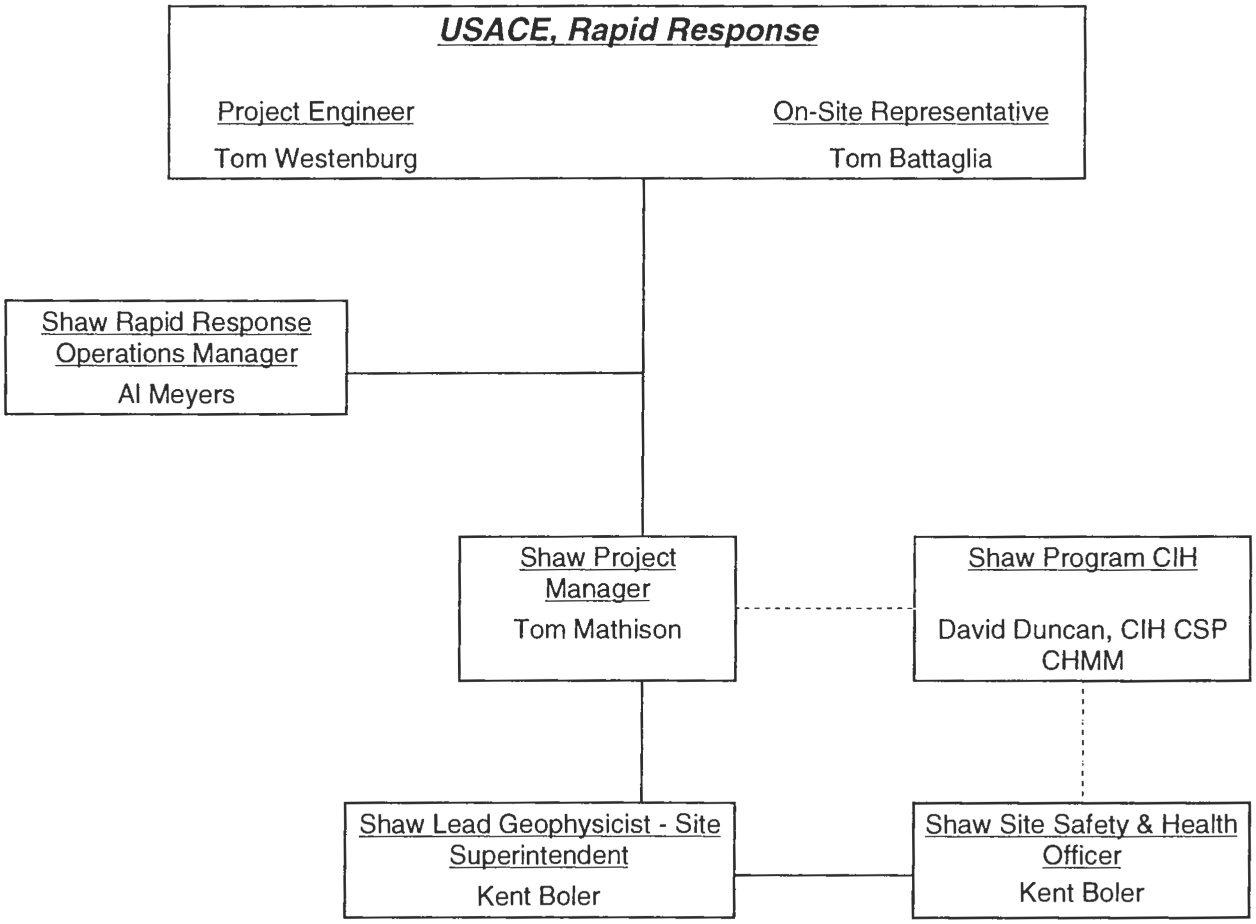
### 2.1.2 Incident Reporting

All injuries, no matter how small, will be reported to the Site Superintendent (SS) and Site Safety and Health Officer (SSHO) or the individual or individuals acting in those capacities. An accident/injury/illness report will be completely and properly filled out and submitted to the Pgm CIH and, if required, the Shaw EHS Hotline will be called to notify members of the Shaw Health and Safety Staff. If there is any dispute with regard to safety and health (S&H), on-site staff will attempt to resolve the issue on the project level. If the issue cannot be resolved, they will consult off-site management for assistance. The specific activity or operation in question shall be discontinued until the issue is resolved.

### 2.1.3 Plan Compliance

All personnel working in the field during site activities, including UXO construction support activities, are responsible for complying with this SSHP and all other required safety and health guidelines.

### 2.1.4 Site Organization




## 2.2 Program Certified Industrial Hygienist

The Program Certified Industrial Hygienist (Pgm CIH) is responsible for the development, implementation, and oversight of the Safety and Health Program and the Site Safety and Health Plan (SSHP). The Pgm CIH may designate a fully trained and experienced individual, such as the Site Safety and Health Officer (SSHO), to implement and continually enforce safety policies and activities on site. The Pgm CIH has formal education and training in occupational S&H and certification in industrial hygiene by the American Board of Industrial Hygiene (ABIH).

## 2.3 Senior Unexploded Ordnance Supervisor

The SUXOS directly controls the operations of all field teams performing OE activities and will spend most of the day in the field monitoring their performance and assisting them in achieving maximum operational safety and efficiency. The SUXOS reports directly to the Program Manager and receives guidance from the Shaw Environmental, Inc. OE Service Center concerning technical UXO and operational issues. He or she will implement the approved plans in the field and must review and approve any changes to the approved UXO plans. The SUXOS will supervise all UXO teams on a project. Additionally, the SUXOS has the authority to temporarily stop work to correct an unsafe condition or procedure.

## 2.4 Unexploded Ordnance Safety Officer

The UXOSO is responsible for implementation of this SSHP during OE removal activities, as well as for making recommendations and revisions for the Program CIH's and Senior Unexploded Ordnance Supervisor's (SUXOS) approval. The UXOSO will conduct daily inspections to determine if operations are being conducted in accordance with this SSHP, Army requirements, and Cal/OSHA regulations. The UXOSO reports directly to the CIH and SUXOS. An open dialogue will be kept between the UXOSO, CIH, SUXOS, and supervisory personnel of the project to ensure that safety issues are quickly addressed and corrective action taken. The UXOSO has the authority to take immediate steps to correct unsafe or unhealthful conditions, including the stoppage of fieldwork when deemed necessary.

The UXOSO will implement the requirements of the Explosives Management Plan (Section 3.0) in compliance with all Department of Defense (DOD), federal, state, and local statutes and codes. The UXOSO will also analyze unexploded ordnance (UXO) and explosives operational risks, hazards, and safety requirements; establish and ensure compliance with all site-specific safety requirements for UXO and explosives operations; enforce personnel limits and safety exclusion zones for UXO clearance operations, UXO and explosives transportation, storage, and destruction; conduct safety inspections to ensure compliance with UXO and explosives safety codes; and operate and maintain required air-monitoring equipment for airborne contaminants.

## 2.5 Site Safety and Health Officer

The SSHO is responsible for providing technical assistance to the Site Supervisor with respect to safety and health matters. He/she will conduct daily inspections to determine if operations are being conducted in accordance with the SSHP, USACE contract requirements, and OSHA regulations.

Due to the somewhat limited scope of activities associated with this task order, and the presence of UXO Safety Officers and Technicians the Lead Geophysicist/Site Supervisor will assume the role and responsibilities of the SSHO for this project. Should conditions warrant, an SSHO shall be assigned to the field.

## 2.6 Project Manager

The Project Manager (PM) is responsible for ensuring that the necessary personnel are available for this project and that the reporting, scheduling, and budgetary obligations for this project are met. The PM will have a minimum of three years of experience in management of hazardous waste operations and/or emergency response, and an education in the environmental profession or a related field.

## 2.7 Site Superintendent

The Site Superintendent (SS), as the on-site representative of Shaw E&I, is responsible for maintaining contact with the USACE representative, the Pgm CIH, and the PM. The SS is also responsible for coordinating and enforcing S&H activities for all individuals on site at all times. The SS will be competent, experienced, and knowledgeable in the field of hazardous waste and specific activities identified in this Task Order.

## 2.8 Ordnance and Explosives Field Personnel

All UXO personnel will be graduates of Naval School Explosive Ordnance Disposal (NAVSCHOLEOD) or a DOD-certified equivalent course.

## 2.9 Subcontractors, Visitors, and Other On-Site Personnel

Subcontractors are responsible for the S&H of their employees and for complying with the standards established in this SSHP and the guidelines established in Shaw E&I's *Safety Rules for Contractors*. Subcontractors will report to the SS. All subcontractors, visitors, and other on-site personnel must check in with the SS prior to being allowed access to the site.

# 3.0 Job Hazard Analysis – Accident Prevention Plan

## 3.1 Accident Prevention Plan

This section of the SSHP serves as the Accident Prevention Plan (APP) and preliminary activity hazard analysis for this project. Activity Hazard Analyses addressing the hazards anticipated on this project are presented below while hazard controls are presented in Section 4 of this plan. Specific controls related to OE and UXO are included in the OE SSHP in Appendix F.

## 3.2 Scope of Work

Shaw will be conducting a geophysical investigation effort at the Seneca Army Depot in the areas SEAD 46 (3.5" rocket range) and SEAD 57 (former EOD range). The on-site tasks to be completed during this project include:

- Task 1: Mobilization
- Task 2: Surface Preparation, Clearing, and OE Identification / Avoidance / Removal
- Task 3: Geophysical Test Plot
- Task 4: Geophysical Investigation, Mapping and Evaluation
- Task 5: Location Surveys and Mapping
- Task 6: Re-acquiring Anomalies
- Task 7: Demobilization

An official detailed scope of work was submitted by USACE and is retained in the project files.

## 3.3 Activity Hazard Analysis (AHA)

The activity hazard analysis is an ongoing process from initiation of the SSHP to implementation and completion of fieldwork. The hazard analysis provided in this plan is the first phase in a two-phase process. The second phase consists of further analysis in the field and completing Phase Safety Plans as necessary (Appendix D).

Unexploded Ordnance activities will be conducted in accordance with the general guidance contained in EP 385-1-95a (USACE, 2001).

Personnel and visitors will be familiar with site hazards and will strictly adhere to the appropriate safety procedures prescribed in this SSHP, including the O&E Activity Hazard Analyses (AHAs) presented in Table F-2. Each AHA identifies potential safety, health, biological, and environmental hazards associated with specific tasks, and provides for the protection of personnel, the community, and the environment. Additional AHAs will be developed for new tasks and added to this SSHP as necessary. Because of the complexity and constant change of projects, sites must be continually inspected to identify new hazards. Changes to the hazard analysis may be originated by the UXOSO but must be approved by the CIH, the SUXOS, and the USACE OE Safety Specialist. Such changes will be documented and included in this plan in Appendix D.

## 3.3.1 Activity Hazard Analysis – Mobilization & Demobilization

**Task Description:** Activities to be completed during these tasks include identification of underground/overhead utilities obtaining appropriate permits, delineation/maintenance of site control zones, and the mobilization/demobilization of construction/analytical supplies, personnel, and equipment.

| Task Breakdown | Potential Hazards | Critical Safety Practices | Personal Protective Clothing and Equipment | Monitoring Devices |
|---|---|---|---|---|
| Equipment/ Facility Set-up | Slips, Trips, Falls | Clear walkways work areas of equipment, tools, vegetation and debris<br>Exit equipment slowly and maintain three point contact<br>Mark, identify, or barricade other obstructions | | |
| | Spills | Clean up spills before initiating maintenance<br>Review maintenance procedures for safety practices | | |
| | Pinch points | Review equipment adjustment procedures, identify pinch points<br>Isolate/block pinch points to limit motion when inserting pins, fasteners, closing tackles | Leather gloves | |
| | Equipment failure | Perform daily maintenance inspections on operating equipment | | |
| | Struck by or against hand tools | Hand and electric tools will be inspected prior to use and after use.<br>Any damaged hand or electric tools will be tagged and removed from service.<br>All tools will be kept in good condition and properly stored.<br>Tools will not be altered, and they will be used only for their intended purposes and within the manufacturer's guidelines.<br>Guards will not be removed from tools, and all nip points, open drums, and flywheels will be guarded. | Work gloves should be used when using tools. Leather gloves may be worn over nitrile to provide protection against mechanical damage. | |

## 3.3.1 Activity Hazard Analysis – Mobilization & Demobilization

**Task Description:** Activities to be completed during these tasks include identification of underground/overhead utilities obtaining appropriate permits, delineation/maintenance of site control zones, and the mobilization/demobilization of construction/analytical supplies, personnel, and equipment.

| Task Breakdown | Potential Hazards | Critical Safety Practices | Personal Protective Clothing and Equipment | Monitoring Devices |
|---|---|---|---|---|
| Equipment/ Facility Set-up (continued) | Handling heavy objects | Observe proper lifting techniques<br>Obey sensible lifting limits (60 lb. Maximum per person manual lifting)<br>Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads<br>Avoid carrying heavy objects above shoulder level<br>Avoid manual lifting/carrying tasks | | |
| | Sharp Objects | Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects<br>Maintain all hand and power tools in a safe condition | Leather gloves | |
| | High Noise Levels | Use hearing protection when exposed to excessive noise levels (greater than 85 dB(A) over an 8-hour work period) | Ear plugs | |
| | Burns associated with loading/unloading equipment on trucks | Identify heavy objects for loading that may have hot surfaces<br>Allow objects to cool or cover hot surfaces with non-combustible material to protect workers from buns | | |
| | Severe Weather | In the event of a tornado warning, severe thunderstorm warnings, or the threat of other severe weather conditions personnel will perform tasks necessary to stabilize the work area and evacuate the site. Personnel will proceed to assigned shelter or assembly point(s) if available. If a tornado approaches take cover in ditches or lower protected areas not in vehicles. | | |
| | High/Low Ambient Temperature | Provide fluids to prevent worker dehydration<br>Monitor for Heat/Cold stress in accordance with Shaw E&I Health and Safety Procedures # HS400, HS401 | Insulated Clothing (Subject To Ambient Temperature) | Meteorological Equipment |

### 3.3.1 Activity Hazard Analysis – Mobilization & Demobilization

**Task Description:** Activities to be completed during these tasks include identification of underground/overhead utilities obtaining appropriate permits, delineation/maintenance of site control zones, and the mobilization/demobilization of construction/analytical supplies, personnel, and equipment.

| Task Breakdown | Potential Hazards | Critical Safety Practices | Personal Protective Clothing and Equipment | Monitoring Devices |
|---|---|---|---|---|
| Equipment/ Facility Set-up (continued) | Biological Hazards | Inspect work area carefully and avoid placing hands or feet into concealed areas. Review Section on Biological Hazards following the AHAs | | |

## 3.3.2 Activity Hazard Analysis – Surface Preparation, Clearing & OE Identification/Avoidance/Removal

**Task Description**: Shaw shall perform surface preparation, surface OE identification, surface OE avoidance, site clearing and any OE removal as required for surface OE or UXO, as appropriate. Site preparation shall include all support areas, staging areas, access routes/paths, and storage areas, as required.

| Task Breakdown | Potential Hazards | Critical Safety Practices | Personal Protective Clothing and Equipment | Monitoring Devices |
|---|---|---|---|---|
| Transportation of explosive materials (if required) | Accidental detonation of explosives | Explosives will be transported in accordance with 49 Code of Federal Regulations (CFR) Parts 100-199. | | |
| | | Explosives will be transported in closed vehicles whenever possible | | |
| | | Observe the U.S. Army Engineering and Support Center, Huntsville, Safety Concepts and Basic Considerations for Unexploded Ordnance (UXO) Operations. | | |
| | | When using an open vehicle, explosives will be covered with a flame resistant tarpaulin. | | |
| | | Motor vehicles will be shut off when loading/unloading explosives. | | |
| | | Beds of vehicles will have either a nonconductive bed liner, dunnage, or sand bags to protect the explosives from contact with the metal bed and fittings. | | |
| | | Initiating explosives, such as blasting caps, will remain separated at all times. | | |
| | | Each vehicle used for the transport of ordnance and explosives (OE) will be outfitted with a fire extinguisher and first aid kit. | | |
| | | Do not fuel trucks when loaded with OE. | | |
| | Unqualified Drivers | Drivers operating outside the boundaries of any federal installation will be licensed in accordance with federal, state, and local regulations. | | |

## 3.3.2 Activity Hazard Analysis – Surface Preparation, Clearing & OE Identification/Avoidance/Removal

**Task Description:** Shaw shall perform surface preparation, surface OE identification, surface OE avoidance, site clearing and any OE removal as required for surface OE or UXO, as appropriate. Site preparation shall include all support areas, staging areas, access routes/paths, and storage areas, as required.

| Task Breakdown | Potential Hazards | Critical Safety Practices | Personal Protective Clothing and Equipment | Monitoring Devices |
|---|---|---|---|---|
| | Vehicle operations | Drivers will observe all posted speed limits while operating a motor vehicle on a public roadway. | | |
| | | Vehicles transporting explosives off road will not exceed 25 MPH. | | |
| | | Chock wheels when loading or unloading OE-related materials. | | |
| Storage of explosive materials (if required) | Accidental detonation of explosives | Materials will be stored in accordance with federal, state, and local regulations. | | |
| | | Refer to the Standard Operating Procedure for the Storage of Explosive Materials. | | |
| Surveying and establishing boundaries and grids. | Accidental detonation of explosives | Personnel involved will attend a site-specific OE/UXO recognition class prior to the commencement of any site activity. | | |
| | | Observe the U.S. Army Engineering and Support Center, Huntsville, Safety Concepts and Basic Considerations for UXO Operations. | | |
| | | UXO personnel will escort non-UXO personnel at all times. | | |
| | | Mark and avoid UXO. Only UXO personnel will handle OE waste. | | |
| | | Check location with magnetometer prior to driving stakes. | | |
| | Wildlife, slips, trips, falls, insects, poisonous plants, use of hand tools | Refer to the Activity Hazard Analysis for Site Preparation and Biological Hazards sections following AHAs | | |
| Clearing and Grubbing | Accidental detonation of explosives | Observe the U.S. Army Engineering and Support Center, Huntsville, Safety Concepts and Basic Considerations for UXO Operation | | |

## 3.3.2 *Activity Hazard Analysis – Surface Preparation, Clearing & OE Identification/Avoidance/Removal*

**Task Description:** Shaw shall perform surface preparation, surface OE identification, surface OE avoidance, site clearing and any OE removal as required for surface OE or UXO, as appropriate. Site preparation shall include all support areas, staging areas, access routes/paths, and storage areas, as required.

| Task Breakdown | Potential Hazards | Critical Safety Practices | Personal Protective Clothing and Equipment | Monitoring Devices |
|---|---|---|---|---|
| Clearing and Grubbing con't | | Personnel involved will attend a site-specific OE/UXO recognition class prior to the commencement of any site activities. | | |
| | | Be alert and mark all OE located. | | |
| | | Only clear and grub to within 4 inches of the ground surface. | | |
| | | UXO trained personnel will escort non-UXO personnel at all times. | | |
| | | Surface sweeps will be conducted with magnetometers or other suitable geophysical instrumentation to identify potential OE. | | |
| | Wildlife, slips-trips-falls, chainsaw operations, poisonous plants, use of hand tools | Refer to the Activity Hazard Analysis for Site Preparation, Chain saw operation and Biological Hazards sections following AHAs | | |
| Transportation of OE Waste (if applicable) | Accidental detonation of explosives | No personnel allowed in OE cargo compartment of vehicle. | | |
| | | No OE allowed in passenger compartment of vehicle. | | |
| | | Block, brace, secure OE. | | |
| | | No smoking in vehicles used for transport of OE/UXO waste. | | |
| | Vehicle operations | Placard vehicle in accordance with U.S. Department of Transportation (DOT) regulations | | |
| | | Vehicles transporting explosives off road will not exceed 25 MPH. | | |
| | | Drivers will observe all posted speed limits while operating a motor vehicle on a public roadway. | | |

## 3.3.2 Activity Hazard Analysis – Surface Preparation, Clearing & OE Identification/Avoidance/Removal

**Task Description:** Shaw shall perform surface preparation, surface OE identification, surface OE avoidance, site clearing and any OE removal as required for surface OE or UXO, as appropriate. Site preparation shall include all support areas, staging areas, access routes/paths, and storage areas, as required.

| Task Breakdown | Potential Hazards | Critical Safety Practices | Personal Protective Clothing and Equipment | Monitoring Devices |
|---|---|---|---|---|
| UXO Screening and Segregation of 3X Scrap | Accidental detonation of explosives/CWM exposure | Observe UXO safety precautions contained in USACE-Huntsville Division Safety Concepts and Basic Considerations for UXO Operations. | | |
| | | Adhere to monitoring plan for CWM using MINICAMS and DAAMS tubes if CWM is present or discovered. | | |
| | | Observe procedures outlined in EOD/TM/TO 60A 1-1-31. | | |
| Hand Excavation of UXO | Accidental detonation | Observe the U.S. Engineering and Support Center, Huntsville, Safety Concepts and Basic Considerations for UXO Operations. | | |
| | | Only UXO technicians will excavate or handle UXO. | | |
| | | Personnel in the immediate vicinity of UXO operations will be kept to the minimum necessary for safe operations but no less than two UXO technicians. | | |
| | | Do not subject UXO to heat, shock, or friction. | | |
| | | Only hand excavation permitted when within 1 foot of UXO. | | |
| | | Magnetometers will be used frequently to pinpoint the location of UXO. | | |
| | Non-UXO personnel | Establish exclusion zone (EZ); post warning signs, maintain site control. | | |
| | | Stop all UXO operations when non-UXO trained personnel are within the EZ. | | |
| Excavation of UXO With Earth-Moving Machinery (EMM) (Observation) | Accidental detonation of explosives | Observe UXO safety precautions contained in USACE-Huntsville Division Safety Concepts and Basic Considerations for UXO operations. | | |
| | | EMM will be used to excavate to no greater than 1-foot of UXO. | | |

## 3.3.2 *Activity Hazard Analysis – Surface Preparation, Clearing & OE Identification/Avoidance/Removal*

**Task Description**: Shaw shall perform surface preparation, surface OE identification, surface OE avoidance, site clearing and any OE removal as required for surface OE or UXO, as appropriate. Site preparation shall include all support areas, staging areas, access routes/paths, and storage areas, as required.

| Task Breakdown | Potential Hazards | Critical Safety Practices | Personal Protective Clothing and Equipment | Monitoring Devices |
|---|---|---|---|---|
| | | Hand excavation shall be used within 12 inches of a potential subsurface UXO. | | |
| | | Only excavation necessary to identify the UXO will be accomplished. | | |
| | | Spotters will be utilized at all times during mechanized excavation of UXO. | | |
| | | Geophysical instrumentation will be used to frequently pinpoint the location of UXOs. | | |
| | | If more than one EMM is used on the same site, they will be separated by at least 100 meters during excavation. | | |
| | | Multiple search teams will be separated by a minimum of 50 meters. | | |
| | | Minimize personnel exposure. | | |
| | | Excavation and trenching shall comply with the provisions of 29 CFR 1926 Subpart P and Shaw E&I H&S procedure HS 307 Trenching/Excavation. | | |
| | Operation of EMM by non-UXO personnel | Operators of EMM will be under the direct supervision of UXO personnel. | | |
| | | Slope and/or shore trenches or holes greater than 4 feet in depth. | | |
| | | Excavation and trenching shall comply with the provisions of 29 CFR 1926 Subpart P and Shaw E&I H&S procedure HS 307 Trenching/Excavation. | | |

### 3.3.3 Activity Hazard Analysis – Geophysical Investigation

**Task Description:** Geophysical investigation tasks are similar and include: Test Plot operations; Geophysical investigation, mapping and evaluation; Location surveys and mapping; Reacquiring anomalies. Such activities involve operation of appropriate vehicles and equipment such as all terrain vehicles (ATV) to tow sensor arrays over paths previously cleared of OE/UXO. Operations may proceed over difficult terrain.

| Task Breakdown | Potential Hazards | Critical Safety Practices | Personal Protective Clothing and Equipment | Monitoring Devices |
|---|---|---|---|---|
| Towing geophysical array over analysis areas | Struck By/ Against Equipment | Wear reflective warning vests when exposed to vehicular traffic<br>Isolate equipment swing areas<br>Make eye contact with operators before approaching equipment<br>Understand and review hand signals<br>Do not attempt verbal communication in high noise backgrounds<br>Complete the Utility Markup Documentation provided in Attachment E. | Warning vests, Hard hat, Safety glasses, Steel toe work boots | |
| | Equipment failure | Perform daily maintenance inspections on operating equipment | | |
| | Unauthorized personnel in work area | Work area security will be maintained during this activity. Access by unauthorized personnel and visitors will be discouraged | | |
| | Hazard communication | MSDS's for applicable products will be reviewed by effected personnel (see chemical hazards section for more) | | |
| | Slips, Trips, Falls | Clear walkways, work areas of equipment, tools<br>Mark, identify, or barricade other obstructions\<br>In cold weather ice may form – use sand or other material to maintain traction in work area | | |

### 3.3.3 *Activity Hazard Analysis – Geophysical Investigation*

**Task Description:** Geophysical investigation tasks are similar and include: Test Plot operations; Geophysical investigation, mapping and evaluation; Location surveys and mapping; Reacquiring anomalies. Such activities involve operation of appropriate vehicles and equipment such as all terrain vehicles (ATV) to tow sensor arrays over paths previously cleared of OE/UXO. Operations may proceed over difficult terrain.

| Task Breakdown | Potential Hazards | Critical Safety Practices | Personal Protective Clothing and Equipment | Monitoring Devices |
|---|---|---|---|---|
| Towing geophysical array over analysis areas con't | Handling Heavy Objects | Observe proper lifting techniques when handling tools.<br>Obey sensible lifting limits (60 lb. maximum per person manual lifting)<br>Ask for assistance or use mechanical lifting aids. | | |
| | Sharp Objects | Keep guards in place during use.<br>When using a knife, cutting strokes will always be away from the body.<br>Place knife in sheath or holder when not in use. Unused knives will never be left with cutting edges exposed.<br>Never use a knife that is defective or has a broken blade or handle.<br>Never use a knife as a pry bar or screwdriver.<br>Don't use a dull blade; replace or have blade sharpened prior to use. | | |
| | Temperature Extremes - Heat Stress and Cold Stress | Workers will be acclimated and fluid intake will be enforced during hot weather.<br>Personnel will be trained to recognize signs and symptoms of heat and cold stress.<br>Wet Bulb Globe Temperature measurements will be taken and physiological monitoring will be performed if the temperature exceeds 90° F.<br>Protective clothing will be worn when the ambient air temperature falls below 36°F. | | |

## 3.3.3 *Activity Hazard Analysis – Geophysical Investigation*

**Task Description:** Geophysical investigation tasks are similar and include: Test Plot operations; Geophysical investigation, mapping and evaluation; Location surveys and mapping; Reacquiring anomalies. Such activities involve operation of appropriate vehicles and equipment such as all terrain vehicles (ATV) to tow sensor arrays over paths previously cleared of OE/UXO. Operations may proceed over difficult terrain.

| Task Breakdown | Potential Hazards | Critical Safety Practices | Personal Protective Clothing and Equipment | Monitoring Devices |
|---|---|---|---|---|
| Towing geophysical array over analysis areas con't | Severe Weather | In the event of a tornado warning, severe thunderstorm warnings, or the threat of other severe weather conditions personnel will perform tasks necessary to stabilize the work area and evacuate the site. Personnel will proceed to assigned shelter or assembly point(s) if available. If a tornado approaches take cover in ditches or lower protected areas not in vehicles. | | |
| | Biological hazards, animals, plants insects | Refer to the Activity Hazard Analysis for Site Preparation and Biological Hazards sections following AHAs | | |
| | Struck by or against hand tools | Hand and electric tools will be inspected prior to use and after use.<br>Any damaged hand or electric tools will be tagged and removed from service.<br>All tools will be kept in good condition and properly stored.<br>Tools will not be altered, and they will be used only for their intended purposes and within the manufacturer's guidelines.<br>Guards will not be removed from tools, and all nip points, open drums, and flywheels will be guarded. | Work gloves should be used when using tools. Leather gloves may be worn over nitrile to provide protection against mechanical damage. | |
| | Fire | Fire extinguishers shall be suitably placed, distinctly marked, readily accessible, and maintained in a fully charged and operable condition. | | |

## 3.3.4 *Activity Hazard Analysis – Chain Saw Operations*

**Task Description:** The use of chain saws may be required to clear a path in order for the geophysical analysis to proceed. In that case these guidelines shall be followed.

| Task Breakdown | Potential Hazards | Critical Safety Practices | Personal Protective Clothing and Equipment | Monitoring Devices |
|---|---|---|---|---|
| Use of chain saws in clearing operations. | Slips, Trips, Falls | Clear walkways, work areas of equipment, tools<br>Mark, identify, or barricade other obstructions\<br>In cold weather ice may form – use sand or other material to maintain traction in work area | | |
| | OE | Use OE avoidance procedures | | |
| | Equipment failure | Perform daily maintenance inspections on equipment | | |
| | Cut by saw | Wear appropriate PPE<br>Use saw according to manufacturer's instructions<br>Use sharp chain<br>Verify chain and bar are properly lubricated prior to startup<br>Place saw on ground for startup<br>Verify all guards are in place and operational prior to startup | Chaps, Hard hat, safety glasses, face shield, gloves, hearing protection | |
| | Handling Heavy Objects | Observe proper lifting techniques when handling the saw.<br>Obey sensible lifting limits (60 lb. maximum per person manual lifting)<br>Do not attempt to use a saw that is too heavy for you to lift and control properly. | | |
| | Dust | Monitor dust levels necessary<br>Utilize dust control as required to minimize fugitive emissions | | |
| | Temperature Extremes - Heat Stress and Cold | Workers will be acclimated and fluid intake will be enforced during hot weather. | | |

## 3.3.4 Activity Hazard Analysis – Chain Saw Operations

**Task Description:** The use of chain saws may be required to clear a path in order for the geophysical analysis to proceed. In that case these guidelines shall be followed.

| Task Breakdown | Potential Hazards | Critical Safety Practices | Personal Protective Clothing and Equipment | Monitoring Devices |
|---|---|---|---|---|
| | Stress | Personnel will be trained to recognize signs and symptoms of heat and cold stress.<br>Wet Bulb Globe Temperature measurements will be taken and physiological monitoring will be performed if the temperature exceeds 90° F.<br>Protective clothing will be worn when the ambient air temperature falls below 36°F. | | |
| | Unauthorized personnel in work area | Work area security will be maintained during this activity. Access by unauthorized personnel and visitors will be discouraged | | |
| | Carbon monoxide | Don't run chain saws in confined areas with limited ventilation | | |
| | Vehicular traffic | Wear traffic vest when working near active roadways | | |
| | Biological Hazards | Inspect work area carefully and avoid placing hands or feet into concealed areas. | | |
| | Severe Weather | In the event of a tornado warning, severe thunderstorm warnings, or the threat of other severe weather conditions personnel will perform tasks necessary to stabilize the work area and evacuate the site. Personnel will proceed to assigned shelter or assembly point(s) if available. If a tornado approaches take cover in ditches or lower protected areas not in vehicles. | | |

## 3.4 Chemical Hazards

Inasmuch as the scope of work to be performed at the Seneca Army Depot involves essentially non-invasive geophysical investigation, it should not involve contact or potential contact with hazardous materials. There are no known chemicals of concern based on initial information presented to Shaw. Therefore no routine chemical monitoring will be undertaken. Should potential chemical hazards be discovered the Pgm CIH shall be notified and an appropriate monitoring plan shall be developed and implemented to verify compliance with applicable laws and regulations. Appropriate PPE ensembles shall be specified and additional procedures, including equipment decontamination may be implemented as required. Such plans and/or procedures, if required, will be attached to this plan in Appendix D.

### 3.4.1 Chemicals found at UXO sites

Lead, explosive compounds, and petroleum distillates have been detected at UXO construction support activities at concentrations that exceed base-specific background concentrations. At these levels, they pose a risk of exposure to site personnel by inhalation, ingestion, and skin and eye contact. Health effects along with routes of exposure for these potential contaminants are detailed in the following paragraphs.

**Lead.**

Lead has no local toxic effects. Systemic poisoning symptoms are nonspecific: fatigue, headache, poor sleeping, aching bones and muscles, constipation, abdominal pains, and decreased appetite. All these symptoms are reversible with time away from exposure. Continued exposure results in anemia, pallor, "lead line" on the gums, and decreased handgrip strength. Lead also has central nervous system effects and was implicated in producing learning deficiencies in exposed children. Compounds of lead display a variety of toxic effects that may be more specific to the compound than to the lead. Some of these compounds were found to be carcinogenic in experimental animals.

**Explosive Compounds.**

Explosive compounds (such as cyclotrimethylenetrinitramine and cyclotetramethylene-tetranitramine) can affect the body if inhaled or swallowed, or by contact with the eyes or skin. Exposure to explosive compounds can cause liver damage with yellow jaundice and anemia that may be fatal. Exposure may also cause irritation of the eyes, nose, and throat with sneezing, coughing, and sore throat. It may cause a skin rash and stain the skin, hair, and nails a yellowish color. It may affect the ability of the blood to carry oxygen. This lack of oxygen may result in a bluish discoloration of the skin, weakness, drowsiness, shortness of breath, and unconsciousness. In addition, it may cause muscular pains, heart irregularities, kidney irritation, cataracts of the eyes, menstrual irregularities, and nerve damage.

**Petroleum Distillates.**

Petroleum distillates can affect the body if they are inhaled, if they come in contact with the eyes or skin, or if they are swallowed. Overexposure to petroleum distillates may cause dizziness, drowsiness, headache, and nausea. They may also cause irritation of the eyes, throat, and skin.

**Other Potential Contaminants**

Other contaminants present a minimal health risk at a low concentration. Chemical hazards may include the following substances: dioxins/furans, volatile organic compounds, polychlorinated biphenyls/pesticides, metals, and crystalline silica. In addition, poison oak may be encountered. Poison oak presents a skin and inhalation hazard.

Should any nonstandard event occur (e.g., discovery of leaking drums or paint cans, soil with abnormal consistency and discoloration, sealed glass containers, or unknown and unidentified materials), fieldwork will be stopped at the event location and the HTRW Project Manager and SSHO will be notified. The SSHO will identify potential concerns and implement requirements before OE removal activities continue.

**Chemical Warfare Agents**

Chemical Agent Identification Sets have not been found at Seneca Army Depot. No other CWM is expected to be encountered. In the event that CWM is encountered, appropriate procedures will be implemented after consultation with UXO staff, Pgm CIH and project management staff.

## *3.5 Biological Hazards*

Potential exposure to biological hazards during performance of this project is believed to be minimal. However since the work is performed outside some precautions should be taken to guard against the following hazards. Bearing in mind that the hazards may vary depending on the time of year.

### *3.5.1 Poisonous Plants*

Three or five leaves radiating from a stem identify poison ivy, poison oak, and poison sumac. Poison ivy is in the form of a vine, while oak and sumac are bush-like. All produce a delayed allergic hypersensitivity. The plant tissues have an oleoresin, which is active in live, dead, and dried parts. The oleoresin may be carried through smoke, dust, contaminated articles, and the hair of animals. Symptoms usually occur 24 to 48 hours after exposure resulting in burning or stinging, and weeping and/or crusted blisters. Should exposure to any of these plants occur, wash the affected area with a mild soap and water, but do not scrub the area. The best antidote for poisonous plants is recognition and avoidance. There are products available over the counter designed for application before exposure and after potential exposure to toxic plants. Some prevent the plant oleoresin from contacting the skin, some are used after potential exposure to wash the skin and others are used to treat symptoms of exposure. In extreme cases prescription steroids may be used to reduce the allergic reaction.

### *3.5.2 Ticks*

Ticks are vectors of many different diseases including Rocky Mountain spotted fever, Q fever, tularemia, Colorado tick fever, and Lyme disease. They attach to their host's skin and intravenously feed on its blood creating an opportunity for disease transmission. Covering exposed areas of the body and the use of tick repellent are two ways to prevent tick bites. Products are available containing permethrins (an insecticide) that may be sprayed on outer clothing to kill ticks that may climb onto clothing. Such products should not be sprayed onto bare skin.

Periodically during the workday employees will inspect themselves for the presence of ticks. If a tick is discovered, the following procedure should be used to remove it:

- Do not try to detach a tick with your bare fingers; bacteria from a crushed tick may be able to penetrate even unbroken skin. Fine-tipped tweezers should be used.
- Grip the tick as close to your skin as possible and gently pull it straight away from you until it releases its hold.
- Do not twist the tick as you pull and do not squeeze its bloated body. That may actually inject bacteria into your skin.
- Thoroughly wash your hands and the bite area with soap and water. Then apply an antiseptic to the bite area.
- Save the tick in a small container with the date, the body location of the bite, and where you think the tick came from.
- Notify the SSHO of any tick bites as soon as possible.

Recently, Lyme disease has been the most prevalent type of disease transmitted by ticks in the United States.

### *3.5.3 Flying Insects*

Flying insects such as mosquitoes, wasps, hornets, and bees may be encountered while site activities occur. Subsequent sections discusses problems associated with them. Mosquitoes can be the vectors for diseases such as West Nile Virus and Saint Louis Encephalitis, reports of which appear in the media periodically. Avoiding mosquito bites is the best way to avoid potential exposure to mosquito-borne disease. Apply insect repellant containing DEET (N,Ndiethyl-meta-toluamide), wear long-sleeved clothes and long pants treated with repellent and stay indoors during peak mosquito feeding hours (dusk until dawn) to further reduce your risk.

#### *3.5.3.1 West Nile Virus*

The Centers for Disease Control and Prevention report that human illness from West Nile virus is rare, even in areas where the virus has been reported. The chance that any one person is going to become ill from a mosquito bite is low. West Nile virus is spread by the bite of an infected mosquito, and can infect people, horses, many types of birds, and some other animals. Most people who become infected with West Nile virus will have either no symptoms or only mild ones. On rare occasions, West Nile virus infection can result in a severe and sometimes fatal illness known as West Nile encephalitis (an inflammation of the brain). The risk of severe disease is higher for persons 50 years of age and older. There is no evidence to suggest that West Nile virus can be spread from person to person or from animal to person.

#### *3.5.3.2 Saint Louis Encephalitis*

The Centers for Disease Control and Prevention report mild infections occur without apparent symptoms other than fever with headache. More severe infection is marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, occasional convulsions (especially in infants) and spastic paralysis. There is no evidence to suggest that Saint Louis encephalitis can be spread from person to person or from animal to person.

**Table 3-1**
**Flying Insect Information**

| Organism | Description | Habitat | Problem | Severity | Protection |
|---|---|---|---|---|---|
| Hornet | One inch long with some body hair. Abdomen is mostly black. | Round, paper like nest hanging from trees, shrubs, or under eaves of buildings. | One nest may contain up to 100,000 hornets that will attack in force at the slightest provocation. | Severe pain, allergic reactions similar to bees. | Do not come near or disturb nest. If a hornet investigates you, do not move. |
| Mosquito | Small, dark, fragile body with transparent wings. From 1/8 to 1/4 inch long. | Where water is available for breeding. | Bites and sucks blood. Itching and swelling result. | Can transmit encephalitis and other diseases. Scratching causes secondary infections. | Use plenty of insect repellant and wear gloves. Stay in windy areas. |
| Wasp | Very thin waist. Color can be black, yellow or orange with stripes. | Underground nest. Paper-like honeycomb nest in abandoned buildings hollow trees, etc. | Stings. Some species will attack if you get too close to the nest. | Severe pain, allergic reactions similar to bees. Can be fatal. | Avoid Nest. Do not swat at them. |
| Bee | Generally have yellow and black stripes and two | Hollow logs, underground nest, | Stings when annoyed. Leaves | If person is allergic, nausea, shock, constriction of the | Be careful and watch where you walk. Cover exposed skin. |

| Organism | Description | Habitat | Problem | Severity | Protection |
|---|---|---|---|---|---|
| | pair of wings. | old buildings, | venom sac in victim. | airway can result. Death may result. | Avoid areas where bees are swarming. Avoid wearing sweet fragrances and bright clothing. Move slowly or stand still when bees are swarming about you. |

### *3.5.4 Spiders*

A common venomous spider is the Black Widow. The adult female is glossy black with short, almost microscopic hairs and a crimson hourglass marking on the underside of the abdomen. They are found in dark corners of barns, stables, garages and piles of boxes and crates. They have also been known to reside in vacant rodent burrows, under stones, logs and long grass, and in hollow stumps and brush piles. Generally Black Widows are not aggressive and usually can be induced to bite only if pressed against the skin. If disturbed, they typically will retreat to a corner of their web. However, these spiders are more aggressive if they are protecting an egg sac. After a bite, a dull numbing pain in the affected extremity occurs. Also, pain and some muscular rigidity in the abdomen or the shoulder, back, and chest may occur. The bite may also produce headache, dizziness, skin rash, nausea, vomiting, anxiety and weakness, and increased skin temperature over the affected area may be observed. Ice may be placed over the bite to reduce the pain. Bites are rarely fatal to adults, but because the black widow spider injects neurotoxins it is important to seek immediate medical attention.

### *3.5.5 Snakes*

The most effective way to prevent snakebites is to avoid snakes in the first place. Personnel should avoid walking at night or in high grass and underbrush. Visual inspection of work areas should be performed prior to activities taking place. The use of leather boots and long pants will be required, since more than half of all bites are on the lower part of the leg. No attempts at killing snakes should be made; many people are bitten in such an attempt.

If a snake bites someone, the following treatment should be initiated:

- Keep patient calm
- Notify emergency medical services
- Wash the wound and keep the affected body part still
- Apply direct pressure to site of bite if bleeding is extreme
- Keep the affected area lower than the heart
- Carry a victim who must be transported, or have him/her walk slowly
- Transport to closest medical facility

## 3.6 Physical Hazards

### 3.6.1 Ordnance and Explosives

An Ordnance and Explosives (O&E) Site Safety and Health Plan is attached as Appendix F. However, as part of the initial evaluation of the site as it relates to O&E the *Evaluating OE/UXO/CWM Hazards in Support of HTRW Activities* form that follows should be completed.

## Evaluating OE/UXO/CWM Hazards in Support of HTRW Activities

Date: ______________________ Form Completed by: ______________________

Site Name: ______________________ Title: ______________________

Job Number: ______________________ Signature: ______________________

| 1a. | Y | N |
|---|---|---|
| **1a.** Have the historical records for this HTRW site been reviewed? | Y | N |
| If the answer to 1a is **YES** proceed to **1b**. | ☐ | ☐ |
| If the answer to 1a is **NO**, review site information before completing this form. | | |

| 1b. | Y | N |
|---|---|---|
| **1b.** Is there recent information (site walk, worker interviews, etc.) that indicates a potential OE/CWM hazard at this site? | ☐ | ☐ |
| Proceed to **2** | | |

| 2a. | Y | N |
|---|---|---|
| **2a.** According to the records review, is this site know or suspected to have been used for: | Y | N |
| Manufacturing, production, or shipping of conventional or chemical warfare materiel (CWM)) OE | ☐ | ☐ |
| Live fire testing of any ordnance: | ☐ | ☐ |
| Conventional or CWM OE Training: | ☐ | ☐ |
| Storage of conventional or CWM OE: | ☐ | ☐ |
| Disposal or demilitarization of conventional or CWM OE: | ☐ | ☐ |
| Other (specify) | ☐ | ☐ |

**Any** 2a question answered "YES" indicates UXO support is required for **all** site activities. If **all** 2a questions are answered "NO", UXO support may not be required. Refer to UXO Site Safety and Health Plan (Appendix F)

| 2b. | Y | N |
|---|---|---|
| **2b.** According to the records review, is this site know or suspected to have been used for: | Y | N |
| Manufacturing , production or shipping of chemical agent: | ☐ | ☐ |
| Research or testing of chemical agent: | ☐ | ☐ |
| Chemical agent related training: | ☐ | ☐ |
| Storage of chemical agent: | ☐ | ☐ |
| Disposal or demilitarization of chemical agent: | ☐ | ☐ |
| Other (specify) | ☐ | ☐ |

**Any** 2b question answered "YES' requires the remainder of this form to be completed. If **all** 2b questions are answered "NO", real time monitoring for chemical agent will not be required and completing the remainder of this form is not required. Refer to Chemical Hazards section of this plan and to OE Safety and Health Plan for additional information concerning agent monitoring.

| 3. For sites where the manufacturing, testing, storage or diaposal of CWM is suspected: | Y | N | For any "YES" in 3, list types of agent (mustard, lewisite, etc.) and the form (in ordnance, in drums, etc.) in which the CWM is expected to be found or state "unknown". |
|---|---|---|---|
| Is there evidence that the CWM is open to the environment (eg. In an open container or free liquid/solid in the soil/water) | ☐ | ☐ | |
| Is there evidence that the CWM hazard has been removed from the site or that the site has been decontaminated: | ☐ | ☐ | List agent breakdown products: |
| Has the site been previously monitored or sampled for chemical agent or agent breakdown products. | ☐ | ☐ | |
| For any "YES" above, was the agent or breakdown product identified? | ☐ | ☐ | |

| Defining the potential for the presence of CWM: | Agent Monitoring Requirements for Site Actitivities: |
|---|---|
| **4a. High Presence Potential** – CWM is known or highly suspected to be present at the site in a condition (within ordnance and/or nonexplosive container, or in an uncontainerized form in sufficient volume that weathering of the product has not rendered it harmless) that will cause potential harm to personnel if it is encountered. | Mandatory personal and perimeter air monitoring using the DAAMS MINICAMS and RTAP collection analysis methods with any off-site surety laboratory confirmation of all environmental samples. Specific monitoring criteria (types and sampling station placement, percentage of personnel monitored) to be established in the Site Specific Safety and Health Plan if required. |
| **4b. Moderate Presence Potential** – CWM is suspected to have been present at the site, but has been previously removed and/or decontaminated, or has been open to the environment such that it is expected to have degraded and been rendered harmless. | The need for personal and perimeter air monitoring using the DAAMS, MINICAMS, and RTAP collection /analysis methods with off-site surety laboratory confirmation of all environmental samples will be reviewed on a site-by-site basis. Specific monitoring criteria (types and sampling station placement, percentage of personnel monitored) to be established in the Site Specific Safety and Health Plan if required. |
| **4c. Low Presence Potential** – No indications that CWM will be present in quantity or reactivity (in munitions, projectiles, drums, etc.) | No specific personnel or area monitoring for chemical agents required beyond what is specified in the SSHP. |

## Evaluating OE/UXO/CWM Hazards in Support of HTRW Activities (Continued)

| | |
|---|---|
| Based on the information available for this site, including information gathered during completion of this form, the potential for CWM to be present at this site, as defined above is expected to be:<br><br>Exceptions/Explanations: (additional space on next page) | *Exposure Potential* (circle one)<br><br>**HIGH** **MODERATE** **LOW** |

| | |
|---|---|
| Based on this questionnaire, the following guidelines will be used for establishing PPE requirements for activities to be performed at this site. Specific details provided in the SSHP Section 3 or Appendix D. | |
| **HIGH Exposure Potential** is determined by evaluating the potential presence of CWM in conjunction with the task(s) to be performed, as well as the specific location and duration of the task(s). | Subject to review by the Shaw PgmCIH, PPE for all personnel in the EZ at the site identified as having a High Exposure Potential will be Level B (supplied are) or Level C (full-facepiece respirator equipped with HEPA/Acid Gas/OV cartridges w/ emergency egress hood) and chemically resistant coveralls. Specific PPE shall be in the SSHP. |
| **MODERATE Exposure Potential** is determined by evaluating the potential presence of CWM in conjunction with the task(s) to be performed, as well as the specific location and duration of the task(s). | Subject to review by the Shaw PgmCIH, PPE for all personnel in the EZ at the site identified as having a Moderate Exposure Potential will be Level D plus disposable coveralls and emergency egress hood ("Modified Level D"). Specific PPE shall be in the SSHP. |
| **LOW Exposure Potential** is determined by evaluating the potential presence of CWM in conjunction with the task(s) to be performed, as well as the specific location and duration of the task(s). | Subject to review by the Shaw Pgm CIH, no additional PPE requirements above those stated in the SSHP are needed for sites identified as having Low Exposure Potential. Specific PPE requirements are in the SSHP. |

**Reviewed By (signatures):**

Shaw UXO Technical Manager ______________________ Date:_____ Shaw H&S Specialist: ______________________ Date: _______

## Evaluating OE/UXO/CWM Hazards in Support of HTRW Activities (Continued)

Additional Notes and Explanations:

### 3.6.2 Occupational Noise Exposure

Heavy equipment and power tools typically used may produce noise levels greater than 85 dB(A). Workers should maintain sufficient distance from noise sources to minimize their potential exposure when possible. Otherwise hearing protection devices such as earplugs or muffs shall be worn. The Hearing Conservation program is outlined in Section 4.

### 3.6.3 Heat and Cold Stress

Workers performing tasks in outdoor environments are subject to heat and cold stress. Heat stress may be exacerbated by required PPE. Specific hazard control measures are presented in Section 4.

### 3.6.4 Severe Weather

Severe weather contingency plan is contained in Section 11.

# 4.0 Hazard Control Program

This section outlines the potential biological, chemical and physical hazards to which workers may be exposed to during site activities. The hazards and control methods that will be used for a specific task are addressed in the Activity Hazard Analysis (AHA) for that task. AHAs are developed for specific tasks and are included in Appendix D. Site workers are briefed on the information included in AHAs prior to performing the tasks and that information is documented in the Health and Safety files.

## 4.1 General Practices

- Legible and understandable precautionary labels shall be affixed prominently to containers of contaminated scrap, waste, debris, and clothing.
- An emergency eyewash unit shall be located immediately adjacent to employees who handle hazardous or corrosive materials, including decontamination fluids. All operations involving the potential for eye injury, splash, etc., must have approved eye wash units locally available capable of delivering at least 0.4 gallons per minute for at least 15 minutes.
- All on-site activities will be conducted during daylight hours. If work after dusk becomes necessary due to an emergency, adequate lighting must be provided and notification of such activity made to the USACE representative.
- Hazardous work, such as handling hazardous materials and heavy loads, and equipment operation, etc., should not be conducted during severe storms.
- All temporary electrical power must have a ground fault circuit interrupter (GFCI) as part of its circuit if the circuit is not part of permanent wiring. All equipment must be suitable and approved for the class of hazard present.
- Overhead and underground utility hazards shall be identified and or inspected prior to conducting operations involving potential contact with utility lines.

### 4.1.1 Hazard Communication

Shaw Procedure HS060, "Hazard Communication Program," outlines the responsibilities and actions necessary to inform personnel of hazards associated with hazardous chemicals through the use of hazardous chemical inventory, container labeling, MSDS's, and documented employee training. The purpose of a Hazard Communication or Employee Right-To-Know program is to ensure that the hazards of all chemicals located at this field project site are communicated according to 29 CFR 1926.59 and 1910.1200 to all Shaw personnel, Shaw's subcontractors, and other workers.

The written hazard communication program that has been established for Shaw includes the following:

- **Hazardous Material Inventory**. Shaw will maintain a written inventory of hazardous chemicals brought to the job site, including manufacturers' MSDSs for each item.

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

- **MSDSs.** There will be an MSDS located in the Health and Safety trailer for each hazardous material used or known to be on site. MSDSs for cleaning and decontamination chemicals will be included on site.

- **Employee Information and Training.** Training employees on chemical hazards is accomplished through formal safety training conducted annually and site safety meetings. Project-specific chemical hazards are communicated to employees through an initial site orientation meeting and during daily safety meetings. The crew will be informed verbally and in writing of the results of air monitoring should it be required.

At a minimum, Shaw employees and subcontractors will be instructed on the following:

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

When any new hazardous material is introduced or discovered on site, employees will be given information on this material at the daily safety meeting. The ES&H Representative or his designee will be responsible for seeing that the MSDS on the new chemical or material is available on site and that the Chemical Inventory Report is completed.

## 4.2 Project-Specific Practices

No project-specific practices that differ from accepted standard operating procedures are anticipated for this project. Should site-specific practices become necessary said practices will be documented as addenda to this plan.

## 4.3 Thermal Stress

### 4.3.1 Cold Stress

Although unlikely, cold stress situations may be encountered at the site. If lower than normal temperatures (i.e., less than 35°F) are forecasted the following information will be utilized. Most cold related worker fatalities have resulted from failure to escape low environmental air temperatures, or from immersion in low temperature water. The two most prominent adverse effects from exposure to cold temperatures are frostbite and hypothermia. A person qualified in first aid or a professional medical provider should administer treatment for cold related injuries. The single most important aspect of life-threatening hypothermia is a drop in the deep-core body temperature. Response to cold stress will be based on Cold Stress section of the ACGIH TLV booklet and Shaw Procedure HS 401 Cold Stress.

#### 4.3.1.1 Frostbite

Frostbite occurs when the extremities do not get sufficient heat from the central body stores. The fluids around the cells of the body tissues freeze from exposure to low temperatures. This condition can result in damage to, and loss of, tissue. The most vulnerable areas are the nose, cheeks, ears, fingers, and toes. Damage from frostbite can occur in either the outer layers of skin, or in the tissue beneath these layers and can be serious, resulting in scarring, tissue death, permanent loss of movement, or amputation. Frostbite is unlikely at the Seneca Army Depot site as the project should be completed prior to the onset of cold weather.

#### 4.3.1.2 Hypothermia

This is the most severe form of cold stress and results from a drop in the body's core temperature. The symptoms of hypothermia are:

- First, uncontrollable shivering and the sensation of the cold.
- Heartbeat slows and may become irregular.
- Pulse weakens and blood pressure changes.
- As the body's core temperature drops, other signs may include cool skin, slow irregular breathing, and apparent exhaustion.
- When core temperatures are in the mid-range, the victim may become listless, confused, exhibit sever shivering, or develop severe pain in the extremities.

- Final signs are a significant drop in blood pressure, fatigue, and shallow respiration.

#### *4.3.1.3 Control Measures for Cold Stress*

Worker comfort will be monitored and increased layers of PPE or modesty clothing (eg long underwear) worn under the PPE may be required to minimize cold stress for those persons exposed to cold weather. For those workers performing tasks outside when ambient temperature falls below 36°F, the following guidelines should be used.

- If wind chill is a factor, shielding the work area or providing employees an outer windbreak layer garment will reduce the cooling effect of the wind.
- Extremities, ears, toes, and nose will be protected from extreme cold by protective clothing.
- Employees performing light work and whose clothing may become wet will wear an outer layer of clothing that is impermeable to water.
- Employees performing moderate to heavy work and whose clothing may become wet will wear an outer layer of clothing that is water repellent.
- Outer garments must provide for ventilation to prevent wetting of inner clothing by sweat.

Workers who become immersed in water or whose clothing becomes wet will immediately be provided a change of clothing and be treated for hypothermia if necessary. If the clothing becomes wet from sweating, the employees may finish the task that caused the sweating before changing into dry clothes. Metal handles of tools and control bars will be covered by thermal insulating materials when temperatures fall below 30°F. Whenever the site becomes covered with snow or ice, eye wear providing employees will wear protection against ultraviolet light, glare, and blowing ice crystals.

When conducting work in air temperatures below 35 degrees F, the following practices shall be followed:

- If the clothing of an employee is expected to become wet, the outer layers of clothing must be impermeable to water.
- If an employee's underclothing becomes wet it must be changed immediately. If the clothing becomes wet from sweating, the employee may finish the task that caused the sweating before changing into dry clothing.
- Hot liquids, such as soups, warm drinks, etc. shall be provided in the break area. The intake of caffeine containing products shall be discouraged due to their diuretic and circulatory effects.

- If appropriate, approved space heaters may be provided in the work area to warm the hands, feet, etc.
- The buddy system shall be practiced. Any employee observed with signs of cold stress shall immediately proceed to the break area.
- Employees will be reminded to layer their clothing, i.e., wear thinner, lighter clothing next to the body with heavier clothing layered outside the inner clothing.
- Avoid overdressing when going into warm areas or when performing activities that are strenuous. This could potentially lead to heat stress situations.
- Auxiliary heated versions of handwear, footwear, etc., can be used in lieu of mittens, insulated socks, etc. if extremely cold conditions exist.
- Employees handling liquids with high evaporation rates (gasoline, hexane, alcohol, etc.) shall take special precautions to avoid soaking of clothing with the liquids because of the added danger of cold injury caused by evaporative cooling.
- Work shall be arranged in such a way that sitting still or standing for long periods is minimized.
- If the air temperature is 20 degrees F or below the hands shall be protected by mittens or gloves prior to contact with cold surfaces such as metal, etc.

Air temperature is not the only factor to be considered while evaluating cold stress situations. Wind chill cooling rate and the cooling power of air are critical factors. The higher the wind speed the greater the risk of experiencing cold related injuries. For exposed skin, continuous exposure should not be permitted when the air speed and temperature result in an equivalent chill temperature of –25 degrees F or less.

### 4.3.2 Heat Stress

The combination of warm ambient temperature, humidity and protective clothing increases the potential for heat stress. Heat stress is caused by a number of interacting factors, including environmental conditions, clothing, workload, and individual characteristics. Extremely hot weather can cause physical discomfort, loss of efficacy, or personal injury. Individuals vary in their susceptibility to heat stress. Factors that may predispose individuals to heat stress include:

- Lack of physical fitness
- Insufficient acclimation
- Age
- Dehydration
- Obesity
- Alcohol and/or drug use
- Medical conditions

- Infections
- Sunburn
- Diarrhea
- Chronic disease.

Reduced work tolerance and the increased risk of heat stress are directly influenced by the amount and type of PPE worn. PPE adds weight and bulk and severely reduces the body's access to normal heat exchange mechanisms (evaporation, convection, and radiation), and increases energy expenditure. Respirators increase the work of breathing. Shaw E&I Health & Safety Procedure HS400 *Working in Hot Environments*, will be adhered to at all times. Heat stress disorders include rash, cramps, exhaustion, and stroke. Heat stress awareness training will be a part of the initial training session and will be reinforced, as necessary, during daily tailgate safety meetings. Heat stress prevention is outlined in procedure **HS400** of the Shaw E&I Corporation Health and Safety Procedures Manual. This information will be reviewed during safety meetings. Workers are encouraged to increase consumption of water and electrolyte-containing beverages; such as Gatorade or fruit juices. These beverages will be provided on-site.

If the body's physiological processes fail to maintain a normal body temperature because of excessive heat, a number of physical reactions can occur, ranging from mild to fatal.

Heat-related problems include:

- **Heat Rash** – Caused by continuous exposure to heat and humidity and is aggravated by chafing clothes. Heat rash decreases the body's ability to tolerate heat as well as being a nuisance.

- **Heat Cramps** – Caused by profuse perspiration with inadequate electrolytic fluid replacement. Heat cramps cause painful muscle spasms and pain in the extremities and abdomen.

- **Heat Exhaustion** – Caused by increased stress on various organs to meet increased demand to cool the body. Heat exhaustion causes shallow breathing; pale, cool, moist skin; profuse sweating; and dizziness. Promptly moving the affected individual to a cool place to lie down and providing cool fluids to drink can alleviate heat exhaustion.

- **Heat Stroke** – The most severe form of heat stress. This is a life-threatening situation. Call EMS. Heat stroke symptoms include hot, dry skin; no perspiration; nausea; dizziness; confusion; strong, rapid pulse; and coma. The body must be cooled immediately to prevent severe injury or death. Remove the victim from heat. Immerse victim in cool bath or wet clothing to allow better evaporative cooling.

#### 4.3.2.1 Heat Stress Prevention

One or more of the following practices may help reduce the probability of succumbing to heat stress:

- Acclimate workers to heat conditions when field operations are conducted during hot weather.
- Provide plenty of liquids to replace the body fluids lost by perspiration. Fluid intake must be forced because, under conditions of heat stress, the normal thirst mechanism is not adequate to bring about a voluntary replacement of lost fluids.
- Train personnel to recognize the signs and symptoms of heat stress and its treatment.
- Rotate personnel to various job duties to minimize exposure, if possible.
- Encourage workers to take rests and report symptoms whenever they feel any adverse effects that may be heat-related. The frequency of breaks may need to be increased based on worker recommendation to the SSHO and SS.

Individuals succumbing to the symptoms of heat stress will notify the ES&H Representative or his designee immediately. In the event of heat stress, halt activities and initiate treatment. Early detection and treatment of heat stress can prevent the onset of more serious heat stroke or exhaustion conditions. Individuals that have succumbed to any heat related illness become more sensitive and predisposed to additional heat stress situations.

**Notify Site Safety and Health Officer** if you have a condition such as cardiac (heart) disease that may affect your ability to tolerate heat, or if you are taking medications such as beta-andrenergic receptor blockers and calcium-channel blockers, diuretics, antihistamines, phenothiazines, or cyclic antidepressants. If you are not sure if your prescription medication is one of those please contact your doctor or pharmacist.

#### 4.3.2.2 Heat Stress Monitoring

Heat stress monitoring will be based on the Evaluation Scheme for Heat Stress published by the American Conference of Governmental Industrial Hygienists (ACGIH) and Shaw Procedure HS 400, Heat Stress.

**The Site Safety and Health Officer** or their designee shall maintain and review logs recording worker's physiological monitoring information and shall determine, based on those records if adjustments to work/rest regimen must be made.

**Individual Monitoring**

Every worker who works in extraordinary conditions that increase the risk of heat stress should be personally monitored. Personal monitoring can be performed by checking the heart rate, recovery heart rate, oral temperature, or extent of body water loss.

To check the heart rate, count the radial pulse for 30 seconds at the beginning of the rest period. If the heart rate exceeds 110 beats per minute, shorten the next work period by one third and maintain the same rest period.

The recovery heart rate can be checked by comparing the pulse rate taken at 30 seconds (P1) with the pulse rate taken at 2.5 minutes (P3) after the rest break starts. The two pulse rates can be interpreted using Table 6-8.

Oral temperature can be checked with a clinical thermometer after work but before the employee drinks water. If the oral temperature taken under the tongue exceeds 37.6°C, shorten the next work cycle by one third. Thermometers that estimate the deep body temperature by measuring the temperature in the ear canal are not considered to be sufficiently accurate to estimate the body core temperature reliably. According the American Conference of Governmental Industrial Hygiene (ACGIH), no worker should be permitted to work when their deep body temperature exceeds 38°C (100.4°F)

Body water loss can be measured by weighing the worker on a scale at the beginning and end of each workday. The worker's weight loss should not exceed 1.5% of total body weight in a workday. If a weight loss exceeding this amount is observed, fluid intake should increase.

## 4.4 Hearing Conservation

A hearing conservation program will be implemented at the site when exposures equal or exceed an 8-hour time-weighted average (TWA) of 85 decibels using the A-weighted scale (dB(A)). Hearing loss caused by high noise levels is a problem that can be prevented. As part of the criteria for the medical surveillance program established for this site, audiometric testing is conducted to monitor each worker's ability to hear. Hearing protection, such as E-A-R™ plugs, is required to be worn by personnel working with or around heavy equipment and as sound level monitoring dictates.

## 4.5 Confined Spaces

Confined space entry is not included in the scope of work for this project, however this section is required by Shaw procedure. Should confined space entry become a part of the project scope the Pgm CIH shall be notified and Shaw, USACE and regulatory policies shall be followed prior to any entry into a confined space. The SSHP shall be amended or revised accordingly.

## 4.6 Control of Hazardous Energy – Lock out/Tag out

It is not anticipated that any procedures will be undertaken during this project that will require control of hazardous energy. Should such tasks arise, work involving hazardous energy sources will be conducted under Shaw Procedure HS 315 Control of Hazardous Energy and Hazardous Material Sources (Lockout/Tagout). Prior to any equipment maintenance or tasks that would require control of hazardous energy, a review of the Shaw procedures will take place and an Energy Isolation Plan (EIP) will be developed and implemented as necessary. The Energy Isolation Plan will specify the components (valves, breakers, etc.) that require lockout/tagout on each affected system. Equipment specific procedures printed in equipment user manuals will be used if possible to develop the EIP. If equipment specific procedures are not available in user manuals procedures may be developed by SSHO in cooperation with skilled craft persons. These equipment specific procedures will be incorporated into the EIP and outlined in the AHA relevant to the task. If a task is to be performed, such as routine on-site maintenance on rental equipment by vendor personnel, those persons are expected to have sufficient training, tools and equipment to perform the tasks safely and control hazardous energy sources during the performance of the tasks on that rental equipment. Shaw HS 315 requires checklists be completed prior to any task requiring control of hazardous energy. Those checklists will be prepared and kept on file as part of the project documentation. Copies of the checklists are included in the Shaw Procedure HS 315 and in Appendix C.

## 4.7 Sanitation

Potable and nonpotable water containers and portable toilets (if used) will comply with OSHA 29 CFR 1910.141 requirements.

The number of toilets provided will be as follows:

| Number of Employees | Minimum Number of Facilities (per Sex) |
|---|---|
| 20 or fewer | One |
| More than 20, fewer than 200 | One toilet seat and one urinal per 40 workers |
| More than 200 | One toilet seat and one urinal per 50 workers |

If portable water containers are used, single-use cup dispensers will be provided and water will not be dipped from containers. Water dispensers will be clearly identified as drinking water. Rest areas will be kept clean, and trash will be removed from them daily. Trash receptacles will be stationed in all eating areas and emptied regularly.

## 4.8 Buddy System

The "buddy system" will be used at all times by all field personnel working at the site. No one is to perform fieldwork alone. Maintain visual, voice, or radio communication at all times.

## 4.9 Fire Prevention and Protection

Fire prevention will be of will be taken into account during fueling of equipment. Fuel is not expected to be stored on site nor is contact with flammable chemicals anticipated.

### 4.9.1 Portable Fire Extinguishers

Portable fire extinguishers will be provided and maintained in the following manner:

- Portable fire extinguishers will be provided, where needed, and inspected on a monthly basis. A visual inspection will be made to ensure that extinguishers are fully charged and in an operable condition. Hoses, nozzles, brackets, and supports will be inspected for deficiencies and corrected. Gauge pressure will be checked on pressurized units on a monthly basis to ensure units are fully charged and nonpressurized units will have their cartridges weighed on an annual basis. The chemical within dry chemical extinguishers will be inspected on an annual basis to ensure that it is powdery and in a free-running condition. An inspection tag will be attached to all extinguishers to designate that they have received an annual inspection.
- Fire extinguishers will be suitably placed, distinctly marked, and readily accessible.
- A fire extinguisher with a rating of not less than 10-B will be located within 50 feet or wherever more than 5 gallons of flammable gas are being used on the work site (this does not apply to integral fuel tanks of motor vehicles).
- A fire extinguisher with a rating of not less than 20-B will be located outside of and within 10 feet of the door opening into any room, building, or trailer used for storage of more than 60 gallons of flammable or combustible liquids.
- At least one dry chemical or carbon dioxide fire extinguisher, with a 5-BC rating minimum, will be available for placement on each unit of heavy equipment.

### 4.9.2 Flammable Liquids – Fuel Storage Areas

- If flammable liquids are being stored in an outside location, at least one portable fire extinguisher with a rating of not less than 20-B will be located at least 25 feet from the storage area but not more than 75 feet away.
- All tank trucks or vehicles used for transporting and/or dispensing flammable or combustible liquids will have a portable fire extinguisher with not less than a 20-BC rating.
- A portable fire extinguisher with a rating of not less than 20-BC will be placed within 50 feet of each service or fueling area.

- Fire extinguishers will be placed in storage areas so they are capable of extinguishing materials being stored.
- All fire extinguishers will be approved by a nationally recognized testing laboratory.
- A fire extinguisher with a rating of not less than 2-A will be provided where torches or open flames are in use.

### 4.9.3 Hot Work

Hot work is not anticipated during site activities. However, should hot work become necessary, all appropriate precautions will be taken to prevent fires in accordance with OSHA 1926 Subpart J, Welding and Cutting and Control of Hazardous Energy Sources, particularly electrical sources. All methods of welding, arc and torch cutting, grinding, and open-flame brazing, open-flame burning, open-flame solder, and other portable torch open-flame operations require a welding/burning/hot work permit. Flame-resistant clothing and firewatcher requirements for personnel protection for hot work operations will be followed. An exemption from the requirements of this procedure will be permitted only upon the review and written approval of the ES&H Representative or his designee and the USACE representative. Open burning of trash and debris is not permitted.

## 4.10 Lead-Based Paint and Asbestos

Potential contact with lead based paint or asbestos-containing materials is not anticipated during performance of this project. If suspect materials are encountered contact with the Pgm CIH is required prior to their disturbance.

## 4.11 Tools, Materials, and Equipment Safety

### 4.11.1 Hand Tools and Hand Operated Power Tools

- Defective tools, materials, and equipment will not be used. Defective tools, materials, and/or equipment will be taken out of service immediately by tagging, destroying, or removing them from the project site. The tag will be removed only when the equipment has been properly repaired and is declared serviceable. Defective equipment tags will be dated and signed by the person tagging the equipment. Defective equipment tags will also contain a description of the problem that requires the equipment, tools, or materials to be tagged.
- All tools will be kept in good condition and properly stored. Tools will not be altered, and they will be used only for their intended purposes and within the manufacturer's guidelines. Guards will not be removed from tools, and all nip points, open drums, and flywheels will be guarded. The user will inspect all tools before use, with special attention given to power cords and the condition of the plug. If a power cord has been damaged, the tool will be tagged defective and not used until a new power cord is installed.

- Power tools will be equipped with constant pressure switches that will shut the tool off when the switch is released. All power tools and electrical equipment will be double insulated or be equipped with grounding plugs. Permanent or portable ground-fault circuit interrupter (GFCI) protection is required in accordance with 29 CFR 1910 and 29 CFR 1926.

- All bench-mounted and floor-mounted tools will be secured. Bench-mounted grinders will be set up and operated according to 29 CFR 1926.303. Tools equipped with handles will have the handles secured. Cracked, splintered, or taped wooden handles will be replaced. Cheater bars will not be permitted except when authorized by the ES&H Representative or his designee.

- Impact tools will be free of mushroomed heads and cracks. Workbenches and sawhorses will be provided when needed. All cords, hoses, and leads must be kept out of walkways. They must be strung 7 feet or more over walkways or along the sides of walkways. Cords, hoses, and leads are not to be exposed to vehicle or equipment traffic unless protected. Cords, hoses, or leads must never be attached to the handrails of any type of man lift, scissors lift, or scaffold unless breakaway attachment is used. They must never be supported by a conductive material or run through doorways, manways, or other wall or floor openings unless protected from damage. Any damage detected on cords, hoses, and leads will require removal from the project. Repairs are not permitted.

- Quick make-up connections on pneumatic lines will be secured with a safety lashing.

- Explosive-activated tools will meet the design requirements of ANSI A10.3 and only be operated by a qualified operator.

- Explosive-activated tools and charges will be secured at all times to prevent unauthorized possession or use.

- Explosive-activated tools will not be loaded until just prior to the intended firing time; neither loaded nor empty tools are to be pointed at any employees; hands will be kept clear of the open barren end.

### *4.11.2 Heavy Equipment Operations*

The extensive use of earth moving equipment is not anticipated during performance of this project. However, these guidelines that follow are applicable to both heavy equipment and other equipment that may be used on site to perform job tasks. All equipment operators will be familiar with the requirements for inspection and operation of the equipment they will be using. Before equipment is placed into use, it will be inspected by the operator to ensure that it is in safe operating condition. The following guidelines will be adhered to while operating construction equipment:

- Equipment will not be operated in a manner that will endanger persons or property nor will the safe operating speeds or loads be exceeded.

- Getting off or on any equipment while it is in motion is prohibited.
- Equipment will be operated in accordance with the manufacturer's instructions and recommendations
- Determinations of road conditions and structures will be made in advance to assure that clearances and load capacities are safe for the passage of equipment.
- All machinery or equipment will be shut down and positive means taken to prevent its operation while repairs or manual lubrications are being done. Equipment designed to be serviced while running are exempt from this requirement.
- No guard, safety appliance, or device will be removed from machinery or equipment, or made ineffective except for making immediate repairs, lubrications, or adjustments, and then only after the power has been shut off. All guards and devices will be replaced immediately after completion of repairs and adjustments and before power is turned on.
- Mechanized equipment will be shut down prior to and during fueling operations. Closed systems, with automatic shut-off that will prevent spillage if connections are broken, may be used to fuel diesel powered equipment left running.
- All self-propelled construction equipment, whether moving alone or in combination, will be equipped with a reverse signal alarm.

Should any changes in the work plan and/or in the equipment selected, follow-up guidelines will be added as a revision to this plan.

## 4.12 Excavation Safety

Excavations per se are not within the scope of work of this project. However, should excavation activities be required then Shaw E&I Procedure *HS307— Excavation and Trenching* must be followed. If excavation activities are anticipated the Pgm CIH shall be contacted and an addendum to this plan shall be written addressing the anticipated activities.

## 4.13 Manual Material Handling

### 4.13.1 Lifting Fundamentals

Many different types of objects may be handled manually during site operations. Care should be taken when lifting and handling heavy or bulky items because they are the cause of many back injuries. The following fundamentals address the proper lifting techniques that are essential in preventing back injuries:

- The size, shape, and weight of the object to be lifted must first be considered. No individual employee is permitted to lift any object that weights over 60 pounds. Multiple employees or the use of mechanical lifting devices are required for objects over the 60-pound limit.

- The anticipated path to be taken by the lifter should be inspected for the presence of slip, trip, and fall hazards.

- The feet shall be placed far enough apart for good balance and stability (typically shoulder width). THE FOOTING SHALL BE SOLID.

- The worker shall get as close to the load as possible. The legs shall be bent at the knees.

- The back shall be kept as straight as possible and abdominal muscles should be tightened.

- To lift the object, the legs are straightened from their bending position.

- A worker shall never carry a load that cannot be seen over or around.

- When placing an object down, the stance and position are identical to that for lifting. The legs are bent at the knees and the object lowered.

### *4.13.2 Team Lifting (Using Two or More Persons)*

When two or more workers are required to handle the same object, coordination is essential to ensure that the load is lifted uniformly and that the weight is equally divided between the individuals carrying the load. When carrying the object, each worker, if possible, shall face the direction in which the object is being carried. In handling bulky or heavy items, the following guidelines shall be followed to avoid injury to the hands and fingers:

- A firm grip on the object is essential; leather gloves shall be used if necessary.

- The hands and object shall be free of oil, grease, and water which might prevent a firm grip, and the fingers shall be kept away from any points that could cause them to be pinched or crushed, especially when setting the object down.

- The item shall be inspected for metal slivers, jagged edges, burrs, and rough or slippery surfaces prior to being lifted.

# 5.0 Personal Protective Equipment

The required components of a personal protective equipment (PPE) ensemble are specific to the activity being conducted. Since there are no known chemicals of concern, minimal levels of PPE will be required.

## 5.1 Respiratory Protection

Respiratory protection, if required, will consist of full-face atmosphere purifying respirator.

### 5.1.1 Medical Certification

Only workers who have been certified by a physician, as being physically capable of respirator usage will be issued a respirator. Personnel unable to pass a respiratory fit test or without medical clearance for respirator use will not be permitted to enter or work in areas on site that require respiratory protection. Employees must also receive a written physician's opinion that they are fit for general hazardous waste operations as per 29 CFR 1910.120(f)(7). The specific requirements for examination of potentially exposed employees appear in detail in HS 100, but include at least the following: History and physiology, dipstick urinalysis, vision, vital signs, spirometry, audiometry, periodic EKG, chest x-ray, biochemistry, and ten panel drug screen.

### 5.1.2 Air Purifying Respirators

A NIOSH approved powered air purifying full-face respirator (PAPR) with elements chosen based on potential hazard will be used for most EZ activities. In some cases a specific combination cartridge type may not be available for the PAPR. In that case a full-face air-purifying respirator (APR) equipped with the appropriate combination cartridge shall be used.

#### 5.1.2.1 Cartridge Selection And Change-Out Schedule

Cartridges shall be chosen based on potential hazard. Protection against potential inhalation of crude oil components will be by organic vapor/P-100/acid gas combination cartridge (Survivair No. 1053). All used cartridges will be disposed of at the end of each shift.

#### 5.1.2.2 Inspection And Cleaning

Respirators shall be inspected before each use by the wearer. Any defective or damaged respirator shall be immediately removed from service. If parts are field replaceable they shall be replaced and the respirator returned to service. If the respirator cannot be repaired it shall be rendered unusable and discarded. All respirators and associated equipment will be decontaminated and hygienically cleaned after each use. Records of inspections of PPE by SSHO or their designee will be kept as part of the field activity daily log or on such documentation as the SSHO deems appropriate in the site safety and health files.

#### 5.1.2.3 Fit Testing

Annual respirator fit tests are required of all personnel using respiratory protection. Copies of worker's medical clearance for respirator wear and fit-testing records will be maintained in the site health and safety files.

#### 5.1.2.4 Facial Hair

No personnel who have facial hair that interferes with the respirator's sealing surface will be permitted to wear a respirator and will not be permitted to work in areas requiring respirator use. Employees with psoriasis, eczema or dermatitis that affects significant skin surface area should be excluded from activities requiring respirator use (i.e., EZ or CRZ).

#### 5.1.2.5 Corrective Lenses

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

#### 5.1.2.6 Air Purifying Respirator Limitations

Air purifying respirators both PAPR and APR types are limited to use in atmospheres containing at least 19.5% oxygen at sea level. They are not appropriate for use in atmospheres immediately dangerous to life and health (IDLH). They are not protective against certain contaminants such as hydrogen sulfide. Based on anticipated hazards, PAPR and APRs are appropriate for this project.

## 5.2 Levels of Protection

### 5.2.1 Level A Protection

Not indicated by initial scope of work. Should the scope of work change such that a fully encapsulated suit worn over SCBA or supplied are respirator with escape SCBA would be required, work shall be suspended and the Safety and Health Manager shall be notified prior to initiating any change in PPE to this level.

### 5.2.2 Level B Protection

Not indicated by initial scope of work. Should the scope of work change such that a full facepiece SCBA or supplied are respirator with escape SCBA worn with hooded chemical resistant clothing would be required, work shall be suspended and the Safety and Health Manager shall be notified prior to initiating any change in PPE to this level.

### 5.2.3 Level C Protection

While not anticipated during the performance of this project, Level C protection is defined her in the event a change in PPE ensemble is required by changed circumstances or conditions. This level of protection shall consist of the following minimum ensemble:

- Full face air purifying respirator with appropriate cartridge as determined after consultation with Pgm CIH.
- Tyvek coveralls with elastic wrists/ankles (polycoated as determined by SSHO)
- Steel-toed chemical resistant boots
- Latex or nitrile inner gloves
- Nitrile outer gloves
- Surgical scrubs or coveralls
- Hearing protection as required
- Hard hat
- Wrists and ankles taped to minimize entry of contaminants
- Cooling device as necessary

### 5.2.4 Level D Modified Protection

- Standard work uniform or coveralls
- Chemical resistant safety toed work boots
- Tyvek coveralls with elastic wrists/ankles (polycoated as determined by SSHO)
- Latex or nitrile inner gloves
- Nitrile outer gloves
- Hearing protection as required
- Hard hat
- Safety glasses
- Splash shield (if necessary)

### 5.2.5 Level D Protection

- Standard work uniforms or coveralls (T-shirt as a minimum on upper part of body, shorts are not permitted)
- Safety toed work boots

- Hard Hat
- Safety Glasses
- Gloves as needed
- Hearing protection as needed

## 5.3 Activity-Specific Levels of Protection

The required level of protection is specific to the activity being conducted. The levels of PPE only apply to activities conducted inside of an established site work zone. All work conducted outside established work zones will require only Level D PPE. The initial levels of protection that will be used while conducting site activities are as follows:

| Activity | Level of Initial Protection | Special Requirements |
|---|---|---|
| Mobilization/Site Preparation | D | |
| Surface Preparation, Clearing, and OE Identification/Avoidance/Removal | D | Changes to ensemble may be required during OE removal based on recommendations of UXO Safety Personnel |
| Geophysical Test Plot | D | |
| Geophysical Investigation, Mapping and Evaluation | D | |
| Location Surveys and Mapping | D | |
| Re-acquiring Anomalies | D | |
| Site Restoration/Demobilization | D | |

## 5.4 Donning/Doffing PPE

### 5.4.1 Donning Procedures for Modified Level D PPE or higher

- Put on boots and boot covers and tape the coveralls over the boots or boot covers.
- Put on gloves
- Tape the coveralls over the gloves at the wrist.
- Don respirator (if Level C PPE) and perform a positive and negative pressure test
- Put hood or head covering over the respirator (if Level C PPE).
- Put on remaining protective equipment, e.g. Hard hat, safety glasses, etc

One person will remain outside the work area to check that each person entering has the proper protective equipment. No persons will be allowed to enter an EZ improperly attired.

### 5.4.2 Doffing Procedures for Modified Level D PPE or Higher

Whenever a person leaves the work site, the following proper decontamination sequence will be followed:

- Upon entering the CRZ, rinse contaminated mud and debris from boots or remove disposable boot covers.
- Clean reusable protective equipment and outer gloves.
- Remove protective garments and equipment. All disposable contaminated clothing should be placed in plastic bags and labeled as contaminated waste.
- Remove respirator and wipe outer surfaces.
- Remove inner gloves.
- Proceed to the clean area and dress.
- Clean respirator and prepare for next use.

All disposable contaminated equipment, garments, and PPE will be bagged in plastic bags and properly labeled for disposal.

# 6.0 Site Control Measures

The primary purpose for site control for this project is to establish the work area perimeter and to prevent access by unauthorized persons. Work zones or cleared paths will be marked as part of the initial OE surface survey. All field activities will be restricted to cleared or known safe areas.

Shaw Procedure HS052 requires the following sections. However, it is not anticipated that rigid demarcation of work zones as described below will be required for this project.

## 6.1 Support Zone

Support Zone consists of all portions of the site not denoted as an EZ or CRZ.

## 6.2 Contamination Reduction Zone

CRZ is the area of the work zone where personnel decontamination is carried out.

## 6.3 Exclusion Zone

A log of all personnel entering or working within an EZ will be maintained at the entrance to each CRZ and will include the time of entry and exit for each individual.

The following are standard safe work practices that apply to all site personnel and will be discussed in the safety briefing prior to initiating work on the site:

- Eating, drinking, chewing gum or tobacco, smoking is prohibited in the EZ/CRZs.
- Hands and face must be washed upon leaving the EZ and before eating, drinking, chewing gum or tobacco or smoking.
- A buddy system will be used. Hand signals will be established to maintain communication.
- During site operations, each worker will consider himself as a safety backup to his partner.
- Visual contact will be maintained between buddies on site when performing activities within the EZ.

## 6.4 Site Entry Requirements

In order to allow an individual into a work zone, he/she must meet the following requirements:

- Documentation of completing training requirements as described in Section 9.0 (including review of this SSHP and signing off as such)

- Documentation of completing medical surveillance requirements as described in Section 10.0
- A hazard briefing which includes current operations at the site, hazards that exist, and control measures to be followed

### 6.5 Posting Site

Signs may be posted at the site giving notice of hazards or PPE requirements such as hearing protection or respirator requirements. The Site Superintendent, or SSHO shall determine specific site signage.

# 7.0 Decontamination

In general, everything that enters a work zone at the site must either be decontaminated or properly discarded upon exit from the work zone. However, since there are no known contaminants of concern, chemical decontamination will not be required. Rental equipment will be cleaned sufficiently to allow return to the vendor.

## 7.1 Equipment Decontamination Procedures

Any item or vehicle used to handle waste materials must be assumed to be contaminated and must be carefully inspected and/or decontaminated prior to being used for other activities. A visual inspection of the frame and tires of all vehicles and equipment leaving a work zone will be completed. In order for a vehicle/equipment to pass inspection, it must be in a clean condition, and free of loose dirt material on tailgates, axles, wheels, etc.

An equipment decontamination area will be established on-site and will be utilized to remove waste materials from all equipment leaving a work zone. Decontamination procedures will consist of cleaning equipment to remove dirt.

Equipment wash water residues (if decontamination via water spray is deemed necessary by the SSHO) will be collected for disposal. Any material that is generated by decontamination procedures will be stored until disposal arrangements are made.

## 7.2 Personnel Decontamination Procedures

These decontamination procedures apply to personnel wearing Level C or D-Modified PPE if those persons are potentially exposed to contaminants of concern. The procedures are listed here in the event that an upgraded PPE ensemble is required. These are the minimum acceptable requirements:

Station 1: Equipment Drop - Deposit equipment used on site (tools, sampling devices and monitoring instruments, radios, etc.) on plastic drop cloths. These items must be decontaminated or discarded prior to removal from the work zone.

Station 2: Outer Boot and Glove Removal - Remove outer boots and then gloves. If outer boots and gloves are disposable, deposit them in container with plastic liner, otherwise, store in a clean dry place after cleaning.

Station 3: Outer Garment Removal - Remove hardhat and disposable coveralls. Deposit disposable coveralls in a container lined with plastic. Decontaminate or dispose of splash suits as necessary. Wipe clean and store hardhat.

Station 4: Respiratory Protection Removal - Remove respirator face-piece. APR cartridges will be discarded at the end of each day or more frequently if personnel begin to experience increased inhalation resistance. Wash and rinse respirator after each use. Store in clean dry location.

Station 5: Inner Glove Removal - Remove inner gloves and deposit in container for disposal.

Station 6: Wash Face and Hands

# 8.0 Exposure Monitoring/Air Sampling Program

There are no known or suspected contaminants of concern. Therefore, routine personal breathing zone exposure monitoring or perimeter air sampling will not be conducted during performance of this project. Should a situation arise that may require air monitoring the Pgm CIH will be contacted and will develop a suitable monitoring program. Such as program shall be described in an addendum to this plan.

# 9.0 Training Requirements

## 9.1 General Training

The SSHO will be responsible for informing all personnel performing on-site activities and all visitors of the contents of this SSHP and ensuring that each person signs the SSHP Acknowledgment Form prior to entering a work area. By signing this form, individuals recognize the hazards present on site and the policies and procedures required to minimize exposure to hazards. Documentation of certification of training requirements will be reviewed by the SSHO and filed on site.

## 9.2 Hazardous Waste Operations Training

Field personnel performing activities within an established work zone are trained in accordance with 29 CFR 1926.65, Hazardous Waste Operations Emergency Response, before their initial assignment to any project. Some activities at the site will be conducted in areas not designated as work zones. The personnel performing these activities will not be required to comply with the training and medical practices established for hazardous waste operations. This in no way relieves these personnel from other requirements contained in this SSHP that apply to their activities. The following criteria is used to determine the level of training for Shaw E&I employees, visitors, and subcontractors engaged in site activities:

### 9.2.1 Forty Hour Training

Personnel engaged in hazardous substance removal within a work zone or other activities that may potentially expose them to hazardous substances and health hazards shall receive a minimum of 40 hours of instruction off site, and three days of supervised field experience.

### 9.2.2 Twenty-four Hour Training

Personnel who perform limited activities within a site work zone and are not potentially exposed to contaminate levels above the permissible exposure limit (PEL) shall receive a minimum of 24 hours of instruction off site, annual refresher, and one day of supervised field experience.

### 9.2.3 Supervisory Training

On-site management and supervisors directly responsible for, or who supervise employees who are engaged in hazardous waste operations shall receive 40 hours of initial training and three days of supervised field experience. The training may be reduced to 24 hours and one day if the supervisor's responsibilities include only employees who are engaged in activities that require only 24 hours of training. That training shall include the Safety and Health Plan, employee-training program, PPE program spill containment and health hazard monitoring procedure and techniques.

### 9.2.4 Refresher Training

Supervisors and field employees shall receive annual refresher training covering aspects of the HAZWOPER standard and critiques of incidents that may have occurred during the preceding years.

### 9.2.5 Supervised Field Experience

All initial training shall include one or more days of supervised field experience as specified in 29 CFR 1926.65 and noted above.

### 9.2.6 Visitor Training

Visitors to the site who will not require access to areas where they may be potentially exposed to contaminants found on site shall only require a general site orientation presented by the SSHO or their designee. Depending on a visitor's duties the visitor shall be required to provide proof of initial 24 or 40 hour training with annual refresher as required for other site workers who may be potentially exposed to site contaminants

## 9.3 Tailgate Safety Meetings

The SSHO conducts a tailgate safety meeting at the beginning of each shift or whenever new employees arrive at the job site once the job commences. The topics discussed at the tailgate safety meeting include S&H considerations for the day's activities, necessary PPE, problems encountered, and new operations. Attendance records and meeting notes are maintained with the project files. At the conclusion of each shift, a debriefing for site employees will be held, if necessary.

## 9.4 Site-Specific Training

Shaw E&I provides site-specific training for all personnel assigned to field projects. The content of the training will be derived from information contained within this SSHP. All workers must also read and sign the SSHP acknowledging acceptance of site rules and understanding of site hazards before being permitted to enter a work zone. Emergency procedures (Section 11.0) and hazard communication training (Section 9.5) will also be reviewed with personnel assigned to the project.

## 9.5 Hazard Communication

All personnel performing field activities shall receive basic hazard communication training, which involves a review of the Shaw E&I written hazard communication program, Material Safety Data Sheets (MSDS) in Appendix B, container labeling, and chemical health hazards.

## 9.6 First Aid and CPR

At least two persons trained in American Red Cross first-aid techniques and CPR will be on site whenever activities occur. Refresher training in CPR is required annually, and every 3 years for first aid. These two employees will meet both the training and vaccination requirement of Shaw E&I's Blood borne Pathogen Exposure Control Plan.

# 10.0 Medical Surveillance Program

All Shaw personnel participate in a medical and health monitoring program. This program is initiated when the employee starts work with a complete physical and medical history and is continued on a regular basis. A listing of Shaw's worker medical requirements is shown below. This program was developed in conjunction with a consultant toxicologist and Shaw E&I's occupational health physician. Other medical consultants are retained when additional expertise is required.

## 10.1 Medical Examination

### 10.1.1 Preplacement Examination

As required by Shaw Procedure HS100, all personnel on site working within a work zone will have successfully completed a preplacement physical examination. The contents of this examination will be determined by Dr. Jerry H. Berke and are based on job title and anticipated duties. The complete matrix appears in HS100, but for field personnel the exam generally includes a medical history questionnaire, Hst. and Phys with dipstick urinalysis, vision, vital signs, spirometry, audiometry, chest x-ray, biochemistry, and 10-panel drug screen.

### 10.1.2 Annual Examination

All personnel on site working within a work zone will have completed and annual physical examination based on their job title and work duties. The annual exam generally includes those items listed in Section 10.1.1.

### 10.1.3 Exit Examination

Exit examinations are required for all employees leaving the company, except those classified "administrative", unless their most recent exam is less than six months old.

The medical surveillance program meets the requirements of the OSHA Standard 29 CFR 1910.120/1926.65(f).

The following information is provided in the event that medical attention is necessary.

The SHAW E&I Medical Director is:
Dr. Jerry H. Berke, MD, MPH
**Health Resources**
600 West Cumming Park, Suite 3400
Woburn, Mass 01801-6350
781-935-8581 (direct dial) **800-350-4511 (toll free)**

The Shaw Medical Director and the Pgm CIH will be immediately notified of any suspected exposures to hazardous materials/wastes.

## *10.2 Subcontractor Requirements*

Subcontractors will certify that all their employees have successfully completed a physical examination by a qualified physician. The physical examinations will meet the requirements of 29 CFR 1926.65. Subcontractors will also supply copies of the medical examination certificate for each employee they have on site.

## *10.3 Medical Restrictions*

When a medical care provider identifies a need to restrict work activity, the employee's home office will communicate the restriction to the employee, the SS, SSHO, and the Pgm CIH. The terms of the restriction will be discussed with the employee and the SS. Every attempt will be made to keep the employee working, while not violating the terms of the medical restriction.

## *10.4 Medical Records*

Medical and personal exposure monitoring records will be maintained according to the requirements of 29 CFR 1926.65 and will be kept for a minimum of 30 years. Confidentiality of employee medical records will be maintained. The written medical opinion from the occupational physician will be made available upon request to the USACE representative for any site worker.

# 11.0 Emergency Response Plan and Contingency Plan

Site personnel must be prepared to respond and act quickly in the event of an emergency or accidental contaminant release. Emergency preparedness and response procedures will aid in protecting site workers and the surrounding environment. Preplanning measures will include employee training, fire and explosion prevention and protection, crude oil spill and discharge prevention and protection, and safe work practices to avoid personal injury or exposure.

## 11.1 Personnel Roles and Lines of Authority

The roles and responsibilities of Shaw personnel for response to emergencies at the site will be clearly defined and coordinated with Shaw subcontractors, USACE project personnel, and the local Fire Department.

### 11.1.1 Site Supervisor.

At all times during scheduled work activities, a designated SS shall be present on site. This individual will be responsible for implementing these procedures and determining appropriate response actions. Depending upon the circumstances and time permitting, the SS will review proposed response actions with the USACE site representative. Specific responsibilities for the SS include:

- Evaluating and assessing emergency incidents or situations
- Assigning personnel and coordinating response activities on site
- Assuring that field personnel are aware of the potential hazards associated with the site
- Summoning local Fire Department
- Notifying the PM or, in his absence, the Program Manager of an emergency situation
- Coordinating response to an incident with the USACE site representative
- Assuring that all emergency equipment is routinely inspected and functional
- Assuring that appropriate emergency response agencies are aware of the provisions made herein
- Evaluating the safety of site personnel in the event of an emergency, and providing evacuation coordination if necessary
- Maintaining site facilities and assisting site personnel in accessing those facilities.

The SS will direct all emergency response activities conducted or managed by Shaw E&I and is responsible for field implementation and enforcement of S&H policies and procedures.

### 11.1.2 Senior UXO Supervisor

At all times during scheduled work activities, the SUXOS or alternate shall be present. This individual will be responsible for implementing emergency procedures and determining appropriate response actions. Depending on the circumstances and time permitting, the SUXOS will review proposed response actions with the UXOSO, the CIH and the USACE OE Safety Specialist. Specific responsibilities for the SUXOS include the following:

- Evaluating and assessing emergency incidents or situations
- Assigning personnel and coordinating response activities on site
- Assuring that field personnel are aware of the potential hazards associated with the site
- Summoning a Fire Department emergency response team as required by Site Supervisor
- Notifying the Project Manager or, in his/her absence, the Senior Project Manager of an emergency situation
- Coordinating response to an incident with the USACE OE Safety Specialist
- Assuring that all Shaw emergency equipment is routinely inspected and functional
- Working with the UXOSO and SSHO regarding the correction of any work practices or conditions that may result in injury to personnel or exposure to hazardous substances
- Assuring that appropriate emergency response agencies are aware of the provisions made herein
- Evaluating the safety of site personnel in the event of an emergency, and providing evacuation coordination if necessary
- Maintaining site facilities and assisting site personnel in accessing those facilities.

The SUXOS will direct all OE emergency response activities conducted or managed by Shaw Environmental, Inc. and is responsible for field implementation and enforcement of the health and safety policies and procedures.

### 11.1.3 UXO Safety Officer

The UXOSO will assist the SUXOS in evaluating health and safety concerns with respect to OE emergency response actions and has authority to take action providing a safe work place to employees and subcontractors during such events.

### 11.1.4 Site Safety and Health Officer

The SSHO will assist the SUXOS and UXOSO in evaluating health and safety concerns with respect to HTRW emergency response actions and has authority to take action providing a safe work place to employees and subcontractors during such events.

### 11.1.5 Project Manager

The Project Manager will provide support to emergency responders and dedicate appropriate project resources to the response effort. If required, the Project Manager will mobilize additional personnel and equipment to the site. The Project Manager will notify and provide the USACE OE Safety Specialist with recommendations concerning any additional action(s) to be taken.

## 11.2 List of Emergency Contacts and Notification

The SS, SSHO, SUXOS or UXOSO and PM will be notified immediately in the event of an emergency. The SS will immediately evaluate the incident and, if necessary, notify the emergency support services. If not previously notified, the PM, Pgm CIH, and USACE site representative will be advised of the situation. Telephone numbers for emergency contact personnel are listed in Table 11-1. The list will be maintained with current contacts, and telephone numbers will be posted along with other emergency phone numbers at all telephone locations at the site.

The information provided to the notified person should include the nature of the incident and the exact location and the suspected contaminants or material involved. Information regarding the incident that should be reported to the emergency operator includes the following:

- Name and telephone number of the individual reporting the incident
- Location and type of incident
- Nature of the incident (fire, explosion, spill, or release) and substances involved
- Number and nature of medical injuries
- Movement or direction of spill/vapor/smoke
- Response actions currently in progress
- Estimate of quantity of any released materials
- Status of incident
- Other pertinent information.

A complete incident report shall be completed by the SSHO and provided to the USACE representative, once the urgency of the emergency incident has been resolved.

**Table 11-1**
**Emergency Phone Numbers**

| EMERGENCY PHONE NUMBERS | |
|---|---|
| Fire | 911 |
| Police | 911 |
| Ambulance | 911 |
| Geneva General Hospital<br>196 North Street<br>Geneva, NY 14456 | |
| National Response Center | (800) 424-8802 |
| Chem-Tel | (800) 255-3924 |
| National Poison Control Center | (800) 458-5842 |
| Safety and Health Manager<br>David Duncan | (865) 694-7407 (day)<br>(865) 539-5937 (evening) |

## 11.3 Advance Notification

Advance notifications will be made before any extraordinary activity, such as OE disposal operations, chemical handling or shipment, deep excavations, road closures, or hauling of contaminated materials on public roads. These notifications include the following:

- Notification to the Appropriate USACE District On site Representative or Installation Representative, who will determine the need for notification to the general public
- Notification to the Fire Department for any activity where there is a potential need for rescue personnel
- Notification to agencies and organizations potentially affected by road closures or detours

Attention will be paid to the potential impacts of activities on nearby residences, businesses, and especially schools. To the extent possible, traffic will be routed to avoid schools. As necessary, work may be conducted when schools or other businesses are closed.

## 11.4 Medical Emergency

In the event of severe physical or chemical injury, local Fire Department personnel shall be summoned for emergency medical treatment and ambulance service. The local Fire Department emergency medical responders will be utilized to provide care to severely injured personnel. Minor injuries will be treated on site by qualified first aid/CPR providers and if additional treatment beyond first aid is required, the injured personnel will be transported to the Medical Center listed above.

## *11.5 Personal Exposure or Injury*

Transportation routes and maps shall be posted in the project office and in each site vehicle prior to the initiation of on-site activities. This map has been included in Attachment A.

## *11.6 Fire Control*

In the event of a fire or explosion, or imminent danger of fire or explosion, all activities shall halt and the local Fire Department shall be notified immediately. If it is safe to do so, site personnel may use fire-fighting equipment available on site to remove and isolate flammable or other hazardous materials that may contribute to the fire.

Upon arrival of the local Fire Department emergency responders, the SSHO, SUXOS and/or UXOSO will advise the fire chief or lead representative of the location, nature, and identification of the hazardous materials on site, as well as any other specific hazards inherent to the site including but not limited to OE and HTRW.

The following measures will be implemented during site field activities to minimize the risk of fire and/or explosion:

- Smoking is permitted on site only in the designated smoke area
- Good housekeeping procedures will be required on site
- Material storage methods will be in accordance with manufacturers' recommendations
- Flammable liquids will be stored in approved containers and cabinets only
- All storage, handling, or use of flammable and combustible materials shall be conducted by trained personnel
- Entry and exit pathways shall be kept clear of debris or obstacles
- Work areas will be cleared of excess vegetation and obstructions.

Any base-specific guidelines established by the Army will be strictly enforced. Any fire, no matter how small, must be reported to the Fire Department chief or designated official.

## 11.7 Spills or Leaks

Shaw will maintain the following equipment and materials for use during spill response activities:

- Absorbent pads
- Granular absorbent material (noncombustible)
- Polyethylene sheeting
- Shovels and assorted hand tools.

If a crude oil spill at the site is observed, Shaw will immediately notify the USACE site representative. An assessment will be made of the magnitude and potential impact of the release. If it is safe to do so, site personnel will attempt to locate the source of the release, prevent further release, and contain the spilled and/or affected materials as follows:

- The spill or release area will be approached cautiously.
- Hazards will be identified based on available information from witnesses or material identification documents (placards, MSDSs, logs). The potential hazards will be evaluated to determine the proper personal protection levels, methods, and equipment necessary for response.
- If necessary, the release area will be evacuated, isolated, and secured.
- If possible, spill containment will initially be made without entering the immediate hazard area.
- Entry to the release area will be made with the PPE, personnel, methods, and equipment necessary to perform the work. Spill containment and collection will be performed in four steps as follows:
- Contain the spill with absorbent socks, booms, granules, or construction of temporary dikes.
- Control the spill at the source by plugging leaks, up righting containers, over packing containers, or transferring contents of a leaking container.
- Collect the spilled material with shovels or heavy equipment as necessary.
- Store the spilled material for further treatment or disposal. Treatment and/or disposal options of the material will depend on the amount and type of material.

In the unlikely event that site personnel cannot safely and sufficiently respond to a release, evacuation of the area may be warranted. The decision to evacuate will depend upon the severity of the release. The local Fire Department will be notified in the event of a significant spill. Upon their arrival at the site, the SS will brief them on the current situation at hand and any potential hazards to the team.

## 11.8 Site Evacuation

Site evacuation shall be in a direction that is upwind of potential releases if possible. Since the immediate work area is not fenced, evacuation on foot may be by any convenient route that allows the workers to achieve a safe distance from the danger area. Evacuation by vehicle should be by way of access roads if possible.

The authority to order personnel to evacuate the area rests with the SUXOS, UXOSO and SSHO who each will advise the other as soon as possible. Evacuations may or may not be limited to specific EZ or site area.

- Personnel working in the EZ will immediately make their way to the designated assembly or rally point for a "head count." Depending on the severity of the event and allowable time, personnel exiting the EZ may be instructed to forego or modify decontamination procedures.
- Personnel in the SZ will immediately report to the designated assembly or rally point for a "head count" and further instructions. The SUXOS, UXOSO and SSHO will remain in contact to ensure that evacuation procedures are properly executed. If the designated assembly or rally point is inaccessible, personnel shall evacuate to an upwind location as determined by the windsock and perform a head count.
- Situations requiring evacuation may include unusually severe weather conditions, fires, or significant chemical spills, releases or OE. In the event of project evacuation, the USACE OE Safety Specialist, Fire Department (911), and Police Department (911) will be notified immediately. A site emergency map that delineates evacuation routes, emergency air horn locations, first-aid kit locations, rally point, and site-control-zone perimeters will be developed once an on-site evaluation of conditions and topography is complete.
- The safe evacuation distance will depend on the type of emergency involved, such as the presence of OE and will ultimately be determined by the UXOSO and the USACE OE Safety Specialist. If an emergency situation involves chemical warfare materiel, the default safe distance will be 2,000 feet from the suspected materials.
- In an emergency, it is imperative that site control and security be maintained. To control site personnel, the Site Entry/Exit Log will be used to ensure all personnel are present or accounted for at the assembly point(s).

## 11.9 Emergency Decontamination Procedures

Significant potential for personnel contamination is low because there are no known or suspected contaminants of concern. Should emergency decontamination of personnel be necessary removal of outer PPE shall take place on site if such removal would not put the victim at increased risk. EMS personnel will be informed of potential contaminants prior to transport to a medical facility.

## 11.10 Emergency Equipment

The team support vehicle is designated as an emergency vehicle. All emergency equipment will be maintained in proper working order and inspected daily to ensure completeness and proper working order. The results of the inspection will be documented in the safety log. In the event that any of the disposable items are used, the UXOSO will ensure they are replaced immediately. The emergency equipment listed in Table X will be available on site.

## 11.11 Adverse Weather Conditions/Natural Disasers

Adverse weather can take many forms. Thunder and lightning storms, hail, dust storms, and tornados are a few examples. Sudden changes in the weather, extreme weather conditions, and natural disasters can create a number of subsequent hazards. Inclement weather may cause poor working conditions including slip, trip and fall hazards to exist. Natural disasters can create many secondary hazards such as release of hazardous materials to the environment, structure failure, and fires.

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

The best protection against most severe weather episodes and natural disasters is to avoid them. This means seeking shelter before the storm hits. If lightning is a threat, stay away from pipes and electrical equipment and watch for damage caused by lightning strikes nearby.

## 11.12 Critique and Follow-Up of Emergency Procedures

The USACE site representative shall be verbally notified immediately and receive a written notification within 24 hours of all accidents or incidents including releases of crude oil, fires, or explosions. The report shall include the following items:

- Name, organization, telephone number, and location of the Contractor
- Name and title of the person(s) reporting
- Date and time of accident/incident
- Location of accident/incident (i.e., site location, facility name)
- Brief summary of accident/incident including pertinent details such as type of operation ongoing at time of accident

- Cause of accident/incident, if known
- Casualties (fatalities, disabling injuries)
- Details of any existing chemical hazard or contamination
- Estimated property damage, if applicable
- Nature of damage, effect on contract schedule
- Action taken by Contractor to ensure safety and security
- Other damage or injuries sustained (public or private).

The SUXOS, the UXOSO, the SSHO and the Site Supervisor will investigate the cause of the incident to prevent its reoccurrence. The investigation should begin as soon as practical after the incident is under control, but not later than the first workday after the incident. Investigations will follow the procedures described below:

- Interview witnesses and participants as soon as possible or practical
- Determine the chronological sequence of events (opinions as to cause should not be solicited at this time)
- Note the location, movement, displacement, liquid levels, sounds, noises, or other sensory perceptions experienced by the participants or witnesses
- Obtain weather data
- Ascertain the location and position of all switches, controls, etc.
- Verify the condition of all safeguards.

After the facts have been collected, causal factors should be identified. Two causal factors typically exist, apparent and contributing; and there may be several of each. Apparent factors are those that are self-evident or readily deduced. Contributing factors usually become apparent by questioning why the apparent causal factor was allowed to exist.

## 11.13 Community alert

In the event of an emergency that would require evacuation of the local community, USACE will coordinate notifications as necessary.

## 12.0 Record Keeping and Data Management

Proper record keeping and data management are essential in the implementation of this SSHP. The forms associated with the record keeping and data management requirements must be completed in an accurate, timely fashion and filed with the appropriate entities. It is the responsibility of the SS to ensure that the forms are properly completed. Completed forms will be kept and maintained by Shaw. These records shall be maintained for a five-year period. Subcontractors will also be responsible for keeping a copy of the forms pertaining to their personnel.

A copy of pertinent site forms and logs have been provided in the Attachments to this SSHP.

### 12.1 Logs

The SS will maintain and complete a daily log for each day's work. The daily log will document chronologically each day's S&H activities in sufficient detail for future reference as needed. Other relevant data and field information will be recorded on separate log forms for air monitoring, sampling, equipment calibration inspections, and incident reporting.

A visitor's sign-in log will be maintained in the project office and administration area. Visitors requesting access to work zones must have appropriate project approval, be medically qualified, and have the S&H training prerequisites for hazardous waste operations.

### 12.2 Safety Inspections

The SS or PM will inspect the site twice a month and interview one or two site workers regarding areas of safety concerns or ideas for safety improvement. Site supervisory personnel will inspect site conditions and activities daily to identify changing conditions or potential hazards. Identified safety and occupational health deficiencies and suggested corrective measures will be brought to the attention of the SS. Safety review inspections will be recorded and filed for reference by project management and USACE personnel and forwarded to the Pgm CIH.

## 12.3 Accident Reporting and Investigation

All project personnel are required to report all near misses, injuries, illnesses, and accidents to their immediate supervisor. The SS shall immediately arrange appropriate medical care as required. Once immediate medical care for the injured personnel has been accomplished, the SS shall complete and submit the appropriate report forms within 24 hours. The appropriate form(s) to be completed may include:

- Supervisor's Employee Injury Report
- Vehicle Accident Report
- General Liability, Property Damage, and Loss Report.

Copies of these forms are in Attachment C of this SSHP.

Identified safety and occupational health deficiencies and corrective measures shall be documented and filed on site for reference by the USACE or designated representative.

On-site management personnel shall investigate all near misses, injuries, illnesses, and accidents. The SS and PM will investigate the conditions that led to the accident. They will document how the accident occurred and identify unsafe acts or conditions that occurred or existed at the time of the accident. Corrective actions will be determined and implemented to prevent recurrence of the accident, and responsibility for implementation of corrective actions will be assigned. The investigation shall be started immediately, and all information shall be collected as soon as possible after the occurrence. The final report and required forms will be submitted to the USACE and other appropriate personnel.

## *Appendix A*
## *Site and Hospital Location Maps*

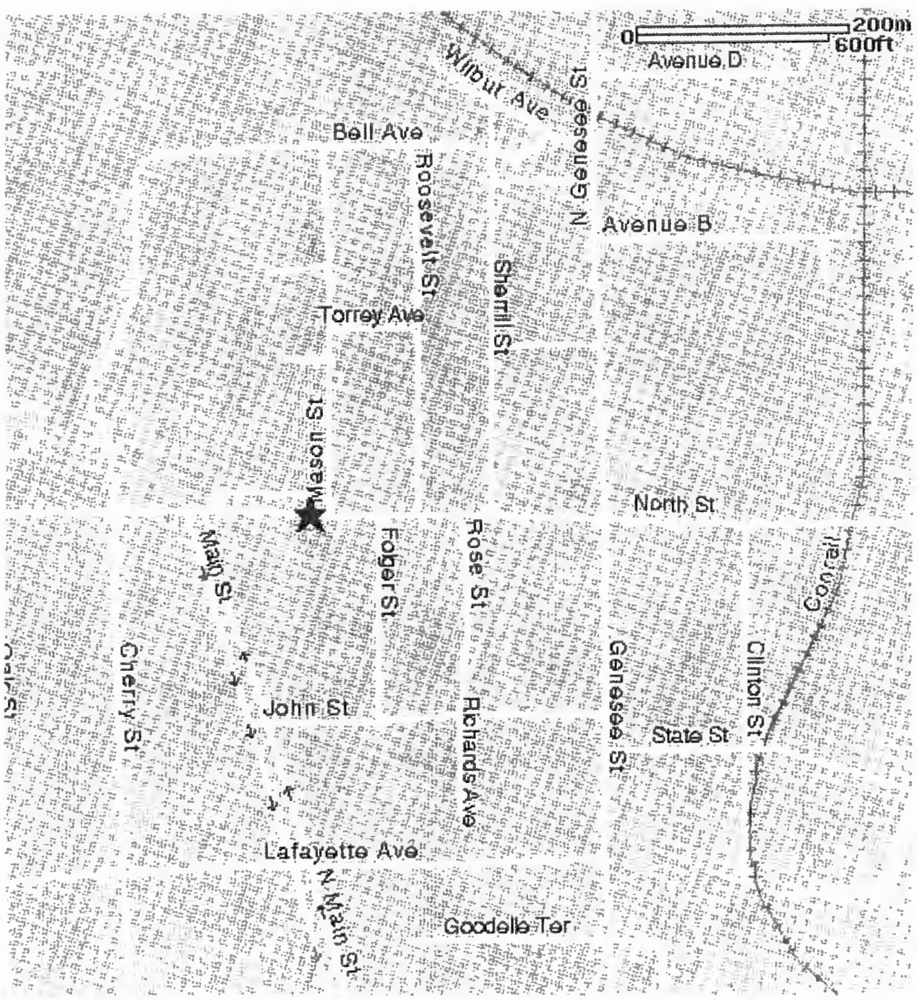
**<u>Back Material Break</u>**

## Hospital Location/Route

Geneva General Hospital
196 North Street
Geneva, NY 14456

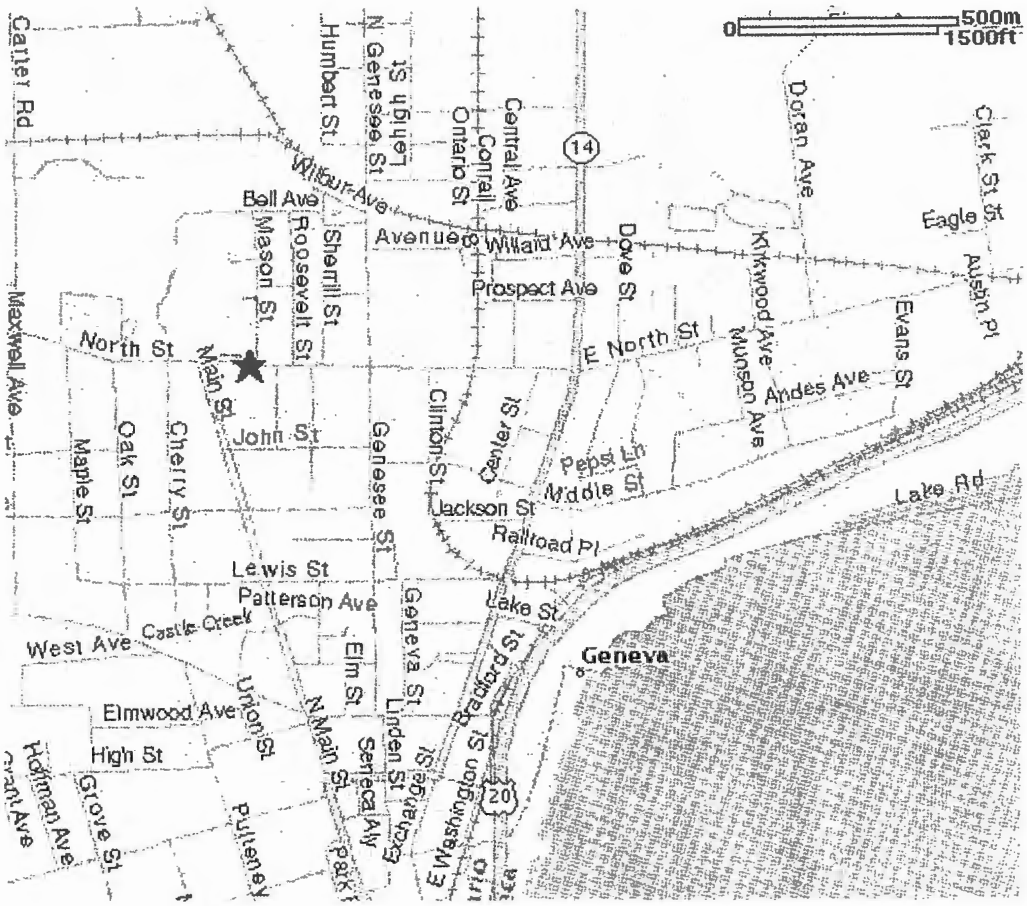
Directions:

Proceed North on NY-96 toward EAST PATROL ROAD
Turn LEFT onto YELLOW TAVERN RD (CR-121)
Turn SLIGHT RIGHT onto NY-96A N
Turn LEFT onto NY-5W/US-20W
Turn RIGHT onto EAST CASTLE STREET
Turn RIGHT onto NY-14/N MAIN ST
Continue to follow N MAIN ST – Hospital on Right

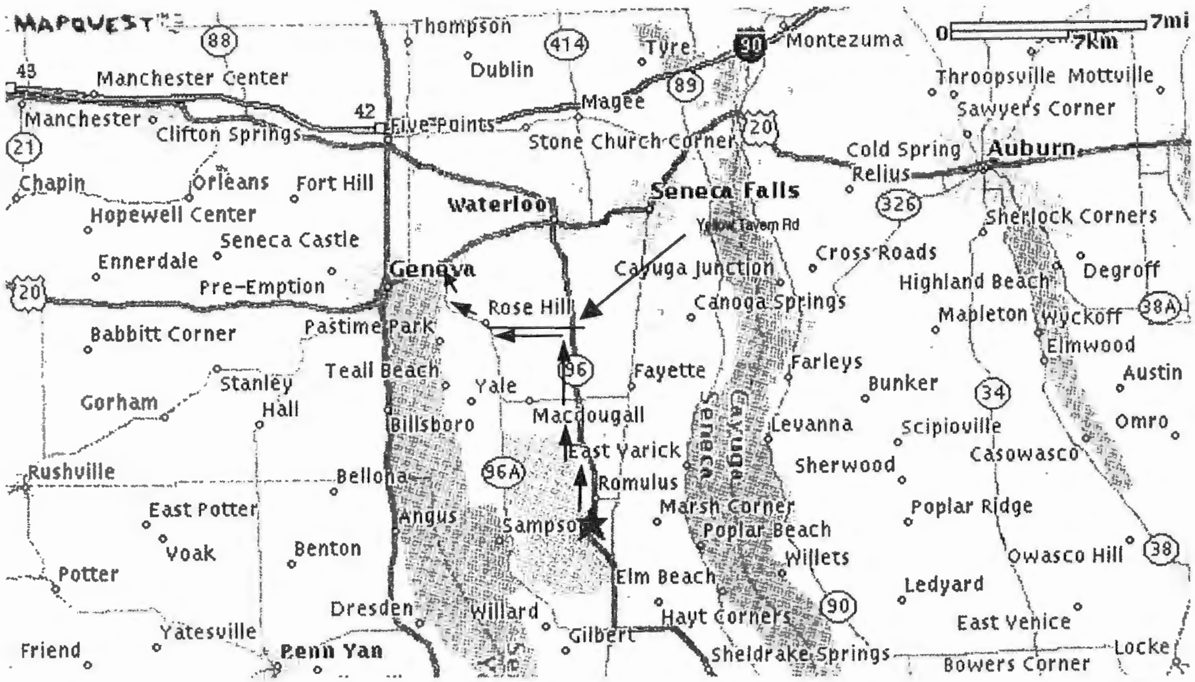


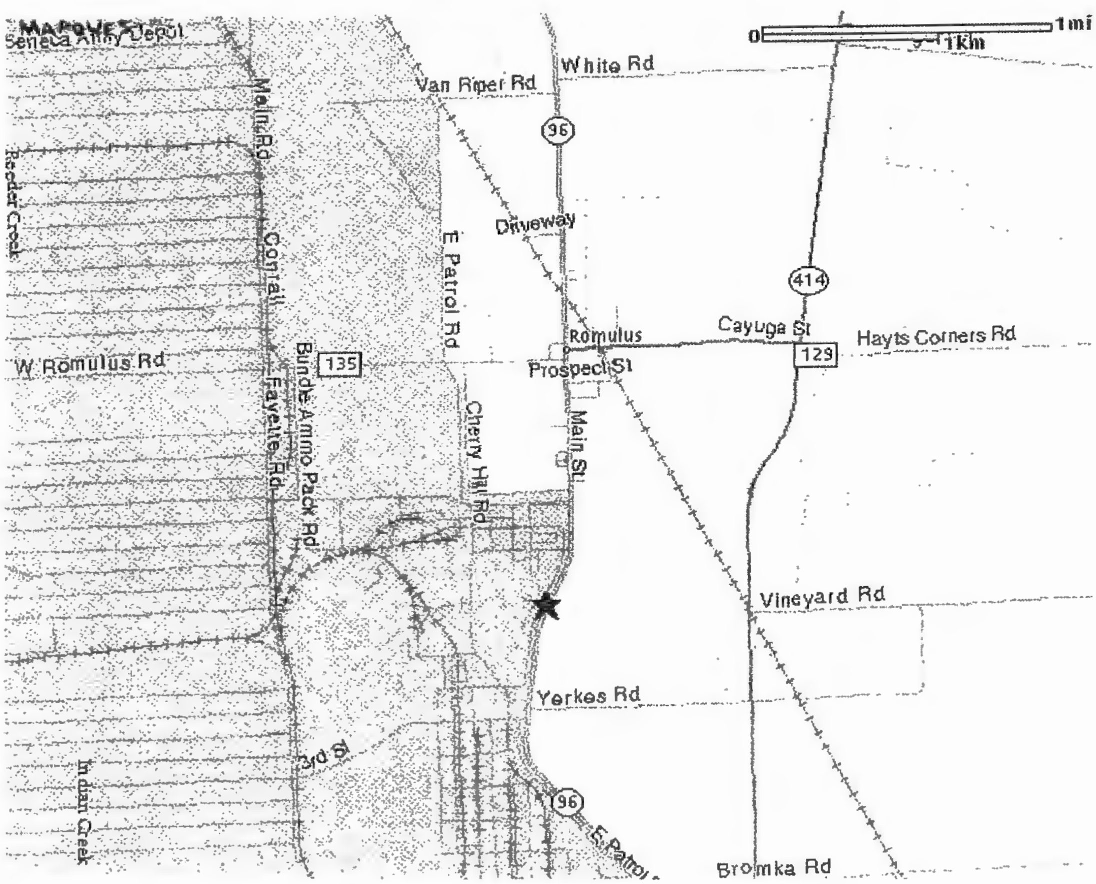
## Route to Hospital Con't

Hospital Location



# Site Location



# *Appendix B*
# *Material Safety Data Sheets*

**AMERADA HESS**

**GASOLINE, REGULAR UNLEADED Revised: 12/30/1997**

AMERADA HESS CORPORATION

NFPA 704
H1
F3
R0

SEE SECTION 16

MATERIAL SAFETY DATA SHEET

GASOLINE, REGULAR UNLEADED

MSDS NO. 0323

## 1. CHEMICAL PRODUCT AND COMPANY INFORMATION (REV. DEC-97)

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

SYNONYMS: 87 OCTANE CONVENTIONAL (OXYGENATED AND NON-OXYGENATED) AND REFORMULATED (RFG) REGULAR UNLEADED GASOLINE

SEE SECTION 16 FOR ABBREVIATIONS AND ACRONYMS.

## 2. COMPOSITION AND INFORMATION ON INGREDIENTS* (REV. DEC-97)

| INGREDIENT NAME* | EXPOSURE LIMITS | CONCENTRATION PERCENT BY WEIGHT |
|---|---|---|
| GASOLINE<br>CAS NUMBER 8006-61-9 | OSHA PEL-TWA/STEL;<br>NONE ESTABLISHED<br>ACGIH TLV-TWA/STEL;<br>300/500 PPM, A3 | 100 |
| BENZENE<br>CAS NUMBER 71-43-2 | OSHA PEL-TWA/STEL;<br>1/5 PPM | 0.1 TO 4.9 |
| | ACGIH TLV-TWA:<br>0.5/2.5 PPM, A1 SKIN | 0.1 TO 1.3* |
| GASOLINE | US COAST GUARD:<br>SAME AS OSHA | *FOR REFORMULATED |
| METHYL-TERTIARY BUTYL | OSHA PEL-TWA/STEL; | 0 TO 15.0 |

| | | |
|---|---|---|
| ETHER (MTBE)<br>CAS NUMBER 1634-04-4 | NONE ESTABLISHED<br>ACGIH TLV-TWA:<br>40 PPM, A3 | |
| TERTIARY-AMYL METHYL ETHER (TAME)<br>CAS NUMBER 994-05-8 | NONE ESTABLISHED | 0 TO 17.2 |
| TOLUENE<br>CAS NUMBER 108-88-3 | OSHA PEL-TWA/CEILING<br>200/300 PPM<br>OSHA PEL-PEAK:<br>500 PPM (10 MIN)<br>ACGIH TLV-TWA:<br>50 PPM, A4 (SKIN) | 1-15 |
| XYLENE, MIXED ISOMERS<br>CAS NUMBER 1330-20-7 | OSHA PEL-TWA:<br>100 PPM<br>ACGIH TLV-TWA/STEL:<br>100/150 PPM, A4 | 1-15 |

A COMPLEX BLEND OF PETROLEUM-DERIVED NORMAL AND BRANCHED-CHAIN ALKANE, CYCLOALKANE, ALKENE, AND AROMATIC HYDROCARBONS. BUTANE IS OFTEN ADDED TO INCREASE VOLATILITY, ESPECIALLY IN WINTER. MAY CONTAIN ANTIOXIDANT AND MULTIFUNCTIONAL ADDITIVES. OXYGENATED AND REFORMULATED GASOLINE WILL HAVE LEGALLY-REQUIRED AMOUNTS OF OXYGENATES (MTBE AND/OR TAME).

*ALSO SEE SECTION 15 FOR LIST OF SARA SECTION 313 TOXIC CHEMICALS AND THEIR EXPOSURE LIMITS.

## 3. HAZARDS IDENTIFICATION (REV. DEC-97)

EMERGENCY OVERVIEW

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

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.

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.

## 5. FIRE FIGHTING MEASURES (REV. DEC-97)

FLAMMABLE PROPERTIES:

FLASH POINT: -45 DEG. F (-43 DEG. C)

AUTOIGNITION TEMPERATURE: HIGHLY VARIABLE; >530 DEG. F (>280 DEG. 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 GEORGRAPHICAL 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 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. DEC-97)

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 OF E.I. DUPONT TYCHEM (R*), BARRICADE (R*) OR EQUIVALENT 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/MSHA-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, ANSI Z88.2-1992, 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. DEC-94)

APPEARANCE: A CLEAR, WATER-LIKE 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

| | ODOR DETECTION | ODOR RECOGNITION |
|---|---|---|
| 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 DEG. F (39 TO 200 DEG. C)

VAPOR PRESSURE: 7 - 15 RVP @ 100 DEG. F (38 DEG. C) (275-475 MM HG @ 68 DEG. F (20 DEG. C)

VAPOR DENSITY (AIR =1): AP 3 TO 4

SPECIFIC GRAVITY (H2O=1): 0.76

EVAPORATION RATE: 10-11 (N-BUTYL ACETATE=1)

PERCENT VOLATILES: 100%

SOLUBILITY (H2O): NON-OXYGENATED GASOLINE - NEGLIGIBLE (<0.1% @ 77 DEG. F)
GASOLINE WITH 15% MTBE - SLIGHT (0.1 - 3% @ 77 DEG. F)

## 10. STABILITY AND REACTIVITY (REV. DEC-94)

STABILITY: STABLE

CONDITIONS TO AVOID (STABILITY):
MATERIAL IS STABLE UNDER NORMAL CONDITIONS. AVOID HIGH TEMPERATURES, OPEN FLAMES, SPARKS, WELDING, SMOKING AND OTHER IGNITION SOURCES.

INCOMPATIBLE MATERIALS:
KEEP AWAY FROM STRONG OXIDIZERS, IGNITION SOURCES AND HEAT.

HAZARDOUS DECOMPOSITION PRODUCTS:
CARBON MONOXIDE, CARBON DIOXIDE AND NONCOMBUSTED HYDROCARBONS (SMOKE). CONTACT WITH NITRIC AND SULFURIC ACIDS WILL FORM NITROCRESOLS THAT CAN DECOMPOSE VIOLENTLY.

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

## 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. DEC-97)

KEEP OUT OF SEWERS, DRAINAGE AREAS AND WATERWAYS. REPORT SPILLS AND RELEASES, AS APPLICABLE, UNDER FEDERAL AND STATE REGULATIONS.

## 13. DISPOSAL CONSIDERATIONS (REV. DEC-97)

CONSULT FEDERAL, STATE AND LOCAL WASTE REGULATIONS TO DETERMINE APPROPRIATE DISPOSAL OPTIONS.

## 14. TRANSPORTATION INFORMATION (REV. DEC-97)

| | |
|---|---|
| DOT PROPER SHIPPING NAME: | GASOLINE |
| DOT HAZARD CLASS AND PACKING GROUP: | 3,PG II |
| DOT IDENTIFICATION NUMBER: | UN 1203 |
| DOT SHIPPING LABEL. | FLAMMABLE LIQUID |

## 15. REGULATORY INFORMATION (REV. DEC-97)

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:

| | |
|---|---|
| ACUTE HEALTH: | X |
| CHRONIC HEALTH: | X |
| FIRE: | X |
| SUDDEN RELEASE OF PRESSURE: | -- |
| REACTIVE: | -- |

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:

| INGREDIENT NAME (CAS NUMBER) | CONCENTRATION WT. PERCENT | EXPOSURE LIMITS | |
|---|---|---|---|
| BENZENE (71-43-2) | 0.1 TO 4.9 | SEE SECTION 2 | |
| BENZENE (71-43-2) FOR REFORMULATED GASOLINE | 0.1 TO 1.3* | SEE SECTION 2 | |
| ETHYL BENZENE (100-41-4) PPM | <3 | OSHA PEL-TWA:<br>ACGIH TLV-TWA/STEL: | 100 PPM<br>100/125 |
| n-HEXANE (110-54-3) | 0.5 TO 4 | OSHA PEL-TWA:<br>ACGIH TLV-TWA: | 500 PPM<br>50 PPM |
| METHYL-TERTIARY BUTYL ETHER (MTBE) (1634-04-4) | 0 TO 15.0 | SEE SECTION 2 | |
| TOLUENE (108-88-3) | 1 TO 15 | SEE SECTION 2 | |

| | | | |
|---|---|---|---|
| 1,2,4- TRIMETHYLBENZENE (95-63-6) | <6 | OSHA PEL-TWA/STEL:<br>ACGIH TLV-TWA/STEL: | 25 PPM<br>25 PPM |
| XYLENE, MIXED ISOMERS (1330-20-7) | 1 TO 15 | SEE SECTION 2 | |

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. DEC-97)

NFPA (R*) HAZARD RATING:
HEALTH: 1 SLIGHT
FIRE: 3 SERIOUS
REACTIVITY: 0 MINIMAL

HMIS(R*) HAZARD RATING:
HEALTH: 1* SLIGHT
FIRE: 3 SERIOUS
REACTIVITY: 0 MINIMAL
*CHRONIC

NFPA 704 FIRE DIAMOND
HEALTH: 1
(BLUE)
FIRE: 3
(RED)
REACTIVITY: 0
(YELLOW)

SUPERSEDES MSDS DATED: 9/16/96

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

AIHA = AMERICAN INDUSTRIAL HYGIENE ASSOCIATION

ANSI = AMERICAN NATIONAL STANDARDS INSTITUTE (212)642-4900

API = AMERICAN PETROLEUM INSTITUTE (202)682-8000

CERCLA= COMPREHENSIVE EMERGENCY RESPONSE, COMPENSATION, AND LIABILITY ACT

DOT = U.S. DEPARTMENT OF TRANSPORTATION (GENERAL INFO: (800)467-4922)

EPA = U.S. ENVIRONMENTAL PROTECTION AGENCY

HMIS = HAZARDOUS MATERIALS INFORMATION SYSTEM

IARC = INTERNATIONAL AGENCY FOR RESEARCH ON CANCER

MSHA = MINE SAFETY AND HEALTH ADMINISTRATION

NFPA = NATIONAL FIRE PROTECTION ASSOCIATION (617)770-3000

NIOSH = NATIONAL INSTITUTE OF OCCUPATIONAL SAFETY AND HEALTH

NOIC = NOTICE OF INTENDED CHANGE (PROPOSED CHANGE TO ACGIH TLV)

NTP = NATIONAL TOXICOLOGY PROGRAM

OPA = OIL POLLUTION ACT OF 1990

OSHA = U.S. OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION

PEL = PERMISSIBLE EXPOSURE LIMIT (OSHA)

RCRA = RESOURCE CONSERVATION AND RECOVERY ACT

REL = RECOMMENDED EXPOSURE LIMIT (NIOSH)

SARA = SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 TITLE III

SCBA = SELF-CONTAINED BREATHING APPARATUS

SPCC = SPILL PREVENTION, CONTROL, AND COUNTERMEASURES.

STEL = SHORT-TERM EXPOSURE LIMIT (GENERALLY 15 MINUTES)

TLV = THRESHOLD LIMIT VALUE (ACGIH)

TSCA = TOXIC SUBSTANCES CONTROL ACT

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 ACKNOWLEDGEMENT.

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.

REVISION DATE: 12/30/97

# *Appendix C*
# *Forms*

Shaw The Shaw Group Inc.™

# Site Specific Health & Safety Plan
## Amendment Documentation

**Project Name:** **Project No.**

**Amendment No.** **Date:**

**Amendment Addresses:** **Sections:**

**Task(s) Amendment Affects:**

**Reason For Amendment:**

**Amendment:**

**Completed by:** **Approved by:**

Shaw The Shaw Group Inc.

# JOB SAFETY ANALYSIS

DATE:
JOB#:
PERMIT#:
ISSUED BY:

**SUPERVISION/FOREMAN**

Consider the following and check the items which apply to the job, then review with the work crew.

**PERMITS**

- ____ Required
- ____ Cold Work
- ____ Hot Work
- ____ Entry Permit
- ____ All Conditions Met
- ____ Signed Off When Complete
- ____ Other ____

**PERSONAL PROTECTIVE EQUIP. (PPE)**

- ____ Rubber Gloves
- ____ Leather Gloves
- ____ Special Purpose Gloves
- ____ Slicker Suit
- ____ Acid Suit
- ____ Rubber Boots
- ____ Mono Goggles (vented/non-vented)
- ____ Face Shield
- ____ Respirator
- ____ Fresh Air
- ____ Ear Protection
- ____ Safety Harness
- ____ Burning Goggles
- ____ Other ____

**TOOLS**

- ____ Current Inspection
- ____ Proper Tools for the Job
- ____ Good Tool Condition
- ____ Qualifications
- ____ Other ____

**EMERGENCY EQUIPMENT**

- ____ Fire Extinguishers
- ____ Safety Shower
- ____ Evacuation Route
- ____ Other ____

**ACCESS**

- ____ Scaffold (properly inspected ____)
- ____ Ladder (Tied off ____)
- ____ Manlift
- ____ Personnel Basket (inspected & approved ____)
- ____ Operator Training
- ____ Special Provisions
- ____ Other

**WELDING**

- ____ Flashburns
- ____ Combustibles
- ____ Spark Containment
- ____ Shields
- ____ Grounding
- ____ Water Hose
- ____ Fire Extinguisher
- ____ Fire Blanket
- ____ Fire Watch
- ____ Sewer Covers
- ____ Other ____

**OVERHEAD WORK**

- ____ Barricades
- ____ Signs
- ____ Hole Cover
- ____ Handrail
- ____ Other ____

**ELECTRICAL**

- ____ Locked & Tagged out
- ____ Try Start/Stop Switch
- ____ GFCI Test
- ____ Assured Grounding
- ____ Extension Cord Inspection
- ____ Other ____

**LIFTING**

- ____ Forklift
- ____ Cherry Picker
- ____ Load Chart
- ____ Angle
- ____ Crane
- ____ Chainfall
- ____ Proper Rigging Practices
- ____ Manual Lifting
- ____ Condition of Equipment
- ____ Operator Certificate

**HAZARDS (ENVIRONMENTAL)**

- ____ Electrical Shock
- ____ Heat Stress
- ____ Heavy Objects
- ____ Hot/Cold Surf. Or Mat.
- ____ Inadequate Lighting
- ____ Line Breaking
- ____ Noise
- ____ Poor Access/Egress
- ____ Sharp Objects
- ____ Other ____

**HAZARDS/CHEMICALS**

- ____ Chemical Burn Shin/Eyes
- ____ Flammable
- ____ Ingestion
- ____ Inhalation
- ____ Skin Contamination

**HAZARDS/BODY**

- ____ Fall Potential
- ____ Pinch Points
- ____ Slip-Trip Potential
- ____ Other ____

**OTHER WORK IN AREA**

- ____ Others Working Overhead
- ____ Type Work Others Doing
- ____ PPE Due to Other Work
- ____ Other ____

## Confined Space

Know the Following:

- Possible hazards within the confined space
- First signs of exposure
- How to summons help
- How to track personnel
- Entering and exiting the confined space
- Maintain contact with all entrants by voice or visual
- Do not attempt to rescue unless you are a part of a coordinated effort
- Remain at entry point assume no duties with take you from there.

SUPERVISOR/FOREMAN RECOMMENDATION:

Location of Job
(Unit/Location on Project):

Shaw The Shaw Group Inc.

# JOB SAFETY ANALYSIS

DATE:
JOB#:
PERMIT#:
ISSUED BY:

| | | |
|---|---|---|
| Required PPE: | **Safety Access/ Location** | Supervisor of Work: |
| | Safe Haven: | JSA Prepared By: |
| | Wind Direction: | Are other crews in area? Yes No |
| Pre-Job Preparation<br>1. Fill out JSA<br>2. Review JSA (EVERYONE)<br>3. Sign JSA (EVERYONE) | Evacuation Route:<br><br>Assembly Point: | New:<br><br>Revised: |

**Job Task**
(What are You Doing)

**Potential Hazards**

**Recommended Action or Procedure**

**Audit the Job**
Audit Time:

**Supervisors Comments**

**Supervisor's Initials:**

**Crew Name Signatures:**

**Shaw** The Shaw Group Inc.™

# MEDICAL FORMS

## AUTHORIZATION FOR RELEASE OF PROTECTED MEDICAL INFORMATION

Printed Name: ________________________________________ Date of Birth: ______________________

Address: ________________________________________________________________

Social Security #:________________________________ Home Telephone:__________________

### Authority to Release Protected Health Information

I hereby authorize the release of medical information, identified in this authorization form, and provide such information to:

**HEALTH RESOURCES**
600 West Cummings Park, Suite 3400
Woburn, Massachusetts 01801
Phone: (800) 350-4511
Fax: (800) 853-2641

**AND**

**The Shaw Group Inc.**
4171 Essen Lane
Baton Rouge, Louisiana 70809
Phone: 225-932-2500
Fax: 225-932-2636

### The Information To Be Released includes the following:

| | | |
|---|---|---|
| Complete health record | Discharge summary | Progress notes |
| History and physical exam | Consultation reports | X-ray films / images |
| Laboratory test results | X-ray & Image reports | Itemized bill |
| Diagnosis & treatment codes | Complete billing record | |

Other, (specify)________________________________________________________________

### Purpose of the Requested Disclosure of Protected Health Information

I am authorizing the release of my Protected Health Information.

**Drug and/or Alcohol Abuse, and/or Psychiatric, and/or HIV/AIDS Records Release**

I understand if my medical or billing record contains information in reference to, psychiatric care, sexually transmitted disease, hepatitis B or C testing, previous drug and/or alcohol abuse and/or other sensitive information, I agree to its release. ***Check One:*** ☐ Yes ☐ No

I understand if my medical or billing record contains information in reference to HIV/AIDS (Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome) testing and/or treatment I agree to its release. ***Check One:*** ☐ Yes ☐ No

### Right to Revoke Authorization

Except to the extent that action has already been taken in reliance on this authorization, the authorization may be revoked at any time by submitting a written notice to ***The Corporate Claims Dept.*** at ***The Shaw Group Inc., 4171 Essen Lane, Baton Rouge, Louisiana 70809***. Unless revoked, this authorization will expire at which time completion of treatment for the injury or illness has been accomplished.

### Re-disclosure

I understand the information disclosed by this authorization may be subject to re-disclosure by the recipient and no longer be protected by the Health Insurance Portability and Accountability Act of 1996.

### Signature of Patient or Personal Representative Who May Request Disclosure

I understand that I do not have to sign this authorization. However, if health care services are being provided to me for the purpose of providing information to a third-party (e.g. fitness-for-work test), I understand that services may be denied if I do not authorize the release of information related to such health care services to the third-party. I can inspect or copy the protected health information to be used or disclosed. **I hereby release and discharge *The Shaw Group Inc* of any liability and the undersigned will hold *The Shaw Group Inc* harmless for complying with this Authorization.**

Signature: ________________________________________ Date: ___________________________________

Description of relationship if not patient: ________________________________________________

Shaw The Shaw Group Inc.™

# MEDICAL FORMS

## AUTHORIZATION FOR TREATMENT OF OCCUPATIONAL INJURY/ILLNESS

Employee Name: ______________________
Social Security #: ______________________

Injury: ☐
Illness: ☐

Job Title: ______________________ Incident Date: ______________________
Project/Location ______________________
Location of Accident/Exposure:
Telephone #: ______________________ ______________________
H&S Representative: ______________________
Body Part(s) Injured: ______________________
Describe in detail how incident occurred: ______________________
______________________

---

**TO TREATING PHYSICIAN:**

In the case of occupational injury/illness, please examine the employee and render necessary conservative treatment directly related to the occupational injury/illness.

Light Duty Work:
It is the policy of our company to provide work assignments, whenever possible, for employees with physical activity restrictions resulting from an occupational injury/illness. If the employee will be subject to a restriction, please contact **Health Resources** before releasing the employee, so that a light duty assignment may be arranged.

Medically Unfit to Return to Work:
It is the policy of our company to assist employees unable to return to work, due to an injury/illness, in obtaining needed medical care and other available benefits. Medical findings are also used to help evaluate unsafe conditions that may have led to the incident. Please help us assist our employees by contacting **Health Resources** with your findings as soon as possible, preferably before the employee leaves your office, but not later than the close of business on the day of initial treatment.

**Health Resources**:Telephone: 1-800-350-4511 Fax: (800) 853-2641

Please Send Reports To **Both** of the Following:

**Health Resources**
600 West Cummings Park, Suite 3400
Woburn, Massachusetts 01801

***AND***

**The Shaw Group, Inc. Corporate Claims Department**
4171 Essen Lane
Baton Rouge, LA 70809

Please Send Bills To:

**The Shaw Group, Inc. Corporate Claims Department**
4171 Essen Lane
Baton Rouge, LA 70809

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**DOCTOR, Please provide:**
Medical Diagnosis: ______________________
Treatment Provided: ______________________
______________________
Recommended Work Limitation/Restriction: ______________________
Return Visit Needed:No ☐ Yes ☐ Date if Yes ______________________ First Aid Only ☐
Physician Name: ______________________ Physician Telephone: ______________________
Physician Signature: ______________________ Date: ______________________

---

**YOU MUST CALL HEALTH RESOURCES FOR ALL OCCUPATIONAL INJURIES/ILLNESSES REQUIRING OUTSIDE MEDICAL TREATMENT: 1-800-350-4511.**

**FAX COMPLETED FORM TO HEALTH RESOURCES (800) 853-2641.**

Send Bills to Shaw Corporate Claims Department

Shaw The Shaw Group Inc.™

## RETURN-TO-WORK EXAMINATION FORM

**Exam Date:** ______ / _____ / _____ **Employee Name:** ________________________________

**Birth Date:** ______ / _____ / _____ **Social Security #:** ________ - ________ - ________

**Job Title:** ____________________________________________ **Sex:** ❑ Male ❑ Female

***Examining Provider:*** **Please complete this form and fax to Health Resources at (800) 853-2641. Please contact Health Resources at (800) 350-4511 to report status of employee post-treatment.**

**DIAGNOSIS:** ____________________________________________

**TREATMENT PLAN:** ____________________________________________

**MEDICATIONS:** ____________________________________________

**PHYSICAL THERAPY:** ____________________________________________

**OTHER:** ____________________________________________

❑ May return to full duty work effective ___/___/

❑ May return to limited duty from ___/___/___ to ___/___/

❑ Unable to return to work from ___/___/___ to ___/___/___

**WORK LIMITATIONS:**

❑ Restricted lifting/pushing/pulling: maximum weight in lbs.: ______________ (company limits all lifting to ≤ 60 lbs.).

❑ Work only with right/left hand.

❑ Restricted repetitive motion right/left hand.

❑ Sitting job only.

❑ Restricted operation of moving equipment.

❑ Other: ____________________________________________

**FOLLOW-UP PLAN:**

❑ Release from care.

❑ Schedule for follow-up appointment on ___/___/___.
Time __________ AM/PM

❑ Referral to ________________________________
Appointment date ___/___/___ Time ___________ AM/PM

Comments: ____________________________________________

______________________________ ______________________________ ______________________
Examiner's Name (*print*) Examiner's Signature Date

Shaw The Shaw Group Inc.™

# GENERAL LIABILITY, PROPERTY DAMAGE AND PROPERTY LOSS REPORT

| | | |
|---|---|---|
| PROJECT/LOCATION: | PROJECT NO.: | DATE: |
| ADDRESS: | | |
| DESCRIPTION AND ESTIMATED DOLLAR VALUE OF DAMAGE/LOSS: | | |
| HOW DID THE DAMAGE/LOSS OCCUR? | | |
| | | |
| LOCATION OF PROPERTY BEFORE LOSS: | | |
| DATE OF INCIDENT: | TIME OF INCIDENT: AM PM | |
| PROPERTY OWNER'S NAME: | PROPERTY OWNER'S PHONE: | |
| ADDRESS: | | |
| WERE ANY PERSONS INJURED? (IF SHAW EMPLOYEE, COMPLETE ACCIDENT REPORTS) | YES ☐ NO ☐ | |
| NAME OF INJURED: | PHONE: | |
| ADDRESS: | | |
| INJURED'S EMPLOYER AND ADDRESS: | | |
| DESCRIBE INJURY: | | |

## WITNESSES

| | |
|---|---|
| NAME: | PHONE: |
| ADDRESS | |
| NAME: | PHONE: |
| ADDRESS | |

| | | |
|---|---|---|
| POLICE NOTIFIED? YES ☐ NO ☐ | DEPARTMENT NAME & PHONE: | REPORT ID: |

## Report Prepared By

| | | |
|---|---|---|
| NAME: | TITLE: | |
| SIGNATURE: | DATE: | PHONE: |

## Project Manager

| | | |
|---|---|---|
| NAME: | SIGNATURE: | DATE: |

**Use Additional Sheets If Necessary**

Shaw The Shaw Group Inc.™

# TAILGATE SAFETY MEETING

Division/Subsidiary ____________ Facility ____________

Date ____________ Time ____________ Job Number ____________

Customer ____________ Address ____________

Specific Location ____________

Type of Work ____________

Chemicals Used ____________

OBTAIN MATERIAL SAFETY DATA SHEETS (MSDS) FOR CHEMICALS TO BE USED ONSITE

## SAFETY TOPICS PRESENTED

Protective Clothing/Equipment ____________

Chemical Hazards ____________

Physical Hazards ____________

Emergency Procedures ____________

Hospital/ Clinic ____________ Phone ____________ Paramedic Phone ____________

Hospital Address ____________

Special Equipment ____________

Other ____________

## ATTENDEES

| NAME PRINTED | SIGNATURE |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |
| | |

Shaw The Shaw Group Inc.™

# TAILGATE SAFETY MEETING

| NAME PRINTED | SIGNATURE |
| --- | --- |
| | |

Meeting conducted by:

NAME PRINTED ____________________ SIGNATURE ____________________

Supervisor ____________________ Manager ____________________

Shaw™

REPORT ALL WORKER'S COMPENSATION INJURIES TO SHAW CLAIMS DEPARTMENT
FAX REPORT WITHIN 24 HOURS OF INCIDENT TO **225-932-2636**.
**Phone all injuries/ illnesses to Shaw Notification Hotline/Helpdesk**
**1-866-299-3445**

# Supervisor's Employee Injury/Illness Report Form

## EMPLOYEE INFORMATION

| | | | |
|---|---|---|---|
| Employee's Social Security Number: | | Claim Number: | |
| Employee's Name: | | Home Phone Number: | |
| Home Address: | | | Business Line Code: |
| Male Female | Date of Birth: | Hire Date: | |
| Dependents: | Dependents Under 18: | Marital Status: | |
| Occupation: | | Department Name: | |
| State Hired: | Currently Weekly Wage: | Hourly Wage: | |
| Hours/Days Worked Per Week: | Days Per Week | Hours Worked Per Day: | |
| Employment Status: | Employee Report No.: N/A | | Employee ID No.: N/A |
| 'aried Continued: | Paid For Date of Injury: | | Education No. of Years: |
| ..ver Injured on the Job: | Supervisor Name & Phone: | | |

## EMPLOYER INFORMATION

| | |
|---|---|
| Employer Name: **The Shaw Group, Inc.** | |
| Work Location: | |
| Contact Name: **John Mollere** | Telephone Number: **(800)747-3322, Ext. 572** |
| Employer SIC: | Employer Location Code: |
| Employer FED ID: | Employer Code: N/A |
| Nature of Business: | |
| Policy Number: | |

## ACCIDENT INFORMATION

| | |
|---|---|
| Date and Time of Injury: | |
| Did the Accident Occur at the Work Location: | If no, where did the accident occur? N/A |
| Accident Address: | |
| Nature of Accident: | |

Give a Full Description of the Accident: (Be as Factually Complete As Possible)

Are Other WC Claims Involved? No

Date and Time Reported to Employer:

Person Reported To:

Shaw™

## WITNESS INFORMATION

Were There Any Witnesses?

If Yes, List Names and How to Contact Them:

## INJURY INFORMATION

Which Part of the Body Was Injured? (e.g. Head, Neck, Arm Leg)

What Was the Nature of Injury? (e.g. Fracture, Sprain, Laceration)

Part of Body Location: (e.g. Left, Right, Upper, Lower)

Injury Description:

| | |
|---|---|
| Source of Injury: | Is Employee Hospitalized? |
| Lost Time: If Yes, What was First Full Day Out: | |
| Date Last Day Worked: | Date Disability Began: N/A |
| Date Returned to Work: | Estimated Return Date: N/A |

## MEDICAL INFORMATION

| | | |
|---|---|---|
| ER Treated & Released: | Hospitalized: | Phy./Clinic: |
| Hospital - Name, Address, Phone Number: | Was Employee Transported via Ambulance: Yes No | |

N/A

Clinic - Name, Address, Phone Number:

## ADDITIONAL COMMENTS & INFORMATION

## REPORT PREPARED BY

| | |
|---|---|
| Name: | Title: |
| Signature: | Phone: |

Shaw™

# VEHICLE ACCIDENT REPORT



ACCIDENT DESCRIPTION

This report is to be initiated by the employee involved in the accident or his/her direct supervisor. Please answer all questions completely. This report must be forwarded to the appropriate health and safety representative within 24 HOURS of the accident. Attach police report.

ACCIDENT DATE ______________________ TIME ______________________ ☐ A.M. or ☐ P.M.

LOCATION OF ACCIDENT (CITY, STATE) ______________________

DESCRIPTION OF ACCIDENT ______________________

______________________

______________________

WITNESS ______________________ PHONE NO. ______________________

ADDRESS ______________________ CITY ______________________ STATE __________ ZIP __________

POLICE OFFICER'S NAME AND BADGE #______________________ DEPARTMENT ______________________

,MPANY VEHICLE

DRIVER ______________________ DRIVERS LICENSE NO. ______________________ STATE __________

ADDRESS ______________________ CITY ______________________ STATE __________ ZIP __________

WORK PHONE NO. _(_____)______________ S.S. NO. ______________ PROJECT NAME/NO. ______________

VEHICLE NO. __________ YEAR __________ MAKE __________ MODEL __________ LICENSE PLATE NO. __________

STATE __________ VEHICLE OWNER: ☐ COMPANY ☐ LEASED/RENTED ☐ PRIVATE VEHICLE

VEHICLE TYPE: ☐ COMMERCIAL MOTOR VEHICLE ☐ NON-COMMERCIAL

IF NOT COMPANY-OWNED: OWNER ______________________ PHONE NO _(____)______________

ADDRESS ______________________ CITY ______________________ STATE __________ ZIP __________

VEHICLE DAMAGE ______________________

NO. OF VEHICLES TOWED FROM SCENE __________ NUMBER OF INJURIES __________ NUMBER OF FATALITIES __________

WERE HAZARDOUS MATERIALS RELEASED? ☐ NO ☐ YES IF YES, DESCRIBE MATERIALS ______________________

______________________

OTHER VEHICLE

DRIVER ______________________ DRIVERS LICENSE NO. ______________________ STATE __________

ADDRESS ______________________ CITY ______________________ STATE __________ ZIP __________

PHONE NO. _(_____)______________ S.S. NO. ______________

OWNER'S NAME (☐ CHECK IF SAME AS DRIVER) ______________________

ADDRESS ______________________ CITY ______________________ STATE __________ ZIP __________

INSURANCE COMPANY ______________________ POLICY NO. ______________________

AGENT'S NAME ______________________ PHONE NO. _(_____)______________

ADDRESS ______________________ CITY ______________________ STATE __________ ZIP __________

VEHICLE YEAR __________ MAKE __________ MODEL __________ PLATE NO. __________ STATE __________

VEHICLE I.D. NO. ______________________

VEHICLE DAMAGE ______________________

PASSENGERS: ☐ NO ☐ YES INJURIES: ☐ NO ☐ YES (If Yes, list names and telephone numbers below)

______________________

______________________

______________________

Shaw™

# VEHICLE ACCIDENT REPORT

WEATHER: ☐ Clear ☐ Cloudy ☐ Fog ☐ Rain ☐ Sleet ☐ Snow Other ____________

PAVEMENT: ☐ Asphalt ☐ Steel ☐ Concrete ☐ Wood ☐ Gravel/Dirt ☐ Brick/Stone Other ____________

CONDITION: ☐ Dry ☐ Wet ☐ Icy ☐ Pot Holes Other ____________

TRAFFIC CONTROL: ☐ Traffic Light ☐ Stop Sign ☐ Railroad ☐ No Intersection ☐ No Control

ROADWAY: Number of Lanes Each Direction: ________ ☐ Residential ☐ Divided Highway ☐ Undivided Highway

***Draw and name roadways showing each vehicle, direction of travel, and point of impact. Indicate travel before the accident with a solid line, and post-accident movement with a broken line.***

SYMBOLS:

Your Vehicle ①

Other Vehicle(s) ② ③

Pedestrian

Stop Sign

Yield

.lroad

## *ADDITIONAL INFORMATION:*

________________________________________

________________________________________

________________________________________

________________________________________

EMPLOYEE ____________ (Print) ____________ (Signature) ____________ (Date)

SUPERVISOR ____________ (Print) ____________ (Signature) ____________ (Date)

HEALTH & SAFETY REP. ____________ (Print) ____________ (Signature) ____________ (Date)

**ATTACH POLICE REPORT TO VEHICLE ACCIDENT REPORT**

**REPORT MUST BE FAXED TO:**
**CORPORATE CLAIMS DEPARTMENT (FAX: 225-932-2636)**
**WITHIN 24 HOURS, OR NOT LATER THAN NEXT BUSINESS DAY.**

**REPORT ALL CHARGEABLE VEHICLE ACCIDENTS TO SHAW NOTIFICATION HOTLINE/HELPDESK**
**(PHONE: 1-866-299-3445)**

# EQUIPMENT, PROPERTY DAMAGE AND GENERAL LIABILITY LOSS REPORT

This report is to be completed for all losses or damage to company property in excess of $1,000.00 and all third party damage, regardless of value, resulting from company activities.

PROJECT/LOCATION____________________ PROJECT NO. _______ DATE

ADDRESS ____________________________________________

HOW DID DAMAGE OR LOSS OCCUR: ____________________________________________

____________________________________________

____________________________________________

DESCRIPTION AND VALUE ($) OF DAMAGED/LOST/STOLEN PROPERTY: ____________________

____________________________________________

LOCATION OF DAMAGED/LOST/STOLEN PROPERTY (Before Loss): ____________________

____________________________________________

DATE AND TIME OF DAMAGE, LOSS, OR THEFT: Date: ____Time: _________a.m./p.m.

OWNER OF DAMAGED/LOST/STOLEN PROPERTY:

Name ______________________________Phone No. (     ) ____________

Address ______________________________City ____________

Employer and Address ____________________________________________

INJURED PARTIES (Also complete a Supervisor's Employee Injury Report if a Company Employee):

Name ______________________________ Phone No. (     ) ______

Address ______________________________ City ____

Employer and Address ____________________________________________

Description of Injury ____________________________________________

WITNESSES:

1. Name ______________________________Home Phone (     ) ____________

Home Address ______________________________City ____________

Employer and Address ____________________________________________

2. Name ______________________________Home Phone (     ) ____________

Home Address ______________________________City ____________

Employer and Address ____________________________________________

WERE PICTURES TAKEN? ☐ YES ☐ NO

WERE POLICE NOTIFIED? ☐ YES ☐ NO DEPT. ____________________REPORT NO. ____________

**COMPLETED BY:** ____________________ ____________________ ____________________

(Print) (Signature) (Date)

**PROJECT/LOCATION MANAGER: :** ____________________ ____________________ ____________________

(Print) (Signature) (Date)

**REPORT MUST BE FAXED TO:**
**CORPORATE CLAIMS DEPARTMENT (FAX: 225-932-2636)**
**WITHIN <u>24 HOURS</u>, OR NOT LATER THAN NEXT BUSINESS DAY**

Shaw™

# INCIDENT INVESTIGATION REPORT

*** Must Be Completed Within 72 HOURS & Relevant Support Documentation Must Be Attached / Submitted***

Investigation Date ____________________ Date of Incident ____________________

Employee Name ________________________________________

Supervisor Name ________________________________________

Project Number/Name __________ / ______________________________

Location of Incident ________________________________________

**Incident Classification**

Injury
- ☐ First Aid
- ☐ OSHA Recordable
- ☐ Lost Workday
- ☐ Restricted Workday

Vehicle
- ☐ Chargeable
- ☐ Non-chargeable

DOT
- ☐ DOT Vehicle
- ☐ DOT Reportable

Near Miss ☐

General Liability ☐

**Description** (Provide facts, describe how incident occurred, provide diagram [on back] or photos)

________________________________________

________________________________________

**Analysis** (What unsafe acts or conditions contributed to the incident?)

________________________________________

________________________________________

________________________________________

________________________________________

**Corrective Action(s)** (List corrective action items, responsible person, scheduled completion date)

________________________________________

________________________________________

________________________________________

**Witness Names** (Complete – Employee Witness Statement)

________________________________________

________________________________________

________________________________________

________________________________________

| | | | |
|---|---|---|---|
| Investigated By | ____________________ Print Name | ____________________ Signature | __________ Date |
| Project/Location Mgr. | ____________________ Print Name | ____________________ Signature | __________ Date |

Shaw™

## Injured Employee Statement
***MUST BE COMPLETED WITHIN 24 HOURS OF THE INCIDENT***

This form should be completed by the injured employee involved in the incident. Describe only the facts for which you have personal knowledge. If you have no knowledge of a particular question, write "no knowledge".

Company ______________________________________________

Exact Location of Incident/Accident ______________________________________________

Name Of Injured Employee ______________________________________________

Date of Incident/Accident ____________________ Time ____________am pm

Date Of This Statement ____________________

Time your shift starts ____________am pm Time your shift ends__________am pm

Names of Known Witnesses

Name ______________________________________________

Name ______________________________________________

Name ______________________________________________

Name ______________________________________________

Your Immediate Supervisors Name ______________________________________________

If not employed by Shaw E&I, enter name of company and phone number ______________________________________________

Have you had a prior injury similar to this injury? ______________________________________________

Was it while you were at work? ______________________________________________

What date did the prior injury occur? ______________________________________________

Stating only factual information, Describe in Detail what Happened and Include any applicable events leading to the incident/accident

______________________________________________

______________________________________________

______________________________________________

______________________________________________

______________________________________________

______________________________________________

______________________________________________

______________________________________________

I certify that, to the best of my knowledge, all of the above information is complete, accurate and factual. I acknowledge that the intentional falsification or altering of facts or making misleading statements may be grounds for disciplinary action.

____________________________ ____________________________

Signature/Date Print Name

Shaw™

Employee Witness Statement

***MUST BE COMPLETED WITHIN 24 HOURS OF THE INCIDENT***

This form should be completed by every employee working in the crew of the injured employee and by every other employee with knowledge of events or circumstances involved in the incident.

This information is being solicited from you so that the company can accurately assess the reported incident to avoid similar occurrences in the future. Describe only the facts for which you have personal knowledge. If you have no knowledge of the incident, write "no knowledge".

Company ______________________________

Exact Location of Incident/Accident ______________________________

Name of Injured Employee ______________________________

Date of Incident/Accident ______________ Time ______ am pm

Date of this Statement ______________ Time ______ am pm

Time your shift begins? Time __________ am pm Ends ______ am pm

Witness Information:

Name ______________________________

Home Phone No. ______________________________

Home Address ______________________________

County ______________ Zip ______________

Witness' Supervisor Name ______________________________

If not employed by Shaw E&I, enter name of company ______________________________

Company Phone Number ______________________________

Did You See the Incident/Accident? ______________________________

How Far From You (approx., in feet) Did the Incident/Accident Occur? ______________

Stating Only Factual Information, Describe in Detail What Happened and Include Any Applicable Events Leading to the Incident/Accident.

______________________________

______________________________

______________________________

______________________________

______________________________

______________________________

______________________________

______________________________

I certify that, to the best of my knowledge, all of the above information is complete, accurate and factual. I acknowledge that the intentional falsification or altering of facts or making misleading statements may be grounds for disciplinary action.

______________________ ______________________

Witness Signature/Date Print Name

Shaw™

# ACCIDENT REVIEW BOARD

| | |
|---|---|
| DATE: | LOCATION: |
| BOARD MEMBERS: | |
| ACCIDENT DATE: | EMPLOYEE(S) INVOLVED IN INCIDENT: |
| INVESTIGATION COMPLETE: YES ☐ NO ☐ | ACCIDENT CLASSIFICATION: |

**THE FOLLOWING INFORMATION MUST BE PROVIDED BY THE REVIEW BOARD FOR THIS INCIDENT (PRINT):**

*SUPERVISOR:* ______________________ **PROJECT/LOCATION** ______________ **MGR.:**

POTENTIAL CAUSE OF ACCIDENT:

ACTION BY BOARD*:

* ALL ACTIONS BY THE ACCIDENT REVIEW BOARD ARE SUBJECT TO FINAL REVIEW BY THE HUMAN RESOURCES AND LEGAL DEPARTMENTS.

ACCEPTED:

______________________ (Employee Signature) ______________________ (Supervisor Signature)

APPROVED: ______________________ (Project/Location Manager)

REJECTED FOR: ______________________

APPROVED: ______________________ (Business Line Health and Safety Manager or Designee)

REJECTED FOR: ______________________

APPROVED: ______________________ (Business Line Vice President)

REJECTED FOR: ______________________

# PROJECT SAFETY INSPECTION REPORT

**PROJECT** ______________________________ **DATE** _________________________

BUSINESS LINE: _____________ PROJECT NAME/NUMBER:
PROGRAM MANAGER: _______________ PROJECT MANAGER:
GENERAL PROJECT DESCRIPTION:
SITE ACTIVITIES AT TIME OF INSPECTION:

INTERVIEWED EMPLOYEE:
SAFETY ISSUE:
CORRECTIVE ACTION:

ASSIGNED TO: ________________________________ FOLLOW-UP DATE:
CORRECTION VERIFIED BY: _______________________________ DATE:

INTERVIEWED EMPLOYEE:
SAFETY ISSUE:
CORRECTIVE ACTION:

ASSIGNED TO: ________________________________ FOLLOW-UP DATE:
CORRECTION VERIFIED BY: _______________________________ DATE:

INSPECTION COMPLETED BY: _____________________________ DATE:

HEALTH AND SAFETY REVIEW BY: ________________________ DATE:

# PROJECT SAFETY INSPECTION REPORT

**PROJECT** ____________________________ **DATE** ________________________

| | YES | NO | N/A |
|---|---|---|---|
| FIRST AID | | | |
| 1. Are first aid kit locations identified and accessible? | ______ | ______ | ______ |
| 2. Are emergency eye wash/safety showers available and inspected monthly? | ______ | ______ | ______ |
| 3. Are first aid kits inspected weekly? | ______ | ______ | ______ |
| 4. Is a qualified first aid/CPR provider on site? | ______ | ______ | ______ |
| PERSONAL PROTECTIVE EQUIPMENT | | | |
| 1. Have levels of personnel protection been established? | ______ | ______ | ______ |
| 2. Are respirators decontaminated, inspected, and stored according to standard procedures? | ______ | ______ | ______ |
| 3. Have employees been fit-tested? | ______ | ______ | ______ |
| 4. Is defective personal protective equipment tagged and taken out of service? | ______ | ______ | ______ |
| 5. Does compressed breathing air meet CGA Grade "D" minimum? | ______ | ______ | ______ |
| 6. Are there sufficient sizes and quantities of protective equipment? | ______ | ______ | ______ |
| 7. At a minimum, are employees utilizing safety glasses, hard hats, and steel toe boots? | ______ | ______ | ______ |
| FIRE PREVENTION | | | |
| 1. Are employees smoking only in designated outdoor areas? | ______ | ______ | ______ |
| 2. Are fire lanes established and maintained? | ______ | ______ | ______ |
| 3. Are flammable liquid dispensing systems bonded? | ______ | ______ | ______ |
| 4. Are approved safety cans available for storage of flammable liquids? | ______ | ______ | ______ |
| 5. Has the local fire department been contacted? | ______ | ______ | ______ |
| 6. Are fire extinguishers available and inspected monthly? | ______ | ______ | ______ |
| 7. Are flammables and combustibles properly stored? | ______ | ______ | ______ |
| 8. Are flammable storage cabinets available and used when needed? | ______ | ______ | ______ |
| AIR MONITORING | | | |
| 1. Is required air monitoring being conducted? | ______ | ______ | ______ |
| 2. Are air monitoring instruments calibrated daily? | ______ | ______ | ______ |
| 3. Are air monitoring logs up to date? | ______ | ______ | ______ |
| 4. Are instrument user manuals available? | ______ | ______ | ______ |
| 5. Are instruments being maintained? | ______ | ______ | ______ |
| 6. Are employees notified of personal sampling results within 5 days of receipt? | ______ | ______ | ______ |
| WELDING AND CUTTING | | | |
| 1. Are fire extinguishers present at welding and cutting operations? | ______ | ______ | ______ |
| 2. Are confined spaces evaluated prior to and during cutting and welding operations? | ______ | ______ | ______ |
| 3. Have Hot Work Permits been completed? | ______ | ______ | ______ |
| 4. Are proper helmets, goggles, aprons, and gloves available for welding and cutting operations? | ______ | ______ | ______ |
| 5. Are welding machines properly grounded? | ______ | ______ | ______ |
| 6. Are oxygen and fuel gas cylinders stored a minimum of 20 feet apart? | ______ | ______ | ______ |
| 7. Are only trained personnel permitted to operate welding and cutting equipment? | ______ | ______ | ______ |
| 8. Are gas cylinders transported in a secured vertical position with caps in place? | ______ | ______ | ______ |
| HAND AND POWER TOOLS | | | |
| 1. Are defective hand and power tools tagged and taken out of service? | ______ | ______ | ______ |
| 2. Is eye protection available and used when operating power tools? | ______ | ______ | ______ |
| 3. Are guards and safety devices in place on power tools? | ______ | ______ | ______ |
| 4. Are power tools inspected before each use? | ______ | ______ | ______ |

# PROJECT SAFETY INSPECTION REPORT

**PROJECT** ______________________________ **DATE** ________________________

| | YES | NO | N/A |
|---|---|---|---|
| 5. Are nonsparking tools available when necessary? | | | |
| 6. Is the correct tool being used for the job? | | | |

MOTOR VEHICLES

| | YES | NO | N/A |
|---|---|---|---|
| 1. Are vehicles regularly inspected? | | | |
| 2. Are personnel licensed for the vehicles they operate? | | | |
| 3. Are unsafe vehicles tagged and reported to supervision? | | | |
| 4. Is vehicle's safety equipment operating properly? | | | |
| 5. Are loads secure? | | | |
| 6. Are vehicle occupants using safety belts? | | | |
| 7. Are current insurance cards and blank accident report forms located in vehicles? | | | |

EMERGENCY PLANS

| | YES | NO | N/A |
|---|---|---|---|
| 1. Are emergency telephone numbers posted? | | | |
| 2. Have emergency escape routes been designated? | | | |
| 3. Are employees familiar with the emergency signal? | | | |
| 4. Has the emergency route to the hospital been established and posted? | | | |
| 5. Is a vehicle on site that can transport injured employees to the hospital? | | | |

MATERIALS HANDLING

| | YES | NO | N/A |
|---|---|---|---|
| 1. Are materials stacked and stored to prevent sliding or collapsing? | | | |
| 2. Are tripping hazards identified? | | | |
| 3. Are semi-trailers chocked? | | | |
| 4. Are fixed jacks used under semi-trailers? | | | |
| 5. Are riders prohibited on materials handling equipment? | | | |
| 6. Are approved manlifts provided for the lifting of personnel? | | | |
| 7. Are personnel in manlifts wearing approved fall protection devices? | | | |

FIRE PROTECTION

| | YES | NO | N/A |
|---|---|---|---|
| 1. Has a fire alarm system been established? | | | |
| 2. Do employees know the location and use of all fire extinguishers? | | | |
| 3. Are fire extinguisher locations posted? | | | |
| 4. Are combustible materials segregated from open flames? | | | |
| 5. Have fire extinguishers been professionally inspected during the last year? | | | |
| 6. Are fire extinguishers visually inspected monthly? | | | |

ELECTRICAL

| | YES | NO | N/A |
|---|---|---|---|
| 1. Is electrical equipment and wiring properly guarded and maintained in good condition? | | | |
| 2. Are extension cords kept out of wet areas? | | | |
| 3. Is damaged electrical equipment tagged and taken out of service? | | | |
| 4. Have underground electrical lines been identified by proper authorities? | | | |
| 5. Has a lockout/tagout system been established? | | | |
| 6. Are GFCIs being used on all temporary electrical systems and as needed? | | | |

ELECTRICAL (continued)

| | YES | NO | N/A |
|---|---|---|---|
| 7. Are extension cords being inspected daily (i.e., group pin in place, no unapproved splices)? | | | |
| 8. Are warning signs exhibited on high voltage equipment (250V or greater)? | | | |
| 9. Is adequate distance maintained from overhead electrical lines? | | | |
| 10. Are switches, circuit breakers, and switchboards installed in wet locations enclosed in weatherproof enclosures? | | | |

Shaw™

| | |
|---|---|
| Procedure No. | HS021 |
| Revision No. | 0 |
| Date of Revision | 4/24/02 |
| Last Review Date | 4/24/02 |

# PROJECT SAFETY INSPECTION REPORT

**PROJECT** ______________________ **DATE** ______________________

| | YES | NO | N/A |
|---|---|---|---|
| **CRANES AND RIGGING** | | | |
| 1. Are cranes inspected daily prior to use? | | | |
| 2. Are crane swing areas barricaded or demarked? | | | |
| 3. Is all rigging equipment tagged with an identification number and rated capacity? | | | |
| 4. Is rigging equipment inspection documented? | | | |
| 5. Are slings, chains, and rigging inspected before each use? | | | |
| 6. Are damaged slings, chains, and rigging tagged and taken out of service? | | | |
| 7. Are slings padded or protected from sharp corners? | | | |
| 8. Do employees keep clear of suspended loads? | | | |
| 9. Are rated load capacities and special hazard warnings posted on crane? | | | |
| 10. Are the records of annual crane inspection available? | | | |
| 11. Has accessible areas within the swing radius of the rear of the crane been barricaded? | | | |
| 12. Do crane operators have required training/certification? | | | |
| **COMPRESSED GAS CYLINDERS** | | | |
| 1. Are breathing air cylinders charged only to prescribed pressures? | | | |
| 2. Are like cylinders segregated and stored in well ventilated areas? | | | |
| 3. Is smoking prohibited in cylinder storage areas? | | | |
| 4. Are cylinders stored secure and upright? | | | |
| 5. Are cylinders protected from snow, rain, etc.? | | | |
| 6. Are cylinder caps in place before cylinders are moved? | | | |
| 7. Are fuel gas and oxygen cylinders stored a minimum of 20 feet apart? | | | |
| 8. Are propane cylinders stored and used only outside of buildings? | | | |
| **SCAFFOLDING** | | | |
| 1. Is scaffolding placed on a flat, firm surface? | | | |
| 2. Are scaffold planks free of mud, ice, grease, etc.? | | | |
| 3. Is scaffolding inspected before each use? | | | |
| 4. Are defective scaffold parts taken out of service? | | | |
| 5. Have employees completed scaffold user training? | | | |
| 6. On scaffolds where platforms are overlapped, is planking overlapped a minimum of 12 inches? | | | |
| 7. Does scaffold planking extend over end supports between 6 to 18 inches (dependent upon platform length)? | | | |
| 8. Are employees restricted from working on scaffolds during storms and high winds? | | | |
| 9. Are all pins in place and wheels locked? | | | |
| 10. Is required perimeter guarding (top rail, mid rail, and toe board) present? | | | |
| 11. Has a competent person been designated to oversee scaffold construction? | | | |
| 12. Are employees prohibited from moving mobile scaffold horizontally while employees are on them? | | | |
| 13. Are all scaffold components manufactured by the same company? | | | |
| **WALKING AND WORKING SURFACES** | | | |
| 1. Are ladders regularly inspected? | | | |
| 2. Are accessways, stairways, ramps, and ladders clean of ice, mud, snow, or debris? | | | |
| 3. Are ladders being used in a safe manner? | | | |
| 4. Are ladders kept out of passageways, doors, or driveways? | | | |
| 5. Are broken or damaged ladders tagged and taken out of service? | | | |
| 6. Are metal ladders prohibited in electrical service? | | | |

# PROJECT SAFETY INSPECTION REPORT

**PROJECT** ______________________ **DATE** ______________________

| | YES | NO | N/A |
|---|---|---|---|
| 7. Are stairways and floor openings guarded? | ____ | ____ | ____ |
| 8. Are safety feet installed on straight and extension ladders? | ____ | ____ | ____ |
| 9. Is general housekeeping being maintained? | ____ | ____ | ____ |
| 10. Are ladders tied off? | ____ | ____ | ____ |
| 11. Are handrails and siderails installed along the unprotected sides of stairways having 4 or more risers or rising more than 30 inches? | ____ | ____ | ____ |

SITE SAFETY PLAN

| | | | |
|---|---|---|---|
| 1. Is a site safety plan available on site or accessible to all employees? | ____ | ____ | ____ |
| 2. Does the safety plan accurately reflect site conditions and tasks? | ____ | ____ | ____ |
| 3. Have potential hazards been described to employees on site? | ____ | ____ | ____ |
| 4. Is there a designated safety official on site? | ____ | ____ | ____ |
| 5. Have all employees signed the safety plan acknowledgment form? | ____ | ____ | ____ |

SITE POSTERS

1. Are the following posters displayed in a prominent and accessible area?

| | | |
|---|---|---|
| A. Minimum Wage | ____ | ____ |
| B. OSHA Job Protection | ____ | ____ |
| C. Equal Employment Opportunity | ____ | ____ |
| 2. Are all required state-specific posters displayed? | ____ | ____ |

SITE CONTROL

| | | | |
|---|---|---|---|
| 1. Are work zones clearly marked? | ____ | ____ | ____ |
| 2. Are support trailers located to minimize exposure from a potential release? | ____ | ____ | ____ |
| 3. Are support trailers accessible for approach by emergency vehicles? | ____ | ____ | ____ |
| 4. Is the site properly secured during and after work hours? | ____ | ____ | ____ |
| 5. Is an exclusion zone sign-in/sign-out log maintained? | ____ | ____ | ____ |
| 6. Are only employees with current training and physicals permitted in exclusion zone? | ____ | ____ | ____ |

HEAVY EQUIPMENT

| | | | |
|---|---|---|---|
| 1. Is heavy equipment inspected as prescribed by the manufacturer? | ____ | ____ | ____ |
| 2. Is defective heavy equipment tagged and taken out of service? | ____ | ____ | ____ |
| 3. Are project roads and structures inspected for load capacities and proper clearances? | ____ | ____ | ____ |
| 4. Is heavy equipment shut down for fueling and maintenance? | ____ | ____ | ____ |
| 5. Are backup alarms installed and working on mobile equipment? | ____ | ____ | ____ |
| 6. Have qualified equipment operators been designated? | ____ | ____ | ____ |
| 7. Are riders prohibited on heavy equipment? | ____ | ____ | ____ |
| 8. Are guards and safety appliances in place and used? | ____ | ____ | ____ |
| 9. Are operators using the "three point" system when mounting/dismounting equipment? | ____ | ____ | ____ |

EXCAVATION

| | | | |
|---|---|---|---|
| 1. Has a "competent person" been designated to oversee excavation activities? | ____ | ____ | ____ |
| 2. Prior to opening excavations, are utilities located and marked? | ____ | ____ | ____ |
| 3. Has a professional engineer evaluated all excavations greater than 20 feet deep? | ____ | ____ | ____ |
| 4. Is there rescue equipment on site and accessible to the excavation area? | ____ | ____ | ____ |
| 5. Is excavated material placed a minimum of 24 inches from the excavation? | ____ | ____ | ____ |
| 6. Are the sides of excavations sloped or shored to prevent cave ins? | ____ | ____ | ____ |
| 7. Have excavations greater than 4 feet deep been monitored for hazardous atmospheres (i.e., LEL/$O_2$ deficiency)? | ____ | ____ | ____ |

# PROJECT SAFETY INSPECTION REPORT

**PROJECT** ______________________________ **DATE** ________________________

| | YES | NO | N/A |
|---|---|---|---|
| 8. Are ladders or ramps used in excavations over 4 feet deep? | ___ | ___ | ___ |
| 9. Are means of egress available so as to require no more than 25 feet of lateral travel? | ___ | ___ | ___ |
| 10. Are barriers, i.e., guardrails or fences, placed around excavations near pedestrian or vehicle thoroughfares? | ___ | ___ | ___ |
| 11. Is excavation inspected <u>daily</u> by competent persons and documented? | ___ | ___ | ___ |

CONFINED SPACES

| | | | |
|---|---|---|---|
| 1. Have employees been trained in the hazards of confined spaces? | ___ | ___ | ___ |
| 2. Are confined space permits posted at entrance to confined space? | ___ | ___ | ___ |
| 3. Is a copy of the confined space entry procedure available? | ___ | ___ | ___ |
| 4. Has a rescue plan been established? | ___ | ___ | ___ |
| 5. Is an entry supervisor present at each permit-required entry? | ___ | ___ | ___ |
| 6. Are required extraction/fall protection devices being used? | ___ | ___ | ___ |

DECONTAMINATION

| | | | |
|---|---|---|---|
| 1. Are decontamination stations set up on site? | ___ | ___ | ___ |
| 2. Is decontamination water properly contained and disposed of? | ___ | ___ | ___ |
| 3. Are all pieces of equipment inspected for proper decontamination before leaving the site? | ___ | ___ | ___ |
| 4. Are shin/metatarsal guards being used during power washing activities? | ___ | ___ | ___ |

HAZARD COMMUNICATION

| | | | |
|---|---|---|---|
| 1. Is there a copy of the HAZCOM procedure on site? | ___ | ___ | ___ |
| 2. Are there MSDSs for required materials/chemicals present on site? | ___ | ___ | ___ |
| 3. Are all containers properly labeled, as to content, hazard? | ___ | ___ | ___ |
| 4. Have employees been trained in accordance with the HAZCOM procedure? | ___ | ___ | ___ |
| 5. Do employees (including subcontractors) know and understand the effects of exposure from the chemicals on site? | ___ | ___ | ___ |
| 6. Have all personnel signed the HAZCOM acknowledgment form? | ___ | ___ | ___ |
| 7. Is there an updated list of chemicals maintained on site? | ___ | ___ | ___ |

TRAINING

| | | | |
|---|---|---|---|
| 1. Are tailgate safety meetings being conducted daily? | ___ | ___ | ___ |
| 2. Are current training/medical records maintained on site? | ___ | ___ | ___ |

DOCUMENTATION

| | | | |
|---|---|---|---|
| 1. Is an OSHA 200 Log maintained on site and posted during the month of February? | ___ | ___ | ___ |
| 2. Are accident report forms available? | ___ | ___ | ___ |
| 3. Is a copy of health and safety policy and procedures available on site? | ___ | ___ | ___ |

Shaw



# PROJECT SAFETY INSPECTION REPORT

**PROJECT** ______________________________ **DATE** ________________

| ALL NEGATIVE RESPONSES | CORRECTIVE ACTION | ASSIGNED TO | DATE ASSIGNED | DATE COMPLETE D | VERIFIED BY |
|---|---|---|---|---|---|
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| DESCRIBE POSITIVE SAFETY OBSERVATIONS |
|---|
| |

ATTACHMENT 3

## OFFICE SAFETY INSPECTION REPORT

**OFFICE** ______________________________ **DATE** ______________________

DATE: _____________ OFFICE NAME:
OFFICE MANAGER:
AREA(S) OF OFFICE INSPECTED:

INTERVIEWED EMPLOYEE:
SAFETY ISSUE:
CORRECTIVE ACTION:

ASSIGNED TO: ______________________________ FOLLOW-UP DATE:
CORRECTION VERIFIED BY: ______________________________ DATE:

INTERVIEWED EMPLOYEE:
SAFETY ISSUE:
CORRECTIVE ACTION:

ASSIGNED TO: ______________________________ FOLLOW-UP DATE:
CORRECTION VERIFIED BY: ______________________________ DATE:

INSPECTION COMPLETED BY: ____________________________ DATE:

HEALTH AND SAFETY REVIEW BY: ________________________ DATE:

# OFFICE SAFETY INSPECTION REPORT

**OFFICE** ______________________________ **DATE** _____

| | YES | NO | N/A |
|---|---|---|---|
| **FIRST AID** | | | |
| 1. Are first aid kits accessible and identified? | ____ | ____ | ____ |
| 2. Are emergency eye wash/safety showers available where needed and inspected? | ____ | ____ | ____ |
| 3. Are first aid kits inspected weekly? | ____ | ____ | ____ |
| **FIRE PREVENTION** | | | |
| 1. Are employees smoking only in designated outdoor areas? | ____ | ____ | ____ |
| 2. Are fire lanes/evacuation routes established and maintained? | ____ | ____ | ____ |
| 3. Are approved safety cans/cabinets available for storage of flammable liquids? | ____ | ____ | ____ |
| 4. Are fire exits clearly identified and unobstructed? | ____ | ____ | ____ |
| **FURNITURE AND EQUIPMENT** | | | |
| 1. Are desks, file cabinets, etc. arranged so that drawers do not open into aisles or walkways? | ____ | ____ | ____ |
| 2. Are desk and file drawers closed after use? | ____ | ____ | ____ |
| 3. Is weight distributed in file cabinets so that upper drawer contents does not create a top-heavy condition? | ____ | ____ | ____ |
| 4. Are cabinets, bookcases, and shelves secured to prevent their falling over? | ____ | ____ | ____ |
| 5. Are faulty desks, chairs, or other office equipment repaired or taken out of service? | ____ | ____ | ____ |
| 6. Is adequate and sufficient lighting provided in all work areas? | ____ | ____ | ____ |
| 7. Are paper cutter blades in fully down and locked position when not in use? | ____ | ____ | ____ |
| 8. Are work stations arranged to be comfortable without unnecessary strains on backs, arms, necks, etc.? | ____ | ____ | ____ |
| 9. Do machines with exposed moving parts have appropriate guards? | ____ | ____ | ____ |
| **AISLES AND FLOORS** | | | |
| 1. Is aisle clearance adequate for two-way traffic and for unobstructed access to all parts of the office and building? | ____ | ____ | ____ |
| 2. Does office arrangement allow easy egress under emergency conditions? | ____ | ____ | ____ |
| 3. Are wastebaskets, briefcases, or other objects placed where they are not a tripping hazard? | ____ | ____ | ____ |
| 4. Are floors clear of pencils, bottles, and other loose objects? | ____ | ____ | ____ |
| 5. Are tripping hazards from electrical cords, phone outlets, or other protrusions on the floor prevented by arrangement of furniture or other means? | ____ | ____ | ____ |
| 6. Are floors free of loose tiles and projections that can create a tripping hazard? | ____ | ____ | ____ |
| 7. Is carpeting in good condition and not badly worn or torn? | ____ | ____ | ____ |
| **HAND AND POWER TOOLS** | | | |
| 1. Are defective hand and power tools tagged and taken out of service? | ____ | ____ | ____ |
| 2. Is eye protection available and used when operating power tools? | ____ | ____ | ____ |
| 3. Are guards and safety devices in place on power tools? | ____ | ____ | ____ |
| 4. Are power tools inspected before each use? | ____ | ____ | ____ |
| 5. Is the correct tool being used for the job? | ____ | ____ | ____ |
| 6. Do knife blades have guards when not in use? | ____ | ____ | ____ |
| **MOTOR VEHICLES** | | | |
| 1. Are vehicles regularly inspected? | ____ | ____ | ____ |
| 2. Are personnel licensed for the vehicles they operate? | ____ | ____ | ____ |
| 3. Are unsafe vehicles reported to supervision? | ____ | ____ | ____ |
| 4. Is safety equipment on vehicles? | ____ | ____ | ____ |
| 5. Are loads secure on vehicles? | ____ | ____ | ____ |

## OFFICE SAFETY INSPECTION REPORT

**OFFICE** ______________________________ **DATE** ____

| | YES | NO | N/A |
|---|---|---|---|
| 6. Are vehicle occupants using safety belts? | | | |
| 7. Are current insurance cards and blank accident report forms located in vehicles? | | | |
| EMERGENCY PLANS | | | |
| 1. Are emergency telephone numbers posted? | | | |
| 2. Have emergency escape routes been designated? | | | |
| 3. Are employees familiar with the emergency signal? | | | |
| 4. Has an emergency route to the hospital been established and posted? | | | |
| MATERIALS HANDLING | | | |
| 1. Are materials stacked and stored to prevent sliding or collapsing? | | | |
| 2. Are flammables and combustibles stored in approved containers? | | | |
| 3. Are tripping hazards identified? | | | |
| 4. Are riders prohibited on material handling equipment? | | | |
| FIRE PROTECTION | | | |
| 1. Has a fire alarm system been established? | | | |
| 2. Do employees know the location and use of all fire extinguishers? | | | |
| 3. Are fire extinguisher locations marked? | | | |
| 4. Have fire extinguishers been professionally inspected during the last year? | | | |
| 5. Are fire extinguishers visually inspected monthly? | | | |
| 6. Is there an operating fire detection system? | | | |
| ELECTRICAL | | | |
| 1. Are extension cords kept out of wet areas? | | | |
| 2. Are certified electricians used for electrical work? | | | |
| 3. Are GFCIs being used as needed? | | | |
| 4. Are extension cords not being used in lieu of permanent wiring? | | | |
| 5. Are warning signs exhibited on high voltage equipment (250V or greater)? | | | |
| 6. Are switches, circuit breakers, and switchboards installed in wet locations enclosed in weatherproof enclosures? | | | |
| 7. Are electric fans protected with guards of not over one-half inch mesh, which prevents fingers getting inside guard? | | | |
| 8. Are cords, panels, receptacles, and plugs in good condition? | | | |
| 9. Are multi-outlet strips not plugged into other multi-outlet strips? | | | |
| 10. Are extension cords not plugged into other extension cords? | | | |
| 11. Are circuit breakers or fuse panels properly labeled, kept closed, and accessible? | | | |
| 12. Are extension cords arranged so that they are not placed over radiators, steam pipes, through doorways, or under carpets? | | | |
| 13. Do space heaters have automatic shut-offs that will actuate if the heater tips over? | | | |
| 14. Are space heaters UL listed and plugged directly into a wall receptacle? | | | |
| 15. Are space heaters located at least 3 feet from combustible material? | | | |
| WALKING AND WORKING SURFACES | | | |
| 1. Are cords, cables, and other items not placed in walkways? | | | |
| 2. Are ladders regularly inspected? | | | |
| 3. Are accessways, stairways, ramps, and ladders clean of ice, mud, snow, or debris? | | | |
| 4. Are ladders being used in a safe manner? | | | |
| 5. Are ladders kept out of passageways, doors, or driveways? | | | |
| 6. Are broken or damaged ladders tagged and taken out of service? | | | |

# OFFICE SAFETY INSPECTION REPORT

**OFFICE** ______________________________ **DATE** _____

| | | YES | NO | N/A |
|---|---|---|---|---|
| 7. | Are metal ladders prohibited in electrical service? | ____ | ____ | ____ |
| 8. | Are stairways and floor openings guarded? | ____ | ____ | ____ |
| 9. | Are safety feet installed on straight and extension ladders? | ____ | ____ | ____ |
| 10. | Are employees walking instead of running? | ____ | ____ | ____ |
| 11. | Are handrails and siderails installed along the unprotected sides of stairways having 4 or more risers or rising more than 30 inches? | ____ | ____ | ____ |
| 12. | Are there torn, loose, or curled carpets? | ____ | ____ | ____ |

HOUSEKEEPING

| | | | | |
|---|---|---|---|---|
| 1. | Is good housekeeping maintained? | ____ | ____ | ____ |
| 2. | Are paper and materials stored properly? | ____ | ____ | ____ |
| 3. | Are cleaning fluids used only in small quantities and stored in closed containers that are kept in well-ventilated areas? | ____ | ____ | ____ |
| 4. | If cleaning fluids are flammable, are they not used near a flame or an open heating element? | ____ | ____ | ____ |
| 5. | Are wastebaskets emptied on a daily basis? | ____ | ____ | ____ |

SITE POSTERS

| | | | | |
|---|---|---|---|---|
| 1. | Are the following posters displayed in a prominent and accessible area? | | | |
| | A. Minimum Wage | ____ | ____ | |
| | B. OSHA Job Protection | ____ | ____ | |
| | C. Equal Employment Opportunity | ____ | ____ | |
| 2. | Are all required state-specific posters displayed? | ____ | ____ | |

HAZARD COMMUNICATION

| | | | | |
|---|---|---|---|---|
| 1. | Is the written HAZCOM program available? | ____ | ____ | ____ |
| 2. | Is there a MSDS FOR EACH HAZARDOUS CHEMICAL present in the office? | ____ | ____ | ____ |
| 3. | Are all containers properly labeled, as to content, hazard? | ____ | ____ | ____ |
| 4. | Have employees been trained on chemical hazards? | ____ | ____ | ____ |
| 5. | Have all employees signed the HAZCOM acknowledgment form? | ____ | ____ | ____ |
| 6. | Is there a list of chemicals maintained on site? | ____ | ____ | ____ |

DOCUMENTATION

| | | | | |
|---|---|---|---|---|
| 1. | Is an OSHA 200 Log maintained and posted during the month of February? | ____ | ____ | ____ |
| 2. | Are accident report forms available? | ____ | ____ | ____ |
| 3. | Is a copy of health and safety policy and procedures available? | ____ | ____ | ____ |

| | |
|---|---|
| Procedure No. | HS021 |
| Revision No. | 0 |
| Date of Revision | 4/24/02 |
| Last Review Date | 4/24/02 |

# OFFICE SAFETY INSPECTION REPORT

**OFFICE** ______________________________ **DATE** ________________

| ALL NEGATIVE RESPONSES | CORRECTIVE ACTION | ASSIGNED TO | DATE ASSIGNED | DATE COMPLETED | VERIFIED BY |
|---|---|---|---|---|---|
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| DESCRIBE POSITIVE SAFETY OBSERVATIONS |
|---|
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Shaw™

## HOT WORK PERMIT

Project Name ______________________________ Project No. ____________

Good for This Date Only _____/_____/_____ Time: From__________AM/PM To ___________AM/PM

Hot Work Area ______________________________

Specific Work to be Done ______________________________

Personal Protective Equipment Required: ______________________________

______________________________

______________________________

Emergency Equipment Required: ______________________________

______________________________

| CHECKLIST | INITIAL: YES | INITIAL: DOES NOT APPLY |
|---|---|---|
| Area personnel have been informed of work to be performed. | | |
| All tanks, lines, valves are disconnected, blinded, or blocked out. | | |
| Electrical service has been locked out and tagged. | | |
| Equipment and all attached piping has been cleaned and purged with (check blank):<br>Water _______ Steam _______ Inert Gas _______ Air _______ | | |
| All grounding/bonding wire in place. | | |
| Surrounding equipment and operations are safe for hot work. | | |
| No open vessels, lines, or combustible items within 35 feet of hot work area. | | |
| Fully charged and appropriate fire extinguisher easily accessible. | | |
| Fire watch has been provided. | | |
| No flammable gases greater than 10% LEL in hot work area. | | |
| Compressed gas cylinders kept upright and secured. | | |
| Air monitoring required. | | |

**AIR MONITORING (If Required)**

| EXACT LOCATION OF TEST | TIME | % LOWER EXPLOSIVE LIMIT | % OXYGEN | OTHER TEST _____ | OTHER TEST _____ | INITIAL |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Special Instructions: ______________________________

______________________________

______________________________

Completed By: ____________________ ____________________ ____________

Printed Name Signature Date

Shaw

# RESERVICE & OPERATIONAL CHECKLIST FOR PRESSURE WATER JET CLEANING AND CUTTING EQUIPMENT

The following information shall be verified before starting work:

| ITEM # | DESCRIPTION | ✔ |
|---|---|---|
| 1. | Date (Print):______________________________ | |
| 2. | Location:______________________________ | |
| 3. | Equipment being cleaned (Print):______________________________ | |
| 4. | Is the area, including the other end of unit being cleaned, properly secured? | |
| 5. | Have precautions been taken to protect all electrical equipment? | |
| 6. | Is there any hazard to personnel resulting from damage to the equipment such as release of corrosive chemicals, flammable liquids, gases, or the like? | |
| 7. | Are all fittings of the correct pressure rating? | |
| 8. | Are all hoses of the correct pressure rating? | |
| 9. | Are all fittings in good operating condition? | |
| 10. | Are all hoses in good operating condition? | |
| 11. | Are all nozzles free from plugging and in good operating condition? | |
| 12. | Have precautions been taken to prevent line-mole reversal? | |
| 13. | Is the filter on the pump suction clean and in good operating condition? | |
| 14. | Is there an adequate water supply? | |
| 15. | Have precautions been taken against freezing? | |
| 16. | Do all personnel have proper personal protective equipment for this job? | |
| 17. | Do all personnel have proper training for this job? | |
| 18. | Are all personnel qualified to perform this work? | |
| 19. | Has the complete hook-up been flushed and air removed from the system prior to installing the nozzle? | |
| 20. | Has hook-up, including pipes, hoses, and connections, been pressure tested with water at the maximum operating pressure? | |
| 21. | Is the dump system operating properly (will it dump when released)? | |
| 22. | Are all control systems operational? | |
| 23. | Is the location of emergency medical aid known? | |

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DATE:____________________ HOT ZONE ENTRY / EXIT LOG ______________ JOB No. ______________

| EMPLOYEE NAME | Level of PPE | Time In | Time Out | Level of PPE | Time In | Time Out | Level of PPE | Time In | Time Out | Level of PPE | Time In | Time Out | Reviewed By |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | |
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Shaw Environmental & Infrastructure, Inc.

# AIR SAMPLING DATA RECORD

## A. EMPLOYEE INFORMATION

| | | | |
|---|---|---|---|
| Type of Sample Personal / Area | | Operation/Task Monitored | |
| Employee Sampled | | Date of Sampling | |
| Job Title | | Project # / Name | |
| SSN | | Location of Air Sampling | |
| Emp # | | Person Performing Sampling/ Employee # | |

## B. SAMPLING DATA

| | | | | | | |
|---|---|---|---|---|---|---|
| Start Calibration (ml/min) | Trial 1 | Trial 2 | Trial 3 | Average | Sample Start Time | |
| End Calibration (ml/min) | Trial 1 | Trial 2 | Trial 3 | Average | Sample End Time | |
| Sample # | | Pump # | | | Sample Duration (min) | |
| Analytes (Contaminants) | Analyte 1 | Analyte 2 | Analyte 3 | | Sample Volume (liters) | |
| Sampling/Analytical Method(s) (NIOSH/OSHA) Collection Media | | | | | Date Sample Shipped to Laboratory | |
| Remarks: Job description; factors affecting sampling efforts, possible interferences, etc: | | | | | | |

## C. PERSONAL PROTECTIVE EQUIPMENT:(☐) check all that apply

| | |
|---|---|
| Eye Protection | ☐ Safety glasses ☐ Goggles ☐ Face shield |
| Respirator | ☐ N/A ☐ ½ face APR ☐ Full-face APR ☐ PAPR ☐ SCBA ☐ Air-Line/egress SAR |
| Gloves/Boots | ☐ N/A ☐ Sample latex ☐ cotton/cloth ☐ Nitrile ☐ PVC ☐ Wizard/cut resist ☐ Leather ☐ other_______________ (Specify) |
| Clothing | ☐ Level D; ☐ Plain Tyvek ☐ Polyethylene-coated Tyvek ☐ Saranex-coated Tyvek ☐ Fully encapsulated (Level A) ☐ Acid gear ☐ Rain suit |
| Other | ☐ Shin/toe guards ☐ Weldshield/apron ☐ Ear plugs ☐ Body harness/line ☐ Warning vest ☐ Hard hat ☐ Steel-toe boots ☐_______________ (Specify) |

## D. WEATHER CONDITIONS

| | |
|---|---|
| Ambient Temperature (°F) | |
| Atmospheric Pressure (in. Hg) | |
| Wind Speed / Direction | |
| Relative Humidity (%) | |
| Precipitation (in.) | |

## E. LABORATORY INFORMATION:

| | | | |
|---|---|---|---|
| Laboratory Used/Address/ Telephone Number | | | |
| Analytical Results ( PPM, mg/m$^3$) | Analyte 1 _______TWA______STEL | Analyte 2 _______TWA______STEL | Analyte 3 _______TWA______STEL |

(1/8/97)

**Shaw**
Shaw Environmental & Infrastructure, Inc.

# REAL TIME AIR MONITORING LOG

Project Name ______________________ Location ____________________ Project No. __________________

| Date | Analyst | Time | Instrument (Mfg/Model/ Serial No.) | Calibration Gas: Compound/ Concentration | Compound Monitored | Concentration (Units) | Location/Activity/Comments |
|---|---|---|---|---|---|---|---|
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Shaw
Shaw Environmental & Infrastructure, Inc.

# REAL TIME AEROSOL MONITORING LOG

Project Name: ______________________________ Project No.: ______________________________

Date _______________

| Sampled By | Instrument Type (Mfg./Model/Serial No.) | Battery Charged (Y/N) | Zeroed (Y/N) | Sample Time | | Sample Readings (mg/m$^3$) | | | Comments |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Start | Finish | TWA | Shift Average | Direct | |
| | | | | | | | | | |
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General Weather Conditions

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Shaw
Shaw Environmental & Infrastructure, Inc.

# COMBUSTIBLE GAS/OXYGEN METER CALIBRATION LOG

Project Name: ______________________ Project No. ______________

Date: __________________ Calibrated by: _____________

Instrument: Manufacturer/Model/Serial Number: ____________________________________

| Time | Battery Charged (Y/N) | Audible Alarm Check (Y/N) | | Zero Checked (Y/N) | | Calibration Standard | Calibration Standard (%) | | Actual Meter Reading (%) | | Ambient Air Re-zero Check | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | LEL | $O_2$ | LEL (0%) | $O_2$ (20.8%) | | LEL | $O_2$ | LEL | $O_2$ | LEL (0%) | $O_2$ (20.8%) |
| | | | | | | | | | | | | |
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Comments ________________________________________________________________

Calibration Q.C.: Calibrations are to be within ±5% for validity.

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Shaw Environmental & Infrastructure, Inc.

# Photoionization Detector
# Calibration Log

Project Name ______________________ Project No. ______________

Date ______________ Calibrated by ______________

Instrument: Mfg/Model/Serial No. ______________________________

| Time | Battery Charged (Y/N) | Calibration Standard | Calibration Standard Concentration (ppm) | Span Setting (if applicable) | Meter Scale Setting (if applicable) | Zeroed (Y/N) | Expecte d Meter Reading (ppm) | Actual Meter Reading (ppm) | Comments |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
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Comments

______________________________________________________________

# *Appendix D*
# *Job Hazard Analyses/Phase Safety Plans/Health & Safety Plan Amendment Documentation*

# *Appendix E*
# *Utility Markout Documentation*

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# UTILITY MARKOUT DOCUMENTATION

Project Name: ______________________________ Location: ______________________

Company Supervisor: ________________________ Date: _________________________

Utility Called:______________________________

Subcontractor: Task/Activity: ____________________________________________________

County of work: ______________________ Municipality of work: _________________

Before work is done on any site, contact the appropriate local utility locating service (Miss Dig, Uloco, etc.) or a local utility contractor to have subgrade utilities marked.

Indicate to the utility locator the nearest intersecting street for the site: .____________________
onfirmation #: .______________________________
List utility firms and the utility they will mark.

| Utility Marker Emergency Telephone Numbers<br>Major Utilities Marked by Color Code | | | |
|---|---|---|---|
| Name of Utility Company | Utility | Color Code | Emergency Phone Number |
| | Water | Blue | |
| | Gas | Yellow | |
| | Electric | Red | |
| | Telephone/Cable/<br>Communication | Orange | |
| | Sewer | Green | |
| List other known utilities in the area that the "One Call" service will not contact: | | | |

| Completed by: | Signature | Date |
|---|---|---|
| | | |

ALL UNDERGROUND UTILITIES MAY NOT BE LOCATED
BY THE LOCAL UTILITY SERVICE

# *Appendix F*
# *Ordnance & Explosives - Site Safety & Health Plan*

### *Ordnance and Explosives Hazards*

This section discusses the hazards associated with the geophysical investigation support activities at Seneca Army Depot and work practices outlined in EP 385-1-95a (USAESCH, 2000) will be followed. Activity hazards analyses detailing hazards associated with OE construction support activities are presented in Table F - 1.

**Ordnance and Explosives.** Ordnance and Explosives are defined as ammunition; ammunition components; chemical or biological warfare materiel; or explosives that have been abandoned, expelled from demolition pits or burning pads, lost, discarded, buried, or fired.

**Unexploded Ordnance.** Unexploded ordnance is defined as military munitions that have been primed, fuzed, armed, or otherwise prepared for action and have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to the operations, installations, personnel, or material, and remain unexploded either by malfunction, design, or any other cause.

### *General Safety Concerns and Procedures*

General safety concerns will be addressed by implementing the following procedures before and during OE operations:

- OE operations will not be conducted until a complete plan for the site is prepared and approved. The plan will limiting exposure such that the minimum number of personnel are exposed for the minimum time, to the least amount of OE consistent with safe and efficient operations.
- Only UXO-qualified personnel will perform OE procedures. Non-UXO personnel may be utilized to perform OE-related procedures when supervised by a UXO Technician III. All personnel will be fully trained and capable of recognizing the specific hazards of the procedures being performed. Training requirements are presented in Section X.X. When non-essential OE personnel enter the exclusion zone, all OE operations will cease.
- Personnel who will be handling OE items will not wear inner or outer garments having static electricity-generating characteristics nor carry fire or spark producing devices into the site.
- Prior to any action being performed on an ordnance item, all fuzing will be positively identified. The identification will consist of fuze type by function, condition (armed or unarmed), and the physical state/condition of the fuze, (i.e., burned, broken, parts exposed/sheared, etc.).

The Most Probable Munition (MPM) for SEAD 46 the MPM is the 3.5 in. Rocket, M28A2; the MPM for SEAD 57 the MPM is the 37 mm MKII projectile. Prior to the initiation of work activities, specific hazards and precautions for these items will be specifically addressed.

The following precautionary measures will be used in the event that hand grenades are encountered:

- Grenades will not be disturbed, other than remotely, until the fuze condition is positively determined.
- No attempt will be made to re-install safety pins on a dud-fired grenade.
- No attempt shall be made to withdraw impinged firing pins from the fuze of a dud-fired grenade.
- Grenades will not be disposed of by functioning them as designed.
-

### *Ordnance and Explosives Safety Precautions*

The following safety precautions will be implemented during OE construction support activities:

- Prior to any action being performed on an ordnance item, every effort will be made to identify the item. Two UXO technicians will positively identify OE items, independently. Under no circumstances will any OE item be moved to make a positive identification. If an unknown OE is found, the USACE OE Safety Specialist will be notified immediately.
- While working on site, all personnel will use the "buddy" system.
- All demolition operations will be in compliance with TM 60A-1-1-31 and applicable/appropriate TM-60 Series publications.
- All operations will be suspended immediately upon approach of an electrical storm.
- All personnel will use appropriate precautions and grounding procedures, recognizing hazards of Electro Magnetic Radiation (EMR) when working with or on electrically initiated or susceptible OE.
- Personnel will avoid inhalation and skin contact with smoke, fumes, dust, and vapors during detonation of OE.
- Personnel will not attempt to extinguish burning explosives or any fire that might involve explosive materials.

- Personnel will incorporate appropriate property and personnel protective measures for shock and fragmentation when conducting OE operations.
- In the event that OE items must be transported off-site, the OE items will be transported in the appropriate container and orientation to provide maximum protection for the personnel operating the vehicle. Personnel will hand-carry no more than two items (one in each hand) at a time, and then only as required by the operation being performed.

### *Training Requirements*

All OE field personnel shall comply with the requirements DID OE-025.01. Non-UXO personnel may be utilized to perform OE-related procedures when supervised by a UXO Technician III. All personnel will be fully trained and capable of recognizing the specific hazards of the procedures being performed.

### *General Training*

The UXOSO will be responsible for informing all personnel performing on-site activities and all visitors of the contents of this SSHP and ensuring that each person signs the SSHP acknowledgment form before entering an EZ. By signing this form, individuals recognize the hazards present on the site and the policies and procedures required to minimize exposure to hazards or adverse effects caused by hazards. Documentation of certification of training requirements and the training acknowledgment form will be reviewed by the UXOSO, provided to the SUXOS, and filed on site. Untrained employees may be restricted from sites where the potential for exposure exists as determined by the UXOSO.

Shaw Environmental, Inc. trains all field personnel according to the requirements in Title 29 CFR 1926.65 or in Title 8 California Code of Regulations (CCR) 5192 before their initial assignment to any project.

Ordnance and Explosives Awareness Training

Ordnance and explosives awareness training is an appropriate safety precaution for all personnel working at Seneca Army Depot. Ordnance and explosives awareness consists of initial and repetitive training in basic UXO characteristics, identification, and reporting procedures.

### *Initial OE Training.*

Initial OE training shall be provided to all field workers prior to engaging in field operations. The intention of the initial OE training is to prepare a previously untrained person to recognize UXO and to properly respond to the discovery of UXO.

Initial training may be given by the most experienced UXO Technician on site. Health and safety personnel should not present the initial training unless they are a qualified UXO Technician, to avoid the possibility of conveying inaccurate information on OE. This training will cover the following topics, at a minimum:

- Ordnance types—Describe the basic characteristics, deployment, and functioning of 3.5 inch rockets and 37 mm projectiles.
- OE and UXO identification—Describe the typical identification features of UXO. This training should be supplemented with photos, diagrams, and inert training aids:
  - What to look for (general shapes, lines that indicate venturi, rotating bands, etc.)
  - Natural camouflage of UXO caused by rust, vegetation, and partial burial
  - Chemical warfare materiel (CWM)
- Procedures to use upon finding a suspected UXO:
  - Do not disturb
  - Mark site with whatever is available (flagging tape, shovel, etc.)
  - Report find to supervisor immediately.

### *Repetitive OE Training.*

In addition to the initial OE training described above, site workers should receive repetitive OE training. Repetitive training is intended to add to the site worker's knowledge of OE hazards and reporting procedures, and to periodically re-emphasize the possibility of encountering hazardous UXO. Repetitive OE training should be given at least once every month by a UXO Technician and can be done during a daily tailgate safety meeting.

A typical repetitive OE training session will last from 5 to 50 minutes depending on the complexity of the topic discussed. Appropriate topics for presentation include the following:

- Review of OE identification
- Review of OE reporting procedures
- Review of OE hazards
- Review of OE accidents that have occurred on other project sites
- New information concerning OE hazards (for example, the discovery of OE in an unexpected location)
- CWM procedures

### ***Supervised Field Experience***

Personnel will receive a minimum of three days actual field experience under the direct supervision of a trained, experienced supervisor. This supervised field experience will be documented.

### Site Control

The UXOSO will designate and coordinate on-site access and security to prevent access to hazardous conditions by unauthorized personnel. Due to the hazardous nature of OE, only UXO-qualified personnel will perform OE procedures. Non-UXO personnel may be utilized to perform OE-related procedures when supervised by a UXO Technician III. All non-UXO personnel will be fully trained and capable of recognizing the specific OE hazards as presented in Section 6.3. When non-essential OE personnel enter the exclusion zone, all OE operations will cease.

An EZ will be established around the perimeter of the work site. The EZ will be large enough to prevent personal injuries from fragmentation as a result of OE operations. The limits of the EZ will be marked with hazard tape or other suitable marking material.

A support zone (SZ) will also be established outside of the EZ where personal decontamination and break areas will be provided. Eating, drinking, and smoking are prohibited except in designated areas.

In the event of an emergency, personnel will exit the site and move to the designated safe area as prescribed in Section X.

### Perimeter Postings

Appropriate warning signs will be posted during OE or construction operations at a given site. The signs will be placed where people enter the EZ. Signs should read:

**DANGER – DO NOT ENTER.**
**UNEXPLODED ORDNANCE AREA.**
**KEEP CLEAR.**

or similar. Signs may be more hazard-specific as necessary. Additional signs may be posted at the perimeter of the site during operations to alert passersby of potential dangers. Depending on the nature and completeness of the remediation/construction, postings may be permanently left in place.

### Communications

Two-way radios will be provided to on-site field personnel during this project. Cellular telephones will also be available.

If ordnance or electro-explosive devices susceptible to electromagnetic radiation devices in the radio frequency range are present, the UXOSO will notify personnel so that preventive steps can be taken.

### *Security Operations*

This section describes the procedures for controlling access by personnel and vehicles into potentially dangerous or hazardous working areas within the site. Site Management may use a combination of security fencing, lighting, and warning signs to control access to each area. Entrance to each area will be restricted to specific points that will be controlled and monitored by project personnel. Only project personnel, subcontractor personnel, and authorized visitors with proper identification will be allowed access to the site. A UXO escort will always accompany non-OE personnel.

The primary mission of security operations is the control of personnel and vehicles entering and leaving the sites.

Security operations will include the following:

- Maintaining a visitor log at the project reception desk and work sites.
- Escorting visitors to the site(s) by project personnel. Visitors will receive an abbreviated site orientation briefing in accordance with this SSHP.
- Contracting with a security service to patrol the sites during off-work hours and weekends, as required.
- Notifying local law enforcement in the event of vandalism, trespassing, or breaking and entering. It is not intended that project personnel assume a confrontational role.
- Locking site facilities containing items of value, or items subject to vandalism, when unoccupied.

A key cabinet will be located at the project offices and will contain master keys (and spares) for on-site locks. A key log identifying personnel and the keys specifically issued will be implemented and maintained. Key control will be the responsibility of the SUXOS and UXOSO.

Attention will be paid to the potential impacts of activities on nearby residences, businesses, and especially schools. To the extent possible, traffic will be routed to avoid schools. As necessary, work may be conducted when schools or other businesses are closed.

# *Appendix F Tables*

**Table F - 1**
**Activity Hazard Analysis for Unexploded Ordnance Operations**

Analyzed By/Date ____________________________ Reviewed By/Date ___________________________

| Principal Steps | Potential Hazards | Recommended Controls |
|---|---|---|
| Transportation of explosive materials | Accidental detonation of explosives | Explosives will be transported in accordance with 49 Code of Federal Regulations (CFR) Parts 100-199. |
| | | Explosives will be transported in closed vehicles whenever possible. |
| | | Observe the U.S. Army Engineering and Support Center, Huntsville, Basic Safety Concepts and Considerations for Ordnance and Explosives Operations. |
| | | When using an open vehicle, explosives will be covered with a flame resistant tarpaulin. |
| | | Motor vehicles will be shut off when loading/unloading explosives. |
| | | Beds of vehicles will have a nonconductive bed liner, dunnage, or sand bags to protect the explosives from contact with the metal bed and fittings. |
| | | Initiating explosives, such as blasting caps, will remain separated at all times. |
| | | Each vehicle used for the transport of ordnance and explosives (OE) will be outfitted with a fire extinguisher and first aid kit. |
| | | Do not fuel trucks when loaded with OE. |
| | Unqualified Drivers | Drivers operating explosive laden vehicles will be licensed in accordance with federal, state, and local regulations. |
| | Vehicle operations | Drivers will observe all posted speed limits while operating a motor vehicle on a public highway. |
| | | Vehicles transporting explosives off road will not exceed 25 MPH. |
| | | Chock wheels when loading or unloading OE-related materials. |
| Clearing and grubbing | Accidental detonation of explosives | Observe CEHNC's Basic Safety Concepts and Considerations for Ordnance and Explosives Operations (Appendix C). |
| | | Personnel involved will attend a site-specific OE/UXO recognition class prior to the commencement of any site activities. |
| | | Be alert and mark all OE located. |
| | | Only clear and grub to within 4 inches of the ground surface. |
| | | UXO trained personnel will escort non-UXO personnel at all times. |
| | | Surface sweeps will be conducted with magnetometers or other suitable geophysical instrumentation to identify potential OE. |
| | Wildlife, slips-trips-falls, chainsaw operations, poisonous plants, use of hand tools. | Refer to Activity Hazard Analysis for Site Preparation located in BENECO's SSHP |

**Table F - 1 (Continued)**
**Activity Hazard Analysis for Unexploded Ordnance Operations**

| Principal Steps | Potential Hazards | Recommended Controls |
|---|---|---|
| UXO Disposal Operations | Accidental detonation of explosives. | Observe UXO safety precautions contained in CEHNC's Basic Safety Concepts and Considerations for Ordnance and Explosives Operations (Appendix C). |
| | | Observe procedures outlined in EODB/TM/TO 60A-1-1-31. |
| OE Related Scrap Demilitarization | Accidental detonation of explosives | Observe UXO safety precautions contained in CEHNC's Basic Safety Concepts and Considerations for Ordnance and Explosives Operations (Appendix C). |
| | | Only UXO Technicians will perform explosive demilitarization of OE-related scrap. |
| | Shredder Operations | Stay clear of moving mechanical parts. |
| | | Ensure only inspected scrap is fed into shredder. |
| Inspection/Certification of OE Related Scrap | Accidental detonation of explosives | Observe UXO safety precautions contained in CEHNC's Basic Safety Concepts and Considerations for Ordnance and Explosives Operations (Appendix C). |
| | | Only UXO Technicians will inspect OE-related scrap. |
| | | Personnel in the immediate vicinity of OE-related scrap inspections will be kept to the minimum necessary for safe operations but no less than two UXO Technicians. |
| | | Observe requirements of DOD 4160.21-M-1. |
| Hand excavation of UXO | Accidental detonation | Observe UXO safety precautions contained in CEHNC's Basic Safety Concepts and Considerations for Ordnance and Explosives Operations (Appendix C). |
| | | Only UXO Technicians will excavate or handle UXO. |
| | | Personnel in the immediate vicinity of UXO operations will be kept to the minimum necessary for safe operations but no less than two UXO Technicians. |
| | | Do not subject UXO to heat, shock, or friction. |
| | | Only hand excavation permitted when within 1 foot of UXO. |
| | | Magnetometers will be used frequently to pinpoint the location of UXOs. |
| | | Establish exclusion zone (EZ); post warning signs, maintain site control. |
| | | Stop all UXO operations when non-UXO trained personnel are within the EZ. |
| Excavation of UXO with earth moving machinery (EMM) (Observation) | Accidental detonation of explosives | Observe UXO safety precautions contained in CEHNC's Basic Safety Concepts and Considerations for Ordnance and Explosives Operations (Appendix C). |
| | | EMM will be used to excavate to no greater than 1-foot of UXO. |

**Table F - 1 (Continued)**
**Activity Hazard Analysis for Unexploded Ordnance Operations**

| Principal Steps | Potential Hazards | Recommended Controls |
|---|---|---|
| Excavation of UXO with earth moving machinery (EMM) (Observation) (continued) | Accidental detonation of explosives (continued) | Hand excavation shall be used within 12 inches of a potential subsurface UXO. |
| | | Only excavation necessary to identify the UXO will be accomplish. |
| | | Spotters will be used at all times during mechanized excavation of UXO. |
| | | Geophysical instrumentation will be used to frequently pinpoint the location of UXOs. |
| | | If more than one EMM is used on the same site, they will be separated by at least 100 meters during excavation. |
| | | Minimize personnel exposure. |
| | | Refer to the Activity Hazard Analysis for Earthwork in BENECO's FWDA SSHP. |
| | Operation of EMM by non-UXO personnel | Operators of EMM will be under the direct supervision of UXO personnel. |
| | Excavation cave-in | Slope and/or shore trenches or holes greater than 4 feet in depth. |
| | | Excavation and trenching shall comply with the provisions of 29 CFR 1926 Subpart P. |
| **Equipment to be Used** | **Inspection Requirements** | **Training Requirements** |
| • Vehicles<br>• Fire extinguishers; first aid kits<br>• Demolition materials<br>• Explosives<br>• Blocking, bracing, and cushioning materials<br>• Manual hand tools<br>• Mechanized equipment (EMM)<br>• Geophysical instrumentation<br>• Personal protective equipment<br>• Communications equipment | • Daily preventive maintenance and operational checks<br>• First aid kits<br>• Calibration of geophysical instrumentation | • 40-hour qualification per 29 CFR 1910.120<br>• 8-hour refresher<br>• UXO personnel EOD trained<br>• Tailgate safety meetings<br>• Site-specific orientation |

Table F - 2
Emergency and First Aid Equipment Requirements

| Emergency Equipment | Number per Location | Location Stored |
|---|---|---|
| First Aid/Burn Kit* | 1 each | Team Support Vehicle |
| Eye Wash | 1 each | All First Aid Kits |
| CPR Pocket Mask | 1 each | All First Aid Kits |
| Disposable Latex Gloves | 5 each | All First Aid Kits |
| Fire Extinguisher (10 BC Rated) | 1 each | Team Support Vehicle |

** First aid kit contents should be consistent with the requirements presented in SOP HS106.*

CHECKED BY _________ APPROVED BY _________

**Table F - 3**
**Ordnance and Explosives/Unexploded Ordnance Notification List**
**U.S. Department of the Army**

| Contact | Phone Number |
|---|---|
| **Corps of Engineers** | |
| 1. | Office:<br>Cell: |
| 2. | Office: |

CHECKED BY _________ APPROVED BY _________

# Appendix E
# Environmental Sampling & Analysis Plan

**Geophysical Investigation**
**Munitions Destruction Areas SEAD's 46 & 57**
**Seneca Army Depot Activity**
**Romulus, New York**

**Contract No. DACA45-98-D-0003**
**Task Order No. 150**

# Appendix E

# SAMPLING AND ANALYSIS PLAN

**NOT APPLICABLE**

**Revision A**

**August 2003**

# Appendix F
# Contractor Forms

**FORM 2-1**
**UXO INFORMATION FORM**

DATE/TIME: ______________________ TRACKING NUMBER: ______________
LOCATION: ____________________________________________________

1. ITEMS REMOVED FROM SITE (YES/NO)

2. WHO REMOVED THE ITEM(S)?
   Name:____________________ Organization: ____________________

3. IF ITEMS WERE REMOVED, WHERE WERE THEY TAKEN? ____________________
   ____________________________________________________________

4. ITEMS DESTROYED ONSITE (YES/NO)

5. WHO DESTROYED ITEM(S)?
   Name: ____________________ Organization: ____________________
   Time of Detonation:______________ UXO Down Time:__________________

6. ORDNANCE ITEMS ENCOUNTERED:

| Type | Quantity | Condition | Disposition |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

7. USACE NOTIFIED AT (TIME): ____________ REP: ________________________

8. IT PERSONNEL NOTIFIED AT (TIME): ________ REP: ________________________

9. COMMENTS (Significant events or findings):
   ________________________________
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________

________________________________ ________________________________
IT UXO Representative (Signature) IT UXO Representative (Print Name)

| CHECKED BY __________ | APPROVED BY ________ |
|---|---|

# Form 2-2
## DGM ANOMALY TRACKING SHEET

**Site:** SEDA
**Area:** ________
**Grid:** ________

*Grid Size:* 125x125 feet
*SW Corner:* ________
*Coordinate System:* NY State Plane, CZ

*Contractor:* Shaw E&I
*Project GP:* ______
*QC GP:* ______

*COE Project Engineer:* ________
*COE Geophysicist:* ________

*Reacquisition Equip. Used:* _______
*Reacquisition Lead:* _______

Shaw E & I, Inc.

| Anomaly Number | DGM SURVEY | | | | REACQUISITION | | | | | | DIG RESULTS | | | | | | | | | | POST-DIG UXO QC | | | POST-DIG DGM QC | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Location (ft) | | Resp. Amp. (mV) | | Location (ft) | | Resp. Amp. (mV) | | Date | Comments | Location (ft) | | | Type Code | Depth (in) | Date | Item Description | Clearance Code | Photo | Cleared (Y/N) | UXO QC Initials | Date | QC Code | GP QC Initials | Date |
| | Easting | Northing | TG3 | Norm | Distance | Direction | TG3 | Norm | | | Easting | Northing | Offset | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | |

Type Code: U (UXO), F (Frag), OS (ordnance related scrap), S (Non-OE scrap), H (Hot rocks, dirt).
Clearance Code: A (Response peak has been removed), B (large item has been removed from hole), C (Source is deeper than 4 feet), D (other-specify).
QC Code: Agreement between DGM results and Dig results: G (Good), F (Fair), U (Unacceptable).

# Form 2-3
# Unexploded Ordnance Report Form

**Report Tracking Number:**

## Discovery and Reporting Time

| **Time of Discovery** | |
|---|---|
| Date | Time |
| | |

| **Time Reported to Base Transition Force** | |
|---|---|
| Date | Time |
| | |

Employee Name:________________________

Reported to FTMC Transitional Force Personnel

Name:________________________________

## Location of Ordnance

Location, Description, and Parcel Number:

| Coordinates of Ordnance: | State Plane Coordinates | |
|---|---|---|
| | Northing | Easting |
| | | |

| Picture Taken of Ordnance | | | |
|---|---|---|---|
| Yes | No | Date | Time |
| | | | |

Written Description and/or Sketch of Ordnance:

## Corrective Action Taken

| Date | |
|---|---|
| | |
| | |
| | |
| | |

## FORM 2-4

## UNEXPLODED ORDNANCE DISPOSAL CHECKLIST

Be sure to equalize electrical potential "Ground" wherever appropriate.

_____ A. Approval of disposal plan from Senior UXO Supervisor, USACE Safety Representative, and Site Authorities.

_____ B. Site is secure. Appropriate EZ per work plan.

_____ C. Ensure the blasting machine is in control of the downrange team.

_____ D. Test the firing cable for continuity and short the wires or clips.

_____ E. Barricade the electric blasting caps (EBCs).

_____ F. Remove the shunt on an EBC.

_____ G. Facing away from the barricade, test the continuity of the EBC with a galvanometer.

_____ H. Replace the shunt or short the EBC.

_____ I. Repeat steps F, G, and H for the second EBC.

_____ J. Recheck the firing cable to ensure the cable is shorted.

_____ K. Make a parallel circuit and connect the leg wires of the EBCs to the firing cable.

_____ L. Connect the EBCs to the main charge. Return to the firing point.

_____ M. Using binoculars, ensure the area is clear and blow the air or vehicle horn three times.

_____ N. Fire the charge.

_____ O. Conduct a destruction site inspection

| CHECKED BY __________ | APPROVED BY _______ |
|---|---|

## Form 2-5

## GENERAL DEMOLITION ELECTRIC MISFIRE CHECKLIST

_____ A. Repeat firing attempts.

_____ B. Check circuit with galvanometer.

_____ C. Switch blasting machines, if possible.

_____ D. Repeat firing attempts.

_____ E. Check circuit with galvanometer.

_____ F. Short firing cable wires.

_____ G. Wait 60 minutes before going downrange.

_____ H. Using new EBCs, countercharge the main charge.

## GENERAL DEMOLITION NON-ELECTRIC MISFIRE CHECKLIST

_____ A. Wait 60 minutes plus time fuze burn time before going downrange.

_____ B. Using new firing train, countercharge the main charge.

| CHECKED BY _________ | APPROVED BY _______ |
|---|---|

# FORM 2-6
# GRID SUMMARY SHEET – Part 1

Page ___ of ____

HAAF Area __________

Sector_________ Grid ID ________

SW Corner Northing ______ Easting ______

Grid Dimensions and Acreage _____________

UXO Team Personnel _____________

Number of Anomalies Detected and Excavated _____________

Number of QA Anomalies Excavated _____________

Total Number of UXO Found _____________

Total Weight of OE Scrap Removed _____________

Total Weight of Non-OE Scrap Removed _____________

Hours Worked Each Day Performing Various Tasks _____________

Signatures

Team Leader _____________

SUXOS _____________

UXOQCS _____________

# Form 3-1

## Explosives Transportation Vehicle Safety Checklist[1]

**This checklist will be satisfactorily completed prior to loading an explosives transportation vehicle. The completed and signed checklist will be kept on the on-site safety files.**

**Senior UXO Supervisor (authorizing transportation of explosives)** ______________________________
**Explosives to be transported:** ______________________________

______________________________

**Check the following items to ensure they are in good working order:**

| Initials | Item |
|---|---|
| 1. | Vehicle body (including non-sparking bed or transportation box) |
| 2. | Tires |
| 3. | Windshield and wipers |
| 4. | Rear view mirrors |
| 5. | Placarding (as required by cargo) |
| 6. | 2 ABC fire extinguishers |
| 7. | Lights (emergency, head, parking, running, interior, backing, turn signals) |
| 8. | Engine (oil, coolant, belts, battery, brake fluid, wiper fluid) |
| 9. | Horn |
| 10. | Fuel |
| 11. | Brakes |
| 12. | Operational radio (successful communication check performed) |
| 13. | Driver know the route to be taken (attach map if required) |
| 14. | Load properly segregated and secured |
| 15. | Permission received from Senior UXO Supervisor to transport explosives |
| 16. | Perform notification of departure |
| 17. | Perform notification on arrival at destination |

**Emergency Phone Numbers:** ______________________________

**Driver** ______________________________ **Safety Observer** ______________________________

[1] This checklist is for on-site explosives transportation only.

## FORM 3-2

## EXPLOSIVES USAGE RECORD

Team Number: ______________________ Date: ______________________

Team Leader: ______________________ Project: ______________________

| **EXPLOSIVES ISSUED** Signature of Team Leader: ______________________ | | | |
|---|---|---|---|
| **Item** | **Quantity** | **Lot Number** | **Checker's Initials** |
| | | | |
| | | | |
| | | | |
| | | | |
| **EXPLOSIVES EXPENDED** Signature of Team Leader: ______________________ | | | |
| **Item** | **Quantity** | **Lot Number** | **Checker's Initials** |
| | | | |
| | | | |
| | | | |
| | | | |
| **EXPLOSIVES RETURNED** Signature of SUXOS: ______________________ | | | |
| **Item** | **Quantity** | **Lot Number** | **Checker's Initials** |
| | | | |
| | | | |
| | | | |
| | | | |

______________________________ ______________________

UXO Supervisor Date

CHECKED BY __________ APPROVED BY __________

# Form 6-1
## Sensor QC Verification Log
## EM-61 MK2 Data

QC Check by: ____________

____________

Date: ____________

SITE SEDA
Area SEAD
Location i.d.: ____________
Survey Date: ____________

### Static Test

Coil #1

| | Pre Survey | | | | Post Survey | | | |
|---|---|---|---|---|---|---|---|---|
| | CH 1 | CH 2 | CH3 | CH4 | CH 1 | CH 2 | CH3 | CH4 |
| File Name | .gdb | | | | .gdb | | | |
| Line #: | | | | | | | | |
| Min: | | | | | | | | |
| Max: | | | | | | | | |
| Mean: | | | | | | | | |
| Std: | | | | | | | | |

Comments: ____________

Coil #2

| | Pre Survey | | | | Post Survey | | | |
|---|---|---|---|---|---|---|---|---|
| | CH 1 | CH 2 | CH3 | CH4 | CH 1 | CH 2 | CH3 | CH4 |
| File Name | .gdb | | | | .gdb | | | |
| Line #: | | | | | | | | |
| Min: | | | | | | | | |
| Max: | | | | | | | | |
| Mean: | | | | | | | | |
| Std: | | | | | | | | |

Comments: ____________

Coil #3

| | Pre Survey | | | | Post Survey | | | |
|---|---|---|---|---|---|---|---|---|
| | CH 1 | CH 2 | CH3 | CH4 | CH 1 | CH 2 | CH3 | CH4 |
| File Name | .gdb | | | | .gdb | | | |
| Line #: | | | | | | | | |
| Min: | | | | | | | | |
| Max: | | | | | | | | |
| Mean: | | | | | | | | |
| Std: | | | | | | | | |

Comments: ____________

# Form 6-1
## Sensor QC Verification Log
## EM-61 MK2 Data

QC Check by: ____________
____________
Date: ____________

SITE SEDA
Area SEAD
Location i.d.: ____________
Survey Date: ____________

### Static SpikeTest

Coil #1

| | Pre Survey | | | | Post Survey | | | |
|---|---|---|---|---|---|---|---|---|
| | CH 1 | CH 2 | CH3 | CH4 | CH 1 | CH 2 | CH3 | CH4 |
| File Name | .gdb | | | | .gdb | | | |
| Line #: | | | | | | | | |
| Min: | | | | | | | | |
| Max: | | | | | | | | |
| Mean: | | | | | | | | |
| Std: | | | | | | | | |

Comments: ____________________

Coil #2 Coil #2

| | Pre Survey | | | | Post Survey | | | |
|---|---|---|---|---|---|---|---|---|
| | CH 1 | CH 2 | CH3 | CH4 | CH 1 | CH 2 | CH3 | CH4 |
| File Name | .gdb | | | | .gdb | | | |
| Line #: | | | | | | | | |
| Min: | | | | | | | | |
| Max: | | | | | | | | |
| Mean: | | | | | | | | |
| Std: | | | | | | | | |

Comments: ____________________

Coil #3 Coil #3

| | Pre Survey | | | | Post Survey | | | |
|---|---|---|---|---|---|---|---|---|
| | CH 1 | CH 2 | CH3 | CH4 | CH 1 | CH 2 | CH3 | CH4 |
| File Name | .gdb | | | | .gdb | | | |
| Line #: | | | | | | | | |
| Min: | | | | | | | | |
| Max: | | | | | | | | |
| Mean: | | | | | | | | |
| Std: | | | | | | | | |

Comments: ____________________

# Form 6-1
## Sensor QC Verification Log
## EM-61 MK2 Data

QC Check by: ____________

Date: ____________

SITE ___SEDA___
Area ___SEAD___
Location i.d.: ____________
Survey Date: ____________

### Cable Shake Test

Coil #1

| | Pre Survey | | | | Post Survey | | | |
|---|---|---|---|---|---|---|---|---|
| | CH 1 | CH 2 | CH3 | CH4 | CH 1 | CH 2 | CH3 | CH4 |
| File Name | .gdb | | | | .gdb | | | |
| Line #: | | | | | | | | |
| Min: | | | | | | | | |
| Max: | | | | | | | | |
| Mean: | | | | | | | | |
| Std: | | | | | | | | |

Comments: ____________________________________________

Coil #2 Coil #2

| | Pre Survey | | | | Post Survey | | | |
|---|---|---|---|---|---|---|---|---|
| | CH 1 | CH 2 | CH3 | CH4 | CH 1 | CH 2 | CH3 | CH4 |
| File Name | .gdb | | | | .gdb | | | |
| Line #: | | | | | | | | |
| Min: | | | | | | | | |
| Max: | | | | | | | | |
| Mean: | | | | | | | | |
| Std: | | | | | | | | |

Comments: ____________________________________________

Coil #3 Coil #3

| | Pre Survey | | | | Post Survey | | | |
|---|---|---|---|---|---|---|---|---|
| | CH 1 | CH 2 | CH3 | CH4 | CH 1 | CH 2 | CH3 | CH4 |
| File Name | .gdb | | | | .gdb | | | |
| Line #: | | | | | | | | |
| Min: | | | | | | | | |
| Max: | | | | | | | | |
| Mean: | | | | | | | | |
| Std: | | | | | | | | |

Comments: ____________________________________________

# FORM 6-2
# NAVIGATION QC FUNCTION LOG

**QC Check**
**by:** ____________
**Date:** ____________

**Project:** SEDA/ODG
**Area.:** SEAD ____
**Location i.d.:** ___________
**Survey Date:** ___________

## 3 pt Bi-Directional Navigation Test

**Comments:**

| | Pre Survey | | Post Survey | |
|---|---|---|---|---|
| | | | | |
| | Latency Correction | Distance Offset (ft) | Latency Correction | Distance Offset (ft) |
| Coil #1 | | | | |
| Coil #2 | | | | |
| Coil #3 | | | | |

## Blind Seeds Detected

**Comments:**

| Seed ID | |
|---|---|
| | |
| **Location** | |
| Easting | |
| Northing | |
| **Seed Description** | |
| Depth (ft) | |
| Orientation | |

| Anomaly ID | |
|---|---|
| | |
| Detected? | |
| **Location** | |
| Easting | |
| Northing | |
| **Dist. & Orient. from Seed** | |
| Dist. (ft) | |
| Orientation | |

## Data Sampling

**Comments:**

| Velocity | |
|---|---|
| Average (mph) | |
| **Along Track / Across Track Sampling** | |
| Along Track (ft) | |
| Across Track (ft) | |
| **Total Area Surveyed (acres)** | |
| This Data Set | |
| Cumulative | |
| **Total Data Gaps (acres)** | |
| This Data Set | |
| Cumulative | |

## Replicate Data

**Comments:**

| | Pre Survey | | Post Survey | |
|---|---|---|---|---|
| | | | | |
| | Anomaly Amplitude mV | Distance Offset (ft) | Anomaly Amplitude mV | Distance Offset (ft) |
| Coil #1 | | | | |
| Coil #2 | | | | |
| Coil #3 | | | | |

**FORM 6-3**
**SURVEY REWORK FORM**
**Seneca Army Depot**

**AREA: SEAD**____________
**DATA SET:**____________
**DATE:**____________

**SITE GEOPHYSICIST**

____________________
Signature Date

| **Tracking** | **Reason For Rework** |
|---|---|
| Survey Crew: | Equipment Failure/Malfunction |
| Survey Instrument: | Data error/Loss |
| Navigation: | Navigation Error |
| Orig. Survey Date: | Survey Error |
| Area to Rework: | Other |

**Comments:**

**Description of Rework Requested**

**Attachment: Data Coverage Map Showing Area For Rework**

# FORM 6-4
# EXAMPLE DIG SHEET

| | |
|---|---|
| **Seneca Army Depot** | **DIG SHEET** |
| **SEAD 46** | **Version 1** |
| **Grid 17** | **Draft** |

| | |
|---|---|
| Grid Size: 125x125 | Survey Date: 6-Feb-03 |
| Hub 4058: N743125.40, E1171300.00 | Survey Type: EM-61 MK2 |
| Hub 4057: N743125.10, E1171425.20 | Geophysicist Approval: 8-Feb-03 |
| Hub 4025: N743000.10, E1171425.12 | QC Approval: 9-Feb-03 |
| Hub 4108: N743000.56, E1171300.15 | USACE QA Approval: 12-Feb-03 |

| Flag | Target ID | Anomaly Peak (mV) | Grid Coordinates X (East) | Grid Coordinates Y (North) | NY State Plane X (Easting) | NY State Plane Y (Northing) |
|---|---|---|---|---|---|---|
| | 1 | 37.50 | 25.00 | 83.33 | 743,125.40 | 1,171,383.33 |
| | 2 | 26.05 | 60.33 | 65.66 | 743,160.73 | 1,171,365.66 |
| QC | 3 | 18.29 | 64.66 | 67.66 | 743,165.06 | 1,171,367.66 |
| | 4 | 17.02 | 27.66 | 95.99 | 743,128.06 | 1,171,395.99 |
| | 5 | 14.81 | 79.99 | 36.00 | 743,180.39 | 1,171,336.00 |
| | 6 | 14.61 | 25.00 | 98.66 | 743,125.40 | 1,171,398.66 |
| | 7 | 10.58 | 57.66 | 1.67 | 743,158.06 | 1,171,301.67 |
| | 8 | 9.00 | 50.00 | 23.00 | 743,150.40 | 1,171,323.00 |
| | 9 | 8.25 | 22.66 | 21.66 | 743,123.06 | 1,171,321.66 |
| | 10 | 7.62 | 84.99 | 16.00 | 743,185.39 | 1,171,316.00 |
| | 11 | 7.54 | 2.67 | 36.66 | 743,103.07 | 1,171,336.66 |
| | 12 | 6.85 | 24.66 | 72.66 | 743,125.06 | 1,171,372.66 |
| | 13 | 6.79 | 25.00 | 24.00 | 743,125.40 | 1,171,324.00 |
| B | 14 | 6.66 | 89.99 | 88.66 | 743,190.39 | 1,171,388.66 |
| | 15 | 5.90 | 87.32 | 18.00 | 743,187.72 | 1,171,318.00 |
| | 16 | 5.24 | 52.33 | 46.33 | 743,152.73 | 1,171,346.33 |
| | 17 | 5.20 | 87.66 | 91.32 | 743,188.06 | 1,171,391.32 |
| IC | 18 | 4.48 | 87.66 | 29.33 | 743,188.06 | 1,171,329.33 |
| | 19 | 4.20 | 47.40 | 20.48 | 743,147.80 | 1,171,320.48 |
| | 20 | 4.00 | 65.33 | 35.33 | 743,165.73 | 1,171,335.33 |
| | 21 | 3.81 | 74.99 | 36.00 | 743,175.39 | 1,171,336.00 |
| | 22 | 3.79 | 50.00 | 50.99 | 743,150.40 | 1,171,350.99 |
| | 23 | 3.77 | 60.33 | 11.67 | 743,160.73 | 1,171,311.67 |
| | 24 | 3.72 | 25.00 | 2.00 | 743,125.40 | 1,171,302.00 |
| | | | CUT LINE | | | |
| | 25 | 3.37 | 99.88 | 95.87 | 743,200.28 | 1,171,395.87 |
| | 26 | 3.03 | 89.99 | 24.66 | 743,190.39 | 1,171,324.66 |
| | 27 | 3.00 | 27.33 | 16.00 | 743,127.73 | 1,171,316.00 |
| | 28 | 2.97 | 94.99 | 97.32 | 743,195.39 | 1,171,397.32 |
| | 29 | 2.92 | 42.66 | 2.33 | 743,143.06 | 1,171,302.33 |
| | 30 | 2.87 | 67.33 | 26.00 | 743,167.73 | 1,171,326.00 |
| | 32 | 2.30 | 80.33 | 15.33 | 743,180.73 | 1,171,315.33 |

FLAG CODES: QC-LOC[illegible] ITEM, [illegible] ITEM, [illegible] SELECTED FOR INTRUSIVE CHARACTERIZATION

**Form 6-5**
**Data Processing Log and QC**

**SurveyDate:** ______________
**Area:** SEAD ____
**Data Set:** ______________
**Sensor:** EM-61MK2

**Approval**

| | Init | Date |
|---|---|---|
| **Shaw GP** | | |
| **Shaw QC** | | |

| | Date Performed | File Names | | Comments |
|---|---|---|---|---|
| Sensor File Review | | Field Data F... | | |
| Navigation File Review | | Field Data Fi... | | |
| QC Data Review | | Field QC Data Files | | |
| Navigation Correction | | Processed X... | | |
| Survey Statistics | | | | |
| Data Leveling | | Processed ... | | |
| Location Plot Review | | | | |
| Gridding | | Grid Files | | |
| Filtering | | Filtered Fi... | | |
| Grid Segregation | | | | |
| Anomaly Detection and Analysis | | Target Dete... List | | |
| Target Analysis | | Dig List | | |

**This data has been reviewed for the following functions:**

**Processing Functions:**

**File Name:** ______________
**Leveling Performed:** ______________
**Latency Correction Performed:** ______________ (... visible chevron effects)
**Audit Log File Name:** ______________
**Anomaly Selection Verified on:** ______________ ... data set

**SNR:**

**Channel Analyzed:** ______________
**Clipping Value:** ______________
**Text Files Attached:** ______________
**Mean / Std.Dev.:**

| | Mean (mV) | Std.Dev. (mV) |
|---|---|---|
| a.m. | | |
| p.m. | | |
| Metric: | </= 3.25 | </= 2.0 |

**Drift:**

**% Lowest:** ______________
**% Highest:** ______________
**Max Value per Block:** ______________

**Verification of Anomalies:**
3 Anomalies < 100 mV: ______________
3 Anomalies > 100 mV: ______________

(Metrics - not altered by 5% / 5mV of) ______________ Anomalies)

**Certification that anomaly selections are reasonable:** Target ID's < 100 = ______________
...get ID's < 100 = ______________

**Comments:** ______________

# FORM 6-6
## CREW DEPLOYMENT LOG
Seneca Army Depot

**DATE:**____________

| CREW | VEHICLE | EQUIPMENT | SURVEY AREA(S) | COMMENTS |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |

| OTHER STAFF | VEHICLE | EQUIPMENT | AREA(S) | COMMENTS |
|---|---|---|---|---|
| | | | | |

Attachments: Site Survey Base Maps

# FORM 6-7
## FIELD ACTIVITY LOG
Seneca Army Depot
PAGE 1 OF __

DATE:______________________
CREW:______________________
INSTRUMENT:________________
AREA:______________________
DATA SET:__________________

**Geophysicist**

______________________________
Signature Date

QC files

| Filename | Description |
|---|---|
| | |

Survey Data and Navigation files

| Filename | Description |
|---|---|
| | |

**FORM 6-7**

# FIELD ACTIVITY LOG

Seneca Army Depot
PAGE __ OF __

DATE:______________________ **Geophysicist:**______________
CREW:______________________ init.
AREA:______________________
DATA SET:__________________

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
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## FORM 6-8
## EXCAVATION LOG SHEET – Part 1

Page ___ of ____
Seneca Army Depot
Area SEAD________ Grid _______ Row_______ Column_______ Random Sequence_______

| Anom No. | Sub Grid | Depth (In.) | Nature (U,F,O) | Type | Fuze | Filler | Status | Offset and Direction | Remarks (item description, weight, etc.) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
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# FORM 6-8
# EXCAVATION LOG SHEET- Part 2

Page ____ of ____
Seneca Army Depot
Area SEAD_______ Grid_______ Row_______ Column_______ Background_________
Survey Instrument ___________ Instrument ID __________ Units _____

| Anom No. | Original Survey | | | Relocation Survey | | | QC Clearance | | | | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | East (ft) | North (ft) | Peak Amp | East (ft) | North (ft) | Peak Amp | Final Amp | Crew Initials | QC Initials | Date | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
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# FORM 6-9
# FALSE NEGATIVE REPORT FORM
Seneca Army Depot

**Area: SEAD**____________
**Grid:**_________________
**Seneca Army Depot**

**Date:**___________________

**SITE GEOPHYSICIST**

_______________ _______
Signature Date

CC: Shaw QC Manager
Shaw Project Manager

**Item type, Location, Depth, Orientation, Weight, Etc.**

**Circumstances of Discovery and Disposition of Item**

**Relevant Site Conditions (Culture, Noise, Geology, Terrain, etc.)**

**Review of Relevant Survey Design, Site Survey and Navigation Data, Data Processing, Anomaly Selection, and Detection Limits**

**Recommendations**

| OMAHA DISTRICT RAPID RESPONSE WEEKLY REPORT | |
|---|---|
| Project Name: | For Week Ending: |
| Project Location: | Report #: |
| Name: | Title: |
| Company Name & Address: | |
| Phone: (    ) | Fax: (    ) |
| Reporting Period: to | |
| Percent Field Work Completed: | |
| Percent Project Completed: | |
| Summary of Work Completed On Site: | |
| Summary of Work Completed Off Site: | |

| OMAHA DISTRICT RAPID RESPONSE WEEKLY REPORT |
| --- |
| Explanation of Deviation From Work Plan (including modifications and schedule slippages): |
| Problems Encountered: |
| Recommendations: |
| Key Personnel Changes: |

| OMAHA DISTRICT RAPID RESPONSE WEEKLY REPORT |
| --- |
| Work Anticipated to be Performed the Following Week: |

| Unit Price Quantities Reached to Date | | | |
| --- | --- | --- | --- |
| **Unit Priced Item** | **Unit** | **Quantity to Date** | **Quantity Anticipated** |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

| Other Remarks: |
| --- |
| Signature: |

| RAPID RESPONSE QUALITY CONTROL DAILY REPORT | | |
|---|---|---|
| Contractor's Name: | | |
| Contract Number: DACA45-98-D-0003, Task Order | | |
| Site Name & Location: | | |
| INSTRUCTIONS<br>The contractor shall submit this form daily at the close of business to the on-site COE representative. Concurrently, the contractor shall provide electronic access to the completed forms to the COE district office and the area office. | | |
| Report #: | Task Order #: | Date: |
| Weather: | Temp. (max. & min.): | Rainfall (in): |
| 1. Work performed today by primary contractor on site and/or off site (include a description): | | |

| RAPID RESPONSE QUALITY CONTROL DAILY REPORT |
|---|
| 2. Work performed by subcontractors on site and/or off site (include a complete description): |
| 3. Complete and attach the daily personnel cost report at the end of this document and label as Appendix 1.<br><br>The daily personnel cost report is required for all cost reimbursable work on site and off site including subcontractors. At a minimum, the cost report shall provide: report title, site name, contractor, contract number, task order number, date, employee name and classification, hourly labor rates (regular, overtime, or other), total hours (regular, overtime, or other), and per diem. Labor costs shall be summed for: each employee, the entire daily report, the entire task order (up to the date of the report), and the percentage of the estimated cost of labor. |
| 4. On-site conditions which resulted in delayed progress: |

| RAPID RESPONSE QUALITY CONTROL DAILY REPORT |
|---|
| 5. Type and results on inspections (indicate whether: P-Preparatory, I-Initial, or F-Final and include satisfactory work completed or deficiencies with action to be taken): |
| 6. List type and location of tests performed and results: |
| 7. List verbal instructions received from government personnel on any deficiencies or retesting required: |

**RAPID RESPONSE QUALITY CONTROL DAILY REPORT**

8. Complete and attach the daily equipment cost report at the end of this document and label as Appendix 2.

   The daily equipment cost report is required for all cost reimbursable work on site and off site including subcontractors. At a minimum, the cost report shall provide: report title, site name, contractor, contract number, task order number, date, equipment type and identification number, hours in service, hours standby, hours idle time, cost rate, and days in service. Equipment costs shall be summed for: each type, the entire daily effort, the entire task order (up to the date of the report), and the percentage of the estimated costs of equipment.

9. List the total number of samples collected and tested for the day:

   Collected: Tested:

   Amplifying Info:

10. List the total quantity of wastewater treated (gal):

11. List the total number of drums overpacked:

| Quantity | Location | Haz-Cat |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |

12. List the total amount of waste(s) removed from the site:

   Liquid (bbl/gal): Solids (yds/tons):

   Amplifying Info:

| RAPID RESPONSE QUALITY CONTROL DAILY REPORT | | | | |
|---|---|---|---|---|
| 13. List the following transportation and/or disposal information: | | | | |
| **Quantity** | **I.D. #** | **Material** | **Manifest #** | **Disposal Location** |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

14. Complete and attach the daily material cost report at the end of this document and label as Appendix 3.

    The daily material cost report is required for all cost reimbursable work on site and off site including subcontractors. At a minimum, the cost report shall provide: report title, site name, contractor, contract number, task order number, date, material purchased, quantity and units, location of material, and vendor. Material costs shall be summed for: each purchase, the entire daily effort, the entire task order (up to the date of the report), and the percentage of the estimated cost of materials.

15. List all safety violations observed and corrective actions taken:

16. List any credits and/or adjustments due to the government (reference invoice number, conversations, etc.):

| RAPID RESPONSE QUALITY CONTROL DAILY REPORT |
|---|
| 17. Complete and attach the Rapid Response Daily Work Order at the end of this document and label as Appendix 4.<br><br>The daily work order is required for all cost reimbursable work on site and/or off site including subcontractors. <u>This document details the contractor's next day work effort which shall have advance approval by the on-site COE representative before the contractor is entitled to cost reimbursement.</u> |
| 18. Additional Comments/Remarks: |
| 19. Certification: I CERTIFY THAT THE ABOVE REPORT IS COMPLETE AND CORRECT AND THAT I, OR MY AUTHORIZED REPRESENTATIVE, HAVE INSPECTED ALL WORK PERFORMED THIS DAY BY THE PRIMARY CONTRACTOR AND EACH SUBCONTRACTOR AND HAVE DETERMINED THAT ALL MATERIALS, EQUIPMENT, AND WORKMANSHIP ARE IN STRICT COMPLIANCE WITH THE PLANS AND SPECIFICATIONS, EXCEPT AS NOTED ABOVE.<br><br>______________________________<br>Contractor's Designated Quality Control Representative |

# INSPECTION PHASE CHECKLIST
# PREPARATORY INSPECTION CHECKLIST

Contract No. ______________________________
Title of Major Phase ___________________________
___________________________

Date Preparatory Held ___________________________
Spec. Section & Paragraph ________________________
Contract Drawings # ____________________________

A. Personnel Present

| Name | Organization |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |

B. Has each Spec. Paragraph, Drawing, and Shop Drawing Detail been studied: Yes ____ No _____

C. Submittals Involved:

_______________________________________________
_______________________________________________
_______________________________________________
_______________________________________________
_______________________________________________
_______________________________________________

C.1 Have All items involved been approved? Yes _____ No _____
If, No List Items:

_______________________________________________
_______________________________________________
_______________________________________________
_______________________________________________

D. Are all materials on hand? Yes _____ No _____

D.1. Have all materials been checked for contract compliance against approved shop drawings? Yes ____ No _____

D.2. Items Not on hand or not in accordance with transmittals:

E. Test required in accordance with Contract Requirements:

F. Accident Prevention and Environmental preplanning - Activity Hazard Analysis and Activity Environmental Analysis (see Attached)

G. Have Procedures for accomplishing the work been Reviewed with appropriate people? Yes ____ No ____

H. Has preliminary work been accomplished in accordance with contract requirements and is this segment of work ready to start? Yes ____ No ____

H.1. Explain any problems:

I. Has Subcontractors submitted:

Insurance Cert? Yes ____ No _____

SF1413? Yes ____ No ____

If over $10.,000.00, has letter been sent to OCC ? Yes ____ No _____

J. Additional Comments/Requests:

# Appendix G
# MSD Calculation Sheets

# Appendix H
# Resumes

# Kent W. Boler

## Professional Qualifications

Mr. Boler is a Senior Geophysicist/Geoscientist with over 12 years of professional experience for Shaw Environmental & Infrastructure, Inc. (Shaw E & I) and its predecessor companies IT Corporation (IT) and ICF Kaiser Engineers conducting geophysical and hydrogeological site investigations - primarily supporting US Army environmental projects. He is the senior geophysicist supporting U.S. Army Corps of Engineers-Baltimore District projects - responsible for designing, conducting, and managing geophysical investigations. He is currently the QA/QC Geophysicist for the Fort Ritchie OE Removal Action – the company's largest UXO project. Mr. Boler has also served as Field Operations Manager or Task Manager for US Army Remedial Investigation and Site Investigations across the country including nine sites (three RODs) at Fort George G. Meade.

## Education

MA, Geology and Geophysics, Rice University, Houston, Texas; 1989
BA, Geology and Computer Science, *magna cum laude*, Duke University, Durham, North Carolina; 1983
***Additional training:***
40-Hour OSHA Health and Safety Training; 1990
8-Hour OSHA Refresher Training; 2002
8-Hour OSHA Site Supervisor Training; 1990
CPR/First Aid, American Red Cross; 2002
USACE Construction Quality Management for Contractors; 1998

## Registrations/Certifications

Professional Geologist: 1994, Tennessee, No. 3662, expires 12/2002

## Experience and Background

***May 2002-Present, Shaw Environmental & Infrastructure, Inc. (Shaw E & I), Knoxville, Tennessee (Please refer to position description below).***

***2002–Present***
***Senior Geophysicist, Shaw Environmental & Infrastructure, Inc. (Science and Technology Group) Edgewood, Maryland***
Mr. Boler is part of the Shaw E & I Science and Technology Group (Geophysics) although he is primarily occupied as the Project Geophysicist for the ongoing Fort Ritchie OE Removal Action and as Field Operations Manager for ongoing environmental investigations and projects at Fort George G. Meade. Mr. Boler also supports analytical software applications for geophysics, mathematical analyses, and CADD/GIS.

***Fort Ritchie OE Removal, Cascade, Maryland.*** Project Geophysicist for $7.2m Non-Time-Critical Removal Action for an initial 200 acres and 38 additional acres of UXO contaminated land at Fort Ritchie – the company's largest OE Removal Action project. Responsible for prove-out testing, survey design, and QA of digital geophysical mapping, reports, and location of buried ordnance. Primary data processing and interpretation tools utilized are Geosoft UX-Detect software. Task Administrator of project website for coordination of digital geophysical survey data, QA/QC review, and clearance results. Project has received multiple commendations from USACE Baltimore District, and continues to track ahead of schedule and under budget.

***RI/FS at Fort George G. Meade, Maryland.*** Field Operations Manager for the $400k Closed Sanitary Landfill groundwater investigation with IT protégé company EM Federal Corp. In conjunction with the development of the facility Site Management Plan, assessed, compiled, and presented to the Fort Meade Environmental Partnership over 150 SWMUs for determination of further action. Actions resulted in the determination of no further action status for over 40 SWMUs.

***1999-2002***
***Senior Scientist – IT Corporation, Edgewood, Maryland***

***Fort Ritchie OE Removal, Cascade, Maryland.*** Project Geophysicist for Non-Time-Critical Removal Action for approximately 200 acres of UXO contaminated land at Fort Ritchie. Responsible for prove-out testing, survey design, and QA of digital geophysical mapping, reports, and location of buried ordnance. Primary data processing and interpretation tools utilized are Geosoft UX-Detect software. Administrator of project website for coordination of digital geophysical survey data, QA/QC review, and clearance results.

***OE and RI/FS at Fort George G. Meade, Maryland.*** Field Operations Manager for BRAC RI/FS investigations the former Ordnance Demolition Area. Responsible for writing CERCLA work plans and reports, managing field teams, and for direction and oversight of subcontractors. Managed the inspection, demilitarization, and certification and disposal of 5 tons of range residue. Other activities included the development of a Site Management Plan and Master Work Plan documents for the non-BRAC portions of the fort. Recognized as part of the project team responsible for Fort Meade winning the 2000 Secretary of the Army's Environmental Award for Environmental Restoration.

***RI/FS of IRP Sites 2, 6, and 46 in Canal Creek - Aberdeen Proving Ground, Maryland.*** Assumed Field Operations Manager position to complete and write an RI for three sites. Sites included a former salvage yard containing a UXO contaminated munitions burn residue disposal area, an inactive Adamsite (DM) production facility, and an inactive railroad yard.

***1990-1999***
***Associate, Scientist III, Scientist IV, and Senior Associate - ICF Kaiser Engineers, Fairfax, Virginia and Edgewood, Maryland***

***RI/FS at Fort George G. Meade, Maryland.*** Field Operations Manager for BRAC RI/FS investigations of four inactive landfills, 9,000 acres of former field training areas, and 2 ancillary sites. Field operations were complicated by extensive UXO removals associated with the Tipton Airfield ordnance removal project. Responsible for writing CERCLA workplans and reports, managing field teams, and for direction and oversight of subcontractors. Project team received a commendation letter from Fort Meade for their role in completing the facility's first ROD (for Tipton Airfield). Three RODs were completed covering six sites. Ongoing activities include development of a Site Management Plan and Master Work Plan documents for the non-BRAC portions of the fort.

***Fort Ritchie EE/CA OE/UXO Sampling, Cascade, Maryland.*** Project Geophysicist for 200+ acre EM-61 survey of Fort Ritchie Cantonment area for statistically based ordnance sampling and characterization. Test pit results and QA program persuaded the client to approve the use of EM-61 for ordnance location saving 50 percent time over traditional mag-and-flag surveys in a highly cultural environment. Responsible for survey design; subcontractor selection; report review; QA of data, reports, and sampling picks; and coordination of geophysical survey results between CEHNC and CENAB. Cited in a CENAB commendation for excellence during the OE EE/CA. Used CEHNC-developed OE-GIS Lite software for geophysical data processing and location of buried ordnance.

***Building 138 UST Site Investigation, Fort Buchanan, Puerto Rico.*** Project Manager for $225K site investigation in Puerto Rico. The scope of work included surface and subsurface soil sampling, collection of Geoprobe groundwater screening samples, on-site immunoassay-based soil and groundwater screening, and the installation, development and sampling of seven permanent wells. Performed the first risk-based site assessment for Fort Buchanan. Characterized the nature and extent of petroleum contamination from former UST locations, then got regulatory approval for no further action based on a demonstration of no future risk. Project used a majority Spanish-speaking workforce.

***Fort Dietrich Area B RI/FS, Frederick, Maryland.*** Previous contractor performed three geophysical surveys and 20 test trenches without locating any disposal sites. Designed and conducted an EM geophysical survey that successfully located and delineated the Area B-11 chemical burial pits.

***RI/FS of Cornhusker Army Ammunition Plant, Grand Island, Nebraska.*** Field Operations Manager for RI/FS investigation. Responsible for direction and oversight of UXO, drilling, and Geoprobe subcontractors and field teams. Fieldwork included UXO clearance surveys, 2 geophysical surveys, a 70-point groundwater screening investigation, 50 monitoring well and miniwell installations, completion of 50 soil borings and 6 test pit excavations, and collection of approximately 60 groundwater and 200 surface soil samples. EM-61 geophysical surveys located former burning pits and waste burial sites. Primary OE issues involved avoidance of XM-41 series non-metallic mini-mines.

· ***RI/FS of Phase II Area, Picatinny Arsenal, New Jersey.*** Task manager for geophysical investigations and site screening of 15 sites using EM, magnetic, and GPR techniques. Tasks included a marine magnetometry survey of Lake Picatinny, utility tracing, tank locations, disposal pit locations, and locating buried building debris. Responsible for scoping and costing tasks, and for subcontractor selection, oversight, and performance.

· ***RI/FS of O-Field Area, Aberdeen Proving Ground, Maryland.*** Led geophysical investigation of chemical munitions disposal areas. Used EM, GPR, and magnetometry techniques to locate and characterize buried ordnance burial structures and burning pits, and to safely focus intrusive activities. The surveys were complicated by significant amounts of metallic debris and by extensive safety restrictions. Designed an Oracle database for managing biologic/ecologic data to support IRP risk assessments at APG.

· ***Geotechnical Investigations, Private Clients, Eastern United States.*** Conducted numerous small geophysical surveys using GPR, magnetic, electrical, and seismic methods. Projects included UST locations; utility and conveyance line tracing; GPR foundation and pavement surveys for void detection; seismic refraction surveys for mapping the bedrock interface; resistivity surveys for determining clay layer extent and thickness; and EM and magnetic surveys for drum and burial pit location.

· ***Archaeological Investigations, Harpers Ferry National Park, Harpers Ferry, West Virginia.*** Used GPR and EM techniques to locate Civil War era ruins buried beneath flood deposits. The surveys located buried foundations, walls, and privies to focus intrusive archeological excavations.

· ***Resistivity Study, Des Moines Landfill, Iowa.*** Project Geophysicist for a resistivity survey to map leachate levels and the variations of resistivity with depth to characterize the nature and extent of landfill leachate.

· ***Metal Plating Facility, Tennessee.*** Project Geophysicist responsible for GPR survey that mapped utilities. Assisted in seismic refraction survey that mapped the bedrock interface and identified a groundwater divide. Supervised natural potential survey that mapped shallow groundwater flowlines to optimize tracer tests.

· ***Site Investigations, Fort Carson, Colorado Springs, Colorado.*** Led geophysical investigation of petroleum product contamination at 18 vehicle maintenance facilities. Conducted EM surveys that, due to highly conductive native soils, were able to directly detect and map subsurface hydrocarbon contamination. Developed innovative filtering algorithms to remove cultural interference from the data.

· ***RI/FS of Milan Army Ammunition Plant, Milan, Tennessee.*** Site geologist responsible for installation of over 30 monitoring wells, 50 soil borings, and 10 directional borings. RI team received a letter of commendation from the facility.

**1983-1989**
***Research Associate, Rice University, Houston, Texas***
Conducted research involving contaminant transport modeling, seismic data processing and interpretation, borehole geophysics, stratigraphic correlation, geologic mapping, structural analysis, and the construction of balanced cross sections.

***Professional Affiliations***

Environmental and Engineering Geophysics Society (EEGS), Founding Member

***Selected Publications***

"Case Study: Use of Varied UXO Detection Approaches at Fort Ritchie to Achieve Maximum Value for Client," to UXO Forum '99, Atlanta, Georgia, May 1999.

"Geophysical QA/QC for a UXO EE/CA, Fort Ritchie Army Garrison, MD" to Symposium on the Application of Geophysics to Environmental and Engineering Problems, Oakland California, March 1999.

***Professional Affiliations***

Environmental and Engineering Geophysical Society, Founding member
Environmental and Engineering Geophysical Society, Founding member

# Thomas P. Mathison

## Professional Qualifications

Mr. Mathison coordinates the overall activities for remediation projects including establishing and maintaining project schedules, budgets, safety requirements, and quality assurance/quality control. He has over 20 years of project management experience in the construction and development industry. Because of his professional achievements, Mr. Mathison has been named an Project Management Associate.

## Education

M.S., Civil Engineering, Carnegie Mellon University, Pittsburgh, Pennsylvania; 1982
B.S., Civil Engineering, West Virginia University, Morgantown, West Virginia; 1981
Additional Training
OSHA 40 Hour Training
OSHA 8 Hour Supervisor Training

## Registrations/Certifications

Underground Utility Contractor License: Florida

## Experience and Background

***2003 – Present***
***Project Manager, Shaw Environmental and Infrastructure, Monroeville, Pennsylvania***
Responsible for the management of environemental remediation projects, including the preparation of cost proposals and work plans, supervision of field personnel, establishing budgets and schedules, and overall coordination of the projects.

***2000 - 2003***
***Senior Project Manager, USFilter Corporation, Warrendale, Pennsylvania***
Responsible for the management of industrial wastewater projects, including oversight of the design engineering, procurement, fabrication, and subcontracting for the projects. Required to establish and maintain budgets and schedules, and to coordinate the overall execution of various projects for the microelectronics and power undustries.

Managed several large equipment supply projects, as well as small pilot projects and lab studies for the treatment of a major microelectronics firm's process wastewater.

Executed a $6 Million raw water treatment system project for a major power plant being constructed in the Midwest. Project was a turnkey project where USFilter was responsible for the design of the system, fabrication of the equipment, and construction of the entire plant. The construction included pile installation, concrete foundations, treatment building construction, tank erection, placement of the equipment, and the required mechanical and electrical construction to provide a complete project.

***1995 - 2000***
***Project Manager, IT Corporation, Pittsburgh, Pennsylvania***
Responsible for the management of remediation projects, including the preparation of cost proposals and work plans, supervision of field personnel, establishing budgets and schedules, and overall coordination of the projects. Many of the projects have been completed in conjunction with Shaw's Rapid Response contract with the U.S. Army Corps of Engineers. Projects completed include:

Managed a $17 Million asbestos removal project for the USACE, involving the excavation of asbestos containing material from over 1300 residences in New Orelans, Louisiana, and restoration of each site.

Managed a $1.2 Million groundwater collection and treatment project at an EPA Superfund site in Upper Black Eddy, PA.

Managed a demolition project consisting of the removal of eleven buildings containg asbestos and other hazardous contaminants located at Langley Air Force Base in Hampton, VA

Managed the preparation of an Engineering Evaluation/Cost Analysis (EE/CA) and delineation sampling effort for a metals impacted area at the former Black Hills Army Depot in South Dakota. Effort was part of overall scope to stabilize and dispose of chromium contaminated soils.

Managed a lead and arsenic contaminated soil removal project in Herriman, Utah. The project involved removing lead contaminated soil from the yards of approximately 70 homes and restoring the properties to their original state.

***1994 -1995***
***President/Project Manager, Redmac Consulting, Inc., Pittsburgh, Pennsylvania***
Created a consulting company which utilized my experience in engineering, sales, and construction management. Provided consulting services for a South Florida client responsible for the construction of the Greg Norman designed golf course, "The Medalist," located in Hobe Sound, Florida, and other golf course and development projects.

***1992 - 1994***
***Project Manager, Environmental Services, IT Corporation, Pittsburgh, Pennsylvania***
Responsible for management of remediation projects, including the preparation of work plans, supervision of work teams, and control of budgets and schedules. Many of the projects have been completed in conjunction with Shaw's Rapid Response contract with the U.S. Army Corps of Engineers. Project experience included:

Managing a fuel recovery and demolition project for Fire Training Facility No. 4 at Andrews Air Force Base in Washington, D.C.

Construction management of a landfill cap project for G. E. Transportation Systems in Erie, Pennsylvania.

Project manager for a drainline installation project at the Rocky Mountain Arsenal in Denver, Colorado. Work was performed utilizing Level B protective clothing due to the possible presence of chemical nerve agents.

Managing a soil excavation and thermal treatment project at Fort Lee, Virginia for the USACE. The project involved the on-site thermal treatment of approximately 3,000 cubic yards of petroleum contaminated soils.

Manager for a project at Fort Eustis, Virginia involving the excavation and removal of jet fuel contaminated soil and the installation of a fuel recovery system. Also includes the disposal of waste oil and associated tanks.

Manager for a project at Fort Story, Virginia involving the removal and disposal of a fire training facility and the insitu treatment of approximately 16,000 cubic yards of petroleum contaminated soils through bioremediation.

Manager for a project for Quaker State Oil Company involving the closure of a fly ash and bauxite fines landfill in Foxburg, Pennsylvania. The project included the grading of the fly ash and bauxite fines to the proper grade, placing a HDPE cover system and placement of two feet of soil over the site. Also included were the associated drainage systems and revegatation required.

Manager of the immediate response project for the USACE involving the remediation of a 7,000 gallon fuel spill in Vernal, Utah. Project includes the installation of monitoring wells, production wells, and the installation of a vacuum enhanced recovery and treatment system.

Manager for a project for Quaker State Corporation in St. Louis, Missouri involving the relocation and onsite storage of radiological contaminated soils and the excavation, transportation, and disposal of approximately 30,000 cubic yards of oil contaminated soil.

***1990 - 1991***
***Project Manager, Pipe Power Utilities, Inc., Riviera Beach, Florida***
Responsible for the daily management and operation of a $6 million per year underground utility contractor. Duties included marketing, contract negotiation, project administration, overseeing bid preparation and purchasing, direct supervision of the accounting department, office personnel, and field crews. Daily functions involved interaction with developers, utility companies, contractors, engineers, and government agencies with regard to contracts, change orders, pay requests, permits and general correspondence in order to ensure proper and efficient project completion. Additional responsibilities included overseeing insurance, workers

compensation matters, payroll, taxes, budget control, and setting future goals and projections for the corporation.

***1983 - 1990***
***Project Engineer, H and T Contractors, Inc., West Palm Beach, Florida.***
Responsible for the project administration of a $15 million per year site development contractor whose projects included major earthwork for subdivisions, golf courses, underground utilities, and road construction. Duties included bid preparation, cost estimates, purchasing, contract negotiations, selection and coordination of sub contractors, preparation of pay requests, and field representations. Interacted with engineers, utility companies, government agencies, and developers in order to ensure proper project coordination and completion

***1983 -***
***Consulting Civil Engineer, Hazen and Sawyer, P.C. Engineers, Hollywood, Florida***
Duties included assisting in the design of water and wastewater treatment plants, sanitary landfills, and deep well injection systems. Prepared project specifications and participated in the field inspection during construction phases of these projects. Collected hazardous sludge pond samples and prepared them for shipment to be tested for compliance with E.P.A. regulations.

***1981 - 1983***
***Research Assistant, Carnegie Mellon University, Pittsburgh, Pennsylvania***
Researched long range transport of trace metals in the atmosphere. Duties included preparation, set up, and collection of ambient air sampling systems in remote areas such as Glacier National Park in Montana and on the ice cap of Greenland. Prepared samples for analysis in a sterilized clean room laboratory and tested for metals using atomic absorption spectrophotometry. The results of the Glacier National Park research were summarized and reported in thesis which partially fulfilled the requirements for the degree of Master of Science.

***Summer 1980***
***Consulting Civil Engineer, Mackin Engineering Company, Pittsburgh, Pennsylvania***
Assisted in the engineering for bridge inspections. Prepared sketches of existing bridges to be used during structural inspections.

# *Tim I. Mathisen*

## *Professional Qualifications*

Mr. Mathisen is a former enlisted and officer military Explosive Ordnance Disposal (EOD) Technician and currently qualified unexploded ordnance (UXO) Technician with over 29 years of EOD/UXO experience. He has served in various military EOD and civilian UXO assignments as detailed below.

## *Education*

U.S Naval School of Explosive Ordnance Disposal, Indian Head, Maryland; 1970
***Additional Training:***
EOD Refresher Courses; 1974, 1977, 1982
EOD Technician, U.S. Navy, Deep Sea Diver, U.S. Navy
40-Hour OSHA Health and Safety Training with Yearly Refreshers
OSHA Health and Safety Supervisor

## *Experience and Background*

***2002 – Present***
***Senior UXO Supervisor/UXO Resource Manager, Shaw Environmental & Infrastructure, Inc., Pittsburgh, Pennsylvania***

***1995 – 2002***
***Senior UXO Supervisor/UXO Resource Manager, IT Corporation (acquired by Shaw in 2002), Pittsburgh, Pennsylvania***
**December 1995 - February 1995: Senior UXO Supervisor/Site Supervisor, IT Corporation, March AFB, California** - 5 man UXO team for the removal of UXO from a landfill and former EOD OB/OD area. Recovered 40 mm practice grenades, CAD's, small arms and jet engine starters. Supervised the inert certification of all ordnance and ordnance related scrap prior to placement in a new consolidated landfill. Ordnance encountered: 40 mm practice grenades, Cad's, jet engine starters, and small arms.

**February 1996 - April 1996:Senior UXO Supervisor/Site Supervisor, IT Corporation, Williams AFB, Arizona** - Responsible for supervision of multiple UXO teams conducting surface clearance of UXO and OE related scrap in preparation for a UXO geophysical survey. Supervised UXO geophysical surveys where geophysical data was collected and post processed to identify anomalies likely to be UXO. Supervised excavation operations, sifting operations, UXO recovery operations, certification of OE scrap as safe for turn in to DRMO for recycling, and site closure. The Williams AFB UXO site was the first BRAC site contaminated with UXO to be released for unrestricted use as certified by the DODESB. Ordnance encountered: Rockets, fuzes, and boosters.

**May 1996 - June 1996: Senior UXO Supervisor/Site Supervisor, IT Corporation, Fort Drum, New York** - Supervised a 5 man UXO team conducting surface clearance of live 40 mm grenades and tank/artillery projectiles on Range 48. Following range clearance operations, supervised the certification of all scrap metal recovered including inert certification of training rounds and target debris. Ordnance encountered: 40 mm grenades, projectiles, and small arms.

**August 1996 - September 1996: Senior UXO Supervisor/Site Supervisor, IT Corporation, Sandia Laboratory, New Mexico** - Responsible for the safe removal of 5 inch Navy projectiles from several mounds of soil used as target sites. Supervised a 3 man UXO team to locate, identify, and remove 50 items that required inert certification prior to contracting the supporting active duty EOD unit. Ordnance encountered: 5 inch projectiles, CAD's, and mortars.
**October 1996 - November 1996: Senior UXO Supervisor/Site Supervisor, IT Corporation, Umatilla Army Depot, Oregon** - Supervised all flaming operations of building materials contaminated with TNT. Also supervised a 3 man team in removing TNT sludge from a concrete sump located next to a TNT manufacturing facility. Designed and constructed a remote initiating system to ignite TNT sludge and set up remote monitoring equipment to observe the disposal process. No UXO encountered.

**November 1996 - December 1996: Senior UXO Supervisor/Site Supervisor, IT Corporation, Fort Drum, New York** - Supervised a 4 man UXO clearance team to locate, identify, and dispose of all UXO encountered in the upper 14 acres of Range 44. Disposed of 30 UXO by detonation. Supervised the inert certification of range debris and ordnance related scrap removed from the range. Ordnance encountered: 40 mm grenades, mortars, projectiles.

**January 1997 - March 1997: Senior UXO Supervisor/Site Health and Safety Officer, IT Corporation, China Lake, California** - Provided UXO avoidance during soil excavation activities and Health and Safety duties for all operations. No UXO encountered.

**June 1997 - August 1997: Senior UXO Supervisor/Site Supervisor, IT Corporation, Fort Drum, New York** - Supervised a 6 man UXO Clearance team to locate and dispose of all UXO on the lower 11 acres of Range 44. Removed over 100,000 practice 40 mm grenades, 3.5 inch rockets, mortars, projectiles, and small arms. Disposed of over 700 UXO by detonation. Ordnance encountered: 40 mm grenades, projectiles, and small arms.

**October 1997 - January 1998: Senior UXO Supervisor/Site Supervisor, IT Corporation, Fort Ord, California** - Assigned to develop and review UXO work plans for future SAC TERC UXO removal operation. No UXO encountered.

**March 1998 - April 1998: Senior UXO Supervisor/Site Supervisor, IT Corporation, Hamilton AFB, California** - Provided UXO safety escort for soil sampling crews in suspected UXO areas and industrial health and safety for all operations. Located and marked two live 40 mm grenades for disposal. Ordnance encountered: 40 mm HE Grenades.

**May 1998 - June 1998: Senior UXO Supervisor/Site Supervisor, IT Corporation, Presido of San Francisco, California** - provided UXO Avoidance support for soil excavation operations. No UXO encountered.

**July 1998 - August 1998: Senior UXO Supervisor/Site Supervisor, IT Corporation, Griffith AFB, New York** - Supervised a 2 man UXO team to locate and remove UXO from soil excavation operations. No UXO encountered.

**October 98 - December 1998: Senior UXO Supervisor/Site Supervisor, IT Corporation, China Lake, California** - Provided and supervised a 2 man UXO clearance team during a geophysical/radiation investigation survey of a former 20 mm DU projectile testing area. No UXO encountered.

**January 1999 - February 1999: Senior UXO Supervisor/Site Supervisor, IT Corporation, Fort Sam Houston, Texas** - Supervised a 3 man UXO clearance team to locate and remove UXO from a former EOD OB/OD area. Ordnance encountered: inert M1 AP mine, and grenades.

**February 1999 - February 1999: Senior UXO Supervisor/Site Supervisor, IT Corporation, Diamond Salvage Yard, Wilmington, Delaware** - Provided emergency response within 24 hours after discovery of suspect UXO during an HTW remediation project excavation. Identified UXO as 20 mm training rounds. Developed addendum's to the Site Specific Work and Heath and Safety Plans for UXO Avoidance. Provided on site UXO support to recover 231 20 mm training rounds which were demilitarized and certified as inert for burial in an approved landfill. Ordnance encountered: 20 mm projectiles.

**June 1999 - June 1999: Senior UXO Supervisor, IT Corporation, Mrytle Beach Air Force Base, South Carolina** - Conducted a UXO surface and subsurface survey of a Firing Buttress prior to soil sampling activities. No ordnance was encountered.

**June 1999 - June 1999: Senior UXO Supervisor, IT Corporation, Redstone Arsenal, AL** - Supervised a four man diving team to collect sediment samples at OU-4 Limestone quarry. No ordnance was encountered.

**June 1999 - June 1999: Senior UXO Supervisor, IT Corporation, Ft. Meade, MD** - Supervised a two man UXO Team to clear well drilling access paths and downhole UXO avoidance for drill rigs and soil sampling activities. Encountered UXO fragments from 155 mm and 105 mm projectiles.

**June 1999 - June 1999: Senior UXO Supervisor, IT Corporation, Ft. Drum, New York** - Supervised a four man team to re-certify approximately 100,000 pieces of UXO scrap metal for re-sale to a local scrap dealer. No live ordnance items were discovered.

**November 1999 - December 1999: Senior UXO Supervisor, IT Corporation, Ft, Drum, New York.**

Supervised a four man team to re-certify UXO scrap for DRMO. Ordnance encountered: 3.5 inch rocket, LAW 72 rockets, and 40 mm practice grenades.

**July 2000 – August 2000: Senior UXO Supervisor, IT Corporation, Sisseton, South Dokota**
Supervised a 6 person excavation crew to locate and dispose of 142 cases of buried dynamite. Excavation of the soil on top and around the buried dynamite was removed by employing a remote control excavator. Dynamite was dispose of by detonation.

**September 2000 – September 2000 Senior UXO Supervisor, IT Corporation, Warren AFB, Cheyenne, Wyoming**
Supervised the explosive demilitarization of hundreds of 3 inch inert filled mortar rounds. Mortars rounds were required to be demilitized prior to the rounds being transported and dispose of in a on base landfill.

**April 2001 – May 2001 Senior UXO Supervisor, IT Corporation, Camp Ridley, Minnesota**
Supervised a 12 man UXO removal crew and a 4 man excavation crew to locate UXO in two separated earth berms and to reduce the height of the berms by spreading the soil over an area of 27 acres. Located and dispose of 5 high explosive filled 90mm projectiles and certfied inert and demilitarized over 1500 projectiles. Reduced the height of two earth berms containing over 130,000 cubic yards of soil.

**February 1999 – Present: UXO Resource/Technical Manager, Senior UXO Supervisor, IT Corporation, Knoxville, Tennessee** - Responsible for coordinating the movement of personnel and equipment to support new and existing projects. This position is responsible for general oversight of the UXO safety program and provides input to the UXO Service Center to assist in identifying the preferred solution(s) for complex UXO Projects. Mr. Mathisen coordinates with Project Managers and Site Supervisory Personnel to ensure that adequate UXO support is provided to meet project objectives. Mr. Mathisen provides input for development of UXO work and safety plans. Mr. Mathisen is responsible for scheduling work and hiring UXO qualified personnel to perform work. Mr. Mathisen also assists the UXO Service Center in the resolution of technical conflicts.

# Robert W. Hickman, Jr.

## Professional Qualifications

Skills in program and project management and other UXO activities, Solid relationships with CEHNC and the UXO industry, Certified to perform Quality functions for UXO operations, Recognized as an Explosive Ordnance Disposal Master Level Technician.

## Education

Masters in Government, Webster College, St. Louis, Missouri
BS in History, University of North Alabama, Florence, Alabama
Certified by the Corps of Engineers in Construction Quality Management

## Experience and Background

***2000-Present***
***Senior Consultant, Shaw Environmental & Infrastructure, Inc., Knoxville, Tennessee***

***1999-2000***
***Independent Consultant***

***1995-1999***
***Program Manager/Quality Assurance Officer, Allied Technology Group***

***1991-1993***
***Commander, US Army Technical Detachment, Indian Head, Maryland***

***1988-1991***
***Ammunition Plans and Policy Officer - US Army Europe, Heidelberg, Germany***

***1985-1988***
***Commander, Explosive Ordnance Disposal Control Team - US Army, Fort Meade, Maryland***

**UXO Commercial Background**
Over 4 years of commercial UXO experience.
Performed all aspects of project development from bid and proposal development to preparation of closure report certification.
Participated in business development and marketing functions with both government and commercial clients.
Supervised field activities for UXO remediation and explosive and radiological materials brokering.
Served as project manager during a diverse range of UXO activities and projects; completed all projects on time and within budget.

Developed corporate level Quality Control and Quality Assurance programs for UXO activities and performed corporate QA audits at project sites.
Supervised OSHA and EPA compliance; monitored operating procedure development to insure compliance.
Presented required 29 CFR 1910.120 training to project personnel.
Used state of the art positioning and detection equipment in conjunction with UXO operations.

**Military EOD Background**
Over 12 years of supervisory EOD experience.
Routinely performed or supervised range or field activities involving UXO materials.
Recognized by the US Air Force as a Master Level Instructor.
Represented the US Army in a joint service effort to develop new technology and methodology to perform land clearance and reclamation operations.
Competitively selected to plan, organize and supervise the performance of all US Army Explosive Ordnance Disposal training including the development of course content and standards.
Managed a construction building program of over $900 million to support warehouse storage, renovation and distribution programs.
Developed and presented disaster preparedness training for federal, state, and local, and military agencies; coordinated activities with all levels of governmental.
Supervises technical and administrative staffs for the performance of hazardous materials operations; responsible for project management and quality programs.
Updated and refined a transportation network routinely moving over 60,000 tons of hazardous cargo each year.
Served as a senior program manager for an ammunition distribution and storage program with an operating budget of over $120 million and employing over 3,000 personnel.
Served as US Army agent to approve EOD policies, procedures, tools and equipment used to support EOD field operations.

**Safety/Quality**
Wrote and implemented numerous health and safety plans for commercial and military hazardous materials and UXO operations.
Certified by the Corps of Engineers in Construction Quality Management (CQM)
Headed two senior level accident investigations of explosive manufacturing accidents for the US Army with damage totaling over $3.5 million.
Administered drug and alcohol monitoring and counseling programs as part of safety and human reliability programs.
Served as Radiological Safety Officer; performed all tasks relating to radiological and dosimetery programs.
Presented required OSHA training to project personnel prior to UXO operations.

# David H. Duncan

## Professional Qualifications

Mr. Duncan is a Master's level Certified Industrial Hygienist and Certified Safety Professional with 13 years experience in the petroleum, combined municipal utility and consulting industries. His experience includes developing and presenting health and safety training, conducting audits, developing health and safety policies, programs and procedures, conducting incident investigations, and conducting or directing industrial hygiene monitoring campaigns.

## Education

Master of Science in Public Health; Emphasis – Industrial Hygiene, The University of Alabama at Birmingham; Birmingham, Alabama; December 1989
Bachelor of Science; Biology; The University of Alabama; Tuscaloosa, Alabama; May 1976
***Additional Training:***
OSHA 29 CFR 1910.120; 40 Hour Hazardous Waste Operations & Emergency Response (HAZWOPER); updated annually
American Red Cross – First Aid, Cardiopulmonary Resuscitation, Preventing Disease Transmission; updated annually
Joyce Institute - Principles and Applications of Ergonomics, 1997
Core Radiological Training - Radiation Worker II, 2000
East Tennessee Technology Park - Park Worker Training, 2000
Department of Energy Portsmouth Facility - General Employee Training, 2000
***Continuing Education:***
Auditing Health & Safety Programs, AIHA, Anaheim, California, 1994
Respirator Cartridge & Filter Testing, AIHA, Anaheim, California, 1994
Facility Spill Prevention & Response, AIHA, Washington, DC, 1995
Leadership Skills for Safety & Health Professionals, AIHA, Dallas, Texas, 1997
Industrial Waste Management for the IH, AIHA, Atlanta, Georgia, 1998
An Introduction to Risk Management Programs, AIHA, Atlanta, Georgia, 1998
AIHA Tennessee Valley Section Fall Industrial Hygiene Conference, Knoxville, Tennessee, 1999, 2000

## Registrations/Certifications

Certified Industrial Hygienist in Comprehensive Practice, 1993, Certificate No. 5919, expires 12/31/2004
Certified Safety Professional in Comprehensive Practice, 1995, Certificate No. 13764, expires 12/31/2005

## *Experience and Background*

***2002 - Present***
***Health and Safety Manager, Shaw Environmental & Infrastructure, Inc., Pittsburgh, Pennsylvania***

***May 2001 - 2002***
***Health and Safety Manager, IT Corporation (acquired by Shaw in 2002), Pittsburgh, Pennsylvania***
Environment, Safety and Health Manager for Portsmouth Quad I Remediation Project at the Portsmouth Uranium Gaseous Diffusion Plant in Piketon, Ohio for Bechtel/Jacobs LLC. Project includes: construction of a barrier wall (using slurry wall methods) and piezometers around the X749 landfill and installation and development of water extraction wells with associated vaults, piping, power and control circuits in the 5-Unit area of the facility. Supervised one Safety Technician with whom monitoring and activity oversight duties were shared to ensure compliance with applicable IT Corporation, OSHA, and job specific ESH policies. Environment, Safety and Health Manager for K1070A Burial Ground Remediation at the East Tennessee Technology Park (former Department of Energy K-25 facility), Oak Ridge, Tennessee performed for Bechtel/Jacobs LLC. Project phase involved geoprobe sampling of soils in trenches of a burial ground containing chemically and radiologically contaminated materials, placement of a geomembrane liner over the site, construction of concrete mixing and decontamination pads, and installation of a gravel access road. Environment, Safety and Health Manager for Tank W-1A Remediation at the Oak Ridge National Laboratory, Oak Ridge, Tennessee performed for Bechtel/Jacobs LLC, and the Department of Energy. Project involved the excavation of Tank W-1A, and packaging for transport chemically and radiologically contaminated soils from the vicinity of Tank W-1A. The project was completed after 40,000+ hours without a recordable incident, resulting in a safety award from Bechtel/Jacobs. Supervised one Safety Technician who conducted monitoring and activity oversight to ensure compliance with applicable IT Corporation, OSHA, and job specific ESH policies. Developed Activity Hazard Analyses as required for changing site conditions.

***October 2000 - May 2001***
***Health and Safety Professional, Pro-2-Serve, Oak Ridge, Tennessee***
As a health and safety professional conducted industrial hygiene monitoring campaigns for commercial clients and performed Health and Safety management for a demolition & decontamination project in a former gaseous diffusion plant equipment maintenance and uranium reprocessing facility at the East Tennessee Technology Park, including performing daily safety briefings, incident investigation and follow up, safety inspections, maintaining training records, performing employee health and safety new hire briefings, presenting training as required, updating MSDS, and preparing safe work permits (similar to Activity Hazard Analyses) for tasks not previously identified.

***April 2000 - October 2000***
***Health and Safety Professional, E I Review Inc, Knoxville, Tennessee***

Developed Department of Energy Chemical Susceptibility presentation, developed Chemical Inventory and Hazard Communication training for a municipal utility, developed "Safety & Health Compliance Roadmap" for municipal utilities for distribution, and was staffed into a position of **Senior Site ES&H Representative** for Portsmouth, Ohio Depleted Uranium Hexafluoride Conversion Facility Site Assessment. On the Portsmouth facility project he monitored daily drilling activities, performed daily safety briefings performed analysis and reporting of an OSHA recordable incident, including lessons learned and recommendations to prevent future occurrence. Developed Activity Hazard Analyses for Depleted UF6 Conversion Facility Site Assessment environmental drilling activities including mobilization, daily activities, and demobilization for rotary drilling rig equipped with hollow stem auger.

***April 2000 - October 2000***
***Independent Health and Safety Consultant, Knoxville, Tennessee***

***Consultant to American BioSystems Inc.*** - Apartment complex bioremediation project, Hampton, VA - Developed duct cleaning methodology to reduce fungal spore concentrations in new duct work, performed bioaerosol sampling, and surface contaminant sampling

***Consultant to PrSM Corp*** - IH Monitoring campaign, including noise, and respirable quartz for manufacturing plant, in Wrens, GA. Report included evaluations of monitoring results as compared to regulatory limits, recommendations to minimize exposure to occupational noise and respirable quartz based on monitoring results.

***June 1999 - March 2000***
***Safety Specialist, Knoxville Utilities Board, Knoxville, Tennessee***
Authored electrocution incident investigation report. Developed Safety Corrective Action Reports procedure and implemented their use. Supervised Safety Technicians and oversaw safety budget. Developed vision and mission statements, and strategic and tactical plan for Safety Section. Developed and presented safety and health training including Tennessee Drugfree Workplace training.

***September 1988 - June 1999***
***Analyst, Equilon Enterprises, LLC, Houston Texas (Joint Venture Shell and Texaco)***
Classified/verified products for DOT Hazmat compliance for new computer system upload and codified procedure to track product, property, environmental losses

***Senior Safety Health and Environmental Coordinator, Texaco, Houston, Texas***
Performed facility self-assessments, OSHA compliance audits and Management Systems Audits of facilities including lubricants plants, refineries, gas plants, bulk terminals, and research laboratories. Developed and presented annual plant Safety training, Oil Spill & DOT training for lubricants plants. Managed Lubricants plant SH&E budget, Radiation licenses, Air permit, Thermal Oxidizer operation. Initiated/facilitated Behavior Based Safety Process in Lubricants Plant. Provided Worker's Compensation case management for plant workforce. Developed policies and procedures including Confined Space Entry, and Control of Hazardous Energy.

Scheduled and performed IH monitoring campaigns for noise, NORM, chemicals, oil mist, dust and asbestos

# Ji Ma

## Professional Qualifications

Mr. Ji MA is a geophysicist with more than 13 years experience in applied geophysics within the teaching and researching environment, and mining exploration and environmental industries. As a Shaw E & I geophysicist he is responsible for developing technical approach, conducting field investigations, data processing and interpretation, as well as report preparation. Mr. Ji MA has managed and conducted geophysical investigations using magnetic, time- and frequency-domain electromagnetic (EM) induction, controlled-source audiofrequency magnetotellurics (CSAMT), magnetotellurics (MT), EM borehole geophysical logging, resistivity, ground penetrating radar (GPR), and seismic techniques. Mr. Ji MA's experience also includes using and interpreting airborne and heli-borne-EM, very low frequency (VLF), high-resolution magnetic, and spectrometer geophysical methods. The projects in which he has been involved include structural, mineral, and petroleum exploration investigations, landfill definition, and locating underground storage tanks (UST), unexploded ordnance (UXO) and buried drums. Mr. Ji MA's client base has been government agencies and public holdings worldwide.

## Education

M.Sc., Geophysics, Ecole Polytechnique, Montreal, Canada, 1994
B.Sc., Physics, Chengdu College of Geology, Chengdu, China, 1982
***Continuing Education***
Certificate, French Language, Sichuan Institute of Foreign Languages, Chonqing, China 1985
OSHA Health and Safety Training: (29 CFR 1910.120), 2000
OSHA Health and Safety Training, Annual Refresher: (29 CFR 1910.120), 2001
OSHA Health and Safety Training, Annual Refresher: (29 CFR 1910.120), 2002
IT Hazardous Waste Supervisor Training, 2002

## Experience and Background

***May 2002-Present, Shaw Environmental & Infrastructure, Inc. (Shaw), Knoxville, Tennessee (Please refer to position description below).***

***2001-2002***
***Geophysicist, Geophysics Group IT Corporation (acquired by Shaw in 2002), Knoxville Tennessee***
Responsibilities include developing technical approach, field investigations, data processing and interpretation, and report preparation.

Lowry, Denver, Colorado. Conducted geophysical investigations to locate UXO. Geophysical survey methods used include magnetic and EM (time domain) with GPS navigation technique.

Sangamon, Illinois. Conducted and interpreted geophysical investigations to locate USTs. Geophysical survey method used is EM (time domain) with remote total station (RTS) navigation technique.

Fort McClellan, Alabama. Conducted and interpreted geophysical investigations to locate waste disposal site consisting of glass debris. Geophysical survey methods used include magnetic, EM (time and frequency domain) and GPR methods.

Fort McClellan, Alabama. Conducted radioactivity investigations to locate radioactive contamination sources. Ludlum Portable Scaler Ratemeter combined with GPS was used.

***2000-2001***
***Geophysicist, Geophysics Group, IT Corporation, Knoxville Tennessee***
Responsibilities include developing technical approach, field investigations, data processing and interpretation, and report preparation.

Fort McClellan, Alabama. Conducted and interpreted geophysical investigations to locate buried drums. Geophysical survey methods used include magnetic, EM (time and frequency domain) and GPR methods.

Fort Gillem, Georgia. Conducted and interpreted geophysical investigations to determine extent of the landfill area at four sites. Geophysical survey methods used include magnetic, EM (time and frequency domain), and GPR.

Scott Air Force Base, Illinois. Conducted and interpreted EM and GPR data to select monitoring well locations and define landfill sites and trenches.

Moody Air Force Base, Georgia. Conducted and interpreted geophysical investigations to determine extent of the landfill area at several locations on the Base. Geophysical survey methods used include magnetic, EM and resistivity.

Sampson State Park, New York. Assisted in data processing, interpretation, and report preparation for geophysical investigation. Geophysical survey methods used include magnetic and EM.

RTP, Durham, North Carolina. Conducted and interpreted geophysical investigations to determine extent of the drain field and associated distribution lines. Geophysical survey methods used include EM and GPR.

Sangamon, Illinois. Conducted and interpreted geophysical investigations to determine extent of the landfill area at three sites. Geophysical survey methods used include magnetic, EM and resistivity.

Ft. Detrick, Maryland. Processed, presented, and interpreted EM, magnetic, spontaneous potential (SP), VLF electromagnetic and seismic data to locate geological contact.

Fort Chaffee, Arkansas. Conducted geophysical investigation using EM and seismic techniques to locate geological faults.

Conducted geophysical survey in Saginaw, Michigan (General Motors Saginaw Metal Casting Operations) using magnetic, EM, and GPR techniques. Assisted in data processing, interpretation, and report preparation. The survey was conducted at an approximately 7.5 acres metal disposal area to screen the site for locating buried metal potentially representing a pit containing multiple buried drums. The investigation was successful in determining several areas of buried drums and metal debris within the area investigated.

Assisted in preparing of Geophysical Survey Report for delineating of gravel bearing zone investigation conducted at Amchitka Island, Alaska. The work was conducted under the contract number DE-AC08-97NV13052 and included EM34 and seismic refraction data processing and preparation of interpretative figures.

Conducted geophysical survey at NAS-Ft. Worth, Texas (formerly Carswell AFB) using time- and frequency-domain EM (EM61 and EM31) and magnetic techniques. Assisted in data processing and interpretation, and report preparation. The survey was conducted at an approximately 1-acre known drum disposal area to screen the site for additional drums and other buried metal debris. The investigation was successful in determining several additional areas of buried debris exist within the area investigated.

Assisted in preparing of Geophysical Survey Report for UST investigation conducted at approximately 65 sites at Hickam AFB, Hawaii. The work was conducted under the AFCEE contract (DO 16) and included EM31, EM61, magnetic, and GPR data evaluation and preparation of interpretative figures.

***1995-1999***
***Project Manager, Geophysicist, Sial Geosciences Inc., Montreal, Canada***
Managed projects, conducted various geophysical surveys: ground surveys (EM, GPR and magnetic), and airborne/heli-borne magnetic, spectrometer, EM and VLF surveys, which covered 150,000 line km. Other duties included: training geophysicists in basic and high level data processing, procedures, and data quality analysis; providing technical support for geophysicists; designing and developing data processing software; interpreting and processing survey data both in the office and in the field.

Project manager, geophysicist, data processing, field quality control. Trained processing team and clients in data processing techniques and geophysics. Field operations; maintained communication with clients. Wrote utility programs for data manipulation; interpreted and processed data both in the field and in the office.

Projects supervisor, geophysicist. Coordinated and trained a team of geophysicists. Wrote data processing manual. Ensured high standards for final map products. Served as liaison with the clients, managed projects and staff, processed and interpreted data.

Geophysicist. Processed high-sensitivity airborne/heli-borne magnetic, electromagnetic, spectrometer, VLF and flightpath data, utilized basic processing procedures as well as sophisticated techniques such as Fast Fourier Transform (FFT) processing, shadow imaging and EM inversions. Provided customers with high quality maps, digital data, and technical support. Projects included mining and petroleum exploration, structural mapping, and environmental applications. The client base was both government and public companies, domestic and foreign.

***1994-1995***
***Project Geophysicist, Quantec Geophysics Inc, Timmens, Canada***
Conducted various ground geophysical surveys (magnetic, time-domain EM, CSAMT, EM borehole logging, and VLF), processed data and prepared the reports.

***1989-1991***
***Lecturer, Hebei College of Geology, Shijiazhuang, China***
Taught Computing Mathematics and Geophysics courses; worked on several research projects (AMT and CSAMT, for development of underground water system conceptual models).

***1986-1988***
***Visiting Scholar, Observatoire Cantonal, Neuchatel, Switzerland***
Geophysical methods research (AMT, CSAMT and MT ); processed data with various modeling and inversion programs.

***1983-1984***
***Assistant Professor, Hebei College of Geology, Shijiazhuang, China***
Tutored students doing geophysical experiments in the laboratory.

**Date:** 06/20/2000
**Author:** Marsha Morozowich
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# Robert W. Mehl

## Professional Qualifications

Mr. Mehl is a geophysicist with more than 6 years experience in performing and planning geophysical field investigations involving ordnance and explosive-related sites, leaking underground storage tanks (LUST), landfill delineation, soil conductivity measurements, and seismic refraction. Mr. Mehl has developed and designed site-specific GIS using Intergraph Modular GIS Environment (MGE) and ArcView GIS, project specific Microsoft Access and Microsoft SQL Server database applications, and custom geophysical data processing software. His work has included geophysical surveys on more than 15 unexploded ordnance (UXO) sites, design of corporate and training internet/intranet web sites, and development of geophysical data management and processing software used to merge multiple channels of geophysical data with navigation data into a deliverable file format for further processing and analysis.

## Education

B.S., Geophysics, University of Connecticut, Storrs, Connecticut; 1998
M.S., Geophysics, University of Connecticut, Storrs, Connecticut; In Progress

***Additional training:***
40-Hour OSHA Health and Safety Training; 1998
8-Hour OSHA Health and Safety Refresher; 2003

## Experience and Background

***2000 - Present***
***Geophysics Group Technology Coordinator, Shaw Environmental, Inc., Middletown, CT***
Develops state-of-the-art geophysical subsurface mapping technologies, including evaluation and integration of field sensor systems, navigation equipment (including Global Positioning Systems and Robotic Total Stations), data reduction and analysis software, geographical information systems, and advanced subsurface mapping capabilities. Performs spatial analyses of analytical data using various geographic information system packages, develops custom ArcView extensions, and designs information management systems to track, manage and report on various types of spatial and non-spatial data. Some key projects include:

- Information Manager for Geophysical Field Activities at Former Lowry Bombing and Gunnery Range, Aurora, Colorado. Project involved using Geometrics 858 Total Field Magnetometers and Geonics EM61 MarkII Metal Detector integrated with GPS to survey the Jeep and Demolition Range for possibly buried chemical warfare training kits. Integrated geophysical data with existing GIS data creating comprehensive maps displaying survey crew progress, geophysical data, potential areas of contamination and potential chemical targets. Managed information from all aspects of geophysical activities. Developed data analysis and management processes to facilitate the discrimination of geophysical targets.

- Software Developer for Brentwood Postal Facility Fumigation, Washington D.C. Develop software to model a potential chlorine dioxide leak based on current meteorological conditions and gas concentration.
- Technical Geophysicist and Information Manager for Geophysical Survey Cyanamid Plant, Florencia Varela, Argentina. Project involved using Geometrics 858 Total Field Magnetometers and the Geonics EM31 Ground Conductivity Meter integrated with a robotic total station to survey two sites for possible individual buried drums and landfill trenches. Supervised field activities, merged and reduced data used to generate daily field maps to delineate areas of potential contamination.
- Technical Geophysicist for ESTCP-sponsored Navigation Technology Research and Development Contract. Developed techniques to integrate robotic total station data with geophysical data as a more accurate alternative to GPS navigation for in-the-tree geophysical surveying applications. Shaw Environmental Subsurface Digital Geophysical Mapping National Practice presented this technology to U.S. Army Corps of Engineers, Huntsville Division as part of a competition with 5 other contractors. Follow on R&D contracts may total $350,000, but the potential for future contracts using this technology can total in the millions of dollars.
- Information Manager for the Army Corps of Engineers Baltimore TERC Task 36, Fort Ritchie Intrusive Investigation, Cascade, Maryland. Designed a Geographic Information System (GIS) to track the daily flow of information from 5 field teams supporting geophysical and UXO intrusive operations. The system incorporates palm technology, Microsoft Access and ArcView GIS to collect, manage, report, and display spatial data. Thematic maps generated by the GIS visually display the status of each work area, UXO items discovered, exclusion zones for intrusive operations, and utility, road and building locations.
- Information Specialist for Nicor Gas Residential Mercury Vapor Testing Project, in the Greater Chicago, Illinois area. Designed a Microsoft Access database to track the working status, location, reliability, and chain of custody of 5 different types of instruments used to test for the presence of mercury vapor. Database provided as a central repository for equipment functional test results and generated reports, which aided equipment maintenance personnel.
- Project Geophysicist for many Army Corps of Engineers Unexploded Ordnance jobs including Tulalip Tribes, WA.; Redstone Arsenal, AL.; Sangamon Ammunition Depot, IL; Picatinny Arsenal, NJ; Crow Landing Testing Facility, CA; Dona Ana Range, Fort Bliss, NM. Performed and managed geophysical field activities, reduced navigation integrated geophysical sensor data, aided in final reporting.

***1998 -2000***
***Geophysicist, Sanford Cohen & Associates, Lowell, Massachusetts***
Led geophysical fieldwork, project planning, logistics, crew coordination, sensor deployment, equipment troubleshooting, data processing, client interfacing, and reporting. Conducted data reductions and analysis steps including data interpretation using GIS techniques. Constructed