

# FINAL WORK PLAN FOR MUNITIONS RESPONSE MODIFIED REMOVAL ACTION AND CONSTRUCTION SUPPORT CONGAREE RIVER PROJECT

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## ACRONYMS

°	Degrees
°C	Degrees Centigrade
°F	Degrees Fahrenheit
ACGIH	American Conference of Governmental Industrial Hygienists
ANSI	American National Standards Institute
APEX	Apex Companies, LLC
APP	Accident Prevention Plan
AR	Army Regulation
ATF	Alcohol Tobacco and Firearms
BATF	Bureau of Alcohol Tobacco and Firearms
BIP	blown in place
bpm	beats per minute
CAR	Corrective Action Request
CFR	Code of Federal Regulations
CHEMTREC	Chemical Transportation Emergency Center
COR	Contracting Officer's Representative
CPR	Cardio-Pulmonary Resuscitation
CPFF	Cost Plus Fixed Fee
CQDM	Quality Control Data Management
CRP	Congaree River Project
CRZ	Contamination Reduction Zone
CSHP	Corporate Safety and Health Plan
CWM	Chemical Warfare Material
DESC	Dominion Energy South Carolina
DGM	Digital Geophysical Mapping
DID	Data Item Description
DDESB	Department of Defense Explosive Safety Board
DMM	Discarded Military Munition
DoD	Department of Defense
DOP	Dive Operations Plan
DOT	Department of Transportation
DQO	Data Quality Objective
DS	Dive Supervisor
EE/CA	Engineering Evaluation/Cost Assessment
EED	Electro-Explosive Device
EM	Engineer Manual
EMR	Electro-Magnetic Radiation
EMT	Emergency Medical Technician
EOD	Explosive Ordnance Disposal
EP	Engineer Pamphlet
EPA	Environmental Protection Agency
ERCP	Emergency Response Contingency Plan
ESP	Explosives Safety Plan

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EZ	Exclusion Zone
FAR	Federal Acquisition Regulation
FCA	Function Check Area
FFP	Firm Fixed Price
FUP	Fixed Unit Price
GCS	geographic coordinate system
GFE	Government Furnished Equipment
GIS	Geospatial Information System
GPS	Global Positioning System
HAZMAT	Hazardous Material
HAZWOPER	Hazardous Waste Operations and Emergency Response
HE	High Explosive
HEPA	High Efficiency Particulate Air
HF	High Frequency
HPS	Hantavirus Pulmonary Syndrome
HTRW	Hazardous, Toxic, or Radiological Waste
IAW	In Accordance With
ID	Identification
ISOs	Industry Standard Objects
lbs	Pounds
MD	Munitions Debris
MDAS	Material Documented As Safe
MEC	Munitions and Explosives of Concern
MF	Modulated Frequency
MGFD	Munition with the Greatest Fragmentation Distance
MGP	Manufactured Gas Plant
MHZ	Megahertz
MM	Millimeter
MPPEH	Material Potentially Presenting Explosive Hazard
MR	Munitions Response
MRA	Modified Removal Action
MRS	Munitions Response Site
MSD	Minimum Separation distance
N/A	not applicable
NAD 83	North American Datum of 1983
NEW	Net Explosive Weight
OE	Ordnance and Explosives
OESS	Ordnance and Explosives Safety Specialist (USACE)
OJT	On the Job Training
OSHA	Occupational Safety and Health Administration
PDS	Personnel Decontamination Station
PEL	Permissible Exposure Limit
PM	Project Manager
POL	petroleum, oil, and lubricants
PPE	Personal Protective Equipment
PR	Pulse Rate
PWS	Performance Work Statement

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QA	Quality Assurance
QC	Quality Control
QCI	Quality Control Inspection
QCIR	Quality Control Inspection Record
QCS	Quality Control Specialist
Q-D	Quantity-Distance
RCWM	Recovered Chemical Warfare Material
RDX	Cyclotrimethylenetrinitramine
RF	Radio Frequency
RFD	Remote Firing Device
RI	Remedial Investigation
RMSF	Rocky Mountain Spotted Fever
RRD	Range Related Debris
SCDHEC	South Carolina Department of Health and Environmental Control
SCE&G	South Carolina Electric & Gas Company
SDS	Material Safety Data Sheets
SE QCI	Search Effectiveness Quality Control Inspection
SF	Square Feet
SLED	State Law Enforcement Division
SOP	Standard Operating Procedure
SOW	Scope of Work
SSFR	Site Specific Final Report
STD	Standard
SUXOS	Senior Unexploded Ordnance Supervisor
SZ	Support Zone
TECH	Technician
TEU	Technical Escort Unit
TBD	To Be Determined
TITAN	Titan Associates Group, Inc
TLM	Tar Like Material
TM	Technical Manual
T&M	Time and Materials
TNT	Tri-Nitro Toluene
TP	Technical Publication
TLV	Threshold Limit Value
Tetra Tech	Tetra Tech Inc.
U.S.	United States
UHF	Ultra High Frequency
USACE	United States Army Corps of Engineers
USAESCH	U. S. Army Engineering and Support Center- Huntsville
UTM	Universal Transverse Mercator
UXO	Unexploded Ordnance
UXOQCS	Unexploded Ordnance Quality Control Specialist
UXOSO	Unexploded Ordnance Safety Officer
UXOSO/QCS	Unexploded Ordnance Safety Officer and Quality Control Specialist (Dual Hat Position)
VCC	Voluntary Clean Up Contract



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VHF	Very High Frequency
WBGT	Wet Bulb Globe Temperature
WP	Work Plan

## 1. CHAPTER 1 – INTRODUCTION

### 1.1. General Background Information

Apex Companies, LLC (APEX) contracted Titan Associates Group, Inc (TITAN) to perform Work Plan updates for clearance of Munitions and Explosives of Concern (MEC) to include Unexploded Ordnance (UXO) personnel in support of contaminated soil and sediment removal on the Congaree River Project (CRP), located in Columbia, South Carolina (SC) for Dominion Energy South Carolina (DESC), formerly South Carolina Electric and Gas Company (SCE&G). Since the project plans were finalized, TITAN is no longer providing MEC support services, and Tetra Tech Inc. (Tetra Tech) has been contracted to take over the UXO support for the project. Revision 2 contains the revisions required to address SCDHEC comments and for Tetra Tech to perform the UXO field support. These changes include adding Tetra Tech’s SOPs, processes, and staffing changes as well as changes to the designated project team and stakeholders since Revision 1 was finalized. For the CRP and these support plans, the acronyms; MEC, UXO, Discarded Military Munition (DMM), and Material Potentially Presenting an Explosive Hazard (MPPEH) will be frequently utilized. UXO and DMM are subcategories of MEC. UXO are munitions that have been fired and failed to function. They are considered to be in the most hazardous condition and must be considered armed and live until fully inspected and assessed. DMM are munitions that have been abandoned or lost and are no longer in the inventory or control of the Department of Defense (DoD). Although DMM can be full up service rounds capable of functioning, they are not armed or fired and are therefore normally in a less hazardous condition than UXO. MPPEH are any munitions-related material (ordnance shipping containers, weapons components) that may contain explosives or explosive residue that may present an explosive hazard. The use of MEC/MPPEH is the accepted acronym to describe all potential explosive hazards that may be encountered.

During the stakeholders meeting held at South Carolina Department of Health and Environmental Control (SCDHEC)’s office on November 15th, 2018, a consensus agreement was reached between stakeholders on a Modified Removal Action (MRA) that altered the original scope of the full-scale effort. The Stakeholder-developed MRA has been developed to reduce the footprints of the required removal areas and cofferdam structures and thereby reducing the adverse effects on the river from the structures and subsequently the amount of sediment to be removed. This updated work plan provides the technical approach, rationale, and field procedures to be followed in order to achieve the objectives of removal of MEC/MPPEH from the cofferdam footprints and sediments within the modified project site. This work plan was prepared in accordance with (IAW) the APEX / TITAN Master Subcontracting Services Agreement 87520200902, dated September 11, 2020.

The purpose of the Stakeholder-developed MRA (and Construction Support of the CRP) is to remove MEC/MPPEH in order to reduce explosive hazards from any Civil War era military munitions reportedly, co-located within the coal tar contaminated soil and sediment removal areas being excavated by DESC’s contractors. This work plan covers the cofferdam footprints and sediment Removal Action and Construction Support. The removal activities will be completed IAW the approved Explosives Safety Plan (ESP).

### 1.2. Site Location

The CRP area is located on the Congaree River in Columbia, SC. The site, also referred to as the “project area”, begins directly south of the Gervais Street Bridge, extends approximately 200 feet into

the river from the eastern shoreline and approximately 1,500 feet downriver, towards the Blossom Street Bridge. The MEC/MPPEH intrusive activities will occur on the eastern side of Congaree River between Gervais and Blossom Street Bridges, within the two cofferdam footprints and removal areas shown on the figures in Appendix B.

### 1.3. Site History

In 1865, during the Civil War, DMM [i.e. cannonballs] and other articles of war produced by the Confederacy were dumped into the Congaree River near the Gervais Street Bridge by Union forces under the direction of General Sherman. This activity took place during Sherman's occupation of Columbia. The Union Army kept some of these items for its own use, and the remainder was destroyed. One of the methods was dumping the items into the river.

Archeological investigations, conducted as late as 1980, recovered some DMM from the area as well as some other potentially historically significant artifacts. Specifically, this work was focused in and adjacent to the unnamed tributary that enters the river just south of the Gervais Street Bridge. Several cannonballs were identified during this operation and properly disposed of by trained explosive ordnance disposal (EOD) personnel located at nearby Fort Jackson.

Due to the potential presence of MEC/MPPEH within the project area, an additional reconnaissance and screening of the area in question were conducted as part of the investigative activities. An acoustic (side-scan sonar) and magnetic (magnetometer) remote sensing survey was performed to identify ordnance and other submerged cultural resources in the remediation area by Tidewater Atlantic Research, Inc., and a report was submitted on 8 February 2012. Analysis of the survey data identified concentrations of anomalies in the immediate vicinity of the Senate Street landing and scatters extending into the river. A terrestrial magnetometer investigation of the unnamed tributary below the Gervais Street Bridge was also carried out, and that investigation identified eight additional anomalies with a potential association with ordnance.

In June 2010, the occurrence of a tar-like material (TLM) within the Congaree River was reported to the SCDHEC. Preliminary testing indicated that the material may be attributable to the Huger Street former Manufactured Gas Plant (MGP) that was operated by predecessor companies of DESC beginning in the early 1900s and ending in the 1950s.

Preliminary sample results conducted on the material by SCDHEC indicated that the TLM had similar chemical and physical characteristics as coal tar. The coal tar material was a waste product from coal-gas production. DESC had previously entered into a Voluntary Cleanup Contract (VCC) with SCDHEC in August 2002 to conduct environmental assessment and cleanup activities at the former Huger Street MGP site. The VCC was later extended to include the TLM impacts within the Congaree River.

In the fall of 2015, a Field Demonstration Project was conducted in which multiple attempts were made to complete a UXO investigation on the alluvial fan, normally dry land adjacent to the river. Repeated rain events that resulted in historic flooding of the Congaree River necessitated curtailment of the MEC/MPPEH investigation efforts. Although approximately 180 anomalies were investigated, including previously identified anomalies and mag-and-dig efforts, no MEC were found.

### 1.4. Topography

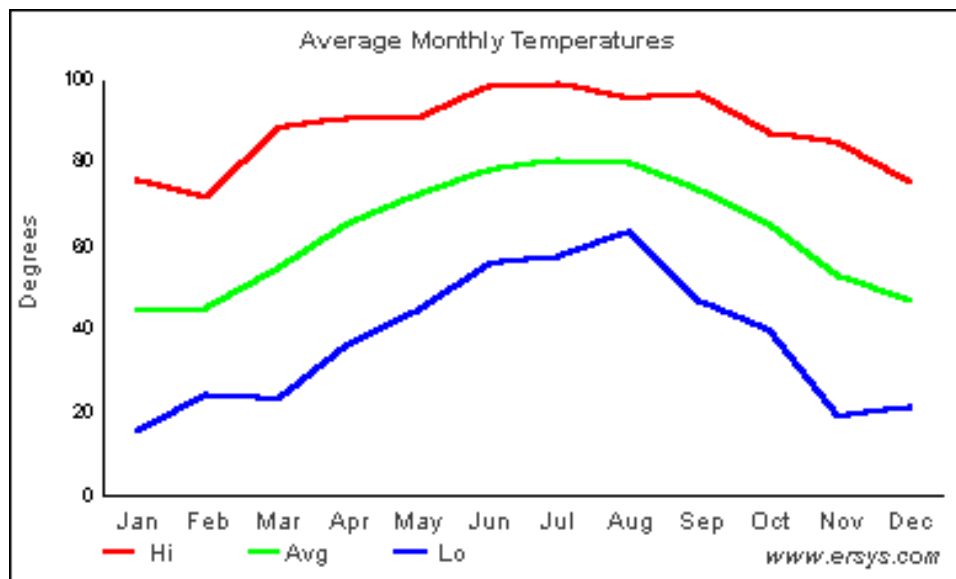
The predominant topographic feature within the project area is the Congaree River itself, which is a broad shallow river with numerous bedrock assemblages that are visible above the water level at normal river flows. The river slope in the vicinity of the project area is approximately 2.10 feet/mile (United States Army Corps of Engineers [USACE], 1977). The river depth varies significantly in the project area due to the variability of the bedrock river bottom elevations. These bottom elevations fluctuate from an approximate high of 116 feet to approximately 105 feet. All elevations are referenced to the North American Vertical Datum of 1988. The average river flow elevation is approximately 116 feet with an extreme variance of approximately 110 to 152 feet in elevation

The project area abuts the eastern shoreline, which rises sharply from the water’s edge in most places due to a steep bank that varies in height from approximately 5 to 20 feet depending on location. The ground slopes more gently to the east once the top of the riverbank is reached, with an approximate 28 feet increase in land surface elevation over approximately 500 feet. Gist Street is the first paved land surface encountered to the east of the project area. The riverbank is forested in this area with vegetative cover consisting of various trees and tall native grasses and shrubs. The undergrowth is periodically maintained and trimmed in the vicinity of the wooden scenic overlook and river walkway and is much thicker and overgrown further south.

Access to the river is provided by a partially paved private access road, which extends from the intersection of Senate and Gist Streets to the river. The Senate Street alluvial fan, a key land feature in this area, is located at the end of the access road. The alluvial fan is a relatively flat portion of the project area that extends out into the river and appears to have developed over time.

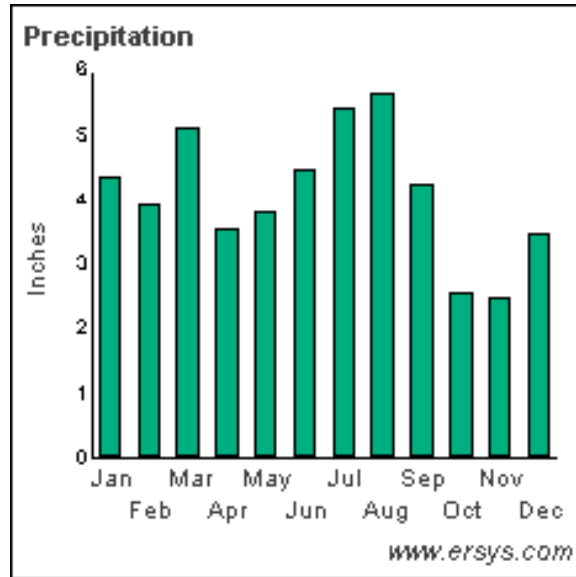
### 1.5. Climate

The climate in the vicinity of the project site is characterized on the following charts presented below the Figure 1-Average Monthly Temperatures, Figure 2-Average Monthly Precipitation, Figure 3-Monthly Inclement Weather Percentage, and Figure 4-Average Wind Speed.

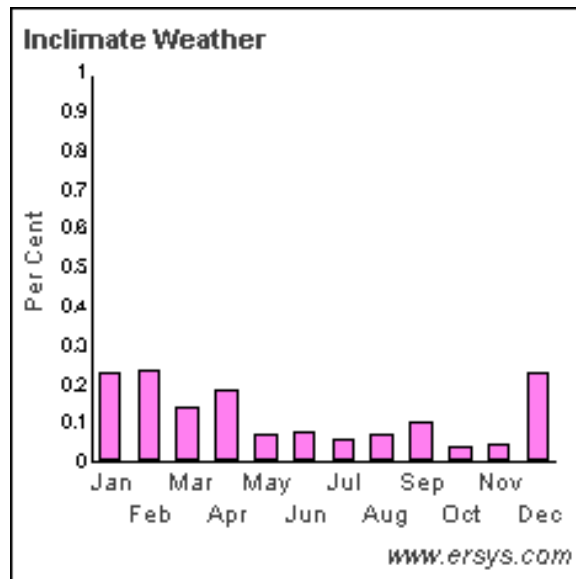


**Figure 1 Average Monthly Temperatures**

The two charts below show information relevant to precipitation. The first chart shows the typical precipitation for the month indicated. The second chart shows the percentage of the month that inclement weather (rain, snow, etc.) occurs. The two charts give the reader a better understanding of precipitation in the area.



**Figure 2 Average Monthly Precipitation**



**Figure 3 Monthly Inclement Weather Percentage**

The chart below illustrates typical wind speeds for the Columbia, SC area.

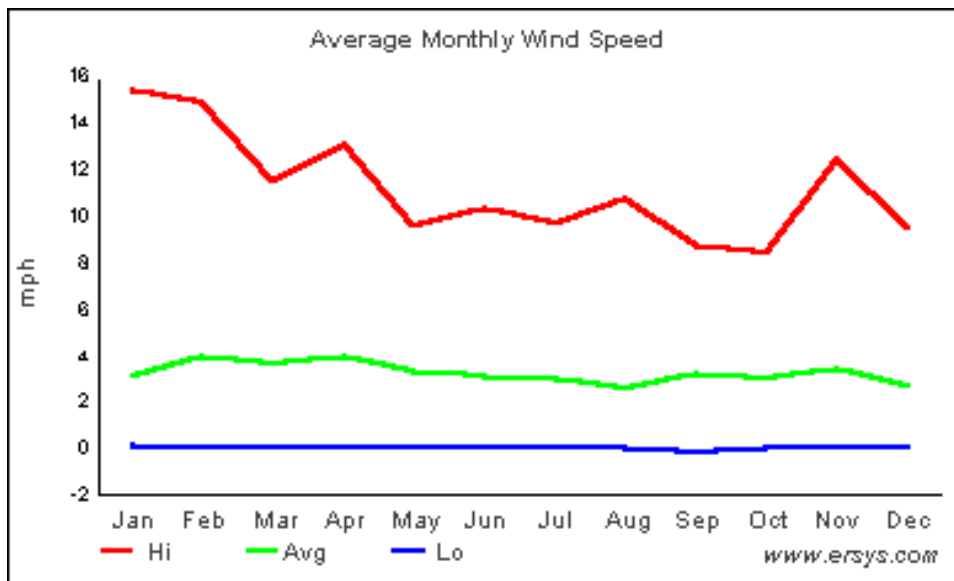


Figure 4 Average Monthly Wind Speed

## 1.6. Discovery of Recovered Chemical Warfare Material (RCWM)

The Congaree River Project site is not suspected of containing Recovered Chemical Warfare Material (RCWM). If, however, during planned MEC/MPPEH removal operations, if the UXO contractor identifies or suspects RCWM, all personnel will immediately withdraw upwind from the work area and contact the on-site DESC representative, who in turn will report the RCWM to the Chemical Warfare Design Center who will coordinate the emergency response with local agencies and the DoD. The UXO contractor will secure the area and provide two personnel located upwind of the suspect RCWM to secure the site until relieved by the DoD emergency response personnel.

If suspect RCWM is encountered, the following procedures will be followed:

- All work will immediately cease;
- Project personnel will withdraw along cleared paths upwind from the discovery;
- A team consisting of a minimum of two UXO contractor personnel will secure the area to prevent unauthorized access;
- The supervisors will position personnel as far upwind as possible while still maintaining the security of the area; and
- The DESC representative will immediately be notified, who will coordinate the emergency response with local agencies and the DoD.

## 1.7. Procedures for Change in Site Conditions

Unforeseen circumstances, such as severe weather events, may create a change in site conditions that could affect the performance of this project. Regardless of the reason for the change in site conditions, the UXO contractor will immediately notify the DESC on-site representative of the condition change and the action taken.

## 2. CHAPTER 2 – TECHNICAL MANAGEMENT PLAN

### 2.1. Objectives

The UXO contractor's objective in this task order is to prepare plans to provide all munitions response services necessary to support operations conducted by DESC to excavate sediment material within the stakeholder-developed removal areas that may be collocated with munitions that may have been discarded and dumped in the river during the American Civil War. The UXO contractor will perform operations as necessary to detect and remove suspected DMM or MEC/MPPEH from two separate areas where sediment and TLM will be excavated and removed.

The UXO contractor will also provide standby construction support during cofferdam construction, dewatering operations, sediment removal activities IAW EP 75-1-2. The UXO contractor will be prepared to mobilize additional personnel if required to dispose of MEC/MPPEH during the construction support phase of the project.

### 2.2. Organization

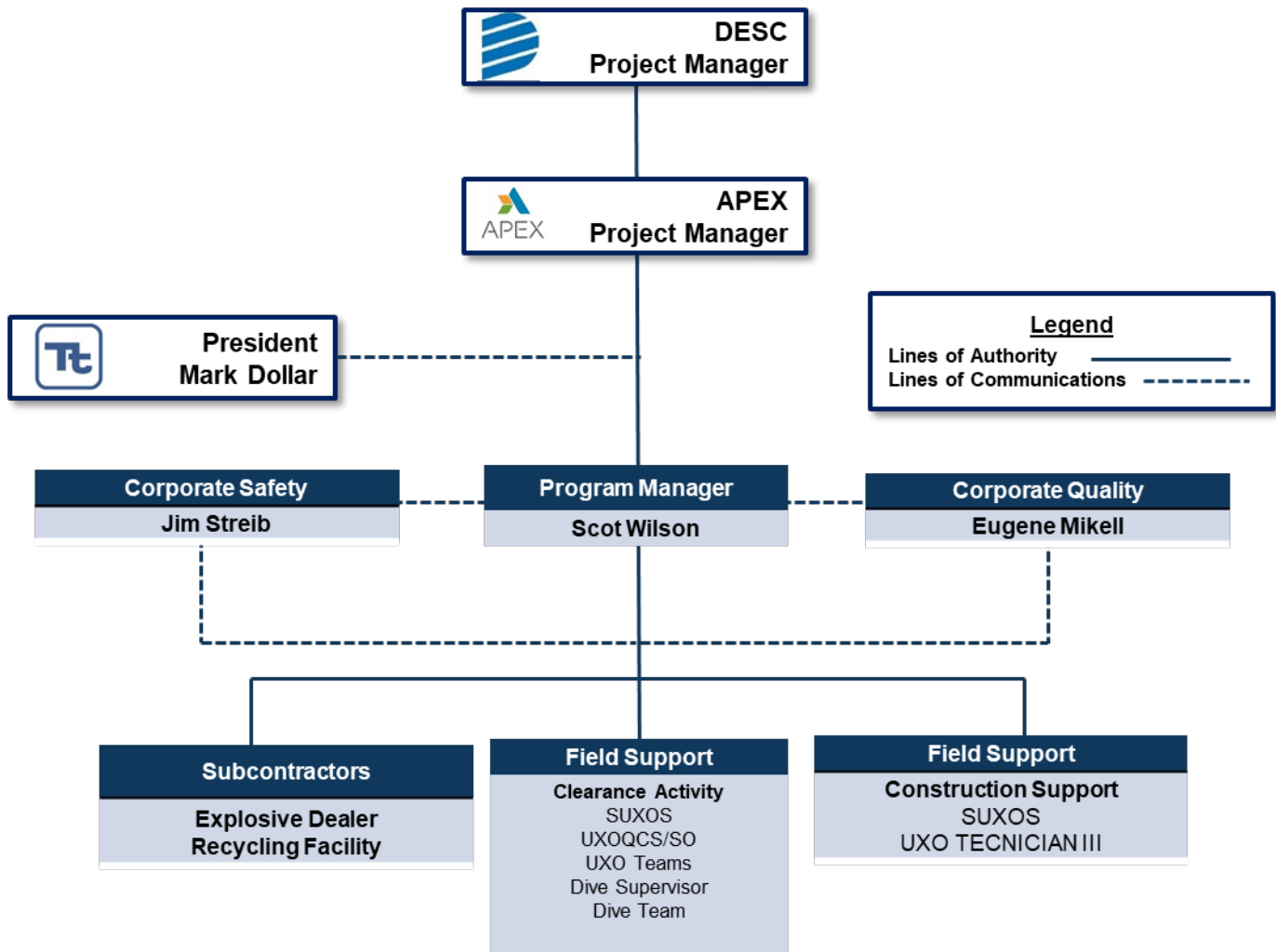
Tetra Tech's project organization is designed to effectively control the munitions investigation, removal, and MEC/MPPEH disposition portion of the MRA. Tetra Tech's Project Manager (PM), Mr. Scot Wilson PMP will be the primary point of contact with the DESC representative, and will have overall responsibility for ensuring that work is completed IAW the Work Plan. He will prepare submittals and reports IAW the Performance Work Statement (PWS). The project organization is presented on Figure 5-Organization Diagram.

The Senior UXO Supervisor/Dive Supervisor (SUXOS/DS) Mr. Don Schwalback will be the primary point of contact in the field. He will plan and supervise work completed on the site and ensure compliance with the Work Plan and other applicable requirements. He will directly coordinate with local officials, and stakeholders as necessary to minimize conflicts with scheduled activities. He will prepare and submit daily reports through the Tetra Tech PM.

The UXO Safety Officer (UXOSO) and the UXO Quality Control Specialist (UXOQCS) will be on-site when work is performed. For this project, the UXOSO and UXOQCS functions will be combined and performed by one dual-hatted person (UXOSO/QCS). That person will be responsible to ensure that work is completed safely and to standard IAW but not limited to USACE and DoD guidance (EM 385-1-97, DoD 6055.9 and Std TM 60A 1-1-31) as well as other guidance as directed throughout this Work Plan. UXOSO/QCS will evaluate work daily and report any safety or quality concern to the SUXOS, PM and / or Corporate Safety Manager. The UXOSO/QCS will work closely with the DESC on-site Safety Representative to immediately address any issues or concerns and will always have a direct line of communication with the Tetra Tech Corporate Safety Manager.

All UXO Technicians and team members will meet or exceed the requirements in Department of Defense Explosive Safety Board (DDESB) Technical Publication (TP) 18 for the positions they hold. The organizational chart below shows the key project positions and personnel and the relationships between them and other team members. The SUXOS/DS, in coordination with the PM, may adjust the project organization and reallocate resource as required to most effectively complete the entire scope of the project. Tetra Tech acknowledges that key members of the overall project team have not yet been

determined (e.g. the remediation/excavation contractor). In addition to the DESC PM, and subject to coordination with any other DESC contractor, Tetra Tech proposes the following:



**Figure 5 Organization Diagram**

Tetra Tech intends to perform this MRA with up to two UXO teams and one dive team. A Team Leader will be responsible for a team of two or more personnel depending on assigned tasks and project needs. During removal operations the standard teams will consist of a UXO Tech III and up to 6 UXO Tech II/I. Team size may be reduced, at the discretion of the SUXOS. The SUXOS will make team assignments daily according to the specific needs of the project. Resumes of key personnel are included in Appendix H of this Work Plan.

### 2.3. Personnel

Personnel and Qualifications - Personnel required for this project will include UXO supervisors and technicians, all of whom possess the relevant personal training and experience requirements set forth in DDESB TP 18. Personnel for this project have been selected from a pool of available UXO technicians. The following paragraphs describe the specific responsibilities of UXO personnel assigned to the project team.



### 2.3.1 Project Manager

The PM is responsible for communicating with the DESC representative. He will execute all directions received from the DESC representative, managing all aspects of the project, overseeing the overall performance of all individuals on the project team, coordinating all contract and subcontract work, and resolving project problems. The PM is also responsible for controlling cost and schedule milestones. The PM will also coordinate the preparation of the Work Plan and the implementation of on-site field activities.

The PM will interface directly with subcontractors to keep them advised of the PWS, schedule, and budgets. The PM is also responsible for ensuring that the subcontractor costs are maintained within budget and that schedule commitments are achieved.

The PM performs overall project management and is responsible for the following:

- Preparing and submitting purchase orders;
- Approving and forwarding accounts payable;
- Approving Daily Activity Report;
- Procuring necessary equipment and supplies;
- Reviewing and approving Time Sheets, Expense Reports, and Travel Order Request;
- Submitting Equipment Expense Report; and
- Supervising the Project SUXOS/DS and, UXOSO/QCS.
- Prepare and conduct coordination meetings

### 2.3.2 Senior UXO Supervisor/Dive Supervisor (SUXOS/DS)

The SUXOS has a minimum of more than 10 years of military/civilian EOD/UXO experience. The SUXOS/DS will manage all on-site field activities. The SUXOS/DS will keep the PM informed of activities requiring his notification. The SUXOS/DS is responsible for all daily work activities. He will brief the PM daily on all project activities to include production, quality of work, safety, equipment status and personnel status. The SUXOS/DS will directly coordinate any evacuation requirements with the DESC representative. The responsibilities of the SUXOS/DS include:

- Identification of personnel and equipment requirements;
- Supervision of all daily field team activities;
- Early detection and identification of potential problem areas and institution of corrective measures;
- Assisting with the preparation of all project reports;
- Preparation of a daily report, which will include man-hours expended, areas cleared, explosives expended, and any other information required by the PM;
- Providing on-the-job training for selected UXO Supervisor(s) who may be called upon to temporarily perform SUXOS/DS duties during his absence from the site;
- Supervision of UXO Technicians; and
- Scheduling and executing a daily safety meeting, scheduling and coordinating subcontractor field team activities, and oversight of all field activities.
- Making acceptable to move determinations for recovered MEC along with the UXOSO/QCS
- Performing MPPEH inspections and Material Documented As Safe (MDAS) certifications along with the UXOSO/QCS.
- The safe conduct of all diving and small boat operations.

- Inventory and security of all explosives and recovered MEC/MPPEH on site.

### 2.3.3 UXO Safety Officer (UXOSO)

The UXOSO has a minimum of more than eight years of military/civilian EOD/UXO experience. He is responsible for implementing all site Accident Prevention Plan (APP) (Appendix D) requirements, on-site training requirements, and recommending changes to the level of personal protection equipment (PPE) to the SUXOS as site conditions warrant. He has Stop Work Authority for safety conditions. He will report all safety work stoppages immediately to the Tetra Tech PM and DESC Safety Specialist. The UXOSO evaluates and analyzes any potential safety problems, implements safety related corrective actions, and maintains a Daily Safety Log. The UXOSO reports to the Tetra Tech Safety Director. The UXOSO will:

- Perform on-the-job training for selected UXO Technicians who may be called upon to temporarily perform the duties of UXOSO during his absence from the site, upon approval of the DESC Safety Specialist; and
- Maintain daily liaison with the DESC Safety Specialist.

### 2.3.4 UXO Quality Control Specialist (UXOQCS)

The UXOQCS has a minimum of more than eight years of military/civilian EOD/UXO experience. The UXOQCS reports to the Tetra Tech Quality Manager. The UXOQCS will perform quality inspections/review all project operations, including explosives inventories, daily reports, timesheets, and other documentation, and will inspect and approve each completed area prior to turnover to the DESC representative.

For this project, the UXOSO and UXOQCS functions will be combined and performed by one dual-hatted person (UXOSO/QCS).

### 2.3.5 UXO Technician III

This individual, who supervises a project team, will have experience in MEC removal operations and supervising personnel, and shall have at least a minimum of eight years combined active duty military EOD and contractor UXO experience. This individual must be able to fully perform all functions enumerated for UXO Tech I and II. Specific duties of the UXO Tech IIIs include:

- Reconnaissance and classification of MEC;
- Identifying fuzes and determining fuze conditions of all munitions, including United States (U.S.) and foreign
  - Guided missiles,
  - Bombs and bomb fuzes,
  - Projectiles and projectile fuzes,
  - Grenades and grenade fuzes,
  - Rockets and rocket fuzes,
  - Land mines and associated components,
  - Pyrotechnic items,
  - Military explosives and demolition materials,
  - Submunitions;
- Supervising the conduct of all on-site activities directly related to MEC operations;

- Supervising the location of subsurface MEC using military and/or civilian magnetometers and related equipment;
- Supervises
  - Excavation and recovery of subsurface MEC by manual means or mechanical
  - Construction of MEC-related protective works,
  - Location of surface MEC by visual means,
  - Transporting and storing MEC assuring compliance with Federal, state, and local laws,
  - Disposal of MEC by detonation,
  - Preparation of a MEC disposal site,
  - Preparation of an on-site safe holding area for MEC,
  - Donning and doffing of personal protective equipment,
  - Operation of a personnel decontamination station,
  - Maintenance and operator checks on all team equipment,
  - Segregation of Munitions Debris (MD) and Range Related Debris (RRD) from clutter,
  - Safe handling procedures,
  - Team preventive medicine and field sanitation procedures;
  
- Determine MEC-related storage compatibility;
- Preparing explosives storage plans IAW all applicable guidance;
- Supervise;
- Preparing required administrative reports;
- Preparing SOPs for on-site MEC operations;
- Conducting daily site safety briefings; and
- Perform Risk hazard analysis.

### 2.3.6 UXO Technician II

This individual will be able to fully perform all functions enumerated for UXO Tech I. In addition, the ability to perform the following functions is a requirement of the UXO Tech II:

- Identifying fuzes and determining fuze condition of all U.S. and foreign munitions, including:
  - Guided missiles,
  - Bombs and bomb fuzes,
  - Projectiles and projectile fuzes,
  - Grenades and grenades fuzes,
  - Rockets and rocket fuzes,
  - Land mines and associated components,
  - Pyrotechnics,
  - Military explosives and demolition materials, and
  - Submunitions;
- Locate subsurface MEC using military and/or civilian magnetometers and related equipment;
- Perform excavation procedures on buried MEC by
  - Manual means, and
  - Mechanical means;
- Perform operator maintenance of military and/or civilian magnetometers;
- Locate surface MEC using visual means;

- Operate motor vehicle transporting MEC material, when appropriate;
- Preparing an on-site holding area for MEC material;
- Perform storage of MEC material and demolition materials IAW applicable guidance;
- Prepare an MEC disposal site;
- Prepare
  - Non-electric firing system for an MEC disposal operation,
  - Electric firing system for an MEC disposal operation,
  - Detonating cord firing system;
  - Dispose of MEC/MPPEH by Detonation;
- Operate a personnel decontamination station;
- Don and doff appropriate personal protective equipment in contaminated areas;
- Construct MEC-related protective works;
- Determining a magnetic azimuth using current navigational/locating equipment; and
- Performing field expedient identification procedures to identify explosives contaminated soil.

### 2.3.7 UXO Technician I

The UXO Tech I's specific duties (under the supervision of a UXO Tech III or a UXO-qualified individual of higher rank than the UXO Tech III) for this project will include:

- Conducting classification of MEC materials;
- Identifying all munitions including
  - Bombs and bomb fuzes,
  - Guided missiles,
  - Projectiles and projectiles fuzes,
  - Rockets and rocket fuzes,
  - Land mines and associated components,
  - Pyrotechnics items,
  - Military explosives and demolition materials,
  - Grenades and grenade fuzes,
  - Submunitions;
- Locating subsurface MEC using military and/or civilian magnetometers and related equipment;
- Performing excavation procedures on subsurface MEC by;
  - Manual means,
  - Mechanical means;
- Locate surface MEC using visual means;
- Transporting and storing MEC and demolition materials;
- Preparing firing systems, both electric and non-electric, for destruction operations disposing of ammunition/ explosives by detonation;
- Operating Personnel Decontamination Stations;
- Donning and doffing personnel protective equipment in contaminated areas;
- Erection of MEC related protective works;
- Assist in performing operator maintenance of military and/or civilian magnetometers and related equipment;
- Operate motor vehicle transporting MEC material, when appropriate; and
- Prepare an MEC disposal site.

## **2.4. Communication and Reporting**

The Tetra Tech PM and SUXOS/DS are primarily responsible for the management of work, data, and cost. The PM will develop the initial schedule. The SUXOS/DS will maintain the schedule and adjust as required throughout the project. The SUXOS/DS will coordinate closely with the DESC representative and local officials to minimize conflicts with other planned activities. He may adjust work hours / days or the order that work is completed in order to minimize conflicts and maximize productivity. The PM will provide updated schedules throughout the project, as required.

The SUXOS/DS will submit data to the PM daily, as required. Data will include a daily report that will describe the activities completed and issues that arose during the workday. The PM will post the daily reports on the project collaboration website, along with photographs and other data relating to the project. The website will incorporate Geospatial Information System (GIS) to better display the data and project status.

The PM will control cost by completing the project on or ahead of schedule and negotiating with vendors to ensure the best prices for equipment and material.

Work will be completed IAW the requirements of the contract. Quality Management and Quality Control requirements described in Chapter 4 will be applied to all phases of the project.

## **2.5. Deliverables**

In addition to the Periodic Reporting requirements discussed in Section 2.7, Tetra Tech will prepare a Site Specific Final Report (SSFR).

## **2.6. Schedule**

Tetra Tech has prepared a Project Schedule that will be updated as necessary throughout the project. The initial schedule is based on the currently defined tasks, and other tasks will be scheduled as they are defined. Tetra Tech will follow the same scheduled work hours as the remediation contractor but anticipates working five, 10- hour days per week. The schedule is generally Monday through Friday. The schedule working days may be adjusted to better suit project needs, depending on weather and river conditions encountered. The SUXOS/DS will coordinate with the PM prior to adjusting workdays and working hours. A record of expenditures will be maintained by the project cost engineer

No single workday during MEC screening and removal operations will exceed ten (10) hours. During construction support, Tetra Tech UXO technicians will be available on site when intrusive operations are conducted.

## **2.7. Periodic Reporting**

The SUXOS/DS will prepare and submit daily reports to the Tetra Tech PM. The PM will provide weekly updates to DESC project management unless events require more frequent reporting.

## **2.8. Costing and Billing**

The PM and SUXOS/DS will control and manage costs by adhering to the project schedule and scope, documenting and tracking expenditures, and effective change management. A record of

expenditures will be maintained by the project cost engineer and monitored by the PM.

## **2.9. Public Relations Support**

The UXO contractor personnel will refer all requests for information concerning site conditions to the DESC representative.

## **2.10. Subcontractor Management Procedures**

### **2.10.1 Identification of Subcontractors and Suppliers**

Tetra Tech anticipates utilizing a subcontracted South Carolina-licensed professional land surveyor or surveyor subcontracted to others to provide survey and mapping support for the project. Also, suppliers or vendors may deliver equipment and materials to the project site. All subcontractor personnel will be trained to the approved Work Plan and the included APP. All visitors, including suppliers supporting the project, will receive a safety brief from the UXOSO/QCS prior to entering any area where work is ongoing. They will sign in and will be escorted as required to perform their functions on the site. Only essential personnel will be allowed in the Exclusion Zone (EZ) while intrusive operations are ongoing.

### **2.10.2 Means for Controlling and Coordinating Subcontractors / Suppliers**

All subcontracted personnel working on the site will receive the same thorough site-specific training provided to all UXO contractor site personnel. This training will include detailed training on procedures in the Work Plan and APP. All suppliers making deliveries to the project site will receive a safety briefing, which will include recognition and awareness of potential site hazards. Suppliers will not be permitted to enter the EZ of the project site unless escorted by a Tetra Tech UXO-qualified employee. Non-essential persons, including suppliers, will not be allowed in any active EZ.

### **2.10.3 Safety Responsibilities of Subcontractors / Suppliers**

All subcontractor personnel and suppliers making deliveries to the project site will receive a safety briefing. They are responsible for following all site safety and health procedures. They will not enter any EZ area without a UXO-qualified escort. Non-essential persons, including suppliers, will not be allowed in any active EZ. They will wear all required PPE while on the site in areas where it is required. They will report any accidents of their personnel to the SUXOS or UXOSO for investigation.

## **2.11. Field Operation Management Procedures**

Tetra Tech's PM has overall responsibility for the management of the project. He will coordinate directly with the DESC representative and subcontractors on project-related issues, such as schedule, submittals/reports, etc. The PM reports directly to the Tetra Tech Operating Unit President. The PM frequently communicates with the SUXOS/DS and UXOSO/QCS. The SUXOS will coordinate all field activities. He will coordinate with the on-site DESC representatives and local officials. He will prepare and submit daily project status reports to the PM. Project-related reports, documents, and information will be placed on a secure project collaboration website to allow team members easy access to up-to-date project status information.

## **2.12. Technical Procedures to Execute Project Tasks**

Detailed procedures for the execution of project tasks are contained in Chapter 3.

### 2.13. Data Management

A detailed accounting of all MEC/MPPEH items encountered during the investigation/removal activities will be maintained. As MEC/MPPEH is located, it will be documented on the MEC Accountability Log (Appendix F). A detailed accounting of all suspected MPPEH / MEC items encountered during the removal action will be maintained. This accounting will include:

- Identification Number (a unique ID #);
- Location;
- Nomenclature;
- Fuse Description;
- Fuse Condition; and
- Additional comments, if required.

Each suspect MEC encountered will be identified using a unique numerical identifier, such as A-3-0001 (for the first suspect item [0001] encountered in the Removal Grid A-3).

The Team Leader will provide validated data to the SUXOS at the close of each working day.

The SUXOS will:

- Collect and review the raw field data for accuracy.
- Provide the verified data to the project server for posting to Tetra Tech's project SharePoint website for use in the final report.
- For documentation purposes, photographs will be taken of encountered MEC. If MEC is determined to be acceptable to move, multiple items may be included in the same photograph. The photograph will be taken to show detail and will be annotated with the location or area discovered.
- Photographic records will be used to supplement information recorded as needed.

### 2.14. Data Quality Objectives (DQOs)

Data Quality Objectives (DQOs) are qualitative and quantitative statements developed, usually in the Technical Planning Process, to clarify study objectives, define the type of data needed, and specify the tolerable levels of potential decision errors. A DQO is used as the basis for establishing the type, quality, and quantity of data needed to support the decisions that will be made. For this project, quality objectives are discussed in Chapter 4. Specific quality objectives for GIS are discussed in Section 3.6 of this WP. In order to safely conduct sediment and TLM removal, a MEC clearance of the potentially co-located MEC/MPPEH is to be performed prior to cofferdam installations and excavations. A list of the type of MEC/MPPEH believed to be present is presented in Section 3.2 but consists of civil war era cannonballs (6 pounds [lbs] and 10-inch cannonballs). While a cannonball of unknown size and depth was reported in the past, the depth of MEC is unknown. Anomalies will be manually investigated and resolved to the depth of detection or to bedrock, whichever is encountered first since the sediment thickness varies from no sediment (exposed bedrock) to approximately 4 to 6 feet. The tolerable limits for this are presented in Chapter 4. While presented in Chapter 3 below, the methodology to be used is a "mag and dig" where magnetometers are used to identify anomalies and dug by hand shovel.

### **3. CHAPTER 3 MEC CLEARANCE PLAN**

#### **3.1. Overall Approach to Munitions Response Activities**

This section describes the UXO contractor approach to completing the CRP Scope of Work requirements. Specific quality management standards and procedures used to control the work completed under the CRP contract are described in detail in Chapter 4 of this Work Plan.

This plan covers the munitions response actions in support of cofferdam installations and the removal of impacted sediment within the Congaree River. The area to be swept and intrusively investigated for MEC/MPPEH consists of approximately 5.8 acres within the Congaree River. A shallow dive operation (covered in a separately submitted Dive Operation Plan) will be performed to remove any potential MEC/MPPEH within the cofferdam footprints prior to cofferdam construction needed to dewater the sediment areas containing TLM.

All MEC/MPPEH disposal operations will be conducted IAW the procedures described in this plan and the approved ESP. DDESB 6055.09-M and EM 200-1-15 will also be followed during munitions response activities. If an unidentifiable MEC is found, the default separation distance specified in DDESB TP16 will be used to establish the appropriate EZs. Unidentified MEC will not be disposed of until the munitions filler can be determined. EM 385-1-97, dated May 2013, and EP 75-1-3 provide guidance in helping to determine unknown explosive fillers. Final disposition/disposal procedures will be determined in coordination with DESC's designee.

Demolition operations will be conducted to destroy or vent MEC / MPPEH, as required for safe disposal. Additional discussion of MEC/MPPEH reporting requirements and disposition methods and techniques are provided in the ESP, submitted separately from the Work Plan.

#### **3.2. Identification of Areas of Concern**

The clearance area for this project is the cofferdam footprints and sediment removal areas shown in the figures in Appendix B.

#### **3.3. Geophysical Prove-out Plan and Report**

Digital Geophysical Mapping (DGM) is not planned for this project. Construction and use of Instrument Verification Strip (IVS) to document effectiveness and proficiency with analog instruments is discussed in Chapter 4.

#### **3.4. Geophysical Investigation**

DGM is not planned for this project. The use of analog instruments (Schonstedt GA 52-Cx or all-metals detector) to accomplish project objectives is discussed in Section 3.7.

#### **3.5. Location Surveys and Mapping Plan**

Surveyors (either subcontracted or provided by DESC or its contractors), will be utilized as needed, to conduct boundary surveys of the designated clearance areas.



Where feasible, stakes will be installed that clearly show the boundaries of the cleared area, and each stake will be labeled with the proper Universal Transverse Mercator (UTM) coordinate system. Flagging will be placed at the top of each stake. No stakes will be installed without approval from the UXO Tech II escort, who will check for anomalies in the location that each stake will be emplaced. The UXO Tech II will scan all stake emplacement locations with a handheld magnetometer (such as a Schonstedt GA-52Cx), or an all-metal detector (such as a White's Metal Detector), or equivalent. The UXO contractor's SUXOS will maintain a field logbook detailing all field activities, including daily entries of the personnel on-site, time of day all work started and ended, weather conditions, delays, all relevant survey data, equipment used, and field sketches.

Survey data will be submitted by hard copy and digital media. The site grid data will include a map of the entire site with grids shown and other pertinent features. Maps will be produced that accurately convey the clearance areas and data.

MEC/MPPEH location data will also be submitted in Microsoft Excel. Data will include grid number where found, item number assigned, type of item, depth, and location in the appropriate UTM coordinates.

### **3.6. Geographic Information System (GIS) Plan**

#### **3.6.1. GENERAL**

The foundation of the GIS will be derived from existing CRP data developed during previous site efforts. Tetra Tech has acquired the existing GIS provided by APEX and will expand it to meet the needs of the project. The GIS will be maintained through the project's life cycle and accumulate all associated geospatial data along with base map layer and analysis data.

#### **3.6.2. ACCURACY**

The accuracy of the GIS will reflect the accuracy of the original data. Boundary points installed by a Surveyor are anticipated to have a minimum accuracy of +/- 3 centimeters. The location of all MEC/MPPEH items discovered during the removal will be collected using the Geo XH Global Positioning System (GPS) unit or equivalent to provide sub-meter accuracy.

#### **3.6.3. GEOGRAPHIC INFORMATION SYSTEMS (GIS) INCORPORATION**

The foundation of the GIS will be derived from base layers collected from APEX, state GIS clearinghouses, and previous munitions-related investigation/reconnaissance conducted on the site. All data will be converted or digitized into ArcGIS shapefiles and or Geodatabase formats to streamline data and avoid multiple data formats.

All data collected during field activities will be submitted to the GIS or Data Manager. The GIS or Data Manager will perform QC measures on all OE field data to elevate formatting or incorporation issues. Collected data will be incorporated into the GIS and conform to the UTM projection, a datum of the geographic coordinate system (GCS) North American Datum of 1983 (NAD 83), and with the linear unit of measure in Meters. All Geospatial data delivered to DESC will conform to UTM projection and a datum of GCS NAD 83 with linear units of measure stated.

#### **3.6.4. PLOTTING**

Tetra Tech anticipates hard copy printouts may be utilized on the project. Hard copy map graphic scales will be based on standard mapping scales. Maps will be available in digital PDF format to DESC and others as may be appropriate.

### 3.6.5. MAPPING

All survey boundary points related to designated work areas will be incorporated into the project-specific GIS. Maps will include true north and magnetic north arrows with the difference between them in degree and minutes shown. Tic marks at the standard interval with UTM coordinate designators for the specified area that the map covers will be shown on the edge of the map. A map legend with standard mapping symbols and map index showing the area covered on the map in relation to project boundary will be displayed on the map.

### 3.6.6. COMPUTER FILES & DIGITAL DATA SETS

Tetra Tech utilizes ESRI's ArcGIS to develop comprehensive and accurate geospatial data. Tetra Tech will submit the most current GIS as part of any report submitted to DESC. This will include ArcGIS project files and metadata for the geospatial data that is referenced in the project files. The GIS will be updated throughout the project's life.

All GIS data and ArcGIS projects will be developed and incorporated into the ESRI's Geodatabase format. All GIS project and layout files will be in the (ArcGIS.mxd) file format and submitted with the SSFR. All spatial imagery during the life of the project will be transferred into Geo TIFF/Geo JPEG format to help in reducing image file size unless stated otherwise by the Government.

The Federal Geographic Data Committee metadata will be developed for core Spatial Data Standard for Facilities, Infrastructure, and Environment data layers that are developed by Tetra Tech. It is assumed that spatial data retrieved from other sources such as GIS clearinghouses, previous site investigations, etc., will contain previously developed metadata created by the originator.

## 3.7. Intrusive Investigation

### 3.7.1. Intrusive Investigation Methodology

#### 3.7.1.1 Mobilization

Immediately after receiving a notice to proceed for each phase, the UXO contractor will begin the mobilization process. It is anticipated that one phase of mobilization will occur to accomplish the clearance task. The PM will identify the personnel and equipment required, schedule a sequenced mobilization, and make the necessary travel and shipping arrangements. Personnel qualifications and certification are in Appendix H of this Work Plan.

#### 3.7.1.2 Personnel

Personnel will be mobilized from regional locations as required to complete the work associated with the project IAW the project schedule. The PM, SUXOS, UXOQCS, and/or UXOSO will mobilize ahead of the main team body, if necessary, to help set up the project site. They will also arrange to receive equipment, coordinate with survey personnel, and ensure that all signed copies of required permits are in place. After this initial mobilization of the management staff, including coordination with

local personnel and setting up the site, the mobilization body of the remaining field team required to complete all planned activities will occur.

#### 3.7.1.3 Equipment

The UXO contractor will deliver equipment to the site as required by the project schedule. Mechanical excavation and/or brush cutting equipment are not anticipated but (if required) will be rented and delivered to the site by a local vendor. Other equipment will be delivered to the site by the UXO contractor personnel or shipped to the site by a commercial carrier.

#### 3.7.1.4 Site Setup

Immediately upon arrival on the first field day at the site, the UXO contractor will begin site setup activities.

#### 3.7.1.5 Office / Facilities

Tetra Tech anticipates that DESC will establish a formal project office at the project location and intends to utilize portable toilets that will be delivered during site set-up.

#### 3.7.1.6 Work Site

Immediately upon arrival for the first field workday, Tetra Tech will set up the worksite. Where feasible, Tetra Tech will establish and survey the boundary of the designated clearance area using a subcontracted South Carolina-licensed surveyor or DESC's designated surveyor. For underwater work within the river, Tetra Tech will utilize GPS units, diver underwater navigation tablets, and buoys or other similar means to establish the work areas. One week prior to the start of intrusive operations, Tetra Tech's SUXOS will notify "call before you dig" number 811 or DESC 1-800-251-7234 of the intent to start subsurface clearance, if not completed by others. DESC will perform marking of any utilities within the clearance footprint, and any required digging in those areas will be carefully conducted by hand to avoid damaging any utilities.

#### 3.7.1.7 Survey / Site Layout

The SUXOS will coordinate with the surveyor responsible for marking the work areas to ensure that the site layout is complete and document the clearance area. To date, the boundary information presented in Appendix B has been provided for this effort.

#### 3.7.1.8 Equipment Testing

Handheld magnetometers/metal detectors will be checked on a Function Check Area (FCA). Daily checks will be conducted by each instrument operator using his assigned instrument on the FCA. The instruments will be tested against a known source to verify that it responds appropriately. Once the instrument is determined to be functioning properly, the operator will conduct a sweep of the test strip, using the methods and techniques applied in the field. The UXO Team leader and UXOQCS will observe each team member to ensure that they use proper techniques and can properly locate seed items in the FCA. If the operator displays improper techniques or is unable to accurately and consistently locate seed item, the team leader will conduct refresher training and the instrument operator will then demonstrate his proficiency on the test strip before moving to the designated clearance area. If it is determined that the operator's technique is proper but that the instrument is the cause of his failure to locate seed items, he will be given a different instrument and will repeat the test. Equipment determined

to be defective will be tagged and removed from operation. The FCA simulates site conditions. It will be placed in a location free of geophysical anomalies that may interfere with the tests or affect the results. The UXOQCS is responsible for ensuring that personnel accomplishes all QC checks and that the appropriate logbook entries are made.

As the boundaries of the areas are being marked, Tetra Tech will establish internal grids or clearance areas. The SUXOS/DS will determine the most effective way to divide the removal area into internal grids or clearance areas. The internal areas will be established based on the size and shape of the area, terrain, etc. but will generally not exceed one acre in size and likely will be much smaller areas.

#### 3.7.1.9 Vegetation Removal

The project area will be within the boundaries of the typical river level. Only minimal vegetation clearance, if any, will be required to effectively clear MEC, as described in Section 3.7.8.2. Only vegetation required to effectively complete the removal action will be cut. Vegetation may be cut using any combination of hand or mechanized clearance methods.

#### 3.7.1.10 Surface Removal

Removal of surface MEC will be completed IAW procedures described in Section 3.7.8.1. The removal will include all MEC/ MPPEH and magnetic anomalies on the surface that could mask items in the subsurface and MD equivalent to, or greater than 3.55 inch diameter or thickness of 3.55 inch or greater from the surface. The method used for surface clearance will be performed visually using analog detectors to assist in the location of items on the surface. Sections below describe the establishment of search lanes to ensure effective removal of the entire clearance area. Although MD and RRD are not expected on this site as it is not a range, any MD removed during the surface, and subsurface removal will be collected and processed as described in section 3.7.28. The surface removal will be completed in conjunction with the subsurface removal. A grid or designated clearance area will not be considered complete and will not be turned over for QC/QA checks until both surface, and subsurface removal is complete.

#### 3.7.1.11 Subsurface MEC / MPPEH Removal

The cofferdam footprints and sediment removal areas are identified in the figures in Appendix B. The parameters for subsurface clearance are to remove MEC/MPPEH and any ferrous metal items equivalent to 3.55 inch diameter or thickness (length) of 3.55 inch to depths up to 11 times the width or diameter. The area may be subdivided by placing grid stakes throughout the clearance area in order to better control the removal action and facilitate reporting and quality control. The internal grids corners will be located with a sub-foot GPS unit or with measuring tapes, and corners will be marked with stakes.

#### 3.7.1.12 Search Lanes

Those areas requiring systematic subsurface removal will be divided into lanes to ensure effective removal of the entire area. Tape measures, cones, or small lines will mark search lanes. Unless otherwise directed, the search lane width will be no wider than five feet. The maps in Appendix B show the areas that require surface and sub-surface removal. The precise location of these areas will be marked on the ground by the surveyor where feasible. Tetra Tech will utilize GPS units, diver underwater navigation tablets, and buoys, or other similar means to establish the work areas within the river. Tetra Tech will

then layout grids/divisions and search lanes in each area that allow for the most efficient removal based on the size and shape of the area.

#### 3.7.1.13 Anomaly Identification and Investigation

After establishing lanes (as described above), the areas will be cleared by teams consisting of a UXO Tech III (Team Leader) and up to six UXO Tech II/I (team members).

Each UXO Technician will use a handheld analog detector to identify potential subsurface MEC. If a geophysical anomaly is detected, it will be investigated by the dig team using mechanical and/or manual digging methods (see ESP for explosives safety information).

#### 3.7.2. MEC Accountability and Records

As MEC/MPPEH is located it will be documented on the MEC Accountability Log (Appendix F). A detailed accounting of all suspected MEC/MPPEH items encountered during the removal action will be maintained. This accounting will include:

- Identification Number (a unique ID #);
- Location;
- Nomenclature;
- Fuze Description;
- Fuze Condition; and
- Additional comments, if required.

Each suspect MEC item encountered will be identified using a unique numerical identifier, such as A-3-0001 (for the first suspect item (0001) encountered in the Removal Area/Grid A-3).

Photographs of or suspect MEC/MPPEH items will be taken for documentation purposes. A ruler or some similar item, to show scale, will be placed adjacent to the item. The photographer needs to remember these photographs will be utilized in the final report; thus, a focused, well-thought-out photograph is necessary.

#### 3.7.3. UXO Personnel Qualifications

UXO personnel required for this project will include UXO supervisors and technicians, all of whom possess the relevant personal training and experience requirements set forth in DDESB TP 18. Personnel for this project has been selected from a pool of available UXO technicians. Detailed personnel qualification requirements are in Section 2.3. Resumes of key personnel are included in Appendix H if not listed in the UXO database maintained by CEHNC.

#### 3.7.4. MC Sampling Locations

MC Sampling is not a part of this project.

#### 3.7.5. MC Sampling Procedures

MC Sampling is not a part of this project.

#### 3.7.6. Munition with the Greatest Fragmentation Distance (MGFD)

The Munition with the Greatest Fragmentation Distance (MGFD) and minimum separation distances are presented in the ESP.

### 3.7.7. MEC Identification

The SUXOS and UXOSO must be in agreement on the condition of a MEC item before any removal action is attempted. All available data sources will be consulted, as required to make this determination.

### 3.7.8. MEC Removal

#### 3.7.8.1 Surface and Subsurface Removal

A surface removal will be conducted in conjunction with the subsurface removal in the designated clearance areas, as shown in Appendix B. UXO Technicians will visually search and use analog detectors to locate MEC/MPPEH, MD, and metallic anomalies. The SUXOS will assign grids/clearance areas to the team, and the Team Leader (UXO Tech III) will organize his team to effectively conduct a systematic surface and subsurface clearance. If any area has heavy surface contamination, the SUXOS may opt to conduct the surface clearance prior to completing the subsurface clearance.

#### 3.7.8.2 Brush Clearance

It is anticipated that no brush cutting will be required. If necessary, Tetra Tech will ensure effective removal in portions of the designated areas. Brush clearance will be conducted by UXO-qualified personnel.

Tetra Tech will conduct brush-cutting operations only as necessary to allow for MEC/MPPEH detection and removal efforts to take place unrestricted from vegetation undergrowth. Tetra Tech will perform only the minimum brush removal required to clear the surface and subsurface of MEC/MPPEH/MD or any ferrous metal items. Underbrush, tall grass, shrubs, small trees, and limbs may be cut in order to allow efficient anomaly detection and/or removal. Cut brush will be removed from the area identified for clearance, if necessary, to prevent interference with site operations. Tetra Tech's brush cutting team will use a variety of clearing techniques depending on the ground conditions and type of vegetation. Various hand and mechanical methods may be applied to complete this task. Tetra Tech does not anticipate heavy vegetation in the project area. However, the use of mechanical brush cutting equipment, such as chainsaws and heavy-duty steel-bladed weed eaters, may be required in the open, lightly vegetated areas. If self-propelled brush cutting equipment is used, the cutting height will be adjusted to ensure that the blades do not strike potential MEC. UXO personnel will perform a visual sweep ahead of the mechanical equipment to identify any potential hazards on the surface of the ground. In areas with soft ground, the brush cutting team will use a combination of mechanical and hand-clearing techniques, possibly including the use of equipment such as a Bobcat Brush Cat or similar equipment and weed eaters. Chain saws and chippers may also be used to cut and reduce brush and low hanging limbs that would interfere with detection and removal operations. The brush cutting team will include at least two UXO Technicians, a minimum of one of whom will meet at least the DDESB TP 18 requirements to be a UXO Tech II.

The brush clearance team(s) will be structured to safely and efficiently clear each of the

designated areas. The SUXOS will designate team personnel and equipment, based on the size of the area, type of brush and terrain.

### 3.7.8.3 Removal of Surface and Subsurface MEC/MPPEH

The map in Figure B-1 shows the area that requires sub-surface removal. The precise location of the area will be marked by the surveyor where feasible. The field team will layout grids and search lanes in each area that allow for the most efficient removal based on the size and shape of the area.

The UXO removal team will consist of a UXO Tech III (Team Leader) and up to six UXO Tech II/I (team members). The SUXOS will organize and make team assignments to ensure that the project is completed in an efficient and safe manner. Any team assigned to complete removal or other MEC operation will have a minimum of two UXO qualified personnel, including at least one that meets the qualification of a UXO Tech III.

The UXOSO/QCS will observe removal operations to ensure that safe, quality work is conducted in compliance with the requirements of the Work Plan. The UXOQCS will conduct at least a 10% Search Effectiveness Quality Control Inspection (SE QCI) check of the area that was cleared using the same type of equipment and techniques used during the removal process. If an area fails the inspection, the team will re-sweep the area, and it will then be re-inspected. The UXOQCS will conduct blind seeding within the clearance area to ensure effective removal IAW QC procedures are contained in Chapter 4.

All analog detectors will be calibrated and working properly. All equipment will be tested prior to each use. At a minimum, equipment will be tested in the morning prior to beginning work and after lunch prior to resuming work. Analog detectors will be tested on an FCA IAW Section 4.7.3.

### 3.7.8.4 Search Lanes

Those areas requiring systematic subsurface removal will be divided into lanes to ensure effective removal of the entire area. Tape measures, cones, or small lines will mark search lanes. Unless otherwise directed, the search lane width will be no wider than five feet.

### 3.7.8.5 Anomaly Identification and Investigation

After establishing lanes (as described above), the areas will be cleared by teams consisting of a UXO Tech III (Team Leader) and up to six UXO Tech II/I (team members).

Each lane will be cleared by qualified UXO Technicians under the supervision of the Team Leader. Each UXO Technician will use a handheld analog detector to identify potential subsurface MEC. If a geophysical anomaly is detected that could be caused by MEC it will be investigated by the dig team using mechanical and/or manual digging methods. If mechanical methods are used, the team will excavate to within one foot of the anomaly, and then hand methods will be used to carefully expose the source of the anomaly. All material suspected as MEC/MPPEH will be inspected by the SUXOS and UXOSO to determine if it is acceptable to move. If, after inspection, it remains MEC and can be safely moved, it will be consolidated and

destroyed by detonation as described in Section 3.7.14. If it is not acceptable to move, it will be blown in place (BIP) as described in Section 3.7.14. All MPPEH, MD, and RRD will be handled and processed IAW Section 3.7.28.

### 3.7.9. MEC Holding Areas

Tetra Tech will establish collection points and a holding area for MEC/MPPEH. An Alcohol Tobacco and Firearms (ATF) Type 2 magazine with proper grounding and fencing adjacent to the clearance site will be utilized for temporary MEC/MPPEH storage until demilitarization of the munitions can occur.

### 3.7.10. Alternative MEC/MPPEH Disposal

In the event that MEC/MPPEH are found that cannot be identified to be inert, Tetra Tech will report this to the DESC on-site representative and implement explosive safety measures to secure and render safe MEC/MPPEH. If the MEC/MPPEH is something that the SUXOS and UXOSO believe to be outside of their capability to safely perform disposal operations, Tetra Tech in conjunction with DESC will contact the Richland County bomb squad at (803) 576-3000 for assistance. If Richland County Sheriff's Department cannot respond Tetra Tech in combination with DESC will request Richland County Sheriff's Department contact the South Carolina State Law Enforcement Division (SLED) for assistance with the item. If SLED cannot support Tetra Tech. DESC will request SLED to contact U.S. Military EOD to assist with the demilitarization of the item.

### 3.7.11. Safety Precautions

A minimum of two personnel (buddy system) will be present during all MEC operations so that one UXO person will always act as a safety observer. Only UXO-qualified personnel will perform MEC procedures. As an exception, a UXO Technician I, may assist in the performance of MEC procedures when under the supervision of a UXO Technician III or higher.

During all MEC operations, only the minimum number of personnel required to safely perform the task will be allowed on-site. All non-essential personnel will remain out of the EZ.

If an unidentifiable MEC/UXO is found, or toxic chemical ordnance is found, Tetra Tech will coordinate for EOD support through the DESC on-site representative as detailed in Section 3.7.10.

UXO personnel required for this project will include qualified UXO supervisors and technicians that possess the relevant qualifications and experience. Personnel assigned to this project have been selected from a pool of available qualified UXO Technicians. All UXO personnel will meet the applicable personnel training and experience requirements.

Tetra Tech UXO personnel will not attempt to remove any fuze(s) from the MEC. Personnel will not dismantle or strip components from any MEC. Personnel are not authorized to inert any MEC items found on-site. MEC/MPPEH, MD, or MDAS items will not be taken from the site as souvenirs.



### 3.7.12. Off-Site Transportation

Tetra Tech does not anticipate transporting any MEC/MPPEH items off-site for disposal. If items are required to be demilitarized offsite, Tetra Tech will report this to the DESC on-site representative and implement alternative disposal methods IAW section 3.7.10.

### 3.7.13. Collection Points

Use of daily collection points will be performed IAW the approved ESP. At the end of each workday, recovered MEC will be transferred to the Type 2 ATF magazine for temporary storage.

### 3.7.14. Demolition and Post Demolition Operations

- Demolition and Post Demolition Operations will be performed IAW the approved ESP. The preferred explosive demolition method is to use the buried explosion module (BEM) to determine the required burial depth so that no blast or fragmentation reaches the surface. This will result in no blast or fragmentation at the surface and a required EZ of only 200 feet. If a MEC is deemed unacceptable-to-move, it will be BIP.



SUXOS – The SUXOS has overall responsibility for reporting and disposition of MEC/MPPEH. He will:

- Schedule and coordinate all demolition operations;
- Ensure a MEC log is maintained;
- Assure that MD generated from demolition operations is inspected prior to placement in the holding bins; and
- Inspect all recovered MEC/MPPEH and MD.

UXOSO and the UXOQCS – The UXOSO and the UXOQCS are responsible for ensuring all MEC operations meet safety and quality requirements. They will:

- Observe and inspect all demolition operations; and
- Ensure all requirements of this section are complied with.

UXO Tech III – The UXO Tech III is responsible for the supervision of the MEC disposal operation. He will:

- Post individuals at entry points (if required);
- Construct appropriate engineering controls IAW "Use of Sandbags for Mitigation of Fragmentation and Blast Effects Due to Intentional Detonation of Munitions," HNC-ED-CS-S- 98-7, August 1998 if required;
- Assign team members to specific demolition duties;
- Assure the area is clear prior to capping in for demolition operations; and
- Check the area following each shot or series of shots.

### 3.7.15. General Demolition Practices

Detailed instructions for conducting demolition procedures are provided in standard operation

procedures (SOPs) contained in Appendix J. Personnel will adhere to these when conducting demolition operations.

### 3.7.16. Material Potentially Presenting an Explosive Hazard (MPPEH)

A UXO Tech I can tentatively identify a located item as MPPEH, followed by a required confirmation by a UXO Tech II or Tech III.

A UXO Tech II will conduct a 100% inspection of each item as it is recovered and determine the following:

- Is the item a MEC/MPPEH, MD, or range-related debris?
- Does the item contain explosive hazards or other dangerous fillers?
- Does the item require detonation?
- Does the item require demilitarization (demil) or venting to expose dangerous fillers?
- Does the item require draining of engine fluids, illuminating dials, and other visible liquid hazardous, toxic, or radiological waste (HTRW) materials?

All MPPEH and MD will be re-inspected by the UXO removal Team Leader (UXO Tech III) prior to transportation to the secured containers (portable storage magazine) or collection point.

MEC/MPPEH items requiring demilitarization and/or venting will be segregated and processed in a timely manner and placed in securable containers.

The UXOSO/QCS will conduct daily audits of procedures for processing MPPEH and will conduct and document random checks of specific pieces.

SUXOS and UXOSO/QCS will ensure that Work Plan procedures, based on and in compliance with Chapter 14 of EM 200-1-15, are being followed and performed safely.

All final processed MDAS material will be placed in lockable containers, for security, before turning in for recycling. IAW Chapter 14 of EM 1110 dated 15 June 2007, and Errata Sheet No. 2, Tetra Tech will dispose of all material determined by inspection not to contain an explosive hazard. All historically significant items will be presented to the on-site archaeologist after certification as MDAS.

MEC/MPPEH items that require demilitarization Tetra Tech will report this to the DESC on-site representative and implement Tetra Tech's explosive safety measures to secure and render safe. If the item is something that the SUXOS and UXOSO believes to be outside of their capability to safely dispose of explosively, Tetra Tech in conjunction with DESC will contact Richland County bomb squad at (803) 576-3000 for assistance. If Richland County Sheriff's Department cannot respond, Tetra Tech in combination with DESC will request Richland County Sheriff's Department to contact the South Carolina SLED for assistance with the item. If SLED cannot support, Tetra Tech and DESC will request SLED to contact U.S. Military EOD to assist with the demilitarization of the item.

Items that require demilitarization will be demilitarized IAW DoD 4160.21-M-1, Defense

Demilitarization Manual. All MEC/MPPEH items will be investigated to ensure that there are no explosives remaining in the items. Redundancy is built into the investigation process to assure no MEC/MPPEH items are removed from the site.

### 3.7.17. Material Documented as Safe (MDAS)

SUXOS will:

- Ensure a Requisition and Turn-in Document, DD Form 1348-1A is completed for all munitions debris and to be transferred for final disposition.
- Perform random checks to satisfy that the munitions debris and are free from explosive hazards necessary to complete the Form, DD 1348-1A.
- Certify all munitions debris and range-related debris as free of explosive hazards, engine fluids, illuminating dials, and other visible liquid HTRW materials. No range-related debris is expected on the CRP project.
- Be responsible for ensuring that inspected MDAS is secured in a closed, labeled, and sealed in a container and documented as follows;
- The container will be closed and clearly labeled on the outside with the following information: The first container will be labeled with a unique identification number that will start with DESC/Installation Name/Contractor's Name/0001/Seal's unique identification and continue sequentially.
- The container will be closed in such a manner that a seal must be broken in order to open the container. A seal will bear the same unique identification number as the container, or the container will be clearly marked with the seal's identification information if it differs from the number on the container.
- A documented description of the container will be provided by Tetra Tech with the following information for each container: contents, weight of container, location where munitions or range-related debris was obtained, name of contractor, names of certifying and verifying individuals, unique container identification, and seal identification. Tetra Tech will also provide these documents within the Final Report.

### 3.8. Geospatial Information and Electronic Submittal

The GIS Plan is described in Section 3.6 of this WP.

### 3.9. Investigative Derived Waste Plan

If generated, Investigative Derived Waste will be contained and disposed of IAW section 6.2.1 of this WP.

### 3.10. Risk Characterization and Analysis

Risk Characterization and Analysis are not a part of this project per the PWS.

### 3.11. Analysis of Land Use Controls

Land Use Controls are not associated with this project.

**3.12. Preparation of the Five-Year Review Plan**

A Five-Year Review is not a part of this project.

**3.13. Construction/Remediation Support**

It is currently anticipated that Tetra Tech will provide a Construction Support team consisting of a SUXOS and a UXO Tech III to provide Standby Support to the construction/remediation contractor when construction activities are conducted. Additional teams may be added if required to provide adequate support to the construction contractor.

Tetra Tech will coordinate schedules with the construction contractor to ensure that the support is available when and where needed. Activities performed during standby support include, but are not necessarily limited to: safety and awareness training; MPPEH inspection/identification; anomaly detection/avoidance; area inspections; etc.

## 4. CHAPTER 4 – QUALITY CONTROL PLAN

### 4.1. QUALITY CONTROL OBJECTIVES

This section presents the project QC Plan as required by the PWS. The QC procedures described in this section will be used for all work performed during the cofferdam footprint MEC clearance and sediment MEC removal project. This site-specific QC plan is designed to manage, control, and document the performance of work efforts and to ensure quality throughout the execution of all tasks.

This QC Plan will achieve the following objectives:

- Identify QC procedures and responsibilities.
- Document the quality of work efforts via audits and independent staff reviews of deliverables.
- Ensure data integrity through the implementation of data management QC procedures.
- Ensure the development of appropriate accountability and appropriate data collection.

### 4.2. QUALITY POLICIES

All services provided will be consistent with and will meet the requirements of all applicable laws and regulations.

Quality Management will be applied throughout all phases of the project – from the time of the task order award, until the SSFR is accepted.

Emphasis will be placed on preventive actions that minimize quality failures or defects.

All field personnel and team members are empowered to identify and evaluate potential quality problem areas and are encouraged to recommend solutions or corrective actions.

Tetra Tech will staff all project sites with the best qualified, trained, available personnel, based upon their knowledge and prior experience with the type of operations and hazards expected to be encountered. The minimum qualifications will meet or exceed the customer's requirements.

All field personnel will be provided with all of the information necessary to accomplish their assigned tasks in a safe, responsible, cost-efficient manner, and they will be held accountable for the quality of their work.

The project team will be provided with a copy of the final approved Work Plan/APP prior to the performance of any MEC-related activities on a project site.

Tetra Tech will take corrective action on any complaint or quality defect resulting from an audit of operations.

### 4.3. DEFINITIONS

Removal Standard - a specified size of MEC to a specified depth. The removal standard for this project is: No findings on the surface of the munitions response site of MEC or MPPEH regardless of size excluding small arms ammunition, and no munitions debris equivalent to, or greater than 3.55 inch (6 lbs shell) in diameter or width with a thickness (length) of 3.55 inch or greater; and finding within the subsurface of the munitions response site no ferrous metal items

(including, but not limited to MEC and MPPEH) equivalent to, or greater than 3.55 inch in diameter or width with a thickness (length) of 3.55 inch (6 lbs shell) or greater to a depth the lesser of 11 times the item diameter (or width).

- Customer/Client - refer to the term “Purchaser” for the contract.
- Nonconformance:
  - A minor nonconformance is not likely to materially reduce the usability of the services. It is generally a departure from the approved procedures that have little bearing on the end product.
  - A major nonconformance is likely to result in failure of the services or to materially reduce the usability of the end product.
  - A critical nonconformance is likely to result in hazardous or unsafe conditions for individuals using or depending upon the services.
- Purchaser: The term purchaser shall refer to the non-government body administering the particular contract involved, or the authorized representative of that body.
- Quality Conformance Inspection (QCI): Normal inspections/audits conducted by authorized the UXO contractor personnel during the accomplishment of the organization’s mission to determine conformance to contract requirements.
- QC: The process by which the UXO contractor manages, controls, and documents its activities in the accomplishment of the mission.
- Quality Defect: A nonconformance issue with published policy and/or a contractual requirement that requires corrective action(s).
- Quality Management: All those control and assurance activities instituted to safely and effectively accomplish the assigned mission.
- Root Cause: The basic reason for an undesirable condition or problem if eliminated or corrected, would have prevented it from existing or occurring.
- Stop-Work-Authority: The right and obligation to stop all work when serious quality or safety concerns arise.
- Surface Removal: Locating and removing MEC/MPPEH, MD, and metallic objects that are visible on the surface, or partially visible. This includes items that are partially exposed, which will require only minimal hand excavation to determine identification.
- Characterize: Locating, identifying, and characterizing metallic objects that caused a geophysical response.

#### **4.4. QC RESPONSIBILITY**

Tetra Tech is solely responsible for the control of product quality. Only those products/services that conform to contractual requirements will be offered to DESC or its contractor for acceptance.

#### **4.5. CONTRACT SUBMITTALS**

All contract submittals will be prepared by qualified personnel IAW the PWS and contract requirements. All documents undergo a peer review in which they will be reviewed by an equally qualified person familiar with the project and submittal requirements.

#### **4.6. QUALITY MANAGEMENT**

The PM has the responsibility of ensuring that QC procedures are implemented IAW the work plan and applicable documents identified within it.

The Program UXO QC Manager will provide the Quality Management oversight for the project. The Project UXOQCS is a part of the project team, but is authorized to elevate any quality problems that cannot be resolved by the project team. The Project UXOQCS interacts with the PM, SUXOS, subcontractor QC staff, as appropriate, to prevent and/or correct problem situations, as necessary. Vendors and subcontractors will be monitored to ensure that they supply items and services, which meet quality requirements. Periodic audits will be performed by the UXOQCS to verify that the quality system and the UXO field staff are performing as required. He also ensures that:

- Required site training is conducted prior to the start of field activities.
- The UXO field staff are qualified and trained.
- QC is built into the Project Work Plan to support the MEC removal action.
- The requirements of the QC Plan are adhered to.

Effective day-to-day field QC management is delegated to the on-site UXOQCS. This person will interact daily with the project team to ensure that all QC procedures presented in the Project Work Plan are followed in the accomplishment of all project tasks. The UXOQCS reports directly to the Tetra Tech QC Program Manager. Scheduled activities are coordinated with the PM, SUXOS, UXOSO, and all other project team members as needed. He has the authority to:

- Initiate action to prevent the occurrence of nonconformances relating to the provided services.
- Identify and record any problems relating to the services.
- Initiate, recommend or provide solutions through the on-site management channel.
- Verify the implementation of solutions.
- Control further actions of any nonconforming services until the unsatisfactory conditions have been corrected.
- Elevate Quality concerns, which cannot be resolved on-site to the Quality Manager.

All project team members are responsible for and will be held accountable for the quality of their work. Every team member has Stop-Work-Authority when an immediate safety situation is observed, which could cause personal injury or damage to property and equipment. All project team members are encouraged to identify potential quality problems and are encouraged to suggest solutions or corrective actions to ensure all work conforms to the approved Work Plan and QC requirements. During site-specific training, personnel will be briefed by the UXOQCS on the importance of quality work and the above-stated requirements. This briefing is aimed at ensuring that all site personnel understands Tetra Tech's dedication to quality.

## 4.7. QC PLAN PROCESSES

This section documents the processes affecting quality. These are essential steps to ensure a quality product is delivered to the client.

### 4.7.1. Specific Procedures

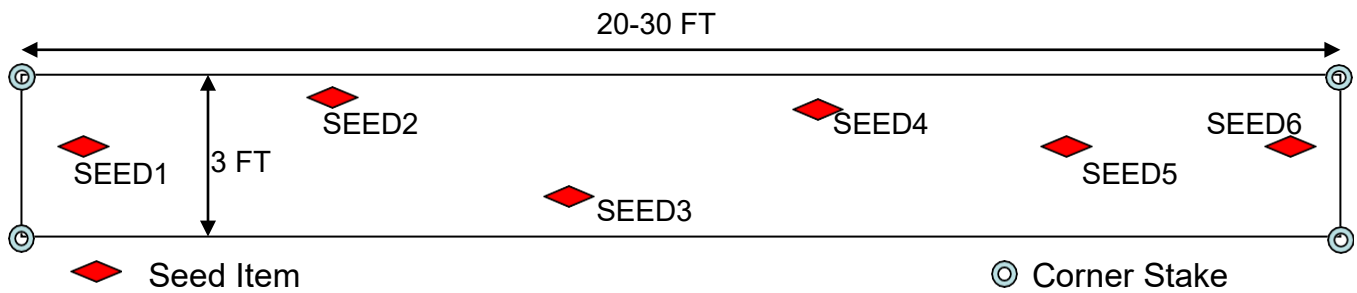
Described below are the specific procedure that will be used to assure quality in this PWS regarding; Audits, Corrective/Preventive Action, Data Management, Field Operations, Equipment Calibration and Maintenance, and Personnel Protective Equipment. The project will follow the 3 phases of the control inspection process, which includes preparatory, initial, and follow on inspections of each definable feature of work.

4.7.2. Scheduled Audits

Periodic audits will be performed by the designated QA Manager to ensure that the requirements of this Quality Plan are being followed. This may include on-site visits as well as frequent document review activities. Training records, periodic reports, and adherence to all aspects of this QC Plan will be monitored to assure compliance.

4.7.3. Daily QC Audits

All instruments, vehicles/machinery, and equipment will be checked prior to the start of each workday and periodically throughout the day, batteries will be replaced as needed, and instruments requiring calibration will be checked against a known source. Handheld magnetometers/metal detectors will be checked on a test plot. Daily checks will be conducted by each instrument operator using his assigned instrument on the test plot. The instruments will be tested against a known source to verify that it responds appropriately. Once the instrument is determined to function properly, the operator will conduct a sweep of the FCA, using the methods and techniques applied in the field. The UXO Team leader and UXOQCS will observe each team member to ensure that he uses proper techniques and can properly locate seed items in the FCA. If the operator displays improper techniques or is unable to accurately and consistently locate seed items, the team leader will conduct refresher training, and the instrument operator will then demonstrate his proficiency on the test plot before moving to the designated clearance area. If it is determined that the operator’s technique is proper but that the instrument is the cause of his failure to locate seed items, he will be given a different instrument and will repeat the test. Equipment determined to be defective will be tagged and removed from operation. The FCA simulates site conditions. It will be placed in a location free of geophysical anomalies that may interfere with the tests or affect the results. Figure 4-1 shows the conceptual layout of the FAC, and Table 4-1 includes seed item placement details. The UXOQCS is responsible for ensuring that personnel accomplishes all QC checks and that the appropriate logbook entries are made. The UXOQCS performs random, unscheduled QCI to ensure that personnel accomplishes all work specified in the Project Work Plan. The QCI Schedule will adhere to the following Table 4-2. The UXOQCS has the latitude to modify this schedule based on the quality of work being performed and the frequency of noted activities.



*Figure 4-1 FCA Conceptual Layout*



*Table 4-1 IVS Seed Item Description*

FAC Seed Item Description			
Seed Item ID	Description	Depth [in]	Notes
SEED1	Large ISO	34	Oriented approximately 45° from horizontal and parallel to the major axis of the test strip
SEED2	Medium ISO	28	Oriented approximately 90° from horizontal and parallel to the major axis of the test strip
SEED3	Large ISO	46	Oriented approximately horizontal and approximately perpendicular to the major axis of the test strip
SEED4	Large ISO	39	Oriented approximately 45° from horizontal and parallel to the major axis of the test strip
SEED5	Medium ISO	31	Oriented approximately 45° from horizontal and perpendicular to the major axis of the test strip
SEED6	Large ISO	43	Oriented approximately 45° from horizontal and perpendicular to the major axis of the test strip

Note: Seed items will be Industry Standard Objects (ISOs). At least two items will be blind seed items that are periodically moved by the UXOQCS.

*Table 4-2 Frequency of QC Inspections and Checks*

TASK	100%	DAILY	WEEKLY	BI-WEEKLY	AS NEEDED
Personnel Qualifications	✓				
Test Plot Proficiency		✓			✓
Accident/Incident Reporting	✓				
Search Effectiveness					✓
Turn-in of Recovered Munitions Debris	✓				
Preventive Maintenance		✓			
Communications Equipment Inspection		✓			
Safety Inspections		✓	✓		
Medical Support		✓			
Communications Effectiveness		✓			
Explosives Accountability					✓
Excavation Activities	✓				
MEC Final Disposal			✓		
MEC Accountability			✓		
Fire Protection – Prevention			✓		
Project Administration			✓		
Safety and Health Programs				✓	
Visitor Briefing					✓
Site-Specific Training					✓
Hazard Assessment – Risk Analysis					✓

## 4.8. QUALITY ASSURANCE / QUALITY CONTROL STANDARDS

### 4.8.1. Surface Removal

Every area designated for surface removal will undergo a Search Effectiveness Quality Control Inspection (SE QCI) involving approximately 10% of the square footage. The exact location of this square footage is at the discretion of the UXOQCS. The UXOQCS will also verify that the anomalies removed from the surface are accounted for separately, properly, and weighed accurately. The UXOQCS will place seed items, as described in this Section, to verify the effectiveness of the removal.

### 4.8.2. Subsurface Removal

The UXOQCS will perform a UXO QCI on at least 10% of each area excavated by the removal team. Additionally, seed items will be used, as described in Section 4.8.3, to ensure removal effectiveness. The UXO QCI will be performed using one of the following two methods, or a combination of the two methods.

- As available, a UXOQCS will monitor UXO Removal Teams while they acquire and excavate anomalies. He will observe the team's procedures to ensure quality standards are met.
- Following excavation, the UXOQCS will check the location using the same detection technology to ensure the team has removed all anomalies.

### 4.8.3. QC Performance Requirements

The Quality Control requirements of this project are provided in Table 4-3. The surface of all indicated removal areas will be cleared, IAW Section 3.7.8 of this work plan.

*Table 4-3 Performance Requirements Matrix*

<b>Performance Requirements Matrix</b>				
<b>Requirement</b>	<b>Applicability</b>	<b>Performance Standard</b>	<b>Frequency</b>	<b>Consequence of Failure</b>
Repeatability	All operators with assigned equipment	All items in the test strip detected (trains ear to items of interest).	At least daily	Replace defective equipment / remedial training. Operators that fail the retest will be assigned to other tasks for the day and will be re-tested again in the next working day.
Coverage	Site	100% of the area swept and anomalies removed / No MEC of any size and no RD/MD items $\geq$ 3.55 inch (6 lbs shell) diameter or width. All seed items are recovered.	At least 1-2 blind seed items per operator per lot	Redo lot
Detection and Recovery	Each Sector	All MEC/MPPEH and MD/RD greater than 3.55 inch (6 lbs) in or width removed from the surface/subsurface. All seed items are located and recovered.	At least 1-2 blind seed items per operator per lot. 10% of the area checked by UXOQCS	Redo lot
Geodetic Equipment Functionality	All	Geodetic Repeatability- Check against a known position set by a surveyor/position located within 1 foot	At least Daily	Replace defective equipment / remedial training. Operators that fail the retest will be assigned to other tasks and will not operate geodetic equipment, until proficiency is demonstrated.
Recheck of Excavations	All	After excavation, the UXOQCS will recheck the voids to determine that no magnetic signature exists.	All excavated voids will be rechecked by UXOQCS	Failure to verify that the void is free of magnetic signatures will result in further excavation and repeat of this operation after the source of the magnetic signature is identified.

The UXOQCS will use blind seed items in the test plots and in the removal areas to ensure the effectiveness and completeness of the removal action. The UXOQCS will place two or three (2-3) ISOs in areas to verify detection proficiency. The UXOQCS will record the location and depth of the seed items using GPS (location) and tape measure (depth) and will document the failure of any operator to locate them accurately. The location, depth, and the number of items will be varied each week, when conducting intrusive operations.

Additionally, the UXOQCS will place seed items on the surface and in the subsurface of the removal area. The detection seeds will also serve as coverage seeds for QC purposes. A lot is defined as the portion of the area assigned to the team to clear. The lots may be irregular shaped and may vary in size, depending on the shape of the removal area, but will generally be approximately one acre. The

UXOQCS will record the location (grid/clearance area) of each seed item and will verify that all are located prior to the final clearance of the area. Failure to recover the seed items will result in a QC failure condition that will require re-clearing of the lot. All QC logs, reports, and other QC-related documentation will be maintained in MS word and MS Excel formats and available to the client PM, Tetra Tech PM, and SUXOS.

#### 4.9. QC FILES

The following two files will be established and maintained by the UXOQCS.

- QCI Record File
- Corrective Action Request (CAR) File

The QCI Record File will be a two-part file, containing Active and Inactive Sub-files.

The Inactive Sub-file will contain the Quality Conformance Inspection Record (QCIR) for tasks that were found to be in compliance with the Work Plan and those that were not in compliance, but have been re-inspected and are subsequently corrected.

The Active Sub-file will contain those QCIR for tasks that were found to be not in compliance with the Work Plan and have not yet been corrected.

The CAR File will be a two-part file containing an Active Sub-file and an Inactive Sub-file. A CAR will be maintained in the Active File until follow-up has been conducted and deemed satisfactory. Once the follow-up is completed, the CAR will be placed in the Inactive File.

#### 4.10. CORRECTIVE/PREVENTATIVE ACTION

Nonconformance will be documented on a QCIR. The QCIR will document the reason for the nonconformance and describe the corrective actions taken to resolve the problem and the actions taken to prevent reoccurrence. QCI are generally intended to be preventative, rather than corrective in nature. Through preventative QCI, continuous improvement of site operations will occur.

The QCIR may be handwritten in ink when computer access is limited, but when practical, they will be prepared electronically in Microsoft Word format.

A QCIR may be completed for tasks when they are in conformance with the Work Plan. QCIRs for conforming tasks will not generally be distributed off the project site.

A QCIR will be completed for tasks when they do not conform to the Work Plan. Nonconformance QCIRs will be forwarded by email to the PM and the QA/QC Managers.

A QCIR will be completed for re-inspection of nonconformance. If the re-inspection indicates that the nonconformance has been corrected, both QCIRs will be filed in the Inactive Sub-file and a copy of the re-inspection QCIR will be forwarded to the PM and the QA/QC Manager. If the re-inspection indicates the nonconformance has NOT been corrected, both QCIRs will be filed in the Active Sub-file. A copy of the re-inspection QCIR will be forwarded to the PM and the QA/QC Manager.

Nonconformance will be evaluated and corrective action implemented by on-site management

whenever possible. The PM and QA/QC Managers will track all non-conformances to assure that they have been resolved, actions to prevent re-occurrence have been implemented and that lessons learned are communicated effectively.

#### **4.11. CUSTOMER COMPLAINTS**

Customer complaints will be addressed immediately. The complaint may come in the form of a verbal comment or written correspondence. Whatever the vehicle, the PM will conduct an investigation to analyze the complaint and assure corrective action has been initiated. The corrective action will address not only the root cause but also the application of controls to assure its effectiveness.

The PM will document the complaint or nonconformance and the investigation. He will look for the root cause.

Lessons Learned will be documented on the CAR and communicated to Project personnel and the QA/QC Managers.

The action on the CAR is not complete until the UXOQCS and/or SUXOS have completed follow-up. The corrective/preventative actions have to be adequate to prevent reoccurrence, and the customer must be satisfied with these actions.

The issue addressed in the CAR will be an item for a future QCI to ensure that the corrective/preventive actions have in fact addressed the issue and the solution was effective.

#### **4.12. DOCUMENT CONTROL AND DATA MANAGEMENT**

Rigid control must be maintained over the production of QC documents. The following guidelines will apply to all documentation generated by QC staff.

##### **4.12.1. Document Completion**

All sections of forms will be completed. Any unused spaces will be marked not applicable (N/A). In long columns of empty lines, N/A may be written in the first and last lines of that column with a single line connecting the entries. Large areas of unused spaces may be designated N/A by drawing a single line through the unused areas with the letters N and A on either side of that line.

Time and date formats: To eliminate misunderstanding, the following formats will be used on all official reports and correspondence:

- Time: 24-hour (Examples: 0730H, 1930H)
- Date: MM/DD/YY (Examples: 10/05/12, 11/15/12)

All signatures will be accompanied by the date the signature was made, either in a date block or with the date written following the signature.

White opaque correction fluids/tape may not be applied to records to correct mistakes.

Incorrect entries shall be drawn through with a single line with the initials of the author and the date of the correction immediately adjacent. Corrected entries will be placed above or immediately

following the line through or otherwise entered on the document in a legible, understandable means.

Any entries or corrections to a document, other than in document control blocks, made after its date of inception, shall be considered a “late entry”. Late entries will be clearly designated with the capital letters “LE”, the initials of the person making the late entry, and the date the late entry is made.

Official original documents will be distinctly marked, as such.

#### **4.13. DATA MANAGEMENT**

Electronic data and records will be managed to prevent accidental loss of information. All data will be backed up periodically, and data will not be stored only on one single media. Zip disks, compact disks, or other means of storage will be used in addition to standard computer hard drives to ensure data is not lost by the failure of any one device. Since conventional Document Control Practices do not always lend themselves to electronic records, the following additional guidelines will be followed for all electronic QC records.

Once an electronic record is completed and saved to disk, the file name will be used as the registration number for that document and shall appear on each page of the electronic record such that it also appears on printed copies. This filename will be entered in the Field Document Control Log as that documents registration number.

Changes, additions, late entries, and corrections to completed electronic records will be accomplished by creating a revision to the previously completed record. Included in the file name of the completed record will be the sequential revision number of that record. The first such revision of any record will be designated as R1 at the end of the file name. Subsequent revisions will be designated R2, R3, etc.

The original record will not be deleted electronically, and each revised record will include a description of the changes made on that particular revision as well as retaining the description of any previous revisions.

Any document that is revised after any required distribution, either off-site or to any electronic or hard copy file, will be likewise distributed to all recipients as the original document. The revision will be filed along with the original and any previous revisions.

Electronic forms, which require signatures, will be printed, and the printed original signed and dated in black ink as required. The words “signature on file” shall be entered on the electronic copy, in the signature space, of all documents requiring signatures. The signed original will be filed in the proper location. Subsequent revisions to forms requiring signatures will also be printed, signed, and filed.

Logs maintained electronically may be updated as required for daily activities without going through the above revision process. Each day’s log, however, will be saved electronically with the date included in the file name. Previous day’s logs will not be deleted from the database and will serve as additional backup should the current days log be damaged or lost.

#### **4.14. PHOTOGRAPHIC RECORDS**

Photographs will be generated to document significant site activities, MEC/MPPEH recoveries. Photographic records will be used to supplement information recorded in the daily logs, including photographs of equipment prior to use, and the condition of the site prior to any activity. Photographs will clearly show the task being accomplished and provide for a visual record of the operations. Operations will not be staged. Selected representative photographs will be included in the SSFR, and all photos will be provided on digital media accompanying the SSFR.

#### **4.15. LOGS AND REPORTS**

Field activity logbooks will be maintained in ink. All personnel will use bound and numbered field logbooks with consecutively numbered pages. These logbooks are QA records and will be completed IAW this section of this QC Plan. These activity logbooks will become part of the SSFR; thus, it is imperative that they be completed clearly and legibly. Appropriate documentation will be maintained regarding the location and disposition of all MEC/MPPEH and MD. Locations will be documented on a site map and entered in the Ordnance Accountability Log. Daily and Weekly Summary Reports will be prepared by the UXOQCS and forwarded via email to the PM on a timely basis.

#### **4.16. DAILY ACTIVITY LOG**

Daily Activity Logs will be maintained and will include the following:

- Date and recorder of field information.
- Start and end time of work activities, including lunch and downtime.
- Visitors.
- Weather conditions.
- Important telephone calls.
- Any deviations from planned activities.
- Equipment checks and calibrations.
- Equipment monitoring results, if applicable.
- QCI Performed.
- Nonconforming conditions.
- Lessons Learned.
- Signatures of the SUXOS and UXOQCS indicate concurrence.

#### **4.17. SAFETY LOG**

Safety Logs will include the following:

- Date and recorder of log.
- Significant site events relating to safety.
- Accidents.
- Stop Work due to safety concerns.
- Lessons Learned.
- Safety Audits.
- Signatures of the SUXOS and UXOQCS indicate concurrence.

#### **4.18. TRAINING LOG**

Training will be documented in the Training Log as follows:

- Date and recorder of log.
- Nature of training.
- Tailgate safety briefings (including time conducted, the person conducting the briefing, and attendees).
- Visitor Training (including names of visitors, description of the training, and the person performing training).
- Signatures of the SUXOS and UXOQCS indicate concurrence.

#### **4.19. MEC IDENTIFICATION AND REPORTING**

The SUXOS and UXOSO must be in agreement on the condition of a suspected MEC item before any removal action is attempted. All available data sources will be consulted prior to this determination.

As MEC/MPPEH is located, it will be documented on the MEC Accountability Log (Appendix F). A detailed accounting of all MEC items encountered during the removal action will be maintained. This accounting will include:

- Identification Number (a unique ID #).
- Location.
- Nomenclature.
- Fuse Description.
- Fuse Condition.
- Additional comments, if required.

Each suspect MEC/MPPEH encountered will be identified using a unique numerical identifier, such as A5-0001 (for the first suspect item [0001] encountered in grid/area A5).

Photographs of suspect MEC/MPPEH will be taken for documentation purposes. A ruler or some similar item, to show scale, will be placed adjacent to the item. The photographer needs to remember these photographs will be utilized in the SSFR; thus, a focused, well-thought-out photograph is necessary.

MEC identification data will be entered into an electronic MEC Accountability Log daily. Terminology and definitions used when completing the MEC Accountability Log will be consistent with those given in the 21 April 2005 Memorandum from the Office of the Assistant Secretary, Installation and Environment; Subject: Munitions Response Terminology. The UXOQCS will review this data to ensure accuracy and consistency in reporting. This review will include a comparison of photographs with recorded data. Any conflict or discrepancy will be discussed and resolved with the Team Leader. Signatures of the SUXOS and UXOQCS on the MEC Accountability Log indicate concurrence of the reported data.

#### **4.20. LESSONS LEARNED**

Lessons learned from day-to-day activities are an important part of the continuous improvement process. They can prove vital to preventing similar problems from occurring at other sites. Lessons learned from daily activities and from the occurrence of nonconforming conditions will be documented by the UXOQCS and UXOSO, as appropriate. Lessons learned as a result of nonconforming conditions are captured and documented on the QCIR as a result of its investigation and disposition. Other Lessons



learned, from both positive and negative events will be documented in the Daily Activity Log and/or Safety Log. These items will be included in the SSFR. The QA/QC Manager will maintain a database of lessons learned for communication to other sites and for incorporation into training requirements.

#### **4.21. TRAINING**

The PM will verify that all project personnel has completed the following training prior to their assignment:

- U.S. Naval Explosive Ordnance Disposal (EOD), Indian Head, Maryland / Eglin AFB, FL or EOD Assistance Course, Redstone Arsenal, AL / Eglin AFB, FL or other formal courses of instruction meeting the requirements in DDESB TP 18 appropriate to the level of employment.
- Occupational Safety and Health Administration (OSHA) 40 Hour Hazardous Waste Operations and Emergency Response (HAZWOPER) IAW 29 Code of Federal Regulations (CFR) 1910.120 and 8-hour refreshers as needed.
- UXOSO will have OSHA 30-hour Safety Course.
- Site-Specific Training on this Work Plan and additional training, as needed, will be performed and documented on a QCIR, which will be forwarded to the PM for review.
- Safety Meetings will also be documented.
- The UXOQCS will ensure that all personnel using geophysical detection equipment are properly trained to use that piece of equipment. This may include verification of past experience as well as on-site training on using specific equipment in site-specific conditions, which will be documented on a QCIR and forwarded to the PM.
- If sweep personnel are employed, they will receive site-specific training related to the task that they will perform.

The UXOQCS will conduct, as necessary, site-specific training and/or review of known MEC to ensure that all site personnel are thoroughly familiar with the hazards and the general safety precautions and procedures required. All personnel and site visitors will also receive site-specific training and safety briefings, as required, to ensure safety on the project. Visitors must be briefed on all of the known or anticipated hazards of the site, required PPE to be worn while on the site, and site emergency procedures. Visitors will be escorted by a UXO qualified person whenever they enter the EZ, and all UXO operations will cease whenever a visitor is within the EZ.

#### **4.22. CHEMICAL QUALITY DATA MANAGEMENT (CQDM)**

No Hazardous, Toxic, and HTRW or Chemical Warfare Material (CWM) is expected at this site per the PWS, therefore a CQDM sub-plan is not applicable.

#### **4.23. QC DOCUMENTATION SUBMITTAL**

All QC documentation required by this Work Plan will be submitted as part of or as supporting documentation for the SSFR.

#### **4.24. QC RECORD RETENTION**

All original QC Records and documentation will be maintained on-site and made available for Client inspection upon request

## 5. CHAPTER 5 EXPLOSIVE MANAGEMENT PLAN

### 5.1. General

This plan details the management of explosives that may be required for the destruction or venting of MEC, suspected MEC, or MPPEH items at CRP. This plan was developed utilizing the guidelines specified in Federal Acquisition Regulation (FAR) 45.5, local and state laws and regulations, Alcohol Tobacco and Firearms Publication (ATFP) 5400.7, DA Pamphlet 385-64, and Department of Transportation (DOT) regulations. Explosives used in the performance of this Task Order will be obtained from commercial sources. These materials will be obtained and used for the specific purpose of disposal of MEC and explosive venting of inert MEC/MPPEH items, if required, recovered during the activities at the CRP site. A Remote Firing Device (RFD) will be used with an electrical detonator system. A shock tube (pyrotechnic lead) initiator may be substituted for the electrical detonator depending upon availability from the supplier.

Explosives will be delivered to the site in the quantities required on the day of planned demolition operations. All explosives delivered to the site will be consumed in the demolition operations on the same day they are delivered.

### 5.2. Licenses/permits

Tetra Tech will maintain on site and, upon request, make available to any local, state, or federal authority a copy of all licenses/permits required authorizing Tetra Tech to purchase, store, transport, or use explosives. If no other licenses or permits are required by the state, Tetra Tech will maintain a copy of the Federal ATF license on-site.

### 5.3. Description and Quantities

Explosive materials used during the performance of the work on this project will be obtained from commercial sources. These explosive materials will be for the specific purpose of disposal of suspect MEC/MPPEH and explosive venting of inert items, if required, located during the removal action. An RFD with an electrical or nonelectrical (shock tube) firing system will be utilized. If an RFD is not available, a hard-wired electrical firing system may be used. Donor explosive materials will be delivered to the site and will be consumed in the demolition operations on the same day they are delivered.

Materials to be delivered to the site may include (approximate quantities):

- 10 each Electric Blasting Caps (1.4B) or
- 10 each Nonelectric initiators (1.4B)
- 100 each Shaped Charge perforators, 32 gram (1.1.D)
- 1000 feet Detonation Cord, (1.1D) 50 each Cast Booster ½ lb. (1.1D)

Depending upon availability from the suppliers, other sizes of boosters and/or perforators may be used. In any case, material to be used for donor explosives will be suitable for the items to be destroyed. Quantities may also vary due to minimum order quantities requirements (generally case lots).

Typically 2 ea. electric blasting caps (1.4B); and 2 ea. 32-gram perforators (1.1D) and/or 2 ea ½ lb cast booster

(1.1D) will be used during disposal or venting operations for a single item, and a detonation cord (1.1D) will be used to link perforators and/or cast boosters if multiple items are disposed of in a single demolition shot. Depending upon availability, shock tube (Non El) detonators may be used in place of electric detonators.

#### **5.4. Acquisition Source**

Donor explosives will be obtained from a regional explosives vendor or other licensed supplier, who agrees to supply and deliver the necessary quantities of demolition explosives.

##### List of Explosive Materials

As stated above, explosives that are expected to be used are:

- Electric Blasting Caps (1.4B) or
- Nonelectric initiators (1.4B)
- Shaped Charge perforators, 32 gram (1.1.D)
- Detonation Cord, (1.1D)
- Cast Booster ¾ lb. (1.1D)

Depending upon availability from the suppliers, other sizes of boosters and/or perforators may be used. In any case, material to be used for donor explosives will be suitable for the items to be destroyed.

#### **5.5. Initial Receipt Procedures**

Upon receipt of donor materials from licensed explosive suppliers, an inventory will be conducted to ascertain:

- correct type
- serviceable condition
- correct quantity

A copy of the invoice(s) for the incoming donor materials will be kept in the on-site donor materials accountability file.

Upon receipt, an Initial Receipt and Closeout Inventory form will be prepared, with the following information, and retained on-site:

- Date of acquisition
- Name or brand name of the manufacturer
- Manufacturer's marks of identification
- Quantity
- Description
- Name, address, and license number of the persons from whom the explosive materials are received

#### **5.6. Procedures for Variances between quantities shipped and quantities received.**

If any discrepancies of any kind should be found during the initial receipt inventory and inspection, the following procedures will be followed:

- If, during the initial receipt inventory, a discrepancy is found between the quantity listed on

the invoice and the quantity being delivered, the quantity received will be annotated on the invoice and on the memorandum.

- The SUXOS will notify the supplier of the discrepancy before the explosives are accepted from the supplier's representative.
- The PM will be notified telephonically, with a copy of the Initial Receipt and Closeout Inventory form and a copy of the invoice being emailed as soon as possible.

## **5.7. Establishment of the explosive storage facility**

A storage facility for donor explosives will not be established at CRP. Donor explosive materials required for destruction or venting of MEC/MPPEH will be ordered from commercial suppliers and delivered to the site when needed for demolition operations. All donor explosive materials received will be used the same day or returned to the supplier.

Recovered MEC/MPPEH will be stored in an ATF Type 2 Magazine. When discovered, it will be inspected to determine if it is acceptable to move. If acceptable to move, it will be stored in the sited magazine until demilitarization activities can be conducted. If it is determined to be unacceptable to move, it will be blown in place. MEC/MPPEH will be guarded, as necessary to ensure the protection of the public (e.g. accessible to the public), until demolition operations are completed.

## **5.8. Physical security of explosive storage facility**

An explosives storage facility will not be established for this project. Explosives for disposal of MEC will be provided and delivered by a local vendor and delivered on an as-needed basis. While donor explosives are on site, Tetra Tech will comply with all applicable regulations and requirements of ATF regulations, and DESC requirements for the security of explosives. Recovered MEC/MPPEH will be stored in an ATF Type 2 Magazine. The Magazine will be secured by the erection of a temporary fence that will be 8 to 10 ft in height and has one locked entry point.

## **5.9. Receipt Procedures**

### **5.9.1. Accountability**

Upon receipt from the vendor, accountability will be established for each type of explosive material IAW Paragraph 5.5 and 5.6 above. Copies of vendor invoices will be kept with the Initial Receipt and Closeout Inventory form in the donor materials accountability file in the on-site project office.

Any transactions, which include receipt, issue, and/or turn-in of donor materials, will be conducted by two persons, at least one of whom will be a UXO Tech III or higher. Discrepancies will be resolved immediately. If it is determined that a theft or loss has occurred, the procedures in Section 5.13 will be followed.

All documents associated with receipt, transfer, issue, or turn-in of donor explosives will be maintained in the Donor Materials Accountability file in the on-site project office.

### **5.9.2. Designated Individuals**

The following individuals are authorized to order and receive explosives from the supplier:

- Senior UXO Supervisor
- UXO Safety Officer

The following individuals are authorized to transport and use donor explosives:

- Senior UXO Supervisor
- Site Safety and Health Officer
- UXO Tech III
- UXO Tech II

### 5.9.3. Explosive Use Certification

At the conclusion of the daily demolition operations, the SUXOS will finalize the Initial Receipt and Closeout Inventory form stating all donor explosives expended during MEC removal operations were used for their intended purpose.

## 5.10. Inventory

Explosives will be delivered to the site in the quantities required on the day of planned demolition operations. All explosives delivered to the site will be consumed in the demolition operations on the same day they are delivered. Therefore, no inventory will be maintained on site.

## 5.11. Procedures upon Discovery of Lost, Stolen, or Unauthorized Use of Explosives

Lost, stolen, or unauthorized use of explosive materials will be reported as follows:

- The SUXOS will give an immediate telephonic notification to the PM, who will notify the DESC, followed up by a written report within 24 hours.
- Notify ATF at 800-800-3855, within 24 hours of discovery (complete ATF Form 5400.5, Report of Theft or Loss - Explosive Materials and mail to nearest ATF office. Instructions for completion of the form are on the reverse side.);
- Notify the local law enforcement agency.

## 5.12. Returning Explosives to the Explosive Storage Area

Explosives will be delivered in the quantity required for the planned demolition operation and all delivered commercial explosives will be consumed in the demolition operation.

## 5.13. Disposal of Unused Explosive Materials

Explosives will be delivered in the quantity required for the planned demolition operation and all delivered commercial explosives will be consumed in the demolition operation.

### 5.13.1. Perform an economic analysis for different alternatives

This requirement does not apply to this Task Order.

## **6. CHAPTER 6 ENVIRONMENTAL PROTECTION PLAN**

This chapter of the Work Plan describes environmental concerns and describes methods used during site activities designed to minimize pollution, protect and preserve natural resources, restore damage, and control noise and dust within reasonable limits.

### **6.1. Identification of Environmental Concerns**

Environmental concerns associated with the CRP are addressed in the Joint Application submittal to USACE, including the Project Description in Appendix I.

### **6.2. Mitigation Procedures**

#### **6.2.1. Manifesting, transportation, and Disposal of Waste**

No explosive hazardous waste that will require off-site transportation, treatment, storage, or disposal is anticipated to be generated. MEC/MPPEH will be destroyed on-site, and resulting scrap will be certified as MDAS and turned over to a recycler for smelting before it is released to the public.

Non-hazardous and municipal waste generated during this project will be transported to an approved landfill for disposal. If generated, waste material containing TLM from equipment decontamination or other sources will be contained in appropriate containers and/or staged for disposal with impacted sediment material.

#### **6.2.2. Burning Activities**

Burning activities will not be conducted during the performance of work required in the PWS.

#### **6.2.3. Dust and Emission Control**

None of the planned activities are expected to generate significant dust. Excavation operations using mechanical equipment may generate small quantities of nuisance dust. The SUXOS, UXOSO/QCS, and Team Leader will closely monitor dust emissions resulting from soil excavation operation. Dust masks will be available to workers in areas of high dust concentrations.

Other emissions will primarily result from the operation of diesel engines associated with excavation equipment. These emissions will be limited by limiting the time that equipment idles when not in use. Team leaders will ensure that equipment is turned off when not in use. If excessive emissions are generated due to engine maintenance, equipment will be shut down until inspected by a mechanic.

#### **6.2.4. Spill Control and Prevention**

Field personnel will inspect vehicles and heavy equipment before, during, and after operation to identify any leaks of petroleum, oil, and lubricants (POL). If leaks are detected, the equipment will not be used until the leak is controlled. Drip pans will be used to catch dripping POL.

POL will be stored on-site in approved containers, in approved areas with required containment. If a spill occurs, it will be reported immediately. Immediate steps will be taken to contain the spill and limit contamination. Contaminated soil will be excavated and packaged for treatment or disposal.

#### 6.2.5. Storage Areas and Temporary Facilities

Chemical toilets may be placed on the site. These toilets will be delivered, set up, and serviced by a subcontractor.

#### 6.2.6. Access Routes

Field personnel will primarily use existing roads and trails or new temporary access roads installed by DESC for the project to access the work areas. These routes will allow access by foot or light vehicle to areas requiring MEC clearance.

#### 6.2.7. Trees and Shrubs Protection and Restoration

The project area requiring MEC clearance is within the Congaree River. Tetra Tech will coordinate with DESC to obtain approval if necessary, in the unlikely event that removal of trees or shrubs is required to safely and efficiently conduct MEC clearance activities.

#### 6.2.8. Control of Water Run-on and Run-off

Extensive excavations for MEC clearance that would require run-on or run-off controls is not anticipated.

#### 6.2.9. Decontamination of Equipment

Soil will be thoroughly cleaned from equipment and tools at the end of the project. Tools and equipment will be cleaned by brushing, sweeping and/or wiping dirt from them. Equipment may be further cleaned at established wash facilities.

Due to the presence of TLM, additional cleaning and decontamination may be necessary, including the use of soaps, detergents, or solvents if necessary. Waste material from equipment decontamination will be contained in appropriate containers and/or staged for later disposal with the impacted sediment material.

#### 6.2.10. Minimizing Areas of Disturbance

Field personnel will minimize the areas of disturbance by working only in the areas designated in the PWS and designated for MEC clearance activities. Field personnel will limit vegetation removal and excavation to what is necessary to complete the work.

### 6.3. Post-activity Clean-up

After completing the project, field personnel will clean up the site and remove all equipment, tools, and material. Field personnel will police the site to remove all trash, debris, and other waste from the worksite. The SUXOS will inspect the area to ensure that area is clean prior to demobilization.

### 6.4. Air-monitoring Plan

There is no RCWM expected at this site. If dust levels become a nuisance or hazard to workers, water may be used as an engineering control to lower the dust levels. Dust masks will be worn, as required to further reduce exposure to dust.

Due to the presence of TLM in the removal areas, air monitoring for dust and other potential

---

contaminants will be performed by DESC as outlined in an air monitoring plan that will be submitted to SCDHEC for approval prior to project implementation.



## **7. CHAPTER 7 PROPERTY MANAGEMENT PLAN**

**This Chapter does not apply to this Task Order.**

*No Government Furnished Equipment is to be used on this project.*

## **8. CHAPTER 8 INTERIM HOLDING FACILITY SITING PLAN FOR RCWM PROJECTS**

**This Chapter does not apply to this Task Order.**

*RCWM is not expected to be encountered at the site where activities described in this Work Plan will take place. No Interim Holding Facility for RCWM is required in the PWS.*

## **9. CHAPTER 9 PHYSICAL SECURITY PLAN FOR RCWM PROJECT SITES**

**This Chapter does not apply to this Task Order.**

*RCWM is not expected to be encountered at the site where activities described in this Work Plan will take place. No Physical Security Plan for RCWM is required in the PWS.*

## 10.CHAPTER 10 -- REFERENCES

Alcohol Tobacco Firearms (ATF), Publication 5400.7, Federal Explosives Laws
Department of Defense Explosives Safety Board (DDESB), TP-16, Methods for Calculating Primary Fragment Characteristic
Department of Defense Explosives Safety Board (DDESB) TP-18, Minimum Qualifications for Unexploded Ordnance (UXO) Technicians and Personnel
Department of Defense (DoD), 4160.21-M-1, Defense Demilitarization Manual
Tetra Tech Corporate Quality Plan
Tetra Tech Corporate Safety Plan
<a href="http://www.ersys.com/usa/45/4516000/wtr_norm.htm">ERsys.com, http://www.ersys.com/usa/45/4516000/wtr_norm.htm</a> ; Climate Weather Norm Charts for Columbia, SC
National Fire Protection Association, NFPA 780, Standard for the Installation of Lightning Protection Systems
U.S. Army Corps of Engineers (USACE), Congaree River Basin Navigability Study, 1977.
U.S. Army Engineering Support Center Huntsville OE-CX Interim Guidance 02-03
U.S. Army, AR 385-64 Explosives Safety Program
U.S. Army, TM 60-Series Training Manuals
USACE, EM 200-1-15, Ordnance and Explosives Response
USACE, EM 385-1-1, USACE Safety and Health Requirements Manual
USACE, EM 385-1-97, Explosive Safety and Health Requirements Manual Change 1
USACE, EP 1110-1-18, Ordnance and Explosives Response
USACE, EP 75-1-2, MEC Support During Hazardous, Toxic, and Radioactive Waste (HTRW) and Construction Activities
USACE, ER 1110-1-12, Quality Management
USACE, OE-CX Interim Guidance 08-01

APPENDIX A  
**TASK ORDER SCOPE OF WORK**

*(TITAN/Tetra Tech has only been contracted to prepare plans, and no formal SOW was prepared. TITANs proposal for currently scoped work is presented below)*

MUNITIONS RESPONSE WORK PLAN CONGAREE RIVER PROJECT  
**REMOVAL ACTION AND CONSTRUCTION SUPPORT**  
**COLUMBIA, SC**

Date: 10/23/2020

Mr. William Zeli, P.E  
Environmental Program Manager  
Apex Companies, LLC  
1600 Commerce Circle  
Trafford, PA 15085

Subject: DESC Congaree River Project

Dear Mr. Zeli,

Please find below TITAN's updated cost to review and revise the existing Congaree River plans in the event the MRA is approved.

Task 1- MEC Work Plan (WP). The WP will be modified/updated in accordance with Data Item Description (DID) WERS-001.01, EM 385-1-97, and EP 75-1-2, MRA and will address UXO support at the remediation site. The WP will describe specific work proposed in order to meet the project objectives and requirements. The WP will contain, at a minimum, a Technical Management Plan, an Explosive Management Plan, an Accident Prevention Plan, which includes a Site Safety and Health Plan, and a Quality Control Plan (QCP). The QCP shall be a detailed and comprehensive plan covering all aspects of the UXO support.

Task 2- Explosives Safety Submission (ESS). TITAN will modify or develop an amendment to the ESS in accordance with requirements of the Department of Defense (DoD) Manual 6055.09-M (DoD, 2008a).

Task 3- Dive Safe Practices Manual. TITAN will update the Dive Safe Practices Manual prepared in accordance with the requirements in EM 385-1-1 Section 30.

Task 4- Diving Operations Plan. TITAN will update/modify the project specific Diving Operations Plan.

Task 5- Virtual Meetings. Virtual meetings will consist of two TITAN employees, The Project Manager and the SUXOS. This task is an hourly rate.

Task 6- In-person Meetings In-person meetings are based on a per event cost. This task consists of personnel time (Project Manager and SUXOS) of 18 hours each. This included 3 hours to attend the meeting and 10 hours travel round trip. This also include lodging for one night at \$112.00 GSA rate and per diem of \$61 a day and 75% on travel day.

If you have any questions or concerns, please feel free to contact me at 423-368-9197 or email [tleonard@titan-associates.net](mailto:tleonard@titan-associates.net).

Thank you,  
Tanya Leonard  
President / CEO  
Titan Associates Group Inc.  
Phone: 423-368-9197  
[www.titan-associates.net](http://www.titan-associates.net)  
Mailing Address:  
P.O. Box 102  
Athens, TN 37371

APPENDIX B MAPS

**MUNITIONS RESPONSE WORK PLAN**  
**CONGAREE RIVER PROJECT**  
REMOVAL ACTION AND CONSTRUCTION SUPPORT COLUMBIA, SC



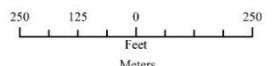


**Legend**

Extent of Proposed TLM Removal



NAD 1983 StatePlane South Carolina (Feet)  
Data Provided By:  
Apex Companies, LLC



Location Map:  
Fort Benning, GA

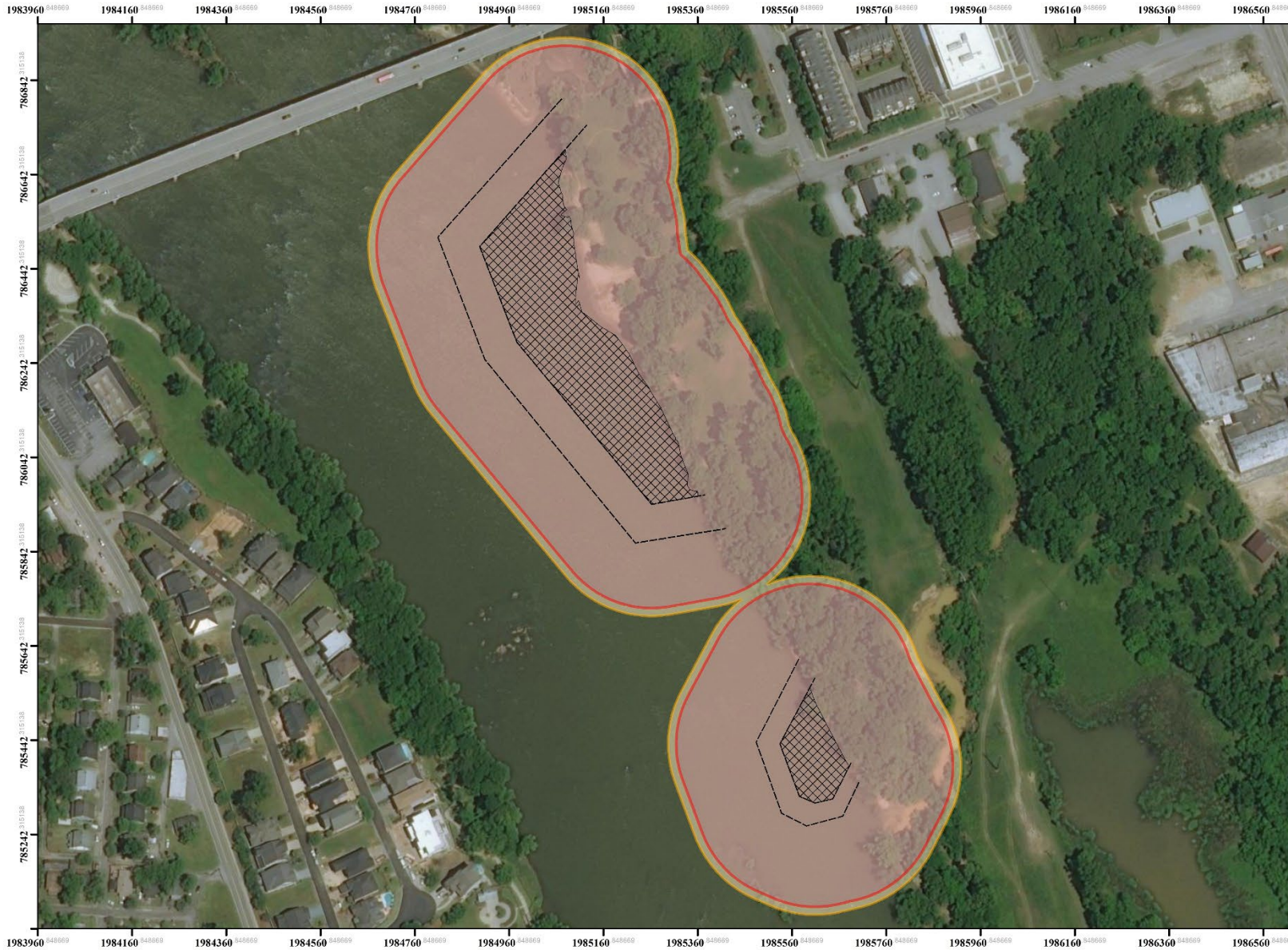


**FIGURE B-1  
SITE LOCATION  
CONGAREE RIVER PROJECT  
COLUMBIA, SOUTH CAROLINA**

Prepared For:  
Apex Companies, LLC

Prepared By:  
ITIAN Associates Group inc. ITIAN

DRAWN M. Norris	VERIFIED T. Leonard	APPROVED
DATE 01/8/2021	FILE B-1 Site Location.mxd	
PAGE # B-1	SCALE 1 inch = 250 feet	

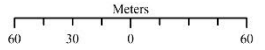
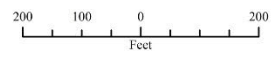


**Legend**

- Proposed Cofferddam Location
  - ▣ Extent of Proposed TLM Removal
- Utilization of Engineering controls will provide the following:
- ▣ Sand Bag Mitigation Minimum Safe Distance of 220 ft
  - ▣ Hazardous Fragmentation Distance 237 ft



NAD 1983 StatePlane South Carolina (Feet)  
Data Provided By:  
Apex Companies, LLC



Location Map:  
Fort Benning, GA



**FIGURE B-2  
INTENTIONAL  
DETONATION DISTANCES  
CONGAREE RIVER PROJECT  
COLUMBIA, SOUTH CAROLINA**

Prepared For:  
Apex Companies, LLC

Prepared By:  
TITAN Associates Group inc. TITAN

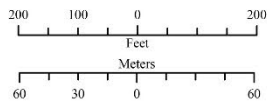
DRAWN	VERIFIED	APPROVED
M. Norris	T. Leonard	
DATE	FILE	
01/8/2021	B-2 Ares.mxd	
PAGE #	SCALE	
B-2	1 inch = 200 feet	



- Legend**
- Magazine
  - Proposed Cofferdam Location
  - ▨ Extent of Proposed TLM Removal
  - PTRD-Low 75 ft  
(31 Lbs Net Explosive Weight)
  - PTRD-Medium 120 ft  
(31 Lbs Net Explosive Weight)
  - IBD/PTRD-High 200 ft  
(31 Lbs Net Explosive Weight)



NAD 1983 StatePlane South Carolina (Feet)  
Data Provided By:  
Apex Companies, LLC

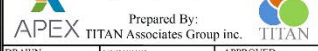


Location Map:  
Fort Benning, GA



**FIGURE B-3  
MEC STORAGE MAGAZINE  
PROPOSED LOCATION  
CONGAREE RIVER PROJECT  
COLUMBIA, SOUTH CAROLINA**

Prepared For:  
Apex Companies, LLC



Prepared By:

DRAWN M. Norris	VERIFIED T. Leonard	APPROVED
DATE 01/08/2021	FILE B-3 Magazine.mxd	
PAGE # B-3	SCALE 1 inch = 200 feet	

APPENDIX C POINTS OF CONTACT

**MUNITIONS RESPONSE WORK PLAN**  
**CONGAREE RIVER PROJECT**  
REMOVAL ACTION AND CONSTRUCTION SUPPORT COLUMBIA, SC

<b>Emergency Response / Services</b>			
Ambulance Service			911
Emergency Medical Response			911
Police*			911
Police Department – Non emergency			803-545-3500
Hospital-Palmetto Health Richland 5 Richland Medical Park Dr Columbia, SC 29203			803-434-7000 * For Emergency Dial 911
Fire Department*			911
Fire Department – Non Emergency			803-545-3700
National Poison Control Center			800-222-1222
CHEMTREC (hazardous materials response)			800-424-9300
National Response Team (hazardous materials response)			800-424-8802
Centers for Disease Control (CDC) <a href="http://www.cdc.gov/health/diseases">http://www.cdc.gov/health/diseases</a>			800-311-3435
<b>Project Management / Coordination</b>			
Tetra Tech			
	Operating Unit President	Mark Dollar	970-206-4263
	Project Manager	Scot Wilson, PMP	360-626-3193
	Safety Manager	Jim Streib	240-727-9240
DESC			
	Project Manager	Rusty Contrael	412-721-6494
APEX			
	Environmental Program Manager	William Zeli, P.E.	412-829-9650 x5004
Explosives Supplier			
	TBD	TBD	TBD

APPENDIX D ACCIDENT PREVENTION PLAN

**MUNITIONS RESPONSE WORK PLAN**  
**CONGAREE RIVER PROJECT**  
REMOVAL ACTION AND CONSTRUCTION SUPPORT COLUMBIA, SC

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**APP APPROVAL**

Project: Surface/Subsurface Clearance      Site: Congaree River Project

Contract Number: 87500614      Site Location: Columbia, SC

We have reviewed the attached Accident Prevention Plan (APP) for the referenced site. We recognize that when this form is completed, the attached APP is approved for field activities on the referenced site. Changes to this APP will be documented in writing.



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Prepared by:  
Jeffrey (Jim) Streib, CIH, CSP, CHMM

January 13, 2022  
Date



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Reviewed by:  
Scot Wilson  
Program Manager

January 13, 2022  
Date



## 1.0 BACKGROUND INFORMATION

**Contractor:** Titan Associates Group, Inc.

**Contract Number:** 87500614

**Project Name:** MEC/UXO Clearance and Support  
Congaree River Project  
Columbia, South Carolina

## 2.0 PROJECT DESCRIPTION AND HISTORY

Apex Companies, LLC (APEX) contracted Titan Associates Group, Inc (TITAN) to perform Work Plan updates and Munitions Response (MR) service consisting of Unexploded Ordnance (UXO) support for clearance of Munitions and Explosives of Concern (MEC) and Material Potentially Presenting an Explosive Hazard (MPPEH). The MR is necessary to support the contaminated soil and sediment removal on the Congaree River Project (CRP), located in Columbia, South Carolina (SC), for Dominion Energy South Carolina (DESC). Since the project plans were finalized, TITAN has gone out of business, and Tetra Tech has been contracted to take over the UXO MR support for the project. Revision 2 contains the revisions required for Tetra Tech to perform the UXO field support. These changes include adding Tetra Tech's SOPs, processes, and staffing changes as well as changes to the designated project team and stakeholders since Revision 1 was finalized.

**Site Location:** The CRP area is located on the Congaree River in Columbia, SC. The site, also referred to as the "project area", begins directly south of the Gervais Street Bridge, extends approximately 200 feet into the river from the eastern shoreline, and approximately 1,500 feet downriver, towards the Blossom Street Bridge. The MEC intrusive activities will occur on the eastern side of the Congaree River between Gervais and Blossom Street Bridges, within the cofferdam footprint and removal areas shown on the figures in Appendix B.

**Site history:** In 1865, during the Civil War, Discarded Military Munitions (DMM) and other articles of war produced by the Confederacy were dumped into the Congaree River near the Gervais Street Bridge by Union forces under the direction of General Sherman. This activity took place during Sherman's occupation of Columbia. The Union Army kept some of these items for its own use and the remainder was destroyed. One of the methods for destruction was dumping the items into the river.

Archeological investigations, conducted as late as 1980, recovered some MEC from the area as well as some other potentially historically significant artifacts. Specifically, this work was focused in and adjacent to the unnamed tributary that enters the river just south of the Gervais Street Bridge. Several cannonballs were identified during this operation and properly disposed of by trained explosive ordnance disposal (EOD) personnel located at nearby Fort Jackson.

Due to the potential presence of MEC/MPPEH within the project area, an additional reconnaissance and screening of the area in question was conducted as part of the investigative activities. An acoustic (side-scan sonar) and magnetic (magnetometer) remote sensing survey was performed to identify ordnance and other submerged cultural resources in the remediation area by Tidewater Atlantic Research, Inc., and a report was submitted on 8 February 2012. Analysis of the survey data identified concentrations of

anomalies in the immediate vicinity of the Senate Street landing and scatters extending into the river. A terrestrial magnetometer investigation of the unnamed tributary below the Gervais Street Bridge was also carried out and that investigation identified eight additional anomalies with a potential association with ordnance.

In June 2010, the occurrence of TLM within the Congaree River was reported to the SCDHEC. Preliminary testing indicated that the material might be attributable to the Huger Street former MGP that was operated by predecessor companies of DESC beginning in the early 1900s and ending in the 1950s.

Preliminary sample results conducted on the material by SCDHEC and DESC indicated that the TLM had similar chemical and physical characteristics as coal tar. The coal tar material was a waste product from coal-gas production. DESC had previously entered into a VCC with SCDHEC in August 2002 to conduct environmental assessment and cleanup activities at the former Huger Street MGP site. The VCC was later extended to include the TLM impacts within the Congaree River.

**Planned Removal Action:** To address the presence of TLM within the river, a Stakeholder-Developed Modified Removal Action was developed and submitted to SCDHEC in December 2018. Two areas within the river, along the eastern shoreline, were proposed for removal of impacted sediment. The TLM-impacted sediment varies in thickness from a few inches to approximately 6 feet thick in some areas. The current total estimate of sediment requiring removal is approximately 11,675 cubic yards. The total project area within the river, including cofferdam footprints and removal areas, is estimated to be 5.8 acres. Sediment removal from within the river will occur after coffer dams are installed and water has been removed. Intrusive diver removal operations of metallic anomalies will be conducted prior to the installation of the cofferdams.

In December 2018, a Stakeholder-Developed Plan for the MRA was developed to reduce the footprint of the project area. The footprint was reduced to the current 2.6-acre area 1 and area 2 approximately 0.5 acres.

The removal of MEC from the cofferdam footprints and impacted sediments and assisting in the segregation and disposal of impacted sediments covered under the Work Plan is to protect worker safety and the environment. The MEC clearance area for the cofferdam footprints and removal areas is shown on the figures in Appendix B.

## 2.1 Chemical Warfare Material

The site is not suspected of containing CWM. However, if a suspected RCWM is encountered during removal and/or support activities, the procedures listed below will be followed:

Upon an unexpected discovery of RCWM, all work will immediately cease. Project personnel will withdraw along a cleared path upwind from the discovery. A team, consisting of a minimum of two personnel, will secure the area to prevent unauthorized access. Personnel must position themselves as far upwind as possible while still maintaining visual security of the area. Upon evacuation, the Senior Unexploded Ordnance Supervisor/Unexploded Ordnance Safety Officer (SUXOS)/(UXOSO) will account for all worksite personnel and immediately notify the DESC on-site representative who will coordinate the emergency response with local and federal agencies.

Once the RCWM item has been removed and site plans updated according to the additional site hazards encountered, work may continue.

## 2.2 Hazardous Chemical Contamination

By definition, hazardous substances are those materials that can threaten human health and/or environmental wellbeing if released into the environment. This describes those hazardous substances or chemical contaminants present in soil or air that pose a threat to the environment, and as such may pose a threat to site personnel and the public during removal actions. From what is currently known about the project area, TLM is expected to be present. It is prudent to be particularly aware of unusual smells, soils stains, or other indications of impacts and to follow the health and safety procedures established for this work. If drums/containers are encountered or there is reason to believe that an unplanned chemical hazard exists, the SUXOS/UXOSO will stop work and report to the Corporate Health and Safety Manager as much information as is known (i.e., names of chemicals if containers have labels, condition of containers, extent of problem, etc.) and plans will be updated to accommodate these additional site hazards prior to resuming work on the site.

## 2.3 Improved Conventional Munitions.

The site is not suspected to contain Improved Conventional Munitions (ICM). If suspect ICM munitions that are not determined to be practice munitions are encountered during any phase of site activities, contractor personnel will immediately withdraw from the work area, secure the site, and contact the DESC representative for assistance and guidance.

## 3.0 ACCIDENT EXPERIENCE

Tetra Tech has an excellent safety record. Since its creation in 2019, Tetra Tech munitions group has never had a lost time accident / injury. Tetra Tech's current Experience Modification Rate is 0.74. Tetra Tech's lost time injury rate is 0.

## 4.0 PHASES OF WORK REQUIRING HAZARD ANALYSIS

The following phases of work on this project require an Activity Hazard Analysis:

- Site-Setup/Layout
- Surface Preparation / Vegetation Removal
- Subsurface Clearance using "Mag & Dig" Methods
- Transportation of Explosives
- Disposal of MEC/MPPEH
- Mechanical Excavation (if used)

Activity Hazard Analyses can be found in this Accident Prevention Plan (APP) at Section 14.0 of this Appendix.

## 5.0 STATEMENT OF SAFETY AND HEALTH POLICY



# HEALTH AND SAFETY POLICY

Tetra Tech, Inc. is committed to providing and maintaining a healthy and safe work environment for our associates. Tetra Tech's program is designed to address the hazards associated with our business and prevent injury and illness in the workplace. Tetra Tech intends to meet its responsibilities for health and safety by committing to the following:

- Complying with applicable standards, laws and regulations,
- Designating personnel accountable for implementing health and safety programs,
- Communicating health and safety programs and practices throughout the organization,
- Mitigating potential risks through hazard identification and assessment, employee training and safe work practices,
- Allocating sufficient resources to the program,
- Implementing enforcement and accountability measures, and
- Establishing health and safety performance standards.

Management is responsible for ensuring that Tetra Tech workplaces are safe and that risks, hazards, and safety violations brought to their attention are investigated and promptly corrected.

Tetra Tech associates are responsible for complying with Tetra Tech's health and safety policy, programs and standards, and conducting their work safely and without detriment to themselves, other employees or property.

Compliance with health and safety program requirements are mandatory. Willful violation of this policy will be considered cause for disciplinary action up to and including termination.

Dan Batrack  
CHIEF EXECUTIVE OFFICER

JANUARY 2020

## 6.0 RESPONSIBILITIES AND LINES OF AUTHORITY

### 6.1 Identification and Accountability

The following personnel and their safety related responsibilities for this project work are listed.

**Operating Unit President (Mark Dollar)** is responsible for enforcement of the Corporate Health and Safety Program at all worksites within his area of responsibility. He must ensure that personnel receives the required training, medical surveillance, and personal protective equipment necessary in order to perform their jobs in a safe and effective manner. The enforcement of the Corporate Health and Safety Program on the worksites will be a critical rating element for site personnel and managers.

**Corporate Health and Safety Manager (Jeffrey (Jim) Streib)** is a CIH, CSP, and a CHMM. He assists in the development, implementation, and maintenance of the Safety Program and individual APP and Site Safety and Health Plan (SSHP). He visits projects as requested to ensure the effectiveness of the Health and Safety Program. He remains available for project emergencies. He develops or reviews modifications to APP/SSHP as needed. He evaluates occupational exposure monitoring/air sampling data and adjusts APP/SSHP requirements as necessary. He serves as a QC staff member and approves the APP/SSHP by signature. He coordinates directly with the PM and the SUXOS/UXOSO routinely to answer technical questions and to provide assistance to the worksites. He also provides safety training, as needed, and performs safety and health program inspections with the Safety and Health Manager to assure compliance with Tetra Tech's safety and health policy.

**Project Manager (Scot Wilson)** directly impacts the safety of the site by setting the tone for the job and encouraging safe performance among all team members. Any areas of concern or questions regarding health and safety issues are coordinated with the Corporate Health and Safety Manager, and the UXOSO. In instances of non-compliance with safety requirements, the PM issues warnings and/or provides disciplinary action up to and including removal of the employee from site operations, should this action be warranted. The PM assures that every accident on the worksite is investigated in order to determine the root cause(s), the accident report is filled out, and takes steps necessary to prevent recurrences.

**Senior UXO Supervisor (SUXOS)** is responsible for the successful accomplishment of the work on the project site. He directly supervises all site work and personnel and assures they are operating in a safe manner. He assures that all personnel, including visitors, are properly trained, qualified, equipped, and protected from the hazards associated with the worksite and site operations. The SUXOS reports directly to the Project Staff on all project issues. The SUXOS has stop-work authority. The SUXOS has numerous onsite responsibilities including, but not limited to:

- Coordinating with all applicable emergency response agencies to ensure appropriate response should an emergency develop on site;
- Establish medical evacuation routes and emergency telephone number listing;
- Inventory first aid equipment, PPE, fire extinguishers, and purchase replacements, as required, with concurrence from the PM;
- Survey the site for hazards;
- Provide daily safety briefings;
- Provide required safety training;
- Designate site control zones;

- Provide visitor briefing and training; and

### **UXO Safety Officer (UXOSO)**

They are granted the authority to administer the safety and health program on the worksite. The UXOSO reports directly to the Corporate Health and Safety Manager on all project safety and health issues, technical assistance on health and safety issues at the worksite, for assistance in ordering safety equipment, medical surveillance program issues, etc. The UXOSO has stop-work authority whenever an imminent danger situation is observed. The UXOSO has numerous onsite responsibilities to support the SUXOS in maintaining a safe work environment. These responsibilities may include, but are not limited to:

- Inventory first aid equipment, PPE, fire extinguishers, and purchase replacements, as required, with concurrence from the SUXOS and PM;
- Survey the site for hazards;
- Provide daily safety briefings;
- Provide required safety training;
- Provide visitor briefing and training;
- Perform onsite monitoring, if required;
- Perform daily safety inspections of site activities to verify compliance with all safety and health requirements in this project APP, as well as the Corporate Health and Safety Program and recording any deficiencies in the Safety Log; and
- Coordination of corrective actions for any deficiencies noted during safety inspections.
- Perform onsite monitoring, if required;

**Team Members** are responsible for performing their assigned tasks in a safe and effective manner. Questions must be immediately brought to the attention of their supervisor. Team members must not attempt to perform an assigned task for which they have not been properly trained. All personnel must attend required safety training and be aware of the operations going on around them at the worksite. Any situations or conditions, which may affect the safety and health of any team member, must be immediately reported to their supervisor. Before, during, and after use, personnel must inspect each piece of personal protective equipment, as well as other tools and equipment, to assure it is in a safe operating condition. Any equipment that is deemed unsafe for use must be immediately turned in for repair or replacement. Personnel must know how to properly use all equipment assigned to them and must use required personal protective equipment at all times.

### **Competent Persons and Qualified Persons**

CPs for anticipated health and safety related issues are designated by the PM and identified, by name, in the AHA where a CP is specifically required (e.g., for excavation) for a task. Subcontractor personnel will provide CPs as required where their tasks require a CP. The subcontractor CPs will also be designated by name in the AHA when needed. For tasks that require a QP, the AHA will also define the QP by name. The names of QPs or CPs designated by Tetra Tech management (e.g., the CSHM, or PM) in the AHAs will be provided to the DESC for review and acceptance before any work starting. No work will occur on-site unless a designated CP/UXOSO is present on the job site.

## 6.2 Lines of Authority

An organization chart depicting the lines of authority is included. Tetra Tech will require that the personnel and subcontractors follow the APP requirements and verify that they are met.

## 6.3 SUBCONTRACTORS AND SUPPLIERS

### Identification of Subcontractors and Suppliers

A local surveying company subcontracted through APEX or the remediation contractor will provide survey support for the project. Additional subcontractors are not anticipated. However, suppliers may deliver equipment and materials to the project site. All subcontractor personnel will be trained to the approved work plan and the included APP. All visitors, including suppliers supporting the project, will receive a safety brief from the SUXOS or the UXOSO prior to entering any area where work is ongoing. They will sign in and will be escorted as required to perform their functions on the site. Only essential personnel will be allowed in the EZ while intrusive operations are ongoing.

### Means for Controlling and Coordinating Subcontractors / Suppliers

All subcontracted personnel working on the site will receive the same thorough site-specific training provided to all site personnel. This training will include detailed training on procedures in the Work Plan and APP. All suppliers making deliveries on site will receive a safety briefing, which will include recognition and awareness of potential site hazards. Suppliers will not be permitted to enter the EZ of the project site unless escorted by a UXO-qualified employee.

### Safety Responsibilities of Subcontractors / Suppliers

All subcontractor personnel and suppliers making deliveries on site are responsible for receiving a safety briefing. They are responsible for following all site safety and health procedures. They will not enter any EZ area without a UXO-qualified escort. They will wear all required personal protective equipment while on the site in areas where it is required. They will report any accidents of their personnel to the SUXOS and UXOSO for investigation.

## 7.0 TRAINING

Prior to the commencement of site activities, the UXOSO will ensure that all employees engaged in MEC operations (a type of hazardous waste operation) are informed of the nature and degree of exposure to chemical and physical hazards that are likely to result from participation in site operations. Tetra Tech will accomplish this by ensuring that all personnel entering the site have received the appropriate regulatory and site-specific training, prior to participation in site activities. The other employees working on the site in other capacities not involving MEC or hazardous waste operations will receive training on the hazards of the MEC operations on site and on MEC recognition and avoidance procedures, as well as emergency procedures. This training will be held at the time of site mobilization and will be reinforced during the daily safety briefings, to which all site workers (including subcontractor personnel) will be required to attend.

## Safety Indoctrination Subjects

Safety indoctrination training will be presented by the UXOSO to all Tetra Tech employees, as well as to subcontractor personnel who will be working on this project site. This is part of on the job training (OJT), which includes classroom type instruction on the topics specified for site-specific training and on site participation in the following:

- Details of the APP;
- Employee rights and responsibilities;
- Safe work practices;
- Nature and extent of anticipated chemical, biological and physical hazards;
- Measures and procedures implemented for controlling site hazards;
- Emergency Response and Contingency Plan;
- Rules and regulations for vehicle use;
- Safe use of field equipment;
- Safe operation of heavy excavation equipment;
- Handling, storage, and transportation of hazardous materials;
- Use, care, and limitations of PPE;
- Hazard communication per OSHA 29 CFR 1910.1200.

If personnel who are not UXO-qualified come on the site, a UXO/MEC recognition and awareness training will also be presented. While there is a MEC/MPPEH hazard on the site, personnel will have a UXO-qualified employee escorting them. Once an area is cleared of surface MEC/MPPEH, these employees will be permitted to enter the area without escort as long as no intrusive operations are performed. The UXO/MEC recognition and awareness training provides an additional level of protection to these workers so that if they see something that could be ordnance related, they will know enough not to touch it and to immediately get a UXO-qualified employee to examine the item.

### 7.1 Initial Training

All Tetra Tech and subcontractor employees who are involved in MEC and/or hazardous waste site activities receive 40 hours of OSHA Hazardous Waste Operations and Emergency Response (HAZWOPER) training IAW 29 CFR 1910.120 (General Industry) and 29 CFR 1926.65 (Construction). If it has been more than a year since any worker has received the 40 Hour OSHA HAZWOPER training, he or she must also have a current HAZWOPER 8-Hour Refresher Training IAW 29 CFR 1910.120 and 29 CFR 1926.65 prior to working on the site. All production workers will also receive site-specific OJT under the direct supervision of a trained/experienced supervisor when they mobilize at the site.

### 7.2 Mandatory Training and Certifications Applicable to This Project

The following training and certifications are required for work on this project:

- EOD School Certificates (UXO-qualified personnel only)
- OSHA HAZWOPER 40 Hour Training
- OSHA HAZWOPER 8 Hour Refresher Training (as applicable)
- OSHA HAZWOPER Supervisor Training (Supervisors only)
- OSHA 30 Hour Safety Course (UXOSO)



- Valid vehicle operator license (All vehicle operators)
- Heavy Equipment Operator Training (Heavy Equipment Operators only)

### 7.3 Supervisory Training

On-site managers and supervisors, who are responsible for directing others, will receive the same training as the general site workers for whom they are responsible. They will also receive an additional 8 hours of OSHA required supervisory training IAW 29 CFR 1910.120 and 29 CFR 1926.65 to enhance their ability to provide guidance and make informed decisions. This additional training includes the following:

- Review of the Tetra Tech Corporate Health and Safety Program;
- Regulatory requirements;
- Management of hazardous waste site cleanup operations;
- Management of site work zones;
- How to communicate with the media and the public;
- PPE selection and limitations;
- Spill containment; and
- Monitoring site hazards.

The UXOSO, with specific responsibilities for safety and health guidance on site, will receive the training provided to general site workers and their supervisors. He also will receive advanced training in safety and health issues, policies, and techniques. The UXOSO will have completed an OSHA-approved 30-hour Construction Safety Class.

### 7.4 Project-Specific Training

The SUXOS and UXOSO will conduct OJT. This training will include classroom type instruction covering the topics specified for site-specific training, and on site participation in the following:

- Details of the Site-Specific Health and Safety Plan;
- Employee rights and responsibilities;
- Safe work practices;
- Nature and extent of anticipated chemical and physical hazards;
- Measures and procedures for controlling site hazards;
- Emergency Response and Contingency Plan;
- Rules and regulations for vehicle use;
- Safe use of field equipment;
- Handling, storage, and transportation of hazardous materials;
- Use, care, and limitations of PPE;
- Hazard communication per OSHA 29 CFR 1910.1200.

### 7.5 UXO/MEC Training

All employees performing work involving the handling and destruction of MEC must be graduates of the Naval Explosive Ordnance Disposal School or other appropriate recognized training per DDESB TP 18. A copy of their certificate of graduation will be kept on file at corporate headquarters. UXO qualified personnel must have knowledge and experience in military ordnance, ordnance components, and explosives location, identification,

render safe, recovery/removal, transportation, and disposal safety precautions. UXO personnel must have the knowledge and experience to effect safe handling and transportation of found ordnance items.

#### **7.6 Hazard Communication Training**

All employees who will be performing work involving the handling of hazardous materials will receive Hazard Communication training detailing the hazards of the product, appropriate protective measures to prevent exposure to the product and work environment hazards, as well as safe procedures for storage and handling of the product, and response to emergencies. Personnel may request a Safety Data Sheet (SDS) for any hazardous material on the site at any time. The location of the SDSs for this site will be in an SDS binder in the site office, and all personnel will be made aware of that fact. This training will occur as part of the initial mobilization training at the site.

#### **7.7 Use of Portable Fire Extinguisher**

Project personnel will receive OSHA-compliant fire extinguisher education (29 CFR 1910.157[g]) to use portable fire extinguishers to respond to incipient-stage fires. Typically provided during site orientation.

#### **7.8 First Aid and Cardiopulmonary Resuscitation (CPR)**

The UXOSO will identify individuals with current first aid and cardiopulmonary resuscitation (CPR) training. At a minimum, two people on-site will have current CPR/first aid certification. The UXOSO have current first aid/CPR training. The names of all CPR/first aid-qualified workers will be posted. An automatic external defibrillator (AED) will be available on-site.

#### **7.9 Periodic Site Training**

On the first workday of each workweek/period or more frequently if needed, a pertinent topic will be selected and elaborated upon by the UXOSO during the Tailgate Safety Briefing. These safety meetings will help ensure the safety and health of site personnel in the performance of regular work activities and in emergency situations. Safety meetings will be documented in the appropriate log, and the Documentation of Training Form will be completed.

#### **7.10 Visitors**

All visitors to the site, even if escorted, must receive as a minimum, a briefing on site conditions, hazards and emergency response procedures. The UXOSO will generally be the one providing the visitor briefing. All visitors to the EZ will be escorted at all times. When visitors who are not UXO qualified enter the EZ, all MEC operations will cease, and will resume again after the visitor has left the area. Visitors will not be permitted in the restricted work areas unless they have the appropriate level of OSHA training and are medically approved. Visitors not complying with the above requirements will not enter the restricted work areas; however, they may observe site conditions from a safe distance. All visitors will make appropriate entries in the Visitor's Log.

#### **7.11 Training Documentation**

A training record will be kept in each employee's individual file to confirm that adequate training for assigned tasks is provided and that training is current. In addition, Documentation of Training Forms

will be completed and kept on file and made available for inspection upon request.

## 8.0 SAFETY AND HEALTH INSPECTIONS

### Internal Safety and Health Inspections

The UXOSO will perform daily inspections on a scheduled and non-scheduled basis, of all site operations. The UXOSO will conduct non-scheduled safety and health inspections as deemed appropriate based upon the ongoing site activities. Documented vehicle inspections will be performed daily by the operator. The UXOSO will complete weekly site inspections along with any other required inspection identified within the AHAs. All inspections will be documented. When discrepancies are observed, follow-up will be documented in the UXOSO log until the corrective actions required have been completed.

### External Inspections

Due to the location and type of work being performed on this site, it is anticipated that the only external inspections required would be an inspection by the DESC to confirm compliance with Work Plan and ESP requirements. Tetra Tech will also be prepared in the event that Local and State safety and health officials or other enforcement agencies may conduct inspections to ensure compliance with Local and State or Federal requirements.

## 9.0 SAFETY AND HEALTH EXPECTATIONS, INCENTIVES & COMPLIANCE

The goal for Tetra Tech on this project is zero accidents. All managers and supervisors are responsible for implementing the provisions of this APP and for answering team member questions about accident prevention. Management is responsible for ensuring that all safety and health policies and procedures are clearly communicated and understood by all team members. Managers and supervisors are expected to enforce the rules fairly and uniformly. This will be accomplished by:

- Informing team members of the provisions of the Safety and Health Program;
- Evaluating the safety performance of all team members;
- Recognizing team members who perform safe and healthful work practices;
- Providing training to team members whose safety performance is deficient; and
- Disciplining team members for failure to comply with safe and healthful work practices.

All team members are responsible for using safe work practices, for following all directives, policies, and procedures, and for assisting in maintaining a safe work environment. Tetra Tech recognizes that open, two- way communication between management and all team members on health and safety issues is essential to an injury-free, productive workplace. To facilitate a continuous flow of safety and health information between all team members that is readily understandable, the following will be accomplished:

- Training all new team members, during the site-specific training, on the site safety and health policies and procedures, which will include this APP;
- Training all new team members on the hazards associated with the job site;
- Conducting daily tailgate safety meeting for all team members;
- Conducting quarterly refresher type training;
- Posting and, if applicable, distributing safety information; and
- Encouraging open communications.

## 9.1 Incentive Program

Safety Performance is a critical element in all performance evaluations. Managers are evaluated on the safety of all operations on their project sites. Other workers are evaluated on their own participation in the safety program and compliance with safety procedures. Tetra Tech takes a team approach to safety and expects all personnel to participate actively in continuously looking for ways to improve safety performance. This will be documented and entered into Tetra Tech's TOTAL system.

## 9.2 Policy and Procedures Regarding Noncompliance with Safety Requirements

Disregard for safety and health requirements will not be tolerated. If the SUXOS, UXOSO and PM determine that a team member is not sufficiently committed to conforming to established safety standards, the team member's employment agreement will be terminated.

Safety rules and practices are established for the safety of all employees and to promote the welfare of the company. If the occasion arises whereby safety rules and practices established by the APP are violated, appropriate penalties will be imposed.

Infractions are divided into two categories: "Major" and "Minor". An example of a minor violation is reporting for work without the prescribed Level D PPE. Any violation of the APP that could have or did result in an accident involving personal injury or property damage is considered a major violation. The following guidelines are imposed for penalties:

### **Minor Violations**

**First Offense:** Verbal warning to individual; offense to be noted in individual and supervisor's project file; discussion with individual's supervisor.

**Second Offense:** Written reprimand by the SUXOS will be entered in individual's file; discussion with individual and individual's supervisor.

**Third Offense:** Termination of employment recommended by the SUXOS to the PM, who makes the final decision after discussion with the Corporate Health and Safety Manager and SUXOS.

### **Major Violations**

**Any Offense:** Minimum penalty will consist of a written reprimand to be entered in individual's file, and a discussion with the individual and the SUXOS will be conducted. Depending upon the severity of the violation, the SUXOS may temporarily dismiss the individual from the job site. If this occurs, the UXOSO or SUXOS will immediately report the incident to the Corporate Health and Safety Manager. Upon completion of a full investigation, the individual's employment may be terminated, if deemed appropriate, through a joint decision of the Program Manager, PM, Corporate Health and Safety Manager, and SUXOS.

When a violation occurs:

- An investigation of the incident will be carried out by the UXOSO to determine if a violation has in fact occurred.
- If the UXOSO determines that a violation has occurred, the following actions will be

accomplished:

- Report of the violation will be submitted to the SUXOS and Corporate Health and Safety Manager by the UXOSO.
- The UXOSO, in conjunction with the Corporate Health and Safety Manager and SUXOS, will determine if the violation is "major" or "minor".
- The SUXOS, in conjunction with the Corporate Health and Safety Manager and the PM, will determine the appropriate disciplinary action.

### 9.3 Procedures for Holding Managers Accountable for Safety

In all cases, supervisors are evaluated on the safety of project sites under their control. If investigation into project site accidents/incidents indicates negligence on the part of a supervisor, the investigation results will be discussed between the UXO Program Manager, the PM and the Corporate Health and Safety Manager. If there is concurrence, and depending on the severity of the situation, the supervisor could be given a written reprimand or could be removed from duty in the case of serious negligence.

## 10.0 ACCIDENT REPORTING

### 10.1 Exposure Data

Exposure data on man-hours worked on a project, will be collected by the PM. The Corporate Health and Safety Manager will be provided this information from the PM in order to prepare accident statistics for the company and exposure reports for individual projects as required.

### 10.2 Accident Investigations, Reports, Logs

Investigation and documentation of emergency responses shall be initiated by the SUXOS/UXOSO. This is important in all cases, but especially so when the incident has resulted in personal injury, property damage, or environmental impact. The documentation will be a written report and will be inclusive of the following:

- Accurate, concise, and objectively recorded information;
- Authentic Information: Each person making an entry must sign and date that entry. Nothing is to be removed or erased. If details are changed or revised, the person making the change should strike out the old material with a single line and initial and date the change;
- Titles and names of personnel involved;
- Actions taken, decisions made, orders given, to whom, by whom, when, what, where, and how, as appropriate;
- Summary of data available;
- Possible exposure of personnel; and
- Copies of the Employer's Report of Occupational Injury or Illness (OSHA Form 300) or the Tetra Tech Accident Report, as appropriate, will be completed and forwarded to the Corporate Health and Safety Manager.

Reportable injury and occupational illnesses fall into one of the following categories:

- Fatality, including missing and presumed dead;
- Permanent total disability;
- Lost workday case involving days away from work;

- Recordable case without lost workdays;

The following unplanned events will also be investigated and reported:

- Damage to military property;
- Damage to contractor property; and
- Unplanned functioning of MEC.

All accidents will be investigated, and immediate steps will be taken to prevent recurrence. DESC will be notified of any accidents occurring on this project site.

Should an accident occur on the site, all reports and records will be documented. Copies will be maintained on site for the duration of site activities. A permanent copy will be maintained in Tetra Tech's Operating Unit Office.

### **10.3 Immediate Notification of Major Accidents [29 CFR 1904.8]**

Within 8 hours after the death of any employee from a work-related incident or the in-patient hospitalization of three or more employees as a result of a work-related incident, the employer shall orally report the fatality/multiple hospitalizations by telephone or in-person to the nearest Area Office of OSHA. This will be accomplished by the Health and Safety Staff. In the event of an emergency, site personnel will be notified by either visual/verbal communication. Personnel will be notified to:

- Stop work activities;
- Evacuate to the designated assembly point;
- Begin emergency procedures; and
- Notify off site emergency response organizations.

In the event of an emergency, the SUXOS will be designated as the On-Scene Incident Commander and will have the overall responsibility for the implementation of the response and coordination with responding off-site emergency services.

Once an emergency has occurred, the SUXOS will report the incident to the client representative, the PM, and the Health and Safety Staff as soon as the situation is under control.

If the emergency involves employee injury, the UXOSO will complete the Tetra Tech Accident Report form. The Health and Safety Staff will be responsible for notifying applicable Federal, state, and local authorities/agencies where required. Once the emergency has been resolved, the UXOSO, PM, and Health and Safety Staff will conduct a follow-up investigation and a Root Cause Analysis. Actions will be taken to prevent recurrence.

### **11.0 MEDICAL SUPPORT**

A first aid kit will be located in all the site vehicles and the project office. A CPR mask and a bloodborne pathogen kit will also be kept with each first aid kit. The SUXOS, in conjunction with the UXOSO, will have final authority on the decision to require additional professional medical services (i.e., paramedics, hospital visit, etc.) for any illness or injury. Two site employees will be certified in First Aid and CPR. They will be the first responders to any site emergency and will render first aid/CPR as needed until medical assistance arrives on the scene. A Trauma First Aid Kit will be kept in the UXOSO vehicle.

All supervisory personnel shall maintain a phone listing of the nearest available medical assistance in the event of an accident. This telephone listing will be kept beside each telephone. The UXOSO will ensure that an Emergency Medical Assistance list is updated and provided to all supervisors. Directions to the nearest medical facility will be kept in each vehicle.



**The nearest medical facility address is:**

*Palmetto Health Richland Hyperbaric Medicine*  
Address: 5 Richland Medical Park Drive  
Columbia, SC 29203  
Phone: (803) 434-7000

From the Project Area, 9 min (3.2 miles)

Take US-176 W/US-21 N/US-321 N and US-76 E to Bull St

Head east on Gervais St/Gervais St Bridge toward Gist St 0.3 mi

Turn left onto US-176 W/US-21 N/US-321 N/Huger St 0.8 mi

Keep right at the fork, follow signs for US-21/US-176/US-321/Elmwood Ave

Continue onto US-176 W/US-21 N/US-321 N/US-76 E 0.9 mi

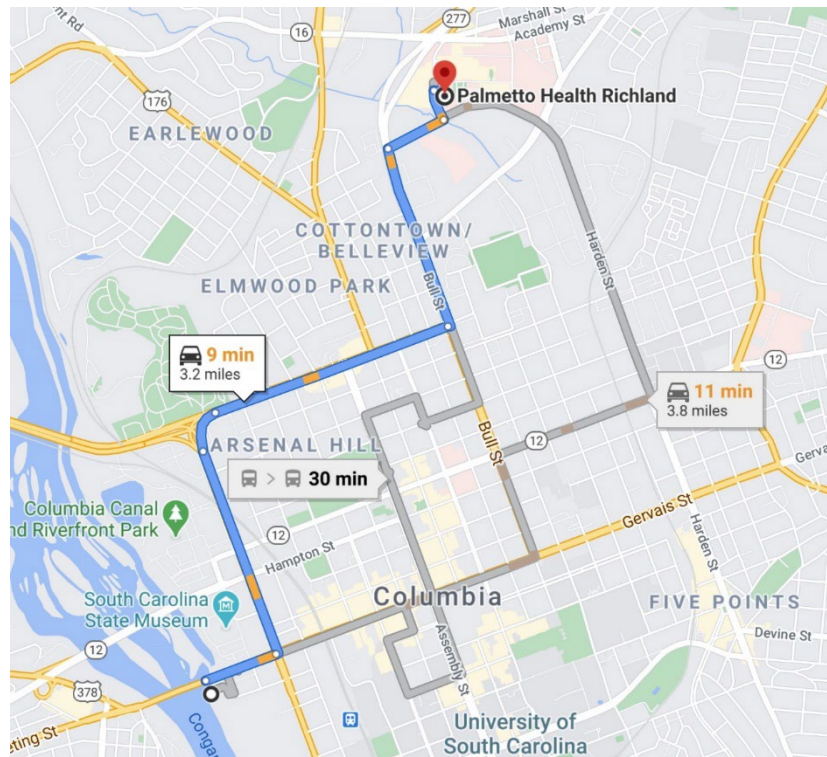
Continue on Bull St to your destination

Use the left 2 lanes to turn left onto Bull St 0.7 mi

Turn right onto Harden Street Extension (signs for Harden St) 0.2 mi

Turn left onto Medical Park Rd 0.1 mi

Arrived.



## 12.0 PLANS, PROGRAMS, AND PROCEDURES

### 12.1 PERSONAL PROTECTIVE EQUIPMENT PLAN

Whenever feasible, engineering controls as a priority and work practices, or a combination thereof, will be utilized to protect site workers from safety and health hazards and maintain personal exposures to hazardous substances below established exposure limits. The exposure limits used by Tetra Tech will be the lower of the OSHA Permissible Exposure Limits (PELs) found in 29 CFR 1910 Subpart G and 29 CFR 1910.1000, or the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs). Other recognized published exposure levels, such as those found on SDSs, will be used if the substance is not listed by OSHA or the ACGIH. Tetra Tech will not utilize a system of employee rotation as a means of complying with the PEL, TLV, or other published limits.

Due to the expected hazards at this site during most operations, modified Level D PPE will be the PPE requirement. Level D PPE is a work uniform affording minimal protection, used for nuisance contamination only. The following modified Level D equipment will be required on this site:

- Leather gloves.
- Face shields – when working around chain saws, weed whackers, and vegetation removal equipment.
- Tinted or clear safety glasses with side shields or goggles.
- Hearing protection, where required by high noise levels above 85db, in the vicinity of heavy equipment operations, and vegetation clearance operations involving gas-powered equipment.
- Leather work boots with ankle support and non-slip soles (no steel toes that interfere with magnetometers).
- Cotton work clothes.
- Leg chaps – when working around vegetation removal equipment or snakes.
- Hard hat – when working around heavy equipment, and in the vicinity of chain saws, weed whackers and powered vegetation removal equipment.
- Safety Vests/Hi-Vis outer torso garments when working around Heavy Equipment.

### 12.2 Selection of PPE

Each task outlined in the Statement of Work will be assessed prior to its initiation to determine the potential of personnel exposure to safety and health hazards, which may be encountered during its conduct. The hazard assessment will be based on available information pertaining to the historical use of the site, site contaminant characterization data, and the anticipated operational hazards. This information will be provided to or collected by site personnel. The PPE assigned as a result of the hazard assessment represents the minimum PPE to be used during initial site activities. Since hazard/risk assessment is a continuing process, changes in the initial types and levels of PPE will be made IAW information obtained from the actual implementation of site operations and data derived from the site monitoring. As a general rule, the levels of PPE will need to be reassessed if any of the following occur:

- Commencement of a new work phase, or work that begins on a different portion of the site.
- Change in job tasks during a work phase.
- Change of season/weather.
- When temperature extremes or individual medical considerations limit the effectiveness of

PPE.

- Contaminants other than those previously identified are encountered.
- Change in ambient levels of contaminants.
- Change in work scope, which affects the degree of contact with contaminants.

During the selection of PPE the Health and Safety Staff and UXOSO will also take into consideration the following factors:

- Limitations of the equipment.
- Work mission duration.
- Temperature extremes.
- Material flexibility.
- Durability/Integrity of the equipment.

### **12.2.1 Eye and Face Protection**

All personnel will use appropriate eye or face protection when exposed to eye or face hazards from flying particles, liquid chemicals, or other eye hazards. All personnel will use eye protection that provides side protection when there is a hazard from flying objects. Detachable side protectors (e.g. clip-on or slide-on side shields) or goggles meeting the pertinent requirements of this section are acceptable. If there is a likelihood for glare, tinted safety glasses are recommended.

All personnel who wear prescription lenses while engaged in operations that involve eye hazards shall wear eye protection that incorporates the prescription in its design, or wear eye protection that can be worn over the prescription lenses without disturbing the proper position of the prescription lenses or the protective lenses.

Eye and face PPE shall be distinctly marked to facilitate the identification of the manufacturer. Protective eye and face devices will comply with ANSI Z87.1-1989, "American National Standard Practice for Occupational and Educational Eye and Face Protection," which is incorporated by reference as specified in Sec. 1910.6.

### **12.2.2 Head Protection**

When working in the vicinity of heavy equipment, as well as vegetation clearance equipment, hard hats will be worn. While there is not expected to be a danger of impact to the head due to falling or flying objects during other operations, it is recommended that personnel wear caps or some type of head covering for protection from the sun. Safety Vests/Hi-Vis outer torso garments shall also be required when working around Heavy Equipment.

### **12.2.3 Foot Protection**

Due to the uneven working surfaces and potential for tripping hazards common to a worksite, all personnel shall wear sturdy leather, work boots with ankle support that rise about the ankle, and non-slip soles. Personnel using magnetometers for the detection of buried MEC will not wear steel-toe safety shoes, as they will affect the readings of the equipment. While working around heavy equipment, UXO personnel will wear steel or composite toe boots or slip-on toe caps.

#### **12.2.4 Hand Protection**

Employees will be required to use appropriate hand protection when employees' hands are exposed to hazards such as those from skin absorption of harmful substances; severe cuts or lacerations; severe abrasions; punctures; thermal burns; and harmful temperature extremes. For most operations on this site, leather gloves will provide adequate protection against minor cuts, which are a hazard in most site operations.

#### **12.2.5 Hearing Protection**

Hearing protectors will be available to all employees exposed to an 8-hour time-weighted average of 85 decibels (OSHA Action Level) or greater at no cost to the employees. Hearing protectors will be replaced as necessary. Hearing protection will be required for all personnel working in and around any operations likely to produce high noise levels, such as during the use of chain saws and weed whackers during thinning and pruning operations and when working in the vicinity of heavy equipment.

#### **12.2.6 Emergency Equipment**

Emergency equipment will be maintained on site for the duration of site operations. An approved, emergency first aid kit, and bloodborne pathogen kit, will be kept in each site vehicle. Portable eyewashes will be located in the work area and in the site vehicles. A 5-lb. ABC fire extinguishers will be kept in each site vehicle for emergency use on site. A Trauma First Aid Kit will be maintained in the UXOSO vehicle.

#### **12.2.7 Upgrading/Downgrading PPE**

If work tasks are added or amended after completion and approval of the APP, the SUXOS/UXOSO will conduct the task hazard assessment and consult with the Corporate Health and Safety Manager. The level and type of PPE to be used will be identified. The Corporate Health and Safety Manager will allow any changes in PPE, which involve downgrading of the level of PPE, only after review of documentation demonstrating that the conditions and/or potential for hazardous exposure are reduced enough to justify the downgrade.

#### **12.2.8 General Requirements**

All personal protective equipment will be provided, used, and maintained in a sanitary and reliable condition wherever it is necessary. PPE is required due to hazards of processes or environment, chemical hazards, or mechanical irritants encountered in a manner capable of causing injury or impairment in the function of any part of the body through absorption, inhalation, or physical contact. All PPE will be used in the manner for which it was designed. The assignment of PPE will be based upon hazard analysis, and the equipment will be selected based on its protection factor against site hazards.

#### **12.2.9 Inspection**

Each piece of PPE will be inspected daily prior to use. Defective or damaged personal protective equipment will not be used. It will be removed from service and turned in for repair or removed from the site for disposal and replaced with new PPE.

### **12.2.10 Training**

Tetra Tech will provide training to each employee who is required by this section to use PPE. Each affected employee will demonstrate an understanding of the training, and the ability to use PPE properly, before being allowed to perform work requiring the use of PPE. Each such employee will be trained to know at least the following:

- The decisions and justifications used to select each piece of PPE.
- The nature of the hazards and the consequences of not using PPE.
- What PPE will be required to conduct each task.
- When PPE will be required during the performance of each task.
- How to properly don, doff, adjust and wear each piece of PPE.
- The proper inspection, cleaning, decontaminating, maintenance, and storage of each PPE item used.
- The limitations of the PPE.

All personnel receiving PPE training will be required to demonstrate an understanding of the training topics and the ability to correctly use the PPE. This will be accomplished through the UXOSO supervising and visually inspecting everyone's ability to properly don and use the PPE during initial use of the PPE.

When the SUXOS or UXOSO has reason to believe any affected employee who has already been trained does not have the understanding and skill required he should retrain each such employee. Circumstances where retraining is required include, but are not limited to, situations where:

- Changes in the workplace render previous training obsolete; or
- Changes in the types of PPE to be used render previous training obsolete; or
- Inadequacies in an affected employee's knowledge or use of assigned PPE indicate that the employee has not retained the requisite understanding or skill.

Upon completion of the training and after each employee has successfully demonstrated the requisite understanding, the SUXOS or UXOSO will complete the Documentation of Training form. This identifies: the employees who attended the training course and successfully demonstrated the required knowledge; the date(s) of the training and demonstration session(s); and the PPE covered by the training session.

### **12.2.11 Cleaning and Decontamination**

The UXOSO will be responsible for ensuring that PPE is in good, clean, working order prior to issuing the PPE the first time. Once issued, site personnel will ensure that re-usable articles of PPE are maintained in a clean and sanitary fashion. For items used inside an EZ, site personnel will ensure that the PPE is properly decontaminated as appropriate before removing the item from the EZ or Contamination Reduction Zone (CRZ).

### **12.2.12 Maintenance**

Maintenance of PPE can vary greatly, based upon the complexity of the PPE and the intricacy of the repair involved. The UXOSO will become familiar with the manufacturer's recommended maintenance and when possible repair defective PPE. If unable or unauthorized to conduct the repair, the UXOSO

will return the item to the manufacturer for repair or procure a replacement.

### **12.2.13 Storage**

PPE will be stored in a location, which is protected from the harmful effects of sunlight, damaging chemicals, moisture, extreme temperatures, impact or crushing. If needed, the SUXOS will designate a specified area for the storage of PPE.

## **12.3 LAYOUT PLANS**

Layout plans for site support operations are being developed by DESC and APEX. Implementation of the plans is expected to be completed by DESC in conjunction with the remediation and project oversight contractors.

## **12.4 EMERGENCY RESPONSE PLANS**

### **12.4.1 Procedures and Tests**

The SUXOS and UXOSO will coordinate to perform the following pre-emergency tasks before starting field activities and during the mobilization and site-specific training phase of the project, and will coordinate emergency response with emergency medical technician (EMT)/police/fire/adjacent industry personnel or other emergency response personnel when appropriate:

- Locate telephone stations;
- Post emergency telephone numbers at accessible telephone locations;
- Inspect all emergency equipment and supplies to ensure they are in proper working order;
- Provide a site map marked with planned evacuation routes, assembly points, and emergency equipment and supplies;
- Provide a map with the route to the hospital marked and highlighted, with copies of this map posted in the office/break area, in the emergency evacuation vehicle, and all other site vehicles;
- Conduct an emergency response drill to test the effectiveness of the Emergency Response Contingency Plans (ERCP); and
- Review and revise the ERCP in the event of a failure of the plan in an actual or staged emergency, or when changes in site conditions or scope of work affect the ERCP.

Before normal activities are resumed, onsite personnel must be prepared and equipped to handle another emergency. These follow-up activities should be completed:

- The Corporate Health and Safety Manager will notify appropriate government agencies as required (Reminder: OSHA must be notified if there have been any fatalities or three or more hospitalizations).
- All equipment and supplies restocked, serviced, and inspected; and
- Review and revise all aspects of the Health and Safety Plan as necessary to address and prevent future emergencies of this type.

### **12.4.2 Spill Plans**

In the event of a spill or leak of any potentially harmful material (regardless of quantity) on site

personnel will:

- Notify the SUXOS immediately;
- The SUXOS shall notify the PM of the spill/leak with relative information (location, time, chemical identity, quantity, hazards listed on the SDS), and any corrective actions/measures taken;
- Locate the source and stop the leak/spill if it can be done safely (as dictated by the UXOSO);
- Begin containment and recovery of spilled material (as directed by the UXOSO), using appropriate PPE and spill clean-up equipment and materials; and
- Once notified, the PM will in turn, notify the DESC representative.

#### 12.4.3 Firefighting Plans

The decision on whether or not to try to extinguish a fire using available site personnel and equipment will be made by the SUXOS and UXOSO and based on whether the fire is small, large or involves explosives.

#### 12.4.4 Small Fires

A small fire is defined as a fire that can most likely be extinguished by site personnel using portable extinguishers. A small fire must also be free and clear of explosive materials, especially MEC. If a small fire occurs, the SUXOS or UXOSO will direct site personnel to perform the following, if safe to do so:

- Evacuate unnecessary personnel to an upwind position;
- Attempt to extinguish the fire using portable fire extinguishers or by smothering;
- Remove any essential or flammable items from the path of the fire; and
- Notify emergency response services (fire, police, ambulance, hospital, etc.) as needed.

If a fire extinguisher is used, this must be immediately reported to the SUXOS. The fire extinguisher must be immediately removed from service until it can be recharged. Another fire extinguisher must be made available to the operating area. The area around where the fire occurred must be watched for a minimum of 30 minutes after the fire has been extinguished to assure re-ignition does not occur. If personnel are not working in the area, the SUXOS should check the area of the fire periodically to assure re-ignition does not occur.

#### 12.4.5 Large Fires

A large fire is defined as a fire, which due to its size, cannot be extinguished using portable fire extinguishers. In the event that a large fire occurs and the fire does not involve explosive materials, the SUXOS/UXOSO will direct personnel to conduct the following, if safe to do so:

- Evacuate all non-essential personnel from the site to an upwind location;
- Notify the Fire Department and other emergency response services (police, ambulance, hospital, etc.) as needed;
- Notify adjacent industries and neighbors;
- Call 911
- Alert any other subs/workers and adjacent bldg. occupants and remove what equipment/combustible material you can as everyone retreats and evacuates the area
- Remove any essential or flammable items from the path of the fire.

#### 12.4.6 Fires Involving Explosive Materials

If a fire occurs which involves explosive materials such as chemicals, fuels, or MEC, the SUXOS will order the immediate evacuation of all site personnel to an upwind assembly point at least maximum fragmentation distance from the fire site. The SUXOS will then notify the Fire Department, adjacent industries, and any other emergency services (police, ambulance, hospital, etc.) as needed. At no time will field personnel fight a fire involving explosive materials, nor will they allow outside emergency personnel to do so. The Fire Department personnel may not enter any closer than maximum fragmentation distance from the fire and they may spray water to surrounding buildings, structures, etc. in order to prevent the spread of fire.

After the fire has burned itself out, the site must be barricaded, and entry prohibited until adequate cooling time has passed (at least 24 hours for a large fire). Explosive materials that may not have discharged during the fire may still be liable to function in the presence of extreme heat. After the site has cooled down, the SUXOS and UXOSO will inspect the site and conditions of any MEC involved in the fire and make a determination as to whether or not the site is safe for others to enter.

If non-UXO qualified personnel must enter the site for purposes of fire investigation, etc. they must receive a briefing on the potential hazards of MEC on the site. They must be accompanied at all times by a UXO-qualified employee. **NO OUTSIDE PERSONNEL WILL BE PERMITTED ONTO THE SITE WHILE THERE IS A KNOWN MEC HAZARD PRESENT.** If, during the course of the investigation, MEC is observed, the site will be evacuated of all non-UXO qualified personnel until the site can be rendered safe for re-entry.

#### 12.4.7 Explosions

In the event of an accidental explosion, the SUXOS will order the evacuation of all site personnel to a safe, upwind assembly point at least fragmentation distance away. The SUXOS will then notify all necessary emergency response services. After an explosion has occurred, the site will remain barricaded a minimum of 30 minutes before entry is permitted if no smoke/burning is observed. If smoke or burning is observed, wait 60 minutes after smoke/burning has stopped. The SUXOS/UXOSO will enter the site with a team member and inspect for presence and condition of MEC. Non-UXO qualified personnel may not enter the area until all known MEC has been removed or destroyed. If non-UXO qualified personnel need to enter the site, they must first be briefed on the potential hazards of the site. They must be accompanied at all times by a UXO-qualified employee. If MEC is discovered during the course of their visit, they must immediately leave the site until it can be rendered safe for re-entry.



**12.4.8 Posting of Emergency Telephone Numbers**

<b>Emergency Response / Services</b>			
Ambulance Service			911
Emergency Medical Response			911
Police*			911
Police Department – Non emergency			803-545-3500
CORE Injury Case Management			1 855-683-9006
Hospital-Palmetto Health Richland 5 Richland Medical Park Dr Columbia, SC 29203			803-434-7000 * For Emergency Dial 911
Fire Department*			911
Fire Department – Non Emergency			803-545-3700
National Poison Control Center			800-222-1222
CHEMTREC (hazardous materials response)			800-424-9300
National Response Team (hazardous materials response)			800-424-8802
Centers for Disease Control (CDC) <a href="http://www.cdc.gov/health/diseases">http://www.cdc.gov/health/diseases</a>			800-311-3435
<b>Project Management / Coordination</b>			
Tetra Tech			
	Operating Unit President	Mark Dollar	970-206-4263
	Project Manager	Scot Wilson	360-626-3193
	Safety Manager	Jim Strieb	240-727-9240
DESC			
	Project Manager	Rusty Contrael	412-721-6494
APEX			
	Environmental Program Manager	William Zeli, P.E.	412-829-9650 x5004
Explosives Supplier			
	TBD	TBD	TBD

### **12.4.9 Wild Land Fire Prevention Plan**

A Wild Land Fire Prevention Plan is not expected to be needed on this site. It is anticipated that heavy vegetation will be cut prior to beginning work that could result in an accidental fire, and therefore, excess vegetation that could contribute to a fire is not expected. However, fire extinguishers will be present at the job site and would be used to immediately put out any small fire that would start in the area, thereby preventing large fires from developing.

### **12.5 Man Overboard/Abandon Ship**

Man Overboard/Abandon Ship plan can be found in the Diving Operations Plan for the CRP.

### **12.6 Hazard Communication Program**

As part of the Hazard Communication Program, an SDS binder will be maintained onsite, which includes copies of SDSs for all hazardous materials brought onto the site. It will be kept in the site office during operations, and all site personnel will be made aware of the location. This SDS binder will be available on request to all site personnel during all working hours. If site workers have further questions about any of the hazardous materials they encounter, the Tetra Tech Corporate Health and Safety Manager will locate the required information and pass it on to the employee.

All employees who will be performing work involving the handling of hazardous materials will receive Hazard Communication training detailing the hazards of the product, appropriate protective measures to prevent exposure to the product, proper labeling of secondary containers, as well as safe procedures for storage and handling of the product, and response to emergencies. Personnel may request an SDS for any hazardous material on the site at any time. This training will occur as part of the initial mobilization training at the site and will be documented on the Documentation of Training Form.

### **12.7 Respiratory Protection Plan**

Due to the type of work taking place, respirators are not expected to be required on this site. Should unforeseen hazards develop, which would require a respirator, the Tetra Tech Respiratory Protection Program would be followed.

### **12.8 Health Hazard Control Program**

Due to the type of work that will be taking place on this project site, toxic, high hazard environments are not anticipated.

### **12.9 Lead Abatement Plan**

As lead is not expected to be a contaminant on this site, a Lead Abatement Plan will not be required.

### **12.10 Asbestos Abatement Plan**

As asbestos is not expected to be encountered on this site and therefore, an Asbestos Abatement Plan is

not required.

### 12.11 Abrasive Blasting Plan

Abrasive blasting is not required on this project.

### 12.12 Excavation Plan

Work in an excavation area is not expected to exceed 48 inches in depth. To control and mitigate the hazards associated with working in and around excavation operations, the requirements outlined in USACE EM 385-1-1, Section 25 should be followed. If deeper excavations are required, sides of the excavations will be sloped at a ratio of at least 2 horizontal feet for every 1 vertical foot of excavation to protect workers from cave-ins and allow easy ingress and egress out of the excavated areas. A Competent Person (CP) needs to be onsite and inspecting the excavations daily and anytime there is a change of condition with the excavation.

If confined space work becomes necessary, it will be accomplished in accordance with the Tetra Tech Confined Space Program.

### 12.13 Power Tool and Equipment Hazardous Energy Control Plan

The work on this project may require the use of power tools and excavation equipment that would require a Tool and Equipment Hazardous Energy Control Plan.

By their very nature, power tools and heavy equipment have the capability of inflicting serious injury upon site personnel if they are not used and maintained properly. To control the hazards associated with power tool and equipment operation, the requirements outlined in USACE EM 385-1-1, Section 12 and the safe work practices listed below shall be observed when using power tools and equipment:

- Operation will be conducted by authorized personnel familiar with the tool or equipment, its operation, and safety precautions.
- Power tools and equipment will be inspected prior to use, and defective equipment will be removed from service until repaired or replaced.
- Power tools and equipment designed to accommodate guards will have such guards properly in place prior to use.
- Loose fitting clothing or unrestrained long hair will not be permitted around moving parts of power tools or equipment.
- Hands, feet, etc. will be kept away from all moving parts.
- Maintenance and/or adjustments to equipment will not be conducted while it is in operation; the power will be locked out according to the Lock-Out/Tag-Out protocol in OSHA 29 CFR 1910.147 prior to maintenance activities.
- All maintenance activities will be performed by personnel experienced and authorized to make the repairs, or it will be sent to the manufacturer for repair.
- An adequate operating area will be provided, allowing sufficient clearance and access for operation.
- Good housekeeping practices will be followed at all times.
- Safety glasses with side shields, goggles, and face shields shall be worn at all times while operating power tools and equipment or when working in the vicinity of operating power tools and equipment.

#### **12.14 Critical Lift Procedures**

Crane operations are not anticipated on this project, so critical lift procedures will not be required. Non critical lifts will not be performed by Tetra Tech or Tetra Tech's subcontractors.

#### **12.15 Contingency Plan for Severe Weather**

Rain, dust storms, floods, electrical storms, and tornadoes in this geographic area can constitute a safety hazard to field operations at the project site. The SUXOS and UXOSO will monitor the weather closely. If the area becomes so windy, wet, muddy, or slippery that an unacceptable level of risk exists for personnel who are working in proximity to MEC items, then MEC operations will cease until the SUXOS and UXOSO determine it to be safe to continue.

No MEC operations will take place if an electrical storm is within ten miles of the site. An electrical storm/Lightning monitor will be used to determine if an electrical storm is approaching. MEC operations will cease when an electrical storm is within ten miles of the site and will not resume again until the SUXOS determines that the electrical storm is at least ten miles past the site or 30 minutes since the last lightning strike or sound of thunder.

#### **12.16 Access and Haul Road Plan**

There are no plans to create access and haul roads for this project, so the Access and Haul Road Plan is not required.

#### **12.17 Demolition Plan (Engineering and Asbestos Surveys)**

As work on this plan does not involve the demolition of buildings containing asbestos-containing material, the Demolition Plan is not required.

#### **12.18 Emergency Rescue (Tunneling)**

As work on this project does not involve tunneling operations, this Emergency Rescue plan is not required.

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

As underground construction is not required on this project, the Underground Construction Fire Prevention and Protection Plan is not required.

#### **12.20 Compressed Air Plan**

As there are no plans to use compressed air on this project, a Compressed Air Plan is not required.

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

As this project will not involve formwork and shoring erection and removal, this plan is not required.

## 12.22 Jacking Plan (Lift) Slab Plans

As there will be no Lift Slab work on this project, this plan is not required.

## 12.23 Blasting Plan

Recovered MEC/MPPEH will be destroyed by consolidated shot or BIP operation. A detailed description of the demolition operation (blasting plan) and procedures is given in Section 3.7 of the Work Plan and will be conducted IAW the ESP.

## 12.24 Diving Plan

Diving portions under this project are covered under a Dive Operations Plan.

## 12.25 Plan for Prevention of Alcohol and Drug Abuse

The use, sale, dispensing, possession, or manufacture of illegal drugs, alcohol, and narcotics on Tetra Tech premises or work sites is prohibited. Employees will be subject to disciplinary action, up to and including termination, for bringing illegal, non-prescribed drugs and narcotics or alcoholic beverages to the workplace; being under the influence of such substances while working; using such substances while at work; or dispensing, distributing, or illegally manufacturing or selling these substances on Tetra Tech premises and work sites.

If, in the judgment of Tetra Tech management, an employee's abuse of drugs, narcotics, or alcohol adversely affects his/her ability to perform the duties intended, that employee may be terminated for cause.

Any employee who notices another employee demonstrating unusual behavioral patterns that appear to be drug, narcotic, or alcohol-related must report the observed behavior to management. Employees may be required to submit to a test, whenever reasonable cause exists, to determine the presence of drugs, narcotics, or alcohol unless the law prohibits such tests. Refusal to submit to testing constitutes grounds for termination of employment for cause. An employee judged to be under the influence of drugs, narcotics, or alcohol will be required to leave the premises. The Employee's Supervisor will arrange to have the employee escorted home.

Drug screening will occur as part of the on boarding process and as deemed necessary. If the drug screen is positive for illegal drugs, the employee will not be permitted to work on the Tetra Tech project site.

An employee who is diagnosed as an alcohol or drug abuser may be terminated or required to take a leave of absence without pay to undergo rehabilitation. The employee will not be permitted to return to work until medical certification is presented as evidence that the employee is drug-free and capable of performing his/her duties. Failure to cooperate with an agreed-upon treatment plan may result in disciplinary action, up to and including termination.

The status of an employee on drug/alcohol rehabilitation leave-of-absence will be reviewed by management on a case-by-case basis. Absences extending beyond six months will require medical

recertification. Employees on leave for more than one year will be considered for termination without prejudice.

If an employee is taking prescription drugs for a medical condition while under a doctor's care, the SUXOS should be made aware of the situation. The side effects of some medications can reduce alertness and judgment and may cause a potential safety hazard to the employee and/or others working in the vicinity, such as a heavy equipment operator becoming drowsy while operating equipment. In cases such as this, the SUXOS has the discretion to re-assign the individual to a less hazardous position on the site until the condition is cleared and medication is no longer required. If there are no other positions available on the site, which would be safe for the individual to perform, he may be placed on sick leave or leave without pay until the condition clears up and he is medically approved to resume work.

#### **12.26 Fall Protection Plan**

As work will be occurring at ground level and below, a Fall Protection Plan is not required. Excavations will be well marked with tape and/or barricades and personnel will be advised to stay away from the perimeter, as will the operators of the heavy equipment. Work will not occur during hours of darkness, when personnel might be less likely to see the excavation.

#### **12.27 Steel Erection Plan**

As no steel erection will be taking place by Tetra Tech on this project, this plan is not required.

#### **12.28 Night Operations Lighting Plan**

As there are no plans to operate during hours of darkness, there is no requirement for a Night Operations Lighting Plan.

#### **12.29 Site Sanitation Plan**

Adequate sanitation facilities will be provided at the work site to ensure proper personal hygiene. Site sanitation will be established and maintained IAW OSHA 29 CFR 1910.120(n).

Outlets and storage containers for non-potable water, such as water for firefighting or decontamination, will be clearly labeled to indicate that the water is not suitable for drinking, washing or cooking. There will at no time be a cross-connection or open potential between a system furnishing potable water and a system furnishing non-potable water. An adequate supply of potable (drinkable) water shall be provided on site at all times.

Permanent restroom facilities are located on the project site. If they are disabled for the season or otherwise not available, Tetra Tech will locate chemical toilets in the support zone (SZ), as required to support field personnel. Toilets will be appropriately maintained, vented, and will be capable of being locked from the inside. There will be at least one toilet for every 15 site personnel.

Hand and face washing facilities will be set up in the SZ of the work area; additionally, Hand Sanitizer and Sanitizer spray bottles will be provided. These will be utilized by all personnel exiting the EZ prior to eating, drinking, using tobacco or other hand to face activities.

Portable eyewash will be available in site vehicles and the office trailer.

### 12.30 Fire Prevention Plan

**Fire Protection:** Portable fire extinguishers are rated and classified with NUMERAL and LETTER designations, based on fire tests conducted by the Underwriters Laboratories, Inc. (UL) or other nationally recognized testing laboratories. The numeral rating indicates the relative extinguishing effectiveness of extinguishers classified for Class A and B fires only. The Letter classified coincides with the class of fire. Extinguishers found to be effective on more than one class of fire have multiple letter classifications. Example: B:C

The rating of hand-portable fire extinguishers is based on the following:

- Class A fire extinguisher is used for ordinary combustible materials.
- Class B fire extinguisher is for flammable liquids.
- Class C fire extinguisher is for electrical fires.
- Class D fire extinguisher is for combustible metal fires.

Many fires are small at origin and may be extinguished by the use of proper hand-portable fire extinguishers. The fire department will be notified as soon as fire is discovered. This alarm should not be delayed awaiting result of application of portable fire extinguishers.

Fire extinguishers can represent an important segment of any overall fire protection program. However, their successful functioning depends upon the following conditions having been met:

- The extinguisher is properly located and in working order.
- The extinguisher is of proper type for a fire, which may occur.
- The fire is discovered while still small enough for the extinguisher to be effective.
- The fire is discovered by a person ready, willing, and able to use the extinguisher.
- Class A fires can be readily extinguished by quenching-cooling with water or a water-mixture agent. Class B fires are more effectively extinguished by an agent that blankets-smothers the fire through exclusion of oxygen surrounding the fire area. Those extinguishers containing bromochlorodifluoromethane, monobromotrifluoromethane, carbon dioxide, or dry chemicals are generally best suited for extinguishing Class B fires. For Class C fires, the primary consideration in extinguishing this type of fire is the selection of a nonconductive extinguishing agent to prevent dangerous electrical shock and possible death to user.
- Water or water-mixture type extinguishing agent must not be used under any circumstances on energized electrical equipment (Class C) fires. Whenever possible, electrical equipment and circuits should be de-energized before attacking a Class C fire. Due to its corrosive nature, dry chemical is not recommended for use on computerized, electronic or other equipment with extensive circuitry.

**Fire Prevention:** In order to prevent fire from occurring in the first place, every step will be taken to keep the site neat and clean. All equipment and materials not in use will be put away in designated locations. There will be trash cans with lids at the site, which will be emptied on a daily basis to keep trash from accumulating. All flammable liquids will be stored in approved flammable UL or FM Approved Safety Cans in order to prevent spillage and ignition of the material. Bonding and grounding procedures will be in place whenever transferring flammable liquids from their designated containers and into equipment. Equipment will never be fueled in the back of a pick-up truck with a bed liner in it. Personnel handling explosive and/or flammable materials will wear cotton under and outer garments to

prevent build-up and transfer of static electricity.

### 13.0 CONTRACTOR INFORMATION

Tetra Tech is the subcontractor on this project. This APP has been prepared by TITAN and revised by Tetra Tech based on Tetra Tech's procedures. In addition, subcontract site personnel will be familiar with and will comply with project procedures and safety requirements.

### 14.0 HAZARD ANALYSIS

An activity hazard analysis (AHA) has been conducted and documented as outlined below for each activity warranted by the hazards associated with the activity. For this project, the following AHA have been prepared for all anticipated field operations:

- Site-Setup/Layout
- Surface Preparation/ Vegetation Removal
- Subsurface Clearance using "Mag & Dig" Methods
- Transportation of Explosives
- Disposal of MPPEH
- Mechanical Excavation (if required)

Should conditions, equipment, or types of operations change during the course of the project work, the Corporate Health and Safety Manager will review an updated existing AHA for continuing work or prepare a new one for new types of operations.

Risk management is and will continue to be integrated into the planning, preparation, and execution of work at the site. Risk management is a dynamic process, and is continuously improved upon, as personnel become more familiar with the site operations, equipment, environment, etc. Personnel are urged to continuously identify hazards and assess accident risks. Once identified, these hazards will be brought to the attention of the SUXOS/UXOSO. Control measures will be developed and coordinated. All personnel are responsible for continuously assessing variable hazards and implementing risk controls.



## Activity Hazard Analysis

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## Activity Hazard Analysis (AHA) #1

*Any modifications to the approved AHA that results in a higher RAC than the approved AHA will also be reviewed by the SHM. The AHA will be maintained by the staff performing the work, under UXOSO oversight to keep it current to the work being performed and the hazards presented by the work as a living document.*

<b>Activity/Work Task: Mob/Demob and Site Setup/Layout</b>	<b>Overall Risk Assessment Code (RAC) (Use highest code)</b>					<b>L</b>
Project Location: Remedial Action at Congaree River Project	<b>Risk Assessment Code (RAC) Matrix</b>					
Date Prepared: January 2022		Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by: Scot Wilson	Catastrophic	E	E	H	H	M
	Critical	E	H	H	M	L
Reviewed by: Jeffrey (Jim) Streib, CIH, CSP, CHMM, CQA Director, Health, Safety and Environmental	Marginal	H	M	M	L	L
	Negligible	M	L	L	L	L
<p><b>Notes:</b> (Field Notes, Review Comments, etc.)</p> <p>In addition to the information listed in this AHA, all field personnel must review and be familiar with all provisions of the approved APP/SSHP. EM 385-1-1 will also be available on site for personnel to review specific materials and mitigation measures associated with this project. PPE for this AHA will consist of a hard hat (when overhead safety hazards exist), leather safety-toed boots, safety glasses with side shields, a standard work uniform (long pants, tee shirt), hearing protection (as required), work gloves worn when indicated, a Class 2 high-visibility safety vest, and other PPE described in this AHA.</p> <p style="color: red;">First Aid-/CPR-Qualified Persons: TBD</p>	Step 1: Review each “ <b>Hazard</b> ” with identified safety “ <b>Controls</b> ” and determine RAC (see above).					
	“ <b>Probability</b> ” is the likelihood to cause an incident, near miss, or accident and is identified as Frequent, Likely, Occasional, Seldom, or Unlikely.				<b>RAC Chart</b>	
	“ <b>Severity</b> ” is the outcome/degree if an incident, near miss, or accident did occur and is identified as Catastrophic, Critical, Marginal, or Negligible.				<b>E = Extremely High Risk</b>	
	Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each “Hazard” on the AHA. Annotate the overall highest RAC at the top of the AHA.				<b>H = High Risk</b>	
				<b>M = Moderate Risk</b>		
				<b>L = Low Risk</b>		

<b>AHA #1 – Mob/Demob and Site Setup/Layout</b>			
<b>Job Steps</b>	<b>Hazards</b>	<b>Controls</b>	<b>RAC</b>
Mob/Demob and unloading and initial staging of materials and equipment in laydown areas.	Vehicle operations or unloading tasks could cause injury to personnel or others on site.	<ul style="list-style-type: none"> <li>• Workers operating rental vehicles will have a valid state issued driver’s license and will be authorized by Tt to operate rental vehicles per corporate procedures.</li> <li>• Any Commercial Driver’s License truck and trailers will be operated by CDL qualified drivers who are vetted and authorized vendors.</li> <li>• Tt drivers will have completed a defensive driving course</li> <li>• Operate at safe speeds and obey traffic speeds and rules as instructed.</li> <li>• Wear seat belt at all times when vehicle is in operation.</li> <li>• Use parking brake when parked. Use chocks when parked on inclines. Use dedicated spotter and standard hand signals for backing operations.</li> </ul>	L
	Ergonomic hazards such as sprains, strains, or back injury could occur from lifting or repetitive actions.	<ul style="list-style-type: none"> <li>• Use mechanical lifting equipment or team lift when possible rather than by hand and tool methods.</li> <li>• Do not bend at the waist, bend at the knees.</li> <li>• Do not twist at the waist and turn while lifting. Keep the load centered and close to body.</li> <li>• Do not lift more than 40 pounds (May be lesser for some workers) alone.</li> <li>• Rotate tasks and take breaks when performing repetitive tasks and try to find the best position possible to perform the task.</li> </ul>	L
	Slips, trips, and falls could lead to injuries.	<ul style="list-style-type: none"> <li>• Keep work areas free of debris and equipment in work paths.</li> <li>• Follow good housekeeping in work areas.</li> <li>• Correct hazards when seen, such as holes or other trip hazards.</li> <li>• If they cannot be removed, they must be covered or marked.</li> </ul>	L
	Handling sharp objects or using hand tools or knives could cause cuts, punctures, or scrapes.	<ul style="list-style-type: none"> <li>• Wear leather work gloves when handling materials that may be sharp or have sharp edges.</li> <li>• Be familiar with the proper use and limitations of hand tools.</li> <li>• Report even minor injuries to your supervisor for evaluation.</li> <li>• Have a first aid kit available and have a minimum of 2 persons with first aid and CPR training onsite.</li> <li>• Never carry a knife in one’s pocket.</li> <li>• Ensure knives have retractable blades.</li> <li>• Cut away from the body.</li> </ul>	L
	Workers could be exposed to heat or to a lesser degree, cold stress.	<ul style="list-style-type: none"> <li>• UXOSO will monitor for heat or cold stress in accordance with SWP 5-15, Heat Illness prevention and SWP 5-16 General Safe work practices for cold stress.</li> </ul>	L

<b>AHA #1 – Mob/Demob and Site Setup/Layout</b>			
<b>Job Steps</b>	<b>Hazards</b>	<b>Controls</b>	<b>RAC</b>
		<ul style="list-style-type: none"> <li>• All workers will be trained in heat (and cold) stress signs and symptoms and proper prevention measures and will employ the buddy system to watch for signs and symptoms in co-workers.</li> <li>• Provide fluids, rest breaks (in shade and/or airconditioned environment; (e.g., work trucks) will be taken during warm weather.</li> <li>• Dress appropriately for the outdoor conditions and be prepared for changes that can occur throughout the day.</li> <li>• Provide a steady controlled work pace.</li> <li>• New workers not used to working in high heat environment may require more acclimatization to site conditions and may be more susceptible to heat stress.</li> </ul>	
	Contracting or spreading coronavirus.	<ul style="list-style-type: none"> <li>• Stay within your social/work group.</li> <li>• Monitor yourself for coronavirus symptoms, if displaying symptoms do not leave your room and self-isolate.</li> <li>• Seek medical advice.</li> <li>• Maintain social distance.</li> <li>• Wear a face covering.</li> <li>• Wash hands regularly.</li> <li>• Site will display posters and information for COVID-19 mitigation measures.</li> </ul>	L
	Eye injuries could occur from dust or debris.	<ul style="list-style-type: none"> <li>• Wear safety glasses with side shields at all times when working onsite.</li> <li>• If something enters the eye, do not rub. Set up portable eye wash for flushing of eye to try to remove object.</li> <li>• Use the eye wash for the full 15-minutes, regardless if you feel that the object has been removed.</li> <li>• Notify supervisor so eye can be monitored. If object still irritates or stays in the eye, seek medical attention as soon as possible.</li> <li>• Follow up with eye exam is recommended any time an object gets into an eye since it is necessary to ensure object does not remain, even if it cannot be felt.</li> <li>• To keep dust down, travel at slower speeds on unpaved roads and laydown areas.</li> <li>• If required, water mist will be used to control dust.</li> </ul>	L
	Noise from operations	<ul style="list-style-type: none"> <li>• Hearing protection is required when sound levels exceed 84 dBA continuously.</li> <li>• This rule applies to personnel working near or any other sources of loud noise.</li> <li>• The UXOSO will monitor and post hearing protection required areas and activities.</li> </ul>	L

<b>AHA #1 – Mob/Demob and Site Setup/Layout</b>			
<b>Job Steps</b>	<b>Hazards</b>	<b>Controls</b>	<b>RAC</b>
	Fall hazards (falls from heights of 6 feet or greater)	<ul style="list-style-type: none"> <li>No person will climb upon any equipment, where there is exposure to a fall of 6 feet or greater unless proper guarding and rails is in place.</li> </ul>	L
	Potential trips or falls	<ul style="list-style-type: none"> <li>Survey the site for any slip, trip, or fall hazards.</li> <li>Either eliminate the hazard or mark the hazard so it can be avoided.</li> <li>Use caution when walking around the site and wear sturdy leather work boots.</li> <li>Maintain a clean and orderly work site and keep travel pathways free of obstacles.</li> </ul>	L
	Contact with biting or stinging insects could occur; including bees, wasps, hornets, ticks, and spiders.	<ul style="list-style-type: none"> <li>Workers will apply DEET to work clothing following manufacturer's instructions as a preventative measure for biting insects as required.</li> <li>Workers with allergies will let the UXOSO know using the medical data sheet and will carry their own prescription medication as applicable.</li> <li>First aid and medical attention as required.</li> <li>Report all bites, stings, and rashes to UXOSO.</li> <li>Avoid reaching blindly into areas, depressions, debris, etc.</li> </ul>	L
	Electrical hazards could be present during tool use or during setup of and breakdown of equipment.	<ul style="list-style-type: none"> <li>Ensure that power cords are inspected and in good condition for use, that GFCIs are used properly, and portable generators are not overloaded.</li> <li>Ensure any power tools used are in good working condition and have third prong on cord or are double insulated.</li> </ul>	L

<b>AHA #1 – Mob/Demob and Site Setup/Layout</b>		
<b>Equipment to be Used</b>	<b>Training Requirements/Competent or Qualified Personnel Name(s)</b>	<b>Inspection Requirements</b>
Site vehicles and delivery vehicles	Drivers must have driver’s license. Drivers of Tetra Tech’s rental vehicles must be authorized to drive the rental vehicle in accordance with Tetra Tech’s procedures.	Receipt inspection by Equipment Supervisor (UXOSO). Vehicle inspection by drivers. Operator’s manual for each vehicle must be located with the vehicle.
Hand and power tools	Training in use of hand and power tools by the UXOSO or designee and review of operating manual. Use proper hand tools.	Daily inspection by users/operators. Inspect tools and power cords to ensure they are listed by a NRTL. Inspect for damage to tool and to cords.
First aid kit, fire extinguisher, eye wash station	Use of emergency equipment including first aid kits, fire extinguishers and eye wash must be done by personnel familiar with this plan; use and inspection criteria of the equipment, and what the equipment is used for, are by or under direction of the UXOSO/SSHO.	Fire Extinguisher <ul style="list-style-type: none"> <li>• Initially and at least monthly thereafter by UXOSO</li> </ul> First Aid Kit <ul style="list-style-type: none"> <li>• Weekly and after use for restocking by UXOSO</li> </ul> Eye Wash Station <ul style="list-style-type: none"> <li>• Weekly by UXOSO</li> <li>• Potable water changed weekly unless a preservative solution is used</li> </ul>
PPE	Users must be trained in the proper use of, limitations of, inspection of, donning and doffing of, and replacement of PPE.	Daily by user

**Abbreviations and Acronyms:**

APP – Accident Prevention Plan  
DEET – 33% diethyl-meta- toluamide  
EHS – Environmental, Health, and Safety  
GFCI – ground-fault circuit interrupter

MEC – Munitions and Explosives of Concern  
NRTL – nationally recognized testing laboratory  
OSHA – Occupational Safety and Health Administration  
UXOSO – UXO Safety Officer

PPE – personal protective equipment  
SSHP – Site Safety and Health Plan  
UL – Underwriters Laboratory  
UXO – unexploded ordnance

**AHA Signature Sheet**

I have reviewed the above AHA and acknowledge the hazards involved with this work task and the controls that will help to minimize illness or injury during the tasks.

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## Activity Hazard Analysis (AHA) #2

*Any modifications to the approved AHA that results in a higher RAC than the approved AHA will also be reviewed by the SHM. The AHA will be maintained by the staff performing the work, under UXOSO oversight to keep it current to the work being performed and the hazards presented by the work as a living document.*

<b>Job/Task: Surface Preparation/Vegetation Removal</b>	<b>Overall Risk Assessment Code (RAC) (Use highest code)</b>					<b>M</b>
Project Location: Remedial Action at Congaree River Project	<b>Risk Assessment Code (RAC) Matrix</b>					
Date Prepared: January 2022		Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by: Scot Wilson	Catastrophic	<b>E</b>	<b>E</b>	<b>H</b>	<b>H</b>	<b>M</b>
	Critical	<b>E</b>	<b>H</b>	<b>H</b>	<b>M</b>	<b>L</b>
Reviewed by: Jeffrey (Jim) Streib, CIH, CSP, CHMM, CQA Director, Health, Safety and Environmental	Marginal	<b>H</b>	<b>M</b>	<b>M</b>	<b>L</b>	<b>L</b>
	Negligible	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
<p><b>Notes:</b> (Field Notes, Review Comments, etc.)</p> <p>In addition to the information listed in this AHA, all field personnel must review and be familiar with all provisions of the approved APP/SSHP. EM 385-1-1 will also be available on site for personnel to review specific materials and mitigation measures associated with this project. PPE for this AHA will consist of a hard hat (when overhead safety hazards exist), leather safety-toed boots, safety glasses with side shields, a standard work uniform (long pants, tee shirt), hearing protection (as required), work gloves worn when indicated, a Class 2 high-visibility safety vest, and other PPE described in this AHA.</p> <p><b>First Aid-/CPR-Qualified Persons: TBD</b></p>	Step 1: Review each <b>“Hazard”</b> with identified safety <b>“Controls”</b> and determine RAC (See above)					
	<b>“Probability”</b> is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.					<b>RAC Chart</b>
	<b>“Severity”</b> is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible					<b>E = Extremely High Risk</b>
	Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each <b>“Hazard”</b> on AHA. Annotate the overall highest RAC at the top of AHA.					<b>H = High Risk</b>
					<b>M = Moderate Risk</b>	
					<b>L = Low Risk</b>	

<b>AHA #2 – Job/Task: Surface Preparation/Vegetation Removal</b>			
<b>Job Steps</b>	<b>Hazards</b>	<b>Controls</b>	<b>RAC</b>
Surface Preparation and vegetation removal with weed whackers and chainsaws.	Slip, trip and fall hazards when walking around the site and across uneven ground surface	<ul style="list-style-type: none"> <li>• Determine the best access route before transporting equipment.</li> <li>• Wear slip resistant footwear with ankle support. Pay attention to footing and best path of travel to avoid tripping hazards.</li> <li>• Prohibit jumping from truck beds or raised platforms.</li> <li>• Be aware of rocks, brush, animal borroughs and other hazards. Choose firm ground for walking, if possible.</li> </ul>	M
	Dehydration, heat stress, sunburn	<ul style="list-style-type: none"> <li>• Drink a minimum of two liters of water per day.</li> <li>• Remain in shade whenever possible.</li> <li>• Wear sunscreen with sun protection factor of at least 45.</li> <li>• UXOSO will monitor for heat or cold stress in accordance with SWP 5-15, Heat Illness prevention and SWP 5-16 General Safe work practices for cold stress.</li> </ul>	M
	Heavy lifting: Injury from physical exertion, sprains, strains, awkward bending/lifts, fatigue, and ergonomic hazards	<ul style="list-style-type: none"> <li>• Use proper lifting techniques.</li> <li>• Assure solid footing.</li> <li>• Maintain good personal level of fitness.</li> <li>• Rotate people between operating the equipment</li> <li>• Be alert to signs and symptoms of overexertion.</li> <li>• Do not lift greater than 50 lbs..</li> <li>• Use team lift whenever possible for awkward or heavy objects.</li> <li>• Limit repetitive awkward motions.</li> <li>• Take adequate work/rest periods based on personal limitations</li> </ul>	M
	Contracting or spreading coronavirus.	<ul style="list-style-type: none"> <li>• Stay within your social/work group.</li> <li>• Monitor yourself for coronavirus symptoms, if displaying symptoms do not leave your room and self-isolate.</li> <li>• Seek medical advice.</li> <li>• Maintain social distance.</li> <li>• Wear a face covering.</li> <li>• Wash hands regularly.</li> <li>• Site will display posters and information for COVID-19 mitigation measures.</li> </ul>	L
	Exposure to poison ivy or oak if present in the area.	<ul style="list-style-type: none"> <li>• As area is inspected, identify any “suspicious” vegetation that may be poisonous.</li> </ul>	L

<b>AHA #2 – Job/Task: Surface Preparation/Vegetation Removal</b>			
<b>Job Steps</b>	<b>Hazards</b>	<b>Controls</b>	<b>RAC</b>
		<ul style="list-style-type: none"> <li>• Mark these areas with warning tape or spray paint in preparation for vegetation clearance.</li> <li>• Avoid contact with these plants.</li> <li>• Wear long sleeve shirts and pants.</li> <li>• Wear disposable gloves</li> <li>• Wear an “ivy blocker” and have Technu® or Zanfel post-exposure washing agent available.</li> <li>• If removal of these plants is necessary, these plants need to be removed carefully to avoid spreading vegetation throughout the site or spraying plant debris on personnel or equipment. Also cutting tools that cut this vegetation need to be cleaned and handled carefully as the oils can remain on cutting surfaces.</li> <li>• Do not stockpile this vegetation with other vegetation that may be used as mulch in the future – it should be disposed of separately. Never burn this vegetation.</li> </ul>	
	Adverse weather and lightning	<ul style="list-style-type: none"> <li>• Monitor warnings or indications of severe weather conditions.</li> <li>• Follow site protocols established in SSHP as well as onsite direction and instruction from UXOSO</li> <li>• Take appropriate precautions to protect personnel and property.</li> <li>• Be aware of lightning, use the lightning 30/30 Rule: If it takes less than 30 seconds to hear thunder after seeing the flash, lightning is near enough to pose a threat; after the storm ends, wait 30 minutes before resuming work activities.</li> <li>• A 30-minute wait time will be observed from last strike before field activities resume.</li> <li>• All personnel will evacuate as directed by the UXOSO and as established in the APP/SSHP.</li> </ul>	L
	Cold or heat stress and weather hazards	<ul style="list-style-type: none"> <li>• Properly dress for the weather.</li> <li>• UXOSO to monitor weather and implement heat stress and cold stress controls in accordance with APP/SSHP.</li> <li>• Provide breaks for personnel to get either into cool or warm environment. Encourage a steady work pace.</li> <li>• Ensure adequate drinking water is available.</li> <li>• Know the signs and symptoms of exposure and keep an eye on your partner.</li> </ul>	M
	Contact with biting or stinging insects and spiders could occur; contact with	<ul style="list-style-type: none"> <li>• Workers will apply DEET to work clothing following manufacturer’s instructions as a preventative measure for biting insects as required.</li> </ul>	L

<b>AHA #2 – Job/Task: Surface Preparation/Vegetation Removal</b>			
<b>Job Steps</b>	<b>Hazards</b>	<b>Controls</b>	<b>RAC</b>
	venomous snakes could occur	<ul style="list-style-type: none"> <li>Workers with allergies will let the UXOSO know using the medical data sheet and will carry their own prescription medication as applicable.</li> <li>First aid and medical attention as required</li> <li>Immediately report all bites, stings, and rashes to UXOSO Avoid reaching blindly into areas, depressions, debris, etc.</li> </ul>	
	Potential to encounter debris on surface that could be MEC/MPPEH	<ul style="list-style-type: none"> <li>Survey team will consist of qualified UXO technicians.</li> <li>Do not handle or remove debris.</li> <li>Flag debris and avoid it.</li> </ul>	L
	Chainsaws can cut or strike workers causing severe injuries if used improperly	<ul style="list-style-type: none"> <li>Qualified workers will be trained and experienced in the proper use of chainsaws and will operate the chainsaws as per manufacturer’s recommendation.</li> <li>All saws shall be equipped with a clutch, chain brake (gas only), throttle trigger latch, stop switch, rear hand guard, chain catcher, vibration damper, spark arrestor, and muffler.</li> <li>Anti-kick teeth will be in place and chain guard mechanism in place.</li> <li>Chainsaws will be industrial or professional grade and maintained per manufacturer’s requirements.</li> <li>Chain will be kept sharp and lubricated.</li> <li>Inspect chainsaw before use.</li> <li>Wear steel toe leather work boots, leather work gloves and leather chaps when working with chainsaws.</li> <li>Do not operate chainsaw at or above shoulder height. For large limbs, begin limb reduction from the tip of the limb and move towards the tree trunk.</li> <li>Prohibit standing on, straddling logs while ground cutting.</li> <li>Stand uphill while ground cutting</li> <li>The operator will hold the saw with both hands during all cutting operations.</li> <li>Workers should not hold logs while being cut.</li> <li>Stop saw motor to remove saw if pinched. Don’t pull on saw. Bend open cut (i.e. wedge) until saw comes free.</li> <li>Wedges and chisels shall be properly pointed and tempered.</li> <li>Only wood, plastic, or soft metal wedges shall be used with power saws.</li> <li>Gas-powered chainsaws shall be equipped with a control that will return the saw to idling speed when released.</li> </ul>	L
	Refueling of saws could cause fires or spills.	<ul style="list-style-type: none"> <li>Ensure saws are turned off and allowed to cool before being refueled.</li> <li>Do not overfill saws by ensuring a small size fuel can is used which the</li> </ul>	L

<b>AHA #2 – Job/Task: Surface Preparation/Vegetation Removal</b>			
<b>Job Steps</b>	<b>Hazards</b>	<b>Controls</b>	<b>RAC</b>
		<p>worker can maintain good control over during refueling.</p> <ul style="list-style-type: none"> <li>• Place equipment on a spill pad for refueling. Visually inspect refueling point to ensure overfill is not done.</li> <li>• Do not fill to capacity; leave space for expansion in the tank.</li> <li>• Do not smoke in or near refueling areas.</li> <li>• Do not refuel in back of a pickup truck.</li> <li>• Have a 60:BC fire extinguisher present at the refueling site and ensure workers are trained in their use.</li> </ul>	
	Eye injuries could occur from wood chips or debris.	<ul style="list-style-type: none"> <li>• Workers will wear safety glasses and a face shield (mesh) when using chainsaws in addition to other PPE specified above. Wear safety glasses with side shields when working onsite.</li> <li>• If something enters the eye, do not rub.</li> <li>• Use client-supplied, onsite eye wash for the full 15-minutes, regardless if you feel that the object has been removed.</li> <li>• Notify supervisor so eye can be monitored.</li> <li>• If object still irritates or stays in the eye, seek medical attention as soon as possible.</li> <li>• Follow up with eye exam is recommended any time an object gets into an eye since it is necessary to ensure object does not remain, even if it cannot be felt.</li> <li>• To keep dust down, travel at slower speeds on unpaved roads</li> </ul>	L
	Handling sharp objects, vegetation, or using hand tools or knives could cause cuts, punctures, or scrapes.	<ul style="list-style-type: none"> <li>• Wear leather work gloves when handling materials that may be sharp or have sharp edges.</li> <li>• When removing limbs using saw, watch where you are going and do not walk backwards</li> <li>• Be familiar with the proper use and limitations of hand tools.</li> <li>• Report even minor injuries to your supervisor for evaluation.</li> <li>• Have a first aid kit available and have a minimum of 2 persons with first aid and CPR training onsite.</li> <li>• Never carry a knife in one's pocket.</li> <li>• Ensure knives have retractable blades.</li> <li>• Cut away from the body.</li> </ul>	L

<b>AHA #2 – Job/Task: Surface Preparation/Vegetation Removal</b>		
<b>Equipment to be Used</b>	<b>Training Requirements/Competent or Qualified Personnel Name(s)</b>	<b>Inspection Requirements</b>
Site vehicles and delivery vehicles	Drivers must have current driver’s license. Drivers of rental vehicles must be authorized to drive the rental vehicle in accordance with Tetra Tech procedures.	Receipt inspection by UXOSO or designee (as applicable). Vehicle inspection by drivers. Operator’s manual for each vehicle must be located with the vehicle.
Hand and power tools	Training in use of hand and power tools by the, UXOSO or designee and review of operating manual. Use proper hand tools.	Daily inspection by users/operators. Inspect tools for damage to tool.
First aid kit, fire extinguisher, eye wash station	Use of emergency equipment including first aid kits, fire extinguishers and eye wash must be done by personnel familiar with this plan; use and inspection criteria of the equipment, and what the equipment is used for, are by or under direction of the UXOSO.	<p><b>Fire Extinguisher</b></p> <ul style="list-style-type: none"> <li>• Initially and at least monthly thereafter by UXOSO</li> </ul> <p><b>First Aid Kit</b></p> <ul style="list-style-type: none"> <li>• Weekly and after use for restocking by UXOSO</li> </ul> <p><b>Eye Wash Station</b></p> <ul style="list-style-type: none"> <li>• Weekly by Tetra Tech UXOSO</li> <li>• Potable water changed weekly unless a preservative solution is used</li> </ul>
PPE	Users must be trained in the proper use of, limitations of, inspection of, donning and doffing of, and replacement of PPE.	Daily by user

**Abbreviations and Acronyms:**

APP – Accident Prevention Plan  
CPR – Cardio Pulmonary Resuscitation  
DEET – 33% diethyl-meta-toluamide

GPS – Global Positioning System  
MRS – Munitions Response Site  
PPE – Personal Protective Equipment

RTK – Real-time Kinematic  
SSHP – Site Safety and Health Plan  
UXOSO – Unexploded Ordnance Safety Officer

**AHA Signature Sheet**

I have reviewed the above AHA and acknowledge the hazards involved with this work task and the controls that will help to minimize illness or injury during the tasks.

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## Activity Hazard Analysis (AHA) #3

*Any modifications to the approved AHA that results in a higher RAC than the approved AHA will also be reviewed by the SHM. The AHA will be maintained by the staff performing the work, under UXOSO oversight to keep it current to the work being performed and the hazards presented by the work as a living document.*

<b>Activity/Work Task: Subsurface Clearance using “Mag &amp; Dig” Methods</b>	<b>Overall Risk Assessment Code (RAC) (Use highest code)</b>					<b>M</b>
Project Location: Remedial Action at Congaree River Project	<b>Risk Assessment Code (RAC) Matrix</b>					
Date Prepared: January 2022		Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by: Scot Wilson	Catastrophic	<b>E</b>	<b>E</b>	<b>H</b>	<b>H</b>	<b>M</b>
	Critical	<b>E</b>	<b>H</b>	<b>H</b>	<b>M</b>	<b>L</b>
Reviewed by: Jeffrey (Jim) Streib, CIH, CSP, CHMM, CQA Director, Health, Safety and Environmental	Marginal	<b>H</b>	<b>M</b>	<b>M</b>	<b>L</b>	<b>L</b>
	Negligible	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>Notes:</b> (Field Notes, Review Comments, etc.) In addition to the information listed in this AHA, all field personnel must review and be familiar with all provisions of the approved APP/SSHP. EM 385-1-1 will also be available on site for personnel to review specific materials and mitigation measures associated with this project. PPE for this AHA will consist of a hard hat (when overhead safety hazards exist), leather safety-toed boots, safety glasses with side shields, a standard work uniform (long pants, tee shirt), hearing protection (as required), work gloves worn when indicated, a Class 2 high-visibility safety vest, and other PPE described in this AHA.  <b>First Aid-/CPR-Qualified Persons: TBD</b>	Step 1: Review each <b>“Hazard”</b> with identified safety <b>“Controls”</b> and determine RAC (see above).					
	<b>“Probability”</b> is the likelihood to cause an incident, near miss, or accident and is identified as Frequent, Likely, Occasional, Seldom, or Unlikely.				<b>RAC Chart</b>	
	<b>“Severity”</b> is the outcome/degree if an incident, near miss, or accident did occur and is identified as Catastrophic, Critical, Marginal, or Negligible.					
	Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each “Hazard” on the AHA. Annotate the overall highest RAC at the top of the AHA.				<b>E = Extremely High Risk</b>	
				<b>H = High Risk</b>		
				<b>M = Moderate Risk</b>		
				<b>L = Low Risk</b>		



<b>AHA #3 – Job/Task: Subsurface Clearance using “Mag &amp; Dig” Methods</b>			
<b>Job Steps</b>	<b>Hazards</b>	<b>Controls</b>	<b>RAC</b>
Establish exclusion zone (EZ) and support zone equipment as required by the site ESS. Remove nonessential personnel from within the EZ boundaries. Perform subsurface clearance	Encountering MEC/MPPEH – UXO may be present and can explode if handled improperly or is misidentified.	<ul style="list-style-type: none"> <li>All workers performing UXO-related activities will be qualified UXO technicians under supervision of the SUXOS.</li> <li>All activities will be performed following standard operating procedures and requirements covered in the Work Plan and ESS.</li> <li>UXO technicians will have refresher training on the key identification and safety precautions for anticipated conventional munitions which could be found on site.</li> </ul>	M
	Non-essential workers or others could come into contact with or be affected by MEC/MPPEH.	<ul style="list-style-type: none"> <li>An exclusion zone (EZ) will be established in accordance with the requirements in the Work Plan and ESS. Only qualified UXO technicians will enter the EZ.</li> <li>Monitor the EZ while work is underway so work can be stopped if any unauthorized personnel enter</li> <li>Follow all applicable standard operating procedures in the Work Plan and ESS regarding surface clearance and MEC avoidance.</li> <li>Only UXO technicians under the direct supervision of the SUXOS will handle MEC/MPPEH.</li> </ul>	L
	Communication between teams and communication with team outside of range area in emergency – lack of proper or working communication.	<ul style="list-style-type: none"> <li>SUXOS and UXOSO will ensure that the UXO teams can communicate with each other and that a means of communication outside the range area are possible.</li> <li>In addition, emergency services, in the event of an emergency must be possible so that someone can either call for or radio someone to call for emergency services.</li> <li>UXOSO will verify that all coordination with emergency services has been performed prior to start of clearance activities and communications checks will be performed at start of work day and periodically during the work day.</li> </ul>	L
	Hand excavation could cause injury to workers.	<ul style="list-style-type: none"> <li>Use probes prior to use of hand tools.</li> <li>Intrusive work to be performed by UXO-qualified personnel only.</li> <li>Wear leather work gloves when using tools and digging.</li> <li>Use the pivot technique when digging soil. Do not twist at the waist.</li> <li>Rotate digging staff as to allow others a break as required.</li> </ul>	L
	Failure to locate and mark utilities (if present) could cause electrocution or damage to utilities.	<ul style="list-style-type: none"> <li>If the clearance area has potential utilities, all dig locations will undergo utility surveys, private locates, and geophysical verification and marking prior to intrusive investigation and clearance.</li> <li>A dig permit may be required.</li> </ul>	L

<b>AHA #3 – Job/Task: Subsurface Clearance using “Mag &amp; Dig” Methods</b>			
<b>Job Steps</b>	<b>Hazards</b>	<b>Controls</b>	<b>RAC</b>
		<ul style="list-style-type: none"> <li>If utilities are present, hand digging in the location of utilities will be required and utilities will be supported in an excavation as required.</li> </ul>	
	Removal of debris can cause back strains if objects are heavy and/or awkward and repetitive.	<ul style="list-style-type: none"> <li>If object is slightly too heavy for one person, use team lift.</li> <li>Rotate repetitive tasks amongst the team so as one person is not performing awkward tasks or lifting.</li> </ul>	L
	Contracting or spreading coronavirus.	<ul style="list-style-type: none"> <li>Stay within your social/work group.</li> <li>Monitor yourself for coronavirus symptoms, if displaying symptoms do not leave your room and self-isolate.</li> <li>Seek medical advice.</li> <li>Maintain social distance.</li> <li>Wear a face covering.</li> <li>Wash hands regularly.</li> <li>Site will display posters and information for COVID-19 mitigation measures.</li> </ul>	L
	Workers could be struck by lightning if storms are in the area.	<ul style="list-style-type: none"> <li>Follow the 30-second rule (time between lightning strike and thunder) for shutdown of operations, or as determined by the UXOSO.</li> <li>Immediately suspend operations when lightning is in the immediate vicinity and seek shelter in a building (preferred) or vehicle.</li> <li>Monitor the local weather report daily and as necessary for any severe weather warnings.</li> <li>Wait 30 minutes after the last lightning strike before resuming work.</li> <li>Don't use or be in contact with metal fixtures or telephone lines when inside structures.</li> </ul>	L
	Noise from adjacent activities (e.g., airfield operations) could cause hearing loss and make it hard to communicate.	<ul style="list-style-type: none"> <li>Hearing protection is required when sound levels exceed 84 dBA continuously.</li> <li>This rule applies to personnel working near or on heavy equipment and any other sources of loud noise.</li> <li>The UXOSO will monitor and post hearing protection required areas and activities.</li> </ul>	L
	Workers could experience extreme sunburn or eye strain.	<ul style="list-style-type: none"> <li>Workers will apply a broad-spectrum sunscreen to exposed skin and reapply as necessary throughout the day.</li> <li>Workers are encouraged to wear a hat with a wide brim (when hardhat is not worn) to keep sun off head and long sleeve breathable UV-blocking shirts when necessary.</li> </ul>	L

<b>AHA #3 – Job/Task: Subsurface Clearance using “Mag &amp; Dig” Methods</b>			
<b>Job Steps</b>	<b>Hazards</b>	<b>Controls</b>	<b>RAC</b>
		<ul style="list-style-type: none"> <li>Safety glasses should have appropriate tint for working in an outdoor environment with strong UV exposure.</li> </ul>	
	Workers could be exposed to heat or to a lesser degree, cold stress.	<ul style="list-style-type: none"> <li>UXOSO will monitor for heat or cold stress in accordance with SWP 5-15, Heat Illness prevention and SWP 5-16 General Safe work practices for cold stress.</li> <li>All workers will be trained in heat (and cold) stress signs and symptoms and proper prevention measures and will employ the buddy system to watch for signs and symptoms in co-workers.</li> <li>Provide fluids and rest breaks (in shade and/or air-conditioned environment (e.g., work trucks) will be taken during warm weather.</li> <li>Dress appropriately for the outdoor conditions and be prepared for changes that can occur throughout the day.</li> <li>Provide a steady controlled work pace.</li> </ul>	L
	Contact with biting or stinging insects, scorpions, and spiders can cause rash, anaphylactic shock, or illness.	<ul style="list-style-type: none"> <li>Workers will apply DEET to work clothing following manufacturer’s instructions as a preventative measure for biting insects as required.</li> <li>Tuck in pant legs to socks and tuck in shirt to pants.</li> <li>Wear long sleeves when necessary.</li> <li>Examine one’s body thoroughly for evidence of tick being attached. Follow steps in the APP for removal of tick. Report bite or rashes to UXOSO for appropriate medical follow up to ensure entire tick has been removed (including mouth parts).</li> <li>Workers with allergies to bees, hornets, wasps, etc. are strongly encouraged to let the UXOSO know using the medical data sheet and will be advised to carry their own prescription medication as applicable.</li> <li>First aid and medical attention as required.</li> <li>Stings to allergic persons or signs and symptoms of anaphylaxis should be considered an emergency situation.</li> </ul>	L
	Potential contact with venomous snakes.	<ul style="list-style-type: none"> <li>Review biological hazards section of the APP. Wear snake gaiters or chaps when working and walking in vegetated areas, if required.</li> <li>Report any bites to the UXOSO immediately.</li> <li>If venomous bite is suspected, emergency services will be contacted. If it is possible to identify the suspected species of snake, provide that information to the emergency medical staff.</li> <li>Provide first aid as required (refer to APP).</li> </ul>	L

<b>AHA #3 – Job/Task: Subsurface Clearance using “Mag &amp; Dig” Methods</b>			
<b>Job Steps</b>	<b>Hazards</b>	<b>Controls</b>	<b>RAC</b>
		<ul style="list-style-type: none"> <li>Wear leather work gloves and use caution when pickup up, turning over, or handling debris. Do not blindly place hands into depressions, holes, under rocks or debris.</li> </ul>	
	MEC/MPPEH is known and/or anticipated to be present and consists of UXO (including potential sub munitions) which presents an explosive hazard if improperly handled and/or misidentified.	<ul style="list-style-type: none"> <li>Only UXO technicians under the direct supervision of the SUXOS will handle MEC/MPPEH. Inspection of MPPEH will include positive identification of the item and if MEC/MPPEH, a determination on whether the MEC/MPPEH is acceptable to move or not.</li> <li>All MEC/MPPEH (and debris that cannot be certified explosives free) will be accounted for at all times.</li> <li>Do not handle ammunition and explosives roughly or carelessly.</li> <li>Extra care should be taken because in most cases the hazards of the ammunition and/or explosives increase with age, deterioration, or damage.</li> <li>Keep all spark- and flame-producing materials away from energetic materials.</li> </ul>	M
	Excavating equipment could strike MEC/MPPEH and cause detonation.	<ul style="list-style-type: none"> <li>Proceed carefully with aid of geophysical equipment and hand digging to identify item and to avoid striking object.</li> <li>Proceed carefully and in a controlled manner.</li> <li>When equipment is moving an item, ensure non-essential personnel are removed per requirements and SOPs in the Work Plan and ESS.</li> </ul>	L
	If MEC is found broken open, filler could be exposed and present an explosive hazard or chemical hazard to workers who touch filler or contaminated soil around the item.	<ul style="list-style-type: none"> <li>Notify the UXOSO/SSHO and SUXOS if a MEC items is broken open and filler is exposed.</li> <li>Do not handle without leather work gloves and nitrile gloves underneath.</li> <li>UXOSO/SSHO will ensure decontamination procedures are put into place appropriately, and ensure a hand washing station is available and used in the Contamination Reduction Zone.</li> <li>Work upwind from any contamination when possible.</li> <li>Control the generation of dusts during earth disturbing activities.</li> </ul>	L

<b>AHA #3 – Subsurface Clearance using “Mag &amp; Dig” Methods</b>		
<b>Equipment to be Used</b>	<b>Training Requirements/Competent or Qualified Personnel Name(s)</b>	<b>Inspection Requirements</b>
Hand tools, shovels	Specific training for hand tools will be provided.	Inspect before each use. Discard defective tools.
Metals detector	Only qualified UXO Technicians and/or geophysical technicians trained on care, use, and limitations of instruments.	Receipt inspection by SUXOS. Daily inspection by UXO Technician (user). Geophysical verification at Instrumentation Verification Strip. Daily function checks.
First aid kit, fire extinguisher, eye wash station	Use of emergency equipment including first aid kits, fire extinguishers and eye wash must be done by personnel familiar with this plan; use and inspection criteria of the equipment, and what the equipment is used for, are by or under direction of the UXOSO/SSHO.	Fire Extinguisher <ul style="list-style-type: none"> <li>• Initially and at least monthly thereafter by UXOSO</li> </ul> First Aid Kit <ul style="list-style-type: none"> <li>• Weekly and after use for restocking by UXOSO</li> </ul> Eye Wash Station <ul style="list-style-type: none"> <li>• Weekly by UXOSO</li> <li>• Potable water changed weekly unless a preservative solution is used</li> </ul>
PPE	Users must be trained in the proper use of, limitations of, inspection of, donning and doffing of, and replacement of PPE.	Daily by user

**Abbreviations and Acronyms:**

APP – Accident Prevention Plan  
DEET – 33% diethyl-meta-toluamide  
EHS – Environmental, Health, and Safety  
GFCI – ground-fault circuit interrupter  
MEC – Munitions and Explosives of Concern

NRTL – nationally recognized testing laboratory  
OSHA – Occupational Safety and Health Administration  
UXOSO – UXO Safety Officer  
PPE – personal protective equipment  
SSHP – Site Safety and Health Plan

SS – Site Superintendent  
UL – Underwriters Laboratory  
UXO – unexploded ordnance

**AHA Signature Sheet**

I have reviewed the above AHA and acknowledge the hazards involved with this work task and the controls that will help to minimize illness or injury during the tasks.

NAME	SIGNATURE	TITLE	DATE
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## Activity Hazard Analysis (AHA) #4

*Any modifications to the approved AHA that results in a higher RAC than the approved AHA will also be reviewed by the SHM. The AHA will be maintained by the staff performing the work, under UXOSO oversight to keep it current to the work being performed and the hazards presented by the work as a living document.*

<b>Job/Task: Disposal of MPPEH</b>	<b>Overall Risk Assessment Code (RAC) (Use highest code)</b>					<b>M</b>
Project Location: Remedial Action at the Congaree River Project	<b>Risk Assessment Code (RAC) Matrix</b>					
Date Prepared: January 2022		Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by: Scot Wilson	Catastrophic	E	E	H	H	M
	Critical	E	H	H	M	L
Reviewed by: Jeffrey (Jim) Streib, CIH, CSP, CQA Director, Health, Safety and Environmental	Marginal	H	M	M	L	L
	Negligible	M	L	L	L	L
<b>Notes:</b> (Field Notes, Review Comments, etc.) In addition to the information listed in this AHA, all field personnel must review and be familiar with all provisions of the approved APP/SSHP. EM 385-1-1 will also be available on site for personnel to review specific materials and mitigation measures associated with this project. PPE for this AHA will consist of leather safety-toed boots, safety glasses with side shields, a standard work uniform (long pants, tee shirt), hearing protection (as required), work gloves worn when indicated, and other PPE described in this AHA.  <b>First Aid-/CPR-Qualified Persons: TBD</b>	Step 1: Review each <b>“Hazard”</b> with identified safety <b>“Controls”</b> and determine RAC (See above)					
	<b>“Probability”</b> is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.					<b>RAC Chart</b>
	<b>“Severity”</b> is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible					
	Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each “Hazard” on AHA. Annotate the overall highest RAC at the top of AHA.					
E = Extremely High Risk						
H = High Risk						
M = Moderate Risk						
L = Low Risk						

<b>AHA #4– Job/Task: Disposal of MPPEH</b>			
<b>Job Steps</b>	<b>Hazards</b>	<b>Controls</b>	<b>RAC</b>
<ul style="list-style-type: none"> <li>• Establish EZ based on MEC item around disposal area.</li> <li>• Make required notifications of demolition/venting operations.</li> <li>• Retrieve donor explosives.</li> <li>• Set up demolition charges IAW procedures</li> <li>• Use engineering controls, if required, to reduce the fragment travel range.</li> <li>• Post sentries outside Fragmentation Zone on all access roads</li> <li>• Ensure sentries have a full view of demolition and access areas.</li> <li>• Contact sentries to ensure that no pedestrian traffic is in the vicinity</li> <li>• Evacuate demolition crew to a safe location</li> <li>• Demolition occurs.</li> <li>• Inspect demolition site to ensure that demolition/venting has been completed properly.</li> </ul>	Slips, trips, and falls	<ul style="list-style-type: none"> <li>• Visually inspect work areas eliminate slip, trip, and fall hazards if feasible. Keep work areas neat and orderly.</li> <li>• Always place supplies in areas away from normal foot traffic, and equipment and tools in a safe location that does not present a trip hazard.</li> <li>• Workers should not stand or walk on either equipment or supplies.</li> <li>• Load/unload on even terrain.</li> </ul>	M
	MEC/MPPEH hazards	<ul style="list-style-type: none"> <li>• On-site MEC/MPPEH training.</li> <li>• Establish and enforce Exclusion Zone (EZ) around operation.</li> <li>• Perform MEC/MPPEH and Anomaly avoidance procedures when selecting the location for the disposal site</li> <li>• All UXO Technicians are certified in accordance with DDESB TP-18.</li> <li>• Observe all MEC/MPPEH/UXO safety precautions, such as movement, heat, shock, and friction.</li> <li>• Do not handle MEC/MPPEH items unnecessarily.</li> <li>• There will be a primary and alternate means of communication.</li> <li>• Leave area immediately if hazardous conditions are observed.</li> <li>• Be alert. Cease operations if unsafe conditions arise.</li> <li>• Establish EZ and secure according to type of shot.</li> <li>• Maintain positive site control; cease operations if unauthorized entry is made.</li> <li>• Observe all MEC/MPPEH safety precautions, such as movement, heat, shock, and friction.</li> <li>• Do not handle MEC/MPPEH items unnecessarily.</li> <li>• Only UXO qualified personnel will perform demolitions operations.</li> <li>• Use engineering controls to reduce or eliminate fragmentation/ overpressure hazards.</li> </ul>	M
	Fire hazards	<ul style="list-style-type: none"> <li>• Observe safe work practices, operating precautions, and instructions for the equipment in use.</li> <li>• Do not allow smoking or flame-producing devices near explosives.</li> <li>• Wear static resistant clothing and long pants.</li> <li>• First Aid kits and fire extinguishers will be readily available.</li> </ul>	M



<b>AHA #4– Job/Task: Disposal of MPPEH</b>			
<b>Job Steps</b>	<b>Hazards</b>	<b>Controls</b>	<b>RAC</b>
	Strains and musculoskeletal injuries	<ul style="list-style-type: none"> <li>• Direct personnel to use proper lifting techniques, such as keeping the back straight, lifting with the legs without twisting, and getting help when moving debris and equipment.</li> <li>• Do not self-lift more than 50 pounds.</li> </ul>	M
	EMR/static electricity hazards	<ul style="list-style-type: none"> <li>• Clothing, radios and cell phones will not be used in the area once the pit is primed or during the priming process, unless radios are at the firing point and the firing line is shunted.</li> </ul>	L
	Workers could be struck by lightning if storms are in the area.	<ul style="list-style-type: none"> <li>• Follow the 30-second rule (time between lightning strike and thunder) for shutdown of operations, or as determined by the UXOSO.</li> <li>• Immediately suspend operations when lightning is in the immediate vicinity and seek shelter in a building (preferred) or vehicle.</li> <li>• Monitor the local weather report daily and as necessary for any severe weather warnings.</li> <li>• Wait 30 minutes after the last lightning strike before resuming work.</li> <li>• Do not use or be in contact with metal fixtures or telephone lines when inside structures.</li> </ul>	L
	Workers could be exposed to heat or to a lesser degree, cold stress.	<ul style="list-style-type: none"> <li>• UXOSO will monitor for heat or cold stress in accordance with SWP 5-15, Heat Illness prevention and SWP 5-16 General Safe work practices for cold stress.</li> <li>• All workers will be trained in heat (and cold) stress signs and symptoms and proper prevention measures and will employ the buddy system to watch for signs and symptoms in co-workers.</li> <li>• Provide fluids and rest breaks (in shade and/or air-conditioned environment (e.g., work trucks) will be taken during warm weather.</li> <li>• Dress appropriately for the outdoor conditions and be prepared for changes that can occur throughout the day.</li> <li>• Provide a steady controlled work pace.</li> </ul>	L
	Contracting or spreading coronavirus.	<ul style="list-style-type: none"> <li>• Stay within your social/work group.</li> <li>• Monitor yourself for coronavirus symptoms, if displaying symptoms do not leave your room and self-isolate.</li> <li>• Seek medical advice.</li> <li>• Maintain social distance.</li> <li>• Wear a face covering.</li> <li>• Wash hands regularly.</li> <li>• Site will display posters and information for COVID-19 mitigation measures.</li> </ul>	L

<b>AHA #4– Job/Task: Disposal of MPPEH</b>			
<b>Job Steps</b>	<b>Hazards</b>	<b>Controls</b>	<b>RAC</b>
	Contact with biting or stinging insects, and spiders can cause rash, anaphylactic shock, or illness.	<ul style="list-style-type: none"> <li>• Workers will apply DEET to work clothing following manufacturer’s instructions as a preventative measure for biting insects as required.</li> <li>• Tuck in pant legs to socks and tuck in shirt to pants.</li> <li>• Wear long sleeves when necessary.</li> <li>• Examine one’s body thoroughly for evidence of tick being attached. Follow steps in the APP for removal of tick. Report bite or rashes to UXOSO for appropriate medical follow up to ensure entire tick has been removed (including mouth parts).</li> <li>• Workers with allergies to bees, hornets, wasps, etc. are strongly encouraged to let the UXOSO know using the medical data sheet and will be advised to carry their own prescription medication as applicable.</li> <li>• First aid and medical attention as required.</li> <li>• Stings to allergic persons or signs and symptoms of anaphylaxis should be considered an emergency situation.</li> </ul>	L

<b>AHA #4 – Job/Task: Disposal of MPPEH</b>		
<b>Equipment to be Used</b>	<b>Training Requirements/Competent or Qualified Personnel Name(s)</b>	<b>Inspection Requirements</b>
Demolitions Equipment Explosives	<ul style="list-style-type: none"> <li>• UXO personnel will meet training and experience requirements outlined in DDESB TP 18.</li> <li>• Site-specific MEC/MPPEH training will be conducted for all site personnel.</li> <li>• Member with CO state blaster's license on site.</li> <li>• Training in disposal operations for items expected to be encountered.</li> <li>• All site personnel will have current HAZWOPER training.</li> </ul> <p>All site personnel will review site-specific slip/fall hazards.</p>	<ul style="list-style-type: none"> <li>• UXOSO will ensure that all controls are being followed, all equipment is being correctly utilized, and all personnel have received appropriate training.</li> <li>• Equipment inspected daily prior to use by user and UXOSO.</li> </ul>
Hand and power tools	<ul style="list-style-type: none"> <li>• Training in use of hand and power tools by the SSHO or designee and review of operating manual. All site personnel will have training and use proper hand tool for the task.</li> </ul>	<ul style="list-style-type: none"> <li>• Daily inspection by users/operators.</li> <li>• Inspect tools and power cords to ensure they are listed by a NRTL. Inspect for damage to tool and to cords.</li> </ul>
First aid kit, AED, fire extinguisher, eye wash station	<p>Use of emergency equipment including first aid kits, fire extinguishers and eye wash must be done by personnel familiar with this plan; use and inspection criteria of the equipment, and what the equipment is used for, are by or under direction of the UXOSO. Those who supply first aid or use AED as first responders must have current first aid/CPR and AED training. AED users must be trained to use the specific AED that will be supplied onsite with hands-on training element.</p>	<p>Fire Extinguisher</p> <ul style="list-style-type: none"> <li>• Initially and at least monthly thereafter by UXOSO</li> </ul> <p>First Aid Kit and AED</p> <ul style="list-style-type: none"> <li>• Weekly and after use for restocking by UXOSO</li> </ul> <p>Eye Wash Station</p> <ul style="list-style-type: none"> <li>• Weekly by UXOSO</li> <li>• Potable water changed weekly unless a preservative solution is used</li> </ul>

**Abbreviations and Acronyms:**

APP – Accident Prevention Plan  
DEET – 33% diethyl-meta-toluamide  
MEC – Munitions and Explosives of Concern  
NRTL – nationally recognized testing laboratory

OSHA – Occupational Safety and Health Administration  
UXOSO – UXO Safety Officer  
PPE – personal protective equipment  
SSHHP – Site Safety and Health Plan

UL – Underwriters Laboratory  
UXO – unexploded ordnance

**AHA Signature Sheet**

I have reviewed the above AHA and acknowledge the hazards involved with this work task and the controls that will help to minimize illness or injury during the tasks.

NAME	SIGNATURE	TITLE	DATE
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## Activity Hazard Analysis (AHA) #5

*Any modifications to the approved AHA that results in a higher RAC than the approved AHA will also be reviewed by the SHM. The AHA will be maintained by the staff performing the work, under UXOSO oversight to keep it current to the work being performed and the hazards presented by the work as a living document.*

<b>Job/Task:</b> Mechanical Excavations (if needed)	<b>Overall Risk Assessment Code (RAC) (Use highest code)</b>					<b>M</b>
Project Location: Remedial Action at the Congaree River Project	<b>Risk Assessment Code (RAC) Matrix</b>					
Date Prepared: January 2022		Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by: Scot Wilson	Catastrophic	E	E	H	H	M
	Critical	E	H	H	M	L
Reviewed by: Jeffrey (Jim) Streib, CIH, CSP, CHMM, CQA Director, Health, Safety and Environmental	Marginal	H	M	M	L	L
	Negligible	M	L	L	L	L
<p><b>Notes:</b> (Field Notes, Review Comments, etc.)</p> <p>In addition to the information listed in this AHA, all field personnel must review and be familiar with all provisions of the approved APP/SSHP. EM 385-1-1 will also be available on site for personnel to review specific materials and mitigation measures associated with this project. PPE for this AHA will consist of a hard hat (when overhead safety hazards exist), leather safety-toed boots, safety glasses with side shields, a standard work uniform (long pants, tee shirt), hearing protection (as required), work gloves worn when indicated, a Class 2 high-visibility safety vest, and other PPE described in this AHA.</p> <p style="color: red;">First Aid-/CPR-Qualified Persons: TBD</p>	Step 1: Review each <b>“Hazard”</b> with identified safety <b>“Controls”</b> and determine RAC (see above).					
	<b>“Probability”</b> is the likelihood to cause an incident, near miss, or accident and is identified as Frequent, Likely, Occasional, Seldom, or Unlikely.				<b>RAC Chart</b>	
	<b>“Severity”</b> is the outcome/degree if an incident, near miss, or accident did occur and is identified as Catastrophic, Critical, Marginal, or Negligible.				E = Extremely High Risk	
	Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each “Hazard” on the AHA. Annotate the overall highest RAC at the top of the AHA.				H = High Risk	
				M = Moderate Risk		
				L = Low Risk		

<b>AHA #5 – Job/Task: Mechanical Excavations (if needed)</b>			
<b>Job Steps</b>	<b>Hazards</b>	<b>Controls</b>	<b>RAC</b>
Operating heavy equipment to the location needing to be excavated, excavating soil, backfilling excavated soil, removal of equipment from location	Struck By/ Against Heavy Equipment	<ul style="list-style-type: none"> <li>• Wear reflective warning vests when exposed to vehicular traffic</li> <li>• Isolate equipment swing areas</li> <li>• Make eye contact with operators before approaching equipment</li> <li>• Understand and review hand signals</li> <li>• Step away from equipment when bucket adjustments are made.</li> <li>• Do not attempt verbal communication in high noise backgrounds</li> <li>• Park equipment in areas where operator can see clearly to dismount equipment</li> <li>• Report minor incidents to site supervisor</li> </ul>	M
	Construction equipment could cause injury to personnel	<ul style="list-style-type: none"> <li>• Workers operating construction equipment will be qualified and designated operators.</li> <li>• Operate at safe speeds and obey local traffic speeds (max 20 mph) and facility rules.</li> <li>• Wear seat belt while seated.</li> <li>• Use dedicated spotter and standard hand signals for backing operations.</li> <li>• Construction equipment will have backup alarms installed.</li> <li>• Wear high visibility vests on ground</li> <li>• Stay out of swing radius of heavy equipment and make positive communication with the operator before entry into work zone.</li> </ul>	M
	Slips, Trips, Falls	<ul style="list-style-type: none"> <li>• Clear, walkways of equipment, vegetation, excavated material, tools and debris</li> <li>• Mark, identify, or barricade other obstructions</li> <li>• Exit equipment slowly and maintain three point contact</li> <li>• Clean boot soles before climbing on equipment</li> </ul>	L
	Contracting or spreading coronavirus.	<ul style="list-style-type: none"> <li>• Stay within your social/work group.</li> <li>• Monitor yourself for coronavirus symptoms, if displaying symptoms do not leave your room and self-isolate.</li> <li>• Seek medical advice.</li> <li>• Maintain social distance.</li> <li>• Wear a face covering.</li> <li>• Wash hands regularly.</li> <li>• Site will display posters and information for COVID-19 mitigation measures.</li> </ul>	L
	Workers could be exposed to heat or to a lesser degree, cold stress.	<ul style="list-style-type: none"> <li>• UXOSO will monitor for heat or cold stress in accordance with SWP 5-15 and SWP 5-16.</li> <li>• All workers will be trained in heat (and cold) stress signs and symptoms and proper prevention measures and will employ the buddy system to watch for signs and symptoms in co-workers.</li> </ul>	L

AHA #5 – Job/Task: Mechanical Excavations (if needed)			
Job Steps	Hazards	Controls	RAC
		<ul style="list-style-type: none"> <li>Provide fluids and rest breaks (in shade and/or air conditioned environment (e.g., work trucks) will be taken during warm weather.</li> <li>Dress appropriately for the outdoor conditions and be prepared for changes that can occur throughout the day.</li> <li>Provide a steady controlled work pace.</li> </ul>	
	Noise from operating heavy equipment and trommel	<ul style="list-style-type: none"> <li>Hearing protection is required when sound levels exceed 84 dBA continuously.</li> </ul>	L
	Excavating equipment could strike MEC/MPPEH and cause detonation.	<ul style="list-style-type: none"> <li>Proceed carefully with aid of geophysical equipment and hand digging to identify item and to avoid striking object.</li> <li>Proceed carefully and in a controlled manner.</li> <li>When equipment is moving an item, ensure non-essential personnel are removed per requirements and SOPs in the Work Plan and ESS.</li> </ul>	L
	Dust generation and excavation hazards (excavation depth is anticipated presently to be less than 5 feet and most excavations will be a maximum of 1 meter in depth).	<ul style="list-style-type: none"> <li>All excavation will be overseen by the designated excavation competent person (<b>TBD</b>).</li> <li>The excavation competent person must inspect excavations on a daily basis or more frequently as required.</li> <li>Excavations will be backfilled as soon as quality control and quality assurance is attained to verify removal of detected anomalies to depth of detection.</li> <li>Spoil banks and equipment must be at least 2 feet away from the excavation.</li> <li>Personnel must wear class 2 high-visibility clothing around operating heavy equipment.</li> <li>Handle soil carefully to avoid dust generation. Use a fine spray of water to control dust as needed if visible dusts are being generated.</li> <li>Competent person will conduct inspection of the excavation to identify the proper precautions are in place to protect workers based on soil types and other site-specific factors associated with the location.</li> </ul>	L

<b>AHA #5 – Job/Task: Mechanical Excavations (if needed)</b>		
<b>Equipment to be Used</b>	<b>Training Requirements/Competent or Qualified Personnel Name(s)</b>	<b>Inspection Requirements</b>
<ul style="list-style-type: none"> <li>• Excavator</li> <li>• Trucks</li> </ul>	<ul style="list-style-type: none"> <li>• Daily equipment inspections as per manufacturers requirements</li> </ul> Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers)	<ul style="list-style-type: none"> <li>• Review AHA with all task personnel</li> <li>• Review Site Specific Health and Safety Plan.</li> <li>• Review operations/safety manuals for all equipment utilized</li> </ul> Review site specific chemical hazards
Hand tools	Specific training for hand tools will be provided.	Daily and before use. Use the equipment safety checklist.
First aid kit, fire extinguisher, eye wash station	Use of emergency equipment including first aid kits, fire extinguishers and eye wash must be done by personnel familiar with this plan; use and inspection criteria of the equipment, and what the equipment is used for, are by or under direction of the UXOSO.	Fire Extinguisher <ul style="list-style-type: none"> <li>• Initially and at least monthly thereafter by UXOSO</li> </ul> First Aid Kit <ul style="list-style-type: none"> <li>• Weekly and after use for restocking by UXOSO</li> </ul> Eye Wash Station <ul style="list-style-type: none"> <li>• Weekly by UXOSO</li> <li>• Potable water changed weekly unless a preservative solution is used</li> </ul>

**Abbreviations and Acronyms:**

AHA – Activity Hazard Analysis  
 APP – Accident Prevention Plan  
 CIH – Certified Industrial Hygienist  
 DEET – 33% diethyl-meta-toluamide

EM – Engineer Manual  
 EZ – exclusion zone  
 MEC – munitions and explosives of concern  
 mph – miles per hour  
 MPPEH – material potentially presenting an explosives hazard

OSHA – Occupational Safety and Health Administration  
 PPE – personal protective equipment  
 RAC – Risk Assessment Code  
 UXO – unexploded ordnance  
 UXOSO – UXO Safety Officer



**AHA Signature Sheet**

I have reviewed the above AHA and acknowledge the hazards involved with this work task and the controls that will help to minimize illness or injury during the tasks.

NAME	SIGNATURE	TITLE	DATE
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## **15.0 SITE SAFETY AND HEALTH PLAN**

The following procedures are attached and intended to address Site-Specific hazards and controls for the CRP project. The Site Description and History for this site are in Section 2.0 of the APP. AHA's are located in Section 14.

### **15.1 GENERAL SAFETY**

Due to the nature of planned site operations, the potential risk for exposure to safety hazards is high. Anticipated safety hazards, which may be encountered during site activities, and precautions to be followed are listed below and in individual Activity Hazard Analyses, above.

#### **15.2 Slips, Trips, and Fall Hazards**

The project site is located between a river and a park area. Site conditions consist of light to moderate terrain and light brush, which make for the possibility of slips, trips, and fall hazards. Site personnel shall be instructed to make themselves aware of the placement of their feet at all times to avoid site conditions that attribute to slips, trips, and falls. As there will be some shallow excavation work taking place, site personnel will be instructed to stay at least two feet away from the edge of excavations. The use of sturdy leather work boots with ankle support and non-slip soles will reduce the risk of slips, trips and falls.

#### **15.3 Cuts/Laceration Hazards**

Power tools, MD surfaces, and other buried debris can be expected to have sharp and rusted surfaces. Project personnel should expect a high likelihood of cuts/lacerations if proper care is not taken. During all activities involving the handling of MEC, scrap, and site materials, personnel will wear leather work gloves to prevent injury to hands.

#### **15.4 Pinched/Crushed Fingers and Toes**

The weight of MEC items expected to be recovered and handled during the surface sweep and MEC inspection activities is expected to pose only a light to moderate hazard to fingers and toes. The mishandling of even light materials can cause injuries to site personnel. All site personnel are required to wear leather work boots and gloves while activities are being conducted. Personnel will utilize proper lifting techniques and, when appropriate, will use additional personnel or material handling equipment for heavy objects.

#### **15.5 Hand Tool Operation**

Use of improper or defective tools can contribute significantly to the occurrence of accidents on site. Therefore, the safe work practices listed below shall be observed when using hand tools:

- Hand tools will be inspected for defects prior to each use.
- Defective hand tools will be removed from service and repaired or discarded.
- Tools will be selected and used in the manner in which they were designed.
- Be sure of footing and grip before using any tool.
- Do not use tools that have split handles, mushroom heads, worn jaws, or other defects.

- Gloves will be worn whenever they increase gripping ability or if cut, laceration or puncture hazards may exist during the use of hand tools.
- Safety glasses with side shields, goggles, or a face shield will be used if tool use presents an eye/face hazard.
- Do not use makeshift tools or other improper tools.
- Use non-sparking tools where there are explosive vapors, gases, or residue.

## 15.6 Material Lifting

Many types of objects are handled in normal day-to-day operations. Care shall be taken in lifting and handling heavy or bulky items because they are the cause of many upper extremity and back injuries. The following fundamentals address the proper lifting of materials to avoid upper extremity and back injuries:

- The size, shape, and weight of the object to be lifted must be considered. Site personnel will not lift more than 50 lbs, or any uncomfortable weight, individually. The lift will otherwise be performed mechanically or with additional personnel.
- A firm grip on the object is essential; therefore, the hands and object shall be free of oil, grease, and water, which might prevent a firm grip.
- The hands and especially the fingers shall be kept away from any points that cause them to be pinched or crushed, especially when setting the object down.
- The item will be inspected for metal slivers, jagged edges, burrs, rough or slippery surfaces, and pinch points, and gloves will be used to protect the hands.
- The feet will be placed far enough apart for good balance and stability.
- Personnel will ensure that solid footing is available prior to lift the object.
- When lifting, get as close to the load as possible, bend the legs at the knees, making sure that the back is kept as straight as possible.
- To lift the object, the legs are straightened from their bending position.
- 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, with the back kept straight, the legs bent at the knees and the object lowered.
- If the item to be lifted is too large, bulky, or heavy for one person to safely lift, ask a co-worker for assistance. If a piece of material handling equipment is available that can do the job, use the equipment instead of trying to lift it yourself.
- When two or more people are required to handle an 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 person, if possible, will face the direction in which the object is being carried.

## 15.7 Munitions and Explosives of Concern (MEC)

MEC may be present and located during CRP site activities. UXO qualified personnel will follow the requirements of the Tetra Tech Safety Program, EP 3851-97, and EM 385-1-1, which outline the safety and health precautions to be taken if MEC are encountered and/or destroyed. All non-UXO qualified personnel will follow the safe work practices listed below:

- Non-UXO qualified personnel will receive site-specific MEC recognition training prior to participation in site activities.

- No soil penetrating activities will be allowed without the area first being cleared by UXO-qualified personnel.
- Non-UXO qualified personnel will be escorted on site by UXO qualified personnel, until such time as the area is cleared.
- Once an area has been cleared and flagged, non-UXO qualified personnel may perform non-intrusive duties in the area unescorted but shall not leave the cleared area unescorted.
- Non-UXO qualified personnel will not touch or disturb any object, which could potentially be MEC, related, and will immediately notify the nearest UXO qualified person of the presence of the object.

Tetra Tech will establish an EZ based on the Hazardous Frag Distance of the Munition with the Greatest Fragmentation Distance (MGFD) for all CRP UXO operations other than MEC Disposal. For MEC Disposal Operations, the EZ will be based on the Maximum Frag Distance of the MGFD. If an unexpected hazardous MEC is located, a review of the MGFD may result in an adjustment to the size of the EZ. Tetra Tech will have control of the entrance to the project area until the area has been cleared. Should personnel not associated with the project operations need to enter the EZ in order to gain access to the area, all MEC operations will halt for the duration of time the person is within the EZ. Once they have departed the area, MEC operations may resume.

### **15.8 Chemical Hazards**

Anticipated chemical hazards expected during CRP site activities include the TLM in the impacted sediments that will be removed from within the cofferdam areas. Use of proper PPE and other health and safety procedures established for this work will be followed to assure worker protection.

The anticipated chemical hazards expected during CRP site activities also include those fuels and oils brought on-site, for equipment maintenance. All site personnel will follow the procedures and precautions outlined in the appropriate SDS. The SDS binder will be kept in the site office and will be available to all employees on request. CWM procedures are outlined in Section 2.1 of this appendix but are not anticipated as necessary during this site operation.

### **15.9 Physical Hazards**

For the planned site activities to be conducted, the potential for exposure to physical hazards is high. The physical hazards that may be encountered during site operations and precautions to be taken are addressed in the Activity Hazard Analysis in Section 14 of this appendix.

### **15.10 Flammable/Explosive Hazards from Fueling Equipment and Site Vehicles**

The chance of fire and/or explosion during vehicle and equipment refueling and maintenance is high when improper procedures are used. All site vehicles will be equipped with a portable fire extinguisher readily available to fight a fire. Equipment will never be refueled on the back of a pick-up truck with a bed liner. Cellular phones will not be used around Flammable Liquids. Grounding and bonding procedures will be used during all fueling operations.

### **15.11 Noise Hazards**

Protection against the effects of noise exposure shall be provided when the sound pressure levels exceed those shown below when measured on the A-scale of a standard sound level meter at slow response.

When employees are subjected to sound exceeding those listed in the following table, feasible administrative or engineering controls shall be utilized. If such controls fail to reduce sound levels to within these levels, personal protective equipment shall be provided and used to reduce sound levels within the levels of the table. If the variations in noise level involve maximal intervals of 1 second or less, it is to be considered continuous.

<b>PERMISSIBLE NOISE EXPOSURES (1)</b>	
<b>Duration per Day, (Hours)</b>	<b>Sound level dBA (Slow Response)</b>
8.00	90
6.00	92
4.00	95
3.00	97
2.00	100
1.50	102
1.00	105
0.50	110
0.25	115

Footnote (1). When the daily noise exposure is composed of two or more periods of noise exposure of different levels, their combined effect should be considered, rather than the individual effect of each. If the sum of the following fractions:  $C1./T1. + C2./T2.$   $C(n)/T(n)$  exceeds unity, then, the mixed exposure should be considered to exceed the limit value.  $C(n)$  indicates the total time of exposure at a specified noise level, and  $T(n)$  indicates the total time of exposure permitted at that level. Exposure to impulsive or impact noise should not exceed 140 dB peak sound pressure level.

Tetra Tech will make hearing protectors available to all employees exposed to an 8-hour time-weighted average of 85 decibels or greater at no cost to the employees. Hearing protectors will be replaced as necessary. Hearing protection will be required for all personnel working in and around any operations likely to produce high noise levels, such as during the use of chain saws and weed whackers during thinning and pruning operations and when working in the vicinity of heavy equipment.

### 15.12 Cold and Heat Stress

Due to the duration, location, and time of year of this project, there is a moderate probability of encountering extreme heat. Precautions for the prevention of cold stress are also provided for the possibility of unseasonable cold temperatures. For unseasonable cool temperatures, workers will dress in warm layered clothing to protect against low temperatures. Fluids will be available on site, and workers will be encouraged to drink frequently. If required for cold temperatures, workers will be given opportunities to warm up in heated facilities based on the ACGIH recommended Work-Warming Regimen.

### 15.13 Heat Stress

Heat stress is one of the most common (and potentially serious) illnesses that affect hazardous waste site workers. When site personnel are engaged in operations involving hot environments and/or the use of semi- or impermeable clothing, a number of physiological responses can occur which may seriously affect the health and safety of the workers. These affects can be eliminated or controlled through the use of a comprehensive heat stress prevention and monitoring program.

Level D PPE is being used at this site, so the heat stress program will be implemented if the ambient temperature exceeds 75°F according to the ACGIH Heat Stress Recommendations for unacclimatized

workers.

**Heat Stress Monitoring:** Heat stress monitoring will be conducted using WBGT readings, in order to assure adequate work/rest cycles are implemented at the site if ambient dry-bulb temperatures exceed 75°F. Pulse monitoring may also be used in addition to the WBGT readings, particularly during acclimatization, to assure workers are adapting to the conditions safely. Monitoring will be performed by the UXOSO, and results will be documented. Heat stress monitoring will be used to determine work-rest cycles to be implemented on site as referenced by the ACGIH TLV guidelines for Heat Stress.

### Causes of Heat Stress

The most common cause of heat stress during site activities is the effect that PPE has on the body's natural cooling mechanism. Impermeable or semi-impermeable PPE interferes with the evaporation of perspiration and causes the body to retain metabolic and environmentally induced heat. Individuals will vary in their susceptibility and degree of response to the stress induced by increased body heat. Heat stress can result in health effects ranging from transient heat fatigue to serious illness or death. Heat stress is caused by a number of interacting factors including environmental condition, clothing, workload, and the individual characteristics of the worker. Because heat stress is probably one of the most common (and potentially serious) illnesses at hazardous waste sites, regular monitoring and other preventive precautions are vital.

Factors, which may predispose a worker to heat stress, include:

- Lack of physical fitness.
- Lack of acclimatization to hot environments.
- Degree of hydration.
- Level of obesity.
- Current health status (i.e., having an infection, chronic disease, diarrhea, etc.).
- Alcohol or drug use.
- The worker's age and sex.
- Sunburn.

Prior to initiating site activities each day, and periodically throughout the day, the UXOSO will inspect the site personnel for evidence of the previously mentioned factors to determine those personnel who are at increased risk for heat stress-related disorders. Evidence of extreme dehydration, illness, or drug or alcohol use may require the SUXOS or UXOSO to restrict the worker's activities until such time as the worker is fit for duty. Personnel identified as being at high risk for heat stress, who are allowed to participate in site operations, will be monitored frequently by the UXOSO throughout the day.

### Heat Stress Disorders

This section outlines the major heat-related illnesses that may result from exposure to high heat environments and/or the use of semi- or impermeable clothing. For the purpose of this Program, reference to "liquids" will indicate the use of water or an electrolyte replacement solution, and not tea or coffee (unless it is decaffeinated) or carbonated soft drinks.

### Heat Rash

Heat rash is caused by continuous exposure to heat and humid air and is aggravated by wet chafing clothes. This condition can decrease a worker's ability to tolerate hot environments.

**Symptoms:** Mild red rash, especially in areas of the body, which sweat heavily.

**Treatment:** Decrease the amount of time in protective gear and provide powder such as cornstarch or baby powder to help absorb moisture and decrease chafing. Maintain good personal hygiene standards and change into dry clothes if needed.

### Heat Cramps

Heat cramps are caused by a profuse rate of perspiration that is not balanced by adequate fluid and electrolyte intake. The occurrence of heat-related cramps are often an indication that excessive water and electrolyte loss has occurred, which can further develop into heat exhaustion or heat stroke.

**Symptoms:** Acute, painful spasms of voluntary muscles such as the back, abdomen, and extremities.

**Treatment:** Remove victim to a cool area and loosen restrictive clothing. Stretch and massage affected muscles to increase blood flow to the area. Have the patient drink one to two cups of liquids immediately and every twenty minutes thereafter. Consult with a physician if the condition does not improve. If available, an electrolyte replacement solution should be taken along with liquids. For maximum benefit, this should be taken in at least a 2:1 ratio with at least two glasses of water to one glass of electrolyte replacement liquid.

### Heat Exhaustion

Heat exhaustion is a state of very definite weakness or exhaustion caused by increased stress on various organs to meet increased demands to cool the body due to excessive loss of fluids from the body. This condition leads to inadequate blood supply and cardiac insufficiency. Heat exhaustion is less dangerous than heat stroke, but nonetheless must be treated. If allowed to go untreated, heat exhaustion can quickly develop into heatstroke.

**Symptoms:** Symptoms of heat exhaustion include pale or flushed, clammy, moist skin, profuse perspiration, and extreme weakness. The body's temperature is basically normal or slightly elevated, the pulse is weak and rapid, and breathing is shallow. The individual may have a headache, be dizzy or nauseated.

**Treatment:** Remove the individual to a cool, air-conditioned place, loosen clothing, elevate feet and allow the individual to rest. Consult a physician, especially in severe cases. Have the patient drink one to two cups of liquids immediately, and every twenty minutes thereafter. Total liquid consumption should be about one to two gallons per day. If the signs and symptoms of heat exhaustion do not subside, or become more severe, immediate medical attention will be required.

### Heat Stroke

Heatstroke is an acute and dangerous reaction to heat stress caused by a failure of the heat-regulating mechanisms of the body. The failure of the individual's temperature control system causes the perspiration system to stop working correctly. When this occurs, the body core temperature rises very rapidly to a point (105+°F) where brain damage and death will result if the person is not cooled quickly.

**Symptoms:** The victim's skin is hot, and may or may not be red and dry, (due to the fact that the individual may still be wet from having sweat while wearing protective clothing earlier), nausea, dizziness, confusion, extremely high body temperatures, rapid respiratory and pulse rate (PR), delirium, convulsions,

unconsciousness or coma.

**Treatment:** Cool the victim immediately. If the body temperature is not brought down quickly, permanent brain damage or death may result. The victim should be moved to a shady area; lie down, and keep the head elevated. Gradually cool the victim by either sponging or immersing the victim in cool water to reduce the core temperature to a safe level (<102°F). If they are conscious, give the victim cool liquids to drink. Observe the victim and obtain immediate medical help. Do not give the victim caffeinated or alcoholic beverages. Heatstroke is considered a medical emergency. Medical emergency assistance must be summoned.

### Heat Stress Preventive Measures

Proper training and preventive measures will help avert serious illness and loss of work productivity. Preventing heat stress is particularly important because once someone suffers from heat exhaustion, that person may become predisposed to additional heat injuries. In order to avoid heat-related illnesses, proper preventive measures will be implemented whenever environmental conditions dictate the need. These preventive measures represent the minimal steps to be taken and will include the following procedures:

- SUXOS or UXOSO will examine each site worker prior to the start of daily operations to determine the individuals susceptible to heat-induced stress. Workers exhibiting factors which make them susceptible to heat stress will be closely monitored by the UXOSO.
- Site workers will be trained to recognize and treat heat-related illnesses. This training will include the signs, symptoms, and treatment of heat stress disorders as outlined in this program.
- In order to maintain workers' body fluids at normal levels, workers will be encouraged to drink, as a minimum, approximately sixteen ounces of liquids prior to start of work in the morning, after lunch, and prior to leaving the site at the conclusion of the day's activities.
- Disposable four (4) to twelve (12) ounce cups and liquids will be provided on site.
- Acceptable liquids will include water and an electrolyte replacement solution, with the recommended intake being two cups of water for each cup of electrolyte replacement solution.
- Liquids containing caffeine are to be avoided.

When ambient conditions and site workload requirements dictate, as determined by the SUXOS, workers will be required to drink a minimum of sixteen (16) to thirty-two (32) ounces of liquids during each rest cycle. The normal thirst mechanism is not sensitive enough to ensure that enough water will be taken to replace lost sweat. When heavy sweating occurs, workers should be encouraged to drink even though they may not be thirsty. The following strategies may be useful in encouraging fluid intake:

- Maintain water temperature at 50°F to 60°F (10°C to 15.6°C).
- Provide small disposable cups that hold about 4 ounces (0.1 liter).
- Have workers drink 16 ounces (0.5 liters) of fluids (preferably water or dilute drinks) before beginning work.
- Urge workers to drink a cup or two every 15 to 20 minutes, or at each monitoring break. A total of 1 to 1.6 gallons (4 to 6 liters) of fluid per day are recommended, but more may be necessary to maintain body weight.

Monitoring of ambient or physiological heat stress indices will be conducted to allow prevention and/or early detection of heat-induced stress. Monitoring will be conducted IAW applicable paragraphs of this



Program. Site workers will be given time to acclimatize to site work conditions, temperature, and workload. Acclimatization usually takes about a week of continued work in hot environments, and allows the worker's body to become adjusted to this level and type of work. This process involves a gradual increase in the workload over the required period, the length of which depends upon the nature of the work performed, the ambient temperatures and the individual's susceptibility to heat stress. Work schedules will be adjusted as follows:

- Modify work/rest schedules according to monitoring requirements.
- Mandate work slowdowns as needed.
- Rotate personnel: alternate job functions to minimize overstress or overexertion at one task.
- Add additional personnel to work teams.
- Perform work during cooler hours of the day if possible or at night if adequate lighting can be provided.

### Supplemental Preventive Measures

Workers will be encouraged to achieve and maintain an optimum level of physical fitness. Increased physical fitness will allow workers to better tolerate and respond to hot environments and heavy workloads. In comparison to an unfit person, a fit person will have a less physiological strain, a lower heart rate and body temperature, and a more efficient sweating mechanism.

### Administrative Controls and Work Practices

Training is the key to good work practices. Unless all employees understand the reasons for new or changing old work practices, the chances of such a program succeeding are greatly reduced. The following will be discussed during the site-specific training and repeatedly as determined by the SUXOS or UXOSO:

- Knowledge of the hazards of heat stress;
- Recognition of predisposing factors, danger signs, and symptoms;
- Awareness of first-aid procedures for, and the potential health effects of, heatstroke;
- Employee responsibilities in avoiding heat stress;
- Dangers of using drugs, including therapeutic ones, and alcohol in hot work environments;
- Use of protective clothing and equipment;
- Purpose and coverage of environmental and medical surveillance programs and the advantages of worker participation in such programs; and
- Dietary effects on heat stress.

Because the incidence of heat stress depends on a variety of factors all workers, even those not wearing protective equipment, should be monitored. Initially, the frequency of physiological monitoring depends on the air temperature adjusted for solar radiation and the level of physical work (see Table 15.1). The length of the work cycle will be governed by the frequency of the required physiological monitoring.

For workers wearing permeable clothing (e.g., standard cotton or synthetic work clothes), recommendations for monitoring requirements and suggested work/rest schedules in the current ACGIH TLVs for Heat Stress shall be followed. If the actual clothing worn differs from the ACGIH standard ensemble in insulation value and/or wind and vapor permeability, change the monitoring requirements and work/rest schedules accordingly.

The goal of all heat stress monitoring is to ensure that the worker's body temperature does not exceed 100.4°F. The physiological monitoring methods listed below are to be implemented based upon the severity of the heat and workload. As a minimum the UXOSO will perform WBGT monitoring. He may also choose to monitor the worker's heart rate as an indication of potential heat stress. The frequency of physiological monitoring will be determined using the information presented in Table 15.1.

#### Heart Rate Monitoring

The worker's baseline heart rate should be recorded prior to initiation of site activities by measuring the radial PR for thirty seconds. After each work cycle the heart rate should be measured by taking the PR for 30 seconds as early as possible into the resting period. Taking the radial (wrist) PR is the preferred method; however the carotid (neck) PR may be taken if a worker has difficulty finding the radial pulse. The PR at the beginning of the rest period should not exceed one hundred and ten (110) beats per minute (bpm). If the PR is higher than 110 bpm, the next work period should be shortened by thirty-three percent, while the length of the rest period stays the same. If the PR exceeds 110 bpm at the beginning of the next rest period, the work cycle should be further shortened by thirty-three percent. This procedure will be continued until the worker's PR at the beginning of the rest cycle is maintained below 110 bpm.

#### Wet Bulb, Dry Globe Temperature (WBGT) Monitoring

For CRP site conditions where personnel are working in Level D PPE, and the ambient temperature is greater than 75°F, the UXOSO will conduct WBGT monitoring to assist in controlling the potential for site workers experiencing heat-related adverse health effects. The SUXOS will use WBGT monitor readings obtained from the monitoring equipment, and after estimating the workload, use the values expressed in Table 15.2, to determine the work/rest schedule to be implemented. The values outlined in this table are designed such that nearly all acclimatized, fully clothed workers with adequate salt and water intake will be able to function without the body temperature exceeding 100.4°F.

Acclimatization is the adaptive process that results in a decrease of the physiological response produced by the application of a constant environmental stress. On initial exposure to a hot environment, there is an impaired ability to work and evidence of physiological strain. If the exposure is repeated on several successive days, there is a gradual return of the ability to work and a decrease in physiological strain. Within 4 to 7 days following initiation of the acclimatization process, a dramatic improvement in the ability to perform work is noticed, subjective discomfort practically disappears, body temperature and heart rate are lower, there is a more stable blood pressure, and the sweat is more profuse and dilute.

Alcohol should not be consumed in a hot environment because the loss of body fluids increases the risk of heat stress.

#### Heat Stress Documentation

Should it be required due to site conditions, the UXOSO will be responsible for recording all heat stress-related information. This will include training sessions and monitoring data. Training sessions will be documented using the Documentation of Training Form. PR monitoring data will be recorded on the Heat Stress Monitoring Log, with the WBGT being recorded in the Site Safety Log and/or Site Monitoring Log.

Table 15.1  
**SUGGESTED FREQUENCY OF PHYSIOLOGICAL MONITORING  
FOR FIT AND ACCLIMATIZED WORKERS<sup>a</sup>**

<b>ADJUSTED TEMPERATURE</b>	<b>NORMAL WORK ENSEMBLE</b>	<b>IMPERMEABLE ENSEMBLE</b>
90°F (32.2°C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5°-90°F (30.8°-32.2°C)	After each 60 minutes of work	After each 30 minutes of work
82.5°-87.5°F (28.1°-28.1°C)	After each 90 minutes of work	After each 60 minutes of work
77.5°-82.5°F (25.3°-28.1°C)	After each 120 minutes of work	After each 90 minutes of work
75°-77.5°F (22.5°-25.3°C)	After each 150 minutes of work	After each 120 minutes of work

- <sup>a</sup> For work levels of 250 kilocalories/hour.
- <sup>b</sup> Calculate the adjusted air temperature (at adj) by using this equation:  $at\ adj\ ^\circ F = ta\ ^\circ F + (13 \times \% \text{ sunshine})$ . Measure air temperature (at) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow. (100 percent sunshine = no cloud cover and a sharp, distinct shadow; 0 percent sunshine = no shadows.)
- <sup>c</sup> A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants.

Table 15.2  
**SCREENING CRITERIA WBGT HEAT EXPOSURE THRESHOLD LIMIT VALUES**

<b>Work - Rest Regimen</b>	<b>WORKLOAD</b>		
	<b>Light*</b>	<b>Moderate</b>	<b>Heavy</b>
Continuous work	(29.5)	(27.5)	(26.0)
75% Work - 25% Rest, each hour	(30.5)	(28.5)	(27.5)
50% Work - 50% Rest, each hour	(31.5)	(29.5)	(28.5)
25% Work - 75% Rest, each hour	(32.5)	(31.0)	(30.0)

Consult the ACGIH TLV booklet for definitions of Light, Moderate, and Heavy workloads. Values are given in (°C) WBGT and are intended for workers wearing single-layer summer type clothing. Use of semi or totally impermeable clothing requires monitoring IAW the Tetra Tech Heat Stress Prevention Program. As workload increases, the heat stress impact on a non-acclimated worker is exacerbated. For non-acclimatized workers performing a moderate level of work, the permissible heat exposure TLV should be reduced by approximately 2.5°C.

### 15.14 Ionizing Radiation Hazards

Ionizing radiation is not expected to be an issue on this project site.

### 15.15 Biological Hazards

Biological hazards, which are usually found on site, include insects, such as ticks, spiders, poisonous snakes and hazardous plants. Employee awareness and the safe work practices outlined in the following sections should be followed to reduce the risk associated with these hazards.

### 15.16 Hazardous Plants

During the conduct of CRP site activities, the number and variety of plants that may be encountered is large and extensive. However, the plants presenting the greatest degree of risk to site personnel (i.e. potential for contact vs. effect produced) are those, which produce skin reactions and skin and tissue injury.

### 15.17 Plants Causing Skin and Tissue Injury

Contact with splinters, thorns, and sharp leaf edges is of special concern to site personnel, as is the contact with the pointed surfaces found on branches, limbs, and small trunks. This concern stems from the fact that punctures, cuts, and even minor scrapes caused by accidental contact may result in non-infectious skin lesions, and the introduction of fungi or bacteria through the skin or eye. Personnel receiving any of the injuries listed above, even minor scrapes, will report immediately to the UXOSO for initial and continued observation and care of the injury.

### 15.18 Plants Causing Skin Reactions

The poisonous plants of greatest concern are poison ivy, poison sumac, and poison oak. Both poison ivy and poison oak thrive in all types of light and usually grow in the form of a trailing vine; however, it can also grow as a bush and can attain heights of 10 feet or more. Poison ivy has shiny pointed leaves that grow in clusters of three. Poison oak can have shiny or dull, pointed leaves that grow in clusters of three. Poison oak leaves are more rounded rather than jagged, and the underside of poison oak leaves are covered with hair. Poison sumac has smooth leaves, grows only in wetlands, and has 7-9 leaves per stem.



The skin reaction associated with contacting these plants is caused by the body's allergic reaction to toxins contained in oils produced by the plant. Becoming contaminated with the oils does not require contact with just the leaves. Contamination can be achieved through contact with other parts of the plant such as the branches, stems, or berries, or contact with contaminated items such as tools and clothing. The allergic reaction associated with exposure to these plants will generally cause the following signs and symptoms:

- Blistering at the site of contact, usually occurring within 12 to 48 hours after contact.
- Reddening, swelling, itching and burning at the site of contact.
- Pain, if the reaction is severe.
- Conjunctivitis, asthma, and other allergic reactions if the person is extremely sensitive to the poisonous plant toxin.



If the rash is scratched, secondary infections can occur. The rash usually disappears in 1 to 2 weeks in cases of mild exposure and up to 3 weeks when exposure is severe. Preventive measures, which can prove effective for most site personnel are:

- Avoid contact with any poisonous plants on site and keep a steady watch to identify report, and mark poisonous plants found on site.
- Wash hands, face, or other exposed areas at the beginning of each break period and at the end of each workday.
- Avoid contact with, and wash on a daily basis, contaminated tools, equipment, and clothing.
- Barrier creams, detoxification/wash solutions and orally administered desensitization may prove effective and should be tried to find the best preventive solution.
- Keeping the skin covered as much as possible (i.e., long pants and long sleeved shirts) in areas where these plants are known to exist will limit much of the potential exposure.
- If burning of these plants occurs, make sure personnel are located upwind of the smoke, as inhalation of the smoke or contact with airborne particles from these plants can still cause a reaction to occur.

## 15.19 Snakes

When site activities are conducted in warm weather on sites that are located in wooded, grassy or rocky environments, the potential for contact with venomous snakes becomes a very real danger. There are 38 snake species in South Carolina, only six of which are venomous. These are Copperhead, Coral Snake, Cottonmouth, Pigmy Rattlesnake, Eastern Diamondback Rattlesnake, and Timber Rattlesnake.

Normally, if a person is approaching a snake, the noise created by the person is usually sufficient to frighten the snake off. However, during the warm months, extreme caution must be exercised when conducting site operations around areas where snakes might be found (i.e. rocks, bushes, logs, or in holes, crevices, and abandoned pipes). If venomous snakes are identified on the CRP site, Tetra Tech will issue protective clothing, such as snake leggings, to site personnel. The rules to follow if a snake bites someone are:

- DO NOT cut “Xs” over the bite area, as this will intensify the effect of the venom.
- DO NOT apply suction to the wound since this has minimal effectiveness in removing venom.
- DO NOT apply a tourniquet since this will concentrate the venom and increase the amount of tissue damage in the immediate area.
- If possible, try to get a good look at the snake so it can be identified for proper selection of anti-venom.
- DO NOT allow the victim to run for help since running increases the heart rate and will increase the spread of the venom throughout the body.
- Keep the victim calm and immobile.
- Have the victim hold the affected extremity lower than the heart while waiting for medical assistance. Do not delay evacuation.

- Transport the victim to medical attention immediately.

## 15.20 Tick Bites

The Centers for Disease Control (CDC) has noted the increase of Lyme Disease and Rocky Mountain Spotted Fever (RMSF) which are caused by bites from infected ticks in and near wooded areas, tall grass, and brush. Ticks are small, ranging from the size of a comma up to about one-quarter inch. They are sometimes difficult to see. The tick season extends from spring through summer. When embedded in the skin, they may look like a freckle.

**Lyme disease** has occurred in 43 states, with the heaviest concentrations in the Northeast, the upper Midwest, and along the northern California coast. It is caused by deer ticks and the lone star ticks, which have become infected with spirochetes. Female deer ticks are about one-quarter inch in size and are black and brick red in color. Male deer ticks are smaller, and completely black. Lone star ticks are larger and chestnut brown in color.

**Rocky Mountain Spotted Fever** has occurred in 36 states, with the heaviest concentrations in Oklahoma, North Carolina, South Carolina, Texas, and Virginia. It is caused by Rocky Mountain wood ticks, and dog ticks which have become infected with rickettsia. Both are black in color.

**Symptoms:** The first symptoms of either disease are flu-like chills, fever, headache, dizziness, fatigue, stiff neck, and bone pain. If immediately treated by a physician, most individuals recover fully in a short period of time. If not treated, more serious symptoms can occur.



If you believe a tick has bitten you, or if any of the signs and symptoms noted above appear, contact the UXOSO, who will authorize you to visit a physician for an examination and possible treatment.

**Protective Measures:** Standard field gear (work boots, socks, and light-colored coveralls) provides good protection against tick bites, particularly if the joints are taped. Light-colored coveralls allow easier identification of ticks on clothing. However, even when wearing field gear, the following precautions shall be taken when working in areas that might be infested with ticks:

- When in the field, check yourself often for ticks, particularly on your lower legs and areas covered with hair.
- Spray outer clothing, particularly your pant legs and socks, **BUT NOT YOUR SKIN**, with an insect repellent that contains permethrin or permethrin. Apply Deet (vapor-active repellent) to any exposed skin surface (except eyes and lips), and apply permethrin repellent spray to field clothing. Allow the permethrin to dry before using treated clothing. The repellent system, Deet and permethrin, offer maximum protection.
- When walking in wooded areas, wear a hat, and avoid contact with bushes, tall grass, or brush as much as possible.
- If you find a tick, remove it by pulling on it gently with tweezers.
- If the tick resists, cover the tick with salad oil for about 15 minutes to asphyxiate it, then remove it with tweezers.
- **DO NOT** use matches, a lit cigarette, nail polish, or any other type of chemical to “coax” the tick out.

- Be sure to remove all parts of the tick's body and disinfect the area with alcohol or a similar antiseptic after removal.
- For several days to several weeks after removal of the tick, look for the signs of the onset of Lyme disease, such as a rash that looks like a bulls-eye or an expanding red circle surrounding a light area, frequently seen with a small welt in the center.
- Also look for the signs of the onset of RMSF, such as an inflammation which is visible in the form of a rash comprising many red spots under the skin, which appears 3 to 10 days after the tick bite.

## 15.20 Bees, Hornets and Wasps

Contact with stinging insects like bees, hornets, and wasps may result in site personnel experiencing adverse health effects that range from being mildly uncomfortable to being life-threatening. Therefore, stinging insects present a serious hazard to site personnel, and extreme caution must be exercised whenever site and weather conditions increase the risk of encountering stinging insects. Some of the factors related to stinging insects that increase the degree of risk associated with accidental contact are as follows:



- The nests for these insects are frequently found in remote wooded or grassy areas.
- The nests can be situated in trees, rocks, and bushes or in the ground, and are usually difficult to see.
- Accidental contact with these insects is highly probable, especially during warm weather conditions when the insects are most active.
- If a site worker accidentally disturbs a nest, the worker may be inflicted with multiple stings, causing extreme pain and swelling, which can leave the worker incapacitated and in need of medical attention.
- Some people are hypersensitive to the toxins injected by a sting, and when stung, experience a violent and immediate allergic reaction resulting in a life-threatening condition known as anaphylactic shock.
- Anaphylactic shock manifests itself very rapidly and is characterized by extreme swelling of the body, eyes, face, mouth, and respiratory passages.
- The hypersensitivity needed to cause anaphylactic shock, can in some people, accumulate over time and exposure, therefore even if someone has been stung previously, and not experienced an allergic reaction, there is no guarantee that they will not have an allergic reaction if they are stung again.

With these things in mind, and with the high probability of contact with stinging insects, all site personnel will comply with the following safe work practices:

- If a worker knows that he is hypersensitive to bee, wasp, or hornet stings, he must inform the UXOSO of this condition prior to participation in site activities.
- All site personnel will be watchful for the presence of stinging insects and their nests and will advise the UXOSO if a stinging insect nest is located or suspected in the area.
- Any nests located on site will be flagged off, and site personnel will be notified of its presence.
- If stung, site personnel will immediately report to the UXOSO to obtain first aid treatment

and to allow the UXOSO to observe them for signs of allergic reaction. If a breathing emergency (anaphylactic shock) occurs as a result of the sting, immediately call 911.

- Site personnel with a known hypersensitivity to stinging insects will keep required emergency medication on or near their person at all times, and will let the SUXOS, UXOSO, and co-workers know where it is kept.

## 15.21 Spiders

A large variety of spiders may be encountered during CRP site activities. While most spider bites merely cause localized pain, swelling, reddening, and in some cases, tissue damage, there are a few spiders that, due to the severity of the physiological effects caused by their venom, are dangerous. These species include the black widow and the brown or violin spiders.



The black widow is a coal-black bulbous spider about ¾-inch in length, with a bright red hourglass on the underside of the abdomen. The black widow is usually found in dark moist locations, especially under rocks, rotting logs, and may even be found in outdoor toilets where they inhabit the underside of the seat. Victims of a black widow bite may exhibit the following signs or symptoms:

- Sensation of pinprick or minor burning at the time of the bite.
- Appearance of small punctures (but sometimes none are visible).
- After 15 to 60 minutes, intense pain is felt at the site of the bite which spreads quickly, and is followed by profuse sweating, rigid abdominal muscles, muscle spasms, breathing difficulty, slurred speech, poor coordination, dilated pupils and generalized swelling of face and extremities.

The brown recluse or violin spider is brownish to tan in color, rather flat, about 5/8-inch long with a dark brown “violin” shape on the top. Of the brown spider, there are three varieties found in the United States, which present a problem to site personnel. These are the brown recluse, the desert violin, and the Arizona violin. These spiders may be found in a variety of locations, including trees, rocks, or in dark locations. Victims of a brown or violin spider bite may exhibit the following signs or symptoms:



- Blistering at the site of the bite, followed by a local burning at the site 30 to 60 minutes after the bite.
- Formation of a large, red, swollen, postulating lesion with a bull’s-eye appearance.
- Systemic affects may include a generalized rash, joint pain, chills, fever, nausea, and vomiting.
- Pain may become severe after 8 hours, with the onset of tissue necrosis.

There is no effective first aid treatment for either of these bites. Except for very young, very old or weak victims, these spider bites are not considered to be life-threatening; however, medical treatment must be sought to reduce the extent of damage caused by the injected toxins.

Scorpions are stinging arachnids found over much of the United States. The two prodoment are the Southern Unstriped Scorpion and the Striped Southern Scorpion. All known scorpion species possess venom and use it primarily to kill or paralyze their prey so that it can be eaten; in general, it is fast-



acting, allowing for effective prey capture. It is also used as a defense against predators. The venom is a mixture of compounds (neurotoxins, enzyme inhibitors, etc.) each not only causing a different effect, but possibly also targeting a specific animal. Each compound is made and stored in a pair of glandular sacs and is released in a quantity regulated by the scorpion itself. Of the 1000+ known species of scorpion, only 25 have venom that is dangerous to humans.

The SUXOS/UXOSO will brief site personnel as to the identification and avoidance of the spiders and scorpions. As with stinging insects, site personnel shall report to the SUXOS/UXOSO if they locate either of these spiders or scorpions on site or notice any type of bite or sting while involved in site activities.

## 15.22 Hazard Mitigation

The hazards listed above will be addressed through a combination of training, engineering controls, and personal protective equipment, with engineering controls as the method of preference, when feasible.

### Implementation of Engineering Controls and Work Practices

Training for site procedures and the use of site equipment is instrumental in preventing accidents from occurring. Training in MEC recognition will be given to all site workers, and all will be watchful for MEC or pieces of MEC, which could be hazardous. When MEC or pieces of MEC are encountered, it is everyone's duty to contact a UXO-qualified person to handle the situation. Other controls include the EZ, which will be used to keep unauthorized personnel out of the project site, and shielding material to protect the operators of heavy equipment.

### Upgrades/Downgrades in Levels of Personal Protective Equipment

Due to the types of hazards at the CRP site, Level D PPE will be required. This type of PPE is used for levels of contamination that may present a nuisance, but not an identifiable hazard. This consists of a hard hat, safety glasses, hearing protection, leather work gloves, rubber over-boots, and non-steel-toed work boots to prevent interference with metal detectors. The hard hat will only be worn in head hazard areas, such as in the vicinity of the heavy equipment operations and during vegetation clearance operations. Rubber over-boots will only be worn over leather boots in watered areas. If hazards are encountered that are greater than estimated, the PPE level will be increased. This will be accomplished by the Corporate Health and Safety Manager, and the decision will be based on documented evidence of the hazards. If excessive dust levels near heavy equipment warrant via exposure monitoring, appropriate respiratory protection will be implemented IAW Tetra Tech's corporate respiratory protection program. If the site is not as hazardous as originally anticipated, the level of PPE can be downgraded by the Corporate Health and Safety Staff. This decision would also be based on definitive data that demonstrates the conclusion that the PPE can be lessened. Normally to downgrade PPE would require at least one week's worth of data, during consistent site operation, demonstrating that the site is not as hazardous as originally suspected. PPE levels will conform to Section 5 of EM 385-1-1.

### Work Stoppage and/or Emergency Evacuation of On-Site Personnel

All personnel are trained to be constantly aware of their work environment. Anyone has the ability to stop operations for safety reasons. No worker is expected to perform any operation for which he has not been trained, or to perform any operation that is considered to be unsafe. After operations are stopped

for safety reasons, the SUXOS and UXOSO will be notified, and they will evaluate the situation. The SUXOS will, in consultation with the Corporate Health and Safety Manager, determine what steps need to be taken to make the situation safe for operations to continue.

### Emergency Evacuation

In the event of an emergency that requires evacuation of the site, verbal instruction will be given by the SUXOS to evacuate the area. Personnel will exit the area to the pre-designated assembly point, which will be the office trailer.

After evacuation, the SUXOS will account for all personnel, ascertain information about the emergency and advise responding onsite personnel. The SUXOS will contact, advise and coordinate with responding off-site emergency personnel if deemed necessary by the situation.

In all situations that require evacuation, personnel shall not re-enter the work area until:

- The conditions causing the emergency have been corrected;
- The hazard has been reassessed;
- The Site-Specific Safety and Health Plan has been revised and reviewed with onsite personnel, if needed; and
- Instructions have been given for authorized re-entry by the SUXOS.

### Prevention and/or Minimization of Public Exposure to Hazards Created by Site Activities

Establishment and maintenance of an EZ create separation between the CRP site footprint and the general public acts as a safety cushion to protect the public against site hazards. Controlling access to the site, closing roads, signs, and barricades are all means of keeping the general public from accidentally wandering into the site during site operations. Training all site workers in the hazards of MEC will have more eyes looking for MEC. Any worker observing MEC or pieces of MEC will not touch or handle it in any way. He will inform a UXO-qualified Tetra Tech worker, who will then handle the situation. If unauthorized personnel are observed in the EZ, all MEC operations will cease until the area is cleared of unauthorized personnel.

## 16.0 STAFF ORGANIZATION, QUALIFICATIONS, AND RESPONSIBILITIES

Descriptions of qualifications and responsibilities of Safety Staff members are contained in Section 6.0 of the APP.

## 17.0 PERSONAL PROTECTION EQUIPMENT

PPE requirements are contained in Section 12.1 of the APP. PPE requirements will be reevaluated as appropriate per Section 12.1 and section 15.2 and will comply with Section 5 of EM 385-1-1.

## 18.0 MEDICAL SURVEILLANCE

Medical surveillance of Tetra Tech employees will be conducted IAW the requirements of OSHA 29 CFR 1910.120(f)(HAZWOPER), 29 CFR 1910.134(b)(10) (Respiratory Protection), and other established guidelines. Personnel to be included in the Medical Surveillance Program will be those who perform hazardous waste operations that may potentially expose the worker to hazardous

substances or other significant safety and health threats. All Tetra Tech personnel on the project site will be part of the Tetra Tech Medical Surveillance Program. Visitors desiring entry into the EZ must be on their employer's Medical Surveillance Program and must have a current physician's statement prior to entry.

### **18.1 Baseline Health Assessment Physical or Bi/Annual Physical**

A baseline health assessment physical or bi/annual physical will be conducted prior to participating in site operations, to determine the worker's ability to perform hazardous waste operations in a safe and healthful manner. The PM, in conjunction with the SUXOS and UXOSO, will ensure that all health assessments address the site-specific health hazards to which workers may be exposed.

Physicals will be scheduled through the services of a board-certified occupational medicine physician in the vicinity of the employee's home or job site. The designated physician will perform the medical assessments and review medical examination results to determine each worker's ability to perform his assigned hazardous waste duties. The physician will also be responsible for determining if supplemental or follow-up examinations are required and for maintaining medical and exposure records IAW OSHA 29 CFR 1910.120(d).

The purposes of the Medical Surveillance Program are to:

- Assess the individual's health status prior to participation in hazardous waste operations; determine the individual's ability to perform work assignments requiring the use of PPE and clothing;
- Establish baseline data for comparison to future medical data in order to provide a means of monitoring a worker's health status;
- Establish facilities and procedures for emergency and non-emergency medical treatment;
- Establish procedures for maintenance and storage of medical and exposure records.

### **18.2 Physician's Statement**

The results of this examination will be made available to the employee, and a written physician's statement will be sent to Tetra Tech. A copy of the physician's statement will be kept in each employee's file at the project site for the duration of site operations. The physician's statement will include the following:

- The physician's opinion regarding any conditions which would place the employee at an increased risk from working in hazardous waste operations;
- The physician's recommended limitations upon the employee's assigned work, if any; and
- A statement that the employee has been informed by the physician of the results of the examination, and any conditions which may require further examination or treatment.

### **18.3 Supplemental Examination**

Any site worker will undergo a supplemental examination if they have been:

- injured;
- received health impairment;
- developed signs or symptoms from possible over-exposure; or
- received a documented over-exposure without the use of respiratory protection.

The contents of this examination will be based upon the type of injury, illness, signs, or symptoms of exposure involved and will be determined by the physician. Prior to reassignment to site activities, the physician will certify that the employee is fit to return to work. If necessary, the physician will specify in writing any activity restrictions or additional tests, which may be required.

#### **18.4 Follow-up Health Assessments**

If, during any pre-assignment, annual or supplemental examination, a condition is detected which requires follow-up tests, the physician will notify Tetra Tech and the employee as to the nature of the follow-up health assessment. The physician will determine the schedule and content of the follow-up health assessment. A statement outlining the employee's fitness for work will be provided to Tetra Tech and the employee upon the conclusion of the follow-up health assessment.

## 18.5 Emergency and Non-emergency Medical Treatment

The medical treatment facility for use at this project site will be:

Hospital-Palmetto Health Richland  
5 Richland Medical Park Dr  
Columbia, SC 29203(803) 434-7000 \*For Emergency Dial 911

Directions to the hospital can be found at Section 11.0 of this Appendix.

## 18.6 Record Keeping

Tetra Tech will retain and maintain copies of all physician statements, exposure records, and associated information for all employees involved in hazardous waste operations. These records will be kept at the project files for the duration of site operations. When the site work is complete, the records will be retained by Tetra Tech occupational health provider. Examining physicians will be responsible for maintaining records related to laboratory and other tests for each employee examined. All records, whether maintained by Tetra Tech or by the examining physician, will be kept on file for a period of thirty (30) years beyond an employee's termination OSHA 29 CFR 1910.1020(d).

## 18.7 Exposure Monitoring/Air Sampling Program

Once sampling is completed on the coal tar like substance this section will be reviewed, but it is not expected to be any significant exposure to hazardous chemicals or excessive levels of dust at this site, exposure monitoring will not be required. As the workers on this site will normally be in Level D PPE, heat stress monitoring will be required if the temperature goes above 75°F. Should it be required, site monitoring data will be recorded using the Site Monitoring Log and will be maintained as part of the project record.

## 18.8 Dust Monitoring

Dust or particulates created during excavation operations may be a nuisance to operators and those working around the equipment but are not expected to exceed a permissible exposure level according to OSHA guidelines for total or respirable particulates. The team leaders will monitor the dust levels in the areas that their teams are working if airborne levels seem excessive.

**18.9 Heat Stress Monitoring:** Heat stress monitoring will be conducted using WBGT readings, in order to assure adequate work/rest cycles are implemented at the site if ambient dry-bulb temperatures exceed 75°F. Pulse monitoring may also be used in addition to the WBGT readings, particularly during acclimatization, to assure workers are adapting to the conditions safely. Monitoring will be performed by the UXOSO, and results will be documented. Heat stress monitoring will be used to determine work-rest cycles to be implemented on site as referenced by the ACGIH TLV guidelines detailed in Section 15 above.

### 18.10 Meteorological Monitoring

Rain and/or other weather conditions can constitute a safety hazard to field operations at this site. The SUXOS and UXOSO will monitor the weather closely. If the area becomes so wet, muddy, or slippery that an unacceptable level of risk exists for personnel who are working in proximity to MEC items, then MEC operations will cease until the SUXOS determines it to be safe to continue.

No MEC operations will take place if an electrical storm is within ten miles of the site. An electrical storm monitor will be used to determine if an electrical storm is approaching. MEC operations will cease when an electrical storm is within ten miles of the site, and will not resume again until the SUXOS determines that the electrical storm is at least ten miles past the site.

### 19.0 STANDARD OPERATING SAFETY PROCEDURES, ENGINEERING CONTROLS AND WORK PRACTICES

Using common sense and following safe practices can reduce hazards due to normal site activities. Personnel must keep the prudent guidelines listed below in mind when conducting field activities.

- Hazard assessment is a continuous process. Personnel must be aware of their surroundings and constantly be aware of the MEC, chemical, and physical hazards that are or may be present.
- The number of personnel in the EZ will be the minimum number necessary to perform work tasks in a safe and efficient manner.
- Team members will be familiar with the physical characteristics of each site, including wind direction, site access, and the location of communication devices and safety/emergency equipment.
- The location of overhead power lines and underground utilities must be established.
- Contact with potentially contaminated surfaces, walking through puddles or pools of liquid, kneeling on the ground, or leaning, sitting, or placing equipment on the contaminated soil should be avoided.
- Detection or appearance of unusual liquids, odors or discolored soil could indicate the presence of contaminants and should be reported to the SUXOS/UXOSO immediately.
- Site personnel are to report any other unusual or potentially hazardous condition to the SUXOS/UXOSO for investigation and/or corrective action.

All personnel on site will be required to follow the safe work practices contained in this Program, as they relate to the hazards encountered during site activities. All site personnel will be required to read, understand and comply with the provisions of this APP. If new tasks or hazards are identified during site operations, which pose additional hazards, the APP will be amended by the Corporate Health and Safety Manager to include additional safe work practices and other control methods as needed.

## 19.1 Site Rules/Prohibitions

Safe practices can reduce hazards due to normal site activities. Personnel must keep the prudent guidelines listed below in mind when conducting field activities. General personnel requirements include:

- Horseplay or fighting is prohibited.
- Eating, drinking, smoking, chewing gum, tobacco, or any other hands-to-face activities are prohibited on-site, except in designated areas after both face and hands have been washed.
- Wearing contact lenses is prohibited in the EZ.
- When required to sit or kneel on the ground, avoid contaminated surfaces.
- Placing equipment on contaminated surfaces should be avoided.
- Climbing on or over obstacles is prohibited. Stacks of materials can be unstable and could cause injury.
- Open flames of any type are prohibited on-site.
- Bringing defective or unsafe equipment on-site is prohibited.
- Only authorized employees may enter the worksite. Only essential personnel will be admitted within the EZ during MEC operations. Visitors must check in with the SUXOS, receive an appropriate safety briefing, and be escorted by UXO-qualified personnel at all times while on-site.

## 19.2 Buddy System

The buddy system is a safety practice in which each individual is concerned with the health and well-being of co-workers. The buddy system will be implemented during all on-site activities and will be incorporated whenever workers may be isolated or as determined by the SUXOS/UXOSO. The objective of the Buddy System is to ensure that no individual is ever alone on-site.

- A minimum of two UXO-qualified personnel will be present during all MEC operations. A UXO Technician I may assist in MEC operations with the supervision of a UXO Technician III or higher. Non-UXO-qualified personnel who have been determined essential for the operations being performed may be utilized to perform MEC-related procedures when supervised by a UXO Technician III or higher.
- At no time will an individual desert his assigned team unless while working in pairs, his partner goes down, and it is considered too hazardous to render assistance. Technicians will enter and exit EZ together and frequently monitor one another for signs of fatigue, heat stress, and any other problems. In such cases, the worker in danger may not even be aware he/she is having a problem. The technicians must always be alert to changes in the behavior of his teammate so that he can remove him from the situation immediately.
- Technicians should inspect each other's equipment, including PPE, to ensure that it is adequate and in proper working order.

### 19.3 Work Permit Requirements

At this time, Tetra Tech does not anticipate work permits for its work on this project. Under the contract, there are no requirements for hot work. All site personnel, to eliminate the hazards from ignition sources, will utilize the general, fire safety precautions and procedures. Excavation work is generally expected to be less than four feet in depth, and there are expected to be no confined spaces or radioactive work on this project. Should this situation change, this APP will be updated to include these additional hazards and shall handle them IAW the Tetra Tech Corporate Health and Safety Program, which addresses all these issues.

### 19.4 Material Handling Procedures

Many types of objects are handled in normal day-to-day operations. Care will be taken in lifting and handling heavy or bulky items because they are the cause of many joint and back injuries. The following fundamentals address the proper lifting of materials to avoid joint and back injuries:

- The size, shape, and weight of the object to be lifted must be considered. Site personnel will not lift more than they can handle comfortably. They will use mechanical lifting equipment for lifts greater than 50 lbs that are unassisted.
- A firm grip on the object is essential; therefore, the hands and object will be free of oil, grease, and water, which might prevent a firm grip.
- The hands, and especially the fingers, will be kept away from any points that cause them to be pinched or crushed, especially when setting the object down.
- The item will be inspected for metal slivers, jagged edges, burrs, rough or slippery surfaces, and pinch points, and gloves will be used, if necessary, to protect the hands.
- The feet will be placed far enough apart for good balance and stability.
- Personnel will ensure that solid footing is available prior to lift the object.
- When lifting, get as close to the load as possible, bend the legs at the knees, making sure that the back is kept as straight as possible.
- To lift the object, the legs are straightened from their bending position.
- 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, with the back kept straight, the legs bent at the knees, and the object lowered.
- If the item to be lifted is too large, bulky, or heavy (over 50 lb.) for one person to safely lift, ask a co-worker for assistance. If a piece of material handling equipment is available that can do the job, the employee should use the equipment instead of trying to lift the object himself/herself.
- When two or more people are required to handle an 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 person, if possible, will face the direction in which the object is being carried.

### 19.5 Spill Containment

Major spills are not expected on this site. Hazardous materials, where necessary, are being brought to the site in small quantity containers. This will minimize the amount of material involved, should a spill occur, as well as reduce the amount of hazardous material on hand to the minimum amount consistent with efficient operations. If a small amount of liquid hazardous material is spilled, it will be cleaned up



with absorbent material by site personnel wearing appropriate chemical-resistant gloves. It will then be containerized, labeled, and sent for disposal at an approved facility.

### **19.6 Drum/Container/Tank Handling**

The use of containers/tanks is not anticipated. The use of 55-gallon drums may be used to contain recovered MDAS items as well as water and/or sediment from decontamination operations. Drums will be handled using drum dollies and mechanical lift gates for transferring onto transport trucks and staging areas.

### **19.7 Comprehensive Activity Hazard Analysis of Treatment Technologies**

Treatment technologies are not expected to be used on this project.

## **20.0 SITE CONTROL MEASURES**

### **20.1 Site Map**

A site map will be utilized during the Tailgate safety briefing to inform the workers of the location of hazardous areas on the site, the assembly areas to be used in the event of a site evacuation, and any other information relevant to the day's activities. The site map will include:

- Site topography
- Site work zones
- Location of unusual/hazardous areas
- Prevailing winds
- Ingress and egress corridors
- Evacuation routes and assembly points
- Location of emergency supplies

### **20.2 Work Zone Delineation and Access Points**

Site work zones will be established by the SUXOS and UXOSO prior to initiating operations to control site access. Establishment of site work zones is based upon site conditions, activities, and exposure potentials. A site EZ will be set up, which includes the footprint of the area where work will take place and a distance based on the MGF around that to protect areas outside the site from potential fragmentation, depending on the site activities. Site work zones will be marked using barricades and signage, closing roads into the area to unauthorized vehicular traffic. Barricades and signs will remain in place for the duration of site work.

### **20.3 Site Access Control**

The SUXOS will control access to each work zone and will ensure that all site workers and visitors have received the proper training and medical surveillance required to enter a specific zone. Access will be denied to any potential entrant not meeting these requirements.

### **20.4 Exclusion Zone**

The EZ includes all areas where significant hazards do or could occur and includes all areas where PPE

is required to control worker exposure to chemical or physical hazards. All personnel entering the EZ will be logged in/out by the SUXOS. All visitors to the EZ must be escorted by a UXO-qualified Tetra Tech employee. The EZ of this site will be designated as the footprint area of actual project operations and the required separation distance surrounding the area. This distance is based on the MGF during specifically defined site operations. When non-essential personnel are required to enter within the EZ, all UXO operations will cease until nonessential personnel are beyond the hazardous fragmentation area of the EZ.

### **20.5 Support Zone**

The SZ is the area outside the EZ where site support activities are conducted. This zone includes break areas and sanitation facilities. Visitors desiring entry into the EZ must first meet with the SUXOS or UXOSO and receive the appropriate safety and emergency procedures briefing in the SZ before gaining admittance to the EZ, and they will be escorted at all times by a UXO-qualified employee while in the EZ.

Site access control will be implemented by the SUXOS or UXOSO and will be accomplished through a program that limits the movement and activities of people and equipment at the project site. This control will be based on site-specific characteristics to include:

- Potential chemical, biological, physical, or explosive hazards
- Terrain
- Expected weather conditions
- Planned site activities
- Site proximity to populated areas

The degree of site access control will include the following:

- Controlled site ingress/egress points – Work area will be clearly visible to anyone approaching the site and vice versa. Only authorized personnel will be permitted within the EZ during MEC operations. All others will remain in the SZ.
- Worker/visitor registration – All personnel working on the site sign in daily at the time of their daily safety briefing in the morning. All visitors to the site must sign the visitor log when they report to the site for their visitor briefing.
- Escort of visitors – All visitors to the site will be escorted by a UXO-qualified employee. Visitors will be briefed on site hazards, PPE requirements, and emergency procedures. Visitors who are not deemed essential will not be permitted within the EZ during MEC operations. If visitors need to access the EZ, all MEC operations will cease while they are in the area, and the visitors will be escorted at all times.
- PPE requirements – PPE requirements have been established based on the site hazards. Personnel working in areas requiring PPE will wear the required PPE for the duration of the operation. Visitors to the area will be required to have the required PPE for the area they will be visiting.

### **20.6 On and Off-Site Communication System**

On and off-site communication will be established using cellular telephones and radios. All personnel will have emergency phone numbers and understand how and under what conditions they are to be used. Cell phones will not be used around MEC where EMR may present a hazard but will remain in the site vehicles with the emergency telephone number list for access during operating hours. Radios

can be used to communicate to personnel on the site and in the site office.

## 21.0 PERSONAL HYGIENE AND DECONTAMINATION

Sanitation facilities will be provided in the SZ area so that employees can wash prior to eating, drinking, smoking, or engaging in any other hand-to-face activities. Chemical toilets may be available in the SZ of the work area, and there are plumbed toilets. As chemical contamination is not expected to be an issue at this site, basic washing of equipment and standard hygiene practices are all that will be required. Site sanitation will be established and maintained IAW OSHA 29 *CFR* 1910.120(n) and USACE EM 385-1-1, Section 2. In particular:

Permanent restroom facilities are located on the project site. If they are disabled for the season or otherwise not available, Tetra Tech will locate chemical toilets in the SZ, as required to support field personnel. Chemical toilets used in these locations and will be serviced every week. Each temporary toilet will be naturally lighted, have a toilet seat with a seat cover, have a urinal, have ventilation with vents screened, and be lockable from the inside. There will be at least one toilet for every 15 workers at the work site if required.

Hand and face washing facilities will be set up at the Tetra Tech worksite and will be utilized by all personnel exiting the EZ prior to eating, drinking, tobacco use, or other hand-to-face activities. Paper towels will be provided for drying. A trash receptacle will be provided for discarded paper towels. IAW ANSI Z358.1-1998, eye-wash facilities will be available on the worksite where operations in any of the work zones involve handling substances, which could be hazardous to the eyes. An eyewash kit will also be located in each site vehicle.

General work practices include the following:

- Safe work practices will be implemented whenever possible to eliminate or reduce the potential for employee exposure.
- Employees will wash their hands immediately or as soon as feasible after the removal of gloves or other PPE.
- Employees will wash hands and any other skin with soap and water, or flush mucous membranes with water immediately following contact with blood or potentially infectious materials.
- If potentially contaminated sharps are encountered, the item will immediately be disposed of in an appropriate container or decontaminated.
- Eating, drinking, smoking, applying cosmetics or lip balm, handling of contact lenses, or storage/handling of food are prohibited in all areas where potentially infectious materials are present.
- Equipment that has become contaminated will be decontaminated prior to servicing or storage, unless decontamination is not feasible, in which case the equipment will be disposed of properly.

## 22.0 EQUIPMENT DECONTAMINATION

At a minimum, basic washing of equipment will be required. Due to the presence of TLM, additional cleaning and decontamination may be necessary, including the use of soaps, detergents, or solvents if necessary. Portable decontamination stations will be established to contain wash water and sediment. Waste material from equipment decontamination will be contained for later disposal with the impacted

sediment material.

### **23.0 EMERGENCY EQUIPMENT AND FIRST AID**

Emergency equipment will be maintained on site for the duration of site operations. An approved, emergency first aid kit, bloodborne pathogen kit, and spill control kit will be kept in the UXOSO vehicle. Portable eyewashes will be located in the work area in the site vehicles. A 5-lb. ABC fire extinguishers will be kept in each site vehicle for emergency use on site. This equipment will be inspected on a weekly basis to ensure they are maintained and ready to use. Any used items will be replaced immediately.

First aid kits are assigned by the Safety Office and approved by the Occupational Health Physician. The size and number of first aid kits shall be sufficient to accommodate the maximum number of people on site at any given time. First aid kits will be located in all operational vehicles, each team, and the site office. A large medical kit, with trauma supplies, will be located with the UXOSO.

Biohazard kits will be available in each operational vehicle and with each team working inside the EZ. The kit will be used any time an injury occurs or where there is the release of body fluids.

Portable kits of eyewash will be available during operations at the site where the potential for hazardous materials may contact the eyes. Portable eyewash bottles will be used while the injured person is being transported to the site eyewash station or medical attention.

Fire extinguishers will be stored where they are well marked and readily accessible. Fire extinguishers shall be protected from the damaging effects of environmental elements. The UXOSO is responsible to ensure that all fire extinguishers are visually inspected monthly and that these inspections are documented. All site personnel will be familiar with the locations of fire extinguishers and will be trained in their use.

### **24.0 EMERGENCY RESPONSE AND CONTINGENCY PLAN (ERCP)**

The ERCP address the emergencies, which could occur during site operations, and outlines the appropriate response actions. field personnel will investigate magnetic anomalies to locate, identify, and dispose of MEC/MPPEH. MEC/MPPEH will be destroyed by site personnel using donor explosive charges obtained from commercial sources.

#### **24.1 Pre-Emergency Planning**

The SUXOS and UXOSO will perform pre-emergency planning before starting field activities and will coordinate emergency response with EMT/police/fire personnel and the servicing medical facility when appropriate. Pre-emergency planning meetings shall be used to inform local authorities of the nature of site activities that will be performed under the PWS and the potential hazards that activities may pose to site workers, the environment, and the public. An agreement will be established between Tetra Tech and emergency response personnel and the hospital regarding responsibilities of each party in responding to a project site emergency. The UXOSO will verify all on-site emergency services information, to include telephone numbers and procedures for requesting services. It will be the UXOSO's responsibility to post these procedures and telephone contact numbers IAW the requirements of this APP. Pre-emergency planning tasks include:

- Locate telephone stations;
- Post emergency telephone numbers at accessible telephone locations;
- Inspect all emergency equipment and supplies to ensure they are in proper working order;
- Provide a site map marked with planned evacuation routes, assembly points, and emergency equipment and supplies;
- Provide a map with the route to the hospital marked and highlighted, with copies of this map posted in the office/break area, in the emergency evacuation vehicle and all other site vehicles;
- Conduct an emergency response drill to test the effectiveness of the ERCP; and
- Review and revise the ERCP in the event of a failure of the plan in an actual or staged emergency, or when changes in site conditions or scope of work affect the ERCP.

#### 24.2 Personnel and Lines of Authority

In the event of an emergency, the SUXOS will be designated as the On-Scene Incident Commander and will have the overall responsibility for implementation of the ERCP and coordination with responding off site emergency services.

Once an emergency has occurred, the SUXOS will report the incident to the client representative, the PM, and the Corporate Health and Safety Manager as soon as the situation is under control.

If the emergency involves employee injury, SUXOS and UXOSO will complete the Tetra Tech Accident Report form. The Corporate Health and Safety Manager will be responsible for notifying applicable Federal, state, and local authorities/agencies. Once the emergency has been resolved, the SUXOS, UXOSO, PM, and Corporate Health and Safety Manager will conduct a follow-up investigation and critique. Actions will be taken to prevent recurrence.

#### 24.3 Criteria and Procedures for Emergency Recognition and Evacuation

Prevention of emergencies will be aided by the effective implementation of this APP, personnel awareness, contingency planning, and onsite safety meetings. Anticipated emergencies may include physical injury, fire, explosion, chemical spill or release, inclement weather, and natural disasters. The SUXOS and UXOSO will use the site-specific briefing and/or the Tailgate Safety Briefings to inform site workers of the recognition, prevention, and response procedures for each anticipated emergency.

In the event of an emergency, site personnel will be notified by either visual/verbal communication. Personnel will be notified to:

- Stop work activities;
- Evacuate to the designated assembly point;
- Begin emergency procedures; and
- Notify off site emergency response organizations and adjacent industries.

In the event of an emergency that requires evacuation of the site, verbal instruction will be given by the SUXOS to evacuate the area. Personnel will exit the area to the pre-designated assembly point.

After evacuation, the SUXOS will account for all personnel, ascertain information about the emergency and advise responding onsite personnel. The SUXOS will contact, counsel with, and coordinate with responding off-site emergency personnel if deemed necessary by the situation.

In all situations that require evacuation, personnel shall not re-enter the work area until:

- The conditions causing the emergency have been corrected;
- The hazard has been reassessed;
- The Site-Specific Safety and Health Plan has been revised and reviewed with onsite personnel, if needed; and
- Instructions have been given for authorized re-entry by the SUXOS/UXOSO.

#### 24.4 Decontamination and Medical Treatment of Injured Personnel

It is not anticipated that hazardous waste decontamination shall be required during any activities under the PWS. This determination has been made based upon archival documentation and past activities conducted at the site.

## 24.5 Emergency Medical Facilities

*The nearest medical facility address is:*

### **Palmetto Health Richland Hyperbaric Medicine**

Address: 5 Richland Medical Park Drive

Columbia, SC 29203

Phone: (803) 434-7000

From the Project Area, 9 min (3.2 miles)

Take US-176 W/US-21 N/US-321 N and US-76 E to Bull St

Head east on Gervais St/Gervais St Bridge toward Gist St 0.3 mi

Turn left onto US-176 W/US-21 N/US-321 N/Huger St 0.8 mi

Keep right at the fork, follow signs for US-21/US-176/US-321/Elmwood Ave

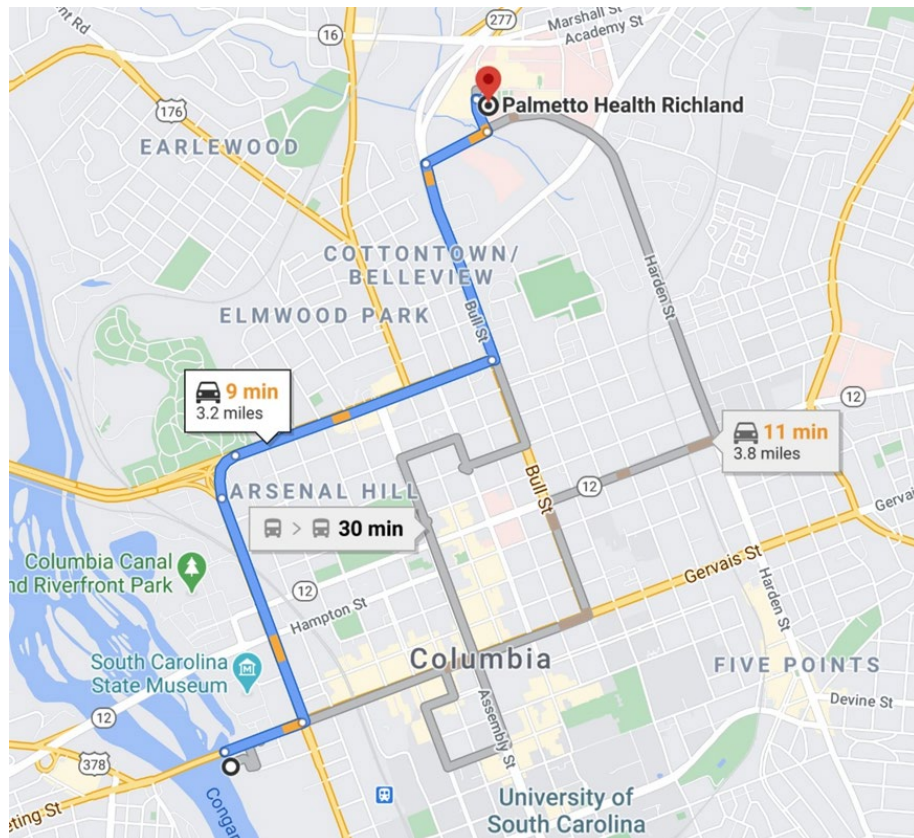
Continue onto US-176 W/US-21 N/US-321 N/US-76 E 0.9 mi

Continue on Bull St to your destination

Use the left 2 lanes to turn left onto Bull St 0.7 mi

Turn right onto Harden Street Extension (signs for Harden St) 0.2 mi

Turn left onto Medical Park Rd 0.1 mi



The emergency telephone list can be found at Section 12.3.8 of this Appendix.

#### **24.6 Criteria for Alerting the Local Community Responders**

In the event of an on-site emergency the individual team leader or first person aware of the emergency will contact the SUXOS by field radio, cellular phone, or in person, as circumstances allow. The SUXOS will normally be responsible for requesting emergency services. If the order is given to evacuate the site of all personnel, each on-site team leader will assemble, account for, and evacuate all team personnel to the pre-designated staging area. The SUXOS/UXOSO will initially instruct the on-site CPR/First Aid trained personnel to respond to the emergency. These individuals shall render emergency first aid treatment and stay with the injured until relieved by off-site emergency services personnel, who would be called in at the discretion of the SUXOS.

#### **24.7 Safety Data Sheets (SDS)**

As part of the Tetra Tech Hazard Communication Program, an SDS binder will be maintained onsite, which includes copies of SDSs for all hazardous materials brought onto the site. It will be kept in the site office during operations. This SDS binder will be available on request to all site personnel during all working hours of the site. If site workers have further questions about any of the hazardous materials they come into contact with, the Tetra Tech Corporate Health and Safety Manager will locate the required information and pass it on to the employee.

#### **24.8 Safe Distances and Places of Refuge**

Normally, during an evacuation, personnel would evacuate to the office trailer and staging area in the SZ, where the SUXOS would take roll and account for all site personnel. An exception to this rule would be in the case of encountering a CWM item, in which case personnel would evacuate at least 450 feet upwind of the item. This location would change with the shifting winds, so it cannot be specifically identified.

#### **24.9 Site Security and Control**

During emergency procedures, the UXOSO will direct emergency vehicles into the site. The site personnel will also be notified that emergency vehicles are coming and be ready to assist where necessary. The UXOSO will ensure that Fire Department personnel approach at no closer than fragmentation distance from any fire that might start in the area. EMT/ambulance personnel will be instructed by the UXOSO as to where to safely proceed to get to the injured worker. Site personnel will assist if required, at the direction of the SUXOS.

#### **24.10 Evacuation Routes and Procedures**

In the event of an emergency that requires evacuation of the site, an alarm will be sounded or verbal instruction given by the SUXOS/UXOSO to evacuate the area to the worksite "Staging Areas." This point will be established outside the EZ and in the SZ. Personnel will be shown the location of the staging areas daily, during the Site Safety Briefing. The location of the assembly point may change as work activity progresses within the project area. However, it will normally be at the office trailer.

After evacuation, the SUXOS will account for all personnel, ascertain information about the emergency, and advise responding on-site personnel. The SUXOS will contact, advise, and coordinate with responding off-site emergency personnel and points of contact for adjacent industries, if deemed necessary by the situation or the client Safety and Health Representative. In all situations that require evacuation, personnel will not re-enter the work area until the conditions causing the emergency have



been corrected; the hazard reassessed; the APP has been revised and reviewed with on-site personnel, if needed; and instructions have been given for authorized re-entry by the SUXOS.

The route directions to the medical facility will be posted in the Tetra Tech office, at the worksite, and in site vehicles. This map also will indicate the evacuation route.

#### **24.11 Decontamination**

Due to the type of work on this project, it is not expected that a major chemical spill would occur that would require personnel decontamination prior to leaving the site. If a worker is accidentally injured using chemicals brought onto the site, the first aid procedures described in the SDS would be followed by co-workers to clean as much of the chemical off as possible before the ambulance arrives. In a case like this, the SDS will be sent to the hospital with the worker to inform the medical staff of the exposure and how best to treat it.

#### **24.12 Emergency Medical Treatment and First Aid**

A minimum of two persons on the project site will be certified in First Aid/CPR. These persons will act as First Responders to any site emergency. First Aid kits will be available for their use in that capacity. The First Responders will perform first aid and/or CPR until medical personnel arrives on site. The SUXOS will contact the EMT/ambulance based on the type of injury received and send the injured worker to the designated emergency treatment facility. If the injury is not so serious, the SUXOS may ask a co-worker to take the injured worker to the hospital for treatment. Maps and directions to the hospital will be kept in all site vehicles. Directions to the hospital can be found in Section 11 of this Appendix.

#### **24.13 Spill Alerting and Response Procedure**

Major hazardous substance spills are not expected due to the type of work taking place on this project. In the event of a minor hazardous substance spill causing an injury, the first responders would provide first aid based on the instruction in the SDS for the substances. The SDS would be taken with the injured worker to the hospital to provide information on the treatment of that chemical.

The emergency alerting procedure on the site will normally be a verbal warning to evacuate the site, and the evacuation procedures outlined above would be implemented. Due to the fact that there should be no large quantities of chemicals found on this site, the only type of chemical spill would be a small one. If a small spill occurs, the individual who caused the spill will inform the SUXOS. He will then get the spill control kit, and use the absorbent material, clean up most of the spill. If some of the soil is contaminated, that soil will be dug up and placed with the rest of the spill clean-up materials. It will all be disposed of at an approved disposal facility. Personnel involved in this clean-up will wear chemical-resistant gloves. Larger spills might require the use of Tyvek suit and respirator as well, but spills of that size are not anticipated on this site.

#### **24.14 Critique of Response and Follow-Up**

After any type of site emergency, the SUXOS/UXOSO, the PM, MEC Safety and Health Coordinator, and the Corporate Health and Safety Manager will review the situation and determine if changes need to be made to the emergency procedures to make them more effective. Applicable changes will be made to the APP, and these changes will be reviewed with all employees, so they are

aware of the new procedures.

#### **24.15 Emergency Response Team**

There will be a minimum of two persons on the project site who are certified in first aid and CPR. These persons will serve as the first responders. They will respond to any site emergency and assist the victim until medical assistance arrives. The SUXOS will call for outside emergency assistance if it is needed. As soon as the professional emergency response services arrive on site, the first responders will turn over the medical care of the injured worker to them. They will be on standby to assist the ambulance crew if requested to do so.

#### **24.16 Personnel Training Requirements**

Personnel acting as first responders will be certified in First Aid and CPR from the American Red Cross or a similar other training entity. They will be qualified to provide basic first aid and CPR and will relinquish authority to the EMT/ambulance crew when they arrive on site.

#### **24.17 Emergency Response Team Responsibilities**

The responsibility of the emergency response team is to respond to on-site emergencies. They will provide only first aid and CPR, and they will attempt to calm and stabilize the patient until professional help arrives.

### **25.0 LOGS, REPORTS AND RECORD KEEPING**

Each person on the site will have an individual file folder, which contains a copy of the following:

- 40 hr HAZWOPER Certificate.
- Current 8 hr HAZWOPER Annual Refresher Certificate.
- 8 hr HAZWOPER Supervisor Certificate, if applicable.
- EOD/UXO Training Certificate
- Any other applicable training certificates.

Personnel folders will be maintained by the SUXOS on-site. Training/Tailgate Safety Record will be completed for all on-site daily training. The SUXOS or UXOSO will maintain the file, which will be made available for the client as requested. This form may be completed in ink, but it is preferred that it be completed with a computer in Word.

#### **25.1 Daily Safety Inspection Logs**

The UXOSO will perform daily inspections on a scheduled and non-scheduled basis, of all site operations. The UXOSO will conduct non-scheduled safety and health inspections as deemed appropriate based upon the ongoing site activities. Scheduled safety and health inspections will be conducted as outlined in Section 8.0. All inspections will be documented. When discrepancies are observed, follow-up will be documented in the UXOSO log until the corrective actions required have been completed.

#### **25.2 Visitor Log**

The Visitor's Log will be maintained by the SUXOS. The log will document the visitor's name, company name, date, time, and reason for visit. There will also be documentation that the visitor was given a visitor safety briefing prior to being permitted to enter the EZ of the site. Visitors will be

escorted at all times within the EZ, and MEC operations will cease during the time they are within the EZ.

### **25.3 Medical Surveillance Records and Certifications**

A copy of the Physician Statement from a licensed physician who is certified in Occupational Medicine by the American Board of Preventive Medicine, regarding the current annual HAZWOPER physical examination will be maintained in the personnel folder with the other HAZWOPER certificates. The Physician Statements will remain in the individual's file on the project site for the duration of site operations. The files will then be transferred to the Knoxville Office.

### **25.4 Air Monitoring Results**

Due to the operations being performed on this project, air monitoring is not required.

### **25.5 Personal Exposure Records**

As there is no chemical work taking place on this project, personal exposure records are not expected to be required.

### **25.6 Records Maintenance**

All personal exposure and medical monitoring records, if generated, will be maintained IAW applicable OSHA standards, 29 CFR 1904, 1910, and 1926.

### **25.7 Final Report**

Tetra Tech will develop, retain and submit as part of the final report, all visitor registration logs, training logs, and daily safety inspection logs as part of the daily QC Reports.

### **25.8 Site Monitoring Results**

All site-monitoring results will be documented. This will be kept in a file at the project site for reference and will become a part of the permanent site record at the conclusion of site activities. At this site, heat exposure monitoring is the only monitoring anticipated to occur and that is dependent upon the site temperature.

### **25.9 Accident Reporting Records**

Accidents/incidents shall be reported IAW EM 385-1-1 using the Tetra Tech Accident Report form. Should an accident occur on the site, all reports and records will be documented. Copies will be maintained on site for the duration of site activities. A permanent copy will be maintained in the Athens Tetra Tech Office.

### **25.10 Safety Exposure Report**

A Safety Exposure Report, a tabulation of field labor hours, lost workday accidents, and number of lost workdays shall be submitted.

## **26.0 UNFORESEEN HAZARDS**

Should any unforeseen hazard become evident during the performance of work, the SUXOS and

UXOSO shall bring such hazard information to the attention of the Corporate Health and Safety Manager and the on-site government representative (both verbally and in writing) for resolution as soon as possible. In the interim, necessary action shall be taken to reestablish and maintain safe working conditions until the procedures to address the new hazards can be put into place and the APP updated accordingly.

APPENDIX E  
**MUNITIONS CONSTITUENTS SAMPLING AND ANALYSIS PLAN**

**MUNITIONS RESPONSE WORK PLAN  
CONGAREE RIVER PROJECT  
REMOVAL ACTION AND CONSTRUCTION SUPPORT  
COLUMBIA, SC**

**NOT APPLICABLE**

APPENDIX F  
**CONTRACTOR FORMS**

**MUNITIONS RESPONSE WORK PLAN  
CONGAREE RIVER PROJECT  
REMOVAL ACTION AND CONSTRUCTION SUPPORT  
COLUMBIA, SC**

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DD1348-1A..... F-17

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Heavy Equipment Inspection Checklist..... F-19

Magazine Data Card ..... F-20

NOTE:

A CD containing all Contractor-specific forms will be maintained on site. The forms in this appendix are examples of the forms that the Contractors will be using during this project. Forms may be modified to meet specific project reporting needs.



# HSE TRAINING COURSE SIGN-IN SHEET

<b>Name of Course:</b>		<b>Location:</b>		<b>Date:</b>	
<b>Topics Covered (list or attach agenda):</b>					
1.		3.			
2.		4.			
		5.			
<b>Instructors:</b> Instructor signature authorizes electronic-signature on certificate.		1. (Print Name)		(Sign Name)	
		2. (Print Name)		(Sign Name)	
		3. (Print Name)		(Sign Name)	
<b>ATTENDEES</b>					
Date	Print Name	Sign Name	Job Title	Company / OU	
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17.					





# HSE TRAINING COURSE SIGN-IN SHEET

<b>Name of Course:</b>		<b>Location:</b>			<b>Date:</b>
ATTENDEES					
Date	Print Name	Sign Name	Job Title	Company / OU	
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**APP ACKNOWLEDGMENT**

Project: \_\_\_\_\_ Site: \_\_\_\_\_

Contract Number: \_\_\_\_\_ Site Location: \_\_\_\_\_

Project Manager: \_\_\_\_\_

SUXOS: \_\_\_\_\_

UXOSO: \_\_\_\_\_

I acknowledge that I understand the requirements of this APP/SSHP and AHAs. I agree to abide by the procedures and limitations specified. I also acknowledge that I have been given an opportunity to have my questions concerning the APP and its requirements answered prior to performing field activities. Health and Safety Training and Medical Surveillance requirements applicable to my field activities at this site are current and will not expire during onsite activities.

**Tetra Tech PERSONNEL:**

SIGNATURE	EMPLOYEE NO.	DATE
_____	_____	_____
_____	_____	_____
_____	_____	_____
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_____	_____	_____

OTHER PERSONNEL:

<b><u>SIGNATURE</u></b>	<b><u>ORGANIZATION</u></b>	<b><u>DATE</u></b>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____



WEEKLY CHECKLIST AND ACTION ITEM REPORT

Project/Location:	Inspector/s:	Time/Date: /
-------------------	--------------	-----------------

TOPIC	OBSERVATIONS	FINDING (Yes/No or N/A)
-------	--------------	----------------------------

This inspection checklist is meant to capture the health, safety, and environment (HSE) inspection items that are appropriate for the particular project being inspected based on the scope of work and relevant project plans (e.g., safety plan, Environmental Protection Plan, Waste Management Plan, at a minimum). Additional relevant plans may include a Stormwater Pollution Prevention Plan (SWPPP) or Spill Prevention, Controls, and Countermeasures Plan (SPCC). This checklist should be completed by a qualified inspector who is familiar with the project plans and scope of work. Not all elements will be applicable to every project. If not applicable, indicate "N/A."

Weather Conditions at time of Inspection \_\_\_\_\_.

WORK CONDITIONS	YES	NO	NA
1. Housekeeping			
2. Walking/Working Surfaces			
3. Aisles and Passageways			
4. Platforms			
5. Ladders			
6. Stairs, Guardrails, Toe Boards			
7. Exits/Egress			
8. Roadways			
9. Lighting			
10. Noise Exposure			
11. Ergonomics			
12. Site Perimeter and Control Zones Identified			

EQUIPMENT	YES	NO	NA
13. Hand/Portable Tool Condition, Storage, and Use			
14. Machine, Conditions/Guarding			
15. Mobile/Heavy Equipment a. Physical inspection of equipment b. Review of daily inspection reports c. Review of equipment deficiency corrections logs/records			



WEEKLY CHECKLIST AND ACTION ITEM REPORT

Project/Location:	Inspector/s:	Time/Date: /
-------------------	--------------	-----------------

TOPIC	OBSERVATIONS	FINDING (Yes/No or N/A)
-------	--------------	----------------------------

This inspection checklist is meant to capture the health, safety, and environment (HSE) inspection items that are appropriate for the particular project being inspected based on the scope of work and relevant project plans (e.g., safety plan, Environmental Protection Plan, Waste Management Plan, at a minimum). Additional relevant plans may include a Stormwater Pollution Prevention Plan (SWPPP) or Spill Prevention, Controls, and Countermeasures Plan (SPCC). This checklist should be completed by a qualified inspector who is familiar with the project plans and scope of work. Not all elements will be applicable to every project. If not applicable, indicate "N/A."

<b>MATERIAL-HANDLING EQUIPMENT</b>	<b>YES</b>	<b>NO</b>	<b>NA</b>
------------------------------------	------------	-----------	-----------

16. Hoisting and Rigging			
17. Lifting Aids Used When Possible			
18. Proper Lifting Techniques Used			

<b>ELECTRICAL SAFETY</b>	<b>YES</b>	<b>NO</b>	<b>NA</b>
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19. Power Cords			
20. GFCI			
21. Generators			
22. Breaker Box Access/Clearance			

<b>HAZARDOUS MATERIALS</b>	<b>YES</b>	<b>NO</b>	<b>NA</b>
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23. Hazardous Materials Inventory Current			
24. Safety Data Sheets (SDS)			
25. Labeling			
26. Signs/Postings/Color Coding			
27. Proper Storage and Segregation of Hazardous Materials			
28. Compressed Gas Storage and Use			

<b>EMERGENCY SYSTEMS</b>	<b>YES</b>	<b>NO</b>	<b>NA</b>
--------------------------	------------	-----------	-----------

29. Emergency Phone Numbers Posted			
30. Evacuation Routes, Rally Points Shown on Site Map			
31. Fire Extinguishers Inspected Monthly			
32. Eyewashes and Showers Periodically Inspected, Units Flushed, and Fluids Periodically Changed			



WEEKLY CHECKLIST AND ACTION ITEM REPORT

Project/Location:		Inspector/s:		Time/Date: /	
TOPIC		OBSERVATIONS		FINDING (Yes/No or N/A)	
<p>This inspection checklist is meant to capture the health, safety, and environment (HSE) inspection items that are appropriate for the particular project being inspected based on the scope of work and relevant project plans (e.g., safety plan, Environmental Protection Plan, Waste Management Plan, at a minimum). Additional relevant plans may include a Stormwater Pollution Prevention Plan (SWPPP) or Spill Prevention, Controls, and Countermeasures Plan (SPCC). This checklist should be completed by a qualified inspector who is familiar with the project plans and scope of work. Not all elements will be applicable to every project. If not applicable, indicate "N/A."</p>					
33. First Aid Kits/Stations					
34. Bloodborne Pathogen Kits					
35. Emergency Rescue Equipment					
<b>PROTECTIVE EQUIPMENT</b>				<b>YES</b>	<b>NO</b>
36. PPE Used, Stored, and Maintained in Accordance with Project EHS Plan					
37. Respirator Use, Storage, and Maintenance					
<b>SPILL PREVENTION AND PREPAREDNESS</b>				<b>YES</b>	<b>NO</b>
38. Are Petroleum Products Stored in Containers or Tanks as Specified in Project-Specific Plans?					
39. Outside of Containers or Tanks (as Applicable) Show No Signs of Deterioration, Leaks, or Discharges at Seams, Gaskets, Piping, Pumps, Valves, Rivets, or Bolts.					
40. Appropriate Containment Materials are Available and Accessible, Including: Drip Pans, Dikes, Berms, Retaining Walls, Curbing, Other Barriers, Spill Diversion Ponds, Retention Ponds, or Integrated Secondary Containment Structures.					
41. Spill Control and Response Materials are Available, Including: Designated Spill Response Kits, Drip Pans, Sorbent Materials, Oil Retention Booms (Floating or Sorbent), Sand Bags/Temporary Curbing Devices, Fuel Recovery Pumps/Collection Hoses, Fuel Recovery Tank Trucks, and Tools.					
42. Is There Any Evidence of a Sheen or Discoloration on the Ground? Are Hazardous Materials Stored Properly in a Manner that Minimizes Potential For Spills?					
43. Emergency Contact Lists are Current and Posted.					



**WEEKLY CHECKLIST AND ACTION ITEM REPORT**

Project/Location:		Inspector/s:		Time/Date: /	
TOPIC		OBSERVATIONS		FINDING (Yes/No or N/A)	
<p>This inspection checklist is meant to capture the health, safety, and environment (HSE) inspection items that are appropriate for the particular project being inspected based on the scope of work and relevant project plans (e.g., safety plan, Environmental Protection Plan, Waste Management Plan, at a minimum). Additional relevant plans may include a Stormwater Pollution Prevention Plan (SWPPP) or Spill Prevention, Controls, and Countermeasures Plan (SPCC). This checklist should be completed by a qualified inspector who is familiar with the project plans and scope of work. Not all elements will be applicable to every project. If not applicable, indicate "N/A."</p>					
44. Workers Have Received Spill Prevention Response Training.					
45. Does the Project Have a Spill Response, Controls, and Countermeasures (SPCC) Plan? If Yes, are Inspections being Performed and Documented as Required in the Plan? Has the Plan Been Updated as Required?					
<b>STORMWATER POLLUTION PREVENTION AND EROSION CONTROLS</b>				<b>YES</b>	<b>NO</b>
46. Are Site Activities that Cause Land Disturbance being Performed (Grading, Excavating, Clearing and Grubbing, Demolition and Foundation Removal, Etc?)					
47. Are Surface Waters Present on or Adjacent to the Site that Could Be Impacted By Runoff from the Site? Is There Any Evidence of Runoff from The Project Site to These Areas?					
48. Are There Storm Drains, Catch Basins or Other Conveyances that Collect Stormwater? Are There Activities Occurring that Could Cause Oil, Contaminants, or Sediments to Enter These Conveyances?  If Yes, Are There Measures In Place Or Needed to Protect Stormwater Quality?					
49. Does The Project Have a Total Land Disturbance = or > 1 Acre or is the Project Part of a Larger or Common Plan of Development That Could Exceed 1 Acre of Disturbance? If Yes, Confirm the Stormwater Pollution Prevention Plan is in Place. If No, Check the Environmental Protection Plan for Requirements or Indicate N/A (E.G., if the Project Does Not Involve Land-Disturbing Activities)					
50. Are There Signs of Erosion on Recently Disturbed Soils (Channelization, Rivulets, Siltation Runoff, Etc.)? Can the Erosion Lead to Sediment or Runoff to Surface Water or Conveyances? If Yes, are					



WEEKLY CHECKLIST AND ACTION ITEM REPORT

Project/Location:	Inspector/s:	Time/Date: /		
TOPIC	OBSERVATIONS	FINDING (Yes/No or N/A)		
This inspection checklist is meant to capture the health, safety, and environment (HSE) inspection items that are appropriate for the particular project being inspected based on the scope of work and relevant project plans (e.g., safety plan, Environmental Protection Plan, Waste Management Plan, at a minimum). Additional relevant plans may include a Stormwater Pollution Prevention Plan (SWPPP) or Spill Prevention, Controls, and Countermeasures Plan (SPCC). This checklist should be completed by a qualified inspector who is familiar with the project plans and scope of work. Not all elements will be applicable to every project. If not applicable, indicate "N/A."				
Erosion Control BMPs Necessary or Recommended?				
51. Are BMPs Being Implemented per the Environmental Project Plans or (if Prepared) SWPPP)? For Instance, Preventative Maintenance, Good Housekeeping Practices, Proper Waste Storage and Storage of Hazardous Materials, Structural BMPs, Etc.?				
52. If the Project Has a Stormwater Pollution Prevention Plan (SWPPP), are Inspections being Performed and Documented as Required in the Plan?				
53. Fugitive Dust – Appropriate BMPs are Instituted for Fugitive Dust Emissions.				
OTHER CONDITIONS OR WORK PRACTICES		YES	NO	NA
54. Are all required postings placed within the site? (deficiency log, OSHA 300A, etc.)				
55.				
56.				
57.				

Reviewed by: \_\_\_\_\_  
Signature

\_\_\_\_\_ Date

**File the Weekly Inspection Checklist with the Site Safety and Health Officer (SSHO)  
Additionally, send a copy to the Project Manager and Safety and Health Director  
IF A STOP WORK IS REQUIRED, NOTIFY THE DIRECTOR OF SAFETY**



WEEKLY CHECKLIST AND ACTION ITEM REPORT

Project/Location:		Inspector/s:	Time/Date: /
ACTION ITEM	RESPONSIBLE PARTY	SCHEDULE (DAY(S)/WEEK(S) TO COMPLETE)	DATE COMPLETED
1.			/
2.			/
3.			/
4.			/
5.			/
6.			/
7.			/
8.			/
9.			/
10.			/
11.			/





DAILY BRIEFING/STAFF & VISITOR SIGN-IN SHEET
SAFETY INSPECTION REPORT

PART I: Daily Safety Briefing/Staff & Visitor Sign-In Sheet

Report #

Form containing fields for Date, Office/Project Name/Location, Shift/Department, Contract/Task Order, Weather, Awareness, Other Issues, Medical Support Available, Hospital, Urgent/Routine Care, Ordnance Training, Presented by, Attendees, and a sign-in table with columns for Print Name, Signature, Company, Time In, and Time Out.





PART II: Safety Inspection Report

DATE:		TIME:		REPORT NO.:	
CONTRACT NO.:			TASK ORDER NO.:		
SITE NAME AND LOCATION:					
WEATHER CONDITIONS:					
Temperature:			Humidity:		
Conditions (circle one):    Sunny    Partly Sunny    Cloudy    Partly Cloudy    Rain    Snow					
<b>I. WORK CONDUCTED:</b>					
<b>II. INSPECTION POINTS</b>					
Item Description		Pass	Item Description		Pass
1.	Personal Protection (PPE)	Y / N	9.	Site Communications	Y / N
2.	Work Processes	Y / N	10.	House Keeping	Y / N
3.	Site Control	Y / N	11.	Heavy Equipment	Y / N
4.	First Aid Kit(s)/Eyewash	Y / N	12.	Refueling Operations	Y / N
5.	Fire Extinguisher(s)	Y / N	13.	Other: (list)	Y / N
6.	Site Vehicles	Y / N	14.	Other: (list)	Y / N
7.	Safety and Health Monitoring Equipment	Y / N	15.	Other: (list)	Y / N
8.	Power Tools	Y / N	16.	Other: (list)	Y / N
<b>III. SIGNIFICANT EVENTS:</b>					
<b>IV. DEFICIENCIES and CORRECTIVE ACTIONS: (If required)</b>					
<b>V. REINSPECTION RESULTS: (If Required)</b>					
<b>VI. SIGNATURES:</b>			Contractor's Verification: On behalf of the Contractor, I certify this report is complete and correct, and all materials used, and work performed during this reporting period are in compliance with the contract plans and specifications to the best of my knowledge, except as may be noted above.		
_____ UXOSO Name (Print)			_____ Signature		

**QUALITY CONFORMANCE INSPECTION (QCI) RECORD**

See Reverse for Completion Instructions

**DATE:** \_\_\_\_\_ **PROJECT SITE:** \_\_\_\_\_

**QC SPECIALIST:** \_\_\_\_\_

**TASK INSPECTED:** \_\_\_\_\_

**SCHEDULED INSPECTION** ( )                      **REINSPECTION** ( )  
**DAILY** ( )   **WEEKLY** ( )              **OTHER** ( ) \_\_\_\_\_

**RESULTS:**

- ( ) **TASK IS BEING ACCOMPLISHED IN CONFORMANCE TO WP/SSHP.**
- ( ) **TASK IS NOT BEING ACCOMPLISHED IN CONFORMANCE TO WP/SSHP.**

**THE NOTED NONCONFORMANCE IS AS FOLLOWS:** \_\_\_\_\_

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**REINSPECTION:**

**TASK AND DATE OF NONCONFORMANCE BEING REINSPECTED:**

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**RESULTS:**

- ( ) **TASK IS BEING ACCOMPLISHED IN CONFORMANCE TO THE WP/SSHP.**
- ( ) **TASK IS NOT BEING ACCOMPLISHED IN CONFORMANCE TO WP/SSHP.**

**THE RE-OCCURRING NONCONFORMANCE IS AS FOLLOWS:**

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## INSTRUCTIONS FOR COMPLETION

**A QCI record will be completed on each task inspected.**

**Date:** Enter the date the inspection took place.

**Project Site:** Enter the project site's name.

**QC Specialist:** Name of the QC Specialist conducting the QCI.

**Task Inspected:** Enter the name of the task being inspected as per the QCI Schedule.

**Scheduled Inspection:** Place a "X" in the appropriate ( ). If Other is applicable, note the reason for the QCI.

**Results:**

Enter a "X" in the appropriate ( ).

If the task is in conformance, no other information is required on this form.

If the task is not in conformance, continue with the explanation in space provided.

**Reinspection:**

Date and Task being reinspected: Enter the date and pertinent task.

Results: Enter a "X" in the appropriate ( ).

If the task is still not in conformance, continue with the explanation in space provided.

**Distribution of completed forms:**

**Conformances:** 1 - Project Manager  
1 - On-site QC File (Inactive)

**Nonconformances:** 1 - Project Manager  
1 - Quality Manager  
1 - On-site QC File (Active)

**Re-inspections:** 1 - Project Manager  
1 - Quality Manager  
1 - On-Site QC File (Inactive) (if compliant)  
(Active) (if noncompliant)





DD FORM 1348-1A, JUL 91 (EG) ISSUE RELEASE/RECEIPT DOCUMENT

27. ADDITIONAL DATA	26. RIC (4-6) UI (23-24) QTY (25-29) CON CODE (71) DIST (55-56) UP (74-80)	25. NATIONAL STOCK NO. & ADD (8-22)	24. DOCUMENT NUMBER & SUFFIX (30-44)
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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29				
OD	CE	N	FROM	MS	UNIT	QUANTITY	SUPPLER'S	MENTARY	ADDRESS	IGN	DIS-	TR-	BU-	JECT	PRO-	R	D	D	A	D	V	R	OC	M	UNIT PRICE	DOLLARS	CTS	DOLLARS	CTS	4. MARK FOR	2. SHIP FROM	3. SHIP TO

5. DOC DATE	6. NMFC	7. FRT RATE	8. TYPE CARGO
10. QTY. RECD	11. UP	12. UNIT WEIGHT	13. UNIT CUBE
			14. UFC
			15. SL
16. FREIGHT CLASSIFICATION NOMENCLATURE			
17. ITEM NOMENCLATURE			
18. TY CONT	19. NO CONT	20. TOTAL WEIGHT	21. TOTAL CUBE
22. RECEIVED BY		23. DATE RECEIVED	

PREVIOUS EDITION MAY BE USED

Form Approved  
OMB No. 0704-0246  
Expires 20210930

The public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, to the Department of Defense, Washington Headquarters Services, at whs.mc-alex.esd.mbx.dd-dod-informationcollections@mail.mil. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.





## VEHICLE INSPECTION CHECKLIST

Project:	
Manufacturer:	Model:
License Number:	Team Number:
Date Period: /	Mileage start/end: /

Equipment Checklist (Check all that apply and provide description of corrections needed)

Item	Status	Corrective Action
Steering	Pass Fail NA	
Service Brakes	Pass Fail NA	
Emergency Brake	Pass Fail NA	
Transmission	Pass Fail NA	
Warning Gauges	Pass Fail NA	
Leaks	Pass Fail NA	
Lights	Pass Fail NA	
Mirrors	Pass Fail NA	
Fluids	Pass Fail NA	
Seat and Seat Belts	Pass Fail NA	
Tires/Tread	Pass Fail NA	
Regular Horn	Pass Fail NA	
Back Up Alarm	Pass Fail NA	
Hand Hold/Running Boards	Pass Fail NA	
Fire Extinguisher	Pass Fail NA	
Emergency Kit	Pass Fail NA	
Other:	Pass Fail NA	
Other:	Pass Fail NA	

Remarks:	NOTE: If the vehicle requires attention or there is something missing, you are required to contact your Responsible Manager before operating vehicle. <i>Please initial appropriate box.</i>						
	Sun	Mon	Tue	Wed	Thu	Fri	Sat

### Approvals

Operator's Signature:		Date:
Supervisor's Signature: <i>(Repairs or adjustments Completed)</i>		Date:
Safety Review by Signature:		Date:



## DAILY HEAVY EQUIPMENT INSPECTION CHECKLIST

Project: \_\_\_\_\_ Date: \_\_\_\_\_

Manufacturer: \_\_\_\_\_

Model: \_\_\_\_\_ Unit Number: \_\_\_\_\_ Hours Start/End: \_\_\_\_\_ / \_\_\_\_\_

Equipment Checklist (Check all that apply and provide description of corrections needed)

Item	Status			Corrective Action
Steering Mechanism <sup>1</sup>	Pass	Fail	NA	
Service Brakes <sup>2</sup>	Pass	Fail	NA	
Emergency Brake <sup>1</sup>	Pass	Fail	NA	
Transmission & Controls	Pass	Fail	NA	
Warning Gauges	Pass	Fail	NA	
Leaks	Pass	Fail	NA	
Lights	Pass	Fail	NA	
Mirrors	Pass	Fail	NA	
Fluids	Pass	Fail	NA	
Seat and Seat Belts (w/Roll Over Protection System)	Pass	Fail	NA	
Tires / Tread	Pass	Fail	NA	
Regular Horn	Pass	Fail	NA	
Audible Back Up Alarm	Pass	Fail	NA	
Steps / Handholds	Pass	Fail	NA	
Fire Extinguisher	Pass	Fail	NA	
Spill Kit	Pass	Fail	NA	
Fenders / Mud Flaps	Pass	Fail	NA	
Heater / Defroster	Pass	Fail	NA	
All items within Cab/bed Secured	Pass	Fail	NA	
Machine Cleaned Out Daily	Pass	Fail	NA	
Other:	Pass	Fail	NA	
Other:	Pass	Fail	NA	

**Approvals**

Operator's Signature: _____		Date: _____
Supervisor's Signature: <i>(repairs or adjustments completed)</i>		Date: _____
Safety Review by Signature: _____		Date: _____

<sup>1</sup> Items required to be operational by OSHA 1926.602 before use.  
<sup>2</sup> Service brake must be capable of stopping and holding equipment fully loaded.



# Same-Day Transaction Report

DATE	MANUFACTURER VENDOR	MANUFACTURER'S MARKS & DESCRIPTION	QTY RCVD	QTY USED	QTY RTNED	BALANCE	NAME/SIGNATURE OF VENDOR REPRESENTATIVE

Note: The Same-Day Transaction Report is to be used when procuring explosives from a vendor for same-day events where all materials will be used or returned to the vendor, leaving a balance of "0" on hand. Complete this report and attach the PO and vendor invoice as part of your explosives files.

APPENDIX G  
**MUNITIONS FRAGMENTATION SHEETS**

MUNITIONS RESPONSE WORK PLAN CONGAREE RIVER PROJECT  
**REMOVAL ACTION AND CONSTRUCTION SUPPORT**  
**COLUMBIA, SC**

# Fragmentation Data Review Form



Database Revision Date 6/5/2020

Category:

Munition:

Case Material:

Fragmentation Method:

Secondary Database Category:

Munition Case Classification:

DODIC:

Date Record Created:

Record Created By:

Last Date Record Updated:

Individual Last Updated Record:

Date Record Retired:

### Munition Information and Fragmentation Characteristics

Explosive Type:

Explosive Weight (lb):

Diameter (in):

Cylindrical Case Weight (lb):

Maximum Fragment Weight (Intentional) (lb):

Design Fragment Weight (95% Unintentional) (lb):

Critical Fragment Velocity (fps):

### Theoretical Calculated Fragment Distances

HFD [Hazardous Fragment Distance: distance to no more than 1 hazardous fragment per 600 square feet] (ft):

MFD-H [Maximum Fragment Distance, Horizontal] (ft):

MFD-V [Maximum Fragment Distance, Vertical] (ft):

### Overpressure Distances

TNT Equivalent (Pressure):

TNT Equivalent Weight - Pressure (lbs):

3.5 psi, K18 Distance (ft):

2.3 psi, K24 Distance (ft):

1.2 psi, K40 Distance (ft):

0.0655 psi, K328 Distance (ft):

"NOTE: Values shown within this section only address overpressure hazards and do not account for applicable distance values for fragments and debris as required per DoD 6055.09-M."

### Sandbag and Water Mitigation Options

TNT Equivalent (Impulse):

TNT Equivalent Weight - Impulse (lbs):

Kinetic Energy 10<sup>6</sup> (lb-ft<sup>2</sup>/s<sup>2</sup>):

Single Sandbag Mitigation

Required Wall & Roof Thickness (in):

Expected Max. Throw Distance (ft):

Minimum Separation Distance (ft):

Double Sandbag Mitigation

Required Wall & Roof Thickness (in):

Expected Max. Throw Distance (ft):

Minimum Separation Distance (ft):

Water Mitigation

Minimum Separation Distance (ft):

Water Containment System:

Note: Use Sandbag and Water Mitigation in accordance with all applicable documents and guidance. If a donor charge larger than 32 grams is utilized, the above mitigation options are no longer applicable. Subject matter experts may be contacted to develop site specific mitigation options.

### Minimum Thickness to Prevent Perforation (in)

	<u>Intentional</u>	<u>Unintentional</u>
4000 psi Concrete (Prevent Spall):	<input type="text" value="12.80"/>	<input type="text" value="7.40"/>
Mild Steel:	<input type="text" value="2.21"/>	<input type="text" value="1.23"/>
Hard Steel:	<input type="text" value="1.81"/>	<input type="text" value="1.01"/>
Aluminum:	<input type="text" value="4.07"/>	<input type="text" value="2.36"/>
LEXAN:	<input type="text" value="11.35"/>	<input type="text" value="7.93"/>
Plexi-glass:	<input type="text" value="9.75"/>	<input type="text" value="6.06"/>
Bullet Resist Glass:	<input type="text" value="9.20"/>	<input type="text" value="5.43"/>

### Item Notes

**Distribution Statement D. Distribution authorized to the Department of Defense and U.S. DoD contractors only for Administrative-Operational Use (7 January 2020). Other requests shall be referred to the Department of Defense Explosives Safety Board, 4800 Mark Center Drive, Suite 16E12, Alexandria, VA 22350.**

# Fragmentation Data Review Form



Database Revision Date 6/5/2020

Category:

Munition:

Case Material:

Fragmentation Method:

Secondary Database Category:

Munition Case Classification:

DODIC:

Date Record Created:

Record Created By:

Last Date Record Updated:

Individual Last Updated Record:

Date Record Retired:

### Munition Information and Fragmentation Characteristics

Explosive Type:

Explosive Weight (lb):

Diameter (in):

Cylindrical Case Weight (lb):

Maximum Fragment Weight (Intentional) (lb):

Design Fragment Weight (95% Unintentional) (lb):

Critical Fragment Velocity (fps):

### Theoretical Calculated Fragment Distances

HFD [Hazardous Fragment Distance: distance to no more than 1 hazardous fragment per 600 square feet] (ft):

MFD-H [Maximum Fragment Distance, Horizontal] (ft):

MFD-V [Maximum Fragment Distance, Vertical] (ft):

### Sandbag and Water Mitigation Options

TNT Equivalent (Impulse):

TNT Equivalent Weight - Impulse (lbs):

Kinetic Energy 10<sup>6</sup> (lb-ft<sup>2</sup>/s<sup>2</sup>):

### Overpressure Distances

TNT Equivalent (Pressure):

TNT Equivalent Weight - Pressure (lbs):

3.5 psi, K18 Distance (ft):

2.3 psi, K24 Distance (ft):

1.2 psi, K40 Distance (ft):

0.0655 psi, K328 Distance (ft):

"NOTE: Values shown within this section only address overpressure hazards and do not account for applicable distance values for fragments and debris as required per DoD 6055.09-M."

#### Single Sandbag Mitigation

Required Wall & Roof Thickness (in):

Expected Max. Throw Distance (ft):

Minimum Separation Distance (ft):

### Minimum Thickness to Prevent Perforation (in)

	Intentional	Unintentional
4000 psi Concrete (Prevent Spall):	<input type="text" value="5.51"/>	<input type="text" value="3.03"/>
Mild Steel:	<input type="text" value="1.08"/>	<input type="text" value="0.58"/>
Hard Steel:	<input type="text" value="0.89"/>	<input type="text" value="0.48"/>
Aluminum:	<input type="text" value="2.15"/>	<input type="text" value="1.21"/>
LEXAN:	<input type="text" value="6.87"/>	<input type="text" value="4.70"/>
Plexi-glass:	<input type="text" value="5.00"/>	<input type="text" value="3.02"/>
Bullet Resist Glass:	<input type="text" value="4.28"/>	<input type="text" value="2.45"/>

#### Double Sandbag Mitigation

Required Wall & Roof Thickness (in):

Expected Max. Throw Distance (ft):

Minimum Separation Distance (ft):

#### Water Mitigation

Minimum Separation Distance (ft):

Water Containment System:

### Item Notes

Note: Use Sandbag and Water Mitigation in accordance with all applicable documents and guidance. If a donor charge larger than 32 grams is utilized, the above mitigation options are no longer applicable. Subject matter experts may be contacted to develop site specific mitigation options.

**Distribution Statement D. Distribution authorized to the Department of Defense and U.S. DoD contractors only for Administrative-Operational Use (7 January 2020). Other requests shall be referred to the Department of Defense Explosives Safety Board, 4800 Mark Center Drive, Suite 16E12, Alexandria, VA 22350.**

# BURIED EXPLOSION MODULE

(Version 7.2)

Note: White cells require input. All other cells are calculated.

Based on DDESB Technical Paper 16, Revision 5 (ENGLISH UNITS)								
<b>BURIAL CHARACTERISTIC INPUTS</b>								
<b>BURIAL MEDIUM</b> Soil <input type="text" value="Soil"/>	<b>SOIL TYPE</b> Dry Sand <input type="text" value="Dry Sand"/> <i>(See TP 16, Revision 5 for soil details)</i>	<b>DEPTH OF BURIAL (ft)</b> <input type="text" value="6.00"/>						
<b>EXPLOSIVE CHARGE INPUTS</b>								
<b>ITEM DESCRIPTION</b> 10 in Cannonball Shell <input type="text" value="10 in Cannonball Shell"/>		<b>NUMBER OF ITEMS</b> <input type="text" value="5"/> <i>See Note 6</i>						
<b>DONOR CHARGE EXPLOSIVE TYPE</b> RDX <input type="text" value="RDX"/>	<b>TOTAL WEIGHT OF DONOR CHARGES (lbs)</b> <input type="text" value="2.50"/>	<b>HORIZONTAL DISTANCE (for pressure calcs)</b> <input type="text" value="200"/>						
<b>VALUES USED IN BEM CALCULATIONS</b>								
SINGLE ITEM NEW (lbs) <input type="text" value="4.00"/> ITEM DIAMETER (in) <input type="text" value="9.850"/> SINGLE ITEM MAXIMUM FRAG. WEIGHT (lbs) <input type="text" value="3.5556"/> SINGLE ITEM MAXIMUM FRAG. VELOCITY (ft/s) <input type="text" value="1,659"/>	TOTAL TNT WEIGHT USED (lbs) <input type="text" value="12.25"/> FRAGMENT WEIGHT USED IN CALCULATIONS (lbs) <input type="text" value="3.5556"/> FRAGMENT VELOCITY USED IN CALCULATIONS (ft/s) <input type="text" value="1,659"/>							
<b>BURIED EXPLOSION MODULE OUTPUTS</b>								
<b>CRATER OR CAMOUFLET?</b> <div style="border: 1px solid black; padding: 2px; display: inline-block;"><b>CAMOUFLET</b></div> See Note 1 See Note 2		<b>CAMOUFLET CAVITY RADIUS (ft)</b> <input type="text" value="3"/>						
Surface K328 Distance (ft) <input type="text" value="756.1"/> Buried Equiv. K328 (0.066 psi) <input type="text" value="-N/A-"/> ft Buried Equiv. K24 (2.3 psi) <input type="text" value="-N/A-"/> ft	<b>NON-ESSENTIAL PERSONNEL DISTANCE (ft)</b> <input type="text" value="0"/>							
<b>Pressure Values</b> Distance Greater of Soil Ejecta and Max. Frag. (0 ft) User-Entered Horizontal Distance (200 ft)	<table border="1" style="border-collapse: collapse; text-align: center;"> <tr> <td>(psi)</td> <td>(dB)</td> </tr> <tr> <td>-N/A-</td> <td>-N/A-</td> </tr> <tr> <td>-N/A-</td> <td>-N/A-</td> </tr> </table> See Note 1 See Note 1	(psi)	(dB)	-N/A-	-N/A-	-N/A-	-N/A-	Note: Provide essential personnel equivalent K24 overpressure distance and protection from all fragments.
(psi)	(dB)							
-N/A-	-N/A-							
-N/A-	-N/A-							
<b>WARNING MESSAGES</b>								
Note 1: Airblast methodology not applicable (N/A) for Camouflet conditions! Note 2: Depth too great--no fragments expected  Note 6: The BEM assumes intentional detonation of a single horizontal layer of munitions.								

# BURIED EXPLOSION MODULE

(Version 7.2)

Note: White cells require input. All other cells are calculated.

Based on DDESB Technical Paper 16, Revision 5 (ENGLISH UNITS)		
<b>BURIAL CHARACTERISTIC INPUTS</b>		
<b>BURIAL MEDIUM</b> Water <input type="text"/>	<b>SOIL TYPE</b> Wet Sand <input type="text"/> <i>(For water burial ignore soil type)</i>	<b>DEPTH OF BURIAL (ft)</b> 3.00 <input type="text"/>
<b>EXPLOSIVE CHARGE INPUTS</b>		
<b>ITEM DESCRIPTION</b> 10 in Cannonball Shell <input type="text"/>		<b>NUMBER OF ITEMS</b> 1 <input type="text"/>
<b>DONOR CHARGE EXPLOSIVE TYPE</b> RDX <input type="text"/>	<b>TOTAL WEIGHT OF DONOR CHARGES (lbs)</b> 0.01 <input type="text"/>	<b>HORIZONTAL DISTANCE (for pressure calcs)</b> <input type="text"/>
<b>VALUES USED IN BEM CALCULATIONS</b>		
SINGLE ITEM NEW (lbs) <input type="text" value="4.00"/> ITEM DIAMETER (in) <input type="text" value="9.850"/> SINGLE ITEM MAXIMUM FRAG. WEIGHT (lbs) <input type="text" value="3.5556"/> SINGLE ITEM MAXIMUM FRAG. VELOCITY (ft/s) <input type="text" value="830"/>	TOTAL TNT WEIGHT USED (lbs) <input type="text" value="1.73"/> FRAGMENT WEIGHT USED IN CALCULATIONS (lbs) <input type="text" value="3.5556"/> FRAGMENT VELOCITY USED IN CALCULATIONS (ft/s) <input type="text" value="830"/>	
<b>BURIED EXPLOSION MODULE OUTPUTS</b>		
<b>FRAGMENT HAZARDS AT SURFACE?</b> <div style="border: 1px solid black; padding: 5px; display: inline-block; color: blue; font-weight: bold; font-size: 1.2em;">NO FRAGS</div> <span style="color: red; font-weight: bold;">See Note 2</span>		
Surface K328 Distance (ft) <input type="text" value="394.1"/> Buried Equiv. K328 (0.066 psi) <input type="text" value="-N/A-"/> ft Buried Equiv. K24 (2.3 psi) <input type="text" value="-N/A-"/> ft	<b>NON-ESSENTIAL PERSONNEL DISTANCE (ft)</b> <input style="width: 100px; height: 30px;" type="text" value="0"/>	Note: Provide essential personnel equivalent K24 overpressure distance and protection from all fragments.
<b>Pressure Values</b> Distance Max Frag Distance (0 ft) <input type="text" value="-N/A-"/> (psi) <input type="text" value="-N/A-"/> (dB) User-Entered Horizontal Distance ( ft) <input type="text" value="-N/A-"/> (psi) <input type="text" value="-N/A-"/> (dB)	<span style="color: red; font-weight: bold;">See Note 3</span> <span style="color: red; font-weight: bold;">See Note 4</span>	
<b>WARNING MESSAGES</b>		
Note 2: Water too deep--no fragments expected Note 3: No overpressure is produced at this depth Note 4: No overpressure is produced at this depth Note 5: Scaled Depth Out of Range -- Extrapolated		



APPENDIX H  
**CONTRACTOR PERSONNEL QUALIFICATIONS CERTIFICATION LETTER**

MUNITIONS RESPONSE WORK PLAN CONGAREE RIVER PROJECT  
**REMOVAL ACTION AND CONSTRUCTION SUPPORT**  
**COLUMBIA, SC**

**RESUMES OF KEY PERSONNEL**

The following personnel are proposed as key personnel for the activities on this project:

Scot Wilson	Project Manager	Resume included
Don Schwalback	SUXOS	CEHNC # 0196
TBD	UXOSO/QCS	
TBD	UXO Technician III	
TBD	UXO Technician II	
TBD	UXO Technician II	
TBD	UXO technician I	
TBD	UXO technician I	

**Personnel Qualifications Certification Letter**

I, Mark Dollar, Operating Unit President, certify that the personnel listed above meet or exceed contract requirements for the function they will perform.

If changes in the identified personnel are required, due to the availability of the proposed personnel or schedule conflicts, Tetra Tech will propose fully qualified personnel to fill the position. Resumes of proposed key personnel that are not in the CEHNC database will be submitted for review and approval.

## 11. Scot Wilson, PMP, Program Manager

<b>Education</b>	MS, Information Systems and Operations, Naval Post Graduate School BS, Oceanography, University of Washington Internship, Applied Physics Laboratory, University of Washington Graduate, Naval EOD School, Navy Dive Officer School
<b>Active Professional Registrations/Special Qualifications</b>	Project Management Professional (PMP), #1436776 USACE Registered UXO Technician #3260 OSHA 40-Hour HAZWOPER OSHA 8-Hour Refresher, current

Mr. Wilson is a graduate of the Navy's Explosive Ordnance Disposal School, a Master Explosive Ordnance Disposal Technician, and a Navy Diving Officer, with over 30 years of experience in diving and UXO field operations and 20 years experience in project and program management leading complex technical projects. He has served as the Project Manager for multiple project sites involving underwater munitions, including the Navy's underwater and terrestrial munitions cleanup projects at Jackson Park, WA; the US Army Corps of Engineers' UXO Remedial Investigation in Culebra, Puerto Rico; and the National Fireworks site in Hanover, MA.. He has led over 4,000 hours of high risk UXO diving and over 1,500 hours of UXO disposal operations while maintaining a perfect safety record.

### **Program Manager, Tetra Tech Underwater Technology and UXO Diving Program.**

Provides strategic guidance and technical oversight of Tetra Tech's underwater programs for diving and underwater technology. Develops test plans and pilot studies to evaluate advanced underwater systems and sensors for UXO detection, identification, and recovery. This includes underwater geophysical sensors, sonars, mixed sensor platforms, ROVs, and underwater navigation, vision, and communication systems. Serves as chairman of the Tetra Tech Diving Review Board.

### **Project Manager, MassDEP, Immediate Response Action, National Fireworks Site, Hanover MP.**

Managed the UXO remediation and diving scope of this complex \$25M T&M multi-contaminate cleanup project performed by a field staff of 25 UXO technicians, geophysicists, and equipment operators. The site contains high amounts of 20mm and 40mm projectiles mixed with asbestos, chemically impacted soil and pond sediment, and laboratory waste. During the initial 4 years of this ongoing project, he prepared all planning documents and SOPs for the field work and diving operations, achieved consensus with multiple stakeholders for change approval to adapt plans and procedure to evolving site conditions, and directed the recovery and disposal of over 17,000 munitions, 500 separate munition disposal events, and the recovery and recycling of over 15 tons of munitions scrap without a recordable injury or incident in the history of the project which totals over 75,000 man hours to date. This project was named the TT Corporate Safety Award winner for 2020.

### **Project Manager, USAESCH, Phase III RI/FS; Culebra Water Ranges, PR.**

Managed this \$2.2M FFP/CPFF underwater UXO RI/FS to characterize MEC and MC at two munitions response/FUDS sites off Culebra Island, PR. This three-phase RI/FS includes an environmental baseline survey to delineate the marine habitat; identification of metallic anomalies; and anomaly investigation by UXO-qualified divers to identify MEC through electromagnetic induction (EM) surveys and MC sediment sampling. Conducted side scan, multi-beam, and video data collection over a 1,100-acre open-ocean area. Developed project plans and designed/implemented an innovative environmental baseline survey plan to delineate/identify listed and protected coral species, which expedited regulatory approval by eight stakeholder agencies. Served as the single POC who communicated and coordinated with USAESCH and stakeholders. Responsible for submitting detailed and accurate monthly progress and cost reporting. Met all performance-based milestones, completing Phase I ahead of schedule, with zero safety incidents.

### **Project Manager, NAVFAC SW, Formal Dispute Resolution Support and RI/FS Project Plans for Munitions Investigation for OU 3M Jackson Park Housing Complex, Bremerton, WA.**

Project manager of three CPFF CTOs, totaling \$4.5M, responsible for all munitions and MC actions. Consistently received CPARs ratings of Exceptional on all task orders. For the OU3-M RI/FS, developed project plans, WP, Naval Ordnance Safety and Security Activity (NOSSA) ESS and After-Action Report, RI/FS Report, and resolution documents from regulatory

negotiations, gaining acceptance for remedial alternatives. Managed 16-person team during a 35-acre surface sweep on 122 private properties. Managed diving operations to investigate/recover Discarded Military Munitions (DMM) at over 800 magnetic anomaly sites in Ostrich Bay. Completed all field tasks ahead of schedule and under budget, maintaining a perfect safety record. Received outstanding ratings in all categories of CPAR evaluation. Met all performance-based objectives, including completing an explosive safety submission (ESS), diving safety submission, and remedial design for the OU3-M pilot study in half the time scheduled. Implemented innovative techniques to minimize processed sediment during munitions dredging that saved the client thousands of dollars in off-site disposal costs. Managed approximately \$500K in government-owned property.

**Project Manager, NAVFAC SW, Phase 2 RI/FS for OU 3-M, Jackson Park Housing Complex, WA.**

Managed and directed a \$4.1 million task order with a project staff of 16 people during the 2009 field season at the Jackson Park OU3-M site. This work included conducting a 35-acre surface sweep for discarded military munitions (DMMs) and diving operations to investigate and recover DMM at over 800 magnetic anomaly sites at the bottom of Ostrich Bay. All field tasks were completed ahead of schedule and under budget while maintaining a perfect safety record. Following the field work, authored the NOSSA After Action Report, the Remedial Investigation/Feasibility Study Report, and dispute resolution documents supporting the Navy during negotiations with the regulators for acceptance of the remedial alternatives. The project earned the highest award fee evaluation possible, ensuring the company received the maximum available fee.

**Project Manager, NAVFAC NW, UXO Underwater EM Survey of Jackson Park Pier Area, Jackson Park OU3-M Site, Bremerton, WA.**

Managing this \$500K CPAF CTO to conduct an underwater EM induction survey for magnetic anomalies over a 10-acre parcel surrounding Pier Two in Ostrich Bay. Developed remote sensing survey plan using proprietary underwater EM array sensor suite to conduct surveys near large structures otherwise inaccessible with a magnetometer. Prepared QAPP, managed survey, and prepared/submitted the survey report. Met all performance-based milestones to date, including completing the identification of >3,000 new anomalies on time, within budget, and with zero safety incidents. Received CPARS ratings of outstanding in all categories.

**Munitions Technical Lead, NAVFAC SW, Naval Weapons Station Concord, CA.** Led field staff in performance of small arms range clearance and HTRW contaminated soil cleanup. Prepared work plans, ESS, and after-action reports. Led field staff in NOSSA audit and pre-audit preparation with zero safety findings.

**Munitions Technical Lead, NAVFAC SW, Naval Weapons Station (NWS) Seal Beach Detachment Fallbrook, CA.** Led field staff performing a TCRA on this \$1.6M, 13-acre UXO site involving biological avoidance and surface range clearance of all accessible metals and exposed Material Potentially Presenting an Explosive Hazard (MPPEH). Recovered >3,000 lbs. of scrap metal and 15 drums of Material Documented as Safe (MDAS)-classified inert munitions debris (MD). To mitigate potential site hazards, an exposed burial pit containing MPPEH was also excavated during the TCRA. Led field team through more than 2,000 labor hours with no safety incidents.

**Project Manager, NAVFAC SW, Explosives Safety Submission and Conceptual Remedial Design, Bremerton Naval Complex, WA.** Authored the Explosive Safety Submission for the OU3-M Pilot Study in half the time listed in the project schedule. Wrote amendment to 2006 Explosive Safety Submission for OU3-M RI/FS to include an innovative underwater collection point, allowing the Navy to open a previously closed public recreation area. Developed new techniques for munitions dredging during the Conceptual Remedial Design to minimize the amount of sediment that must be processed, saving thousands of dollars in off-site disposal. The project earned the highest award fee evaluation possible.

APPENDIX I  
**JOINT APPLICATION SUPPLEMENT**  
**PROJECT DESCRIPTION**

MUNITIONS RESPONSE WORK PLAN CONGAREE RIVER PROJECT  
**REMOVAL ACTION AND CONSTRUCTION SUPPORT**  
**COLUMBIA, SC**



**JOINT APPLICATION SUPPLEMENT  
PROJECT DESCRIPTION**

**CONGAREE RIVER STAKEHOLDER-DEVELOPED MODIFIED REMOVAL ACTION  
COLUMBIA, SOUTH CAROLINA**

September 2020

*Prepared for:*

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Cayce, South Carolina 29033

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## 1.0 INTRODUCTION

This Project Description has been prepared on behalf of Dominion Energy South Carolina, Inc. (DESC) to provide supplemental information for the Joint Federal and State Application Form (Joint Application) for the planned Modified Removal Action (MRA) for tar-like material (TLM) and impacted sediments within a portion of the Congaree River in Columbia, South Carolina.

The general site location and planned removal areas are shown on Figure 1. The project area includes the proposed removal areas and landside area necessary for access and operations to support the removal activities. As summarized in the Joint Application Form (item 33), the purpose of the MRA is to remove TLM and impacted sediments from the project area and eliminate its potential for human contact. The MRA will also mitigate the potential for resuspension and downstream movement of impacted sediments.

The MRA is being planned at the direction of the South Carolina Department of Health and Environmental Control (SCDHEC). A plan for the removal of tar-like material within the Congaree River was requested by SCDHEC in a letter dated July 31, 2018 (see Appendix A). The documentation in Appendix A is being provided as required by Nationwide Permit (NWP) Regional General Condition 47a.

In response to the July 2018 SCDHEC letter, a Preliminary Removal Action Work Plan (PRAWP) was prepared and submitted to SCDHEC on September 12, 2018. In a letter dated October 22, 2018 (see Appendix A), SCDHEC acknowledged receipt of the PRAWP and proposal to remove tar-like material from the Congaree River, and directed DESC to proceed with the process of obtaining permit approval from the US Army Corps of Engineers (USACE).

To facilitate the planning process and assure concurrence with the scope of the planned removal efforts, DESC participated in a meeting with Stakeholders on November 15, 2018. As follow-up to that meeting, DESC prepared the Conceptual Plan for a Modified Removal Action – December 2018 (Stakeholder-Developed MRA Plan) described in Section 2.0. The Stakeholder-Developed MRA Plan was submitted to SCDHEC on December 12, 2018 for confirmation of Stakeholders agreement. In a letter dated February 7, 2019 (see Appendix A), SCDHEC provided their agreement with the plan along with Declarations of Support from two primary stakeholders, Congaree Riverkeeper and Guignard Associates LLC.

There has been a considerable amount of work undertaken in support of this project, which is available in the Administrative Record and can be found on SCDHEC's website at the following location: <http://www.scdhec.gov/HomeAndEnvironment/Pollution/CleanUpPrograms/OngoingProjectsUpdates/CongareeRiverSediment/AdministrativeRecord/>. The Administrative Record is also available for review at the main branch of the Richland County Public Library located at 1431 Assembly Street, Columbia, SC 29201.

## 2.0 DESCRIPTION OF OVERALL PROJECT

The Stakeholder-Developed MRA Plan delineates a revised approach toward completing a “Modified” Removal Action to address impacted sediment that exists within a portion of the Congaree River in



Columbia, SC. The project objective is to pursue a MRA that consists of the removal of TLM and impacted sediment from two separate areas as depicted on Figure 2 as a revised approach that may be able to receive a favorable USACE permit decision for the necessary cofferdam as well as all other required regulatory approvals. The project description in this section is being provided for general information purposes and as a supplement to item 32 in the Joint Application Form.

The MRA will involve removal of impacted sediments from areas that are:

- Close to the shoreline and therefore more susceptible to human dermal contact or exposure (e.g., river users such as kayakers, waders/swimmers, fishermen etc.); and
- More concentrated with tar-like-material (TLM), or where thicker deposits of TLM are shown to exist.

Figure 2 shows the outline of the previously proposed full-scale removal area versus the currently proposed two areas comprising the MRA. The volumes shown on Figure 1 for each approach were calculated using a combination of new survey information collected in the spring of 2018 and the sediment coring logs collected from the remedial investigations conducted in 2010 to 2012. Figure 3 shows the proposed MRA areas with a GIS visualization of each sediment boring as a TLM “hot-spot” which depicts the greater thickness of the TLM by a brighter color. Figure 4 provides an updated depiction of the average TLM thickness with estimated volume, using a similar GIS tool in which the data representation extends into the adjacent data point. Sediments in the “other areas” that will not be removed consist of either:

- Relatively minor thicknesses of TLM, and/or
- Are now covered by additional sediment resulting from the “superstorm” of 2015; and/or
- Occur far enough away from the shoreline and in deeper water, whereby risk of human dermal contact or exposure is minimal.

The currently proposed MRA consists of two areas as shown on Figures 2 through 4. Area 1 is approximately 2.6 acres and as proposed, has a similar footprint to the original full-scale Phase 1 Area. Area 2 is approximately 0.5 acres in size. Table 1 provides a comparison of volume estimates from previously submitted documents. Assuming successful completion of the MRA, an estimated 73 percent of the total TLM will have been removed from the Congaree River.

### **3.0 IMPLEMENTATION CONSIDERATIONS**

The primary implementation considerations involve the following items discussed in this section:

- Access to the project area;
- Cofferdam placement within the river for isolation of the removal areas;
- Site operations plan for the landside support zone;
- Dewatering and water management for the removal areas inside the cofferdams;

- TLM and sediment excavation, management, transport and disposal; and
- Support plans for screening and management of unexploded ordnance (UXO) and historical artifacts.

### **3.1 Project Area Access**

DESC evaluated several options for access to the project area, including access from the north along the river using City of Columbia-owned property (northern access), from Senate and Gist Streets (central access), and from Blossom Street (southern access).

Landside access to the project area within the river is currently anticipated from Senate and Gist Streets using the central access option. A lease agreement with the property owner is anticipated to allow for both access to the river and the landside operations that will be necessary to support MRA activities within the river. Site access and the anticipated lease area are identified on the conceptual site operations plan provided as Figure 5.

### **3.2 Cofferdams**

To isolate the removal areas and allow for dewatering and screening the areas for the potential presence of UXO and historical artifacts, reinforced rockfill berm cofferdams will be installed. The cofferdam locations around Areas 1 and 2 are identified on Figure 3. The design of the cofferdams is presented with the set of drawings provided as Attachment B to the Joint Application.

#### **Design and Construction Considerations**

Features of the design include:

- A spillway height of 123.5 feet (NGVD 29), designed to minimize overtopping events during the primary construction season;
- Full reinforcement of the outboard side of the cofferdam to minimize damage and risk of material loss;
- Full reinforcement of the overtopping structure to minimize damage to the cofferdam during overtopping events;
- A level surface at the top of the cofferdam, of sufficient width and finish to provide a driving surface for project support vehicles;
- Placement of a HDPE liner within the fill to reduce leakage and associated water handling requirements; and
- A HDPE pipe (or equivalent) through the downriver end of the cofferdam with a check valve, to allow for dewatering of the interior area following an overtopping event.

Prior to initiating cofferdam construction, the footprint of each cofferdam will be addressed following the Mussel Relocation Plan described in Section 5.0 and UXO Management Plans described in Section 3.6. Detailed plans for cofferdam construction will be developed by the construction/remediation contractor. Each area will be addressed separately using the following general construction considerations:

- Total suspended solids (TSS) monitoring will be conducted in accordance with the TSS Monitoring Plan provided in Appendix E during cofferdam construction to monitor and control potential sediment release from the work area;
- The river bank surface that interfaces with the cofferdam will be stripped and prepared properly during installation;
- Material will generally be placed in lifts as the cofferdam is constructed;
- The outlet structure will be installed as material lifts are being placed;
- HDPE liner and reinforcement material (articulated concrete block (ACB) mats) will be placed over the outboard slope and crest of the cofferdam, with additional reinforcement on the inboard slope at the spillways and other critical sections (based on anticipated sediment removal depth);
- Diversion berms, sumps and pumps will be utilized for dewatering the inboard area;
- To the extent practicable during initial dewatering, fish present within the cofferdam area will be captured and relocated within the river, and the presence of vulnerable or imperiled plant species (Rocky Shoal's Spider Lily) will be assessed and these plants will be relocated to a suitable habitat.
- Removal of TLM and sediment within the isolated area, to the extent feasible;
- Pressure wash the exposed bedrock bottom of the river where necessary;
- Deconstruction (i.e., removal of the reinforcement and other cofferdam materials from within the river following completion of sediment removal within each area); and
- The cofferdam in each area will be constructed following the same general sequence.

### **Real-Time Water Quality Monitoring**

Downstream and upstream (background) real-time TSS monitoring will be conducted during cofferdam construction activities to ensure the project does not contribute to elevated TSS levels within the river. Conducting real-time TSS monitoring downstream of the construction area and comparing the results to the background levels from upstream, if needed, will provide timely notification of elevated project related TSS conditions, should they occur. Mitigation measures, such as deployment of a silt curtain, will be employed if an increase above the established conservative TSS action level is indicated. Specific details with respect to the TSS monitoring, action level and the mitigation procedures are provided in the TSS Monitoring Plan located in Appendix E.

### **Inspection and Maintenance**

The Cofferdam Inspection and Maintenance Plan (Appendix B) provides a detailed daily cofferdam structure inspection plan that will be implemented by project oversight personnel. Areas of inspection include the cofferdam structural integrity, exterior conditions (such as debris buildup), riverbank tie-in locations, overall performance and leakage volumes, navigational signage and notification components, expected future river levels, etc. An inspection form will be completed during each work day and any potential areas in need of repairs will be documented and addressed as soon as practical. Implementation of this plan will ensure that cofferdam structural issues are identified and rectified in a timely manner and that project personnel are aware of changing river conditions and can plan accordingly.

### **3.3 Site Operations Plan**

The Site Operations Plan (Appendix C) is intended to provide general procedures to safely and effectively implement the proposed MRA activities. Several site preparation activities will take place prior to initiating the removal work to assure the safe and effective implementation of the MRA. The conceptual approach to the site operations plan is summarized on Figure 5. Some variations to the plan may occur, depending on site conditions encountered at the time of remediation. The actual layout for site operations will be finalized at the discretion of remediation personnel provided DESC, SCDHEC and the landside property owner concur with any significant modifications.

Site preparation and operations will involve the following activities addressed in the plan:

- Landside support zone construction;
- Utility clearance and management;
- Archaeologist demarcation of historic and archaeological sites;
- Evaluation of the power line corridor and demarcation of plant species of concern locations, if present;
- Site office location;
- Site security and fencing;
- Stormwater management and sedimentation controls;
- Work zones;
- Traffic control; and
- Staging areas.

### **3.4 Water Management**

Management of water will be a major component of the overall remediation project. The Water Management Plan (Appendix D) provides details on the anticipated procedures to be implemented during remediation activities. For implementation purposes, water to be managed has been divided into two categories: non-contact water and contact water.

Non-contact water is visually unimpacted water that has not been in contact with TLM or impacted sediments. It includes water from initial dewatering or overtopping events, cofferdam leakage, landside stormwater run-on, and non-contact removal area water including precipitation falling within the cofferdams. Contact water is water that has been in contact with TLM or impacted sediments or appears to be visually impacted (e.g., contains large amounts of suspended solids, exhibits a sheen, or has TLM particles suspended within the water column). The area of origin of the water will be a primary consideration in determining which mode of water management will be used, along with a visual evaluation by site personnel.

The on-site water management system will be used to contain, filter and discharge contact water. The planned discharge location is a sanitary sewer manhole located near the eastern perimeter of the landside support zone shown on Figure 5. Stormwater from the landside operations area will be

controlled via the requirements and best management practices (BMPs) established in the Comprehensive Stormwater Pollution Prevention Plan (C-SWPPP) submitted with the Notice of Intent (NOI) for coverage under the South Carolina National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges from Construction Activities. Non-contact water within the removal areas, including leakage through the cofferdam, will be contained and returned to the river as described further in the Water Management Plan.

### **3.5 Excavation and Material Management**

The major objective of this project is the removal of the TLM and impacted sediment from within the removal areas to the extent practicable. However, visually un-impacted sediment will also be removed and conservatively managed similar to “impacted sediment”. After the cofferdam in each area is constructed, initial dewatering operations will begin and the water from within the cofferdam will be systematically lowered. At this point coordination of several activities will be required including:

- Conduct mussel relocation activities, if not conducted in conjunction with the cofferdam footprint;
- Safely screen the removal area for potential UXO as described in the UXO Management Plans;
- Complete final dewatering of the removal area; and
- Construct an internal, bermed area along the toe of the cofferdam for the leakage/seepage water collection system.

There will be two types of advance screening of the work areas, including mussel relocation activities and UXO clearance and management. No intrusive removal operations will be conducted unless the planned removal area has been screened and designated as safe by the UXO management personnel. UXO screening and management will be conducted in accordance with the UXO Management Plans further discussed in Section 3.6. The UXO personnel will clear portions or the entire isolated and dewatered area prior to permitting the initiation of removal operations. The mussel relocation activities are further discussed in Section 5.0.

After final dewatering and construction of the leakage/seepage water collection system, the removal area will be relatively water-free and suitable for safe removal of the sediment. A combination of removal methodologies and equipment will most likely be required to successfully complete the project due to the varying thickness of sediment and changing bathymetric conditions within the project area. Standard excavation methods coupled with vacuum removal or other techniques will likely be employed.

It is currently estimated that approximately 11,700 cubic yards (CY) of sediment material (or 23,350 tons using a 2.0 conversion factor) are present within the proposed removal areas. Table 1 provides a summary of the material estimates. These volume estimates are approximations due to the inherent difficulties with measuring sediment thicknesses and the variations of the river bottom within the project area. Additionally, the majority of material to be removed from the river will likely require addition of a drying agent or other bulking agent to render the material suitable for transportation to the on-site screening facility or the off-site disposal facility. Therefore, the actual final tonnage will depend on a number of variables.

Sediment material removed from the river will be screened for historical artifacts on-site by trained professionals operating under direct supervision of the project archaeologist. Methods and procedures to be used have been developed and reviewed by SCIAA. A Memorandum of Agreement (MOA) between DESC, USACE and SCIAA was signed in May 2017 and will be updated as necessary. If required, more highly impacted material may be transported directly to a prepared site at the disposal landfill for artifact screening. Recovered artifacts will be preserved in accordance with SCIAA-approved procedures.

As envisioned, sediment removal will start from the northern portion of each cofferdam and progress southward. However, the removal area sequence is subject to change based on conditions including the river bottom characteristics, sediment volume and thickness, and presence of TLM, as well as the judgement of the remediation contractor. Sediment removal within the cofferdam will be further controlled via the establishment of grids, or controlled sequences, to minimize the area of open excavation, to document progress and conditions, and for artifact recovery purposes. To the extent practicable, sediment removal operations will extend inward toward the riverbank until visual impacts are no longer present.

To the extent practicable, the excavated sediment will be piled or stacked in designated draining areas where entrained water will be allowed to flow away from excessively wet material. This water will be contained and ultimately transferred to the water management system. This technique will reduce the amount of material conditioning required to transport the impacted sediment to the next location or step in the process. Any contact water collected on the landside will also be transferred to the water management system.

After allowed to drain, the sediment will be mixed with a conditioning or drying agent (e.g., saw dust) or commercially available polymer, as necessary, to render it suitable for transport to the landside support zone for further conditioning and artifact screening. After the artifact screening process, DESC will utilize appropriately licensed transportation companies to conduct the material transportation activities to the landfill. Similar to material disposal during remediation of the Huger Street former MGP site, use of the Waste Management Richland County Landfill is currently anticipated for disposal of the excavated material. All shipments will be manifested in accordance with federal and state requirements.

### **3.6 UXO and Historical Artifacts Support Plans**

Due to the potential presence of UXO and historical artifacts in the removal areas, support plans have been developed to address these items. The plans have been provided as attachments to the Joint Application in response to application or permit condition requirements and are summarized below.

#### **UXO Screening and Management**

UXO screening and management will be conducted in accordance with the UXO Management Plans (Attachment N to the Joint Application), which provide specific details pertaining to the UXO management operations. No intrusive construction or removal operations will be conducted unless the work area has been screened and designated as safe by the UXO management personnel. As currently planned, the UXO management personnel will conduct diving operations to clear the path of the cofferdam footprint prior to the initiation of cofferdam construction. The area within the cofferdam will be cleared in sections or its entirety after the area has been adequately dewatered.

DESC previously retained Explosive Ordnance Technologies, Inc. (EOTI) to address the planning phase for screening, removal and management of the UXOs. EOTI developed the following four UXO Management Plan documents, consistent with typical USACE guidance and protocols:

- Draft Work Plan for Munitions Response MEC Clearance and Support;
- Explosive Safety Submission Munitions and Explosives of Concern Clearance and Support;
- Dive Safe Practices Manual; and
- Diving Operations Plan.

These four plans, provided in Attachment N to the Joint Application, will be updated, as necessary. During implementation of the MRA, each identified metal anomaly will be evaluated and confirmed as either UXO, historical artifact or other metallic debris and managed in accordance with the approved plans.

#### **Historical Artifacts Screening and Recovery**

This project involves the potential presence of historical artifacts located within the river. Therefore, DESC has worked closely with the South Carolina Institute of Archaeology and Anthropology (SCIAA) and the State Historical Preservation Office (SHPO) to develop an appropriate approach to recover and preserve any potential historical properties.

The Cultural Resource Identification Survey and Archaeological Data Recovery Plan developed by TRC Environmental Corporation are provided in Appendix M. The recovery plan contains the specific methodology and techniques that are currently planned for processing the removed material and segregating the potential artifacts. Recovered artifacts will be preserved in accordance with SCIAA-approved procedures. A draft Memorandum of Agreement (MOA) between USACE, DESC and SHPO/SCIAA is also provided in Appendix M.

## **4.0 SITE RESTORATION**

Minimizing disturbance and properly restoring disturbed areas will be a critical component of the overall project. Figure 5 provides the currently anticipated site operations plan scenario and indicates the potential approximate areas of activity for landside operations, removal operations within the river, and locations along the eastern shoreline of the riverbank that will likely be disturbed as a result of MRA activities. Efforts will be undertaken to safeguard the remainder of the areas from impacts. Areas where disturbance may not be necessary will be demarcated with flagging or fencing to ensure they are not impacted by removal operations or heavy equipment movement unless required. This preservation technique will be a key to minimizing the disturbed areas.

In areas where landside operations occur and shoreline impacts are unavoidable, DESC will conduct restoration activities. DESC plans to strategically locate landside site operations components in areas that will limit the need for clearing and grading activities, as much as practical. This scenario will reduce disturbance of currently forested land and further preserve the riparian corridor. It will also minimize the amount of landside restoration activities that will be required prior to final demobilization. Restoration

plans are described in two documents provided as attachments to the Joint Application in response to application or permit condition requirements (Attachment K – Draft Stormwater Management and Sediment Control Plan and Attachment P – Restoration Operation, Maintenance and Monitoring Plan). Restoration of the landside operations area, removal areas within the river, and the disturbed riverbank and shoreline locations are described briefly below.

### **Landside Restoration**

Prior to mobilization, a Notice of Intent will be submitted to the City of Columbia for coverage under South Carolina NPDES General Permit For Stormwater Discharges From Construction Activities SC100000. This submittal will include a Comprehensive Stormwater Pollution Prevention Plan which includes a Stormwater Management and Sediment Control Plan (SMSCP). The SMSCP provides details on erosion and sediment control methods to be established, maintained and inspected at the site during active operations, as well as plans for final restoration following completion of landside activities. The general approach to final restoration of the landside operations areas is to restore the locations to pre-MRA conditions to the extent practical.

### **River Restoration**

DESC plans on removing all sediment and gravel, small rocks, etc. (both visually impacted with TLM and visually unimpacted material) from the removal areas to the extent practical. Large rocks that are visually unimpacted may be temporarily relocated within the work area to facilitate sediment removal and then returned to their approximate original locations. As an additional measure, DESC plans to pressure wash the exposed bedrock bottom of the river where necessary. Water generated during the pressure washing stage will be collected and removed from the excavation for treatment and discharge to the City of Columbia Public Owned Treatment Works (POTW). The intent is to remove any residual staining or impacts due to the presence of TLM.

Current plans do not include replacing any removed material with backfill. The TLM, impacted sediment, and visually un-impacted sediment will be removed down to the top of the underlying bedrock. In many areas, this will only require removal of several inches of sediment. Following completion of the removal activities, the cofferdam will be removed and over time, the natural depositional processes of the river will restore the river bottom to natural conditions. This process will allow for natural re-deposition of sediment within the removal area based on current river hydraulics. Not replacing the impacted sediment with fill material will also eliminate the potential for backfill materials to be washed downstream and deposited in other areas or degrade other habitats through siltation, etc.

### **Riverbank and Shoreline Restoration**

Detailed plans for the riverbank and shoreline restoration are provided in Attachment P to the Joint Application (Restoration Operation, Maintenance and Monitoring Plan). It is estimated that approximately 975 linear feet of the project area shoreline may be impacted by MRA activities. Shoreline disturbances will be limited to the extent practical. These locations include access roads and cofferdam/riverbank tie-in locations. Available delineation data suggest that TLM is not located within the riverbank soil and as a result, much of the riverbank and riparian corridor may be left undisturbed.

Restoration will include recreating the approximate shoreline slope, stabilization of the bank via riprap and/or bioengineered solutions, and restoration of vegetative cover where practical. DESC's goals are to minimize riverbank disturbance where possible, to restore disturbed areas to natural pre-MRA conditions,



and to utilize bioengineering techniques and structures to the extent practical when repairing impacted shoreline. As stated above, portions of the riparian corridor where disturbance may not be necessary will be demarcated to ensure that they are not impacted unless required. This preservation technique will be a key component of the overall project.

Following completion of the MRA sediment removal and restoration activities, the riverbank and shoreline area will be monitored to assure restoration was successful. Periodic inspections will occur on a monthly basis or following significant weather-related events for a period of one year, unless property owner redevelopment plans result in an earlier change to restored conditions. Should issues be identified during inspections that warrant mitigation, DESC will implement repairs to the affected area(s), as necessary, to assure sufficient stabilization.

As project plans are further developed, certain details or specifications regarding restoration may be modified in order to reflect minor changes or input from applicable experts and/or the property owner. The USACE, SCDHEC and other agencies, as may be appropriate, will be made aware of any major modifications to planned activities prior to implementation.

## **5.0 MITIGATION MEASURES**

Measures to mitigate potential impacts during implementation of the MRA are described in this section. The measures are based on anticipated requirements of the permit authorization as determined from review of the Joint Application, NWP General Conditions (GC) and Regional General Conditions (RGC). This information supplements Items 39 and 40 of the Joint Application and addresses factors identified in GC 23. The mitigation measures described below include plans to address:

- Navigation within the river during MRA implementation (based on GC 1);
- Aquatic life, spawning areas and endangered species within the project area (based on GCs 2,3 and 18); and
- Historic properties within the project areas (based on GC 20).

Additional measures to avoid impacts associated with MRA implementation are described in plans developed to address other requirements of the Joint Application. These measures address landside, riverbank and shoreline, and within the river project areas, and include:

- Draft Stormwater Management and Sediment Control Plan for the landside area (Attachment K to the Joint Application);
- Restoration Operation, Maintenance and Monitoring Plan which addresses the riverbank and shoreline, including the area below the ordinary high-water mark (Attachment P to the Joint Application); and
- Total Suspended Solids Monitoring Plan which describes monitoring and contingency measures for TSS within the river (Section 3.2 and Appendix E in this Project Description).

Compensatory mitigation is not required because no wetlands are adversely impacted and the MRA project has an overall positive environmental impact. The proposed removal action within the river portion of the project area is short-term and the improvement resulting from removal of the TLM-impacted sediment will be permanent. Removing the impacted sediment will provide benefit in the form of reduced potential for contact with the TLM by humans and other organisms. Removal of the TLM also reduces the potential for resuspension and downstream movement and reduction in the potential for flux of dissolved phase constituents with the water column. Aquatic resource function and quality will be improved due to the removal of the impacted sediment. The cofferdams and other support operations will be removed and disturbed portions of the riparian corridor will be restored following completion of the MRA. No permanent loss of wetlands, open waters, riparian areas or aquatic habitat will occur.

## **5.1 Navigation (GC 1)**

The Draft Navigation Plan (Attachment G to the Joint Application) was developed in accordance with the instructions provided with the United States Coast Guard (USCG) Private Aids to Navigation Application. The Application and Draft Navigation Plan will be finalized and submitted to the USCG for approval following receipt of permit authorization for the USACE.

The Plan provides specific methods for notifying boaters and other users of the river in advance of the project location (upriver and downriver) and the need to take appropriate measures to avoid the cofferdam structure. It provides the specific methods for demarcating the area to be avoided and the buoy/signage/lighting scenario for the project. Implementation of the MRA will have no adverse impact on navigation in the Congaree River.

## **5.2 Aquatic Life Movements, Spawning Areas and Endangered Species (GCs 2, 3 and 18)**

### **Aquatic Life Movements**

Because the project area will only occupy a portion of the river at any given time and downstream and upstream movement and access of aquatic organisms will not be impeded, no impact on aquatic life movements is anticipated.

### **Spawning Areas**

Downstream movement of suspended particles and sediment liberated from the work area can potentially impact spawning areas and other aquatic resources. BMPs such as roadway construction and maintenance, shoreline stabilization and deployment of sediment (i.e., silt) curtains, etc. will be utilized as needed. Erosion and sediment control measures associated with the landside support zone are presented in the Draft Stormwater Management and Sediment Control Plan (Attachment K to the Joint Application).

As described in Section 3.2, downstream and upstream (background) real-time TSS monitoring will be conducted during cofferdam construction activities to ensure the project does not contribute to elevated TSS levels within the river. Specific details with respect to the TSS monitoring, action level and the mitigation procedures are provided in the TSS Monitoring Plan located in Appendix E. Conducting real-time TSS monitoring downstream of the construction area and comparing the results to the background levels from upstream, if needed, will provide timely notification of elevated project related TSS conditions,

should they occur. Mitigation measures, such as deployment of a silt curtain, will be employed if an increase above the established conservative TSS action level is indicated.

### **Endangered Species**

The project area was evaluated for the potential presence of threatened and endangered species and spawning habitat. Due to the nature of the project and the associated mitigation measures built into the project plans, specifically the project construction schedule (Section 6.0) and the freshwater mussel relocation activities described in this section, project related activities are not anticipated to negatively impact sensitive species or spawning areas/migrations. A number of sources were used to assess the potential presence of endangered or threatened species in the project area and include:

- U.S. Fish and Wildlife Service (FWS);
- U.S. National Marine Fisheries Service (NMFS);
- South Carolina Department of Natural Resources (SCDNR); and
- The Rare, Threatened and Endangered Species Assessment developed by Kleinschmidt (March, 2008) prepared for the Saluda Hydroelectric Relicensing Project (FERC project no. 516).

Table 2 provides a summary of Federal and State Rare, Threatened and Endangered Species for the project area general vicinity. The Kleinschmidt report was primarily focused on Lake Murray and the Lower Saluda River and the downriver extent was generally terminated at the confluence with the Broad River or the headwaters of the Congaree River (Figure 1). However, the shortnose sturgeon study and the freshwater mussels study conducted as part of the assessment activities extended into the upper Congaree River including the planned project area. Review of these assessments and the available information from the FWS and SCDNR identified a number of federal and state threatened and endangered species, federal candidate species and other species of concern.

Of specific interest to this general project area are the Rafinesque's big-eared bat, shortnose sturgeon, robust redhorse sucker, species of freshwater mussels, and three plant species (Georgia aster, smooth coneflower and Rocky Shoal's Spider Lily). The Rafinesque's big-eared bat and shortnose sturgeon are listed as state endangered species and state and federal endangered species, respectively. The robust redhorse sucker is identified as critically imperiled on the federal list. Eight species of freshwater mussels listed in Table 2 are potentially present in the project area and range from "vulnerable" to "imperiled" at either the national or state level in the NatureServe database. The smooth coneflower is a federal endangered species, the Georgia aster is a federal candidate species, and the Rocky Shoal's Spider Lily is a federal vulnerable and NatureServe imperiled species.

The Rafinesque's big-eared bat's range includes the sandhills region and it is known to roost under I-beam and T-beam bridges. The Gervais Street Bridge may provide a roosting site for this bat. However, project activities will occur downstream of the bridge and should not impact potential roosting sites within the structure.

The shortnose sturgeon have been anecdotally reported to be present in the vicinity of the project area during spawning runs. Based on available information and prior communications with USACE trustees (NMFS and USFWS), if the project is completed between the months of May through October it will not impact potential sturgeon migration. The robust redhorse sucker has been stocked in large numbers in

the Broad River and may be periodically present in the vicinity of the project area. The relatively limited extent of project operations within the river will not be detrimental to this species, if present. Also, during initial dewatering of the areas within the cofferdams, any fish present within the cofferdam areas will be captured and relocated within the river to the extent practicable.

DESC has agreed to conduct freshwater mussel screening and relocation operations in an attempt to preserve indigenous freshwater mussels that may be present within the project footprint. As seen in Table 2, a number of sensitive mussel species were identified in the planned project vicinity. The anticipated mussel relocation activities are explained in detail in the Mussel Relocation Plan (Attachment H). Mussels located within the removal areas, including the planned footprint of the cofferdam structures, will be collected and relocated. As currently envisioned, one of two potential scenarios will be implemented based on project logistical considerations. The first scenario includes conducting the mussel collection and relocation in one mobilization per construction phase following determination of a suitable relocation site. Relocation area(s) will be chosen by the subject matter experts and will be located close to the planned project area. A combination of wading and diving will be necessary in order to adequately survey the majority of the project area. The second scenario includes mobilizing the collection and relocation team and removing the mussels from the approximate footprint of the planned cofferdam and the outboard buffer zone. The relocation team would then demobilize until the cofferdam is constructed and the isolated area is partially dewatered. The team would remobilize and complete the collection and relocation of the mussels within the isolated area. With this scenario, the partial dewatering will facilitate access to the mussels and potentially increase the effectiveness and overall efficiency of the process.

The potential habitat for the smooth coneflower and Georgia Aster would be along the power line corridor located directly east of the river-based project area. Current plans include the use of portions of the power line corridor for landside support activities. During site operations setup activities, the corridor will be evaluated for the presence of smooth coneflower and Georgia Aster. If identified, their location will be demarcated and avoided to the extent practicable during implementation of the project. Should disturbance of these locations become necessary, these plants will be protected or relocated to the extent practical.

The Rocky Shoal's Spider Lily is a perennial plant that inhabits rocky shoals or bedrock outcrops in large streams or rivers at or above the fall line (Kleinschmidt, 2008). It is found in relatively large numbers directly upstream of the project area at the confluence of the Saluda and Broad Rivers, and some portions of the project area may exhibit favorable conditions for its occurrence. Because of the potential for Rocky Shoal's Spider Lily to exist within the removal areas within the river, DESC plans to assess their presence during cofferdam installation and initial dewatering activities. If present, these plants will be relocated to a suitable habitat to the extent practicable.

### **5.3 Historical Properties (GC 20)**

Historic and archaeological properties in the general project vicinity have been identified and specific activities will be undertaken as needed to safeguard these properties during project implementation. A Cultural Resources Identification Survey (CRIS) was conducted by TRC (Attachment M to the Joint Application) that covered the overall project area and general vicinity. In addition, potential historical sites were researched using ArchSite, which is a geographic information system (GIS) maintained by SHPO

and SCIAA. A historic and archaeological properties identification, including tabular listing and figure showing locations, is provided as Attachment L to the Joint Application.

Two separate sites are located in the general vicinity of the project area that are designated as historically significant. The sites consist of the Gervais Street Bridge and the Columbia Canal. Both properties are listed in the National Register of Historic Places. The Gervais Street Bridge is located directly upstream of the project area. Implementation of the project is not expected to adversely impact the Gervais Street Bridge. Although MRA activities are located within the Columbia Canal area as defined by the National Register, project related activities are not expected to adversely impact this historic property.

Nine archaeological sites have been identified in the vicinity of the project area. The locations of these sites are shown on the figure in Attachment L to the Joint Application and include:

- Late 19th to Early 20th Century Artifact Scatter/Dump Site (ID# 38RD233)
- Underwater Civil War Era Ordnance Dumpsite (ID# 38RD286)
- Possible Ruins of Briggs' Saw Mill (ID# 38RD224)
- Late 19th to Early 20th Century Structure Foundation – House (ID# 38RD234)
- Underwater Deposit of Historic Ceramics and Metal Artifacts (ID# 38RD278)
- 19th to 20th Century Bottle Dump/Landfill (ID# 38RD223)
- Expanded Boundary of Underwater Civil War Era Ordnance Dumpsite (ID# 38RD286)
- Unknown Prehistoric Lithic Flake and Brick Fragment Scatter, 20th Century (ID# 38RD275)
- V-Shaped Wooden Object Eroding Out of Riverbank (ID# 38RD235)

One of these sites (ID# 38RD233) is located north of the Gervais Street Bridge and is not expected to be within the disturbed project area. Two of these sites (ID# 38RD275 and ID# 38RD235) are located south of Area 2 and the tributary near the downstream end of Area 2 and are also not expected to be within the disturbed project area.

The originally identified underwater Civil War era ordnance dumpsite area (ID# 38RD286) is just north of the northern end of Area 1 and is not expected to be disturbed. [It should be noted however, that the limits of the Civil War ordnance dumpsite were expanded based on the findings of initial magnetometer studies conducted as part of this project. Area 1 and Area 2 are situated within the ordnance dumpsite (ID# 38RD286).] A 19th to 20th century bottle dump/landfill (ID# 38RD223) is located on the eastern bank of the river between Area 1 and Area 2 and may be partially disturbed although intrusive activities are not expected. Possible ruins from a saw mill (ID# 38RD224) and a former structure foundation (ID# 38RD234) are located directly adjacent to Area 1. The archaeologist will locate these sites in the field, and they will be sufficiently demarcated and avoided to the extent practicable during implementation of the project. Should disturbance of these areas become necessary, proper precautions will be undertaken similar to the plans developed for the protection of other locations of historical significance.

An underwater deposit of historic items (ID# 38RD278) is located adjacent to and within Area 1, and the expanded boundary of the underwater Civil War era dumpsite (ID# 38RD286) is located within the river, including the cofferdam and removal areas. These areas will be impacted by cofferdam construction and

sediment removal activities and are of primary concern. The presence of the Civil War dumpsite presents two primary issues or concerns, including the potential for the artifacts to be UXO and the need to properly recover and preserve any historical artifacts encountered. DESC, SCDHEC and the USACE have invested considerable time and effort into addressing these issues. Multiple UXO management plans have been developed to specify the potential management of such items. The current plans are provided as Attachment N to the Joint Application and will be updated as necessary prior to implementation.

The Field Demonstration Project (FDP) was conducted in the fall of 2015 to evaluate metallic anomalies, and potentially identify historical items or UXO in the alluvial fan area and none were found. Fifty-one previously identified metallic anomaly locations were investigated and only cultural debris and trash was uncovered. As a result, it is expected that a minimal amount of historically significant items and/or UXO is still present within the project area. However, as a precaution, an archaeologist will be on-site to properly document and secure any potential historical items. The Archaeological Data Recovery Plan developed by TRC Environmental Corporation is provided as Attachment M to the Joint Application. It contains the specific methodology and techniques that are currently planned for processing the removed material and segregating the potential artifacts. Recovered artifacts will be preserved in accordance with SCIAA-approved procedures.

An archaeologist will be on-site during intrusive activities to screen material and disturbed areas for historical artifacts after the areas have been prescreened for UXOs as described in the UXO Management Plans. If required, more highly impacted material may be transported directly to a prepared site at the disposal landfill for artifact screening. If historical items are identified, the archaeologist will document the finding and secure the item for transmittal to SCIAA/SHPO in accordance with the Archaeological Data Recovery Plan. The required licenses (Intensive Survey License and Data Recovery License) were previously obtained and will be updated as necessary prior to implementation.

## **6.0 CONSTRUCTION SCHEDULE**

A detailed schedule of activities will be developed following receipt of the required permit approval from USACE and approval of the Final MRA Work Plan by SCDHEC. Key components of the schedule include:

- Obtaining other required permits and approvals, including access;
- Contractor selection; and
- Implementation of the removal action.

Due to seasonal fluctuations in typical river levels, the active in-the-river construction season for building or relocating the cofferdams will be from May through October of each year (pending approval). This construction season also avoids impacts on aquatic life migration and spawning seasons within the river.

The cofferdam construction and sediment removal work will require several seasons to complete. DESC has also requested permission to work behind the cofferdam year-round, with minimal site activity

projected during the months of December through April. Conceptually, the UXO screening may be able to be completed during the off-season, assuming favorable weather/river conditions. The total duration of the project will be contingent upon factors including:

- Detailed plans of the selected contractor, developed in conjunction with DESC;
- Weather and river level conditions;
- The extent of UXO, historical artifact, and cultural debris presence within the project area; and
- Volume of water to be managed.

General considerations regarding the overall schedule for implementation of the MRA include:

- SCDHEC approval – Prepare a Final MRA Work Plan, submit to SCDHEC for review including public and stakeholder comments, and receive authorization.
- Access agreement(s) – Obtain agreement(s) with property owner(s) for landside operations and access to the proposed removal areas.
- City of Columbia approvals – Develop and submit applications to the City of Columbia and receive the required authorizations.
- Remediation Contractor procurement and site operations setup – Prepare project specifications, obtain and review contractor bids, select contractor, and complete site operations setup including access roads.
- Sediment removal with restoration and documentation – Removal of the impacted sediment within Areas 1 and 2, including construction and removal of the cofferdams, is expected to occur over three seasons.

## **7.0 COMPLIANCE CERTIFICATION STATEMENT**

Pursuant to requirements of NWP General Condition 30, following completion of MRA activities, DESC will provide a signed certification documenting completion of the authorized activities and implementation of any required compensatory mitigation.

The certification document is expected to be provided by USACE with the NWP verification letter and to include the following items:

- A statement that the authorized activities were done in accordance with the NWP authorization, including any general, regional or activity-specific conditions;
- If applicable, a statement that the implementation of any required compensatory mitigation was completed in accordance with the permit conditions; and
- The signature of the permittee certifying completion of the activities, and mitigation if applicable.

## TABLES



**Table 1 Estimated Removal Volumes**

<b>Estimated by</b>	<b>MTR</b>	<b>Glenn &amp; Associates</b>	<b>Apex</b>	<b>Percent Removal</b>
	<b>EE/CA Sediment Volume Estimate January 2013</b>  Original, Full-Area Removal	<b>Preliminary Removal Action Work Plan (PRAWP) September 2018</b>  Full-Area Removal	<b>Proposed Conceptual Plan - MRA Sediment Volume Estimate December 2018</b>  MRA Areas 1 & 2	<b>MRA vs PRAWP</b>
<b>Total Volume of Sediment to be Removed</b>	<b>26,700 CY</b>	<b>25,550 CY</b>	<b>11,675 CY</b>	<b>46%</b>
<b>Total Volume of TLM to be Removed</b>	<b>Not Estimated</b>	<b>5,745 CY</b>	<b>4,204 CY</b>	<b>73%</b>

TABLE 2

## SUMMARY OF RARE, THREATENED AND ENDANGERED SPECIES FOR THE PROJECT AREA AND VICINITY

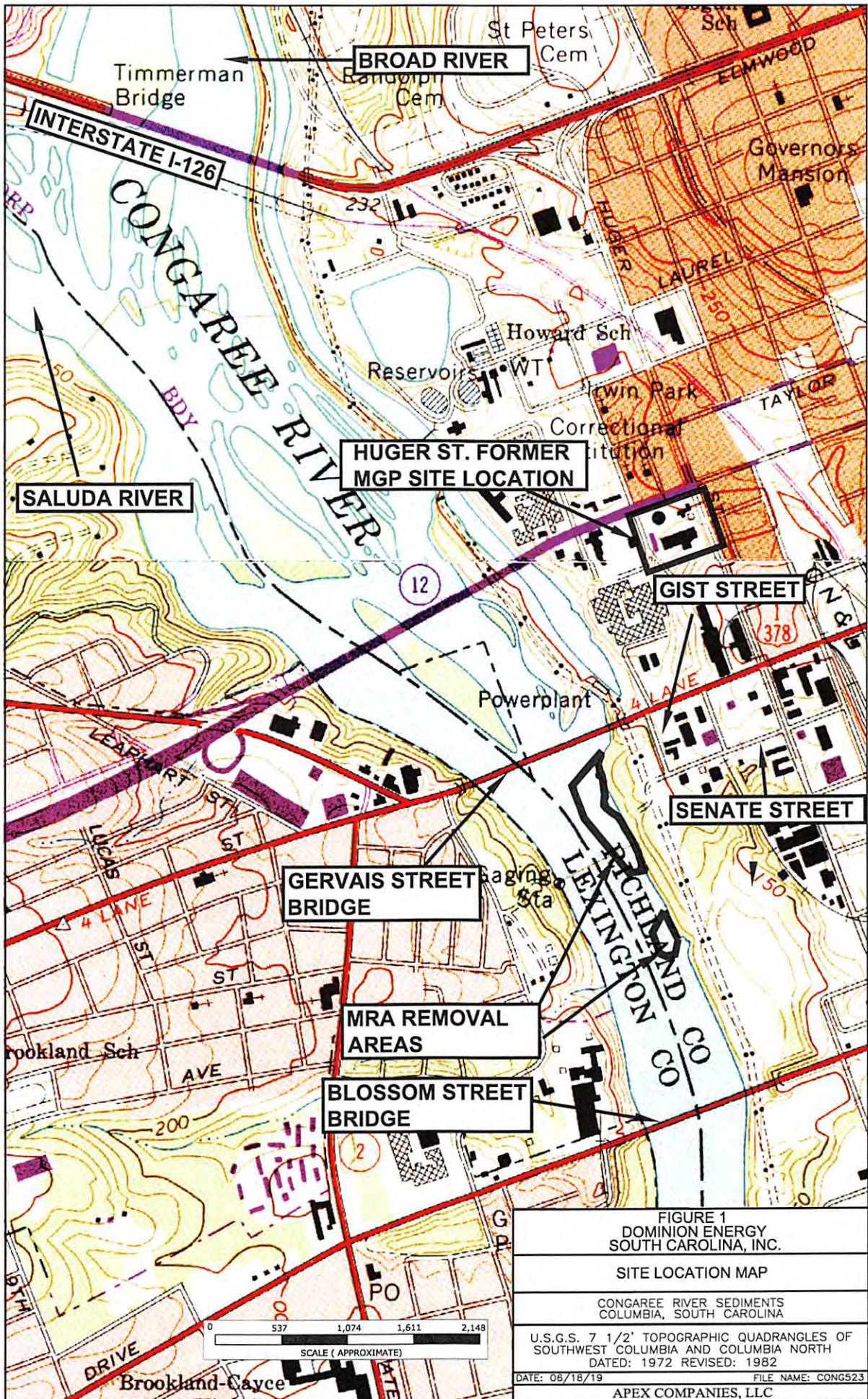
Congaree River Sediments  
Columbia, South Carolina

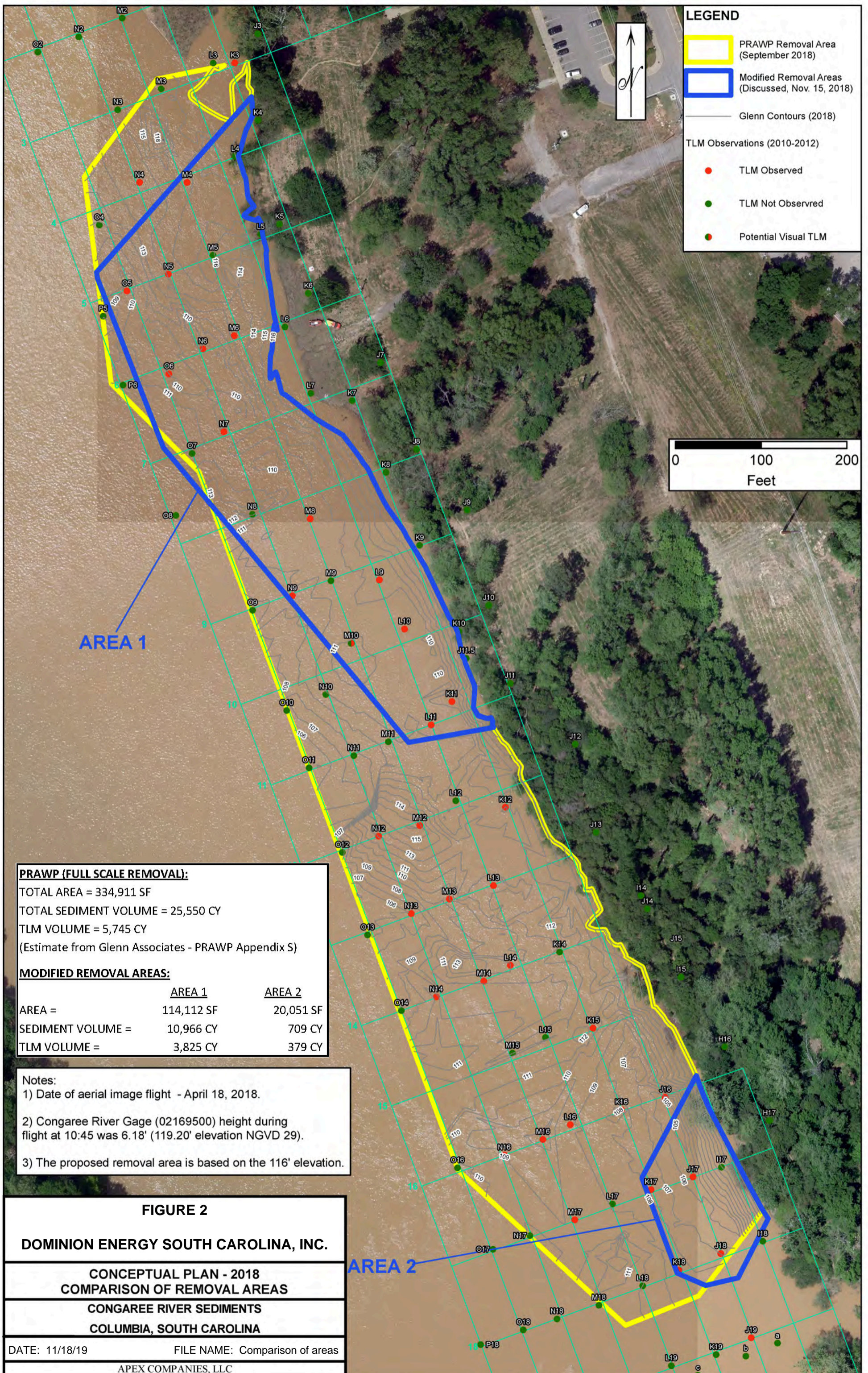
Common Name	Scientific Name	Federal Listed and Status <sup>(2)</sup>	State Protection and Status <sup>(3)</sup>	Potential Occurrence
<b>Mammals</b>				
Rafinesque's Big-Eared Bat	<i>Corynorhinus Rafinesquii</i> / <i>Plecotus Rafinesquii</i>	No	Yes - Endangered	Potential for occurrence in project vicinity under the Gervais and Blossom Street bridges.
American Alligator	<i>Alligator mississippiensis</i>	Yes - Threatened	Yes - Threatened	No - habitat not suitable
<b>Birds</b>				
Red-Cockaded Woodpecker	<i>Picoides Borealis</i>	Yes - Endangered	Yes - Endangered	No - habitat not suitable.
Wood stork	<i>Mycteria Americana</i>	Yes - Threatened	Yes - Endangered	No - habitat not suitable, extremely rare and if present likely from dispersion or migration.
Bald Eagle	<i>Haliaeetus Leucocephalus</i>	No	Yes - Threatened	Noted upstream of the project area but not in vicinity of project area. No anticipated impact.
<b>Fish/Amphibians/Reptiles</b>				
Pine Barrens Treefrog	<i>Hyla Andersonii</i>	No	Yes - Threatened	No - found in the sandhills region located northeast of the project area.
Shortnose Sturgeon	<i>Acipenser Brevirostrum</i>	Yes - Endangered	Yes - Endangered	Yes - though if present numbers likely limited
Robust Redhorse Sucker	<i>Moxostoma Robustum</i>	N1 - Critically Imperiled	SNR - Not Ranked	Yes - stocked by SCDNR below Parr Shoals dam.
Southern Hognose Snake	<i>Heterodon Simus</i>	No	Yes - Threatened	No - habitat not suitable
<b>Freshwater Mussels</b>				
Carolina Heelsplitter	<i>Lasmigona Decorata</i>	Yes - Endangered	Yes - Endangered	No - found in rivers and tributaries other than the Congaree River.
Roanoke Slabshell	<i>Elliptio Roanokensis</i>	N3 - Vulnerable	S2 - Imperiled	Yes - potential for occurrence in project vicinity
Yellow Lampmussel	<i>Lampsilis Cariosa</i>	N3N4 - Vulnerable, Apparently Secure	S2 - Imperiled	Yes - potential for occurrence in project vicinity
Carolina Slabshell	<i>Elliptio Congaraea</i>	N3 - Vulnerable	S3 - Vulnerable	Yes - potential for occurrence in project vicinity
Carolina Lance	<i>Elliptio Angustata</i>	N4 - Apparently Secure	S3 - Vulnerable	Yes - potential for occurrence in project vicinity
Fatmucket	<i>Lampsilis Splendida</i>	N3 - Vulnerable	S2 - Imperiled	Yes - potential for occurrence in project vicinity
Eastern Floater	<i>Pyganodon cataracta</i>	N5 - Secure	SNR - Not Ranked	Yes - potential for occurrence in project vicinity
Creepers	<i>Strophitus undulatus</i>	N5 - Secure	S2 - Imperiled	Yes - potential for occurrence in project vicinity
Eastern Creekshell	<i>Villosa delumbis</i>	N4 - Apparently Secure	S4 - Apparently Secure	Yes - potential for occurrence in project vicinity
<b>Plants</b>				
Canby's Dropwort	<i>Oxypolis Canbyi</i>	Yes - Endangered	S2 - Imperiled	No - habitat not suitable
Georgia Aster	<i>Symphyotrichum Georgianum</i>	Yes - Candidate	SNR - Not Ranked	Yes - power line corridor provides potential habitat.
Rough-Leaved Loosestrife	<i>Lysimachia Asperulaefolia</i>	Yes - Endangered	S1 - Critically Impaired	No - habitat is not suitable.
Rocky Shoal's Spider Lily	<i>Hymenocallis coronaria</i>	G3 - Vulnerable	S2 - Imperiled	Yes - known to occur directly upriver of project area.
Michaux's Sumac	<i>Rhus michauxii</i>	Yes - Endangered	SX - Presumed Extinct	No - habitat is not suitable.
Smooth Coneflower	<i>Echinacea Laevigata</i>	Yes - Endangered	S3 - Vulnerable	Yes - power line corridor provides potential habitat.

**Notes:**

- (1) Freshwater mussel occurrence taken from Kleinschmidt, March 2008.
- (2) If species was not listed in the USFWS Endangered Species Database the NatureServe Global or National Status is shown.
- (3) If species was not listed in the SCDNR SC Rare, Threatened & Endangered Species Inventory the NatureServe State or Subnational Status is shown.
- (4) Federal and state listed threatened and endangered mammals, birds, fish, amphibians, reptiles and plants are provided in table. Mussels with a NatureServe rank are also listed due to their potential presence in the project area.

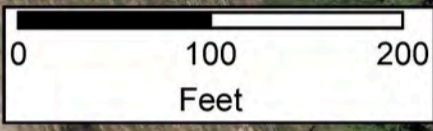
## FIGURES





**LEGEND**

- PRAWP Removal Area (September 2018)
- Modified Removal Areas (Discussed, Nov. 15, 2018)
- Glenn Contours (2018)
- TLM Observed
- TLM Not Observed
- Potential Visual TLM



**PRAWP (FULL SCALE REMOVAL):**  
 TOTAL AREA = 334,911 SF  
 TOTAL SEDIMENT VOLUME = 25,550 CY  
 TLM VOLUME = 5,745 CY  
 (Estimate from Glenn Associates - PRAWP Appendix S)

**MODIFIED REMOVAL AREAS:**

	AREA 1	AREA 2
AREA =	114,112 SF	20,051 SF
SEDIMENT VOLUME =	10,966 CY	709 CY
TLM VOLUME =	3,825 CY	379 CY

**Notes:**  
 1) Date of aerial image flight - April 18, 2018.  
 2) Congaree River Gage (02169500) height during flight at 10:45 was 6.18' (119.20' elevation NGVD 29).  
 3) The proposed removal area is based on the 116' elevation.

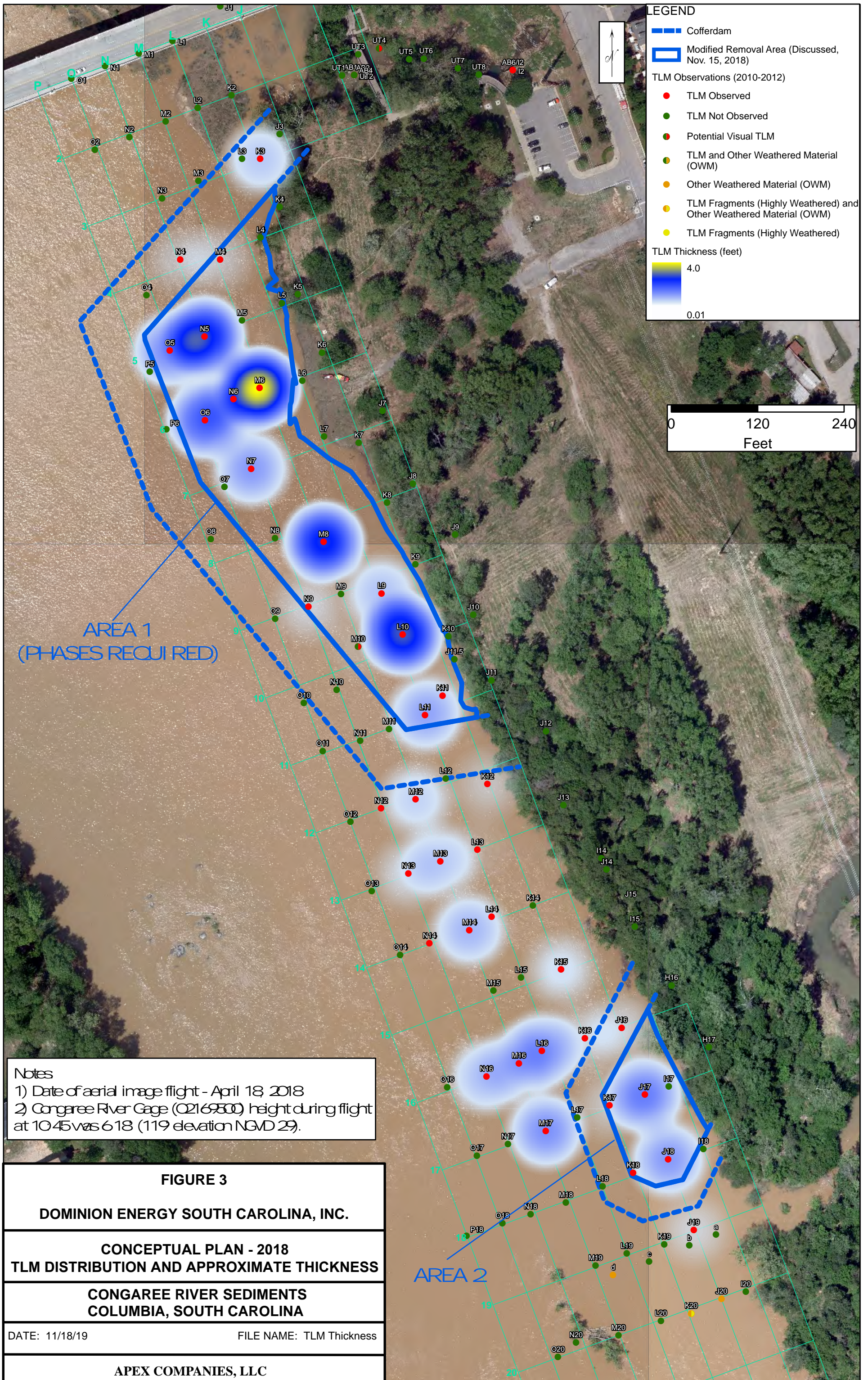
**FIGURE 2**

**DOMINION ENERGY SOUTH CAROLINA, INC.**

**CONCEPTUAL PLAN - 2018**  
**COMPARISON OF REMOVAL AREAS**  
**CONGAREE RIVER SEDIMENTS**  
**COLUMBIA, SOUTH CAROLINA**

DATE: 11/18/19      FILE NAME: Comparison of areas

APEX COMPANIES, LLC



**LEGEND**

- Cofferdam
- Modified Removal Area (Discussed, Nov. 15, 2018)
- TLM Observations (2010-2012)**
- TLM Observed
- TLM Not Observed
- Potential Visual TLM
- TLM and Other Weathered Material (OWM)
- Other Weathered Material (OWM)
- TLM Fragments (Highly Weathered) and Other Weathered Material (OWM)
- TLM Fragments (Highly Weathered)

**TLM Thickness (feet)**

4.0  
0.01



AREA 1  
(PHASES REQUI RED)

AREA 2

**Notes**  
 1) Date of aerial image flight - April 18, 2018  
 2) Congaree River Gage (02169800) height during flight at 10:45 was 6.18 (119 elevation NGVD 29).

**FIGURE 3**

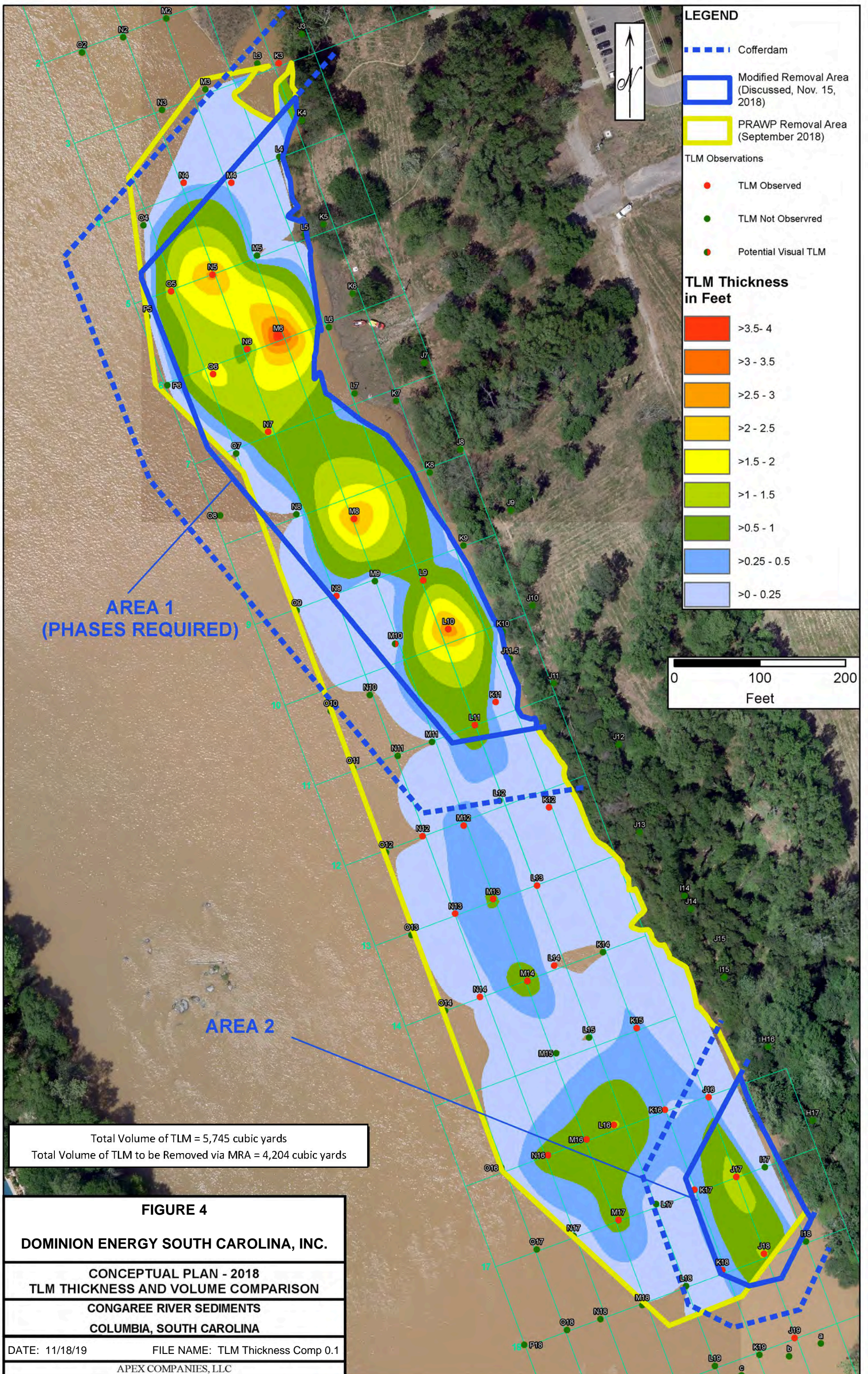
**DOMINION ENERGY SOUTH CAROLINA, INC.**

**CONCEPTUAL PLAN - 2018**  
**TLM DISTRIBUTION AND APPROXIMATE THICKNESS**

**CONGAREE RIVER SEDIMENTS**  
**COLUMBIA, SOUTH CAROLINA**

DATE: 11/18/19                      FILE NAME: TLM Thickness

**APEX COMPANIES, LLC**



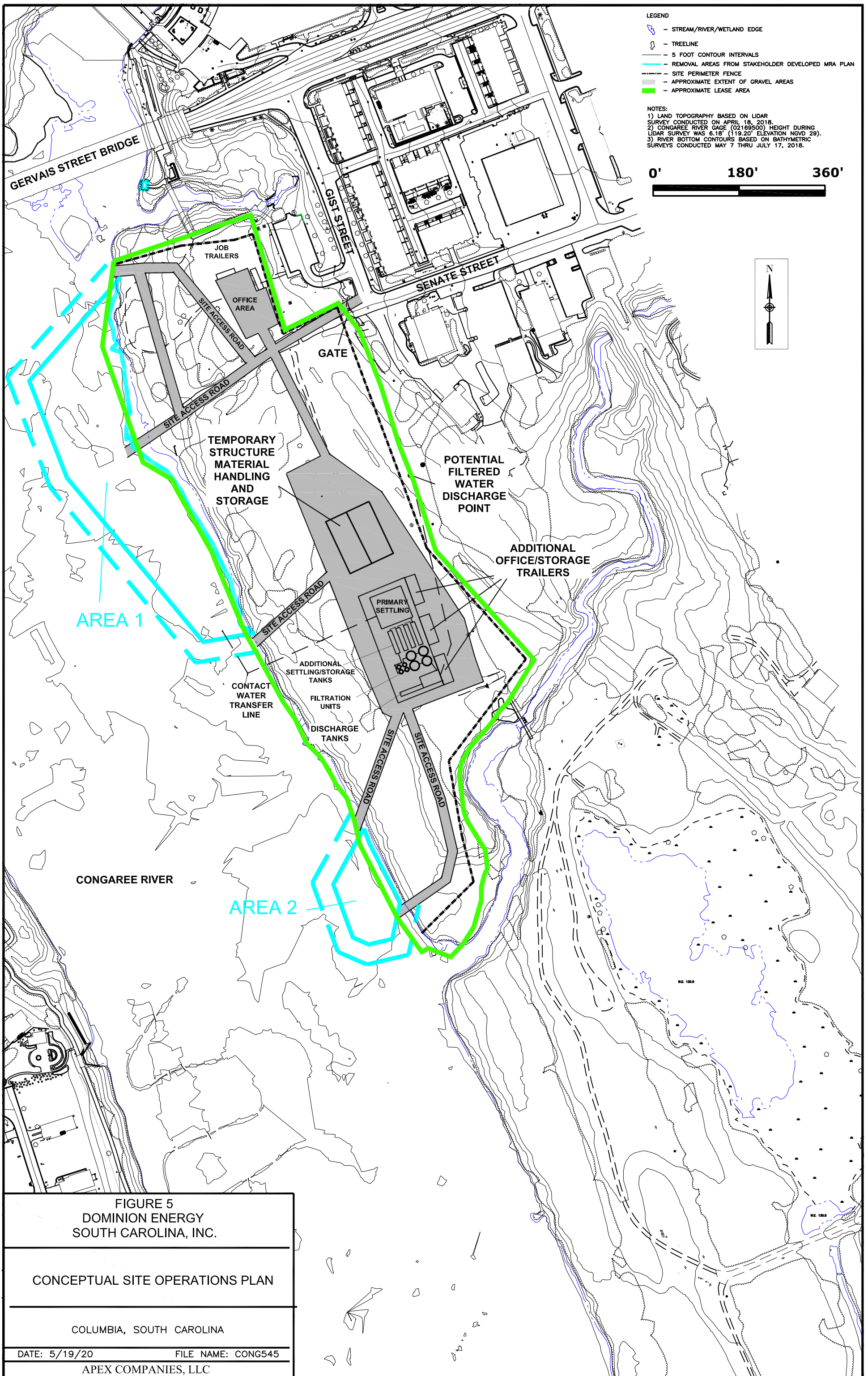


FIGURE 5  
DOMINION ENERGY  
SOUTH CAROLINA, INC.

CONCEPTUAL SITE OPERATIONS PLAN

COLUMBIA, SOUTH CAROLINA

DATE: 5/19/20

FILE NAME: CONG545

APEX COMPANIES, LLC



APPENDIX J  
**STANDARD OPERATING PROCEDURES**

MUNITIONS RESPONSE WORK PLAN CONGAREE RIVER PROJECT  
**REMOVAL ACTION AND CONSTRUCTION SUPPORT**  
**COLUMBIA, SC**



## UXO SOP for MEC Management and Disposal





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## 1.0 PURPOSE AND SCOPE

This Standard Operating Procedures (SOP) provides Munitions and Explosive Concern (MEC) management and basic explosive demolition procedures for the treatment of MEC and material potentially presenting material potentially posing an explosive hazard (MPPEH) found during the MEC activities on Munitions Response Site (MRSs). These procedures will be conducted in accordance with the Quality Assurance Project Plan (QAPP) or equivalent planning documents.

This SOP provides the detailed information needed to safely configure, conduct demolition procedures, and perform post demolition inspection and area restoration. These operations include:

- Documenting the recovery, accountability, and management of MEC/MPPEH
- Conducting disposal operations involving MEC/MPPEH
- Post disposal operations

All training on equipment or software will be either formal or on-the-job training (OJT). Training will be documented by site personnel and subject to review for accuracy and completeness. The Unexploded Ordnance (UXO) Quality Control Specialist (UXOQCS) will verify training is completed and documented.

## 2.0 PERSONNEL, EQUIPMENT, AND MATERIALS

This section describes the personnel, equipment, and materials required to implement this SOP.

### 2.1 PERSONNEL REQUIREMENTS

Explosive demolition operations require specific organizational roles and personnel assignments, specifically:

- Senior Unexploded Ordnance Supervisor (SUXOS), to oversee all demolition operations.
- Demolition Supervisor (DS), an Unexploded Ordnance (UXO) Technician Level III or above, designated by the SUXOS. The DS is responsible for planning, directing, and executing all demolition operations. The SUXOS may perform duties of the DS based on the project manning.
- Unexploded Ordnance Safety Officer (UXOSO), ensures that all demolition operations are performed safely and following the approved site-specific plans.
- Two Unexploded Ordnance Technicians Level II or I, designated to assist the DS.

### 2.2 EQUIPMENT

The Demolition teams conducting MEC management and disposal tasks will be equipped with the following:

- Analog Geophysical Sensor
- Disposal equipment
- Donor explosives
- Logbook and/or personal digital assistant (PDA) for recording data
- Camera

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## 3.0 PROCEDURES AND GUIDELINES

### 3.1 MEC/MPPEH MANAGEMENT

When MEC and MPPEH are discovered, they are inspected and positively identified using a three-tiered inspection process while the munitions are left in place.

1. Inspected first by the UXO technician discovering the munition(s) to determine if it is MEC or MPPEH,
2. Second by a UXO Tech II to independently classify the munitions(s), and
3. Third by the UXO Tech III, Team Leader.

For MEC/MPPEH, the SUXOS and UXOSO must assess and agree that the risk associated with the movement of MEC or suspected munition is acceptable and necessary. They will document the decision in writing. If necessary, the Director of Technical Operations and Explosives Safety will be consulted and concur with the decision to move the ordnance. Based on knowledge of the site, this may be accomplished before field operations beginning.

If MEC/MPPEH are determined by the SUXOS and UXOSO to be unacceptable to move, they will be conspicuously marked, secured, and scheduled for Blow-in-Place (BIP) treatment by a demolition team.

All MEC shall be secured or guarded by a UXO technician or approved security personnel until demolition operations.

All MEC will be photographed, and as much information as possible will be recorded on the dig sheet or PDA. Recorded data to include nomenclature (if known), type (projectile, mortar, rocket, mine, etc.), size, physical condition, fuzed or unfuzed, fuze type by function (e.g., point detonating, mechanical time, etc.), condition (e.g., fired or unfired, armed or unarmed), filler if known, Global Positioning System (GPS) coordinates (if different from the relocated position) and depth.

### 3.2 NOTIFICATIONS

The SUXOS will ensure that the agencies responsible for emergency response are notified as far in advance as possible that demolition activities will be taking place. The notifications should address scheduling, evacuations, road closures, exclusion zones (EZs), and any other required support. Table 1 provides a list of emergency telephone numbers and contacts.

**Table 1: Emergency Contact Numbers**

Contact	Phone Number
Fire Department	
EMS	
Police	
FAA	
Base Operations	
<i>Anyone else not listed....</i>	



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### 3.3 EXCLUSION ZONES, ENGINEERING CONTROLS, AND ROAD CLOSURES

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Engineering controls should be employed whenever possible to minimize the damage from demolition operations. These controls may consist of sandbags, ecology blocks, trenching, buttressing, taping of glass, mounding, flooding and/or venting to reduce the effects of detonations.

The SUXOS will ensure EZ barricades are set up with signs at all access roads and marked appropriately: Danger, UXO Remediation Project in Progress, DO NOT ENTER, and list contact information on the barricade sign.

### 3.4 WEATHER AND ENVIRONMENTAL CONSIDERATIONS

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Before commencing demolition operations, the SUXOS or UXOSO will obtain a local weather report.

Demolition operations will not be conducted if electrical storms are within 10 miles of the demolition site or during severe weather conditions that would impact safety.

The SUXOS and UXOSO will decide on whether wind speed and visibility will hamper the safe execution of demolition operations.

### 3.5 FIRE SUPPORT

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The telephone number of the responding fire departments will be posted in plain sight at the site office and the disposal site.

The Fire Department nearest the disposal site location will be notified of disposal operations each day.

When the fire hazard is high due to dry conditions, disposal operations will not be conducted unless mobile fire-fighting equipment is standing by and the fire department is capable of responding within five (5) minutes.

Fire extinguishers, portable water tanks, and shovels will be on-site to fight small fires. Evacuate the area if the fire approaches ordnance or explosives. Do not fight grass fires in areas where there may be ordnance or kick-outs.

Conduct a fire risk assessment before conducting disposal operations to consider the type of ordnance to be disposed of, environmental conditions on the site, and appropriate preventative measures to be employed before initiation of explosive procedures.

Consider preventative measures to include: Movement of the MEC to a prepared site, if possible, ground preparation to include scraping and vegetation removal, wetting of the site just before the commencement of operations, and tamping of the shot with sand, or water.

### 3.6 DEMOLITION OPERATIONS

---

#### 3.6.1 Demolition Briefing

The DS will brief all personnel involved in range operations in the following areas:

- General Safety Precautions
- Type of MEC or MPPEH being destroyed
- Type, placement, and quantity of demolition material being used

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- Method of initiation (electric or Nonel)
- Team assignments
- Equipment being used (e.g., Remote Firing Device [RFD], galvanometer, blasting machine, firing wire, etc.)
- Misfire procedures
- Post-shot cleanup of range procedures
- Emergency procedures

### 3.6.2 Preparing Donor Charges for Initiation

#### One Pound Pentolite Booster

1. Insert the 80-grain detonating cord into the detonator well. Insert all the way through the first hole and back through the second hole, then tie an overhand knot to secure it.
2. When using more than one booster, insert the detonating cord through each of the booster's detonator wells and secure to keep it from sliding along the detonating cord.
3. Place the booster on the MEC/material documented as an explosive hazard (MDEH) using tape or other suitable material to prevent it from moving.

#### Jet Perforator

1. Using tape or detonating cord clips secure the detonating cord to the jet perforator.
2. Place the jet perforator on the MEC/MPPEH using tape or other suitable material to prevent it from moving.

#### Binary Explosives

1. Obtain part A and part B.
2. Mix per manufacturer requirements and the site where the operation will be conducted.
3. Place on item in same manner as booster and as discussed during demolition briefing.

### 3.6.3 Initiation Set-ups

The UXOSO will act as a safety observer during demolition set-ups and will depart the range/demolition area before the demo team priming the donor charge. He/she will maintain communications with the team, the SUXOS, and Site Field Office at all times.

A maximum of 2 people will prime the shot. All others will be located outside the EZ.

#### Electric Blasting Cap

- Prior to making a connection with the electric blasting cap, the firing circuit will be continuity tested.
- All parts of the firing circuit will be kept insulated from the ground or other conductors such as bare wires, rails, pipes, or other paths of stray current.
- The shunt will not be removed from the wires until the individual performing the operation has been grounded. Electric blasting caps will be connected to the firing circuit before connection to the main initiation charge.
- Electric blasting caps of different manufacturers or types will not be used in the same system.
- The electric blasting caps will be tested for continuity with a galvanometer at least 50-ft (15.2-m) downwind from any explosives before connecting them to the firing circuit. After the testing is completed, the lead

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wires will be short-circuited by twisting the bare ends of the wires together. The wires will remain shunted until ready to connect to the firing circuit.

- The electrical lead wires of electric blasting caps, detonators, or other electro-explosive devices should not be pulled; detonation may occur.
- The legs should be unrolled so that the cap is as far as possible from the operator and pointing away from him before testing.
- The blasting cap will be placed in a hole, behind a barricade, or under a sandbag before removing the shunt and testing for continuity. The cap should not point toward other personnel or explosives. Always test at the extent of lead wires with ones back towards the blasting cap.
- Only authorized and serviceable testing equipment will be used.
- The remote receiver will not be connected to the firing wires until all pre-firing tests have been completed, and all preparations have been made to fire the charge.

### **Nonel Blasting Cap**

- No testing required
- Blasting cap should be placed in a hole, behind a barricade, or under a sandbag before priming.
- The blasting cap should not point towards other personnel or explosives.

### **Nonel Lead Line Splicing**

- Care should be taken to keep moisture from the cut end of the shock tube.
- The DS or designated UXO Technician will perform the following procedures to cut and splice the shock tube.
- Minimize the number of splices in a shock tube line to as few as possible.
- Lead Line splicing procedure as follows:
  1. Use a sharp knife or razor blade to squarely cut (at a 90-degree angle) approximately 12 inches from a new roll or the cut-off end of a partial roll.
  2. Loosely tie the two-shock tube ends to be spliced together. Leave at least 2 inches free at the end of each shock tube beyond the knot.
  3. Pull the shock tube lightly to tighten the knot, but not so tight as to significantly deform the shock tube in the knot.
  4. Use only the splicing tubes provided to make splices. Taping the two cut ends of the shock tubes together does not make a reliable splice.
  5. Push one of the free shock tubes, to be spliced, firmly into one of the pre-cut splicing tubes at least 1/4 inch.
  6. Push the other shock tube end firmly into the other end of the splicing tube at least 1/4 inch. Attempt to push the two ends up against each other or get as close as possible.

### **Nonel Lead Line Preparation**

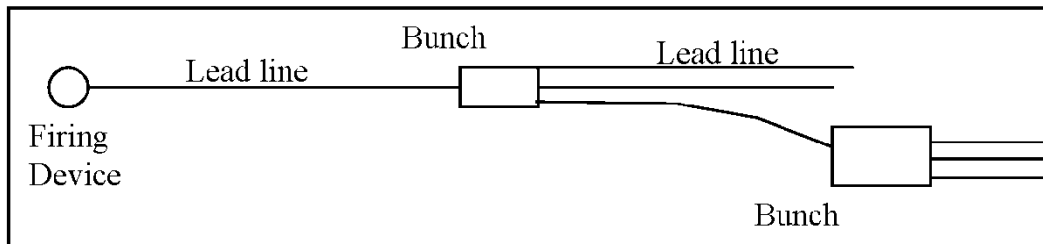
The DS or designated UXO Technician will perform the following procedures to set up the lead line.

1. Layout the required length of lead line from the demolition area back to the firing point.
2. Attach an EZTL 30 Bunch Block (or equivalent method) to the lead line at the demolition site using the supplied splicing tube.
3. Secure the bunch block or immobilize with sandbags.
4. Run additional lead line(s) from the bunch block to the MEC/MPPEH (see Figure 3-1).

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Note: Only attach a maximum of six additional leads per bunch block. Use additional bunch blocks, if necessary.

Figure 3-1 Nonel Lead Line Setup



### 3.6.4 Initiation Systems

The firing system will use RFD with Nonel or electric blasting caps. As a back-up to the RFD, the Scorpion Electronic Blasting Machine with electric caps or Nonel will be used.

#### Remote Firing Device Preparation

1. Perform system pre-operational test and set up using the operator's manual. Remove key from controller unit until ready to fire.
2. Place the remote near the detonation site with the antenna in the vertical position. If using electric caps, the remote should be within 100 feet of the shot. Using the unit blast shield, sandbags, or natural cover to protect the remote.
3. Ensure the remote indicates a READY condition for the selected initiation method (green READY LED on steady, red ARMED LEG off).
4. If using Nonel, connect the shock tube to the igniter tip. The tube should be wrapped around through holes in the tip's molded casing to keep it from falling out. Prime the shot and return to the safe area.
5. If using electric caps, cut off a length of firing wire that will reach between the remote and the charges (100' or less).
6. Conduct a continuity check of the firing wire with a galvanometer. Shunt the free ends of the wire to prevent an electric charge from building up in the firing wire.
7. Test each electric blasting cap 50 feet downwind of other explosives with a galvanometer.
8. Place blasting caps in a hole, behind a barricade or under a sandbag before removing the shunt and testing for continuity.
9. Fully extend the leg wires and ensure the cap is pointing away from the person conducting the continuity test.
10. Secure the leg wires to prevent the cap from moving during the test.
11. Use only a special silver-chloride dry cell battery in the testing galvanometer. Other type batteries may provide sufficient voltage to fire the blasting cap.
12. Upon completion of testing, re-shunt the leg wires. The wires will remain shunted until ready to connect to the firing circuit.
13. For dual priming connect blasting caps in a parallel circuit to the extension wires.
14. Test the circuit with the Galvanometer, and then connect extension wires to the remote.
15. Retrieve caps from barricade, prime shot, and return to safe area.

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## Scorpion Electronic Blasting Machine Preparation

1. Perform pre-operational check as per instructions on blasting machine.
2. Layout firing wire or Nonel.
3. Conduct a continuity check of the firing wire with a galvanometer. Shunt the free ends of the wire to prevent an electric charge from building up in the firing wire.
4. Test each blasting cap with a galvanometer 50 feet downward of other explosives.
5. Place blasting caps in a hole, behind a barricade or under a sandbag before removing the shunt and testing for continuity.
6. Fully extend the leg wires and ensure the cap is pointing away from the person conducting the continuity test.
7. Secure the leg wires to prevent the cap from moving during the test.
8. Use only a special silver-chloride dry cell battery in the testing galvanometer. Other type batteries may provide sufficient voltage to fire the blasting cap.
9. Upon completion of testing, re-shunt the leg wires. The wires will remain shunted until ready to connect to the firing circuit.
10. For dual priming connect blasting caps in a parallel circuit to the firing wire.
11. Retrieve caps from barricade, prime shot, and return to safe area.

## Initiation Sequence

The SUXOS or DS will ensure that the actions taken before initiating a demolition shot are completed as follows.

1. Ensure all required notifications have been made.
2. Set up EZ and post guards at the barricades.
3. Visually inspect EZ and surrounding area for unauthorized personnel.
4. **Five-minute warning.** The DS will give the five-minute warning on the radio, followed by a one-minute series of long blasts on the air-horn.
5. **One-minute warning.** The DS will give the one-minute warning on the radio, followed by a one-minute series of short blasts on the air-horn before the shot. At this time, the arming of the RFD or Blasting Machine will occur.
6. Before initiating the shot, the DS will give three loud "*Fire in the Hole!*" warnings and then give the "fire" command on the radio.

## Firing the Remote Firing Device

1. Install the key and engage the "POWER" switch on the controller to the right until the BATTERY LED illuminates.
2. Momentarily depress the controller STATUS button. The yellow TRANSMIT LED will flash for approximately one second. At the end of this time, a green READY LED will come on steady, indicating that the remote is on and in the standby mode. The steady green LED also means the remote is within range of the controller.
3. Push the ARM/DISARM switch to the left and hold for one second. The red ARMED LED will flash for approximately 18 seconds then come on steady. The remote is now armed.
4. The SUXOS or DS gives three loud "Fire-in-the-Hole" warnings.
5. Then the SUXOS gives permission to fire the shot.
6. Lift the safety cover on the FIRE switch and push the FIRE switch forward.

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## Firing the Scorpion Electronic Blasting Machine

1. Connect the firing leads to the terminal posts of the blasting machine.
2. For Nonel plug in the shock tube adapter and attach Nonel.
3. SUXOS or DS gives three loud "Fire-in-the-Hole" warnings.
4. Then the SUXOS gives permission to fire the shot.
5. Degrees and hold CHARGE button (keep depressed throughout sequence).
6. Press DETONATE button when green ready light comes on. For non-electric shots hold DETONATE button down for one second and release.

### 3.6.5 Misfires

If a misfire does occur, it must be cleared with extreme caution. The responsible technician will investigate and correct the situation using the steps outlined below.

#### Misfire Procedures for the Remote Firing Device

1. Make three successive attempts to fire.
2. Turn off the controller and remove the key.
3. Wait 1 hour from the last initiation attempt.
4. After the wait time has elapsed, the SUXOS or DS and one other UXO technician will proceed downrange to inspect the firing system.
5. Disconnecting from RFD:
  - 5.1 If Nonel was used, do not remove the caps from the charge. Disconnect Nonel from the igniter tip on the remote firing device.
  - 5.2 If electric caps were used, remove the old blasting caps from charge and disconnect from extension wires. Shunt cap leg wires.
6. Set up new firing system.

#### Misfire Procedures for the Scorpion Electronic Blasting Machine

1. Make three successive attempts to fire.
2. If using firing wire and still unsuccessful disconnect wires and check continuity.
3. If continuity is good, reconnect to blasting machine and make three more attempts to fire.
4. If still unsuccessful check connections of firing wires to terminals and make three more attempts to fire.
5. Change blasting machine after third unsuccessful attempt.
6. If unsuccessful with new blasting machine disconnect and shunt firing leads.
7. If using Nonel disconnect from blasting machine.
8. Wait 1 hour from the last initiation attempt.
9. After the wait time has elapsed, the SUXOS or DS and one other UXO technician will proceed downrange to inspect the firing system.
10. Clearing the primed shot:
  - 10.1 If electric caps were used, remove the old blasting caps from charge and disconnect from firing wire. Shunt cap leg wires.
  - 10.2 If detonating cord was used cut detonating cord between cap and charge, disconnect cap from fire wire. Shunt cap leg wires.
  - 10.3 If Nonel was used, do not remove the caps from the charge. Place a new, primed explosive charge next to the misfired charge.
11. Set up new firing system.

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### 3.6.6 Post Demolition Procedures

1. Wait the designated wait times specified by the SOP. A minimum of 5 minutes after a single shot or after a series of shots that can be counted. A minimum of 30 minutes after multiple shots that could not be counted.
2. The SUXOS or DS and one other UXO technician will return to the detonation site and check the results of the shot. If the procedure was successful, the demo supervisor will call in additional personnel to clean up the site. UXO personnel will conduct a visual sweep of the detonation site and the immediate area to gather fragments and explosive residue if present.
  - 2.1 Metal fragments will be examined to ensure complete consumption of explosive material.
  - 2.2 Explosive residue will be collected and detonated.
  - 2.3 Intact MEC items will be disposed of if they fail to detonate.
3. After the area is swept and cleared, the SUXOS or DS will notify the remaining personnel over the radio that the "All Clear" is given.
4. Backfill hole, as necessary.
5. Recover all equipment.

### 3.7 DOCUMENTATION

Forms and checklists should be generated and/or modified to meet site-specific requirements. The forms provided in this SOP may be used, or alternate forms containing the same information may be used. The SUXOS will make this determination. For disposal operations, the SUXOS or the UXO DS will, as a minimum, complete the following.

- General Safety Precautions
- Disposal Operations Checklist
- Explosive Disposal Log

## 4.0 QUALITY CONTROL

The MEC Management and Disposal operations will meet the quality control (QC) performance objectives identified in the QAPP or equivalent planning document and the attached quality control inspection checklist.

The QC team will verify the quality of the task through the three phases of the control process and document the results as described in the QAPP or equivalent planning document. Any tasks the QC team determines do not meet the quality control metrics, will be considered deficient or non-conforming. If a deficiency or nonconformance occurs, the UXOQCS will prepare a Deficiency Report or Nonconformance Report.

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## ATTACHMENTS




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## ATTACHMENT 1

### DEMOLITION EQUIPMENT CHECKLIST

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	<h2 style="margin: 0;">DEMOLITION EQUIPMENT CHECKLIST</h2>	
<b>Equipment List</b>		
Equipment	Quantity	Comments
Explosive Vehicle(s)		
Personnel Vehicle(s)		
Digital Camera		
Air Horn		
Hand-held Radios		
Cellular Telephone(s)		
Remote Firing Device		
White XLT all-metals detector		
Shovel, round point, long handle		
Shovel, round point, short handle		
Blasting Machine		
Tape, duct		
Tape, measuring, 50- or 100-meter		
Tape, electricians, plastic		
Toolbox, general hand tools		
Galvanometer		
IME-22 container		
Knife		
Initiating explosives		
Donor explosives		
Fire Extinguishers, 20B:C		
Wheel Chocks		
<b>Checklist Verification</b>		
Disposal Supervisor Signature:		Date:

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## ATTACHMENT 2

### HEALTH AND SAFETY EQUIPMENT CHECKLIST




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### **ATTACHMENT 3**

### **GENERAL SAFETY PRECAUTIONS**

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 <b>TETRA TECH</b>	<b>GENERAL SAFETY PRECAUTIONS</b>
<ol style="list-style-type: none"> <li>1. Carry blasting caps in approved containers and keep them out of the direct rays of the sun. Keep the caps located at least 25 feet from other explosives until they are needed for priming.</li> <li>2. Do not work with electric blasting caps or other electro-explosive devices while wearing clothing prone to producing static electricity such as nylon, silk, synthetic hair, etc.</li> <li>3. Do not use explosives or accessory equipment that is obviously deteriorated or damaged. They may cause premature detonation or fail completely.</li> <li>4. Always point the explosive end of blasting caps, detonators, and explosive devices away from the body during handling.</li> <li>5. Use only standard blasting caps of at least the equivalent of a commercial No. 8 blasting cap.</li> <li>6. Use electric blasting caps of the same manufacturer for each demolition shot involving more than one cap.</li> <li>7. Do not use improvised methods for initiating blasting caps.</li> <li>8. Do not bury blasting caps. Use detonating cord to transmit the explosive wave from the blasting caps, on the surface, to a buried/tamped explosive charge. Buried blasting caps are subject to unobserved pressures and movement, which could lead to premature firing or misfires.</li> <li>9. Test electric-blasting caps for continuity at least 50 feet from any other explosives before connecting them to the firing circuit. Upon completion of testing, the lead wires will be shunted by twisting the bare ends of the wires together. The wires will remain shunted until ready to be connected to the firing circuit.</li> <li>10. In the event of a misfire when disposing of explosives by detonation, do not approach the disposal site for at least 60 minutes after the expected detonation time, when firing electrically.</li> <li>11. Items with lugs, strong backs, tail-booms, base plates, etc., should be oriented away from personnel locations.</li> <li>12. Consideration should be given to tamping the UXO to control fragments if the situation warrants. Fragments will be minimized not only to protect personnel but also property, such as buildings, trees, etc.</li> <li>13. Avoid inhaling the smoke, dust, or fumes of burning pyrotechnic or incendiary materials. The smoke, dust, and fumes from many of these materials are irritating and/or toxic if inhaled.</li> <li>14. Do not use water on incendiary fires. Water may induce a violent reaction or be completely ineffective, depending on the mixture.</li> <li>15. Anticipate a high order detonation when burning pyrotechnic or incendiary-loaded MEC. Safety measures for personnel and property must be based upon this possibility.</li> <li>16. Inert ordnance will not be disposed of, or sold for scrap, until the internal fillers have been exposed and unconfined. The heat generated during a reclamation operation can cause the inert filler, moisture, or air to expand and burst the sealed casings. Venting or exposure may be accomplished in any way necessary to preclude rupture due to pressure from being confined. All requirements of the UXO Procedure for the Management and Disposition of MPPEH will be met before releasing any inert ordnance material.</li> <li>17. Maintain minimum safe distances between electromagnetic-radiating sources and electro-explosive devices (IAW EODB/TM-TO 60A-1-1-12).</li> <li>18. Do not conduct blasting or demolition operations during an electrical, dust, sand, or snowstorm severe enough to produce atmospheric static electrical charges, or when such a storm is nearby (within 6 miles). Under such conditions, all operations will be suspended or terminated, cap and lead wires shunted, and personnel removed from the demolition area. Demolition operations will also be terminated if visibility becomes less than 600 feet.</li> <li>19. Loose initiating explosives: lead azide, mercury fulminate, lead styphnate, and tetracene, these explosives manifest extreme sensitivity to friction, heat, and impact. Extra precautions are required when handling</li> </ol>	

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## GENERAL SAFETY PRECAUTIONS

- these types of explosives. Keep initiating explosives in a water-wet condition at all times until ready for final preparation for detonation. The sensitivity of these explosives is significantly increased when dry.
20. Exercise extreme care when handling and preparing high explosives for detonation. They are subject to detonation by heat, shock, or friction.
  21. Do not pack bomb fuze wells with explosives unless it can be positively confirmed that the fuze well does not contain any fuze components.
  22. Photo flash bombs must be handled with the same care as black powder-filled munitions.
  23. MEC containing white phosphorous will not be detonated into the ground. White phosphorous munitions will be counter-charged on the bottom centerline (CCBC) when possible.
  24. A search of the detonation site, after the demo operation, will be conducted to assure complete disposal was accomplished.
  25. Do not abandon any explosives.
  26. Do not leave explosives, empty cartridges, boxes, liners, or other materials used in the packing of explosives lying around where children, unauthorized persons or livestock can get at them.
  27. Do not allow any wood, paper, or other materials used in packing explosives to be burned in a stove, fireplace, or other confined space, or be re-used for any other purpose. Such materials will be destroyed by burning at an isolated location out of doors, with no one allowed within 100 feet of the burning operation.
  28. Do not fight fires involving explosive material. Evacuate all personnel to a safe location and secure the area.
  29. Know and observe international, federal, state, and local laws/regulations that apply to the transportation, storage, and use of explosives.
  30. Do not permit metal, except approved metal truck bodies, to contact explosive containers.
  31. Do not transport metal, flammable, or corrosive substances with explosives.
  32. Do not allow smoking, or the presence of unauthorized personnel, in vehicles transporting explosives.
  33. Carefully load and unload explosives from vehicles. Never throw or drop explosives from the vehicle.
  34. Assure the load is blocked and braced to prevent it from movement and displacement.
  35. Do not drive vehicles containing explosives over public highways until all permits and certifications have been obtained from the state enforcement agencies.
  36. All routes must be approved in writing before transporting explosive materials over public highways.
  37. Licensed commercial carriers will conduct the shipment of explosive materials over public highways unless Tetra Tech UXO personnel have been specifically licensed and certified to make the shipment.
  38. Never leave a vehicle that is loaded with explosives unattended.
  39. Do not store blasting caps, detonators, or other items containing initiating explosives in the same box, container, or magazine with other explosives.
  40. Store explosive materials in military or ATF-approved magazines only. Ensure the magazines used for the storage comply with quantity distance requirements, for the class of explosive material they contain. Reference documents include: NAVSEA OP-5, TM 9-1300-206, AMCR 385-100, ATF - Explosives Law and Regulation, ATF P 5400.7, and 49 CFR.
  41. Do not store spark-producing metal/tools in an explosive magazine.
  42. Do not permit smoking, matches, or any source of fire or flame within 100 feet of an explosive magazine.
  43. Do not allow leaves, grass, brush, or debris to accumulate within 50 feet of an explosive magazine.
  44. Do not permit the discharge of firearms within 300 feet of an explosive magazine.

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## GENERAL SAFETY PRECAUTIONS

45. Do not use any alkaline material such as lye, washing soda, or soap to remove TNT exudate. Alkaline materials will react with TNT to render it more sensitive.
46. Do not permit smoking, matches, or other sources of fire or flame within 100 feet of an area in which explosives are being handled.
47. Do not expose explosives or devices containing explosive to prolonged exposure to direct sunlight. Such exposure can increase sensitivity and deterioration.
48. Ensure all unused explosives are returned to their proper containers, and the container closed after use.
49. Do not carry explosives or explosive components in pockets or on the body.
50. Do not strike, tamper with, or attempt to remove or investigate the contents of an electric/non-electric blasting cap, detonator, or other explosive initiating device. A detonation may occur.
51. Do not pull on the electrical lead wires of electric blasting caps, detonators, or their electro-explosive devices. A detonation may occur.
52. Do not attempt to remove an unfired or misfired primer or blasting cap from a base coupling. There is a high risk of an explosion.
53. Do not allow unauthorized or unnecessary personnel to be present when explosives are being handled.
54. Do not use pull rings or safety pins to lift or handle explosive devices.




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## **ATTACHMENT 4**

### **DISPOSAL OPERATIONS CHECKLIST**

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	<b>DISPOSAL OPERATIONS CHECKLIST</b>	
FUNCTION	DATE/TIME	SIGNATURE
<b>SUXOS</b>		
Assign Disposal Team		
Brief Disposal Team Review emergency procedures Discuss MEC/MPPEH to be disposed Describe Disposal procedures and method		
Inspect Range/Exclusion Zone upon completion of operations		
<b>Disposal Supervisor</b>		
Assign demolition task to team members		
Verify Not Later Than (NLT) disposal time includes wait time for misfire procedures		
Verify roads are closed		
Verify Exclusion Zone boundaries in place		
Complete health and safety and equipment checklists		
Ensure Field Site Office has completed the verification checklist Responsible activity Medical Facility Fire Department Security/Police Department		
Disposal Supervisor tailgate safety brief: Designate emergency vehicles Designate emergency evacuation route Review emergency response procedures		
Verify daily equipment inspection		
Verify detonators are separated from explosives		
Verify area has been evacuated		
Verify engineering controls are correct		
Notify Field Site Office that operations are commencing		
Start disposal activities		
Inspect shot after designated wait time		
Collect all metal fragments for later disposal		
QC check performed		
QA check (if required)		
Tetra Tech to notify upon completion: Client Responsible Activity Medical Facility Fire Department Security/Police Department		
Complete MEC/MPPEH Accountability Log and record data in Explosive Disposal Log		
Demolition Supervisor signature:		Date:

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## **ATTACHMENT 5**

### **EXPLOSIVE DISPOSAL LOG**



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## **ATTACHMENT 6**

### **QUALITY CONTROL INSPECTION CHECKLIST**

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### MEC MANAGEMENT AND DISPOSAL

TEAM INFORMATION		
Team:	Location:	Date:
Team Leader:		
Personnel Present:		
Contract #:		
Task Order #:		

QC CHECKLIST POINTS						
ITEM	REF.	INSPECTION POINT	YES	NO	N/A	COMMENTS
1	<b>Workers' Statement</b>	Have all MEC Management and Disposal Team Members read this SOP?				
2	<b>QAPP</b>	Have assigned disposal team members received training on and demonstrated proficiency with the RFD?				
3	<b>SOP</b>	Did all personnel attending the morning safety/operational briefing sign-in?				
4	<b>SOP</b>	Did the Team Leader conduct and document the Tailgate Safety Briefing before beginning operations?				
5	<b>SOP</b>	Did all recovered MPPEH undergo the three-tiered inspection process?				
6	<b>SOP</b>	Did the SUXOS and UXOSO assess all MEC and agree that the risk associated with movement is acceptable or not?				
7	<b>SOP</b>	Was the decision to move MEC documented in writing before movement or transporting the items to the storage magazines for temporary storage?				
8	<b>SOP</b>	Were MPPEH items further classified as or MDAS, as appropriate?				
9	<b>SOP</b>	Were all MEC items photographed?				
10	<b>SOP</b>	Did the Demolitions Supervisor conduct and document the demolitions briefing?				
11	<b>SOP</b>	Was the EZ established and observed?				
12	<b>SOP</b>	Was the demolition sequence observed?				
13	<b>SOP</b>	Were donor charges properly prepared?				
14	<b>SOP</b>	Were post-demolition operations conducted?				

<b>FINDINGS</b>
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## UXO SOP MPPEH and MDAS Management and Disposal







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## 1.0 PURPOSE AND SCOPE

The purpose of this standard operating procedure (SOP) is to provide procedures and technical guidance for material potentially presenting an explosive hazard (MPPEH) inspection, management, safety, security and chain of custody (CoC) certification during munitions response activities. This applies to all Tetra Tech Unexploded Ordnance (UXO) Technicians involved in the inspection and management process for certifying MPPEH as material documented as safe (MDAS) before transfer within or release from U.S. Department of Defense (DOD) control.

This SOP is not a stand-alone document and should be used together with the Quality Assurance Project Plan (QAPP) or equivalent planning documents, other Tetra Tech SOPs, applicable Federal, State, local regulations, and contract restrictions and guidance.

All training on equipment or software will be either formal or on-the-job training (OJT). Training will be documented by site personnel and subject to review for accuracy and completeness. The UXO Quality Control Specialist (UXOQCS) will verify training is completed and documented.

## 2.0 PERSONNEL, EQUIPMENT, AND MATERIALS

This section describes the personnel, equipment, and materials required to implement this SOP.

### 2.1 PERSONNEL

The following individuals may be involved in MPPEH and MDAS Management and Disposal activities:

- Senior Unexploded Ordnance Supervisor (SUXOS)
- UXOQCS
- Unexploded Ordnance Safety Officer (UXOSO)
- UXO Technicians, Levels III, II, and I
- Government or third-party Quality Assurance personnel

### 2.2 EQUIPMENT

- MDAS containers (e.g., 55-gallon drums, 20yd roll-off, etc.)
- Unique Numbered Seals
- Expray Kit
- Logbook and/or PDA for recording data
- Bottled water
- Camera
- Communications equipment
- First-aid kit
- Level D personal protective equipment (PPE)
- Fire extinguisher

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## 3.0 PROCEDURES AND GUIDELINES

### 3.1 UXO TECHNICIAN RESPONSIBILITIES AND PROCEDURES

The objective of the following procedures is to ensure that an inspection of the exterior and interior surfaces of all recovered MPPEH is safely conducted to ensure these items do not present an explosive hazard and are not transferred from DOD or Tetra Tech custody.

#### 3.1.1 Unexploded Ordnance Sweep Personnel (UXOSP)

Will only mark suspected MPPEH and will not be allowed to perform any assessment of a suspect MPPEH to determine its status.

#### 3.1.2 UXO Technician I

Can tentatively identify a located material as MPPEH confirmation by a UXO Technician II or III.

#### 3.1.3 UXO Technician II

Will perform a 100 percent inspection of each piece of MPPEH as it is recovered and determine the following:

- a. Is the MPPEH MEC, munitions debris (MD), range-related debris (RRD) or is non-munition related debris (NMRD)?
- b. Does the MPPEH contain explosives hazards or other dangerous fillers?
- c. Does the MPPEH/MEC require detonation?
- d. Does the MPPEH/MEC require demilitarization or venting to expose dangerous fillers of cavities not inspectable?
- e. Does the MPPEH require removal of batteries, mercury seals, or switches; the draining of engine fluids, illuminating dials, and other visible liquid hazardous, toxic, or radiological waste (HTRW) materials?

Will segregate material MPPEH requiring demilitarization or venting procedures from those items ready for certification.

Will process any MPPEH found to contain explosives hazards or other dangerous fillers following applicable UXO SOP – MEC Management and Disposal.

#### 3.1.4 UXO Technician III:

Will perform a 100 percent re-inspection of all reclassified MPPEH to determine if free of explosives hazards or other dangerous fillers and engine fluids, illuminating dials, and other visible liquid HTRW materials.

Will supervise detonation of MEC/MPPEH found to contain explosive hazards or other dangerous fillers and venting/demil procedures.

Will supervise the consolidation of inspected MPPEH for containerization and sealing. MD and RRD or NMRD will be segregated.

#### 3.1.5 UXO Quality Control Specialist (UXOQCS)

Will conduct daily audits of the procedures used by UXO teams and individuals for processing MPPEH.

Will perform and document random sampling (by pieces, volume, or area) of all MPPEH collected from the various teams to ensure no MD, RRD, or NMRD contains and explosive hazard, engine fluids, illuminating dials, and other visible liquid HTRW.

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The UXOQCS will sign as the verifier on the DD Form 1348-1 in the absence of a government representative.

### 3.1.6 UXO Site Safety Officer (UXOSO)

Will ensure the specific procedures and responsibilities for processing MPPEH for certification as MD or RRD specified in the work plan are being followed.

Will ensure all procedures for processing MPPEH are being performed safely and consistent with applicable regulations.

### 3.1.7 SUXOS:

Will be responsible for ensuring work and Quality Control (QC) plans specify the procedures and responsibilities for processing MPPEH for final disposition as MD or RRD.

Will ensure a Requisition and Turn-in Document DD Form 1348-1A is completed for all MD and RRD to be transferred for final disposition.

Will perform a final 100 percent re-inspection of all recovered MPPEH to certify that they are free of explosives hazards or other dangerous fillers and engine fluids, illuminating dials, and other visible liquid HTRW material necessary to complete the DD Form 1348-1A.

Will be responsible for ensuring that inspected debris is secured in a closed, labeled, and sealed container and documented as follows:

- a. The container will be closed and clearly labeled on the outside with the following information: The first container will be labeled with a unique identification that will start with the applicable DOD component/Installation Name/Tetra Tech/0001/Seal's unique identification and continue sequentially.
- b. The container will be closed in such a manner that a seal must be broken to open the container. A seal will bear the same unique identification number as the container, or the container will be clearly marked with the seal's identification if different from the container.
- c. Tetra Tech will provide a documented description of the container with the following information for each container: contents, weight of the container, location where munitions or RRD was obtained, name of the contractor, names of certifying and verifying individuals, unique container identification, and seal identification, if required.

Will establish a secure location for the collection, processing, and storage of MD, RRD, and NMRD until transferred off-site.

All acceptable to move MEC or MPPEH will be stored in a magazine or secured until disposal.

## 3.2 MD CERTIFICATION AND CONTAINERIZATION

MPPEH procedures will be per DOD Instruction 4140.62, EM 385-1-97 or OP-5. All MPPEH will be assessed and its explosive safety status determined and documented before transfer within the DOD or release from DOD control. Before release to the public, MPPEH will be documented by personnel who are authorized in writing and technically qualified to certify or verify MDAS after a 100 percent inspection, and an independent 100 percent re-inspection to ensure that it is safe from an explosive perspective. The following certification and verification procedures will be followed for material suspected or determined as MPPEH:

- The SUXOS will certify that the debris is free of explosives hazards.
- The UXOQCS or similarly trained individual in the absence of a government representative will verify that the debris is free of explosive hazards.

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- DD Form 1348–1A Issue Release/Receipt Document will be used as the certification/verification documentation. The DD Form 1348–1A must clearly show the names and contact numbers of the SUXOS and the UXOQCS, similarly trained UXO-qualified individual or Government representative and will be completed with the following information:

Block 2: Site Address

Block 3: Address where the MDAS will be shipped to

Block 5: Document date

Block 8: Cargo type (MDAS or NMRD – non-munitions related debris)

Block 9: Mandatory Entry - Enter “U” if Unclassified material. For more Controlled Inventory Item Codes (CIIC) see DOD 4100.39-M, Volume 10, Chapter 4, Table 61.

Block 10: Actual quantity received. Entered by Receiver

Block 11: Number of items for this unit. Enter “1” if only one container is listed on the form.

Block 12: Enter the weight of the container listed on the form

Block 15: Mandatory Entry – Enter “0” for No Shelf-life. For more codes see DOD 4100.39-M Volume 10, Chapter 4, Table 50

Block 16: Leave blank for the transport company

Block 17: Basic material content such as Material Documented as Safe or Non-Munitions Related Debris with the type of metal (steel or mixed)

Block 18: Type of container

Block 19: Number of containers that make up the shipment

Block 20: Total weight of all containers that make up the shipment

Block 22: Signature of receiver

Block 23: Date received

Block 24:

- Site Name
- Site Location
- Company name
- Contract Number

Block 25: Container number - DOD component/Installation Name/Tetra Tech/0001/Seal’s unique identification

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Block 26:

- The following certification/verification will be entered on each DD Form 1348–1A for MD or RRD transferred within or release from DOD control and will be signed by the SUXOS and the UXOQCS, a similarly trained UXO-qualified individual or Government representative. This statement will be used on any ranges where range related debris is to be processed along with MD:

*“This certifies that the material listed has been 100 percent properly inspected and, to the best of our knowledge and belief, are free of explosive hazards, engine fluids, illuminating dials, and other visible liquid HTRW materials.”*

- The following certification/verification will be entered on each DD Form 1348–1A for turnover of MD and will be signed by the SUXOS and the UXOQCS, similarly trained UXO-qualified individual or Government representative where only munitions debris is being processed:

*“This certifies and verifies that the material listed has been 100 percent inspected and, to the best of our knowledge and belief, are inert and/or free of explosives or related materials.”*

Block 27: Signature Block for both the SUXOS and UXOQCS containing:

- Certified by: SUXOS Name / Verified by: UXOQCS Name or other verifier  
Tetra Tech (OU Name Here), Munitions Response Services  
Applicable OU Address  
Home Office: XXX-XXX-XXXX  
SUXOS phone number / UXOQCS phone number or other verifier  
Signature of SUXOS / Signature of UXOQCS or other verifier

Upon receipt of the material identified on the DD Form 1348–1A, the PM is responsible for ensuring the following blocks are completed by the qualified recycler:

- Block 10: Quantity of material receive;
- Block 22: Signature; and
- Block 23: Date.

### 3.3 MAINTAINING CHAIN OF CUSTODY AND FINAL DISPOSITION

Tetra Tech will arrange for maintaining the chain of custody and final disposition of the certified and verified materials. The certified and verified material will be released only to an organization that will:

- A. Upon receiving the unopened labeled containers, each with its uniquely identified and unbroken seal ensuring a continued chained of custody, and after reviewing and concurring with all the provided supporting documentation, the receiving vendor will sign for having received and agreeing with the provided documentation that the sealed containers contained no explosive hazards upon receipt. This will be signed on company letterhead that states the contents of these sealed containers will not be sold, traded, or otherwise given to another party until the contents have been smelted and are only identifiable by their basic content.**



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**B. Send notification and supporting documentation to the sealed container-generating contractor documenting the contents of the sealed containers have been smelted and are now only identifiable by their basic content.**

**C. If the chain of custody is broken, the affected shipment must undergo a 100 percent inspection, a second 100 percent re-inspection, and be documented to verify its explosives safety status.**

MDAS is no longer considered MPPEH as long as the chain of custody remains intact. A legible copy of the inspection, re-inspection, and documentation must accompany the material through final disposition and be maintained thereafter for three years.

## 4.0 QUALITY CONTROL

The MPPEH and MDAS Management and Disposal operations will meet the QC metrics outlined within the QAPP or equivalent planning document and the Compliance Checklist in this SOP.

The UXOQCS will verify the quality of the task through the three-phase of control and document the results as described in the QAPP or equivalent planning documents. Any tasks the UXOQCS determines not to meet the QC metrics will be considered deficient or non-conforming. If a deficiency or nonconformance occurs, the UXOQCS will prepare a Deficiency Report or Nonconformance Report.

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## 4.1 QC CHECKLIST: MPPEH/MDAS MANAGEMENT AND DISPOSAL

TEAM INFORMATION						
Team:		Location:			Date:	
Team Leader:						
Personnel Present:						
Contract #:						
Task Order #:						
QC CHECKLIST POINTS						
Item	Ref.	Inspection Points	Yes	No	N/A	Comments
1	SOP	Have all personnel read and signed the workers' statement?				
2	SOP	Do all personnel performing this DFW meet the minimum qualifications required?				
3	SOP	Have all personnel performing this DFW been trained on this SOP, and is it documented?				
4	SOP	Have the teams been provided maps of the overall project site and evacuation routes?				
5	SOP	Are all equipment and materials required to perform the DFW inspected, available on-site, and is it documented?				
6	SOP	Was each received container marked as MPPEH or MDAS, sealed and contained in a cleared area?				
7	SOP	Is the PPE serviceable and worn properly?				
FINDINGS						
Item	Comments					

Conducted By: \_\_\_\_\_ Reviewed By: \_\_\_\_\_



## UXO SOP for Intrusive Investigation





Procedure: UXO SOP – Intrusive Investigation Operations      Approver: MMRP Working Group		
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## 1.0 PURPOSE AND SCOPE

The purpose of this Standard Operating Procedure (SOP) is to provide procedures and technical guidance for the Intrusive Investigation Operations to include surface clearance at designated munitions response sites. These operations include:

- Surface Clearance
- **Mag and Flag Operations**
- Mag and Dig Operations
- Target Investigations as a result of geophysical data collection

All training on equipment or software will be either formal or on-the-job training (OJT). This training will be documented by site personnel and subject to review for accuracy and completeness. The Unexploded Ordnance (UXO) Quality Control Specialist (UXOQCS) will verify training is complete and documented.

## 2.0 PERSONNEL, EQUIPMENT, AND MATERIALS

This section describes the personnel, equipment, and materials that may be required to implement this activity.

### 2.1 PERSONNEL

The following individuals or vendors may be involved in Surface Sweep/Clearance activities:

- Geophysical Personnel
- UXO Personnel

### 2.2 EQUIPMENT

- Personal protective equipment outlined in the Activity Hazard Analysis (AHA)/Job Safety Analysis (JSA)
- Geophysical or metal-detector instruments
- Global positioning system (GPS) or real-time surveying (RTS) positioning units
- Computers/Tablets
- Cameras
- Marking flags or ribbon
- Utility or Passenger Vehicles
- First-aid kit
- Fire extinguisher

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## 3.0 PROCEDURES AND GUIDELINES

The Senior UXO Supervisor (SUXOS), UXO Safety Officer (UXOSO), and UXO Team Leader (TL) will review the site terrain and determine the best approach for intrusive investigation operations. Any inaccessible locations will be documented in the field logbook.

### 3.1 EQUIPMENT SET-UP

Materials or equipment received at the site will be inspected for serviceability and against purchase order requirements or operations manuals. Photos will be taken and filed with the daily quality control reports, the quality receipt inspection report (QRIR) or equivalent record.

Analog metal detector sensors will be assembled with fully charged batteries and tested for functionality at an Instrument Test Strip (ITS) prepared under the direction of the UXOQCS. The test strips will include a collection of Industry Standard Objects (ISO) buried at depths and orientations defined in the Quality Assurance Project Plan (QAPP) or equivalent planning document. This will simulate the size and depth of the targets expected at the project site. Sensors will be tested at the ITS prior to beginning operations each day and the results recorded in the team logbook or on forms. All tests will be reported to the UXOQCS for inclusion in the daily report.

Geophysical sensors (EM61) will be assembled and operated in accordance with the appropriate SOPs. GPS or RTS positioning systems will be assembled and operated in accordance with the appropriate civil survey SOP. This includes daily equipment checks and data recordings as appropriate to their use in support of Intrusive Investigations.

Cameras will have video cards and batteries checked.

All tests will be reported to the UXOQCS for inclusion in the daily report.

## 3.2 OPERATIONS

### 3.2.1 General Safety

The most pertinent rules for handling munitions and explosives of concern (MEC) are summarized below:

- Assume munitions contain a live charge until determined otherwise.
- Avoid inhalation of and skin contact with smoke, fumes, and vapors of explosives and related hazardous materials.
- Consider munitions that have been exposed to fire or detonation as extremely hazardous. Chemical and physical changes may have occurred to the contents, which can render them much more sensitive than their original state (e.g., changes to the condition of the fuze or explosives).
- Make every effort to identify the munitions. Carefully examine the munition for markings and other identifying features such as shape, size, and external fittings. Do not move the suspected munition until it is identified and confirmed safe to move by the SUXOS and UXOSO.
- Plan for, provide, and know the measures to be taken in the event of an accident.
- Provide a designated emergency vehicle in the area in case of an accident or an emergency.



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- Do not handle, use, or remain near explosives during the approach or progress (within 10-miles) of an electrical storm. All personnel will shelter as identified in the Accident Prevention Plan (APP) or as directed by the UXOSO.
- Only allow essential personnel to be present near the munitions.
- Always base operations on minimum exposure consistent with efficient operations.
- Do not rely on the color-coding of MEC for positive identification of contents. Munitions having non-existent, incomplete, or improper color codes may be present.
- Avoid the area forward of the ammunition’s nose until it can be determined that the item is not a shape-charge or high-explosive anti-tank round. The explosive jet can be fatal to great distances forward of the item’s longitudinal axis. Assume any shape-charge munitions contain a piezoelectric fuzing system until the fuzing is otherwise identified. Piezoelectric fuzes are extremely sensitive, can fire at the slightest physical change, and may remain hazardous for an indefinite period.
- Approach an unfired rocket motor from the side. Ignition will create a moving projectile hazard and hot exhaust. Do not allow electrically fired rocket motors within 25 feet of any exposed electronic transmitting equipment or antenna leads.

### 3.2.2 Daily Briefing

After arriving at the worksite, the SUXOS or designee will conduct a tailgate operations/safety meeting at the work location. The UXOSO or designee will brief the teams on potential hazards in the area and operations conducted during the shift and review the AHA/JSA for the task. The SUXOS will assign selected worksites to each of the UXO teams for intrusive investigation.

The TL will ensure hand-held instruments, GPS, communications equipment, safety gear or other equipment is function checked and serviceable before beginning field operations. The checks will be documented in team logs or on forms.

### 3.2.3 Intrusive Operations

#### 3.2.3.1 Mag and Flag Operations

The general process for mag and flag operations are:

- The government will be afforded time prior to analog operations for seeding.
- The TL will take a photograph of the area to be cleared once the ropes are setup. This photograph will serve as evidence in proper setup
- The TL will assign lanes to each team member. The TL will document the person assigned to each lane, the start time, stop time, and distance of each lane or transect worked by team member. This information can be recorded on grid sheets or the team logbook.
- For mag and flag operations, lay ropes, lines, or any means to establish a search area within the grid or transect. It will be the TLs discretion to determine the width of the search lanes based on the anomaly density.
- Guide on the lines while walking forward slowly down the search lane sweeping the head of the analog sensor smoothly from side to side;
- Ensure the sensor head exceeds the width of the search lane;

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- A wide head electromagnetic analog sensor requires an overlap of one-half the width of the head to perform an effective search. The sensor head must be parallel to the ground surface. Keep the head close to the ground;
- A small head magnetic sensor such as a Schonstedt, requires a sweep spacing of six inches or less depending on the smallest munitions anticipated at the site;
- The sensor head must be kept at a constant height throughout the sweep;
- Each pass across a search lane should take 2-3 seconds;
- Mark and document the location for every anomaly detected that is consistent with the smallest munition anticipated at the site;
- Do not be deceived by a dull or low volume signal from a sensor. Deep targets do not necessarily produce a loud or sharp signal;
- Continue the process until the assigned area/lane is complete.
- TLs will verify lane or grid sheets/personal digital assistant (PDA) are filled out correctly, are complete, and correct.

### 3.2.3.2 Mag and Dig Operations

The general intrusive investigation procedures for mag and dig operations are:

- For mag and dig operations, lay ropes, lines, or any means to establish a search area within the grid or transect. It will be the TLs discretion to determine the width of the search lanes based on the anomaly density.
- Guide on the lines while walking forward slowly down the search lane sweeping the head of the analog sensor smoothly from side to side;
- Ensure the sensor head exceeds the width of the search lane to slightly overlap the adjacent lane;
- A wide head electromagnetic analog sensor requires an overlap of one-half the width of the head to perform an effective search. The sensor head must be parallel to the ground surface. Keep the head close to the ground;
- A small head magnetic sensor such as a Schonstedt, requires a sweep spacing of six inches or less depending on the smallest munitions anticipated at the site;
- The sensor head must be kept at a constant height throughout the sweep;
- Each pass across a search lane should take 2-3 seconds;
- Investigate every anomaly detected that is consistent with the smallest munition anticipated at the site;
- Do not be deceived by a dull or low volume signal from a sensor. Deep targets do not necessarily produce a loud or sharp signal;
- Define the extent of the anomaly using the analog sensor;
- Technicians may use a non-sparking probe if soil conditions permit;
- Using a shovel, trowel or other suitable tool, remove soil in small amounts from the side of the anomaly and work inward toward the anomaly;
- Once the anomaly is uncovered characterize and recover it as described in this SOP;
- Recheck the excavation with the analog sensor and continue clearing the anomaly if necessary;

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- When restarting the sweeping activity, back up a foot and begin sweeping this should ensure that no residual target is present in the excavation;
- Backfill any excavation after completing documentation unless otherwise instructed; and
- Continue the process until the assigned area/lane is complete.
- TLs will verify dig sheets/personal digital assistant (PDA) are filled out correctly, are complete, correct, standardized nomenclature is used, and no-finds are listed. MEC requires positive identification on the dig sheet. Gross weight of material documented as safe (MDAS) per grid is documented separately. Location and depth of item is recorded.
- Blind seed items (BSIs) must be recovered and correctly identified/documentated.

### 3.2.3.3 DGM Target Investigation

The specific intrusive investigation procedures for digital geophysical mapping (DGM) target investigations are:

- The selected targets from the DGM data are marked with non-metallic flags using the appropriate positioning system;
- Each target flag will be investigated to the radius and depth defined in the work plan by passing the analog sensor over the surface of the ground and then investigating all contacts identified within the search radius. The search radius may be extended by the geophysical data processor and noted in the dig sheet.
- After prosecution of the target to the extent required, the EM61 or analog metal detector will be used to verify the remaining signature is less than the threshold criteria selected for the project. Once complete the flag should be bent to indicate a completed target.

Upon completion of the target clearance, all munitions debris (MD), radiological dispersal devices (RDD) and non-munition related debris (NMRD) will be 100% inspected by a UXO Technician II and a UXO Technician III before it is removed from the grid to ensure it is free of explosive hazards. If MEC/ material potentially presenting an explosive hazard (MPPEH) is found it will be left in-place, clearly marked, and the UXO Technician III will notify the SUXOS and UXOSO.

The TL will photograph all MEC/MPPEH and record as much information as possible in the Team Leader’s logbook or in the PDA. Recorded data includes nomenclature (if known), type (projectile, mortar, rocket, etc.), size, physical condition, fuzed or unfuzed and fuze type by function (point detonating, mechanical time, etc.), condition (fired or unfired, armed or unarmed), filler if known, GPS coordinates.

All MD, RDD, and NMRD will be brought to the central consolidation point for SUXOS and UXOQCS or government representative inspection. See SOP for MPPEH and MDAS Management.

All project records will be returned to the SUXOS or project data manager at the end of the day

### 3.2.4 Collection Points

Collection points allow for temporary accumulation of recovered MEC/MPPEH that are acceptable to move to another area for storage or destruction. The net explosive weight, location, and separation distances between the collection point will be identified in the explosive safety documents. No MEC/MPPEH will be transported from one munitions response site to another.

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### 3.2.5 Field Communication

When feasible, handheld radios will be used for any required communications between the UXO teams and the site office/site management personnel. The site office will relay all required communication to other on-site personnel using established radio links or by telephone/cell phone. Applicable telephone numbers can be found in the APP/SSHP. Additionally, these will be posted in the site office and placed in all site vehicles. If necessary, a radio base station or repeaters will be used to ensure reliable communications across the site.

### 3.3 MPPEH CHARACTERIZATION

Refer to the specific SOP for full details on MPPEH characterization.

- The first person who discovers the MPPEH will conduct the initial classification (MEC, MD, RDD, NMRD). If the person is a UXO Tech I he will have a UXO Tech II or higher verify the classification. UXO Sweep personnel will never touch or move MPPEH until directed by a UXO Tech II or higher.
- The UXO Tech III (UXO TL) will inspect all MD, RDD, and NMRD before leaving the clearance area (i.e., grid, transect)
- The UXO TL will determine whether the MPPEH, once visible, is MEC and notify the SUXOS and UXOSO. MPPEH that is not inspectable will be treated as MEC, as discussed in the Work Plan.
- The SUXOS will make the final identification of any suspected MEC.
- The SUXOS and UXOSO will make a joint decision on the acceptable to move determination. The two must be in agreement of the decision and it will be documented.
- If an MEC/MPPEH is determined by the SUXOS and UXOSO to be unsafe to move, it will be blow in place (BIP) or may be moved remotely after all appropriate precautions have been taken. MEC will not be left unsecured in the field at any time. Notifications to the client, Ordnance and Explosives Safety Specialist or equivalent and PM will be made as outlined in the Work Plan.
- Protective works will be implemented as described in the explosive safety documents for BIPs
- If MEC is not intact upon discovery (i.e., exposed high explosive [HE] or filler), this will be noted on the Investigation Data Sheet & MEC Accountability Log. If the MEC/MPPEH is judged to be safe to transport, it will be placed in a container to prevent further loss of the filler and will be destroyed by detonation at a point identified in the Explosive Safety Plan (ESS) or Explosives Safety Plan (ESP). Any HE or filler found on/in the soil will be marked with a digital global positioning system (DGPS) coordinate and logged in the TL's logbook and reported to the SUXOS and Project Manager (PM).
- Any suspected hazardous material (not munitions-related related) identified will be assessed on a case-by-case basis by the SUXOS and PM in consultation with client. A hazardous material will be suspected to be hazardous if it emits a chemical odor, has caused soil staining, or is contained in a drum or other container commonly used (or marked) for storage of hazardous materials. If any doubt, materials will be reported for further investigation.

### 3.4 MEC/MPPEH and MDAS

Refer to the specific SOP for full details on MEC/MPPEH and MDAS disposal.

MPPEH identified as MEC [i.e., UXO, discarded military munitions (DMM), recovered bulk explosive, or Munitions Constituents (MC)] will be disposed of via detonation in-situ or relocated to a collection point. MEC/MPPEH will be disposed of individually or as part of a consolidated shot, the day they are found, using a same-day donor explosives delivery service or guarded until disposal is able to be conducted. MEC Management and Disposal SOP addresses how MEC/MPPEH is transported.

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MEC/MPPEH will be tracked/documentated from discovery to final disposal in an accountability log.

Materials that cannot be certified and verified as inert (either following demolition disposal or otherwise) will have demolition activities performed on them again. MEC/MPPEH certified as explosive-free (materials documented as safe) will be managed and recycled as scrap metal in accordance with the MPPEH and MDAS Management SOP.

## 4.0 DATA MANAGEMENT

The following sections describe the data that is needed to perform this SOP and the resulting data.

### 4.1 INPUT DATA REQUIRED

No data other than sensor user manuals and target location Geographic Information Systems (GIS) files are required to perform intrusive operations.

### 4.2 OUTPUT DATA

The primary output from this SOP is the quantities and locations of MEC/MPPEH and the amounts of MD, RDD, and NMRD recovered that are recovered. Secondary outputs include equipment inspection records and daily quality reports.

## 5.0 QUALITY CONTROL

QC for this SOP will be achieved through three-phase of control of the Definable Feature of Work (DFW), completion of the QC Checklist for Intrusive Investigation Operation (Section 5.3), and performance metrics identified in the plans are met. The checklist will be filled out and signed by the onsite quality lead or designee upon completion of unit of production.

### 5.1 MEASUREMENT QUALITY OBJECTIVES

The Measurement Quality Objectives (MQOs) for Intrusive Investigation Operation are presented in the project plans. Results will be documented in the daily quality control report.

### 5.2 REPORTING

Input to the project MEC/MPPEH Accountability Log and disposal records are the only reporting output from this SOP.

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## 5.3 QC CHECKLIST FOR INTRUSIVE INVESTIGATIONS

TEAM INFORMATION						
Team:		Location:			Date:	
Team Leader:						
Personnel Present:						
Contract #:						
Task Order #:						
QC CHECKLIST POINTS						
Item	Ref.	Inspection Points	Yes	No	N/A	Comments
1	UXO SOP	Have personnel read and signed the workers' statement?				
2	UXO SOP	Has the equipment been checked out and is it documented correctly?				
3	UXO SOP	Have all intrusive results been fully and appropriately documented?				
4	UXO SOP	Have the appropriate MQOs been achieved for Intrusive Investigation?				
5	UXO SOP	Were all seeds (if instituted) recovered?				
FINDINGS						
Item	Comments					

Signature:

UXOQCS or Designee: \_\_\_\_\_

Date: \_\_\_\_\_



## UXO SOP for MEC AVOIDANCE







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## 1.0 PURPOSE AND SCOPE

The purpose of this Standard Operating Procedure (SOP) is to provide procedures and technical guidance for the MEC Avoidance at designated munitions response sites. These operations include:

- Civil survey operations to establish boundary lines, control points, grids, and transects;
- Vegetation Clearance/Removal operations
- Soil Sampling
- Escort
- Construction Support

## 2.0 PERSONNEL, EQUIPMENT, AND MATERIALS

This section describes the personnel, equipment, and materials that may be required to implement this activity.

### 2.1 PERSONNEL

The following individuals or vendors may be involved in Munitions and Explosive Concern (MEC) Avoidance activities:

- Subcontractors (Surveyors, Construction workers, Soil Sampling, etc.)
- Unexploded Ordnance (UXO) Personnel
- Visitors or other site personnel

### 2.2 EQUIPMENT

- Personal protective equipment outlined in the Activity Hazard Analysis (AHA) (gloves, safety glasses, etc.)
- Hand-held geophysical instruments
- Hand-held Global Positioning System (GPS) Unit
- Computers/Tablets
- Cameras
- Utility or Passenger Vehicles
- First-aid gear
- Fire extinguisher

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## 3.0 PROCEDURES AND GUIDELINES

### 3.1 EQUIPMENT SET-UP

#### 3.1.1 Receipt Onsite

Materials or equipment received at the site will be inspected for serviceability and against purchase order requirements. Photos will be taken and filed with the daily quality control reports or the Quality Receiving Inspection Report (QRIR).

Hand-held geophysical sensors will be tested and, if applicable, search programs uploaded and verified in the test strip for functionality per the operator's manual.

Hand-held or other Global positioning systems for use during MEC Avoidance will be checked for correct project and coordinate upload.

Cameras will have video cards and batteries checked.

Utility vehicles or passenger vehicles will be inspected for damage and verified as operational. Photos of vehicles will be taken and given to the site safety officer.

#### 3.1.2 Daily Prior to Operations

Electronic equipment will be tested prior to beginning operations each day and the results recorded in the team logbook or on forms. All tests will be reported to the lead onsite quality representative for inclusion in the daily report.

GPS devices will be checked against know points before use to ensure accuracy during use.

Hand-held geophysical sensors will be checked in an established test strip or against a metal piece on the surface before beginning daily operations.

UTVs or passenger vehicles will be inspected daily for damage and operability. Inspection forms will be submitted to the site safety officer weekly.

### 3.2 OPERATIONS

#### 3.2.1 General Safety

Intrusive anomaly investigation is not authorized during MEC avoidance activities. Avoidance for intrusive construction activities such as grading and trenching will only be conducted on projects with a documented low MEC probability based on past use and historical evidence.

MEC avoidance activities will not be conducted until the required training and proper equipment checks have been completed, documented, and the appropriate exclusion zone (EZ) is established, marked, and secured.

The appropriate authorities will mark all utilities before intrusive operations.

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Avoidance activities at any given location onsite may be conducted by a single individual trained as a UXO Technician I, provided a second UXO Technician and reliable communications between UXO Technician has been established in case of emergency.

The appropriate supervisor will be notified immediately of all MEC or suspected MEC finds.

Non-UXO personnel must always be escorted by UXO-trained personnel, after receiving 3R training, in areas potentially containing MEC.

If MEC is encountered that presents an immediate threat to life or property, it will be marked and secured until turned over to EOD or the appropriate local authorities.

UXO personnel must remain onsite at all times when non-UXO personnel are conducting intrusive operations.

Do not touch or disturb MEC; mark their location with a red pin flag or surveyors' tape and avoid them.

Do not expose electrically fired munitions to radio, cell phone, or satellite phone transmissions within 25-ft. (7.6-m).

Do not collect souvenirs.

Do not smoke except in designated areas.

Prohibit non-essential personnel from encroaching upon the site.

Suspend all operations immediately upon approach of an electrical storm (within 10-miles).

### 3.2.2 Survey of Access Lanes and Work Sites

UXO technician must conduct a surface and subsurface survey for anomalies on the access path both to and from the worksite before any type of activities commence, including foot and vehicular traffic. The surface area checked should be at least twice the width of the largest vehicle to be used. The UXO technician will also complete a surface and subsurface survey of the proposed work site, as listed in the work plan. The work site will be a minimum dimension in all directions equal to twice the length of the longest vehicle or equipment to be used unless stated in the work plan. These boundaries will be clearly marked using survey flagging or pin flags.

The UXO Technician will use the appropriate magnetometer to clear the areas listed above. Subsurface anomalies will be marked with proper pin flags and will be avoided. If MEC is located, the UXO technician will halt escorted personnel in place, mark the item, and notify the appropriate supervisor for further instruction.

### 3.2.3 Avoidance for Sampling Activities

A survey of all access lanes, worksites, and buffer zones in accordance with 7.5.1 must be completed before conducting sampling activities. UXO technicians equipped with appropriate magnetometer will clear all sampling sites and observe all sampling activities. If anomalies are detected, they will be marked, avoided, and a new sampling location was chosen. If MEC is located, the UXO technician will halt sampling activities, mark the item, and notify the appropriate supervisor, who will then notify the proper authorities.

### 3.2.4 Avoidance for Civil Survey Operations

A UXO technician must survey access lanes ahead of the surveyor when locating specific survey points. Once the surveyor has found the survey point, the area must be checked for anomalies with the magnetometer before placing a grid stake or pin. If an anomaly is located, the pin placement will be moved to another area. If MEC is found, the UXO technician will mark the item and notify the appropriate supervisor.

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### 3.2.5 Escort Duties

A UXO trained person will escort all non-UXO trained personnel as necessary to support project operations. The UXO Escort will lead the group and visually and, if needed, utilize a hand-held instrument to detect surface contacts in vegetated areas.

### 3.2.6 Discovery Of Anomalies/Items Other Than MEC

Material other than munitions may be located during the MEC avoidance operations, including metal debris, underground utilities, chemicals, and other hazards.

Metal debris located during MEC avoidance will be clearly marked with surveyors' tape, paint, or another identifiable item and left in place unless stated in the contract or presents a safety hazard.

Suppose there are any indications that a near-surface utility line is present (such as a signal from the locator or discovery of marking tape). In that case, all activities will cease, and the appropriate supervisor will be notified. The work area should be relocated to another site, if possible.

Locating industrial chemicals is a possibility during MEC avoidance operations. If any evidence of chemical contamination is detected (stained soil, chemical odors, powders, or other substances resembling chemicals), all activities will cease. The appropriate supervisor will make the required notifications as per the work plan.

Suppose sealed drums or other suspect materials or conditions indicate a potential health or safety hazard are encountered during the investigation. In that case, all activities will cease, and the appropriate supervisor will make the required notification as per the work plan.

## 4.0 DATA MANAGEMENT

The following sections describe the data that is needed to perform this SOP and the resulting data.

### 4.1 INPUT DATA REQUIRED

The data input in order to perform MEC avoidance is varied depending on what task is being performed.

### 4.2 OUTPUT DATA

The primary output from this SOP are areas ready for civil survey, soil sampling data is collected, or areas are identified for surface operations.

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## 5.0 QUALITY CONTROL

Quality Control (QC) for this SOP will be achieved through visual checks of the definable feature of work (DFW), completion of the QC Checklist for MEC Avoidance (Section 5.3), and performance metrics identified in the plans are met. The checklist will be filled out and signed by the onsite quality lead or designee upon completing the area or grid.

### 5.1 MEASUREMENT QUALITY OBJECTIVES

The Measurement Quality Objectives (MQOs) for MEC Avoidance are presented in the project plans, with results documented in the team logbook.

### 5.2 REPORTING

Input to the project MEC/Material Potentially Posing an Explosive Hazard (MPPEH) Accountability Log is the only reporting output from this SOP.

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### 5.3 QC CHECKLIST FOR MEC AVOIDANCE

TEAM INFORMATION						
Team:		Location:			Date:	
Team Leader:						
Personnel Present:						
Contract #:						
Task Order #:						
QC CHECKLIST POINTS						
Item	Ref.	Inspection Points	Yes	No	N/A	Comments
1	UXO SOP X	Have personnel read and signed the workers' statement?				
2	UXO SOP X	Has the equipment been checked out, and is it documented correctly?				
3	UXO SOP X	Are daily position checks within specified tolerances if the GPS is used?				
4	UXO SOP X	Have the appropriate MQOs been achieved for MEC Avoidance?				
5						
FINDINGS						
Item	Comments					

Signature:

UXOQCS or Designee:

Date:

\_\_\_\_\_





## UXO SOP for Surface Sweep/Clearance Operation





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## 1.0 PURPOSE AND SCOPE

The purpose of this Standard Operating Procedure (SOP) is to provide procedures and technical guidance for the Surface Sweep/Clearance Operations at designated munitions response sites. This SOP does not cover escort duties for Construction Support, Soil Sampling, or Surveyor operations. These operations include:

- Surface Sweep/Clearance
- Construction Support (access)

## 2.0 PERSONNEL, EQUIPMENT, AND MATERIALS

This section describes the personnel, equipment, and materials that may be required to implement this activity.

### 2.1 PERSONNEL

The following individuals or vendors may be involved in Surface Sweep/Clearance activities:

- Unexploded Ordnance (UXO) Sweep Personnel
- Sampling Technicians
- Professional Licensed Surveyors
- Construction Workers
- UXO Personnel

### 2.2 EQUIPMENT

- Personal protective equipment outlined in the Activity Hazard Analysis (AHA)/Job Safety Analysis (JSA)
- Hand-held geophysical instruments
- Global Positioning System (GPS) units
- Computers/Tablets
- Cameras
- Marking flags or ribbon
- Utility or Passenger Vehicles
- First-aid Kit
- Fire extinguisher

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## 3.0 PROCEDURES AND GUIDELINES

All training on equipment will be either formal or on-the-job training (OJT). This training will be documented by site personnel and subject to review for accuracy and completeness. The UXO Quality Control Specialist (UXOQCS) will verify and document that all personnel assigned to surface sweep/clearance teams have received training on the equipment, Accident Prevention Plan/Site-Specific Health and Safety Plan (APP/SSHP), AHA/JSA, environmental requirements, and as dictated in the Work Plan.

The Senior UXO Supervisor (SUXOS), UXO Safety Officer (UXOSO), and UXO Team Leader (TL) will review the site terrain and determine the best approach for sweep/clearance operations. Although not expected, all inaccessible locations will be documented in the field logbook.

### 3.1 EQUIPMENT SET-UP

#### 3.1.1 Receipt Onsite

Materials or equipment received at the site will be inspected for serviceability and against purchase order requirements or operations manuals. Photos will be taken and filed with the daily quality control reports or the quality receipt inspection report (QRIR) or equivalent record.

Hand-held geophysical sensors will be tested and, if applicable, search programs uploaded and verified in the test strip for functionality per the operator's manual.

Hand-held or other Global positioning systems for use during Surface Sweep/Clearance will be checked for correct project and coordinate upload.

Cameras will have video cards and batteries checked.

Utility/passenger vehicles and heavy equipment will be inspected for damage and verified as operational. Photos of vehicles will be taken and filed, as stated above.

#### 3.1.2 Daily Prior To Use

Electronic equipment will be tested prior to beginning operations each day and the results recorded in the team logbook or on forms. All tests will be reported to the lead on-site quality representative for inclusion in the daily report.

GPS devices will be checked against know points before use to ensure accuracy during use.

Hand-held geophysical sensors will be checked in an established test strip or against a piece of metal on the surface before beginning daily operations.

Personal Protection Equipment (PPE) will be inspected before use.

First-aid kits and fire extinguishers will be inspected weekly.

Utility terrain vehicles (UTVs) or passenger vehicles will be inspected daily for damage and operability. Inspection forms will be submitted to the site safety officer weekly.

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## 3.2 OPERATIONS

### 3.2.1 General Safety

The most pertinent rules for handling Munitions and Explosive Concern (MEC) are summarized below:

- Assume munitions contain a live charge until determined otherwise.
- Avoid inhalation of and skin contact with smoke, fumes, and vapors of explosives and related hazardous materials.
- Consider munitions that have been exposed to fire or detonation as extremely hazardous. Chemical and physical changes may have occurred to the contents, which can render them much more sensitive than their original state (e.g., changes to the condition of the fuze or explosives).
- Make every effort to identify the munitions. Carefully examine the munition for markings and other identifying features such as shape, size, and external fittings. Do not move the suspected munition until it is identified and confirmed to be safe to move by the SUXOS and UXOSO.
- Plan for, provide, and know the measures to be taken in the event of an accident.
- Provide a designated emergency vehicle in the area in case of an accident or an emergency.
- Do not handle, use, or remain near explosives during the approach or progress (within 10-miles) of an electrical storm. All personnel will shelter as identified in the Accident Prevention Plan (APP) or as directed by the UXOSO.
- Only allow essential personnel to be present near the munitions.
- Always base operations on minimum exposure consistent with efficient operations.
- Do not rely on the color-coding of MEC for positive identification of contents. Munitions having non-existent, incomplete, or improper color codes may be present.
- Avoid the area forward of the ammunition's nose until it can be determined that the item is not a shape-charge or high-explosive anti-tank round. The explosive jet can be fatal to great distances forward of the item's longitudinal axis. Assume any shape-charge munitions contain a piezoelectric fuzing system until the fuzing is otherwise identified. Piezoelectric fuzes are extremely sensitive, can fire at the slightest physical change, and may remain hazardous for an indefinite period.
- Approach an unfired rocket motor from the side. Ignition will create a moving projectile hazard and hot exhaust. Do not allow electrically fired rocket motors within 25 feet of any exposed electronic transmitting equipment or antenna leads.

### 3.2.2 Daily Briefing

After arriving at the worksite, the SUXOS will conduct a tailgate operations/safety meeting at the work location. The UXOSO will brief the teams on potential hazards in the area and the operations performed during the shift, and review the AHA/JSA for the task. The SUXOS will assign selected worksites to each of the UXO teams for surface sweep/clearance operations.

The TL will ensure hand-held instruments, GPS, communications equipment, safety gear, or other non-construction equipment is function checked and serviceable before beginning field operations. The checks will be documented in team logs or on forms.

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### 3.2.3 Surface Sweep/Clearance

All analog geophysical sensor visual surface sweep/clearance operations will be performed under the direct supervision of a Qualified UXO Technician III or higher. The UXO team will consist of one UXO Technician III, two UXO Technician IIs, and four UXO TIs or UXO Sweep personnel (UXOSP). A standard team will not exceed seven personnel, but if large areas require surface sweep/clearance as many as 22 personnel can perform this activity. If the area to be swept is large, two additional UXO Technician IIs and up to twelve UXO sweep personnel may be added to the basic team (for a total of twenty-two personnel).

- The UXO team members will be spaced approximately 5–ft (1.5-m) apart. At the direction of the UXO Technician III, will move through the grid/area, making sure the hand-held instruments do not interfere with one another as the technicians traverse the area to be swept. Hand-Held instruments meeting the detection performance metrics will be used to detect any surface debris that may be obscured by brush or heavy grasses.
- If UXO Sweep personnel are utilized, the UXO Sweep person will visually look at a contact once the hand-held instrument indicates a target is present. They will notify a UXO Tech II or higher to make the identification. At no time will UXO Sweep personnel touch with their instrument or hands any contact.
- IF UXO Personnel are used to conduct sweep/clearance operations, the UXO Technician will make a tentative identification to determine if the contact is MPPEH or Non-munitions-related debris (NMRD) [note, the identification of any debris discovered by a UXO Technician I must be confirmed by a fully qualified UXO Technician (defined as a UXOTII or above)]. The UXO Technician II will inspect the contact to verify if it is MPPEH, munitions debris (MD), range-related debris (RDD), or NMRD. All MEC/MPPEH will be left in place and marked as identified in the Explosive Safety Submission (ESS) or Explosives Siting Plan (ESP).
- As the team moves forward, the team member at the edge of the grid will use the grid stakes (or other visual marking) as one clearance lane boundary. The team member on the opposite end of the line will mark the limit of the cleared lane with pin flags, ribbon, cone, or other marking mechanism. These markers become the guide for the turnaround and define the limits of the previously cleared lane.
- This procedure is continued until the grid or area is completely cleared.
- The UXO Technician II and III will follow behind the sweep line depending on team configuration (seven or 22 personnel), ensuring that proper spacing is maintained, will inspect and verify the identification of the flagged MEC/MPPEH, and record data on the type, nomenclature, and location of the items as required.

Upon completion of the grid clearance all MD, RDD, and NMRD will be 100% inspected by a UXO Technician II and a UXO Technician III before it is removed from the grid or area to ensure it is free of explosive hazards. If MEC is found, it will be left in place, clearly marked, and the UXO Technician III will notify the SUXOS for further instructions. The UXO Technician III will also notify the SUXOS when MPPEH (not able to be 100% inspected) is found and request further instructions.

The team leader will photograph all MEC or MPPEH and record as much information as possible in the Team Leader’s logbook or in the personal digital assistant (PDA). Recorded data includes nomenclature (if known), type (projectile, mortar, rocket, etc.), size, physical condition, fuzed or unfuzed, and fuze type by function (point detonating, mechanical time, etc.), condition (fired or unfired, armed or unarmed), filler if known, and global positioning system (GPS) coordinates.

The SUXOS and UXOSO are the only personnel who are authorized to make them acceptable to move determination for MEC or suspected MPPEH.



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### 3.2.4 Collection Points

Collection points allow for temporary accumulation of recovered MEC/MPPEH that are acceptable to move to another area for storage or destruction. The net explosive weight, location, and separation distances between the collection point will be identified in the explosive safety documents. No MEC/MPPEH will be transported from one munitions response site to another.

### 3.2.5 Field Communication

Hand-held radios will be used for any required communications between the UXO teams and the site office/site management personnel. The site office will relay all required communication to other on-site personnel using established radio links or by telephone/cell phone. Applicable telephone numbers can be found in the APP/SSHP and will be posted in the site office and placed in all vehicles. If necessary, a radio base station or repeaters will be used to ensure reliable communications across the site.

## 3.3 MPPEH CHARACTERIZATION

- The first person who discovers the MPPEH will conduct the initial classification (MEC, MD, RDD, NMRD). If the person is a UXO Tech I, he will have a second person UXO Tech II or higher verify the classification. UXO Sweep personnel will never touch or move MPPEH until directed by a UXO Tech II or higher.
- The UXO Tech III (UXO TL) will inspect all MD, RDD, and NMRD before leaving the clearance area (i.e., grid, transect)
- The UXO TL will determine whether the MPPEH, once visible, is MEC and notify the SUXOS and UXOSO. MPPEH that is not inspectable will be treated as MEC, as discussed in the Work Plan.
- The SUXOS will make the final identification of any suspected MEC.
- The SUXOS and UXOSO will make a joint decision on the acceptable to move determination. The two must be in agreement with the decision, and it will be documented.
- If an MEC/MPPEH is determined by the SUXOS and UXOSO to be unsafe to move, it will be blow in place (BIP) or may be moved remotely after all appropriate precautions have been taken. MEC will not be left unsecured in the field at any time. Notifications to the client, Ordnance and Explosives Safety Specialist or equivalent and PM will be made as outlined in the Work Plan.
- Protective works will be implemented as described in the explosive safety documents for BIPs
- If MEC is not intact upon discovery (i.e., exposed high explosive [HE] or filler), this will be noted on the Investigation Data Sheet & MEC Accountability Log. If the MEC/MPPEH is judged to be safe to transport, it will be placed in a container to prevent further loss of the filler and will be destroyed by detonation at a point identified in the ESS or ESP. Any HE or filler found on/in the soil will be marked with a digital global positioning system (DGPS) coordinate and logged in the TL's logbook and reported to the SUXOS and PM.
- Any suspected hazardous material (not munitions-related related) identified will be assessed on a case-by-case basis by the SUXOS and PM in consultation with the client. Hazardous material will be suspected to be hazardous if it emits a chemical odor, has caused soil staining, or is contained in a drum or other container commonly used (or marked) for storage of hazardous materials. If any doubt, materials will be reported for further investigation.

## 3.4 MEC/MPPEH AND MDAS

MPPEH identified as MEC [i.e., UXO, discarded military munitions (DMM), recovered bulk explosive, or Munitions Constituents (MC)] will be disposed of via detonation in-situ or relocated to a collection point. MEC/MPPEH will

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dispose of individually or as part of a consolidated shot, the day they are found, using a same-day donor explosives delivery service or guarded until disposal can be conducted. MEC Management and Disposal SOP addresses how MEC/MPPEH is transported.

MEC/MPPEH will be tracked/documentated from discovery to final disposal in an accountability log.

Materials that cannot be certified and verified as inert (either following demolition disposal or otherwise) will have demolition activities performed on them again. MEC/MPPEH certified as explosive-free (materials documented as safe [MDAS]) will be managed and recycled as scrap metal following the MPPEH and MDAS Management SOP.

## 4.0 DATA MANAGEMENT

The following sections describe the data that is needed to perform this SOP and the resulting data.

### 4.1 INPUT DATA REQUIRED

No data other than the Geographic Information System (GIS) files are required to perform surface sweep/clearance operations.

### 4.2 OUTPUT DATA

The primary output from this SOP is the MEC/MPPEH, MD, RDD, and NMRD quantities that are recovered during the operation and its location and identifying information.

## 5.0 QUALITY CONTROL

Quality Control (QC) for this SOP will be achieved through three-phase of control of the definable features of work (DFW), completion of the QC Checklist for Surface Sweep/Clearance Operation (Section 5.3), and performance metrics identified in the plans are met. The checklist will be filled out and signed by the on-site quality lead or designee upon completion of unit of production.

When surface sweep/clearance using hand-held instruments is the remedy, coverage seeds placement and measurement quality objectives (MQOs) developed by the project team will be followed. EM200-1-15 does not recognize a surface clearance or sweep as a final remedy.

### 5.1 MEASUREMENT QUALITY OBJECTIVES

The MQOs for Surface Sweep/Clearance Operations are presented in the project plans. Results will be documented in the daily quality control report.

### 5.2 REPORTING

Input to the project MEC/MPPEH Accountability Log and disposal records are the only reporting output from this SOP.

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## 5.3 QC CHECKLIST FOR SOIL SURFACE SWEEP/CLEARANCE

TEAM INFORMATION						
Team:		Location:			Date:	
Team Leader:						
Personnel Present:						
Contract #:						
Task Order #:						
QC CHECKLIST POINTS						
Item	Ref.	Inspection Points	Yes	No	N/A	Comments
1	UXO SOP	Have personnel read and signed the workers' statement?				
2	UXO SOP	Has the equipment been checked out, and is it documented correctly?				
3	UXO SOP	Have the appropriate MQOs been achieved for Surface Sweep/Clearance?				
4	UXO SOP	Were all seeds (if instituted) placed and recovered?				
FINDINGS						
Item	Comments					

Signature:

UXOQCS or Designee: \_\_\_\_\_

Date: \_\_\_\_\_



## UXO SOP for Vegetation Clearance/Removal





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## 1.0 PURPOSE AND SCOPE

The purpose of this Standard Operating Procedure (SOP) is to provide procedures and technical guidance for the vegetation clearance/removal at designated munitions response sites. These operations include:

- Vegetation clearance of boundary lines, control points, grids and transects;
- Manual and mechanical vegetation clearance/removal operations

## 2.0 PERSONNEL, EQUIPMENT, AND MATERIALS

This section describes the personnel, equipment, and materials that may be required to implement this activity.

### 2.1 PERSONNEL

The following individuals or vendors may be involved in vegetation clearance/removal activities or be in the area during these operations:

- Vegetation Clearance/Removal Subcontractors
- Surveyors
- Site Geophysicist
- Unexploded Ordnance (UXO) Technicians
- UXO Quality Control Specialist (UXOQCS)

### 2.2 EQUIPMENT

- Hand brush clearing tools
- Mechanical brush clearing equipment (chainsaws, skid steers, hydro axes, etc.)
- Personal protective equipment outlined in the Activity Hazard Analysis (AHA)/Job Safety Analysis (JSA)
- Hand-held geophysical instruments
- Hand-held Global Positioning System (GPS) Unit
- Computers/Tablets
- Cameras
- Utility or Passenger Vehicles
- First-aid Kit
- Fire extinguisher
- Refueling equipment



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## 3.0 PROCEDURES AND GUIDELINES

### 3.1 EQUIPMENT SET-UP

#### 3.1.1 Receipt onsite:

Materials or equipment received at the site will be inspected for serviceability and against purchase order requirements. Photos will be taken and filed with the daily quality control report or the Quality Receiving Inspection Report (QRIR).

GPS units or GPS enabled tablets will be loaded with the coordinates specific to the project. Upon receipt at the site, receipt inspections will verify all electronic equipment is operational and that coordinate systems and layers are loaded for the project.

Hand-held geophysical sensors will be tested and, if applicable, search programs uploaded and verified in the test strip for functionality per the operator's manual.

Cameras will have video cards and batteries checked.

Utility vehicles, passenger vehicles, or mechanized brush clearing equipment will be inspected for damage and verified as operational. Photos of vehicles/equipment will be taken and given to the site safety officer.

#### 3.1.2 Daily Prior to Operations:

Electronic equipment will be tested prior to beginning operations each day of use and the results recorded in the team logbook or on forms. All tests will be reported to the lead onsite quality representative for inclusion on the daily quality control report.

GPS devices will be checked against know points before use to ensure accuracy during use.

Hand-held geophysical sensors will be checked in an established test strip or against a piece of metal on the surface before beginning daily operations.

Mechanized or power equipment will be checked out before use, following owners' operations manuals and documented on forms or in a logbook.

Utility terrain vehicles (UTVs)/passenger vehicles will be inspected daily for damage and operability. Inspection forms will be submitted to the site safety representative weekly.

### 3.2 OPERATIONS

#### 3.2.1 General Safety

Surface sweeps will be performed before vegetation clearance/removal operations if Munitions and Explosives of Concern (MEC) is known to exist on the surface. UXO Escorts may be used in place of surface sweeps if the UXO escort surveys the grid or area if MEC is not confirmed on the surface.

Vegetation will be removed as limited by the contract. All vegetation at or below the allowed removal size will be chipped, mulched, shredded, or cut down and removed from the area operations will be conducted.

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The measurement to determine if a tree is allowed to be removed will be measured from a height of 4-feet above the ground surface. All trees exceeding the allowed removal size will not be removed, and all practical measures to limit damage will be taken by vegetation removal personnel.

When powered equipment is in use, a Safety observer not engaged with brush cutting activities will be designated.

Observe safety precautions/warnings found in the operator's manual/manufacturer's publications.

Maintain 6 inches of ground clearance during vegetation cutting operations.

Maintain exclusion zone site control.

Non-UXO personnel must always be escorted by UXO-trained personnel in areas potentially containing MEC.

Avoidance activities at any given location onsite may be conducted by a single individual trained as a UXO Technician I, provided a second UXO Technician or the Senior UXO Supervisor (SUXOS) is readily available and reliable communications between UXO Technician has been established in case of emergency.

Observe MEC safety precautions for items encountered or suspected.

Extreme caution must be used when any vegetation removal equipment, powered or otherwise, is in use. Personnel observing manual brush clearing operations will stand outside of the debris throwing distance for that equipment. For mechanized brush clearing equipment, the safe distance identified in the operations manual will be observed.

Onsite mobile refueling operations will only be conducted when equipment is shut down. Additionally, the task will have the appropriate spill prevention and containment controls in place, along with the required fire extinguisher for that task.

The appropriate supervisor will be notified immediately of all MEC or suspected MEC finds.

Non-UXO personnel must be escorted by UXO-trained personnel at all times in areas potentially containing MEC.

If MEC is encountered that presents an immediate threat to life or property, it will be marked and secured until turned over to Explosive Ordnance Disposal (EOD) or the appropriate local authorities.

Do not touch or disturb MEC; mark their location with a red pin flag or surveyors' tape or other means and avoid them.

Do not expose electrically fired munitions to radio, cell phone or satellite phone transmissions within 25-ft. (7.6-m).

Do not collect souvenirs.

Do not smoke except in designated areas.

Prohibit non-essential personnel from encroaching upon the site.

Suspend all operations immediately upon the approach of an electrical storm as defined within AHA/JSA

In areas where vegetation removal is needed, UXO Technicians will first conduct a hand-held instrument-assisted surface sweep of the area to mark any surface material potentially presenting an explosives hazard (MPPEH), will remove any surface debris and identify other hazards that might damage equipment or injure personnel. Hazards will be marked with the flagging, paint, pin flag to ensure the vegetation team can clearly see the hazard. Team personnel will be briefed on location and type of hazardous features before commencing the vegetation removal.

If the purpose of the project is to gather data to determine area contamination density, the number of contacts removed will be recorded in logbooks or forms and reported to the SUXOS, Site Geo, or designee.

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Team personnel are to ensure that 6 inches of ground clearance is maintained during removal operations. Those areas marked as hazards are to be avoided. The manner in which operations are accomplished will follow safe work practices and procedures. If MPPEH/MEC is located, the UXO technician will halt operations, mark the item, and notify the SUXOS and UXOSO.

Upon completion of the unit of production (grid, transect, or grouping of grids), the UXO person assigned to the vegetation clearance/removal operation will notify the SUXOS or Lead Site Manager by the end of the production day. The Site Geophysicist and UXOQCS or designee will inspect the area for compliance with the contract and requirements in the plan. Inspections will be documented on the daily quality control report and the project database updated.

## 4.0 DATA MANAGEMENT

The following sections describe the data that is needed to perform this SOP and the resulting data.

### 4.1 INPUT DATA REQUIRED

The data input to perform vegetation clearance/removal is the Geographic Information System (GIS) or project layout data loaded into the GPS or tablet system being utilized.

### 4.2 OUTPUT DATA

The primary output from this SOP are areas ready for civil survey, surface clearance (if not previously performed), blind seeding, and preparations for further geophysical or intrusive activities.

## 5.0 QUALITY CONTROL

Quality Control (QC) for this SOP will be achieved through inspection of the area or grids; completion of the QC Checklist for vegetation clearance/removal (Section 5.3) and performance metrics identified in the plans are met. The checklist will be filled out and signed by the Site Geophysicist, and onsite quality lead upon completion of the area or grid.

### 5.1 MEASUREMENT QUALITY OBJECTIVES

The Measurement Quality Objectives (MQOs) for vegetation clearance/removal are presented in the project plans. Results will be documented in the project GIS tracking system and daily quality control reports.

### 5.2 REPORTING

The project GIS tracking system will contain all vegetation clearance/removal status. Control documentation checks (coordinate readings) will be recorded in team logbooks. The UXOQCS will verify the completion of the checks and proper documentation on the frequency specified in the plans. The check will be documented on the daily quality control report when performed. For any work performed by a land surveyor subcontractor, a surveyor's report will be generated by the subcontractor upon completion of the work.

Procedure: UXO SOP - Vegetation Clearance/Removal Approved By: Tetra Tech MMRP Working Group		
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### 5.3 QC CHECKLIST FOR VEGETATION CLEARANCE

TEAM INFORMATION						
Team:		Location:			Date:	
Team Leader:						
Personnel Present:						
Contract #:						
Task Order #:						
QC CHECKLIST POINTS						
Item	Ref.	Inspection Points	Yes	No	N/A	Comments
1	UXO SOP	Have personnel read and signed the workers' statement?				
2	UXO SOP	Has the equipment been checked out, and is it documented correctly?				
3	UXO SOP	Are daily position checks within specified tolerances if the GPS is used?				
4	UXO SOP	Have the appropriate MQOs been achieved for vegetation clearance?				
5	UXO SOP	Has the Site Geophysicist or UXOQCS conducted a visual walkthrough of the area to ensure the work is acceptable?				
6	UXO SOP	Has the GIS Tracking system been updated?				
FINDINGS						
Item	Comments					

Item	Comments

Signature:

UXOQCS or Designee:

\_\_\_\_\_

Date:

\_\_\_\_\_