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

Prepared for:

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I have reviewed the attached Work Plan for the referenced site.

Approved by:
Final Revision Date: January 2021

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ACRONYMS

°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	Blow 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
DID	Data Item Description
DDESB	Department of Defense Explosive Safety Board
DMM	Discarded Military Munition
DoD/DOD	Department of Defense
DOP	Dive Operations Plan
DOT	Department of Transportation
DQO	Data Quality Objective
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
ESS	Explosives Safety Submission
EZ	Exclusion Zone
FAR	Federal Acquisition Regulation

FFP	Firm Fixed Price
FGDC	Federal Geographic Data Committee
FUP	Fixed Unit Price
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
LB	Pound
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
MRS	Munitions Response Site
MSD	Minimum Separation distance
MSDS	Material Safety Data Sheets
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
PPE	Personal Protective Equipment
PR	Pulse Rate
PWS	Performance Work Statement
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
SDSFIE	Spatial Data Standard for Facilities, Infrastructure, and Environment
SE QCI	Search Effectiveness Quality Control Inspection
SF	Square Feet
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
TLM	Tar Like Material
TM	Technical Manual
T&M	Time and Materials
TNT	Tri-Nitro Toluene
TP	Technical Publication
TPP	Technical Planning Process
TLV	Threshold Limit Value
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
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) 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). For the CRP and these support plans, the acronyms; MEC, UXO a sub category of MEC and Discarded Military Munitions (DMM) which are Munitions that have been discarded that have to possibility to be live or inert will be frequently utilized.

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/UXOs 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 / UXO in order to reduce 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 U. S. Army Corps of Engineers (USACE) approved Explosives Safety Submission (ESS).

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/UXO intrusive activities will occur on 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, Discarded Military Munitions (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/UXO 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 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 South Carolina Department of Health and Environmental Control (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 UXO investigation efforts. Although approximately 180 anomalies were investigated, including previously identified anomalies and mag-and-dig efforts, no MEC items 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 (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 NAVD ’88. 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.

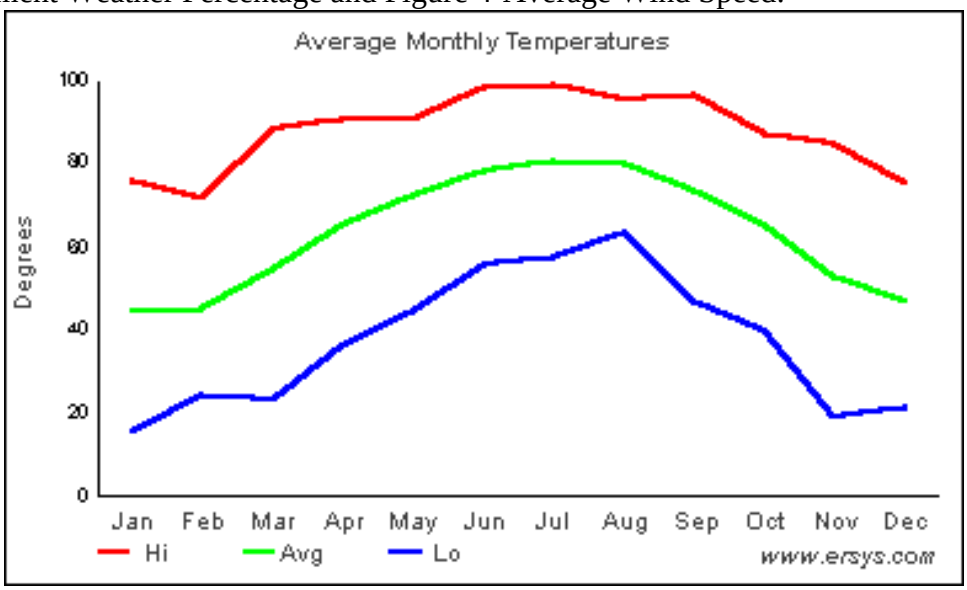


Figure 1 Average Monthly Temperatures

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

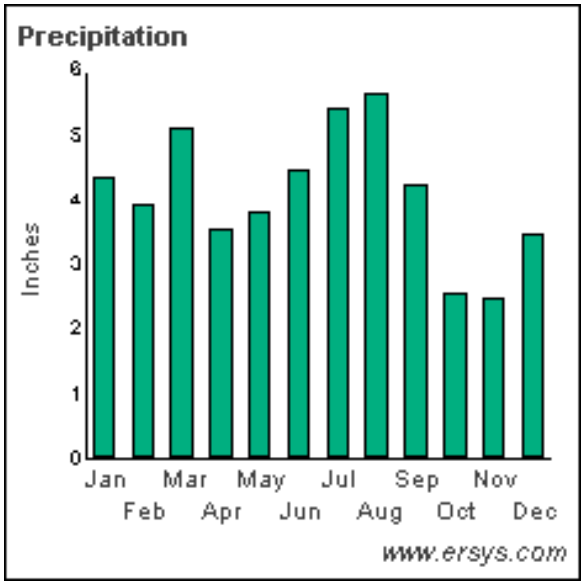


Figure 2 Average Monthly Precipitation

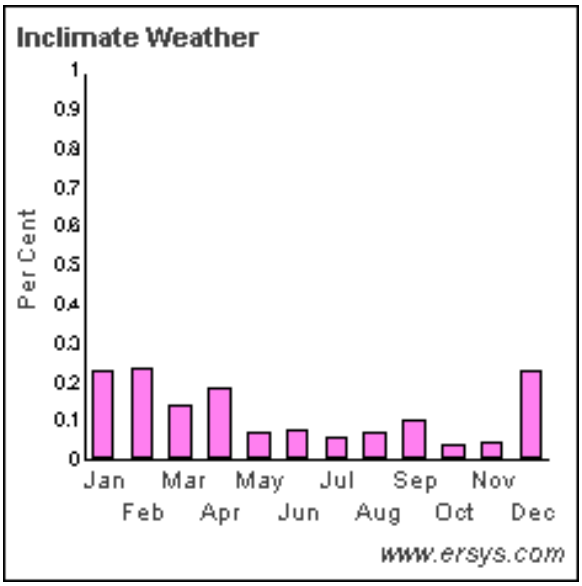


Figure 3 Monthly Inclement Weather Percentage

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

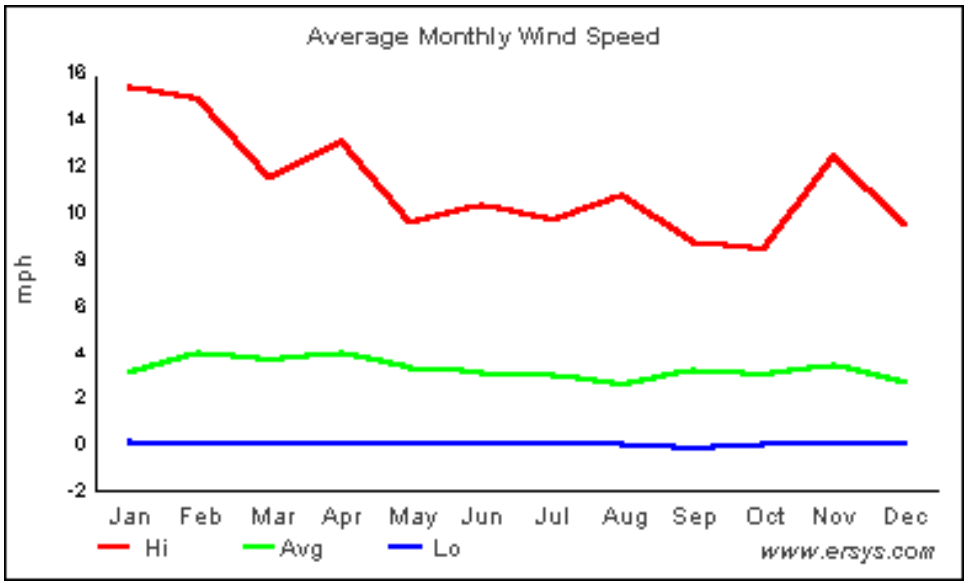


Figure 4 Average Monthly Wind Speed

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 / UXO removal operations, TITAN identifies or suspects RCWM all personnel will immediately withdraw upwind from the work area and contact the DESC Project Manager who in turn will report the RCWM to USACE. TITAN will secure the area and provide two personnel located upwind of the suspect RCWM to secure the site until relieved by the Department of the Army 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 TITAN UXO personnel will secure the area to prevent unauthorized access;
- The supervisors will position personnel as far upwind as possible while still maintaining security of the area; and
- The USACE Ordnance and Explosives Safety Specialist (OESS) will immediately be notified, if required and/or appropriate.

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, TITAN 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

TITAN'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. TITAN will perform operations as necessary to detect and remove suspected DMM or MEC/UXO from two separate areas where sediment and tar-like material (TLM) will be excavated and removed.

TITAN will also provide Standby Construction Support during cofferdam construction, dewatering operations, sediment removal activities in accordance with EP 75-1-2. TITAN will be prepared to mobilize additional personnel if required to dispose of MEC /UXO or Material Potentially Presenting Explosive Hazard (MPPEH) during the construction support phase of the project.

This Technical Management Work Plan describes the approach, methods, and operational procedures to be employed by TITAN to perform MEC / UXO operations at the CRP site. Chapter 9 of EM 200-1-15 were used in addressing technical management for this MEC / UXO project.

2.2. Organization

TITAN's project organization is designed to effectively control the MEC portion of the MRA. TITAN's Project Manager, Mr. Matthew Norris, GISP will be the primary point of contact with the DESC representative, will have overall responsibility for ensuring that work is completed in accordance with the Work Plan. He will prepare submittals and reports in accordance with the PWS. The project organization is presented on Figure 5-Organization Diagram.

The Senior UXO Supervisor (SUXOS) 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, USACE onsite safety representative, and stakeholders as necessary to minimize conflicts with scheduled activities. He will prepare and submit daily reports through the TITAN Project Manager.

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, Project Manager and / or Corporate Safety Manager. The UXOSO/QCS will work closely with the USACE on-site Safety Representative to immediately address any issues or concerns. He always has a direct line of communication with the TITAN Corporate Safety Manager.

All UXO Technicians and team members will meet or exceed the requirements in DDESB 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, in coordination with the Project Manager, may adjust the project organization and reallocate resource as required to most effectively complete the entire scope of the project. TITAN 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 project manager, and subject to coordination with any other DESC contractor, Titan proposes the following:

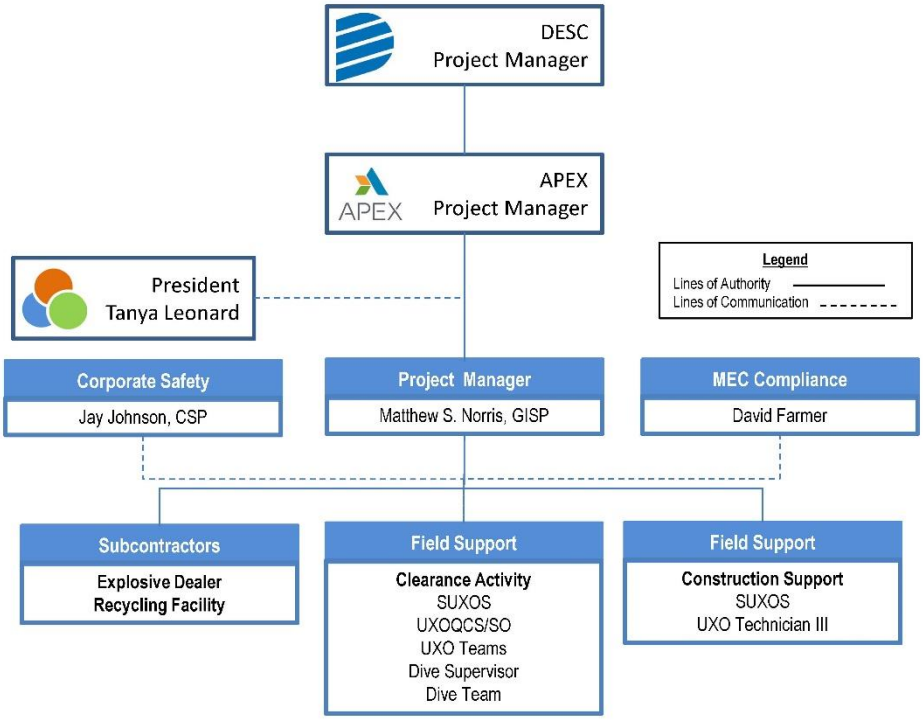


Figure 5 Organization Diagram

TITAN 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. Resumes of key personnel are included in Appendix H if not listed in the UXO database maintained by CEHNC. The following paragraphs describe the specific responsibilities of UXO personnel assigned to the project team.

2.3.1 Project Manager

The Project Manager 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 Project Manager is also responsible for controlling cost and schedule milestones. The Project Manager will also coordinate the preparation of the Work Plan and the implementation of on-site field activities.

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

The Project Manager 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;
- Establishing, maintaining and tracking petty cash expenditures;
- Reviewing and approving Time Sheets, Expense Reports, and Travel Order Request;
- Submitting Equipment Expense Report; and
- Supervising the Project SUXOS and, UXOSO/QCS.
- Prepare and conduct coordination meeting

2.3.2 Senior UXO Supervisor (SUXOS)

The SUXOS has more than 10 years of military/civilian EOD/UXO experience. The SUXOS will manage all on-site field activities. The SUXOS will keep the Project Manager informed of activities requiring his notification. The SUXOS is responsible for all daily work activities. He will brief the Project Manager daily on all project activities to include production, quality of work, safety, equipment status and personnel status. The SUXOS will directly coordinate any evacuation requirements with the USACE Safety Specialist. The responsibilities of the SUXOS 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 Project Manager;
- Providing on-the-job training for selected UXO Supervisor(s) who may be called upon to temporarily perform SUXOS 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.

2.3.3 UXO Safety Officer (UXOSO)

The UXOSO has more than eight years of military/civilian EOD/UXO experience. He is responsible for implementing all site SSHP requirements, on-site training requirements and recommending changes

to 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 USACE 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 Safety Manager. 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 USACE Safety Specialist; and
- Maintain daily liaison with the USACE Safety Specialist.

2.3.4 UXO Quality Control Specialist (UXOQCS)

The UXOQCS has more than eight years of military/civilian EOD/UXO experience. The UXOQCS reports to the Quality Manager. The UXOQCS will perform quality inspections/review all project operations, including explosives inventories, daily reports, time sheets and other documentation, and will inspect and approve each completed area prior to turnover to the USACE Safety Specialist.

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 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 UXO;
- Identifying fuzes and determining fuze conditions of all munitions including 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 UXO using military and/or civilian magnetometers and related equipment;
- Supervises
    - Excavation and recovery of subsurface UXO by manual means or mechanical
    - Construction of UXO-related protective works,
    - Location of surface UXO by visual means,
    - Transporting and storing UXO/MEC assuring compliance with Federal, state, and local laws,
    - Disposal of UXO by detonation,

- Preparation of a UXO disposal site,
- Preparation of an on-site safe holding area for UXO,
- 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 UXO-related storage compatibility;
- Preparing explosives storage plans in accordance with 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 UXO using military and/or civilian magnetometers and related equipment;
- Perform excavation procedures on buried UXO by
  - Manual means, and
  - Mechanical means;
- Perform operator maintenance of military and/or civilian magnetometers;
- Locate surface UXO 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 in accordance with 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 (PDS);
- 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 TITAN Project Manager and SUXOS are primarily responsible for the management of work, data, and cost. The Project Manager will develop the initial schedule. The SUXOS will maintain the schedule and adjust as required throughout the project. The SUXOS will coordinate closely with 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 project manager will provide updated schedules throughout the project, as required.

The SUXOS will submit data to the Project Manager daily, as required. Data will include a daily report that will describe the activities completed and issues that arose during the workday. The project manager will post the daily reports on the project collaboration website, along with photographs and other data relating to the project. The website will incorporate GIS to better display the data and project status.

All task included in this project are FFP or FUP. The Project Manager 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 in accordance with the requirements of the contract. Quality Management and Quality Control requirements described in Chapter 4 will be applied to all phases of the project. TITAN will ensure strict compliance with the Accident Prevention Plan in Appendix D.

2.5. Deliverables

In addition to the Periodic Reporting requirements discussed in Section 2.7, TITAN will prepare a Site Specific Final Report.

2.6. Schedule

TITAN has prepared a Project Schedule and 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. TITAN 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 will coordinate with the Project Manager prior to adjusting and Travel Orders. A record of expenditures will be maintained by the SUXOS and monitored by the schedule.

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

2.7. Periodic Reporting

The SUXOS will prepare and submit daily reports to the TITAN Project Manager.

2.8. Costing and Billing

The Project Manager and SUXOS will control and manage costs through the use of Purchase Orders and Travel Orders. A record of expenditures will be maintained by the SUXOS and monitored by the Project Manager.

2.9. Public Relations Support

TITAN 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

TITAN 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 may deliver equipment and materials to the project site. All subcontractor personnel will be trained to the approved work plan and the included Accident Prevention Plan. All visitors, including suppliers supporting the project, will receive a safety brief from the SUXOS or 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 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 TITAN site personnel. This training will include detailed training on procedures in the Work Plan and Accident Prevention Plan. 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 Exclusion Zone (EZ) of the project site unless escorted by a TITAN 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 on site will receive a safety briefing. They are responsible for following all site safety and health procedures. They will not enter any exclusion zone area without a UXO-qualified escort. Non-essential persons, including suppliers, will not be allowed in any active EZ. They will wear all required personal protective equipment (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

TITAN's Project Manager 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 Project Manager reports directly to the TITAN President and MEC Program Manager. The Project Manager communicates frequently with the SUXOS and UXOSO/QCS. The SUXOS will coordinate all field activities. He will coordinate with the on-site USACE representatives and local officials. He will prepare and submit daily project status reports to the Project Manager. 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 / UXO items encountered during the investigation / removal activities will be maintained. As MEC/UXO 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 item encountered will be identified using a unique numerical identifier, such as A-3-0001 (for 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 Athens office for posting to TITAN's project collaboration 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. DQOs

Data Quality Objectives (DQOs) are qualitative and quantitative statements developed, usually in the Technical Planning Process (TPP), 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 Geospatial Information Systems (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/UXO is to be performed prior to cofferdam installations and excavations. A list of the type of MEC/UXO believed to be present is presented in Section 3.2 but consists of civil war era cannonballs (6 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 TITAN's approach to completing the requirements of the CRP Scope of Work. 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.

All MEC/UXO disposal operations will be conducted in accordance with the procedures described in this plan and the approved ESS. DDESB 6055.09-M and EM 200-1-15 will also be followed during munitions response activities. If unidentifiable UXO is found, the default separation distance specified in DDESB TP16 will be used to establish the appropriate exclusion zones. Unidentified UXO 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 or the USACE on-site safety representative if available.

Demolition operations will be conducted to destroy or vent UXO / MPPEH, as required for safe disposal. Detailed discussion of MEC / UXO reporting requirements and disposition methods and techniques are provided in the ESS, submitted separately of the work plan.

Personnel deemed non-essential to the demolition operation will be evacuated or assigned duties outside of the fragmentation zone. Electrical or nonelectrical systems (Non-EL) will be used to initiate BIP to insure maximum control and safety. The UXOSO is responsible for ensuring all personnel are accounted for during disposal operations and that the demolition operation is conducted in strict accordance with required procedures. The TITAN SUXOS and/or UXOSO will visually inspect the demolition site with the Demo Team Leader and announce all clear upon completion of demolition operations.

3.2. Identification of Areas of Concern

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

Based on historical information primarily from an Inventory of Stores Captured in Columbia, SC document dated February 17, 1865, MEC items of interest that could potentially be encountered are identified below. The historical list contained a more general nomenclature than that used in the DOD Fragmentation data base of today. The list below is taken directly in name from the 1865 document.

- Case shot, fixed, 12 pounder gun
- Fuse-shell, fixed, 12 pounder gun
- Grape, 12 pounder gun
- Canister, fixed, 12 pounder gun
- Shot, fixed, 6 pounder gun

- Case, fixed, 6 pounder gun
- Fuse-shell, fixed, 6 pounder gun
- Canister, fixed, 6 pounder gun
- Shot, fixed, 24 pounder gun
- Shell, fixed, 24 pounder gun
- Canister, fixed, 24 pounder gun
- Shell, fixed, 8 inch
- Shot and shell, not fixed, 8 inch
- Shot and shell, not fixed, 8 inch
- Shot and shell, not fixed, 10 inch

According to historical information for Columbia, SC inventory, a variety of other munitions were identified as having been used or stored at the site. No information found to date associates any other munitions with the project site. Therefore, the 10 in "cannonball" shell has been selected as the munition with the greatest fragmentation distance (MGFD) for the project.

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

Digital Geophysical Mapping (DGM) is not planned for this project. 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

TITAN will be supported by surveyors (either subcontracted or provided by DESC or its contractors), 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 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-metals detector (such as a White's Metal Detector), or equivalent. TITAN'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 / UXO 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 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. TITAN 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

During removal activities, results will be collected and documented by the UXO Teams. All MEC coordinate locations will be documented using hand-held GPS or by taping in from two known points in order to determine the location of the item within plus or minus one foot.

3.6.3. GEOSPATIAL INFORMATION SYSTEMS (GIS) INCORPORATION

The foundation of the GIS will be derived from base layers collected from APEX, state GIS clearinghouses, and previous UXO 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 Manager. The GIS Manager will perform QC measures on all Geophysical and OE field data to elevate formatting or incorporation issues. Collected data will be incorporated into the GIS and conform to the Universal Transverse Mercator (UTM) projection, a datum of GCS North America 1983 (NAD83), and with linear unit of measure in Meters. All Geospatial data delivered to USACE will conform to Universal Transverse Mercator projection and a datum of GCS North America 1983 (NAD83) with linear units of measure stated.

TITAN will maintain GIS QC data for the project. QC procedures will be performed periodically on the GIS datasets for inaccuracies that may jeopardize the stability of the GIS and spatial data it contains. Any inaccuracies that arise will be reviewed to determine if the error rests in the GIS incorporation methods or if the actual field data is inaccurate. After the error assessment has been completed, the TITAN Project Manager will be made aware of the inaccuracies and a formal error assessment report will be submitted by the GIS Manager. The GIS Manager will take proper action to resolve the error and retain stability over the GIS database.

Additional data entered or modifications to the existing GIS will be noted with revision dates. This will also be captured in the geospatial dataset's Federal Geographic Data Committee (FGDC) metadata.

Federal Geographic Data Committee (FGDC) metadata will be developed for spatial layers that have been created by TITAN. It is assumed that spatial data retrieved from other sources such as GIS clearinghouses, previous site investigation, imagery, etc., will contain previously developed metadata created by the originator. All GIS data will be developed and incorporated in to ESRI's Shapefile or 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 transferred into geo TIFF format to help in reducing image file size.

3.6.4. PLOTTING

TITAN anticipates hard copy printouts will be utilized on the project. Hard copy map graphic scales will be based on standard mapping scales. Maps will be developed showing results of MEC found during project activities. Detailed site maps will be produced. 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 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 area covered on map in relationship to project boundary will be displayed on the map.

3.6.6. COMPUTER FILES & DIGITAL DATA SETS

TITAN utilizes ESRI's ArcGIS version 10.x in development of comprehensive and accurate geospatial data. TITAN 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 JEPG format to help in reducing image file size unless stated otherwise by the Government.

All MEC items that are discovered during the removal that are determined or suspected of containing energetic material will be documented within the GIS. Coordinates for the individual items will be collected using the Geo XH GPS unit prior to BIP, consolidation, or removal operations beginning.

External tabular data that is not integrated within the Geodatabase will be provided to DESC in ANSI SQL format as well as Microsoft Access at the completion of the project. All supporting databases will be complete and single entities, with no relations or joined connections to others.

Federal Geographic Data Committee (FGDC) metadata will be developed for core SDSFIE data layers that are developed by TITAN. 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, TITAN will begin the mobilization process. It is anticipated that one phase of mobilization will occur to accomplish the clearance task. The Project Manager 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 their home to Columbia, SC as required to complete the work associated with the project in accordance with the project schedule. The Project Manager and SUXOS 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 has coordinated with local personnel and set up the site, the mobilization body of the remaining field team required to complete all planned activities will occur.

3.7.1.3 Equipment

TITAN 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 TITAN personnel or shipped to the site by commercial carrier.

3.7.1.4 Site Setup

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

3.7.1.5 Office / Facilities

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

3.7.1.6 Work Site

Immediately upon arrival for the first field workday, TITAN will setup the work site. Where feasible, TITAN 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, TITAN will utilize GPS units and buoys or other similar means to establish the work areas. One week prior the start of intrusive operations TITAN's PM 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 foot print 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 documents the clearance area. TITAN will utilize GPS units and buoys or other similar means to establish the work areas within the river. 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 an IVS. Daily checks will be conducted by each instrument operator using his assigned instrument on the IVS. 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 he uses proper techniques and can properly locate seed items in the IVS. 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 IVS 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 accomplish all QC checks and that the appropriate logbook entries are made.

As boundaries of the areas are being marked, TITAN will establish internal grids or clearance areas. The SUXOS 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 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 3.7.9. 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 in accordance with procedures described in Section 3.7.9. The removal will include all MEC, MPPEH and magnetic anomalies on the surface that could mask items in the subsurface and no munitions debris 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 using magnetometers 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 3.7.13. 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/UXO, 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 a 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 shows 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. TITAN will utilize GPS units and buoys or other similar means to establish the work areas within the river. TITAN 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 magnetometer (such as a Schonstedt GA-52Cx), or an all-metals detector (such as a White's Metal Detector), or equivalent 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 ESS for explosives safety information).

3.7.2. MEC Accountability and Records

As UXO/MPPEH is located it will be documented on the MEC Accountability Log (Appendix F). A detailed accounting of all suspected UXO/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 UXO item encountered will be identified using a unique numerical identifier, such as A-3-0001 (for first suspect item (0001) encountered in the Removal Area/Grid A-3).

Photographs of or suspect UXO/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 have 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 Explosives Safety Submission (ESS).

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, in accordance with the SOW (Appendix A). UXO Technicians will visually search and use magnetometers such as Schonstedt GA52Cx, White's Metal detector, or similar equipment to locate MEC/MD. 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, TITAN will ensure effective removal in portions of the designated areas. Brush clearance will be conducted by UXO qualified personnel. The purpose of the brush clearance is to allow an effective removal of MPPEH as required in the SOW.

TITAN will conduct brush-cutting operations only as necessary to allow for MEC/UXO detection and removal efforts to take place unrestricted from vegetation undergrowth. TITAN will perform minimum brush removal required to clear the surface and subsurface of MPPEH/MD required by the PWS. Underbrush, tall grass, shrubs, small trees, and limbs may be cut in order to allow efficient MPPEH detection and /or removal. Cut brush will be removed from the area identified for clearance, if necessary to prevent interference with site operations. TITAN'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. TITAN 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, TITAN 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 TITAN brush cutting team will consist of UXO Technicians. In any case, any brush cutting team will include at least two persons, a minimum of one of whom will meet at least the 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, terrain, MPPEH, etc. Brush cutting teams will consist of no less than two personnel.

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. TITAN 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.

TITAN's 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.

TITAN's UXOSO/QCS will observe removal operations to ensure that safe, quality work is conducted in compliance with the requirements of the Work Plan. The UXO/QCS 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. UXOQCS will conduct blind seeding within the clearance area to ensure that Complete QC procedures are contained in Chapter 4.

All magnetometers 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. Magnetometers will be tested on a test strip in accordance with Section 4.7.3.

3.7.8.4 Search Lanes

Those areas requiring a 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 magnetometer (Schonstedt GA-52Cx, White's Metal Detector, or equivalent) 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 MPPEH, including UXO, DMM, MD, and Range Related Debris, will be inspected by the SUXOS and UXOSO to determine if it is acceptable to move. If, after inspection, it remains MPPEH and can be safely moved, it will be consolidated and destroyed by detonation as described in Section 3.7.11. If it is not acceptable to move, it will be blown in place as described in Section 3.7.11 All MD and RRD will be handled and processed IAW Section 3.7.13.

3.7.9. MEC Holding Areas

TITAN will establish a holding area for MEC/UXO. TITAN will utilize an ATF Type 2 magazine with proper grounding and fencing adjacent to the clearance site. This will allow for acceptable to movie items to be stored until demilitarization of the item can occur.

3.7.10. MEC/UXO Disposal

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

TITAN will utilize on-call explosives and conduct demolition operations. The following are the responsibilities of TITAN personnel in the event demolition operations is to be commenced.

3.7.10.1. Personnel Responsibilities

SUXOS – The SUXOS has overall responsibility for reporting and disposition of MEC/UXO. 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 MD, RRD and CD.

UXOSO and the UXOQCS – The UXOSO and the UXOQCS are responsible for insuring 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.

UXO Tech II – The UXO Tech II will perform demolition duties as assigned.

UXO Tech I/Sweeper – The UXO Tech I/Sweeper will perform demolition duties as assigned.

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 exclusion zone.

If an unidentifiable MEC/UXO is found, or toxic chemical ordnance is found, TITAN will coordinate for EOD support through the DESC on-site representative APEX and Fort Jackson EOD Unit or local law enforcement.

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.

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

3.7.12. Off-Site Transportation

TITAN does not anticipate transporting any MEC / UXO items off-site for disposal. If items are required

to be demilitarized offsite, TITAN will report this to the DESC on-site representative and implement TITAN's explosive safety measures to secure. TITAN in conjunction with DESC will contact Richland County bomb squad at (803) 576-3000 for assistance. If Richland County Shariff's Department cannot respond TITAN in combination with DESC will request Richland County Shariff's Department to contact the South Carolina State Law Enforcement Division (SLED) for assistance with the item. If SLED cannot support TITAN and DESC will call for SLED to contact U.S. Military EOD to assist with demilitarization of the item.

3.7.13. Collection Points

Collection points will be performed in accordance with the approved ESS.

3.7.14. Demolition and Post Demolition Operations

- Demolition and Post Demolition Operations will be performed in accordance with the approved ESS.

3.7.15. General Demolition Practices

Personnel will adhere to the following standard safe practices and procedures when conducting demolition operations:

- Review electromagnetic radiation (EMR) hazards and precautions and electrical grounding procedures;
- Carry blasting caps in approved containers and keep them out of the direct rays of the sun;
- Do not handle, use, or remain near explosives during the approach or progress of an electrical storm. All persons will retire to a place of safety;
- Do not use explosives or accessory equipment that are deteriorated or damaged. They may detonate prematurely or fail completely;
- Do not abandon any explosives. Fatal or serious accidents can result from such careless practice;
- Do not use unexploded dud ordnance items for demolition purposes. They may be in an extremely sensitive and hazardous condition;
- Disposal operations will not be initiated until at least one-half hour after sunrise and will be concluded by at least one-half hour prior to sunset;
- Restrict and control access to the disposal site to a minimum of authorized personnel necessary for safe conduct of the disposal operations;
- Do not carry fire- or spark-producing devices into a disposal site except as specifically authorized;
- Do not smoke except in areas specifically designated. After smoking, assure that all burning tobacco is extinguished; and
- Avoid inhaling, and skin contact with explosives, the smoke, fumes, vapors of explosives, and related hazardous materials.

3.7.16. Handling Demolition Materials

When handling demolition materials, TITAN UXO Technicians will observe the following rules and safe practices:

- Do not strike, tamper with, or attempt to remove or investigate the contents of a blasting cap

(electric or non-electric), detonator, or other explosive initiating device. A detonation may occur.

- Do not pull on the electrical lead wires of electric blasting caps, detonators or other electro-explosive devices. A detonation may occur.
- Do not attempt to remove an unfired or misfired primer or blasting cap from a coupling base. There is a high risk of an explosion.
- Always point the explosive end of blasting caps, detonators, and explosive devices away from the body during handling. This will minimize injury should the item explode.
- Shaped charges - be certain there is no obstruction in the conical cavity or between the charge and the target, as any obstruction will materially reduce the penetration effect.

3.7.17. Preparation for Electric Firing

When preparing firing systems, TITAN will:

- Use only standard blasting caps of at least the equivalent of a commercial No. 8 blasting cap.
- If using electric blasting caps, all caps will be of the same manufacture, for each demolition shot involving more than one cap.
- Keep blasting caps in approved containers, located at least 7.62 meters (25 feet) from other explosives, until needed for priming.
- Do not bury blasting caps. Use detonating cord to position blasting caps above the ground. Buried blasting caps are subject to unobserved pressures and movement, which could lead to premature firing or misfires.

3.7.18. Electric Priming

- TITAN plans to use an RFD. TITAN plans to prime with electric detonators attached to the receiver unit(s). Depending upon availability, Non-El (shock tube) detonators may be used in place of electric detonators. Non-electric procedures are included at paragraph 3.7.26.

TITAN will prepare electric priming systems using the following techniques and procedures:

- Test electric-blasting caps for continuity at least 50 feet downwind from any explosives prior to connecting them to the firing circuit. Upon completion of testing, the lead 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.
- Unroll the lead wires so that the cap is as far as possible from the operator and pointing away from him/her. Place the blasting cap under a sandbag or behind a barricade before removing the shunt and testing for continuity. Make sure the cap does not point toward other personnel or explosives.
- Use only the special silver-chloride dry cell battery in the testing galvanometer. Other types of dry cells may produce sufficient voltage to detonate blasting caps.
- Do not connect the power source to the firing wires until all pre-firing tests have been completed and until ready in all respects to fire the charges.
- Do not hold the blasting cap directly in the hand when uncoiling the leads. Hold the wires approximately 152 millimeter (6 inches) from the cap. This will minimize injury should the cap explode. The lead wires will be straightened by hand and not thrown, waved, or snapped to loosen the coils.
- Do not remove the shunt from the lead wires of blasting caps except for testing for continuity or

actual connection into the firing circuit. The individual removing the shunts will ground himself prior to this operation to prevent accumulated static electricity from firing the blasting cap.

- Keep both ends of the firing wires shorted or twisted together except for testing or firing. Do not connect the blasting caps to the circuit firing unless the power ends of the circuit firing leads are shorted.
- Keep all parts of the firing circuit insulated from the ground or other conductors such as bare wires, rails, pipes, or other paths of stray current.
- The UXO person in-charge will order the final priming of the shot.

3.7.19. Firing Demolition Charges

Keep the power end of the firing wire shunted until ready to connect the power source.

The signal for detonation will be given by the UXO person in-charge only after all personnel in the area have reached cover or a safe distance from the charge.

Prior to making connections to the power source, test the firing circuit for electrical continuity.

The UXO person in-charge will order the firing wires to be connected to the power source. He will maintain control over the activating device, while verifying that the area is clear of personnel, animals, and equipment, including aircraft.

When using a firing panel, lock the switch in the open position until ready to fire. The single key will be in the possession of the UXO person in-charge.

Do not complete the circuit at the power source (panel) or give the signal for detonation until directed to do so by the UXO person in-charge.

Do not attempt to fire a single electric blasting cap or a combination of electric blasting caps in a circuit with less than the minimum current required by the total circuit. Misfires can be expected where this occurs.

The UXO person in charge and a safety observer shall check the shot following the detonation.

The team will search the area after each firing for any remaining explosive components and loose explosives. Scattered explosive material should be carefully gathered and destroyed by detonation with the next shot. If left in place, these items can create an additional explosive hazard. This search includes verifying that a secondary item is not present in the area after conducting “blow-in-place” operations. Always check the “blow-hole” for secondary items and remove all MD.

Electro-Magnetic Radiation (EMR) Hazards. Prior to the application of detonation-in-place procedures, an EMR survey shall be conducted to determine if there are any transmitting antennas of radio, radar, or other electro-magnetic-generating devices located in the vicinity.

Radio Frequency (RF) EMR. RF EMR consists of waves of electrical energy. These waves are radiated in a line-of-site from the antennas of electronic devices that transmit radio, radar, television, or other communication, to include cellular telephones, or other communication or navigation radio frequency signals. Table 3-1 states the minimum safe distance from electro-explosive devices

(EEDs) and the transmitting antenna of all RF emitters. Table 3-2 states the minimum safe distances, which will be maintained between Mobile RF transmitters and electric blasting operations. The factors to be considered when evaluating the degree of hazard that the EMR (RF) energy represents are:

- The strength of the field (its power);
- The frequencies transmitted;
- The distance from the transmitter antenna to the ordnance; and
- The amount or type of protection available.

Table 3-1 Minimum Safe Distance from Electro-explosive Devices (EEDs) and RF Transmitter Antenna Emitters

AVERAGE OR PEAK TRANSMITTER POWER IN WATTS	MINIMUM DISTANCE TO TRANSMITTER IN METERS/FEET
0 – 30	30 / 98.4
31 – 50	50 / 164.1
51 – 100	110 / 360
101 – 250	160 / 525
251 – 500	230 / 755
501 - 1,000	305 / 1,000
1,001 - 3,000	480 / 1,575
3,001 - 5,000	610 / 2,001
5,001 - 20,000	915 / 3.002
20,001 - 50,000	1,530 / 5,020
50,001 – 100,000	3.050 / 10,007
100,001 - 400,000	6,100 / 20,014
400,001 - 1,600,000	12,200 / 40,028
1,600,000 - 6,400,000	24,400 / 80,056

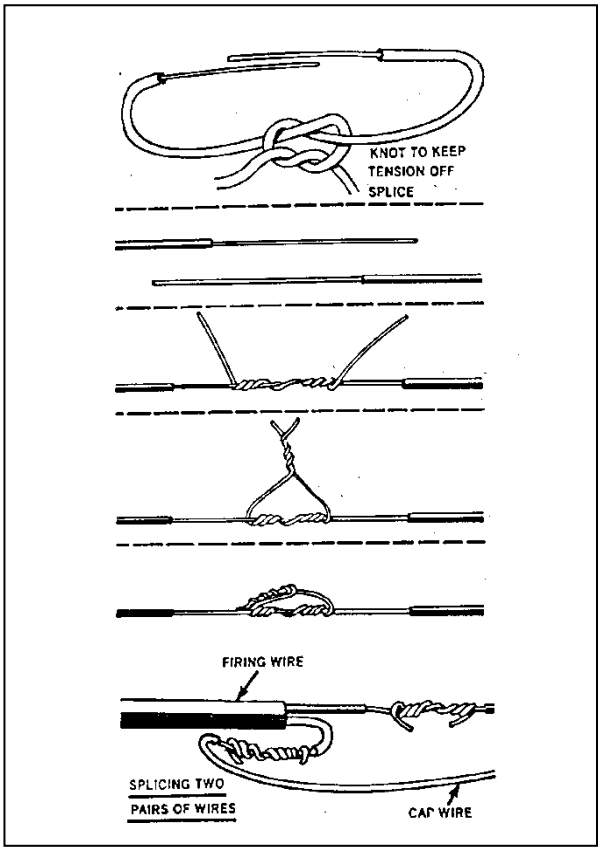
* When the transmission is a pulsed or pulsed continuous wave type and its pulse width is less than 10 microseconds, the power column indicates average power. For all other transmissions, including those with pulse widths greater than 10 microseconds, the power column indicates peak power.

Table 3-2 Minimum Safe Distances in Feet Between Mobile RF Transmitters and Electric Blasting Operations

Transmitter Power (Watts)	MF to 3.4 MHz Industrial	HF 28 to 29.7 MHz Amateur	VHF 35 to 36 MHz 42 to 44 MHz 50 to 64 MHz	VHF 144 to 148 MHz 150.8 to 161.6 MHz	UHF 450 to 460 MHz Cellular Car Phones above 800 MHz
5[1]	30	70	60	20	10
10	40	100	80	30	20
50	90	230	180	70	40
100	120	320	260	100	60
180[2]	170	430	350	130	80

[1] Citizens band radio (walkie-talkie) (26.96 to 27.41 MHz) - minimum safe distance -five feet. Double sideband - 4 watts maximum transmitter power - hand-held, 5 feet; vehicle mounted, 65 feet. Single sideband - 12 watts peak envelope power - handheld, 20 feet; vehicle mounted, 110 feet.
[2] Maximum power for 2-way mobile units in VHF (150.8 to 161.6 MHz range) and for 2-way mobile and fixed station units in UHF (450 to 460 MHz range).

Lightning, Electric Power Lines, and Static Electricity. Lightning is a hazard to both electric and non-electric blasting caps. A strike or a nearby miss is almost certain to initiate either type of cap or other sensitive explosive elements such as caps in delay detonators. Lightning strikes, even at remote locations, may cause extremely high local



earth currents, which may initiate electrical firing circuits. Effects of remote lightning strikes are multiplied by proximity to conducting elements, such as those found in buildings, fences, railroads, bridges, streams, and underground cables or conduit. The only safe procedure is to suspend all blasting activities during electrical storms and when one is impending. All blasting activities will be suspended when lightning- thunder storms are within ten miles of the project site.

Electrical firing will not be performed within 510 feet of energized power transmission lines. When it is necessary to conduct disposal operations at distances closer than 510 feet to electric power lines, non-electric firing systems will be used or the power lines de-energized.

Many electric blasting caps have been detonated because they grounded static electricity that was in the air. Static electricity is produced by a great variety of causes; among them, dust storms, which have caused a large number of detonations; snow storms, less dangerous, but known to have caused premature explosions; and escaping steam, known to have charged the air and detonated electric caps. Enough static electricity to detonate electric caps also can be generated by such sources as moving belts and revolving automobile (truck) tires. Static electricity is an increased hazard when operating in an extremely cold climate or area of low humidity.

3.7.20. Preparation of Demolition Shots

After determining and locating a safe location away from the charges, lay out the firing wire and prepare and place all explosive charges.

3.7.21. Test Firing Wire

If using the blasting galvanometer/M51 test set - check the galvanometer by holding a piece of metal across its terminals. If the battery is good, there should be a wide deflection of the needle. Check the M51 test set by holding a piece of wire across its terminals and depress handle - lamp should glow.

When using a Model “D” Blaster’s Ohmmeter with the Lawrence Silver Chloride Dry Cell, a full needle

indication is required. Frequently cells, which have been stored for long periods of time, will require re-activation. To obtain full-scale deflection of the

meter needle, the meter contact posts should be shorted with a metal instrument such as a screwdriver or knife blade. Place the metal blade in full contact with both terminals simultaneously for a period of twenty seconds to one minute. This should activate the cell to full-scale deflection. If it does not, do not use the ohmmeter.

Separate firing wire connectors at both ends, and touch those at one end to galvanometer/test set posts. The needle should not move nor lamp glow. If either occurs, the firing wire has a short circuit.

Twist wires together at one end and touch those at the other end to the galvanometer/test set posts. This should cause a wide deflection of the needle or the lamp to glow. No movement of the needle indicates a break; a slight movement indicates a point of high resistance, which may be caused by a dirty wire, loose wire connections, or wires with several strands broken off at connections. Note: Firing wire can be tested on the reel, but unnoticed broken wires could produce false readings. Firing wire must be tested after unreeling. Caution: Do not drag a firing cable over sand or other insulated surfaces as this can generate a static charge that will electrically fire blasting caps.

Twist free ends of firing wire together to prevent an electric charge from building up in the firing wire.

3.7.22. Test Blasting Caps

Complete the following steps in order to test the electric blasting caps:

- Test galvanometer/M51 test set as outlined above.
- Test electric-blasting caps for continuity at least 50 feet downwind from any explosives prior to connecting them to the firing circuit.
- Place the cap under a sandbag or other protective device in the event that the cap accidentally functions.
- Individual conducting this test will ground himself prior to removing the shunt.
- Remove short circuit shunt.
- Touch one cap lead wire to one post and the other cap lead wire to the other post. If the galvanometer's needle deflects slightly less than it did when instrument was tested, or the lamp glows, the blasting cap is satisfactory; if not the cap is defective. Destroy it on the detonation. Note: If the battery is fresh, the galvanometer should read at least half scale when the instrument is tested and when a good blasting cap is tested.

3.7.23. Connecting the circuit.

Complete the following steps when connecting an electrical firing circuit:

- At the firing position, keep the free ends of the firing wire twisted together until ready to connect the blasting machine.
- Individual will ground himself prior to performing next step.
- Splice free cap lead wires to firing wire.
- Insert cap into charge.

3.7.24. Firing Procedures

Complete the following steps in order when firing the shot:

- Test the entire circuit. Move to the firing position and test the entire firing circuit with the galvanometer or test set as outlined above. If the firing circuit is defective, shunt wires; go down-range and recheck circuit. If the splice is found defective, re-splice wires. If cap is found defective, replace it.
- Twist free ends of firing wire together.
- Exercise the blasting machine. Test blasting machine by actuating it several times with nothing attached to the terminals.
- Connect blasting machine.
- Sound a warning (siren, horn, etc.) and loudly call out "Fire in the hole"! three times. (Specific procedures for warnings and notifications will conform to SOP for demolition operations at CRP)
- Activate blasting machine.

3.7.25. Electric Misfire

Prevention of electric misfires: In order to prevent misfires, insure that:

- All blasting caps are included in the firing circuit;
- All connections between blasting cap wires, connecting wires, and firing wires are properly made;
- Short circuits are avoided;
- Grounds are avoided; and
- Number of blasting caps in any circuit does not exceed rated capacity of power source on hand.

Causes of electric misfires. Common specific causes of electric misfires include:

- Inoperative or weak blasting machines or power source;
- Improperly operated blasting machine or power source;
- Defective and damaged connections, causing either a short circuit, a break in the circuit, or high resistance with resulting low current;
- Faulty blasting caps;
- The use in the same circuit of blasting caps made by different manufacturers or different design; and
- The use of more blasting caps than power source rating permits.

Clearing electric misfires. If charge is primed electrically, proceed as follows:

- Make three successive attempts to fire;
- If unsuccessful, remove firing wires from blasting machine and check continuity of firing circuit.
- If continuity is good, reattach firing wires to blasting machine and make 3 more attempts to fire charge;
- Check firing wire connections to terminals of the blasting machine and make 3 more attempts to fire charge;
- Change blasting machine after third unsuccessful attempt with original blasting machine.
- If still unsuccessful, disconnect blasting machine from firing wire ends and shunt firing wire by

twisting firing wire ends together;
- Allow a minimum of 30 minutes to elapse from the last attempt to fire, before starting to investigate;
- Remove and disconnect old blasting caps and shunt wires; Connect wires of new blasting cap(s) to firing circuit and re-prime charge; and
- Reconnect firing wire ends to blasting machine and fire charge.

3.7.26. Non-electric Procedures

A nonelectric (shock tube) detonator firing system is designed to initiate demolition charges when a lightweight, low-initiating explosive weight, nonelectric, non-fragmenting, and waterproof initiating system is desired. These systems are made up of nonelectric detonators with pyrotechnic leads, pyrotechnic lead initiators, firing devices, and connectors. These systems provide control similar to electric initiating systems. The nonelectric detonators are not hazards of electromagnetic radiation to ordnance (HERO) or electrostatic sensitive. Unlike standard nonelectric blasting caps, no crimping or water sealing of the detonator or pyrotechnic lead is necessary and time fuze is not required in most applications. All handling procedures for donor explosives will be done as with electric firing systems.

- After determining and locating a safe location away from the charges prepare and place all explosive charges.
- The UXO person in charge will order the final priming of the shot.
- Make sure detonator is not pointed toward personnel or explosives.
- Unspool nonelectric detonator (with pyrotechnic lead) from demolition charge to required standoff.
- Insert or attach detonator to demolition charge.
- The UXO person in-charge will order the lead to be connected to the power source. He will maintain control over the activating device, while verifying that the area is clear of personnel, animals, and equipment, including aircraft.
- Attach lead to firing device (initiator or receiver) IAW the manufacturer's instructions.
- When using a firing panel, lock the switch in the open position until ready to fire. The single key will be in the possession of the UXO person in-charge.
- Fire the shot using the initiating device IAW the manufacturer's instructions.
- The UXO person in charge and a safety observer shall check the shot following the detonation.
- The team will search the area after each firing for any remaining explosive components and loose explosives. Scattered explosive material should be carefully gathered and destroyed by detonation with the next shot. If left in place, these items can create an additional explosive hazard. This search includes verifying that a secondary item is not present in the area after conducting "blow-in-place" operations. Always check the "blow-hole" for secondary items and remove all MD.

- In the event of a misfire, follow the RFD manufacturer's procedures in order:
  - Do not approach the shot until 30 minutes has elapsed.
  - Igniter tip may be worn or damaged. Try a new tip.
  - There may be water on the tip. Blow out the tip and test fire the tip without any tube installed.

- Shock tube may be damaged or defective. Cut a one-foot section beginning approximately six inches from the igniter. Hold one end of the one-foot section over the palm of your hand and gently blow through the other end. If a fine powder is blown out of the tube, reattach the pyrotechnic lead to the igniter tip.
- Replace the detonator assembly and shock tube and attempt the detonation again.

3.7.27 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 UXO, a DMM, munitions debris, 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 munitions debris and DMM will be picked up by UXO removal team during surface sweep and subsurface removal operations.

The munitions debris and DMM will be placed into containers for collection while sweeping. When the containers are approaching full, they are transported to a predetermined location on the site.

All munitions debris and DMM will be re-inspected by the UXO removal Team Leader (UXO Tech III) prior to transportation to the secured containers.

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 material will be placed in lockable containers, for security, before turning in for recycling. In accordance with Chapter 14 of EM 1110 dated 15 June 2007, and Errata Sheet No. 2, TITAN 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.

Items that require demilitarization TITAN will report this to the DESC on-site representative and implement TITAN's explosive safety measures to secure and render safe MEC/UXO. If the item is something that the SUXOS and UXOSO believes to be outside of their knowledge TITAN in

conjunction with DESC will contact Richland County bomb squad at (803) 576-3000 for assistance. If Richland County Shariff's Department cannot respond TITAN in combination with DESC will request Richland County Shariff's Department to contact the South Carolina State Law Enforcement Division (SLED) for assistance with the item. If SLED cannot support TITAN and DESC will call for SLED to contact U.S. Military EOD to assist with demilitarization of the item.

Items that require demilitarization will be demilitarized in accordance with DoD 4160.21-M-1, Defense Demilitarization Manual. All MEC/UXO/DMM items will be investigated to ensure that there are no explosives remaining in the items and that only inert filled or empty items are removed from the grid. Redundancy is built into the investigation process to assure no MEC items are removed from the site.

SUXOS will be responsible for ensuring work and Quality Control (QC) Plans specify the procedures and responsibilities for processing MPPEH for final disposition as UXO, DMM, munitions debris or range-related debris.

3.7.28 Munitions Debris (MD)

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 debris 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 USACE/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 TITAN 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. TITAN will also provide these documents within the Final Report.

3.7.29 Disposal Alternatives

If MPPEH is discovered that cannot be destroyed on-site, the SUXOS will coordinate with the DESC on-site representative and implement TITAN's explosive safety measures to secure. TITAN in conjunction with DESC will contact Richland County bomb squad at (803) 576-3000 for assistance. If Richland County Shariff's Department cannot respond TITAN in combination with DESC will request Richland County Shariff's Department to contact the South Carolina State Law Enforcement Division (SLED) for assistance with the item. If SLED cannot support TITAN and DESC will call for SLED to contact U.S. Military EOD to assist with demilitarization of the item.

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 with impacted sediment material.

3.10. Risk Characterization and Analysis

Risk Characterization and Analysis is 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 TITAN 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.

TITAN 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 this MEC Removal Project. This site-specific QC plan is designed to manage, control, and document 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 implementation of data management QC procedures.
- Ensure the development of an 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 TITAN employees and team members are empowered to identify and evaluate potential quality problem areas and are encouraged to recommend solutions or corrective actions.

TITAN 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 TITAN 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 / SSHP prior to the performance of any MEC-related activities on a project site.

TITAN will take corrective actions on any complaint, quality defect, or negative result 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 in (6 lbs shell) in diameter or width with a thickness (length) of 3.55 in 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 in in

diameter or width with a thickness (length) of 3.55 in (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 TITAN personnel during the accomplishment of the organization's mission to determine conformance to contract requirements.
- QC: The process by which TITAN 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 UXO items 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

TITAN 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 in accordance with 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 Project Manager has the responsibility of ensuring that QC procedures are implemented in accordance with the work plan and applicable documents identified within it.

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

- Required site training is conducted prior to the start of field activities.
- The UXOQC Specialist is 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 TITAN UXOQCS. He 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 QA/QC Manager. Scheduled activities are coordinated with the Project Manager, SUXOS, UXOSO, and all other project team members as needed. He has the authority to:

- Initiate action to prevent the occurrence of nonconformance's 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 QA requirements. During site-specific training, personnel will be briefed by the QA/QC Manager or the UXOQCS, on the importance of quality work and the above stated requirements. This briefing is aimed at insuring that all site personnel understand TITAN'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 Government.

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.

4.7.2. Scheduled Audits

Periodic audits will be performed by the QA/QC 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 functioning properly, the operator will conduct a sweep of the IVS, 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 test plot. 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 test strip 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 IVS and Table 4-1 includes seed item placement details. The UXOQCS is responsible for ensuring that personnel accomplish all QC checks and that the appropriate logbook entries are made. The UXOQCS performs random, unscheduled QCI to ensure that personnel accomplish 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.

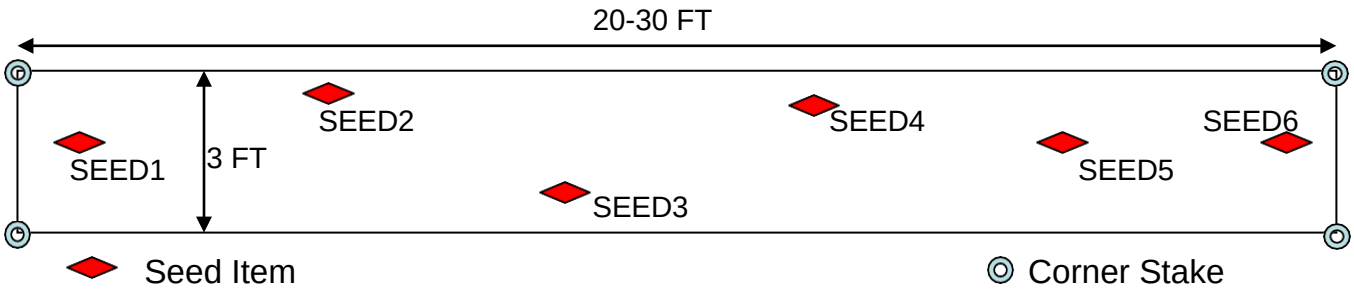


Figure 4-1 IVS Conceptual Layout

Table 4-1 IVS Seed Item Description

IVS Seed Item Description			
Seed Item ID	Description	Depth [in]	Notes
SEED1	10 lb Shell	34	Oriented approximately 45° from horizontal and parallel to the major axis of the test strip
SEED2	6 lb Shell	28	Oriented approximately 90° from horizontal and parallel to the major axis of the test strip
SEED3	10 lb Shell	46	Oriented approximately horizontal and approximately perpendicular to the major axis of the test strip
SEED4	6 lb Shell	39	Oriented approximately 45° from horizontal and parallel to the major axis of the test strip
SEED5	8 lb Shell	31	Oriented approximately 45° from horizontal and perpendicular to the major axis of the test strip
SEED6	8 lb Shell	43	Oriented approximately 45° from horizontal and perpendicular to the major axis of the test strip

Note: Seed items may be inert items or simulants with similar dimensions. At least two items will be blind seed items that are periodically moved by the UXOQCS.

Table 4-2 Frequency of QC/QA 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 the 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, in accordance with DID WERS-004.01.

Table 4-3 Performance Requirements Matrix

Performance Requirements Matrix				
Requirement	**Applicability**	**Performance Standard**	**Frequency**	**Consequence of Failure**
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 the next working day.
Coverage	Site	100% of the area swept and anomalies removed / No MEC of any size and no RD/MD items ≥ 3.55 in (6lb 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 (6 lb) 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 source of 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) inert MD items or surrogates (similar to those used to seed the test strip) in area 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 accurately locate them. The location, depth, and 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. The seed items may be metallic covers for electrical junction boxes or other suitable surrogate item, painted and identified with a unique number. 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 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, TITAN 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 facsimile or email to the Project Manager and the QA/QC Manager.

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 Project Manager 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 Project Manager and the QA/QC Manager.

Nonconformance will be evaluated and corrective action implemented by on-site management whenever possible. The Project Manager and QA/QC Manager 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 Project Manager 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 Project Manager 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 Manager.

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. Floppy disks, Zip disks, CDs or other means of storage will be used in addition to standard computer hard drives to assure 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 file name 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 back up should the current days log be damaged or lost.

4.14. PHOTOGRAPHIC RECORDS

Photographs will be generated to document significant site activities, MPPEH, and MEC. Photographic records will be used to supplement information recorded in the daily logs, to include 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 in accordance with 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 and munitions, range-related and clutter. 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 facsimile or email to the

Project Manager 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 down time.
- 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 indicating 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 indicating 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, person conducting the briefing and attendees).
- Visitor Training (including names of visitors, description of training, and person performing training).
- Signatures of the SUXOS and UXOQCS indicating concurrence.

4.19. MEC IDENTIFICATION AND REPORTING

At least two UXO qualified personnel 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 UXO/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 UXO/MPPEH item encountered will be identified using a unique numerical identifier, such as A5–0001 (for first suspect item (0001) encountered in grid/area A5).

Photographs of suspect MEC 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 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 prevent 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 Project Manager will verify that all project personnel have 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 course of instruction meeting the requirements in DDESB TP 18 appropriate to the level of employment.
- OSHA 40 Hour Hazardous Waste Operations and Emergency Response (HAZWOPER) in accordance with 29CFR1910.120 and 8 hour refreshers as need.
- 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 Project Manager 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 Project Manager.

- 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 exclusion zone and all UXO operations will cease whenever a visitor is within the exclusion zone.

4.22. CHEMICAL QUALITY DATA MANAGEMENT (CQDM)

No Hazardous, Toxic and Radiological Waste (HTRW) or 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 government 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 inert UXO/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 DOT regulations. Explosives used in the performance of this Task Order will be obtained by TITAN from commercial sources. These materials will be obtained and used for the specific purpose of disposal of MEC and explosive venting of inert MEC items, if required, located during the MPPEH Removal activities at the CRP site. An 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

TITAN will maintain on site and, upon request, make available to any local, state, or federal authority a copy of all licenses/permits required authorizing TITAN or subcontractor to purchase, store, transport, or use explosives. If no other licenses or permits are required by the state, TITAN 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 UXO/MPPEH and explosive venting of inert items, if required, located during the removal action. A remote firing device with an electrical or nonelectrical (shock tube) firing system will be utilized. If a remote firing device 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 will include:

- 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 1/2 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).

Quantities of explosive materials required to conduct the day's operation will be ordered from the vendor, as required, and delivered to the site on the day they are required. MEC will be marked and guarded, if necessary (e.g. accessible to the public), until disposal is accomplished. TITAN estimates 2

ea. electric blasting caps (1.4B); and 2 ea. 32-gram perforators (1.1D) and/or 2 ea ½- pound cast booster (1.1D) will be used during disposal or venting operations for a single item and 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

TITAN will obtain donor explosives from regional explosives vender 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, a separate TITAN Memorandum will be prepared, with the following information, and retained on-site:

- Date of acquisition
- Name or brand name of 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 Project Manager will be notified telephonically, with a copy of the memorandum and a copy of the invoice being faxed as soon as possible.

5.7. Establishment of explosive storage facility

TITAN will not establish a storage facility for donor explosives at CRP. Donor explosive materials required for destruction or venting of 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.

MPPEH will be stored in a 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. 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

TITAN does not plan to establish an explosives storage facility 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, TITAN will comply with all applicable regulations and requirements of ATF regulations, and USACE requirements for security of explosives.

5.9. Transportation

When transporting donor explosives within the project site to the disposal location:

- Vehicles carrying explosives should be inspected and have a Motor Vehicle Inspection DD Form 626 completed.
- Vehicles used for transportation of explosive materials will not be loaded beyond their rated capacity and the explosive materials will be secured to prevent shifting of load or dislodgment from the vehicle; when explosive materials are transported by a vehicle with an open body, a magazine or closed container shall be securely mounted on the bed to contain the cargo.
- All vehicles transporting explosive materials shall display all placards, lettering, and/or numbering required by DOT and will have two each 10BC fire extinguishers on board.
- Explosive materials and blasting supplies shall not be transported with other materials or cargos. Blasting caps (including electric) shall not be transported in the vehicle or conveyance with other explosives unless the conditions of 49 CFR 177.835(g) are met (i.e., an IME-22 Container is used to transport the blasting caps).
- All vehicles used for transportation of explosive materials will be in the charge of and operated by a person who is physically fit, careful, reliable, able to read and understand safety instructions, and not under the influence of intoxicants or narcotics.
- Only the authorized driver and his or her helper will be permitted to ride on any conveyance

transporting explosive materials or detonators.

- Explosives will not be exposed to sparking metal during transportation of materials and all electric wiring will be completely protected and securely fastened to prevent short circuits.
- Vehicles used to haul explosives will be properly inspected and an "Explosives Motor Vehicle Inspection Checklist" completed and kept on file.
- Vehicles transporting explosive materials will be operated with extreme care; full stops will be made at approaches to all railroad crossings and main highways and the vehicles shall not proceed until it is known that the way is clear.
- No vehicle will be refueled while explosive materials are on the motor vehicle except in an emergency.
- Persons employed in the transportation, handling, or other use of explosive materials will not smoke or carry on their persons or in the vehicle, matches, firearms, ammunition, or flame-producing devices.
- Vehicles transporting explosive materials will not be left unattended.

5.10. Requirements for vehicles transporting explosives to the removal site

All applicable requirements of DOT and ATF regulations that apply to transportation of explosives on the removal site will be enforced.

5.11. Receipt Procedures

5.11.1. Accountability

Upon receipt from the vendor, accountability will be established for each type of explosive material in accordance with Paragraph 5.6 above. Copies of vendor invoices will be kept with the receipt memoranda 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 5.14 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.

5.11.2. Designated Individuals

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

- Senior UXO Supervisor
- Site Safety and Health 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

5.11.3. Explosive Use Certification

At the conclusion of the intrusive activities at the CRP, the SUXOS will complete an TITAN Memorandum stating all donor explosives expended during MEC removal operations were used for their intended purpose. Any explosives remaining after a disposal operation will be disposed of in accordance with Section 5.16.

5.12. Inventory

TITAN will not store explosives on the site and therefore only the initial inventory, as described Section 5.6, will be required.

5.13. 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 Contracting Officer, followed up by a written report within 24 hours
- Notify the Bureau of Alcohol, Tobacco, and Firearms (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.

5.14. 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.

5.15. 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.

5.15.1. Perform an economic analysis for different alternatives

Since this is a firm fixed price (FFP) task, this requirement does not apply.

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 C.

6.2. Mitigation Procedures

6.2.1. Manifesting, transportation, and Disposal of Waste

TITAN does not anticipate generating any hazardous waste that will require off-site transportation, treatment, storage, or disposal. MEC and/or MPPEH will be destroyed on-site and resulting scrap will be certified as Material Documented as Safe (MDAS) and turned over to a recycler for smelting before it is released to the public.

Non-hazardous, CD 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 and disposed with impacted sediment material.

6.2.2. Burning Activities

TITAN will not conduct burning activities during the performance of work required in the PWS.

6.2.3. Dust and Emission Control

None of the planned activities by TITAN 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 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

TITAN 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

TITAN may place chemical toilets on the site. These toilets will be delivered, setup and serviced by a subcontractor.

6.2.6. Access Routes

TITAN 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. TITAN 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

TITAN does not anticipate extensive excavations for MEC clearance that would require run-on or run-off controls.

6.2.9. Decontamination and Disposal 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 should be contained and disposed with the impacted sediment material.

6.2.10. Minimizing Areas of Disturbance

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

6.3. Post-activity Clean-up

After completing the project, TITAN will cleanup and restore the site to a condition as close to its original condition as possible. All equipment, tools and material will be removed from the site. TITAN will police the site to remove all trash, debris and other waste from the work site. 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 the work planned by TITAN.
No Government Furnished Equipment is to be used on this project.

8. CHAPTER 8 INERIM HOLDING FACILITY SITING PLAN FOR RCWM PROJECTS

This Chapter does not apply to the work planned by TITAN.

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
TITAN Corporate Quality Plan
TITAN Corporate Safety Plan
ERsys.com, http://www.ersys.com/usa/45/4516000/wtr_norm.htm ; 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 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

TITAN
Associates Group Incorporated

Titan Associates Group Inc.
P.O. Box 102 • Athens, Tennessee 37371
Tel: (423) 368-9197 Online: www.titan-associates.net

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.

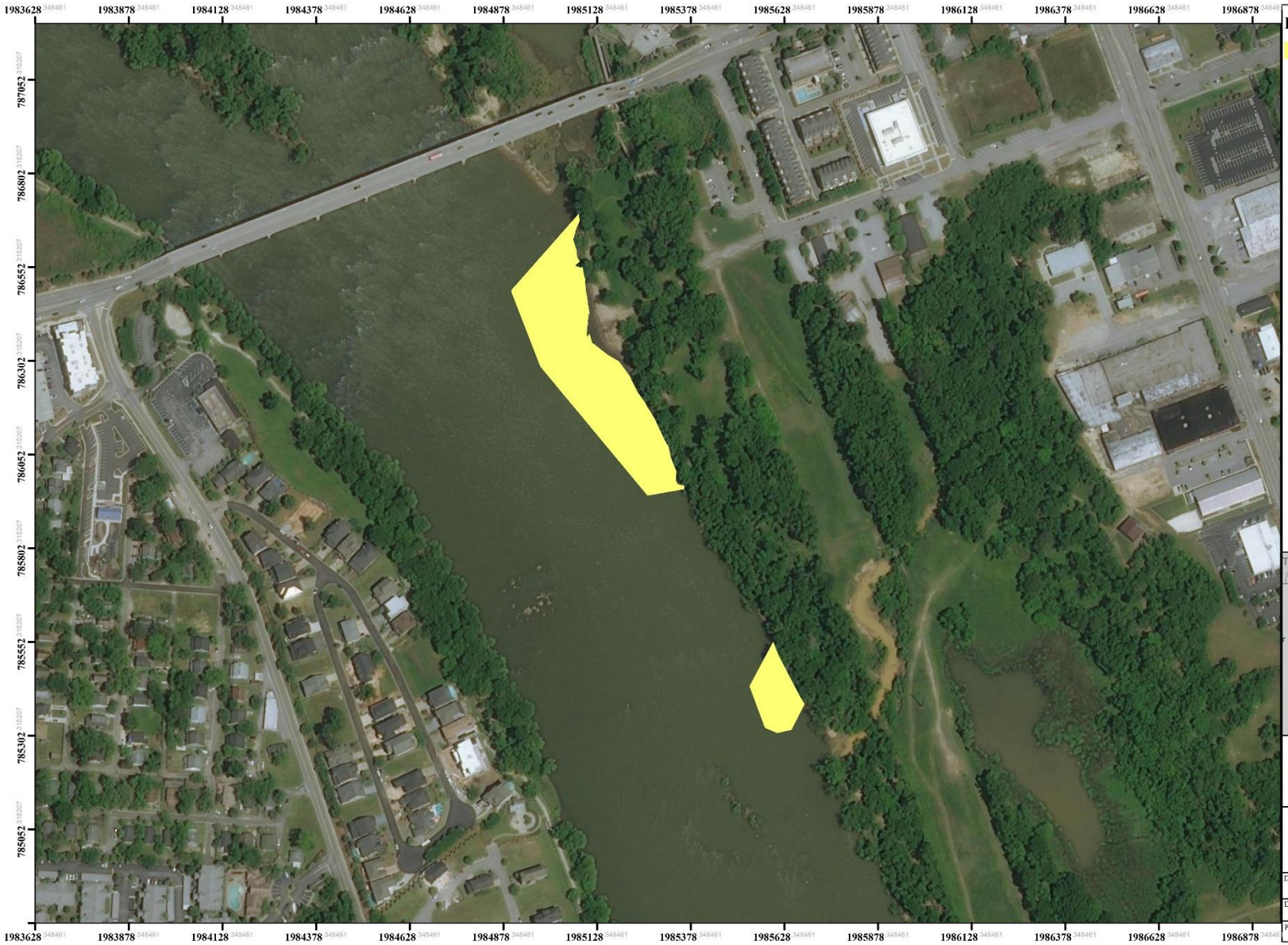
If you have any questions or concerns, please feel free to contact me at 423-368-9197 or email tleonard@titan-associates.net.

Thank you,
Tanya Leonard
President / CEO
Titan Associates Group Inc.
Phone: 423-368-9197
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

18°21'

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

250 125 0 250
Feet
Meters
75 37.5 0 75

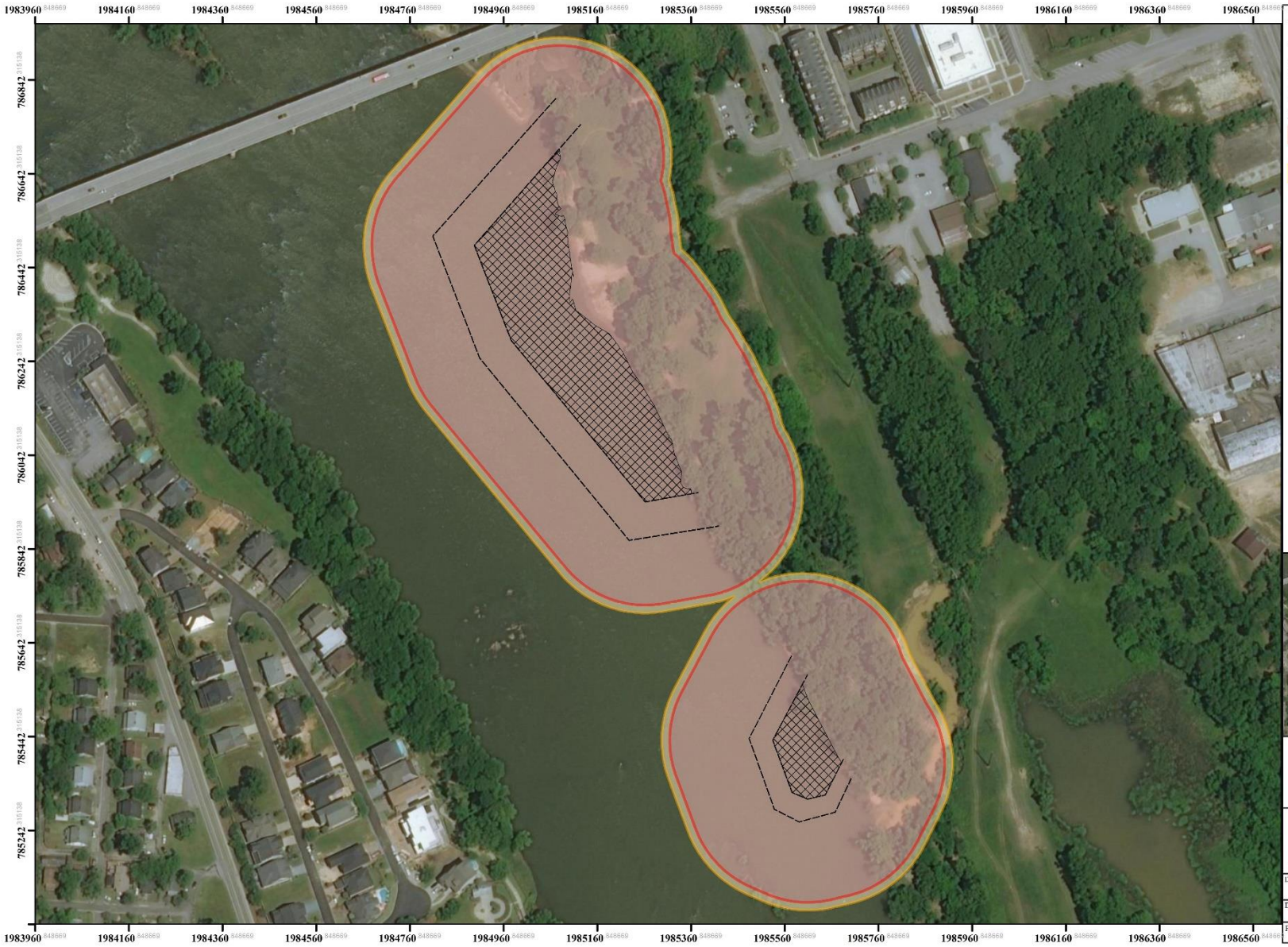
Location Map:
Fort Benning, GA

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

Prepared For:
Apex Companies, LLC

Prepared By:
ITTAN Associates Group inc.

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



Legend

- Proposed Cofferdam 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

18°21'

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

200 100 0 200
Feet

Meters
60 30 0 60

Location Map:
Fort Benning, GA

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

Prepared For:
Apex Companies, LLC

Prepared By:
ITIAN Associates Group inc.

DRAWN	VERIFIED	APPROVED
M. Norris	T. Leonard	
DATE 01/8/2021	FILE B-2 Arcs.mxd	
PAGE # B-2	SCALE 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)

18°21'

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

200 100 0 200
Feet
Meters
60 30 0 60

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:
TITAN Associates Group inc.

DRAWN	VERIFIED	APPROVED
M. Norris	T. Leonard	
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

Emergency Response / Services			
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) **http://www.cdc.gov/health/diseases**			800-311-3435
Project Management / Coordination			
TITAN			
	President	Tanya Leonard	423-368-9197
	Project Manager	Matthew S. Norris, GISP	865-924-9591
	Safety Manager	David Farmer	423-368-9197
DESC			
	Project Manager	Rusty Contrael	412-721-6494
APEX			
	Environmental Program Manager	William Zeli, P.E.	412-829-9650 x5004
USACE			
	TBD	TBD	TBD
Explosives Supplier			
	TBD	TBD	TBD

APPENDIX D ACCIDENT PREVENTION PLAN

MUNITIONS RESPONSE WORK PLAN
CONGAREE RIVER PROJECT

REMOVAL ACTION AND CONSTRUCTION SUPPORT COLUMBIA, SC

1) TABLE OF CONTENTS

Section **Page #**

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.

January 8, 2020
Date

Prepared by:
Jay Johnson, CSP Certified Safety Professional
TITAN Associates Group Inc.
(720)-470-2704

January 8, 2020
Date

Reviewed by:
Tanya Leonard
President/
Program Manager
TITAN Associates Group Inc.
(423) 368-9197

Reviewed by: _____ Date _____

Reviewed by: _____ Date _____

Reviewed by: _____ 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

TITAN Associates Group, Inc. (TITAN) is to provide all Munitions Response (MR) services necessary to remove Material Potentially Presenting an Explosive Hazard (MPPEH), to include munitions debris and Discarded Military Munitions (DMM) from approximately 3.1 acres of at Congaree River Project (CRP), Columbia, SC.

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 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 ordinance disposal (EOD) personnel located at nearby Fort Jackson.

Due to the potential presence of MEC/UXO 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 submitted on 8 February 2012. Analysis of the survey data identified concentrations of anomalies with UXO potential 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 South Carolina Department of Health and Environmental Control (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 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 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.

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 Dive removal operations of metallic anomalies with be conducted prior to installation of the coffer dams.

In December 2018, a Stakeholder-Developed Plan for the Modified Removal Action (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 Munitions and Explosives of Concern (MEC) from the cofferdam footprints and impacted sediments and assisting in the segregation and disposal of impacted sediments covered under this work plan is to protect worker safety and 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 Chemical Warfare Material (CWM). However, if a suspected Recovered Chemical Warfare Material (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 work site personnel and immediately notify the DESC on-site representative who will in turn will notify United States Army Corps of Engineers (USACE) with detailed information regarding the suspected RCWM and assist, if requested, in making notifications in accordance with (IAW) CEMP-CE Memorandum, Notification Procedures for Discovery of RCWM during USACE Projects.. Security will be maintained on the item until relieved by a military EOD unit or Technical Escort Unit.

Once 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, tar-like material (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 Staff 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, TITAN will immediately withdraw from the work area, secure the site, and contact the USACE Safety Office for assistance and guidance.

3.0 ACCIDENT EXPERIENCE

TITAN has an excellent safety record. Since its inception in 2015, TITAN has never had a lost time accident / injury. TITAN's current Experience Modification Rate is 0.72. TITAN'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
- 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

The TITAN Safety Policy is the first page in the Corporate Health and Safety Program and sets the tone for all safety efforts.

TITAN strongly believes that our people are our most important and valuable asset. It is the actions of our personnel, working together as a team, which ultimately determines the success of our endeavors as

a company.

Accidental injuries and illnesses can cause needless pain and suffering of employees and their families, as well as increasing costs and decreasing productivity and morale among employees. TITAN is committed to providing a safe and healthful work environment for all our employees in all locations. The company's goal is an accident-free work environment. The management of TITAN is committed to doing all in our power to make this a reality.

The management staff alone cannot accomplish a goal of this magnitude. It is only with the entire organization working together as a team that we can hope to achieve this level of performance. It is up to each of us to follow applicable safety requirements and procedures while performing our job functions.

A truly successful safety program involves more than simply following procedures. It involves active participation by all employees constantly striving to make improvements. No person knows any job better than the person doing that job. No person knows the condition of the equipment, potential problems with the procedures, and the work environment of a job better than the person doing that job. It is up to all of us to be constantly observant of changes in our own work environment, and to bring any potentially harmful conditions to the attention of management as soon as possible. It is the responsibility of the management staff to promptly and effectively respond to employee concerns for their safety and health.

In addressing potential safety and health problems as soon as they are observed, we prevent these situations from developing into accidents. Keeping open lines of communication at all levels within TITAN will foster an increased understanding of the safety and health issues that face us all.

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.

President (Tanya Leonard) is responsible for enforcement of the Corporate Safety and Health Program at all worksites within his area of responsibility. She must assure that personnel receive 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 Safety and Health Program on the worksites will be a critical rating element for site personnel and managers.

Corporate Safety and Health Management Consultant (Jay Johnson) is a CSP. He assists in the development, implementation, and maintenance of the Safety Program and individual Site Safety and Health Plans (SSHPs). 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 SSHPs as needed. He evaluates occupational exposure monitoring / air sampling data and adjusts SSHP requirements as necessary. He serves as a QC staff member and approves the APP/SSHP by signature.

Corporate MEC Health and Safety Coordinator (Dave Farmer) meets all the requirements of a UXOSO, Unexploded Quality Control Specialist (UXOQCS), and SUXOS and is responsible for creating, updating, and managing the Corporate Safety and Health Program, as well as APP/SSHP for individual worksites under the direction of the Corporate Safety and Health Manager. 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 TITAN safety and health policy.

Project Manager (Matthew S. Norris) 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 safety and health issues are coordinated with the Corporate Health and Safety Staff, Corporate MEC Safety and Health Coordinator, and the UXOSO. In instances of noncompliance 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 work site 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, personal protective 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)
He is granted the authority to administer the safety and health program on the worksite. The UXOSO reports directly to the Vice President of MEC Operations on all project safety and health issues. He coordinates with the Corporate MEC Safety and Health Coordinator for technical assistance on safety and health 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/SSHP, as well as the Corporate Safety and Health 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 work site. 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.

The minimum qualifications for on-site UXO personnel are as follows:

The SUXOS, UXOSO, UXOQCS**,** UXO Supervisors and UXO Technicians must be graduates of the U.S. Army Bomb Disposal School, Aberdeen Proving Ground, MD, the U.S. Naval School, Explosive Ordnance Disposal (EOD), or approved UXO School. All personnel will meet or exceed the standards established by the Department of Defense Explosives Safety Board (DDESB) in DDESB TP 18.

The SUXOS must have at least 10 years combined MEC/ military EOD experience, which shall include 5 years in supervisory positions, which may be a combination of active duty military EOD functions and/or civilian MEC time. A SUXOS must be fully able to perform all the functions enumerated for UXO Sweep Personnel and UXO Technicians I, II, and III.

All UXO Supervisors (Tech III) shall have at least 8 years combined MEC/ military EOD experience. The UXO Technician III must be fully able to perform all the functions enumerated for UXO Sweep Personnel and UXO Technicians I, and II.

The UXOSO and UXOQCS will have at least 8 years combined active duty military EOD and contractor UXO experience and documented Safety or Quality Control training. The UXOSO must have successfully completed an approved Occupational Safety and Health Administration (OSHA) 30-Hour Safety Training program.

The UXOSO and the UXOQCS must be fully able to perform all the functions enumerated for UXO Sweep Personnel and UXO Technicians I, II, and III. These individuals must have documented experience supervising UXO removal operations and personnel.

A UXO Technician II be a graduate of military EOD school of the United States or other approved nation and must have prior military EOD experience or be a graduate of an approved course of instruction as defined in TP 18 and have a minimum of 3 years experience in the UXO field. All UXO Technician II's must be fully able to perform all the functions enumerated for UXO Sweep Personnel and UXO Technicians I.

Any other team member(s) must be at least OSHA 40-Hour Hazardous Waste Site Trained, have received Site Specific Hazard and Ordnance Recognition Training. UXO Technician I's must also be graduates of an appropriate recognized training course and meet all requirements in DDESB TP 18. Copies of training records, including training required by 29 Code of Federal Regulations (CFR) 1910.120, will be available at the project site office.

6.2 Lines of Authority

The ultimate authority for enforcing health and safety requirements is the Vice President/UXO Program Manager. He reports directly to the President of TITAN, and he makes all decisions regarding UXO operations. The Project Manager and the Corporate Health and Safety Staff report directly to the Vice President/UXO Program Manager.

The Project Manager is responsible for all aspects of running the project, including the safety and health of employees and the general public. The SUXOS reports directly to him on all project and safety and health issues. If there are questions, he consults with the Corporate Health and Safety Staff for resolution of areas of concern. He reports directly to the President / Program Manager.

The Corporate Health and Safety Manager provides consultation and advice on health and safety issues to the UXOSO, MEC Safety and Health Coordinator, the Project Manager, and the Vice President/UXO Program Manager. He reports directly to the President/UXO Program Manager.

The UXOSO directly manages the health and safety issues on the site. He coordinates with client site

personnel and visitors to the site regarding health and safety issues. If there are questions on safety and health policy or procedures, he consults with the Corporate Health and Safety Staff. He reports directly to the Project Manager.

6.3 SUBCONTRACTORS AND SUPPLIERS

Identification of Subcontractors and Suppliers

TITAN anticipates utilizing a local surveying company subcontracted through Apex or the remediation contractor to provide survey support for the project. TITAN does not intend to subcontract any other portion of the scope of work. 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 AAP. 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 exclusion zone (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 TITAN site personnel. This training will include detailed training on procedures in the Work Plan and AAP. All suppliers making deliveries on site will receive a safety briefing, which will include recognition and awareness of potential site hazards. Supplies will not be permitted to enter the EZ of the project site unless escorted by a TITAN 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 andUXOSO for investigation.

7.0 TRAINING

Prior to commencement of site activities, the UXOSO will ensure that all employees engaged in hazardous waste operations are informed of the nature and degree of exposure to chemical and physical hazards that are likely to result from participation in site operations. TITAN will accomplish this by ensuring that all personnel entering the site have received the appropriate OSHA and site-specific training, prior to participation in site activities. The other employees working on the site in other capacities not involving 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 TITAN 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/SSHP;
- 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 recognition and awareness training will also be presented. While there is a UXO hazard on the site, personnel will have a UXO-qualified employee escorting them. Once an area is cleared of surface UXO, these employees will be permitted to enter the area without escort as long as no intrusive operations are performed. The UXO 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

Initial site-specific training will include proper procedures to evacuate the work site. It will also provide a description of the basic characteristics, deployment and functioning of the following ordnance:

- Rockets/missiles
- Projectiles
- Bombs
- Grenades
- Small Arms

All TITAN and subcontractor employees who are involved in hazardous waste site activities receive 40 hours of OSHA Hazardous Waste Operations and Emergency Response (HAZWOPER) training in accordance with 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 in accordance with 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 in accordance with 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 TITAN Corporate Safety and Health 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 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 Tailgate Safety Briefing

Tailgate Safety Briefings consist of providing short training sessions in various subjects that give the site worker knowledge and confidence in performing duties in a potentially hazardous environment. The TITAN Documentation of Training Form doubles as the Tailgate Safety Brief Log/Form. The Tailgate Safety Briefing will be given prior to commencing work each day and will include such items as:

- Expected weather conditions;
- General site hazards;
- Biological hazards on site;
- MEC hazards;
- PPE required at each site;
- Emergency evacuation procedures;
- Heat or cold stress precautions;
- Buddy system procedures;
- A review of any safety violations from the previous day; and
- Any other significant events involving safety.

Additional briefings will be provided as needed concerning the use of safety equipment, emergency medical procedures, emergency assistance notification procedures, accident prevention, the work plan, and site orientation to ensure that accomplishment of the project can be carried out in a safe and effective manner.

7.8 Daily Debriefing

At the conclusion of each workday, debriefing for all employees will be held if appropriate, and the day's work will be discussed to determine if changes are warranted before commencing the next day's activities.

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 TITAN 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 Emergency Response Training Requirements

All personnel will receive training in the Emergency Response and Contingency Procedures as part of their mobilization training. In addition to this training, First Responders will receive the following training in addition to being offered the Hepatitis B vaccine, if they have not already received it:

- First Aid/Cardiopulmonary resuscitation (CPR) Training,
- Bloodborne Pathogens Training.

7.12 Other Training Requirements

Tailgate Safety Briefings consist of providing short training sessions in various subjects that give the site worker knowledge and confidence in performing duties in a potentially hazardous environment. The TITAN Documentation of Training Form doubles as the Tailgate Safety Brief Log/Form. The Tailgate Safety Briefing will be given prior to commencing work each day.

Additional briefings will be provided as needed concerning the use of safety equipment, emergency medical procedures, emergency assistance notification procedures, accident prevention, the work plan, and site orientation to ensure that accomplishment of the project can be carried out in a safe and effective manner. Subcontractor personnel will also attend the daily tailgate safety briefings each morning.

At the conclusion of each workday, debriefings for all employees will be held if appropriate, and the day's work will be discussed to determine if changes are warranted before commencing the next day's activities.

7.13 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 at the work site for the duration of site activities 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. Scheduled safety and health inspections will be conducted as outlined below. 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. The following table lists the scheduled areas and frequency of inspection. More frequent inspections can be held at the discretion of the SUXOS/UXOSO.

AREA	FREQUENCY
Sanitation	Daily
Medical and First Aid	Daily
Temporary Facilities	Weekly
Personal Protective and Safety Equipment	Daily
Hazardous Substances, Agents, and Environments	Weekly
Lighting	Monthly
Accident Prevention Signs, Tags, Labels, and Signals and Piping System Identification	Monthly
Fire Prevention and Protection	Weekly
Hand and Power Tools	Daily, if applicable
Material Handling, Storage and Disposal	Weekly
Machinery and Mechanized Equipment	Daily, if applicable
Motor Vehicles	Weekly
Safe Access and Fall Protection	Weekly, if applicable
Hazardous, Toxic and Radioactive Waste (HTRW)	Daily, if applicable

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 USACE to confirm compliance with Work Plan and COE requirements. TITAN 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 TITAN on this project is zero accidents. All managers and supervisors are responsible for implementing the provisions of this APP/SSHP 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. TITAN 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/SSHP;
- 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. TITAN takes a team approach to safety and expects all personnel to participate actively in continuously looking for ways to improve safety performance.

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 Project Manager 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 Project Manager, 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 individual and the SUXOS will be conducted. Depending upon 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 Staff.
Upon completion of a full investigation, the individual's employment may be terminated, if deemed appropriate, through a joint decision of the Program Manager, Project Manager, Corporate Health and Safety Staff, 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 Staff 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 Project Manager, 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 Project Manager and the Corporate Health and Safety Staff. 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 Project Manager. The Corporate Health and Safety Staff will be provided this information from the Project Manager 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 TITAN 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 UXO.

All recordable and reportable accidents will be recorded on the OSHA Form 300, Log of Federal Occupational Injuries and Illnesses, which will be maintained at the TITAN Safety Office. [29 CFR 1904.2]

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 TITAN's Oak Ridge, TN 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 hospitalization 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 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 Project Manager 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 ENG Form 3394 Accident Report. 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, Project Manager 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 placed in 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 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

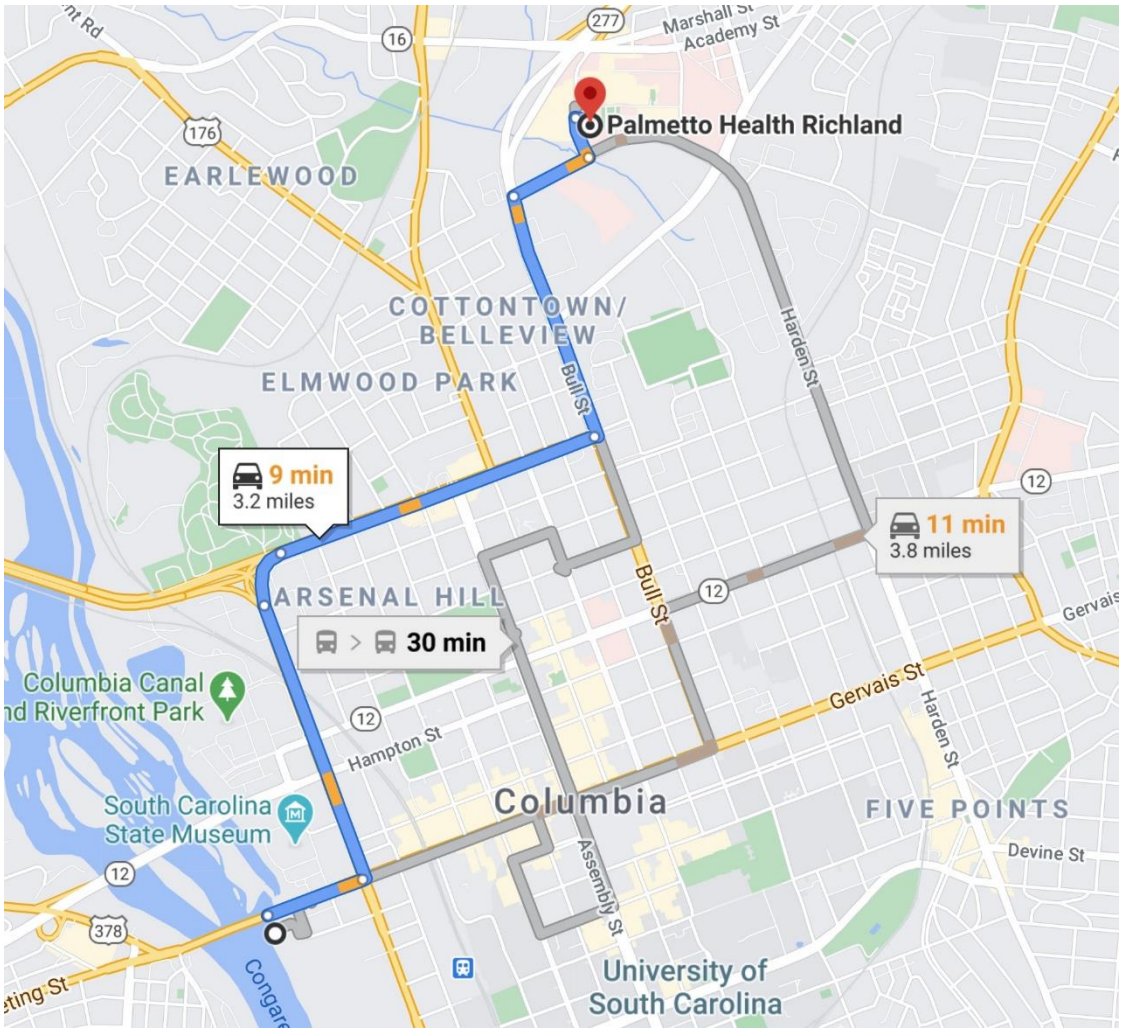
Continue on Bull St to your destination

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.


Palmetto Health Richland
EARLEWOOD
COTTONTOWN/
BELLEVIEW
ELMWOOD PARK
ARSENAL HILL
9 min
3.2 miles
11 min
3.8 miles
30 min
Columbia Canal
nd Riverfront Park
South Carolina
State Museum
Columbia
FIVE POINTS
University of
South Carolina
Bull St
Harden St
Gervais St
Hampton St
Assembly St
Devine St
Marshall St
Academy St
16
277
176
12
378

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 TITAN 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. TITAN 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 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 TITAN 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 in accordance with 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 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 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 UXO site, all TITAN 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

TITAN selects and requires employees 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

TITAN will make hearing protectors 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 extinguisher 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 Staff 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 Purchasing PPE

The MEC Safety and Health Coordinator will maintain a list of sources for purchasing PPE and will assist the Project Manager in ordering the correct type and amounts of the PPE to accomplish the project objectives.

12.2.9 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.

12.2.10 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.

12.2.11 Training

TITAN 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.

12.2.12 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).

12.2.13 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.

12.2.14 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 Staff 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 Project Manager 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 TITAN Project Manager 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 TITAN 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 of TITAN. 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 an 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

Emergency Response / Services			
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) **http://www.cdc.gov/health/diseases**			800-311-3435
Project Management / Coordination			
TITAN			
	President	Tanya Leonard	423-368-9197
	Project Manager	Matthew Norris, GISP	865-924-9591
	Safety Manager	David Farmer	423-368-9197
DESC			
	Project Manager	Rusty Contrael	412-721-6494
APEX			
	Environmental Program Manager	William Zeli, P.E.	412-829-9650 x5004
USACE			
	TBD	TBD	TBD
Explosives Supplier			
	Austin Powder	TBD	423)-562-2227

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 TITAN Hazard Communication Program, an SDS binder will be maintained onsite, which includes copies of SDSs for all hazardous materials brought onto the site by TITAN. It will be kept in the site office during operations, and all site personnel will be made aware of that fact. 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 TITAN Corporate Health and Safety Staff 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 TITAN 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 TITAN Respiratory Protection Program would be followed per Chapter 16 of the TITAN Corporate Health and Safety Program.

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. However, if lead should be encountered, a Lead Abatement Plan will be prepared in accordance with the requirements of Chapter 38 of the TITAN Corporate Health and Safety Program.

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 TITAN 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

TITAN will not be performing any crane operations on this project, so critical lift procedures will not be required. Should the scope of work change, TITAN will prepare critical lift procedures in accordance with the TITAN Heavy Equipment Program found in the TITAN Corporate Health and Safety Program.

12.15 Contingency Plan for Severe Weather

Rain, dust storms, 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. EM 385-1-1 requires suspension of work if lightning is within 10 miles or less.. 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 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

TITAN will destroy MPPEH and potentially hazardous MEC by detonation in either consolidated shots or by Blow-In-Place (BIP) (if items are unacceptable to move). TITAN will also use explosive or mechanical means to vent MEC scrap prior to disposal. A detailed description of TITAN's Blasting plan and procedures is given in Section 3.7 of the Work Plan.

12.24 Diving Plan

Diving portions under this project are covered under a Diving Plan with accident prevention that has been submitted separately and is under a separate approval process.

12.25 Plan for Prevention of Alcohol and Drug Abuse

The use, sale, dispensing, possession, or manufacture of illegal drugs, alcohol, and narcotics on TITAN 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 TITAN

premises and work sites.

TITAN does not regulate the conduct of employees during personal time off. However, misconduct due to the abuse of drugs, narcotics, or alcohol may bring discredit to TITAN its subcontractors and its clients. If, in the judgment of TITAN 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 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 annual physical. If the drug screen is positive for illegal drugs, the employee will not be permitted to work on the TITAN 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 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 in accordance with OSHA 29 CFR 1910.120(n).

An adequate supply of potable (drinkable) water shall be provided on site at all times, and will be supplied in accordance with the following provisions:

- Individual disposable water bottles will be distributed of drinking water.

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.

Permanent restroom facilities are located on the project site. If they are disabled for the season or otherwise not available, TITAN 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 chemical 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 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

TITAN is the subcontractor on this project. This APP has been prepared by TITAN based on TITAN 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 MEC
- Mechanical Excavation (if required)

Should conditions, equipment, or types of operations change during the course of the project work, the Corporate Health and Safety Staff 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 to continuously assess variable hazards and implement risk controls.

ACTIVITY HAZARD ANALYSIS		
ACTIVITY: Site Setup/ Lay-out	**ANALYZED BY/DATE: D. Farmer November 2020**	
PRINCIPLE STEPS	**POTENTIAL SAFETY/HEALTH HAZARDS**	**RECOMMENDED CONTROLS**
• UXO personnel will accompany subcontracted survey personnel responsible for marking the work areas. • UXO personnel will lead the team into area and will clear the path of entry into the site. If MEC is encountered, path will be routed around it. • If MEC is encountered, the area will be marked and the item will be evaluated and disposed of in accordance with the work plan. • Where intrusive operations, such as driving stakes, are required UXO personnel, using geophysical equipment, will determine if there are potential MEC beneath the ground surface. • If potential MEC is located below the ground surface, the area for the intrusive operations will be moved. • Magnetometers will be used for each two feet of depth for intrusive operations to assure accuracy of readings.	• MEC hazards • Electromagnetic Radiation (EMR) for Electric Fuzes • Uneven working surfaces – slip, trip, fall hazards. • Muscle strain carrying instruments • Heat/Cold Stress • Biological hazards - poisonous plants, bees, wasps, ticks, mosquitoes, rodents, and snakes. • Sunburn • Glare of sun	• Training on MEC on site. • Controlled use of radios and cell phones. • Be observant while walking. Use sturdy, leather, work boots with ankle support and non-slip soles. • Follow appropriate lifting/ carrying procedures. (Corporate Safety and Health Plan) CSHP Chp 21) • Heat stress monitoring, drinking water, work-rest schedule, and acclimatization. Proper cold weather clothing and warming areas in extreme cold. • Training in biological hazards avoidance. (CSHP Chp 21) • Long sleeved shirts, long pants, cap, and use sunscreen. • Tinted glasses. • SUXOS ensures UXO personnel are qualified to perform assigned tasks, in accordance with of the Work Plan.
EQUIPMENT TO BE USED	**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**

• Appropriate geophysical equipment / magnetometer. • Footwear with ankle support and non-slip soles. • Back braces (optional). • Communications to determine Wet Bulb Globe Temperature (WBGT) Index, drinking water. • Appropriate clothing and PPE (to include protective tinted eyewear, leather gloves and leg chaps).	**SUXOS/UXOSO** will assure that all controls are being followed; all equipment is being utilized and that all personnel have received appropriate training. • Equipment inspected daily prior to use. • PPE inspected daily prior to use	• UXO personnel will be properly trained / qualified. • Site-specific MEC training will be presented to all site personnel. • Site specific training, slip/fall hazards. • Site-specific training/lifting techniques. • Heat Stress / Cold Stress symptoms/first aid. • Site-specific flora/fauna to include first aid. • PPE training. • Current HAZWOPER Training.

ACTIVITY HAZARD ANALYSIS		
ACTIVITY: Surface Preparation / Vegetation Removal (if required)	**ANALYZED BY/DATE: D. Farmer November 2020**	
PRINCIPLE STEPS	**POTENTIAL SAFETY/HEALTH HAZARDS**	**RECOMMENDED CONTROLS**
• UXO personnel will visually examine the surface for MEC. • If there are areas where dense vegetation prevents a visual surface clearance, geophysical equipment (hand held magnetometers) may be used to detect surface MEC. • If vegetation is extremely dense in some areas, vegetation clearing may be required using rotary mowers, chain saws and weed whackers. • If MEC is encountered, the area will be marked and the item will be evaluated and disposed of in accordance with the work plan. • Following the surface clearance, the area will be cleared for entry.	• MEC hazards • EMR for Electric Fuzes • Uneven working surfaces – slip, trip, fall hazards. • Heat Stress/Cold Stress • Biological hazards - poisonous plants, bees, wasps, ticks, mosquitoes, rodents, and snakes. • Muscle strain carrying instruments/equipment. • Lacerations and cuts from vegetation clearing equipment. • Eye/face injuries due to use of vegetation clearing equipment. • Noise • Sunburn • Glare of sun	• Training on MEC and equipment on site. • Controlled use of radios and cell phones. • Be observant while walking. Use sturdy leather work boots with ankle support and non-slip soles. • Heat stress monitoring, drinking water, work-rest schedule, and acclimatization. Proper cold weather clothing and warming areas in extreme cold. • Training in biological hazards avoidance. (CSHP Chp 21) • Bug Spray and Wasp/Hornet Spray available • Follow appropriate lifting/ carrying procedures. (CSHP Chp21) • PPE – leather gloves and leg chaps during vegetation clearance operations. • PPE – safety glasses and hard hat with face shield during vegetation clearance operations. • PPE – hearing protection during vegetation clearance operations • PPE – wear long sleeved shirts, long pants and a cap, use sunscreen • PPE – wear tinted glasses. • SUXOS ensures UXO personnel are qualified to perform assigned tasks, in accordance with the Work Plan.
EQUIPMENT TO BE USED	**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**

• Geophysical equipment (handheld magnetometers). • Vegetation removal equipment: Rotary mowers, chain saws and weed whackers. • Footwear with ankle support and non-slip soles. • Communications to determine WBGT Index, drinking water. • Appropriate clothing / PPE (to include protective eyewear, gloves, and chaps if necessary) • Hard hat, face shield, hearing protection and leg chaps during vegetation clearance operations. • Steel toe or composite toe boots, or slip on toe guards	**SUXOS/UXOSO** will assure that all controls are being followed; all equipment is being utilized and that all personnel have received appropriate training. • Equipment inspected daily prior to use. • PPE inspected daily prior to use	• UXO personnel will be properly trained / qualified. • Site-specific MEC training will be presented to all site personnel. • Site specific training, slip/fall hazards. • Heat Stress / Cold Stress symptoms/first aid. • Site-specific flora/fauna to include first aid. • Training in proper lifting techniques. • Training in use of equipment. • Noise prevention training • PPE training. • All site personnel will have current HAZWOPER training.

ACTIVITY HAZARD ANALYSIS		
ACTIVITY: Subsurface Clearance using "Mag and Dig" Methods	**ANALYZED BY/DATE: D. Farmer November 2020**	
PRINCIPLE STEPS	**POTENTIAL SAFETY/HEALTH HAZARDS**	**RECOMMENDED CONTROLS**
• Lanes will be established throughout the footprint of each work site. • UXO personnel will walk down each lane with handheld magnetometers to identify subsurface anomalies. • If anomalies are identified that may be caused by MEC / MPPEH, it will be investigated by mechanical and / or hand digging. • If MEC is encountered, the area will be marked and the item will be evaluated and disposed of in accordance with the work plan.	• MEC hazards • EMR for Electric Fuzes • Uneven working surfaces – slip, trip, fall hazards. • Heat Stress/Cold Stress • Biological hazards - poisonous plants, bees, wasps, ticks, mosquitoes, rodents, and snakes. • Muscle strain carrying instruments/equipment. • Lacerations and cuts from frag or tools. • Eye/face injuries due to use of vegetation clearing equipment. • Noise • Sunburn • Glare of sun • Heavy equipment operation (noise, crushing, etc.)	• Training on MEC on site. • Controlled use of radios and cell phones. • Be observant while walking. Use sturdy leather, work boots with ankle support and non-slip soles. • Heat stress monitoring, drinking water, work-rest schedule, and acclimatization. Proper cold weather clothing and warming areas in extreme cold. • Training in biological hazards avoidance. (CSHP Chap 21) • Bug Spray and Wasp/Hornet Spray available • Follow appropriate lifting/ carrying procedures. (CSHP Chap 21) • Training in heavy equipment operation and excavation procedures. • PPE – leather gloves and leg chaps during vegetation clearance operations. • PPE – safety glasses and hardhat with face shield during vegetation clearance operations. • PPE – wear long sleeved shirts, long pants and a cap, use sunscreen • Maintain minimum team separation distances and exclusion zones to protect workers and the public from unintentional detonation.
EQUIPMENT TO BE USED	**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**
• Geophysical equipment (handheld magnetometers). • Excavation equipment: Shovels / backhoe/ excavator. • Footwear with ankle support and non-slip soles. • Back braces, optional. • Communications to determine WBGT Index, drinking water. • Appropriate clothing and PPE (to include protective tinted eyewear, leather gloves, and leg chaps if snakes are a problem) • Hardhat, face shield, hearing protection and leg chaps during vegetation clearance operations.	**SUXOS/UXOSO** will assure that all controls are being followed; all equipment is being utilized and that all personnel have received appropriate training. • Equipment inspected daily prior to use. • Ensure safety features such as backup warnings, seatbelts, lights, gauges, etc. are in place and functioning properly. • PPE inspected daily prior to use.	• UXO personnel will be properly trained / qualified. • Site-specific MEC training will be presented to all site personnel. • Site specific training, slip/fall hazards. • Heat Stress / Cold Stress symptoms/first aid. • Site-specific flora/fauna to include first aid. • Training in proper lifting techniques. • Training in use of equipment. • Noise prevention training • PPE training. • All site personnel will have current HAZWOPER training.

ACTIVITY HAZARD ANALYSIS		
ACTIVITY: Transport of Explosives (If Required)	**ANALYZED BY/DATE: D. Farmer November 2020**	
PRINCIPLE STEPS	**POTENTIAL SAFETY/HEALTH HAZARDS**	**RECOMMENDED CONTROLS**
• Inspect vehicles to ensure proper working condition. • Ensure vehicles are properly equipped with seat belts, placards, fire extinguishers, and equipment for securing load • Explosives will be packed so items are not touching one another. • Explosives transported on public roads will be packed and labeled in accordance with Department of Transportation rules and regulations. • Boxes are secured to prevent shifting. • Transport to designated disposal location	• Explosive hazards • Vehicle accidents • Fire • Heat stress	• Complete motor vehicle inspection form. • Licensed driver • Driver and all passengers will use seat belts when vehicle is in operation. • Vehicle will be placarded while traveling on public roads. • Explosives will be placed securely in back of vehicle and anchored to prevent movement. • Vehicles will not be left unattended. • Driver will observe posted speed limits. • A minimum of 2 persons in vehicle during transport.
EQUIPMENT TO BE USED	**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**
• Vehicle • Safety Equipment: seat belts, first aid kit, two-way communication, emergency eyewash kit, bloodborne pathogen kit, Hazard Material spill response kit, 2 fire extinguishers • Explosive placards • Explosive storage boxes • Roadside emergency markers • Level D PPE: Cotton clothing, leather gloves, leather work boots, safety glasses • Drinking water and cups	**UXOSO/QC** will assure that all controls are being followed; all equipment is being utilized and that all personnel have received appropriate training. • Equipment inspected daily prior to use. • PPE inspected daily prior to use. • Inspect packing, labeling, and security of explosives.	• UXO personnel will be properly trained / qualified. • Driver must have valid driver's license • Training in fire extinguisher usage and trained not to fight fire involving explosives. • Site-specific UXO training will be presented to all site personnel. • Heat stress training and first aid • Training in small quantity spill clean-up • All site personnel will have current HAZWOPER training.

ACTIVITY HAZARD ANALYSIS		
ACTIVITY: Disposal of MEC	**ANALYZED BY/DATE: D. Farmer November 2020**	
PRINCIPLE STEPS	**POTENTIAL SAFETY/HEALTH HAZARDS**	**RECOMMENDED CONTROLS**
• Establish EZ based on MEC item around disposal area. • Make required notifications of demolition/venting operations. • Retrieve donor explosives. • Set up demolition charges IAW procedures • Use engineering controls, if required, to reduce the fragment travel range. • Post sentries outside Fragmentation Zone on all access roads • Ensure sentries have a full view of demolition and access areas. • Contact sentries to ensure that no pedestrian traffic is in the vicinity • Evacuate demolition crew to a safe location • Demolition occurs. • Inspect demolition site to ensure that demolition/venting has been completed properly.	• MEC hazards • Slips, trips and falls • Biological hazards – plants, spiders, ticks, mosquitoes, snakes, rodents, etc. • Heat stress • EMR/static electricity hazards • Overpressure hazards due to blast. • Fragmentation hazard due to blast. • Eye hazard • Noise hazard • Cuts and abrasions hazard • Unauthorized personnel entering EZ during operations • Sunburn	• Training on MEC on site. • Be observant when walking, and wear leather, work boots with ankle support and non-slip soles. • WBGT readings, drinking water, work/rest schedule. • 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. • Establish EZ to reduce blast and overpressure hazards. • Use PPE and distance to relieve fragmentation and overpressure hazards. • EZ sentries will be posted at access road barricades to prevent unauthorized entry. • EZ sentries will wear orange vests during operations and maintain radio communications with demolition team supervisor • Demolition crew will observe frag distance when seeking shelter from blasting. • Hearing protection. • Procedures for demolition operations in Work Plan will be followed.
EQUIPMENT TO BE USED	**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**
• Donor explosive materials • Blasting circuits • PPE (Orange safety vests, cotton clothing, leather gloves, leather work boots with non-slip soles, safety glasses, hearing protection. • Radio communications	**UXOSO/QC** will assure that all controls are being followed; all equipment is being utilized and that all personnel have received appropriate training. • Equipment inspected daily prior to use. • PPE inspected daily prior to use	• UXO personnel will be properly trained / qualified. • Site-specific UXO training will be presented to all site personnel. • Heat stress training. • Training in safe operating procedures, emergency procedures and PPE requirements during demolition operations. • All site personnel will have current HAZWOPER training.

ACTIVITY HAZARD ANALYSIS		
ACTIVITY: Mechanical Excavation (if required)	**ANALYZED BY/DATE: D. Farmer November 2020**	
PRINCIPLE STEPS	**POTENTIAL SAFETY/HEALTH HAZARDS**	**RECOMMENDED CONTROLS**
• Establish exclusion zone around project site footprint. • Prior to intrusive operations, locate large anomalies using handheld magnetometer equipment. • Investigate when within one foot of anomalies using hand-digging methods. • Carefully dig around the item, so that it can be identified and examined for condition. • Excavate soil in lifts of up to 1 foot and re-sweep the area for large anomalies • If MEC is encountered, the area will be marked and the item will be evaluated and disposed of in accordance with the work plan. • If inert Munitions Debris (MD) is encountered, it will be inspected and certified as inert and secured at a collection point	• MEC hazards • EMR for Electric Fuzes • Uneven working surfaces – slip, trip, fall hazards. • Muscle strain carrying instruments • Heat Stress / Cold Stress • Biological hazards - poisonous plants, bees, wasps, ticks, mosquitoes, rodents, and snakes. • Unauthorized personnel entering site during operations • Heavy equipment operations (noise, dust, exhaust, crushing hazards). • Fueling hazards • Pinching/crushing hazards from moving equipment • Moving equipment hazards within arc of bucket	• Training on MEC on site. • Controlled use of radios and cell phones. • Be observant while walking. Use sturdy leather work boots with ankle support and non-slip soles. • Follow appropriate lifting/ carrying procedures. (CSHP Chp21) • Heat stress monitoring, drinking water, work-rest schedule, and acclimatization. • Training in biological hazards avoidance; PPE. (CSHP Chp 21) • Site control measures will be implemented and exclusion zone established. • Training in heavy equipment operations and excavation procedures, PPE. • Follow fueling precautions in Section 15.9. • No one will be within the arc of bucket swing when equipment is operating.
EQUIPMENT TO BE USED	**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**

• Geophysical equipment (handheld magnetometers). • Footwear with ankle support and non-slip soles. • Communications to determine WBGT Index, drinking water • Appropriate clothing and PPE to include hard hats, Hi-Visibility vests and hearing protection (around heavy equipment operations), leather gloves and leg chaps (as required), dust masks (as Required). • Backhoes and/or Mini Excavators will be used for excavation	**SUXOS/UXOSO** will assure that all controls are being followed; all equipment is being utilized and that all personnel have received appropriate training. • Equipment inspected daily prior to use. • PPE inspected daily prior to use.	• UXO personnel will be properly trained / qualified. • Site specific MEC training. • All UXO personnel will receive refresher training in excavating of anomalies. • Site specific training on slip, trip and fall hazards. • Training-lifting techniques. • Heat/Cold Stress symptoms. • Site specific flora/fauna to include first aid. • All site personnel will have current HAZWOPER training. • Heavy equipment training.

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 scrap expected to be recovered and handled during 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 for 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 lifting 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 may be present and located during CRP site activities. UXO qualified personnel will follow the requirements of the TITAN Safety Program, EP 385-97, 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.

TITAN 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 unexpected hazardous MEC is located, a review of the MGFD may result in an adjustment to the size of the EZ. TITAN 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.

Hazardous MEC disposal operations will be performed by TITAN. MPPEH will be inspected and, if determined to be inert, certified as non-hazardous, and will be collected in a secured location until the conclusion of the project work. After the project work has been completed, the non-hazardous scrap will be transferred to metal recycling facility.

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 should 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 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 listed below.

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.

PERMISSIBLE NOISE EXPOSURES (1)	
Duration per Day, (Hours)	**Sound level dBA (Slow Response)**
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.	

TITAN 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 the time of year of this project, there is a moderate probability of encountering extreme heat. Precautions for 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 base 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^{o}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 affect 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 orUXOSO 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 patient drink one to two cups of liquids immediately and every twenty minutes thereafter. Consult with physician if 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 heat stroke.

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 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

Heat stroke 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, 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. Heat stroke 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 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 to 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 in accordance with 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 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, heat stroke;
- 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 pulse rate for thirty seconds. After each work cycle the heart rate should be measured by taking the pulse rate (PR) for 30 seconds as early as possible into the resting period. Taking the radial (wrist) pulse rate is the preferred method however the carotid (neck) pulse rate 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. Pulse rate 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[a]

ADJUSTED TEMPERATURE	NORMAL WORK ENSEMBLE	IMPERMEABLE ENSEMBLE
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

[a] For work levels of 250 kilocalories/hour.
[b] Calculate the adjusted air temperature (at adj) by using this equation: at adj °F = ta °F + (13 x % 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.)
[c] 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

Work - Rest Regimen	WORK LOAD Light*	Moderate	Heavy
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 (^{0}C) WBGT and are intended for workers wearing single layer summer type clothing. Use of semi or totally impermeable clothing requires monitoring IAW the TITAN 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^{0}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 paragraphs should 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. affect 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, TITAN 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 a minimal effective 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 permanone. 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. 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 Hantavirus Pulmonary Syndrome

Basic Transmission Cycle – some rodents are infected with a type of Hantavirus that causes Hantavirus Pulmonary Syndrome (HPS). In the United States, deer mice (plus cotton rats and rice rats in the southeastern states and the white-footed mouse in the Northeast) are the rodents carrying hantaviruses that cause hantavirus pulmonary syndrome. Common house mice do not carry Hantavirus.

These rodents shed the virus in their urine, droppings and saliva. The virus is mainly transmitted to people when they breathe in air contaminated with the virus. This happens when fresh rodent urine, droppings or nesting materials are stirred up. When tiny droplets containing the virus get into the air, this process is known as aerosolization.

There are several other ways rodents may spread Hantavirus to people:

- If a rodent with the virus bites them, the virus may be spread this way – but this is very rare.
- Researchers believe that you may be able to get the virus if you touched something that had been contaminated with rodent urine, droppings, or saliva, and then touched your nose or mouth.
- Researchers also suspect that if virus-infected rodent urine, droppings or saliva contaminates food that you eat, you could also become sick.

Symptoms of HPS: Early symptoms include fatigue, fever, and muscle aches, especially the large muscle groups – thighs, hips, back, sometimes shoulders. These symptoms are universal. There may also be headaches, dizziness, chills and/or abdominal problems, such as nausea, vomiting, diarrhea and abdominal pain. About half of all HPS patients experience these symptoms.

How long could it be between the time you get the virus, and the time you start showing these symptoms? Because there have been so few cases of HPS, it is not quite clear what this "incubation time" is. However, it appears right now that it may be between one to five weeks after you are exposed to potentially infected rodents and the rodent's droppings before you will show any symptoms.

Late symptoms – 4-10 days later – symptoms include coughing and shortness of breath, with the sensation of, as one survivor put it, a "tight band around my chest and a pillow over my face" as lungs fill with fluid.

MINIMIZE RISK - do not disturb rodents, burrows, or dens.

Preventive Measures: If there are signs of a rodent nest or rodent droppings, make it known to the SUXOS/UXOSO. To clean and disinfect the area, spray a disinfectant on the area and leave a waiting time of 20 minutes. Then clean it up using rubber or plastic gloves, coveralls, rubber boots or disposable shoe covers, protective goggles, and a half-face mask air-purifying respirator with a high-efficiency particulate air (HEPA) filter. Bag the cleaning materials and dispose of it. Then, re-clean the area with disinfectant.

15.23 Mosquitoes

Mosquitoes are responsible for transmitting diseases such as malaria and West Nile Virus through bites to the skin.
While malaria is much more contagious, it is not normally found in North America. West Nile virus is commonly found in Africa, West Asia and the Middle East. In recent years, West Nile virus has been increasingly found in the continental United States. It is believed to have first appeared in the United States in 1999. It is most common in late summer or early fall, which is the active season for mosquitoes, but in warmer southern climates where the temperatures are milder, West Nile virus can be transmitted year round.

Transmission Cycle: Mosquitoes become infected with the virus when they feed on infected birds, which may circulate the virus in their blood for a few days. Infected mosquitoes can then transmit the virus to humans and animals while biting to take blood. The virus is located in the mosquito's salivary glands, and may be injected into the animal or human, where it can multiply, possibly causing illness. Even in areas where the virus is circulating, few mosquitoes are infected with the West Nile virus. Even if the mosquito is infected, less than 1% of people who get bitten

and become infected will get seriously ill. The majority of cases of West Nile virus have been identified in birds, it has also been found in horses, cats, bats, chipmunks, skunks, squirrels, and domestic rabbits. It was recently found in a horse in New Mexico. Once West Nile virus has been contracted, the survivor of this illness is believed to carry a lifelong immunity to it. At this time there is no vaccine against West Nile virus.

Symptoms: West Nile virus is encephalitis, which causes an inflammation of the brain. Following transmission by an infected mosquito, West Nile virus multiplies in the person's blood system and crosses the blood-brain barrier to reach the brain. The virus interferes with normal central nervous system functioning and causes inflammation of the brain tissue. Fatality rates range from 3%-15% of persons who develop severe illness, and rates are highest among persons over 50 years of age and those with weakened immune systems. This disease is not transmitted from person-to-person, so touching or working in the vicinity of someone with the disease will not increase the risk.

The incubation period for West Nile virus is normally 3-15 days. Most infections are mild, and symptoms include fever, headache, and body aches, occasionally with skin rash and swollen lymph glands. More severe infection may be marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, paralysis, and, rarely, death.

If symptoms develop, seek medical attention immediately.

Preventive Measures: Prevention and control of West Nile virus is most effectively accomplished through vector management programs. Be alert for dead animals on the site, particularly birds. If a dead bird or other animal is found on site, bare-handed contact should be avoided. Using gloves or double plastic bags, wrap animal and call the Health Department. If the Health Department wants to test the bird, they will come and pick it up. If they are not testing the bird, it should remain wrapped in the plastic and disposed of in accordance with established procedures.

Other ways of reducing risk of becoming infected with West Nile Virus include:

- Implement mosquito control measures on the site.
- Make sure that there are no open containers of standing water on the site in which mosquitoes can breed.
- Wear long sleeved shirts and long pants while outdoors.
- Stay indoors at dawn, dusk, and in the early evening when mosquitoes are most active.
- Spray clothing with repellants containing permethrin or DEET.
- Apply insect repellant sparingly to exposed skin. An effective repellant will contain 35% DEET. Higher concentrations of DEET provide no additional protection. Always read the manufacturer's directions on the repellant prior to applying it to the skin.
- Vitamin B and "ultrasonic" devices are NOT considered to be an effective deterrent to mosquito bites.

Treatment: If symptoms have developed that are consistent with West Nile virus, a blood sample will be taken and sent for analysis. There is currently no specific therapy. In more severe

cases, intensive supportive therapy is indicated, normally involving hospitalization, intravenous fluids, airway management, respiratory support (ventilator), prevention of secondary infections (pneumonia, urinary tract, etc.) and nursing care.

15.24 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 Staff, 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 in accordance with TITAN'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 Staff, 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 creates 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 TITAN 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 requirement are contained in Section 12.1 of the APP. PPE requirements will be reevaluated as appropriate per Section 12.1 and section 15.24 and will comply with Section 5 of EM 385-1-1.

18.0 MEDICAL SURVEILLANCE

Medical surveillance of TITAN 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 TITAN personnel on

the project site will be part of the TITAN 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 Annual Physical

A baseline health assessment physical or 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 Project Manager, 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 personal protective equipment (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 TITAN. 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 TITAN 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 TITAN and the employee upon 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

TITAN 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 site for the duration of site operations. When the site work is complete, the records will be retained by TITAN at the Knoxville, TN office. Examining physicians will be responsible for maintaining records related to laboratory and other tests for each employee examined. All records, whether maintained by TITAN 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

Since there 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 Staff 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 work site. 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 TITAN 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 SSHP will be updated to include these additional hazards and shall handle them in accordance with the TITAN 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 lifting 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 reducing 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

TITAN does not anticipate the use of drums/containers/tanks during activities under the PWS.

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 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 MGFD 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 TITAN 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 MGFD 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 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 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 in accordance with 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, TITAN 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 TITAN work site 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. In accordance with ANSI Z358.1-1998, eye-wash facilities will be available on the work site 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 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. Waste material from equipment decontamination should be contained and disposed 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 extinguisher will be kept in each site vehicle for emergency use on site. This equipment will be inspected on a weekly basis to assure 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 eye wash 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

The ERCP address the emergencies, which could occur during site operations, and outlines the appropriate response actions. TITAN will investigate magnetic anomalies to locate, identify, and dispose of MPPEH. 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 TITAN 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 Project Manager and the Corporate Health and Safety Staff as soon as the situation is under control.

If the emergency involves employee injury, SUXOS and UXOSO will complete the ENG Form 3394 Accident Report. The Corporate Health and Safety Staff will be responsible for notifying applicable Federal, state and local authorities/agencies. Once the emergency has been resolved, the SUXOS, UXOSO, Project Manager, and Corporate Health and Safety Staff 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 SSHP, 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

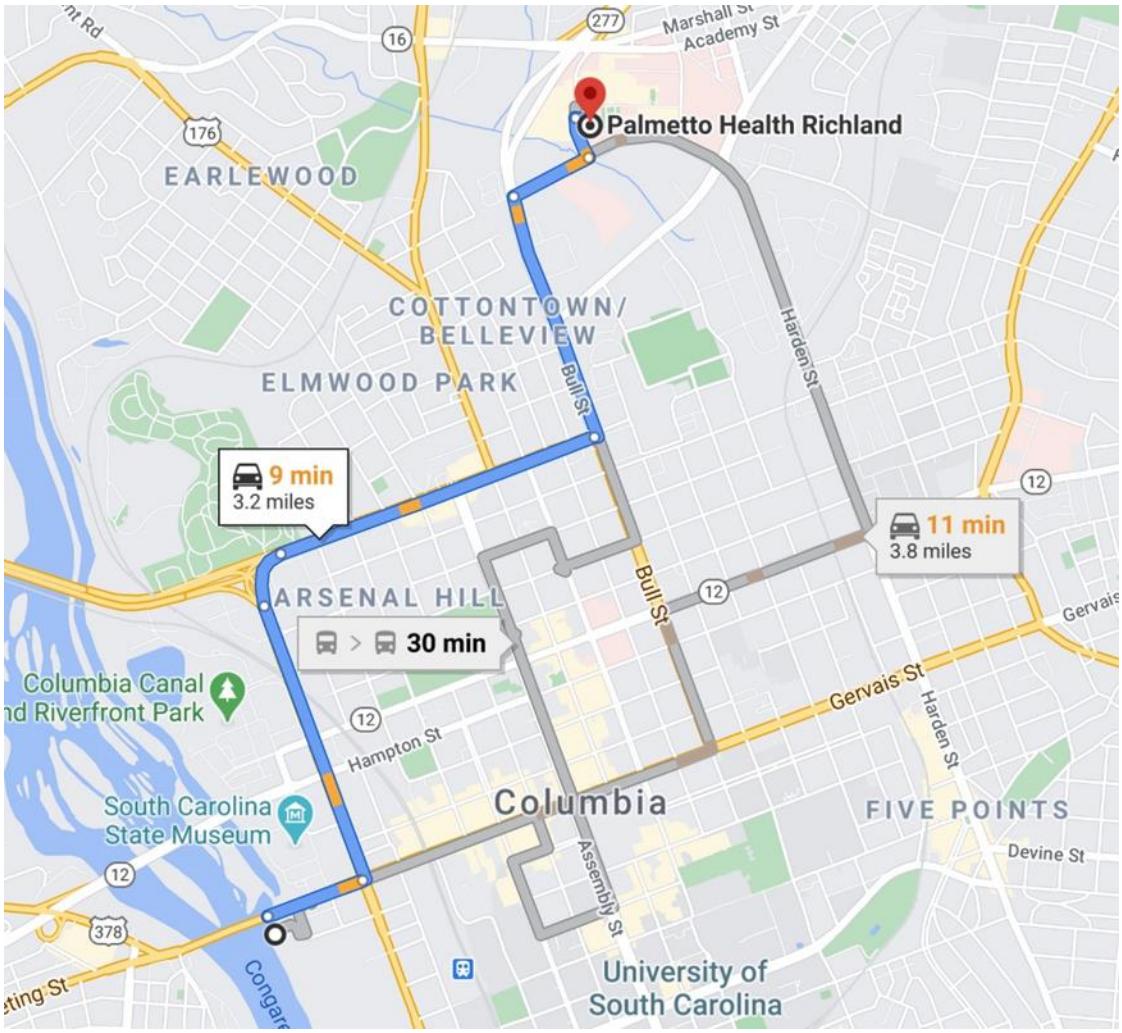
It is not anticipated that hazardous waste decontamination shall be required during any activities under the PWS. This determination has been made based upon archival documentation and past activities conducted at the site.

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 Material Safety Data Sheets

As part of the TITAN Hazard Communication Program, an SDS binder will be maintained onsite, which includes copies of SDSs for all hazardous materials brought onto the site by TITAN. 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 TITAN Corporate Health and Safety Staff 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 assure 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 work site “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 TITAN office, at the work site, 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 arrive 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.

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 treatment of that chemical.

24.13 Spill Alerting and Response Procedure

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 in a licensed hazardous waste 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 Project Manager, MEC Safety and health Coordinator, and the Corporate Health and Safety Staff 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 onsite, the first responders will turn over medical care of the injured worker to them. They will be on stand-by 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 the 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 in accordance with applicable OSHA standards, 29 CFR 1904, 1910, and 1926.

25.7 Final Report

TITAN 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 in accordance with EM 385-1-1 using the ENG Form 3394 Accident Report form in Appendix F. 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 TITAN 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 Staff 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

TABLE OF CONTENTS

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.

DOCUMENTATION OF TRAINING

Training Course Name: _____
(General, UXO Equipment, Visitor, Special)

Presented By: _____ **Date:** _____

Topics Discussed

Work Plan/SSHP/APP: _____

UXO/MEC Hazards: _____

Chemical Hazards: _____

Physical Hazards: _____

Emergency Procedures: _____

Weather Conditions: _____

Other: _____

_____

_____

Attendees

Printed Name	Signature	Date

Trainer: _____ **Date:** _____

SSHP ACKNOWLEDGMENT

Project:_____ Site: _____
Contract Number: _____ Site Location: _____

Project Manager: _____
SUXOS: _____
UXOSO: _____

I acknowledge that I understand the requirements of this SSHP and 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 SSHP 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.

TITAN PERSONNEL:

SIGNATURE	EMPLOYEE NO.	DATE

OTHER PERSONNEL:

SIGNATURE	**ORGANIZATION**	**DATE**

WEEKLY SAFETY CHECKLIST

Location: _____

Site: _____

Description	Findings	Remarks
1. Personal Protection (PPE) per SSHP/APP	Pass/Fail	
2. Work Practices Follow SSHP/APP	Pass/Fail	
3. Site Control/Decon per SSHP/APP	Pass/Fail	
4. Eyewash Station(s)	Pass/Fail	
5. First Aid Kit(s)	Pass/Fail	
6. Fire Extinguisher(s)	Pass/Fail	
7. Monitoring Equipment	Pass/Fail	
8. Calibration	Pass/Fail	
9. Communications	Pass/Fail	
10. Overall Cleanliness of Site	Pass/Fail	
11. Other	Pass/Fail	

Printed Name: _____

Signature: _____

Date: _____

REMARKS: _____

_____

_____

DAILY SAFETY ATTENDANCE SIGN-IN SHEET

NAME	COMPANY	SIGNATURE	DATE
Person Presenting the Safety Briefing:			

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: _____

REINSPECTION:

TASK AND DATE OF NONCONFORMANCE BEING REINSPECTED:

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:

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)

Quality Control
Corrective Action Log

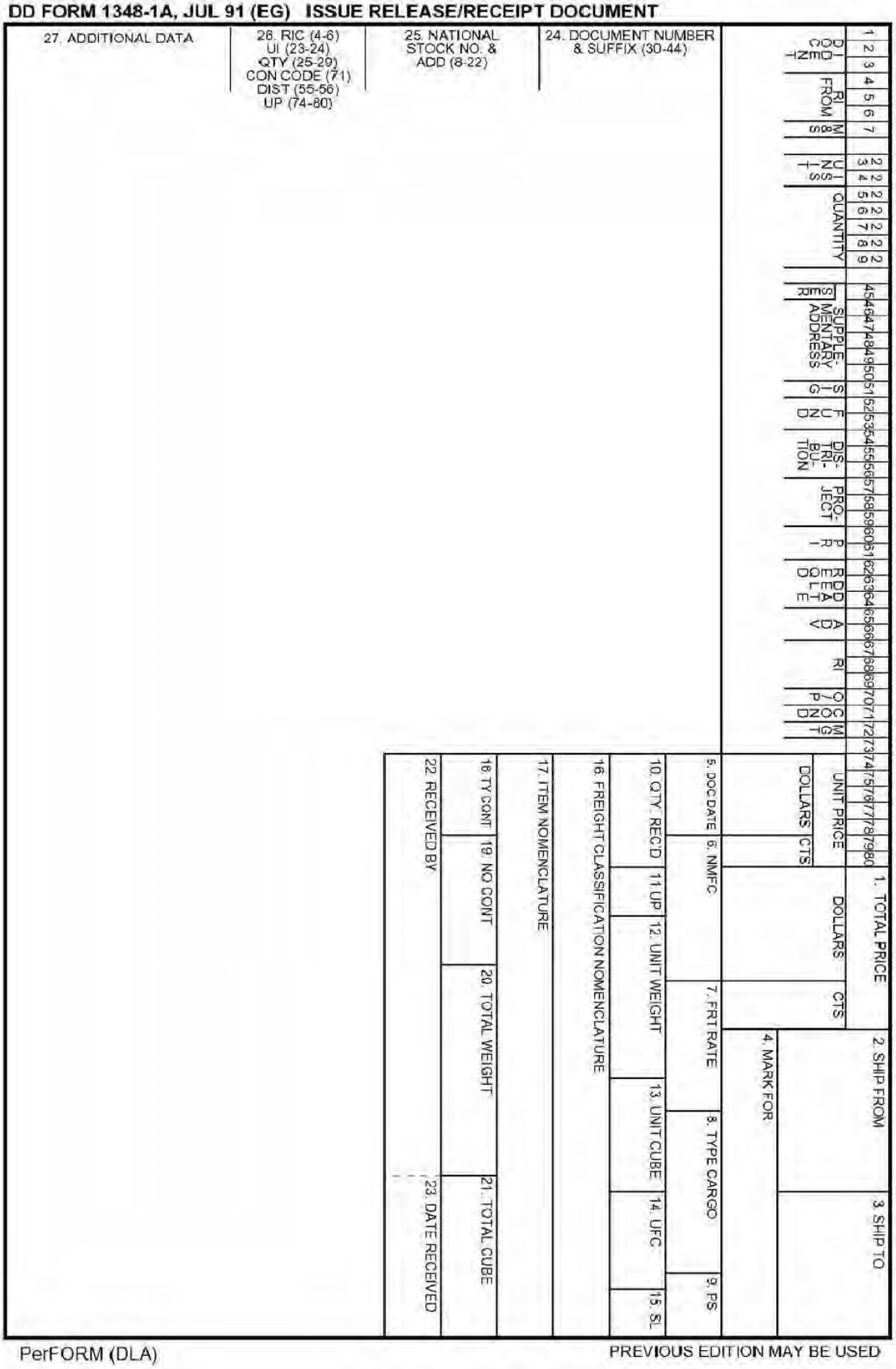
Project: _____
Location: _____
SUXOS: _____
UXOQCS: _____

Non Conformance			Correction		
Date	Activity	Nature	Action Taken	Completed By	Date

MEC Accountability Log

Identification					Description			Disposition			
ID #	Anomaly #	Date	Grid/Area	Location	Nomenclature	Fuze Description	Fuze Condition	Method	Date	By Whom	Photo #

DD FORM 1348-1A, JUL 91 (EG) ISSUE RELEASE/RECEIPT DOCUMENT



PerFORM (DLA)

PREVIOUS EDITION MAY BE USED

VEHICLE/HEAVY EQUIPMENT INSPECTION CHECKLIST

Project:		Equipment Type:	
Equipment No.		Model:	
Manufacturer:		Date:	
Engine Hrs/Mileage		Team Number:	

Equipment Checklist (Check all that apply and provide description of corrections needed)

	Condition Good	Correction Needed
Steering		
Service Brakes		
Emergency Brakes		
Retarder		
Transmission		
Controls		
Hydraulic Leaks		
Exhaust System		
Warning Gauges		
Windshield		
Lights		
Mirrors		
Seat and Seat Belts		
Tires/Tread		
Regular Horn		
Back-up Alarm		
Steps, Hand-holds		
Fire Extinguisher		
Rollover Cage		
Other:		
Other:		

Remarks:

Approvals

Operator's Signature (Field Technician):	Date:
Site Manager Signature:	Date:
Equipment Supervisor's Signature (Repairs or Adjustments Completed):	Date:

SITE VISITOR'S LOG

PRINT NAME	SIGNATURE	AGENCY	PURPOSE OF VISIT	PHONE #	DATE/TIME ARRIVED	DATE/TIME DEPARTED

MAGAZINE DATA CARD

NOMENCLATURE: _____

EXEMPTION NO.:_____MANUFACTURER ID NO.:_____

2) ==========

DATE	ACTION TAKEN	QUANTITY RECEIVED	QUANTITY ISSUED	BALANCE	SIGNATURE

Instructions for Completion

Two sets of this form will be maintained on **each** separate item. One will be maintained with the materials and the other in the project office.

Nomenclature: Nomenclature of item.

Exemption No.: Exemption number of item, if applicable.

Manufacturer's ID No.: Manufacturer's ID number

Date: Enter date action is being completed.

Action taken:
- INT REC -Initial Receipt from shipper
- ISSUED -Issued for Use
- RTS -Returned to Stock
- BCF -Balance Carried Forward

Quantity Received: Enter number of items received from shipper or returned to stock.

Quantity Issued: Enter number of items issued for use.

Balance: To be completed for each transaction.

Signature: Signature of the individual completing the transaction.

Last row on form should contain the entry BALANCE CARRIED FORWARD and the balance.

First row on a new form should contain the entry BALANCE BROUGHT FORWARD and the balance.

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 4/16/2013

Category:	Black Powder Rounds
Munition:	10 in Cannonball Shell
Case Material:	Cast Iron, Grey, CL35
Fragmentation Method:	Naturally Fragmenting
Secondary Database Category:	Civil War Era
Munition Case Classification:	Extremely Heavy Case

DODIC:	
Date Record Created:	11/2/2009
Record Created By:	SDH
Last Date Record Updated:	4/15/2013
Individual Last Updated Record:	SDH
Date Record Retired:	

Munition Information and Fragmentation Characteristics

Explosive Type:	Black Powder
Explosive Weight (lb):	4
Diameter (in):	9.8500
Cylindrical Case Weight (lb):	93.88430
Maximum Fragment Weight (Intentional) (lb):	3.5556
Design Fragment Weight (95%) (Unintentional) (lb):	0.8186
Critical Fragment Velocity (fps):	1659

Sandbag and Water Mitigation Options

TNT Equivalent (Impulse):	0.43
TNT Equivalent Weight - Impulse (lbs):	1.720
Kinetic Energy 10^6 (lb-ft²/s²):	4.8957

Single Sandbag Mitigation

Required Wall & Roof Thickness (in)	36
Expected Max. Throw Distance (ft):	220
Minimum Separation Distance (ft):	220

Double Sandbag Mitigation

Required Wall & Roof Thickness (in)	Not Permitted
Expected Max. Throw Distance (ft):	Not Permitted
Minimum Separation Distance (ft):	Not Permitted

Water Mitigation

Minimum Separation Distance (ft):	275.000
Water Containment System:	1100 gal tank

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.

Theoretical Calculated Fragment Distances

HFD [Hazardous Fragment Distance: distance to no more than 1 hazardous fragment per 600 square feet] (ft):	237
MFD-H [Maximum Fragment Distance, Horizontal] (ft):	3060
MFD-V [Maximum Fragment Distance, Vertical] (ft):	2087

Overpressure Distances

TNT Equivalent (Pressure):	0.43
TNT Equivalent Weight - Pressure (lbs):	1.720
Unbarricaded Intraline Distance (3.5 psi), K18 Distance:	22
Public Traffic Route Distance (2.3 psi); K24 Distance:	29
Inhabited Building Distance (1.2 psi), K40 Distance:	48
Intentional MSD (0.0655 psi), K328 Distance:	393

Note: Per V5.E3.2.2.1 of DoD 6055.09-M the minimum sited K328 distance may be no smaller than 200 ft.

Minimum Thickness to Prevent Perforation

	Intentional	Unintentional
4000 psi Concrete (Prevent Spall):	12.80	7.40
Mild Steel:	2.21	1.23
Hard Steel:	1.81	1.01
Aluminum:	4.07	2.36
LEXAN:	11.35	7.93
Plexi-glass:	9.75	6.06
Bullet Resist Glass:	9.20	5.43

Item Notes

The TNT equivalency for black powder rounds has been updated from 0.4 to 0.43 to agree with Rev 4 of TP 16. This has resulted in minor changes in values.

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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:

Matthew Norris	Project Manager	Resume included
David Farmer	Site Manager	
Donald Koch	SUXOS	CEHNC # 0196
Thomas Dailey	UXOSO/QCS	CEHNC # 1071
Wayne Madsen	UXO Technician III	CEHNC # 0184
Jay Johnson	UXO Technician II	CEHNC # 1418
Phillip Lewallen	UXO Technician II	CEHNC # 1843
Logan Daily	UXO technician I	CEHNC # 1989
De La Von Conner	UXO technician I	CEHNC # 2333

Personnel Qualifications Certification Letter

I, Tanya Leonard, 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, TITAN 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.

MATTHEW S. NORRIS, GISP

matthew.suter.norris@gmail.com, Linkedin

Results-driven management professional with 15 years of experience within progressive business environment, and achievements in key leadership roles that have included substantial contributions to company growth, securing multimillion-dollar Federal contracts, managing up to 35 employees, improving efficiency by up to 75%, and directing the start-up of new departments. Earned recognition as a top performer in most recent role and won Outstanding Achievement Award, Excellence in Management Award, Presidents Award of Excellence, and two Employee Appreciation Awards. Strengths and core competencies:

- Operations Management
- Program Management
- Marketing Programs
- Budget Administration
- Strategic Planning/Execution
- Team Leadership
- Business Development
- Cost Controls
- Information Technology
- Staff Management
- Proposal Development
- Process Standardization

PROFESSIONAL EXPERIENCE

TITAN ASSOCIATES GROUP INC. (TITAN), Athens, TN **2018-Present**

(Economically Disadvantaged Woman Owned Small Business Environmental Remediation service provider with a core focus of remediation of military munitions and Geospatial Information Technologies)

Chief Operations Officer (COO)

Operations Management: Oversees ongoing business operations within TITAN though collaboration with TITAN CEO on five- and ten-year plans for corporate growth and evolution, Assist CEO with financial projections and analyses of existing programs and policies, Lead budgeting and resource allocation efforts alongside the other C-level executives and the senior management team, and ensure all program initiatives align with TITAN's core values and culture.

Program Management: Manages TITAN's Military Munitions Response Program (MMRP) and environmental services branch to support Federal and non-federal clients with environmental remediations solutions and services related to CERCLA and RCRA. Additionally, operates TITAN's Geospatial Information technology program.

- **Munition Response / Environmental Services Program:** Develops winning strategies and teams to gain contract awards through federal solicitations, liaison between team members that compliment TITAN's services lines and provide a superior value to our clients, oversees development of work plans documents such as UFP-QAPPs, Site Safety and Health Plans, Accident Prevention Plans, Quality Control Plans, Explosive Management Plans, Explosive Safety Submissions, and Site Specific Final Reports, approves utilization of TITAN resources for both field and proposal efforts.

- **Geospatial Technologies Program:** Oversees final integration of Geospatial Services lines with in client network, Quality Assurance of datasets and GIS related deliverables, and meets with clients to support solutions to spatial data needs.

- **Cost Strategy Development**: Executed strategies in cost compliance with RFP/PWS, verifies cost proposals are coordinated with technical proposal definable features of work and milestones. Additionally, develops winning cost strategies to reflect the needs of the RFP and the services that the company provides. Moreover, provides technical and narrative development in both technical and cost volumes.

- **Proposal Strategy Development**: Directs the negotiation of contracts, execution of Prime and sub contracts, analyzes solicitations potential contractual factors, advises team on preapproved subcontractors to help mitigate risk and provide more robust services, and oversees management of subcontractor database. Acting advisory to proposal team and develops proven strategies unique to each solicitation. Moreover, performs customer satisfaction reviews/surveys, contract documentation.

EXPLOSIVE ORDNANCE TECHNOLOGIES, INC. (EOTI), Knoxville, TN **2004 - 2018**

(Small business munitions response service provider with a core focus of investigation and remediation of military munitions and environmental services)

Vice President of Programs

Program Management: Maximized operational efficiency by a managing, motivating, delegating assignments, and facilitating teamwork to as many as 35 employees. Advises/collaborates with corporate principles to develop and implement internal policies/procedures and strategic planning that increased productivity across multiple departments. Involved in making decisions about the purchase of materials and/or services in line with project needs.

- **Business Development:** Develops teaming ventures to support large scale IDIQ procurements by analyzing proposal task requirements and evaluate possible teaming members based of the cross-function between services and past performance verses proposal contractual needs. Markets services to potential Federal and commercial clients based on projected Federal acquisitions for the Fiscal year. Creates commercial business relationships to facilitate winning proposal strategies to support Federal contracts.

- **Proposal Strategy Development**: Key role in creating standardized proposal development procedures related to government contracting for the company, consistently improving efficiency and preparing large-scale programmatic proposals (Cost Plus Fixed Fee, Firm Fixed Price, and Time & Material) for private industry and government entities under MATOC and SATOC type contracts.

- **Proposal Successes**: Key proposal development team member in two awards for a shared capacity contracts totaling $1.63 billion with U.S. Army Engineering Support Center; developed pricing structure, researched costs/providers, obtained subcontractor bids, and performed proposal writing, technical editing, and graphic design. Recently lead the development of a Technical and Cost proposal resulting in a contract award to removal Munitions and Explosives of Concern from a Formerly Used Defense Site, valued over $4,000,000.00.

Project Management: Hired as one of the first employees with the company and holds a leadership role in developing/implementing leadership efforts in the areas of operations management, logistics, procurement, proposal development, information technology, business development, and staff recruiting/hiring that expanded the company from five to 100 employees and escalated revenues from 500,000 to an average of 6 million a year. The following highlight specific management contributions and achievements by category:

- **Budgeting & Cost Controls**: Manages contract budgets for numerous, Military Munitions Response Program (MMRP) related projects and forecasts project work on existing contracts. Contributed to increasing profitability by developing budgets for annual IT infrastructure. Additionally, implementing cost controls that reduced overall operational expenses. Expand client relationships beyond existing contract to build a greater foundation between client and contractor. Identifies potential cost saving opportunities within existing contracts by review of subcontractor costs, potential areas of opportunity were internal services could be needed outside of work scope.

- **Data Management**: Developed the data management system, processes, and procedures, and trained employees on use of the system. Accountable for all aspects of report development/submittals, data management of field information, and development of data quality control and quality assurance protocol/procedures.

AMERICAN TECHNOLOGIES, INC. (ATI), Oak Ridge, TN **2002 - 2004**

(One of the leaders in the Military Munitions Response remediation services industry and held a large presence the geophysical interpretation arena)

GIS Specialist

- Managed the development of the GIS services branch of ATI's IT department.
- Directed the start-up of the GIS services branch for ATI and brought services in-house that resulted in saving approximately $400,000 while also achieving a 75% improvement in data processing and reporting time.
- Maximized efficiency of department operations by developing all aspects of data management processes, data design standards, user training programs, field mapping standards, and data collection techniques.
- Provided GIS mapping services, analysis, and implementation for ATI's Unexploded Ordnance (UXO) services group under a multimillion-dollar Multiple Award Task Order Contract (MATOC) for the U.S. Army Corp of Engineers – Huntsville (USACE).
- Developed GIS standards in data design, user training programs, field mapping standards and data collection techniques

Additional Experience:

GIS Analyst, SCIENCE APPLICATIONS INTERNATIONAL CORPORATION (SAIC), Oak Ridge, TN, 2001 – 2002

- GIS database development and analysis
- Leadership roles for selected project tasks on contracts related to Environmental Protection Agency Superfund sites
- Quality Control validation of geospatial data developed by associates within the division
- Spatial analysis such as contamination extent, contouring, surface modeling, and grid analysis
- Performed GIS mapping utilizing survey grade GPS equipment

GIS Crimes Analyst, CITY OF CROSSVILLE ENGINEERING & POLICE DEPT., Crossville, TN, 1999 - 2001

- Managed the development of GIS services within Crossville's Engineering Department in conjunction with the Crossville Police Department
- Designed strategic planning presentations regarding city utilities, district planning, zoning
- Developed the five-year urban growth boundary through projected development and population growth
- Conducted geospatial analysis and created geospatial data used by the City Planning Commission

EDUCATION

Bachelor of Science, Business Administration- BRYAN COLLEGE, Dayton, TN GPA 3.84
Associate of Science, Geospatial Information Systems (GIS) - ROANE STATE COMMUNITY COLLEGE, Harriman, TN

PROFESSIONAL AFFILIATIONS

GISCI GIS Professional (GISP) Certification: 90429
Urban and Regional Information Systems Association (URISA) Member: 063570
Member of Society of American Military Engineers (SAME) Member: 329633
Geospatial Information & Technology Association (GITA) Member: 4804945

PUBLICATION: *"Munitions Cleanup Is Enhanced Using GIS"*, Authored, ESRI's ArcNews, Spring 2003

COMPUTER SKILLS: Proficient in Microsoft Office; Microsoft Project; ESRI ArcGIS; Microsoft Windows & Exchange Server

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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:

Dominion Energy South Carolina, Inc.
400 Otarre Parkway
Cayce, South Carolina 29033

Prepared by:

Apex Companies, LLC
1600 Commerce Circle
Trafford, Pennsylvania 15085

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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 submi8tted 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 develop 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

Estimated by	MTR	Glenn & Associates	Apex	
	EE/CA Sediment Volume Estimate January 2013	**Preliminary Removal Action Work Plan (PRAWP) September 2018**	**Proposed Conceptual Plan - MRA Sediment Volume Estimate December 2018**	**Percent Removal**
	Original, Full-Area Removal	Full-Area Removal	MRA Areas 1 & 2	**MRA vs PRAWP**
Total Volume of Sediment to be Removed	**26,700 CY**	**25,550 CY**	**11,675 CY**	**46%**
Total Volume of TLM to be Removed	**Not Estimated**	**5,745 CY**	**4,204 CY**	**73%**

TABLE 2

SUMMARY OF RARE, THREATENED AND ENDANGERED SPECIES FOR THE PROJECT AREA AND VICNITY

Congaree River Sediments
Columbia, South Carolina

Common Name	Scientific Name	Federal Listed and Status[2]	State Protection and Status[3]	Potential Occurrence
Mammals				
Rafinesque's Big-Eared Bat	*Corynorhinus Rafinesquii / Plecotus Rafinesquii*	No	Yes - Endangered	Potential for occurrence in project vicinity under the Gervais and Blossom Street bridges.
American Alligator	*Alligator mississippiensis*	Yes - Threatened	Yes - Threatened	No - habitat not suitable
Birds				
Red-Cockaded Woodpecker	*Picoides Borealis*	Yes - Endangered	Yes - Endangered	No - habitat not suitable.
Wood stork	*Mycteria Americana*	Yes - Threatened	Yes - Endangered	No - habitat not suitable, extremely rare and if present likely from dispersion or migration.
Bald Eagle	*Haliaeetus Leucocephalus*	No	Yes - Threatened	Noted upstream of the project area but not in vicinity of project area. No anticipated impact.
Fish/Amphibians/Reptiles				
Pine Barrens Treefrog	*Hyla Andersonii*	No	Yes - Threatened	No - found in the sandhills region located northeast of the project area.
Shortnose Sturgeon	*Acipenser Brevirostrum*	Yes - Endangered	Yes - Endangered	Yes - though if present numbers likely limited
Robust Redhorse Sucker	*Moxostoma Robustum*	N1 - Critically Imperiled	SNR - Not Ranked	Yes - stocked by SCDNR below Parr Shoals dam.
Southern Hognose Snake	*Heterodon Simus*	No	Yes - Threatened	No - habitat not suitable
Freshwater Mussels				
Carolina Heelsplitter	*Lasmigona Decorata*	Yes - Endangered	Yes - Endangered	No - found in rivers and tributaries other than the Congaree River.
Roanoke Slabshell	*Elliptio Roanokensis*	N3 - Vulnerable	S2 - Imperiled	Yes - potential for occurrence in project vicinity
Yellow Lampmussel	*Lampsilis Cariosa*	N3N4 - Vulnerable, Apparentley Secure	S2 - Imperiled	Yes - potential for occurrence in project vicinity
Carolina Slabshell	*Elliptio Congaraea*	N3 - Vulnerable	S3 - Vulnerable	Yes - potential for occurrence in project vicinity
Carolina Lance	*Elliptio Angustata*	N4 - Apparently Secure	S3 - Vulnerable	Yes - potential for occurrence in project vicinity
Fatmucket	*Lampsilis Splendida*	N3 - Vulnerable	S2 - Imperiled	Yes - potential for occurrence in project vicinity
Eastern Floater	*Pyganodon cataracta*	N5 - Secure	SNR - Not Ranked	Yes - potential for occurrence in project vicinity
Creeper	*Strophitus undulatus*	N5 - Secure	S2 - Imperiled	Yes - potential for occurrence in project vicnity
Eastern Creekshell	*Villosa delumbis*	N4 - Apparently Secure	S4 - Apparently Secure	Yes - potential for occurrence in project vicinity
Plants				
Canby's Dropwort	*Oxypolis Canbyi*	Yes - Endangered	S2 - Imperiled	No - habitat not suitable
Georgia Aster	*Symphyotrichum Georgianum*	Yes - Candidate	SNR - Not Ranked	Yes - power line corridor provides potential habitat.
Rough-Leaved Loosestrife	*Lysimachia Asperulaefolia*	Yes - Endangered	S1 - Critically Impaired	No - habitat is not suitable.
Rocky Shoal's Spider Lily	*Hymenocallis coronaria*	G3 - Vulnerable	S2 - Imperiled	Yes - known to occur directly upriver of project area.
Michaux's Sumac	*Rhus michauxxi*	Yes - Endangered	SX - Presumed Extinct	No - habitat is not suitable.
Smooth Coneflower	*Echnincea Laevigata*	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 NaturServe 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

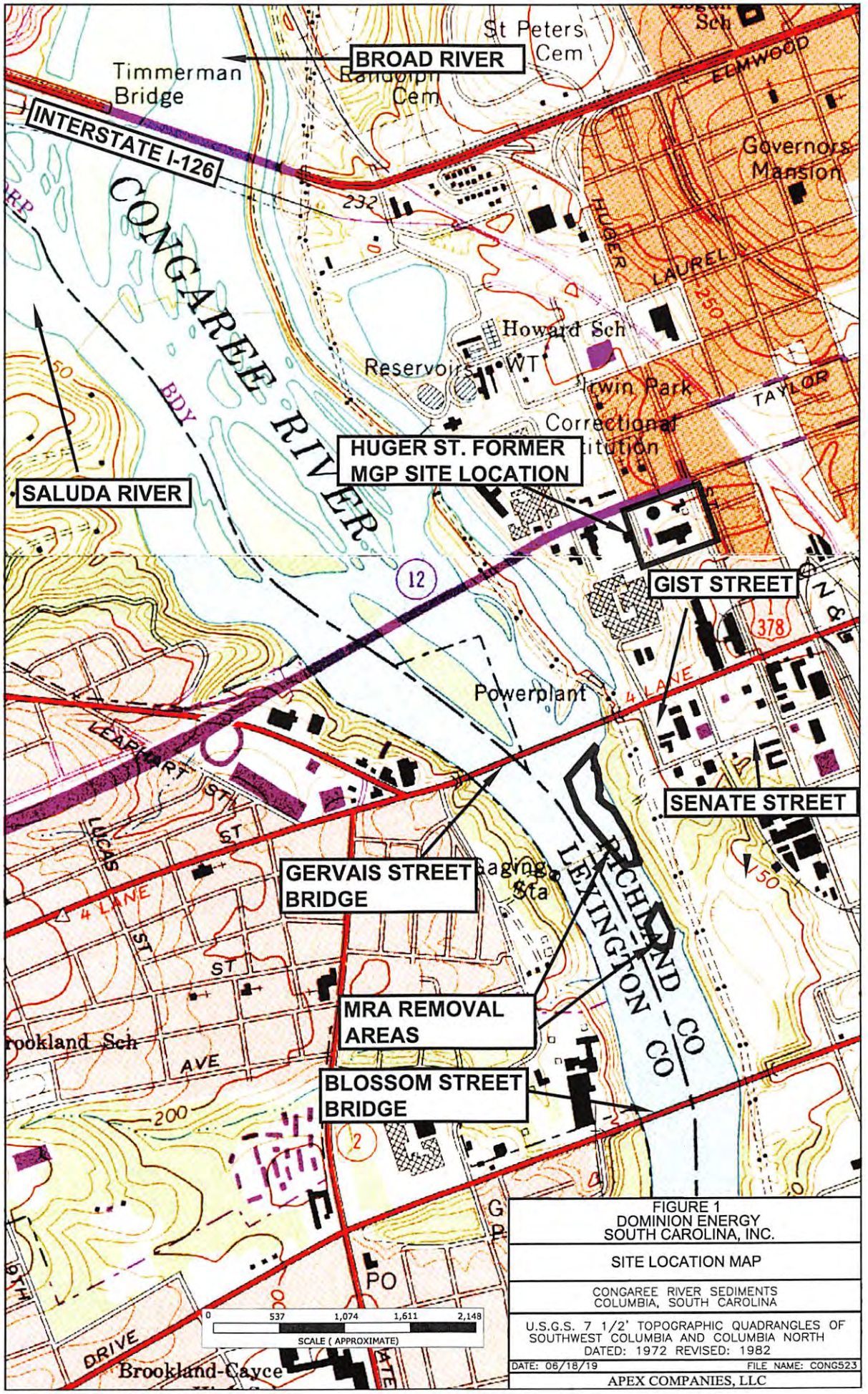


FIGURE 1
DOMINION ENERGY SOUTH CAROLINA, INC.

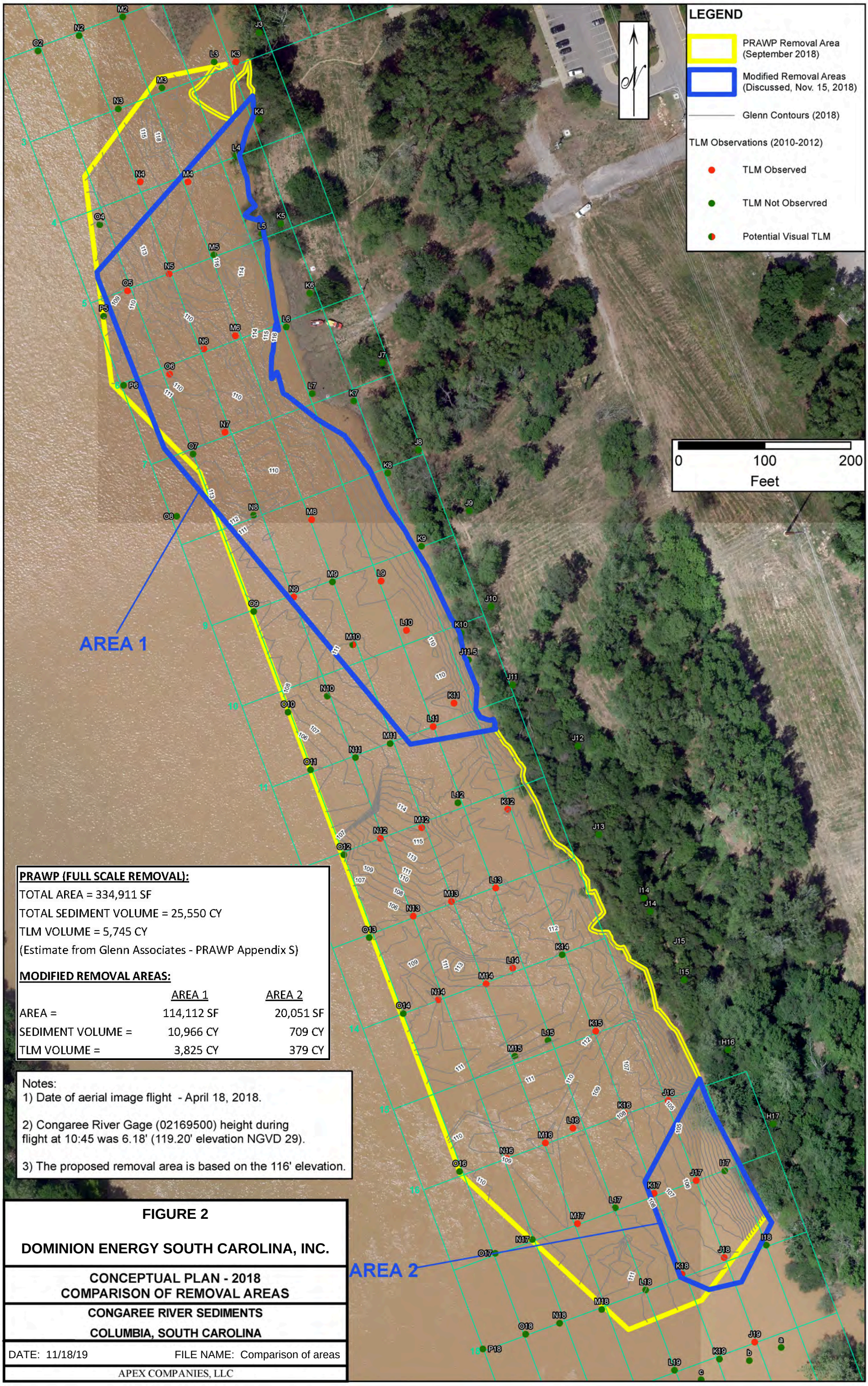
SITE LOCATION MAP

CONGAREE RIVER SEDIMENTS
COLUMBIA, SOUTH CAROLINA

U.S.G.S. 7 1/2' TOPOGRAPHIC QUADRANGLES OF SOUTHWEST COLUMBIA AND COLUMBIA NORTH
DATED: 1972 REVISED: 1982

DATE: 06/18/19 FILE NAME: CONG523

APEX COMPANIES, LLC



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

0 120 240

Feet

AREA 1
(PHASES REQUIRED)

AREA 2

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' 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

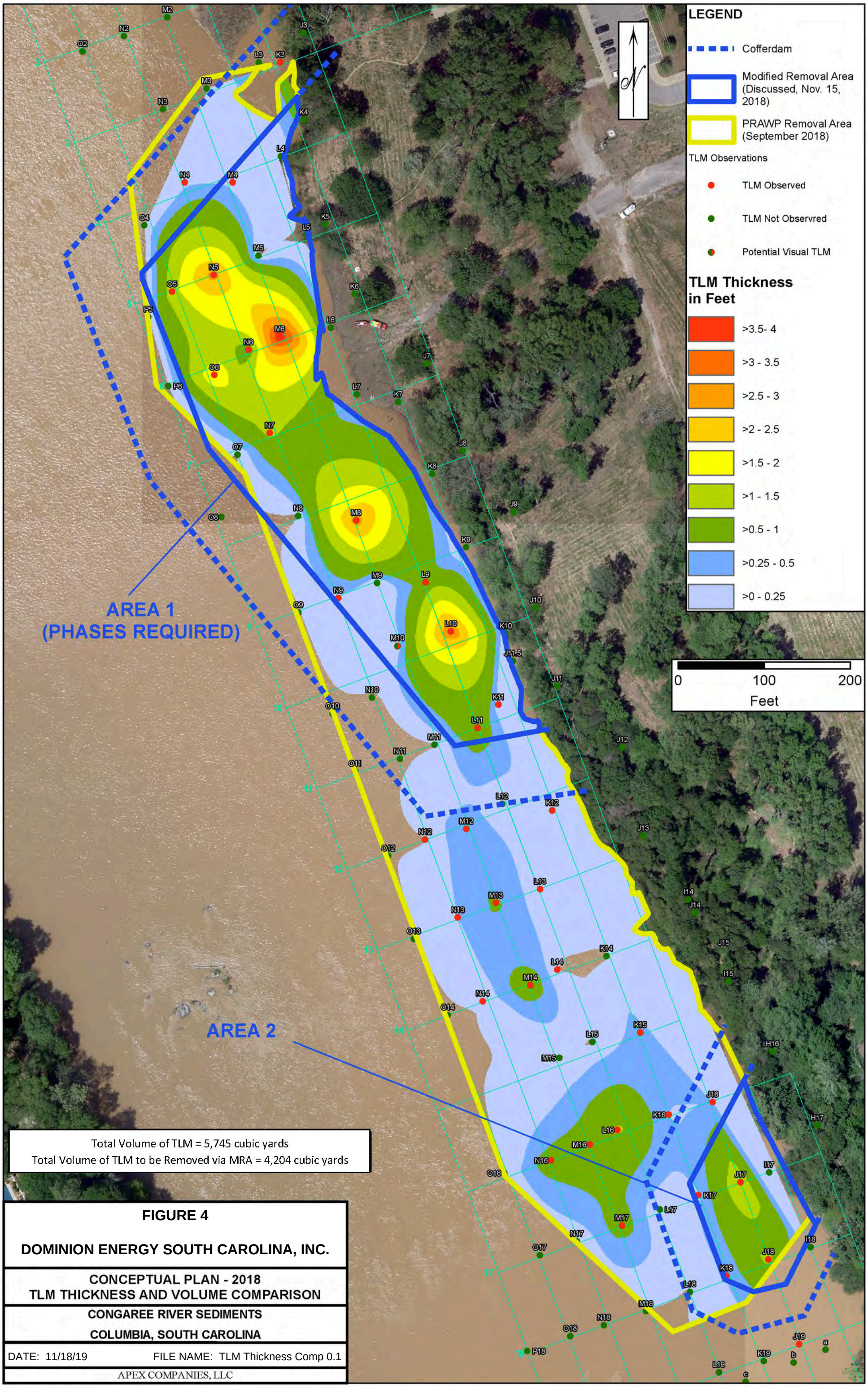


FIGURE 4

DOMINION ENERGY SOUTH CAROLINA, INC.

CONCEPTUAL PLAN - 2018
TLM THICKNESS AND VOLUME COMPARISON

CONGAREE RIVER SEDIMENTS

COLUMBIA, SOUTH CAROLINA

DATE: 11/18/19 FILE NAME: TLM Thickness Comp 0.1

APEX COMPANIES, LLC

LEGEND

– STREAM/RIVER/WETLAND EDGE
– TREELINE
– 5 FOOT CONTOUR INTERVALS
– REMOVAL AREAS FROM STAKEHOLDER DEVELOPED MRA PLAN
– SITE PERIMETER FENCE
– APPROXIMATE EXTENT OF GRAVEL AREAS
– APPROXIMATE LEASE AREA

NOTES:
1) LAND TOPOGRAPHY BASED ON LIDAR SURVEY CONDUCTED ON APRIL 18, 2018.
2) CONGAREE RIVER GAGE (02169500) HEIGHT DURING LIDAR SURVEY WAS 6.18' (119.20' ELEVATION NGVD 29).
3) RIVER BOTTOM CONTOURS BASED ON BATHYMETRIC SURVEYS CONDUCTED MAY 7 THRU JULY 17, 2018.

0' 180' 360'

N

GERVAIS STREET BRIDGE
GIST STREET
SENATE STREET
JOB TRAILERS
OFFICE AREA
SITE ACCESS ROAD
GATE
TEMPORARY STRUCTURE MATERIAL HANDLING AND STORAGE
POTENTIAL FILTERED WATER DISCHARGE POINT
ADDITIONAL OFFICE/STORAGE TRAILERS
AREA 1
PRIMARY SETTLING
ADDITIONAL SETTLING/STORAGE TANKS
FILTRATION UNITS
CONTACT WATER TRANSFER LINE
DISCHARGE TANKS
CONGAREE RIVER
AREA 2

FIGURE 5
DOMINION ENERGY
SOUTH CAROLINA, INC.

CONCEPTUAL SITE OPERATIONS PLAN

COLUMBIA, SOUTH CAROLINA

DATE: 5/19/20 FILE NAME: CONG545

APEX COMPANIES, LLC