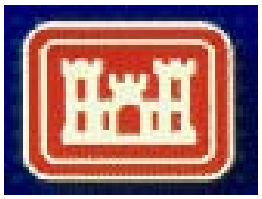
Final

Site-Specific Work Plan
for
MEC Removal Action Along Bains Gap Road
at
Ft. McClellan, Alabama

PREPARED FOR:

U.S. ARMY ENGINEERING AND SUPPORT CENTER, HUNTSVILLE



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ACRONYM LIST

ADEM	Alabama Department of Environmental Management
AR	Army Regulation
ARAR	Applicable and Relevant and Appropriate Requirements
ATFP	Alcohol, Tobacco and Firearms Publication
BATF	Bureau of Alcohol, Tobacco and Firearms
BEM	Buried Explosion Module
BIP	Blow in Place
BRAC	Base Realignment and Closure
CEHNC	Corps of Engineers, Huntsville Center
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CRL	Corporate Reference Library
CWM	Chemical Warfare Materiel
DERP	Defense Environmental Restoration Program
DID	Data Item Description
DN	Deficiency Notice
DoD	Department of Defense
DOT	Department of Transportation
DRMS	Defense Reutilization and Marketing Service
EE/CA	Engineering Evaluation/Cost Analysis
EOD	Explosive Ordnance Disposal
FAR	Federal Acquisition Regulation
FTL	Field Team Leaders
FWS	U.S. Fish and Wildlife Service
GIS	Geospatial Information System
GPO	Geophysical Proveout
GPS	Global Positioning System
GTM	Geophysical Task Manager
HERO	Hazards of Electromagnetic Radiation to Ordnance
IAW	in accordance with
IDW	Investigative Derived Waste
ITR	Independent Technical Review
MD	Munitions Debris
MEC	Munitions and Explosives of Concern
MGFD	Munition with Greatest Fragmentation Distance
MIL-STD	Military Standard
MLNWR	Mountain Longleaf National Wildlife Refuge
MR	Munitions Response
MSD	Minimum Separation Distance
msl	Mean Sea Level
NCR	Nonconformance Report
NONEL	Non-Electric
NTCRA	Non-Time Critical Removal Action
OSHA	Occupational Safety and Health Administration
PCMCIA	Personal Computer Memory Card International Association
PM	Project Manager

ACRONYM LIST
(Continued)

PWS	Performance Work Statement
QA	Quality Assurance
QC	Quality Control
RAM	Random Access Memory
RCRA	Resource Conservation and Recovery Act
RLS	Registered Land Surveyor
RTS	Robotic Total Station
SARA	Superfund Amendments and Reauthorization Act
SG	Site Geophysicist
SOW	Scope of Work
SSFR	Site Specific Final Report
SSHP	Site Safety and Health Plan
SSWP	Site Specific Work Plan
SUXOS	Senior UXO Supervisor
TBC	To Be Considered
TM	Technical Manual
TO	Task Order
TtEC	Tetra Tech EC, Inc.
USAESCH	U.S. Army Engineering and Support Center, Huntsville
UXO	Unexploded Ordnance
UXOQCS	UXO Quality Control Specialist
UXOSO	UXO Safety Officer
WP	Work Plan

1.0 INTRODUCTION

1.1 GENERAL INFORMATION

The purpose of this Site Specific Work Plan (SSWP) is to provide the standard procedures and safety and health requirements applicable to conducting a Munitions and Explosives of Concern (MEC) Removal Action along a selected portion of Bains Gap Road and St. Clair Road, Ft. McClellan. The removal action is a Clearance to Depth removal action. The work was awarded to Tetra Tech EC, Inc. (TtEC) by the U.S. Army Engineering and Support Center, Huntsville (USAESCH) under contract W912DY-04-D-0011-0004.

1.2 SITE LOCATION

1.2.1 Fort McClellan is located northeast of the City of Anniston, Calhoun County, Alabama. To the west are the areas known as Weaver and Blue Mountain. To the North is the City of Jacksonville. The Talladega Forest is located east of the Fort. Fort McClellan occupies 18,929 acres adjacent to the city of Anniston, Alabama.

1.2.2 The area subject to the removal action described in this SSWP is a section of Bains Gap Road and St. Clair Road as described in the Scope of Work (SOW), which is located in Appendix A. Bains Gap Road and St. Clair Road runs east and west through the portion of the previous installation that is now the Mountain Longleaf National Wildlife Refuge (MLNWR). See Figure 1-1 for a more detailed view of the location within the former Ft. McClellan.

1.3 SITE HISTORY

1.3.1 Fort McClellan was used for artillery training of Army troops and the National Guard from as early as 1912 to early WW II. In 1951, Fort McClellan became the site of the Chemical Corps Training Command. In 1962, the U.S. Army Combat Developments Command Chemical Biological-Radiological Agency moved to Fort McClellan. In 1973, the Chemical Corps School along with the U.S. Army Combat Developments Command and Chemical Biological-Radiological Agency moved to Edgewood Arsenal. In 1979, the U.S. Army Chemical Corps School and a training Brigade for Basic Training were re-established. In September of 1999 Fort McClellan was closed under the Base Realignment and Closure Act (BRAC).

1.3.2 The portions of Bains Gap Road and St. Clair Road to be cleared under this task order, traverse through documented training and impact areas. Previous investigations and studies conducted at Fort McClellan described the MEC and Unexploded Ordnance (UXO) located within these training areas as high explosive, practice, training, and expended. The Charlie Area Engineering Evaluation/Cost Analysis (EE/CA) Report and the Site Specific Final Report (SSFR) for the Fish and Wildlife Service (FWS) Roads, Firebreaks and High Use Areas confirms

this and documents the types of MEC and Munitions Debris (MD) that were located in this former training and impact area.

1.4 TOPOGRAPHY

1.4.1 The topographic gradient on Ft. McClellan generally increases towards the south and east of the main installation. Local relief on Ft. McClellan is in excess of 1,320 feet. The lower elevations (700 feet above mean sea level [msl]) occur along Cane Creek, near Baltzell Gate Road, while the maximum elevations (2,063 feet above msl) occur in the Choccolocco Mountains, which traverses the area in a north/south direction, with the steep easterly slopes grading abruptly into the Choccolocco Valley. The western slopes are more continuous, with the southern extension maintaining elevations up to 900 feet above msl near the western reservation boundary. The northern extension decreases in elevation in the vicinity of Reilly Airfield. The central portion of Fort McClellan is characterized by flat to gently sloping land.

1.4.2 The topography along Bains Gap Road and St. Clair Road is mostly flat to slightly sloping along the northern side of the road, with an occasional steep slope caused from a cut during the construction of the road. As the road travels east, it rises slowly towards the Choccolocco Mountains.

1.5 CLIMATE

1.5.1 Fort McClellan is situated in a temperate, humid climate. Summers are hot and long, and winters are usually short and mild to moderately cold. The climate is influenced by frontal systems moving from northwest to southeast, and temperatures change rapidly from warm to cool due to the inflow of northern air. The average annual temperature is 63 degrees Fahrenheit (ºF). Summer temperatures usually reach 90ºF or higher about 70 days per year, but temperatures above 100ºF are rare. Freezing temperatures are common but are usually of short duration. The first frost may arrive by late October. At Anniston, Alabama the average date of the first 32ºF temperature is November 6, and the last is March 30. This provides a growing season of 221 days. Snowfall averages 0.5 to 1 inch. On rare occasions, several inches of snow accumulate from a single storm.

1.5.2 The average annual rainfall is approximately 53 inches and is well distributed throughout the year. The more intense rains usually occur during the warmer months, and some flooding occurs nearly every year. Drought conditions are rare. Approximately 80 percent of the flood-producing storms are of the frontal type and occur in the winter and spring, lasting from two to four days each. Summer storms are usually thunderstorms with intense precipitation over small areas, and sometimes result in serious local floods. Occasionally, several wet years or dry years occur in series. Annual rainfall records indicate no characteristic order or pattern.

1.5.3 Winds in the Fort McClellan area are seldom strong and frequently blow down the valley from the northeast. However, there is no truly persistent wind direction. Normally, only light

breezes or calm prevail. Tornadoes are possible however, and can have winds of 100 miles per hour or more.

Figure 1-1 Site Layout Map

2.0 TECHNICAL MANAGEMENT PLAN

2.1 GENERAL

This plan details the approach, methods, and operational procedures to be implemented at Fort McClellan by Tetra Tech EC, Inc. and subcontractor personnel.

2.2 GUIDANCE AND REGULATIONS

2.2.1 MEC response actions must be conducted in compliance with current environmental regulations implemented by Federal, state, and local governments. Applicable Federal statutes and regulations include the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Defense Environmental Restoration Program (DERP), and the Resource Conservation and Recovery Act (RCRA). Environmental standards promulgated by the state (i.e., Alabama Department of Environmental Management (ADEM)) must also be considered as potentially applicable to MEC response at Fort McClellan.

2.2.2 MEC response activities at Fort McClellan are part of a Non-Time Critical Removal Actions (NTCRA) to be conducted in a manner consistent with the CERCLA, as amended by the Superfund Amendments and Reauthorization Act (SARA), the NCP and CERCLA guidance entitled "Guidance on Conducting Non-Time Critical Removal Actions Under CERCLA." In accordance with CERCLA Section 121, actual permits will not be required for on-site work. Rather, substantive compliance with the selected Applicable and Relevant and Appropriate Requirements (ARARs) and/or requirements To Be Considered (TBCs) must be achieved. It should be noted that the selection of ARARs/TBCs is an iterative process that will evolve throughout the various phases of the project.

2.2.3 The areas included in this removal action are surrounded by a series of locked gates that are an effective way of restricting access. During intrusive activities the locks on the gates will be changed to locks that only TtEC have keys for. This ensures that personnel with normal access to the area do not accidentally enter the area.

2.3 DISCOVERY OF CHEMICAL WARFARE MATERIEL (CWM)

2.3.1 In the event that CWM is located or suspected, TtEC personnel will evacuate the area immediately in an upwind direction. The UXO Team Leader will:

- Notify the Senior UXO Supervisor (SUXOS);
- Ensure that all personnel are clear of the area; and
- Maintain security of the area until relieved.

2.3.2 The SUXOS will:

- Notify the TtEC Project Manager;
- Notify the Corps of Engineers, Huntsville Center (CEHNC) on-site Safety Representative;
- Stop all field operations- assemble at designated assembly points; and
- Standby to provide assistance as required**.**

2.4 OFF SITE MEC DISPOSAL

The safest procedure for personnel when encountering MEC is to destroy the MEC in place using Blow in Place (BIP) explosive procedures. Standard procedures will be to dispose of all located MEC items daily. All located MEC will be disposed of in the position/location found. In the event an area cannot withstand a high order detonation, items that can be safely moved will be disposed of in an approved area. If an item is located that is considered unsafe to move and the area cannot withstand a high order detonation, engineering controls will be used to reduce the blast and fragmentation effect of a detonation, and the item will be disposed of in place. If the area cannot withstand a high order detonation even with the application of engineering controls, the SUXOS will notify the Corps of Engineers, Huntsville Center (CEHNC) Safety Representative that the item is not safe to move and that the item cannot be disposed of in place, and request additional assistance.

2.5 TECHNICAL SCOPE

2.5.0 The SOW supplied with this Task Order (TO) does not contain any formal tasks, meaning they are not numbered. The SOW maintains this is a Performance Work Statement (PWS) and that the following tasks are required to be performed:

- Quality Control
- Work Plan
- Geophysical Prove-out
- Removal Action
- Backfilling Excavations
- MEC Accountability
- Disposal of MEC Scrap
- Geospatial Data
- Final Report

Based on the requirements outlined above the following paragraphs will document the approach that TtEC will be using to complete this task order:

2.5.1 Site Specific Work Plan

This SSWP for the Bains Gap Road and St. Clair Road area within the MLNWR shall include site-specific details that are required by Data Item Description (DID) Munitions Response (MR)-005-01 Type II SSWP. No site work will commence until approval of this SSWP is received.

2.5.2 Location Survey and Mapping

A sub-contracted Registered Land Surveyor (RLS) shall set out boundary markers every 100 feet around the boundary of the clearance area. The RLS will also set out a marker every 100 feet along the centerline of Bains Gap Road and St. Clair Road. The boundary and centerline markers will create 100 x 100 foot grids along the entire length of Bains Gap Road and St. Clair Road that is to be cleared as part of this task order. All location surveys will be carried out in accordance with (IAW) DID MR-005-07 and are detailed in Section 7 of this SSWP. All survey activities performed, as part of this task order will require a qualified UXO escort be present during the location survey field work.

2.5.3 Geophysical Survey

TtEC will provide the necessary personnel and equipment to carry out geophysical survey of the investigation area. The primary tool utilized will be the EM-61 Mk-2. The EM-61 will be a one meter coil that will be man carried and will utilize either the Constellation laser positioning system or the Robotic Total Station to collect position data. Note that due to excessive slope or other factors, some areas may not be able to be effectively geophysically surveyed. These areas will be identified and addressed on an individual basis by other conventional UXO investigation methods such as the mag and dig technique. Full details of the geophysical survey can be reviewed in Section 6 of this SSWP.

2.5.4 Anomaly Reacquisition

TtEC will provide equipment and personnel to reacquire the targets selected during the geophysical survey task. Suspected subsurface MEC locations (geophysical anomalies) will be presented as co-ordinate locations in the packages provided to the rnjeacquisition teams. Reacquire teams will have several methods available to perform the reacquire with. These include the Vulcan laser position system, measuring tapes from the known corners, or the Robotic Total Station (RTS). Each anomaly will be flagged with a numbered pin flag corresponding to the anomaly ID located at that position.

2.5.5 MEC Removal

2.5.5.1 TtEC or its approved sub-contractor will provide the necessary personnel and equipment in order to carry out the intrusive investigation of the Bains Gap Road and St. Clair Road removal area. The Intrusive Teams shall be equipped with hand tools or mechanical excavation equipment (back hoe or mini excavator) to excavate all target anomalies previously marked; this includes anomalies located under Bains Gap Road and St. Clair Road. The team leader shall directly supervise all team members and shall maintain a detailed log.

2.5.5.2 In the instance where anomalies are located underneath tree stumps, manual excavation methods will be utilized to dig down beside the anomaly and then access will be gained from the side. Although not expected, in instances where target sized anomalies are found to be grown within a tree stump, explosive or manual methods will be used to gain access to the item.

2.5.5.3 All recovered MEC shall be disposed of daily in accordance with Technical Manual (TM) 60A-1-1-31, General Information for Explosive Ordnance Disposal (EOD) Procedures unless an exception is approved by the SUXOS. All explosives for disposal operations will be stored in the approved TtEC magazine.

2.5.5.4 TtEC shall maintain as part of its database, an account of all MEC, MD and Non-MD encountered on the project site. This information will be provided to the Geospatial Information System (GIS) manager for inclusion in the final report.

2.5.5.5 TtEC shall furnish all necessary personnel to inspect and turn in all recovered scrap. The metal scrap will be processed for recycling in accordance with Department of Defense (DoD) 4160.21-M, Defense Demilitarization Manual.

2.5.6 MEC Destruction

2.5.6.1 Demolition operations will begin when all personnel are out of the Minimum Separation Distance (MSD) of the ordnance being detonated. An MSD sheet has been prepared by the USAESCH for all MEC discovered on Fort McClellan to date. If an item is discovered for which the MSD has not been calculated, the contractor will work with the onsite safety representative to acquire the MSD for the item. To the greatest extent possible, all items will be BIP to reduce the risk inherent in handling and moving UXO. The Demolition Team Leader (UXO Technician III) will be responsible for all demolition operations as directed by the SUXOS.

2.5.6.2 The demolition operations will be performed under the direction and supervision of the Demolition Team Leader, who is charged with the responsibility of ensuring that procedures contained in the demolition procedures and referenced documents are followed. The UXO Safety

Officer (UXOSO) will monitor compliance with the safety measures contained in the work plan and associated documents. In the event of noncompliance with these procedures, the UXOSO is vested with the authority to stop or suspend operations. All roads within the exclusion zone for this project are currently locked or closed via existing Land Use Controls. During demolition operations these roads will remain locked with a lock that is controlled by TtEC personnel only. No known exclusion zone extends outside of the controlled area of this task.

2.5.6.3 Upon completion of disposal operations, the Team Leader and one UXO Technician II will inspect each disposal shot. Upon completion of this inspection, and providing that there are no residual hazards, the SUXOS will authorize the resumption of site operations. MEC will be destroyed on the day of its discovery. If for some reason demolition operations cannot be completed on the same day, the MEC item will be guarded or secured using existing land use controls located on Ft. McClellan until demolition can be performed. Detailed demolition procedures are located in Section 2.10 below.

2.5.7 Scrap Management and Disposal

2.5.7.1 Disposal of recoverable and recyclable materials, which are the property of the Department of Defense, is generally governed by the Defense Reutilization and Marketing Service (DRMS). DOD 4160.21M provides guidelines on the classification, and procedures for the disposal of AEDA material. DoD has instituted requirements that all waste materials, which are gleaned from ranges, must be examined and certified as safe when there is no danger of detonation or explosive reaction. The certification must be performed by individuals who have defined training and experience, and are therefore qualified to determine that the items are safe. Disposal of waste is governed by the RCRA and the applicable local regulations.

2.5.7.2 MD will receive 2 inspections that will ensure it is safe for shipment to the smelter. The first inspection will be carried out by the UXO Team Leader on the day the scrap is found. The team leader will perform this inspection in the field and will segregate the scrap into two categories; MD and Non MD. This scrap will be stored in drums awaiting final inspection. Non-MD will be disposed of locally as normal waste.

2.5.7.3 Only personnel who are qualified UXO personnel will perform these inspections. The SUXOS will certify, and the CEHNC's Safety Specialist will verify, that all scrap metal is free of explosive hazards.

2.5.7.4 Once all MD has been inspected and certified free of explosives, the scrap will be placed in Department of Transportation (DOT) approved shipping containers. The container will be closed and clearly labeled on the outside with the following information: The first container will be labeled with a unique identification that will start with USACE/Ft. McClellan/Tetra Tech EC/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 if different from the container.

2.5.7.5 A documented description of the container will be provided by TtEC with the following information for each container: contents, weight of container, location where MD was obtained, name of contractor, names of certifying and verifying individuals, unique container identification and seal identification.

2.5.7.6 A DD Form 1348-1A will be used as certification documentation. All DD Form 1348-1A must clearly show the typed or printed names of TtEC's SUXOS and the USACE's Safety Specialist, organization, signature, and TtEC's home office and field office phone number(s) of the persons certifying and verifying the scrap metal.

2.5.7.7 In addition to the data elements required and any locally agreed to directives, the DD 1348-1A must clearly indicate the following for scrap metal:

- Basic material content (Type of metal; e.g., steel or mixed)
- Estimated weight
- Unique identification of each of the containers and seals stated as being turned over.
- Seal identification, if different from the unique identification of the sealed container.

2.5.7.8 The following certification/verification will be entered on each DD 1348-1A for turn over of scrap and will be signed by the SUXOS and the USACE OE Safety Specialist.

> "This certifies that the material listed has been 100 percent properly inspected and, to the best of our knowledge and belief, are free of explosive hazards, engine fluids, illuminating dials and other visible
> liquid HTRW materials."

2.6 CHANGED SITE CONDITIONS

As described in the Performance Work Statement (PWS), there will be no changed site conditions. In the event something outside the PWS is encountered, a letter will be sent to the Contracting Officer notifying of the potential changed condition and requesting direction.

2.6.1 Geophysical Prove-out (GPO)

A GPO WP will be completed and a report written in accordance with DID MR-005-05A. The GPO will be conducted in accordance with, and after approval of, the GPO WP and will occur at TtEC's existing geophysical test grid. The GPO WP is located in Appendix I of this SSWP. The

GPO Report will be written and approved prior to starting actual collection of geophysical data under this task order. Full details of the GPO can be reviewed in the GPO WP.

2.6.2 Surface Clearance

Prior to conducting the brush removal and geophysical survey an instrument assisted surface clearance of the proposed area will be conducted to remove metallic debris and any MEC from the ground surface. This will assure the safety of the brush removal and geophysical survey personnel, as well as reduce the potential for cultural interference in the geophysical data. Schondstedt GA-52CX hand held detectors or other approved detectors will be used in conjunction with the visual search. All metal debris will be removed from each grid and temporarily stored for subsequent disposal. Any MEC that is located will be destroyed IAW the procedures outlined in the SSWP Section 10 for performing demolition procedures.

2.6.3 Brush Removal

TtEC will sub-contract out the brush removal task. Personnel shall carry out brush clearance by mechanical and/or manual means. If required, trees up to 4 inches in diameter will be removed. Lateral branches and other impediments to ordnance clearance operations shall be removed to approximately 8 feet above grade to allow unimpeded access to all areas. A UXO escort will be present during brush removal activities.

2.7 PROJECT ORGANIZATIONAL CHART

The project organization chart is provided as Figure 2-1.

2.8 MOBILIZATION PLANS

2.8.1 TtEC will schedule the arrival of the work force in a manner that is most effective and designed to allow for immediate productivity. All TtEC and subcontractor personnel mobilized to the site will meet the Occupational Safety and Health Administration (OSHA) hazardous waste operations training and medical surveillance requirements as specified in the Site Safety and Health Plan (SSHP). As part of the mobilization process, TtEC will perform site-specific training for all on-site personnel assigned to this project. The purpose of this training is to ensure that all on-site personnel fully understand the operational procedures and methods to be used by TtEC at Fort McClellan, to include individual duties and responsibilities, and all safety and environmental concerns associated with operations. Any personnel arriving at the site after this initial training session will be trained as they arrive. Training will be conducted by the SUXOS, or UXO Quality Control Specialist (UXOQCS), or the UXOSO.

2.8.2 Project equipment will come from TtEC sources and local leases/ purchases. All equipment, regardless of source, will be checked to ensure its completeness and operational

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

2.8.3 TtEC will use its existing office facility for the storage of equipment and to house the administrative staff needed for this task order.

2.9 STATISTICAL SAMPLING

No statistical sampling is planned during this task order.

2.10 REPORTING AND DISPOSITION OF MEC

2.10.1 The intrusive team leader will notify the SUXOS when a possible MEC item is located. The SUXOS will positively determine if the item is MEC that requires disposal and will then schedule demolition operations. If a government safety specialist is on site, the SUXOS will notify them that MEC was located and when demolition is planned.

2.10.2 The SUXOS is responsible for planning, directing and executing all MEC disposal operations and ensuring the safety of all personnel. He will ensure the range or exclusion zone is clear of all unauthorized personnel before commencing explosive handling operations.

2.10.3 A minimum of three UXO Specialists will be used in conducting explosive disposal operations; one member in charge, the Demolition Team Leader; and, a third member who will act as safety observer. The safety observer will be located in the safe area and will maintain visual contact with the down range team as well as maintaining communications with the TtEC project office. For small projects the Senior UXO Supervisor may act as the third UXO specialist in the safe area.

2.10.4 The following specific safety precautions for disposal operations will be observed:

- The two-man rule will be in effect in all disposal operations. In addition, a third person (safety) shall be available near the disposal site to act as a safety observer and communications watch in the event of an accident.

- Demolition operations will not be conducted during dust, wind, rain, snow, electrical storms or when cloud cover is less than 200 meters.

- Only condition code "A" or "C" military explosive items, or commercial explosives within their shelf life limit, shall be used as donor explosives for disposal operations.

- Extreme care will be exercised in handling and preparing high explosives for detonation. They are subject to detonation by heat, shock, or friction.

- Photo flash bombs will be handled with the same care as black powder filled munitions.

- MEC containing white phosphorous shall not be detonated into the ground. The MEC shall be counter-charged on the bottom center line when possible.

- Blasting caps will be carried in approved containers and kept out of the direct rays of the sun, and located at least 25 feet from other explosives, until they are needed for priming.

- Do not handle, use, or remain near explosives during the approach or progress of an electrical storm. All persons shall retire to a place of safety.

- Explosives or accessory equipment that are obviously deteriorated or damaged will not be used. They may cause a premature detonation or fail completely.

- The explosive end of blasting caps, detonators, and explosive devices will always be pointed away from the body during handling.

- In the event of a misfire when disposing of explosives by detonation, the disposal site will not be approached for at least 30 minutes after the expected detonation time when firing electrically. When conducting non-electric procedures, the wait time shall be one hour from the expected time of detonation.

- A post-search of the detonation site shall be conducted to assure complete disposal was accomplished.

- If the situation dictates, protective measures to reduce shock, blast, and fragmentation shall be taken. Army Technical Manual TM 5-855-1, Fundamentals of Protective Design for Conventional Weapons, DOD standard 6055.9 and EODB 60A-1-1-4, Protection of Personnel and Property, contain data on blast effects, ground shock, cratering, ejection, and fragmentation. The following distances shall be used unless protective measures are implemented:

  - All exclusion zones for MEC disposal operations will be based on the Maximum Separation Distance expected to be encountered in accordance with DOD 6055.9 or as calculated by the CEHNC Engineering Branch. If specific distances are not specified the following general distances will apply;
  - For non-fragmenting explosive materials, evacuation distance will be calculated using DOD 6055.9 C.9(T35) based on the diameter of the item being disposed of, or the distance located in DDESB TP 16.

- For fragmenting explosive materials, evacuation will be calculated using DOD 6055.9 (C9.T35) based on the diameter of the item being disposed of, or the distance located in DDESB TP 16.
- Items with lugs, strong backs, tail plate sections, etc., should be oriented away from personnel locations as fragmentation from these items tends to travel farther than normal. Consideration should be given to tamping the UXO to control fragments, if the situation warrants. Fragments shall be minimized not only to protect personnel but also property, such as buildings, trees, etc.
- Open burning of explosives and smokeless powder or chemical decomposition of explosives shall not be accomplished without approval of the contracting officer.
- Do not inhale the smoke or fumes of burning pyrotechnic or incendiary materials. The fumes and dust from many of these materials are irritating and/or toxic if inhaled.
- Do not use water on incendiary fires. Water may induce a violent reaction or be completely ineffective, depending on the mixture.
- Anticipate a high order detonation when burning pyrotechnic or incendiary-loaded MEC. Safety measures for personnel and property must be based upon this possibility.

2.10.5 All handling of MEC and donor explosives will be in accordance with accepted safety precautions found in Army Regulation (AR) 385-64, TM 60A-1-1-31, TM 60A-1-1-22 and state requirements. It is anticipated that all located MEC items will be disposed of in the position found. Unfuzed MEC items considered acceptable to move may be transported for the purposes of consolidating shots if desired. Prior to the actual handling operations, the exclusion zone will be adjusted for the actual fragmentation range of the MEC encountered.

2.10.6 For BIP operations donor explosives will be transported from the magazine area to the BIP site via motor vehicle. All motor vehicle transportation of explosive materials will be in accordance with the provisions of 49 CFR Parts 100 to 199, state and local requirements.

2.10.7 For the purposes of this Work Plan only one method of disposal will be utilized, Open Detonation. This method uses a donor explosive charge placed in contact with the ordnance, and when detonated results in a detonation of the energetic material. Under no circumstances shall ammunition and explosives be disposed of by detonation unless they are specifically identified and their characteristics are known. Specific guidance on donor charge placement for the specific ordnance type encountered is contained in TM 60A-1-1-31.

2.10.8 Disposal operations will only be conducted during daylight hours. All vegetation including dry grass, leaves, and other combustible materials shall be removed within a safe radius around the disposal site.

2.10.9 Prior to commencing disposal operations the SUXOS will obtain a local weather report. Disposal operations will not commence during periods of heavy rain, low or total overcast, or during electrical storms.

2.10.1 NONEL Firing System

2.10.1.1 The Non-Electric (NONEL) Firing System utilized at Fort McClellan by TtEC will be the Shock Tube Firing System. The shock tube is a thin plastic tube of extruded polymer with a layer of special explosive material deposited on its interior surface. This special explosive contained within the plastic tubing dust propagates a detonation wave from the initiating end (safe zone) to the demo area.

2.10.1.2 Shock tube provides the instantaneous action of electric initiation without the risk of accidental initiation of an electrical blasting cap (and the charge) by electromagnetic radiation. The system also reduces the amount of detonating cord required which helps reduce range fires caused by the detonating cord. The NONEL system can be initiated electrically if desired.

- Lay out required length of shock tube to reach from demo site to initiating area
- At the MEC, place perforator or booster attached to 2-3' detonating cord in position-secure with sand bags
- At MEC attach detonating cord to shock tube lead line with cap on end and tape connection.
- NOTE!!! The lead line could run straight to the safe area or to a bunch block if multiple shots are being fired. If multiple shots are being fired the shock tube lead line would run from the safe area to a bunch block to additional lead lines to additional shots. The procedure is illustrated in the SOP for UXO Disposal Operations.
- Check system when complete and depart for safe area (firing point)
- Attach shock tube to firing device.
- Ensure area is clear, give verbal warning and activate firing device.

2.10.2 NONEL Misfire Procedures

2.10.2.1 The most common cause of a misfire in a shock tube firing system is the initiating element (igniter) malfunctioning. A one hour wait time is mandatory before going down range after a misfire has occurred. If two or three retries with the igniter does not initiate the shock tube, cut the shock tube, replace the igniter with a new one and repeat the firing procedure.

2.10.2.2 If the igniter appears to have fired (primer pops and smokes) but the charge did not fire, cut a one foot section from the shock tube lead in starting 6" from the igniter. Hold the one foot piece of shock tube so that one end is over the palm of your hand and gently blow

through the other end. If a fine powder is blown from the shock tube, it has not fired. In this case install a new igniter and repeat the firing procedure.

2.10.2.3 If the igniter functioned properly and no fine powder was blown from the shock tube, then the suspect cause would be the non-electric blasting cap at the MEC side of the shock tube. Wait one hour.

2.10.2.4 After the one hour waiting period has passed go to the MEC end of the shock tube. Check each component in the train until the cause of the failure is identified. Replace the component that failed. Lay out another firing system and repeat the firing procedure.

2.10.2.5 At the conclusion of detonation and after a five minute wait time, the SUXOS or Demolition Team Leader will inspect the site prior to allowing other personnel to enter the blast area. The demolition team will conduct a shoulder to shoulder sweep of the detonation site to gather fragments and explosive residue if present. Intact ordnance items that failed to detonate will be counter-charged and blown in place. Explosive residue will be collected and detonated. Metal fragments will be examined to ensure complete detonation of explosive material.

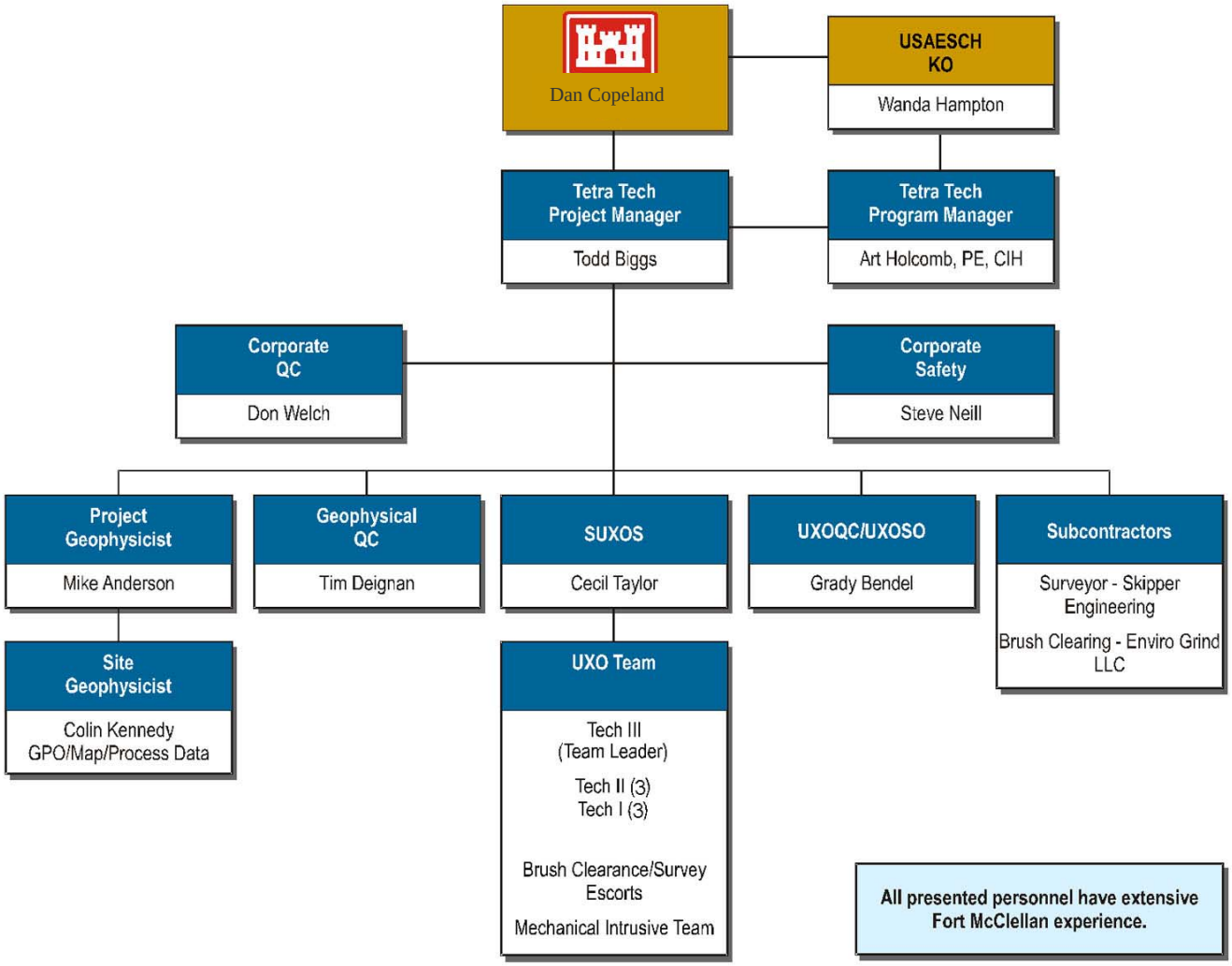
2.11 ADDITIONAL TASKS

There are no known additional tasks than those discussed elsewhere in this plan.

2.12 LESSONS LEARNED

Lessons learned will be covered under Section 9.

Figure 2-1 Project Organization Chart



3.0 EXPLOSIVE MANAGEMENT PLAN

This plan outlines the procedures that will be used to manage explosives required to perform MEC disposal activities at Fort McClellan. The procedures are in accordance with the following:

- Federal Acquisition Regulation (FAR) 45.5
- Alcohol Tobacco and Firearms Publication (ATFP) 5400.7
- DoD 6055.9-STD
- AR 190-11
- Department of Transportation (DOT) Regulations
- Alabama Explosive Safety Act of 1993

3.1 ACQUISITION OF EXPLOSIVES

TtEC has a Bureau of Alcohol, Tobacco and Firearms (BATF) permit to purchase and use explosives and will supply commercial demolition material for disposal operations at Fort McClellan. This permit will be posted on site and will be available for local, state, or federal inspection. The physical accountability and use of the explosives will remain with TtEC unless custody is transferred to the government or another contractor with a current BATF explosive license.

3.2 INITIAL RECEIPT

Shipments of explosives will be by commercial carrier from the explosives supplier. The explosive supplier is responsible for all permits and documentation required by federal, state, and local regulations.

3.3 STORAGE

TtEC will use the existing explosives storage facilities at Fort McClellan. This facility consists of two portable explosives magazines that have been properly sited at Ft. McClellan. The explosive siting plan was conducted under a separate TO at Ft. McClellan.

3.4 TRANSPORTATION

Transportation of MEC and donor explosives will comply with all federal, state, and local regulations. Permits are not required under CERCLA for on-site or on federal installations for transportation of explosives or conventional MEC.

3.5 RECEIPT PROCEDURES

On receipt, the type, quantity, and lot number of each explosive item will be checked against the manifest and recorded on the magazine data card (Appendix F). The original receipt documents and an inventory will be maintained on file by the SUXOS. The magazine data card will remain in the magazine with the explosive items and be annotated and updated for each issue and receipt.

3.6 INVENTORY

3.6.1 The SUXOS will strictly control access to all explosives. Only sufficient explosives for the day's operations will be requested and issued.

3.6.2 Access to explosive magazines will require a TtEC UXO escort for non- TtEC employees. This is required to maintain accountability and meet BATF inspection requirements. Issues of explosives are recorded on Explosive Usage Records, deducted from the Magazine Data Card(s) and annotated in the daily journal. This procedure will ensure that the issued explosives are accounted for while they are in the possession of individual users. The SUXOS and UXO Technician III team leader performing demolition will sign and date the explosives usage form (see Appendix F) certifying that the explosives were used for their intended purpose.

3.6.3 Entries made on the Explosive Usage Records and Magazine data Cards will be verified via a physical count by the Demolition Team UXO Technician III when drawing or turning-in the explosives. The SUXOS will verify the record.

3.6.4 Explosives will be inventoried at least weekly. Weekly inventories will be conducted by the SUXOS and UXOQCS and the results provided to the project manager. Complete inventories will also be conducted daily at the end of the day after any issues/turn-ins.

3.6.5 If there is a discrepancy between the inventory and the volume of explosives within the magazine, then they will review the magazine Data Card and Explosives Use Record to see if the inventory records are current.

3.7 DISCOVERY OF LOST OR STOLEN EXPLOSIVES

If it is confirmed that ordnance or explosives are missing, then the TtEC Project Manager and the United States Army Corp of Engineers (USACE) Site Safety Specialist will be notified. TtEC will notify BATF and immediately begin an investigation. TtEC will contact the United States Army Corp of Engineers, Huntsville Center (CEHNC) contract officer within 24 hours of discovery. Local authorities will be notified and a written report will be issued within 24 hours.

3.8 RETURN TO STORAGE PROCEDURES

Only the amount of explosives required for the day's demolition activities will be drawn from the magazine. If the explosives are not used or need to be returned to the magazine, the items will be inventoried and added back to the magazine data card and verified by both the SUXOS and UXOQC.

3.9 DISPOSAL OF REMAINING EXPLOSIVES

TtEC is required by BATF to account for all explosives purchased and used. At project completion all unused explosives will either be disposed of by detonation or custody and accountability transferred to an incoming contractor or the Government. An economic analysis for different alternatives is not required since this requirement does not apply to firm fixed price delivery orders.

4.0 EXPLOSIVE SITING PLAN

This plan outlines the procedures TtEC will use to perform explosive disposal operations at Fort McClellan and the explosive storage requirements on site. The explosive magazines that will be used were sited and approved in 2001 under a separate contract.

4.1 MUNITIONS RESPONSE SITES

For this SSWP the Munitions Response Site is the Bains Gap Area that is being cleared.

4.2 SAFE SEPARATION DISTANCE

The safe separation distances for the public during intrusive operations will be the distance calculated by the MSD sheet for the munition with the greatest fragmentation distance (MGFD) that will most likely be encountered during the intrusive investigation (MSD sheets are included in appendix G and the ESS for this project). The MGFD for this task order is the 81mm Mortar with an MSD of 1395 ft. The safe separation distances for the public during demolition operations will be the distance calculated by the MSD sheet for the particular piece of ordnance being disposed of. If no sheet or calculation is available then the DoD 6055.9 STD (C9.T35) or DDESB TP16 will be used to calculate the distance to be used. A Q-D arc map for this project site can be viewed as Figure 4-1.

4.3 PLANNED DEMOLITION AREAS

4.3.1 MEC will be disposed of in the areas where the item(s) are encountered. The distance will be the maximum fragmentation distance for the MEC that is being destroyed, as calculated by CEHNC's Engineering Directorate.

4.3.2 In areas where an acceptable fragmentation distance cannot be achieved, items acceptable to move/transport may be moved to another area as long as the movement does not require transportation on public roads. If movement to another area is not possible, other methods of mitigation, such as berms, tamping (IAW the buried explosion module (BEM), DDESB TP 16), or sandbag mitigation (in accordance with HNC-ED-CS-S-98-7), will be employed to reduce the fragmentation hazard. If these methods of disposal are determined to be impractical, TtEC will notify the CEHNC Safety Specialist.

4.4 FOOT PRINT AREAS

The footprint for demolition areas is the entire Bains Gap Road and St. Clair Road removal area which can be seen on Figure 4-1.

4.4.1 Blow in Place

Prior to initiation of demolition operations, all non-essential personnel are evacuated to the MSD. Prior to priming the demolition charges all avenues of ingress will be physically blocked. Radio communications are maintained between all involved parties at all times. Avenues of ingress are not to be opened without the express permission of the SUXOS. A constant state of vigilance will be maintained by all personnel to detect any intrusion into the fragmentation zone or over flights of aircraft. Upon completion of disposal operations, the disposal team's UXO Technician III and one UXO Technician will visually inspect each disposal shot. One of these personnel will perform a visual inspection of the disposal site(s). The second person will standby at a safe distance and be prepared to render assistance in the event of an emergency. Upon completion of this inspection and providing that there are no residual hazards, the SUXOS will authorize the resumption of site operations.

4.4.2 Collection Points

MEC collection points will not be used as items will be disposed of in the location where they are encountered. Suspect items that can be safely moved and items requiring demilitarization may be relocated within the grid as described below. All MEC items will be disposed of on a daily basis. Items will not be returned to any magazine for storage.

4.4.3 In Grid Consolidated Shots

Items that are acceptable to move may be consolidated to one location within a grid to reduce the number of demolition shots and fragmentation contamination. All movement of MEC will be coordinated with and approved by the SUXOS. Consolidated shots will be in accordance with the CEHNC report "Procedures for Demolition of Multiple Rounds (Consolidated Shots) on Ordnance and Explosives (OE) Sites, March 2000".

4.4.4 Explosive Storage Magazines

TtEC will use government supplied portable explosives storage facilities approved BATF Type 2, outdoor, box magazines at Fort McClellan that have been previously sited and approved for use. TtEC will:

- Maintain the magazines to comply with the magazine criteria and quantity distance requirements established in DoD 6055.9-STD, Department of Defense Ammunition and Explosives Safety Standards.
- Maintain security by using fencing to prevent unauthorized access and/or theft.
- Magazines will be bullet-resistant, fire-resistant, weather-resistant, theft-resistant, and ventilated. They will be supported to prevent direct contact with the ground. The ground around them will slope away for drainage or other adequate drainage will be provided.

- Hinges and hasps will be attached to doors by welding, riveting, or bolting (nuts on inside of door). Hinges and hasps will be installed so they cannot be removed when the doors are closed and locked. Each door will be equipped with two padlocks fastened in separate hasps and staples. Padlocks will have at least five tumblers and a casehardened shackle of at least 3/8-inch diameter. Padlocks will be protected with not less than 1/4-inch steel hoods constructed so as to prevent sawing or lever action on the locks, hasps, and staples.

4.4.4.1 Explosive Magazine Siting Map

The explosive magazine siting map is included in Appendix B.

Figure 4-1 Explosives Storage Magazine

Figure 4-2 Q-D Arc Map

5.0 GEOPHYSICAL PROVE-OUT PLAN AND REPORT

5.1 GPO WORK PLAN

The GPO Work Plan is a stand alone document and will be included in the Final SSWP as an appendix.

5.2 GPO LETTER REPORT

The GPO letter report is a stand alone document and will be included in the Final SSWP as an appendix.

6.0 GEOPHYSICAL INVESTIGATION PLAN

A geophysical survey will be performed over an area of approximately 19 acres to support the Bains Gap and St. Clair Road removal action at Fort McClellan, Alabama. The objective of the geophysical survey is to detect, accurately locate, and select anomalies that are representative of the MEC items of concern. The selection of the optimum approach for this project will be based on the evaluation of the data collected at the GPO area.

6.1 SITE DESCRIPTION

The area of concern is presented in Figure 1-1. The geophysical survey will be performed over an area of approximately 19 acres; the area is inclusive of the paved roadway, and will extend 100 ft from the centerline of Bains Gap Road and St. Clair Road.

6.1.1 Geophysical Data Quality Objectives

The acceptance criteria for this work is the following:

- No ferrous objects with a width (diameter) between a 37mm projectile and a 155m projectile at a depth of less than 11 diameters of the object.
- The GPO area will be used to evaluate the overall data acquisition methodology and sensor platform design in terms of spatial sample density, sensitivity, "noise" characteristics, and positional accuracy and repeatability to ensure that the acceptance criteria is achieved.
- Data gaps (i.e., in-line and across line) will be defined during the analysis of the data from the GPO. It is anticipated the adjacent track paths will not exceed 3.5 ft, and the in-line sample density for the geophysical measurements will not exceed 0.75 ft.

6.1.2 Area Map

The area map is provided as Figure 1-1 in the SSWP.

6.1.3 Past, Current, and Future Use

6.1.3.1 The current Fort McClellan has documented use as a training area since 1912, when the Alabama National Guard used it for artillery training. As early as 1898 the Choccolocco Mountains may have been used for artillery training during the Spanish American War. The 29th Infantry Division used areas of the site for training prior to being ordered to France during World War I. Prior to World War II, the 27th Infantry Division assembled at Fort McClellan for training, and during the war many other units used the site for various training purposes. After World War II the site was used for National Guard training, and was also selected as the site for the Army's Chemical Corps school.

6.1.3.2 The area of Bains Gap Road and St. Clair Road being cleared under this task order is owned by the U.S. Fish and Wildlife Service and is located in a National Wildlife Refuge.

6.1.4 Anticipated UXO Types and Depths

Expected Types of MEC	Expected Depths
Trip Flare	Surface to 3"
Artillery Simulator	Surface
Mortar, 60mm	Surface to 6"
Projectile, 75mm, Shrapnel	Surface to 3"
Mortar, 81mm	Surface to 12"
Projectile, 37mm	Surface to 6"

6.1.5 Topographic Maps

No topographic map is being provided with this task order.

6.1.6 Vegetation

The vegetation within the area of concern consists of partially "open" and wooded areas. The wooded area (i.e., canopy) prevents the efficient use of Global Positioning System (GPS) for positioning.

6.1.7 Geologic Conditions

6.1.7.1 Fort McClellan is situated near the southern terminus of the Appalachian Mountain chain. All but the easternmost portion of the Main Post lie within the Valley and Ridge Province of the Appalachian Highlands. The portion of Fort McClellan west of Choccolocco Creek lies within the Piedmont Province. The age of the consolidated sedimentary and metamorphic rocks range from Precambrian to Pennsylvanian. On a large scale, most of the rocks have been intensely folded into an aggregate of northeast-southwest trending anticlines and synclines with associated thrust faults. Colluvial deposits characterize the shallow geology in the area. Table 6-1 summarizes the major stratigraphic units underlying Fort McClellan.

6.1.7.2 The presence of metamorphic and igneous rocks in the area of concern increases the potential for minerals such as magnetite and other associated magnetic minerals. It is not anticipated that this condition will adversely affect the EM61 Mk 2 data, however, the client will be notified if the TtEC geophysicists cannot meet the project objectives due to this condition.

Table 6-1
Summary of Major Stratigraphic Units

Period	Formation	Thickness (feet)	Lithology
Quaternary	Alluvium, colluvium, and undifferentiated deposits	--	Alluvium, sandy to clayey; slope wash, gravel, and sand.
Tertiary	Deposits of Paleocene or early Eocene age	10-100	Clay, sand, and gravel.
Pennsylvanian	Pottsville Formation	300?	Sandstone, gray and brown with interbedded gray and brown shale.
Mississippian	Parkwood Formation	350	Sandstone, gray, feldspathic, silica - cemented, fossiliferous; and gray clayey shale.
	Floyd Shale	2,000	Shale, black to greenish-black, fissile; interbedded with minor thick to thin, greenish-gray sandstone and clayey limestone beds.
	Fort Payne Chert	100-350	Chert, finely broken; includes some dark flint in basal part; highly fossiliferous.
	Maury Formation	2-3	Claystone, green, locally red, and phosphate nodules; locally interbedded with red shale.
Devonian	Frog Mountain Sandstone	50	Sandstone, brown, coarse-grained, siliceous cement; locally includes dark, hard, siliceous shale or gray very coarse-grained, thick-bedded with light-brown shale.
Silurian	Red Mountain Formation	50	Sandstone, light-gray to white, thick-bedded to massive, 30 feet thick; overlain by 20 feet of light- brown, thin-bedded sandstone interbedded with light-brown shale.
Ordovian	Sequatchie Formation	100	Siltstone and shale, calcareous, maroon and greenish-gray mottled, locally fossiliferous.
	Chickamauga Limestone	275-325	Sandstone, white to light-gray, thick- to thin-bedded orthoquartizitic; well-sorted medium to coarse, rounded to well-rounded grains; locally conglomeratic; bentonitic beds in upper part of formation; maroon and orange-brown variegated shale and siltstone, with irregular lenses of thinly laminated, gray to gray-green and maroon sandstone; limestone and calcarious mudstone in lower part; locally fossiliferous.
Ordovian (Continued)	Little Oak Limestone	15	Limestone, gray crystalline, medium- to thick- bedded, fossiliferous; black, fissile shale interbedded with dark shaley limestone.
	Athens Shale	200	Limestone, gray, crystalline, medium- to thick-bedded, fossiliferous; black, fissile shale interbedded with dark shaley limestone.
	Lenoir Limestone	15	Limestone, gray, crystalline, medium- to thick-bedded, fossiliferous; black fissile shale interbedded with dark shaley limestone.
	Newala Limestone andLongview Limestone undifferentiated	400-600	Limestone, pearl-gray, dark-gray, and bluish-gray, dense, medium- to thick-bedded; thin beds of coarse-grained dolomite; fine-grained chert common in the Longview.
Ordovician and Cambrian	Chepultepec Dolomite, Copper Ridge Dolomite,and Ketona Dolomite, undifferentiated	2,000	Dolomite, siliceous; abundant chert except in the Ketona.
Cambrian	Conasauga Formation	500	Limestone, dolomitic limestone, and crystalline gray dolomite; thin beds of gray shale that weathers green. Shale is dominant facies to the north and northwest.
	Rome Formation	1,000	Shale and siltstone, red; green shale and red and light-gray sandstone; locally includes lenticular beds of light-gray limestone or dolomite.
	Shady Dolomite	1,000	Limestone and dolomite, yellowish- to light- to dark-gray, crystalline, medium- to thick-bedded; Variegated clayey shales in lower part.
	Weisner Formation	2,500	Shale, siltstone, sandstone, quartzite, and Conglomerate; forms mountains. Local deposits of bauxite, hematite, and limonite.

6.1.8 Soil Conditions

According to the US Department of Agriculture (1961), three soil associations are found at Fort McClellan that potentially exist in the area of concern. Generally, the soils are acidic to very strongly acidic and are described as follows:

- ***Anniston-Allen, Decatur-Cumerland.*** Alluvium, resulting from weathering of older saprolitic soils developed from sandstone, shale, and quartzite; deep, well-drained, level to moderately steep soils in valleys underlain by limestone and shale. Subsoil is dark red sandy clay loam. Cumberland and Decatur soils are dark reddish-brown gravelly loam developed from limestone saprolite source.

- ***Rarden-Montevallo-Lehew.*** Moderately deep or shallow soils or ridgetops and steep slopes and in local alluvium in draws. Soils are developed from the residuum of shale and fine-grained, micaceous sandstone and reddish-brown to dark gray brown to yellow-brown silt loam, clay, or silty clay.

- ***Stony Rough Land.*** Shallow, steep, and stony soils formed from the weathering of sandstone, limestone, and Talladega Slate. Infiltration is slow; the soils contain many boulders and fragments with clayey residuum. This association underlies a large portion of the Main Post at Fort McClellan.

6.1.9 Ground Water Conditions

6.1.9.1 Shallow groundwater beneath Fort McClellan occurs principally in the residuum developed from Cambrian sedimentary and carbonate bedrock units of the Weisner Formation in the Choccolocco Mountains and locally in the lower Ordovician carbonates (ESE, 1997).

6.1.9.2 Groundwater flow generally occurs in a northwesterly direction under a hydraulic gradient of 0.02 feet per foot, based on average groundwater elevation measurements from spatially clustered and widely spaced monitoring wells. Variability in the groundwater flow direction is likely to occur in localized areas of the Main Post, depending upon local topography, proximity to surface water bodies, and subsurface geology and structure. The measured groundwater elevations ranged between 677.1 feet above msl and 1,043.2 feet above msl on the Main Post (IT, 1999).

6.1.10 Geophysical Conditions

The geomagnetic field components at the site are the following:

- Declination -2.003 degrees (changing –0.098 degrees per year)
- Inclination 62.822 degrees (changing –0.069 degrees per year)
- Total intensity 50,412.33 gammas (changing –125.9 nanoteslas per year)

6.1.10.1 Values are calculated for September 28, 2005. In order to monitor potential geomagnetic field storms arising from excessive solar wind, the vertical component of the magnetic field will be monitored at the beginning of each day using Space Environment Center data. It is not anticipated that solar storms will adversely affect the EM61 data.

6.1.11 Site Utilities

Utilities, especially those of metallic origin, will be identified for each area surveyed using historical and current information. The location, approximate depth, and type of utility will be posted on the color-coded geophysical map of the area, if applicable, to ensure that intrusive activities occur in the safest manner possible.

6.1.12 Man Made Features

Man-made features such as power lines, roads, fences, vehicles, and any other features that may influence the geophysical investigation will be documented with specific information on the location, extent, and nature of the feature. This documentation may be in the form of a site features map (e.g., MR-005-05 Attachment A), noted in logbooks and will be shown in geophysical maps. The information may also be stored in digital format by the RTS. This process will allow the information to be transcribed onto a plan map of the survey area in the most cost-effective manner.

6.1.13 Site Specific Dynamic Events

Dynamic events that may affect geophysical investigations include weather (precipitation, wind, extreme temperatures) and electromagnetic “noise” from radio transmissions. It is the responsibility of the field team leader to evaluate these events/conditions during acquisition to determine their effect, if any, on the geophysical data quality. If it is determined that these events/conditions are adversely affecting the data quality, data acquisition will cease until the event/condition ceases. If necessary, engineering controls may be implemented to reduce the effect of the disturbance (e.g., do not transmit on field radio within 25 ft of TDEM sensor).

6.1.14 Site Accessibilities

The project area is inclusive of and adjacent to a well-maintained road. Accessibility to the project area from the TtEC site office is economical. Access to work areas may be restricted by locked fences/gates. The TtEC field teams will lock the gates behind them upon entering restricted areas and will lock these gates again when leaving the work area.

6.1.15 Potential Work Hazards

Potential worker hazards specific to geophysical investigations include slips, trips, and falls (especially on steep/wet slopes or heavily vegetated areas), heat/cold stress, biological hazards (e.g., insects, snakes, poisonous biota), MEC hazards, vehicle operation, heavy lifting, severe weather (e.g., tornadoes, heavy rain), and cuts/punctures from tree branches. Measures will be in-place and implemented prior to data acquisition to reduce/eliminate exposure to these hazards.

6.2 GEOPHYSICAL INVESTIGATION

6.2.1 Survey Type

Geophysical data will be collected over two- dimensional (2D) grids, on parallel transects that are approximately 2.5 ft apart. While there are approximately eighty ¼ acre grids that will be used for "bookkeeping" purposes and intrusive activities, the geophysical field teams will collect geophysical data over as large an area as possible (generally ½-1 acre) during each data acquisition session to maximize productivity.

6.2.2 Equipment

6.2.2.1 Survey Platform

The man-portable (MP) method of data collection will be used during the geophysical survey. Specifically, the two-man tethered carry will be utilized, with one team member transporting the TDEM coils, and the second team member transporting the TDEM and positioning system electronics.

Two-man tethered carry

6.2.2.2 Detectors

6.2.2.2.1 The geophysical sensor proposed is the Geonics Limited EM61 MK2 system. The EM61 MK2 uses time domain technology to facilitate the detection of metallic objects. Two coils 3.3 ft by 3.3 ft in size are oriented in a horizontal coplanar fashion and separated by a vertical distance of 40-centimeters. Due to the terrain characteristics within the area of concern, the system will be utilized in a two man tethered carry configuration, with the lower coil 16 inches (+- 1 inch) above the ground surface. This distance will be measured and verified by field personnel prior to each data acquisition session.

6.2.2.2.2 A transmit pulse of unipolar rectangular current (25 % duty) of very short duration is applied to the lower coil. This primary current creates a primary magnetic field that induces eddy currents in nearby metal objects. The current flowing in the metal object creates a secondary magnetic field that is detected by both the lower and upper coils. The transmitter pulse frequency is 75 Hertz (Hz), the pulse duration is 3.3 milliseconds, the peak power output is 50 Watts, and the average power is 25 Watts. Both coils possess ~ zero decibels of gain.

6.2.2.2.3 The secondary magnetic field created by metal objects is sampled by the EM61 MK2 electronics, which reside in the backpack, at times of 216 microseconds (us), 366 us, and 660 us after the primary pulse is turned off. The lower coil is sampled at 216, 366, and 660 us and the upper coil is sampled only at 660 us (the 1266 us time gate will not be recorded for this project). Digital data for these four individual time gates are integrated and recorded to a Juniper Allegro field computer at a rate of 12-15 hertz. The individual time gate data are converted into units of millivolts (mV), normalized, and gain is applied to each time gate by the EM61MK2A software v1.10 on the Juniper Allegro field computer. Normalization and gain parameters reside in the EM61 MK2 manual, App. B.

6.2.2.2.4 The Juniper Allegro field computer is a waterproof, ruggedized field logger that operates in MS DOS v6.22 and MS Windows CE v3.01 environments. The unit contains 32 MB of Random Access Memory (RAM) for recording data, as well as a Personal Computer Memory

Card International Association (PCMCIA) card slot where the amount of data that can be stored is limited only by the memory of the card. The Juniper Allegro is connected to the EM61 MK2 backpack via a ruggedized 9 pin serial cable.

6.2.2.2.5 Safety hazards for the EM61 MKII equipment include electromagnetic radiation. The electromagnetic field of the system could potentially detonate some types of specialized ordnance. The Hazards of Electromagnetic Radiation to Ordnance (HERO) distance for the EM61 MKII is 20 cm. The USACE recommends a ground clearance of at least 40cm when electrically fuzed ordnance is present.

6.2.3 Sampling Rates

The sampling rate for the EM61 MK2 data will be 12-15 Hz. At a normal walking speed of approximately 3 ft per second, signal measurements are acquired at intervals of 3-4 inches along the ground surface.

6.2.4 Navigation and Mapping System

6.2.4.1 Two positioning systems are necessary due to the physical characteristics of the survey area. The Constellation is the most optimum positioning system for the wooded areas in the area of concern, and the RTS will be used in the "open" areas, as the high tree line will eliminate the possibility of using a GPS based system.

6.2.4.2 The Constellation consists of four laser transmitters and a field computer for logging the position data via wireless modem. Four Trimble Spectra Precision LS920 Laser Transmitters are positioned in a diamond or square geometry over ½ to 1 acre depending upon the tree density. The transmitters are leveled, and an automatic routine calculates the relative x-y-z- plane between the transmitters to a tolerance of 1 inch or less. A laser detector "wand" (i.e., receiver) is centered over the EM-61 MK2 coils on a TtEC-designed fiberglass "doghouse". The detector wand receives the laser pulses from the four transmitters simultaneously, and computes a position based on the known position of the laser transmitters. Only two of the laser transmitters are necessary to compute a reliable position to a relative accuracy of approximately 1 inch. The position data are updated at 2-3 Hz and sent via wireless modem to the field computer for storage.

6.2.4.3 The Leica Series 1100 or 1200 RTS consists of a laser-based total station survey instrument (transmitter), prism (receiver), and RCS 100 remote control. The transmitter is positioned over a ground position point of known location, and an x-y-z Cartesian coordinate system is defined by occupying an additional known ground position with the receiver prism. The RCS 1100 remote control handheld unit allows one operator to control the RTS instrument from distances of several thousand feet away via wireless protocol. The receiver prism is mounted on a TtEC doghouse centered over the EM61 MK2 coils, and the RTS automatically tracks the prism at distances of several thousand feet to an accuracy of approximately 1 inch.

Position data for the receiver prism are updated at a rate 0f 3-4 Hz and stored on a PCMCIA card located on the RTS unit.

6.2.5 Data Processing System

6.2.5.1 The EM61 MK2 data and position system data are collected independently with a time stamp that is used to correlate the measurement records from each respective system.

6.2.5.2 All digital data from the geophysical sensor and positioning equipment are stored on non-volatile media, and backed-up at the site-processing center at the end of each day's survey activities.

6.2.6 Procedures

It is anticipated that two field teams will collect the geophysical data. One team will primarily survey the "open" areas using the RTS for positioning, and the second team will primarily survey the wooded areas using the Constellation to provide coordinate positions for the geophysical measurements. Standard protocol for each data acquisition session will involve completing a field data sheet similar to that in MR-005-05 Attachment "A" prior to data collection activities.

6.2.6.1 Wooded Areas

The Constellation and EM61 MK2 equipment will be configured as a two man tethered carry as described in Section 6.2.2.1. Each setup will be no larger than 1.5 acres in size. Several fiberglass tape measures are positioned perpendicular to the direction of the data acquisition transects at intervals of approximately 50 ft. Specially modified traffic cones (or equivalent) are positioned along the intended transects at the measuring tape locations and the data acquisition crew uses these cones as "waypoints". When the crew reaches a waypoint, the sensor operator moves the cone sideways to the next intended transect (2.5 ft to the side) and continues navigating to the next waypoint (cone) along the current transect. As an alternative to this method, fiberglass pin flags may be placed along each transect and act as waypoints. The acquisition crew will proceed a minimum of 5 ft outside of the intended survey area, reverse direction, and proceed along the next adjacent transect. When encountering an obstacle, the sensor operator pauses for ~0.5 second, steps around the obstacle, and pauses for an additional 0.5 seconds. In this manner, the highest quality spatial data is obtained around obstacles.

6.2.6.2 "Open" Areas

6.2.6.2.1 The RTS laser-based system will be used in conjunction with the EM61 MK2 in the areas outside of the dense woods. Each setup will be no larger than 1-1.5 acres in size, depending on terrain, and fiberglass pin flags (or equivalent) will be positioned at pre-defined grid corners using the RTS. Similar to procedures used in the wooded areas, tape measures and

traffic cones will be utilized to maintain proper line spacing. In unimpeded, smooth terrain the traffic cones may be spaced along each transect at distances of approximately 100 ft. This distance of 100 ft is determined based on TtEC's extensive experience in assessing data acquisition paths for personnel that are right- and left-eye dominant.

6.2.6.2.2 At the end of each day's activities, the field team leaders will provide the digital data to the geophysicist at the site-processing center for initial storage and initial analysis.

6.2.7 Personnel

6.2.7.1 The geophysical staff for the Bains Gap Road and St. Clair Road area will consist of a Geophysical Task Manager (GTM), site geophysicist (SG), field team leaders (FTL), two geophysical survey crews, and data processors/interpreters. All of these individuals will have a combination of science, engineering, and computer science backgrounds, or will be trained in the specific use of the instrumentation employed via the pre-project GPO. The GTM and SG will have experience and training in geophysical equipment operation, maintenance, and supporting software. The geophysical and position data will be processed and interpreted by degreed geophysicists.

6.2.7.2 The TtEC GTM is responsible for overall coordination of data processing and analysis, technical content of deliverables, and technical review of data. The TtEC GTM will assist the TtEC project manager and USACE geophysicist to ensure the geophysical survey meets the project objectives. The specific responsibilities of the TtEC GTM include the following:

- Providing recommendations for project staff. Providing recommendations for additional staff, or a change in staffing requirements.
- Coordinating with the SG and FTL to ensure consistency of performance and maintenance of established schedules.
- Providing technical leadership in the discipline of geophysics and the quality control and assurance of the geophysical data.
- Monitoring technical performance of TtEC team members.
- Technically reviewing all deliverables of the study.
- Approving contributions to any technical deliverable for any geophysical work element.

6.2.7.3 The TtEC SG is responsible for the administration of all field activities and geophysical personnel. The SG works as an integrated team with the GTM, TtEC project manager, and USACE geophysicists to ensure the success of the data acquisition phase of the project. The specific responsibilities of the SG includes the following:

- Scheduling field crew activities in concert with the TtEC project manager (PM).
- Establishing and maintaining daily, end-of-day communications with data acquisition team personnel and the PM.
- Establishing work schedules and control of site access with the PM.
- Ensuring the proper equipment (e.g., sensors, cables, PCMCIA cards, manuals, etc.) computers, storage media, and supplies are present to perform each task.
- Maintaining data acquisition-related paperwork and digital acquisition files and ensuring their repeatability and accuracy (i.e., file and information systems management).
- Ensuring geophysical data is backed up a minimum of once per day and stored in a secure place.
- Coordinating and directing activities of all personnel on the geophysical field team, including setting and enforcing schedules that are necessary to achieve the goals for each day's activities.
- Supervising geophysical field operations and related location surveying activities, including directing field team activities.
- Logging all pertinent activities at the geophysical survey site in the field logbook and maintaining relevant project files.
- Ensuring that all materials needed at the survey site are in stock (e.g., geophysical equipment, writing materials, tape, diskettes, pin flags, traffic cones, markers, etc.).
- Planning field data acquisition schedule for the next day with the PM.
- Checking sites to be surveyed and access routes in advance of data acquisition activities.
- Reporting level of effort expended and production to the GTM and PM on a daily basis via email.
- Uploading data to the processing center on a daily basis.
- Monitoring, as necessary, instrument standardization/repeatability checks at a specified area for geophysical and positioning instrumentation.
- Creative thinking to improve the efficiency and/or quality of the data based on site-specific survey conditions.

6.2.7.4 The responsibilities and authority of the FTLs include the following:

- Ensuring that the field team collects data that is of sufficient quantity and quality to meet the project objectives.

- Documenting field activities in logbook and/or Field Data Sheet.
- Shutting down geophysical operations on a site to prevent compromising technical quality.
- Shutting down geophysical operations on a site to prevent compromising health and safety.
- Field transfer of data from the data recording devices to PCMCIA (or equivalent) media.

6.2.7.5 The TtEC geophysical survey personnel are responsible for the acquisition of geophysical data and will work in conjunction with the SG and FTLs. Their responsibilities include:

- Following the designed geophysical survey procedures in a consistent manner.
- Maintaining geophysical and related equipment and supplies in excellent condition. Informing the FTL and SG of equipment failure and/or damage.

6.2.8 Production Rates

Based on our extensive site experience, it is anticipated that over a large percentage of the survey area, the EM61 MK2-RTS system can collect 1.5-2 acres per day in the "open" areas, and the EM61 MK2-Constellation system between 1.25 and 1.5 acres per day in the wooded areas.

6.2.9 Data Spatial Density

6.2.9.1 Because of the variety and unique characteristics of the survey area and the necessity for complete coverage with the geophysical sensor, grid based data acquisition methodologies will be employed. The data acquisition "setups" will not necessarily be square or rectangular but will be established to allow complete coverage of irregularly shaped areas. In all cases, the "setups" will consist of uniformly spaced data acquisition lines suitable for traverse using the man-portable geophysical sensor systems.

6.2.9.2 The spatial sample density required to detect a target at a specific depth is one of the most important considerations in survey planning. Based on our past site-specific experience, it is anticipated that a survey line spacing of ~2.5 feet (ft) and an instrument recording interval of at least 10 times per second will be sufficient to detect small, shallow items of interest (e.g., 37 millimeter (mm) projectile) with the EM61 MK2. The GPO results will be used to confirm the proper spatial density.

6.2.10 Instrument Standardization

6.2.10.1 DID MR-005-05 will be the primary guidance document used to implement the quality control measures and functional instrument tests for the Bains Gap project. The following USACE tests will be performed at the specific intervals indicated:

Test	Frequency of Testing			
	Beginning of Day	**Beginning and End of Day**	**First Day of Project Only**	**Equipment Change**
Personnel Test	**X**			**X**
Cable Shake	**X**			**X**
Static (Background)		**X**		**X**
Instrument Response		**X**		**X**
Sensor Offset			**X**	**X**
Repeat Data		**X**		**X**
6 Line Test			**X**	**X**
Height Optimization	**X**			**X**

6.2.10.2 In addition to these tests, TtEC will perform additional quality functions that are specified in Section 6.2.15.

6.2.10.3 No calibration or standardization will be made to the Geonics, Leica, or Constellation instrumentation since they are calibrated prior to leaving the factory.

6.2.11 Data Processing

6.2.11.1 Initial Field Processing

6.2.11.1.1 The data acquisition file naming convention for the EM61 MK2 and positioning system (Constellation or RTS) will include the team identification, date, survey grid, and file sequence identifier, at a minimum. At the beginning of each acquisition file, the internal clock of the respective positioning system will be synchronized (+ or - 1 second) to the Geonics EM61 Mk2a software version 1.10 that resides on the Juniper Allegro data recorder.

6.2.11.1.2 The Field Data Sheet (Attachment "A" in DID MR-005-05) will be completed by the FTL or their designee for each grid surveyed.

6.2.11.1.3 A minimum of once per day, the positioning system and geophysical sensor files will be uploaded to the site processing computer and stored under a file folder system similar to the following:

Bains_Gap_geodata
- 092705
- interpretation
- process
- raw_em61
- raw_RTS
- raw Constellation

6.2.11.1.4 A data tracking mechanism (MS Excel spreadsheet, MS Access database, etc.) will be employed to document all data acquisition file names, as well as any changes that might occur. The data tracking form will track dates, personnel who performed the specific task (i.e., data acquisition team, processor, etc.) and have a section for comments. The data tracking form will be updated on a daily basis.

6.2.11.2 Standard Data Analysis

6.2.11.2.1 The Constellation positioning information is recorded via wireless modem to a binary file at 2-3 Hz to a field computer along with a corresponding time stamp for each recorded position. The EM61 MK2 data are recorded at 12-15 Hz by a Juniper Allegro ruggedized data collector. The raw data for both systems is transferred to the site processing computer. Geonics software DAT61MK2 v 1.30 is used to convert the EM61MKII data to units of mV with a corresponding time stamp for each record. The positioning and EM61 MK2 signal data are merged with the software MergeMK2 v1.8 developed by TtEC. The software has been proven and verified on several projects and test programs conducted for the Department of Defense. EM61 MK2 data are interpolated between corresponding position segments that are spaced at intervals of 12-15 inches along the ground surface; at a normal acquisition speed of 3 ft per second, samples along each acquisition transect are produced at intervals of approximately 3-4 inches. Processed data have bias and drift removed, and are corrected for latency. The data from the MergeMK2 v1.8 software are output as an ASCII file that contains the following information:

- x-y-z coordinates for each geophysical measurement
- EM61 MK2 signal intensity for each data channel
- Elapsed distance and sample distance
- Position quality
- Geophysical sensor time stamp and positioning system time stamp

6.2.11.2.2 Position data are collected with the RTS at a rate of 3-4 Hz and stored, along with a time stamp, on a PCMCIA card at the RTS. The EM61 MK2 data are recorded at 12-15 Hz by a Juniper Allegro ruggedized data collector. The raw data for both systems is backed- up on CDROM, uploaded to a PCMCIA card and transferred to the in-field processing computer. Geonics software DAT61MK2 v 1.30 is used to convert the EM61MK2 data to units of mV with a corresponding time stamp for each record. The positioning and EM61 MK2 signal data are merged with the software MergeMK2 v1.8 developed by TtEC. The software has been proven and verified on two projects and test programs conducted for the Department of Defense. EM61 MK2 data are interpolated between corresponding position segments that are spaced at intervals of 9-12 inches along the ground surface; at a normal acquisition speed of 3 ft per second, samples along each acquisition transect are produced at intervals of approximately 3-4 inches. Processed data have bias and drift removed, and are corrected for latency. The data from the

MergeMK2 v1.8 software are output as an ASCII file that contains equivalent information to that specified above for the EM61 MK2-Constellation system.

6.2.11.2.3 The data from the MergeMk2 v1.8 software will be imported into a Geosoft Oasis Montaj project. Data will be interpolated using minimum curvature gridding routine to generate color-coded images of the EM61 MK2 signal intensities for each data acquisition session.

6.2.11.3 Advanced Data Processing

6.2.11.3.1 No advanced data processing, as specified in MR-005-05, is anticipated for this project. However, all processing operations and parameters are digitally logged in the TtEC *.chk processing files and/or the Oasis Montaj version 6.2 *.log files for each data acquisition session.

6.2.11.3.2 All processing performed in Oasis Montaj is performed with pre-defined scripts to minimize any human error associated with data processing sequence (e.g., keyboard entry errors).

6.2.11.4 Anomaly Selection and Decision Criteria

6.2.11.4.1 Oasis Montaj scripts will be used to generate color-coded images of the EM61 MK2 data for each survey grid. Potential target locations will be selected using a combination of two target selection methods; automatic and manual. The automatic method utilizes the target selection algorithm within the Geosoft Oasis Montaj software (gridpeak.gx). This procedure selects anomaly locations based solely on the signal amplitude of the bottom coil. The second method (herein referred to as "manual") utilizes a data interpreter who manually selects potential target locations using data characteristics such as the signal amplitude from the top and bottom coil and different time gates, anomaly shape, anomaly trend, track line characteristics, terrain, reacquisition information, GPO results, and previous intrusive information from other Fort McClellan task orders. The automatic target selector will select a pipeline or known cultural feature, while the manual selection procedure will not. However, the automatic target selector prevents the interpreter from potentially "missing" an anomaly; i.e., it provides immediate feedback to the interpreter in the form of a control check. The automatic target selector amplitude will be set to a value that is determined during analysis of the data from the GPO.

6.2.11.4.2 The data interpreter will classify the selected anomalies as "dig" or "no dig" based on the similarity of the geophysical anomaly characteristics to the MEC items of interest for this project. The interpreter will not attempt to differentiate MEC items from non-MEC items. To ensure the repeatability and "correctness" of this geophysical interpretation process, a percentage of the "no dig" classifications will be intrusively investigated; this procedure is discussed more thoroughly in the Quality Control Plan.

6.2.11.4.3 A master Oasis Montaj database that contains all of the individual data acquisition files will be generated and updated each day in order to track the daily progress of the geophysical survey.

6.2.12 Dig Sheet Development

The interpreted data are digitally recorded in a *.dat file, and uploaded to a Microsoft Access database and/or Microsoft Excel spreadsheet. The digsheet data for each survey grid will be organized by grid identifier, and contain a unique anomaly identifier for each target selection, its x-y coordinate location, signal intensity value(s) from the EM61 MK2, and dig priority. Other pertinent information as specified in MR-005-05 will also be included in the project database.

6.2.13 Anomaly Reacquisition

6.2.13.1 It is anticipated that the x-y coordinates and anomaly identifier will be uploaded to the RTS to enhance the efficiency of target reacquisition activities. Where site physical features prevent the use of the RTS, the field team will reacquire the anomaly locations using the hardcopy digsheet and the Constellation.

6.2.13.2 A handheld TDEM detector that will be selected for project use based on the results of the GPO investigation (e.g., Vallon VMH3C, Minelab Explorer) will be used to pinpoint the location of the geophysical anomaly. A minimum of two existing grid corners will be reacquired prior to any geophysical anomalies to validate the repeatability of the positioning system setup for that particular grid(s). The interpreted anomaly position will be marked on the ground surface with a boot mark or other simplistic method of identifying the interpreted location. Using the interpreted location as the origin of search, a 1.0 meter radius will be scanned with the reacquisition instrument. The final reacquired location of the anomaly target will be flagged and a unique identification number written on the flag. This location will also be digitally stored by the respective positioning system or transcribed onto the reacquisition sheet in relative or absolute coordinates and uploaded to the project database. TtEC will track this information to ensure that the difference between the reacquired and interpreted location for each anomaly is within 1 meter as specified in MR-005-05.

6.2.13.3 The SG will be informed of those anomalies that were not reacquired within a 1 meter radius during reacquisition activities or at the end of the day. TtEC will also report any anomalies that could not be reacquired and the reason(s) for the occurrence.

6.2.14 Feed Back Process

Intrusive investigation results will be evaluated and compared against interpretation data a minimum of once per week during the intrusive program to ensure that the interpretation is as repeatable and accurate as possible for the specific site conditions. Should intrusive results diverge significantly from interpretation data (e.g., “no find” percentage exceeds 15 % as a

running average for the project, inconsistency between the geophysical anomaly characteristics and the size and material properties of the item(s) excavated), the TtEC PM will be notified and a procedure will be implemented to evaluate the components of the relevant processes involved. This procedure will ensure that the disparity between the results is minimized for subsequent grids investigated. The geophysical investigation components that will be evaluated include those associated with data acquisition (coverage, density, quality, noise levels, positioning), data processing (merging of sensor data and position data, background shifts), and data interpretation (anomaly selection, computer calculations for location and estimated depths). The procedures for target reacquisition will also be evaluated. Corrective measures will be implemented, as necessary, to ensure that subsequent interpretive data and/or reacquisition procedures are modified to more accurately reflect ground-truth results.

6.2.15 Geophysical Quality Control

6.2.15.1 The pre-project test executed during the GPO program will not be repeated prior to the large-scale field program (e.g. six-line test, sensor offset).

6.2.15.2 In addition to the pre-project test executed during the GPO program and daily test procedures addressed in Section 6.2.10.1, TtEC-specific instrument and functional checks will be performed at the beginning and end of every data acquisition session. Acceptance criteria for the instrument and functional checks may be modified based on the results of the GPO. The TtEC test regimen includes the following:

- Acquisition personnel metal check (ensure no metal on acquisition personnel)
- Height optimization (ensures repeatability and comparability of data for different coil operations – 16 inches +- 1 inch tolerance as measured from ground surface to middle of lower EM61 coil.
- Static position system check (accuracy and repeatability of position – 0.25 ft tolerance)
- Static geophysical sensor check (repeatability of geophysical sensor measurements, influence of ambient noise – 2mV tolerance, c2_216 time gate)
- Kinematic geophysical sensor check with test item (repeatability and comparability of measurements with sensor in motion) – aka TtEC “cloverleaf” or “rebar” test – align samples to 0.5 ft tolerance.
- Repeatability of overall data (re-survey of portion of the survey area during each data acquisition session – ensure background removal is within +- 2mV, and repeatability of peak anomaly intensity within 20% when position within 0.25 ft)
- Occupation (kinematic) of known survey control (e.g., grid corners) during the acquisition session to ensure comparability, accuracy, and repeatability of the positioning systems (1 ft tolerance)

6.2.16 Corrective Measures

Corrective measures for the geophysical survey are presented in Section 9.5.

6.2.17 Records Management

A data processing center will be established at a centrally located facility at Fort McClellan for initial analysis of the geophysical data. At this center data reduction and interpretation activities can be completed on a daily basis in order to verify that the project objectives are being met and to aid in the planning, or modification, if necessary, of the next day's field activities. The final processing and interpretation of the data will be performed at Fort McClellan or the Lakewood Processing Center (LPC) in Lakewood, Colorado. All digital geophysical data will be backed-up each night on DVD or the TtEC network.

6.2.18 Interim Reporting

This information is presented in Section 8.5.

6.2.19 Map Format

The geophysical data will be presented on maps that are similar to those specified in MR-005-05, Attachment D.

6.3 GEOPHYSICAL INVESTIGATION PERFORMANCE GOALS

The performance goals for this project are specified in PWS. If TtEC believes that this goal cannot be achieved over a specific portion of the project area, the USCAE will be notified.

6.3.1 Horizontal Accuracy and False Positives

6.3.1.1 The specifications in MR-005-05 will be achieved and proven at the GPO during the initial stage of the project. 95 % of the final reacquired locations as determined in the field will be within a 1-meter radius of the interpreted location of the anomaly as specified on the digsheet. 95 % of the excavated item(s) will be within a 0.35-meter radius of the reacquired locations as marked in the field. If 95% of the locations are not within the required 1-meter radius a deficiency will be documented and corrective action taken IAW section 9.5 of this SSWP.

6.3.1.2 The number of "false positives" (as defined in MR-005-05) will be tracked in the project database, and corrective actions will be implemented if more than 15 % false positives are identified during the investigation, calculated as a running average for the project.

6.4 GEOPHYSICAL MAPPING DATA

- The grid locations for this project will be established by a RLS.

- The geophysical and position data for each data acquisition session will be supplied to the client via the TtEC FTP file transfer site (or equivalent method) no later than 36 hours after the data are collected. These data will allow for corrections such as position, instrument bias, and drift correction but there will be no advanced processing performed to these data. If the client requests the data in ¼ acre grid format (as compared to each data acquisition session), the data will be delivered when the last data acquisition session for the specific grid has been acquired and merged with the other data acquisition sessions that comprise the grid.

- No individual file transferred will be more than 100 megabytes in size or 600,000 lines in length. The format of the files will be ASCII and the initial data transfer will contain the header information. Each grid of data shall be logically and sequentially named so that the file name can be easily correlated with the grid name used by other project personnel.

- Within 10 days after intrusive activities have commenced, the intrusive data for interim grids will be transferred to the client via the TtEC FTP site (or equivalent method).

- Within 14 days of the completion of geophysical data acquisition, TtEC will provide the client with the final interpretation product, which includes color-coded images and MS Excel digsheet (or equivalent ASCII file) for each project grid.

6.4.1 Geophysical Data Analysis, Field Reacquisition, and Reporting

Geophysical anomaly data collected during the execution of this project will be gathered, organized and centralized via a digital database. A database manager will manage and generate all required documentation IAW DID MR-005-05.

6.4.2 Anomaly Reacquisition and Marking

The geophysical anomalies identified by the TtEC interpreter will be reacquired by TtEC personnel using the protocol developed and documented during the GPO anomaly reacquisition phase. TtEC will report any anomalies that cannot be reacquired, and document pertinent reacquisition and intrusive information in the project database.

6.4.3 Anomaly Excavation Reporting

- Qualified TtEC personnel will excavate all anomalies specified as “dig” on the digsheet for each grid. The intrusive data will be recoded on digital handheld field computers (e.g., ruggedized Casio PDA) and uploaded to the project database at the end of each day.

- Within 10 days of the completion of intrusive activities in each grid, the intrusive data will be transferred to the client via the TtEC FTP site (or equivalent method).

- Data required by DID MR 005-05 will be collected for each anomaly

7.0 GEOSPATIAL INFORMATION AND ELECTRONIC SUBMITTALS

7.1 GENERAL

The purpose of this document is to provide details of the methods and equipment to be used to achieve accuracy requirements in performing location surveys and mapping plans and to detail the quality and type of digital data that will be provided under this task order.

7.2 ACCURACY

The accuracy of the horizontal and vertical control will be accomplished by maintaining "Class 1, Third Order" or better, for the network of monuments. Horizontal control will be based on the English or metric system and referenced to the North American Datum of 1983 (NAD83) and the State Plane Coordinate System. The vertical control will also be based on the English or metric system and referenced to the North American Datum of 1988 (NAVD88).

7.3 GEOGRAPHIC INFORMATION SYSTEM INCORPORATION

7.3.1 Plotting

The control points recovered and/or established at this site will be plotted at the appropriate coordinate point on a reproducible map. Points to be plotted include all monuments, grid corners, and the location of MEC discovered over the course of this task order. Scales shall be in accordance with DID MR-005-07.

7.3.2 Mapping

The location, identification, coordinates, and elevations of all the control points recovered and/or established for this delivery order will be plotted on reproducible maps. Each control point will be identified on the map by its name and number and the final coordinates. Each map will include a north arrow. A legend will be shown which provides the standard symbols used for the mapping along with a map index showing the site in relationship to Ft. McClellan. In addition, the state plane coordinates will be established for the corners of each grid area investigated (100' by 100'). The locations of individual recovered items shall be plotted and identified on the map.

7.4 COMPUTER FILES AND DIGITAL DATA SETS

All final text files generated by this contract and other individual delivery orders will be furnished to CEHNC in MS Word 6.0 or higher software, IBM PC compatible format and in

Adobe Portable Document Format (PDF), suitable for viewing, without modification, on the Internet. Freeware versions of Adobe Acrobat Reader, Netscape, and Internet Explorer shall accompany the text files on CD-ROM, so that the user can use the CD to either install the programs and text files on a machine, or use the CD in a stand alone mode to view the text files. The basic software supported to the field shall be capable of operating on a typical single Intel Pentium processor PC utilizing the Windows NT version 4.0 operating system with a minimum of 32 megabytes of memory and adequate disk storage for project data. All in progress and fielded GIS data, design drawings, survey data, relational databases and related data generated may be required to be available on line to the government through the use of an Internet connection. Formal submittals for all GIS, survey and mapping data, and design drawings, generated by the contractor under this contract will be submitted in the proper format and media that will permit their loading, storage, and use without modification or additional software on the CEHNC GIS workstations. The base GIS workstations consist of Intel dual Pentium GIS machines with 96 megabytes of memory. The workstations run under the Windows NT 4.0 operating system with Microstation utilizing the MGE 6.0 compliment of software and the Oracle relational database. Current GIS project related software includes: Microstation 5.5, Oracle 8.0, IRAS B, IRAS C 5.04 and IRAS Engineer, DB Access, MGE Basic Nucleus, MGE Analyst, MGE Map Finisher, MGE Projection Manager, MGE Grid Analyst, MGE Modeler, MGGA, ERMA Data Manager, ERMA Site Geologist, Inroads, and Insitu. Other specific packages to be considered must be proposed to CEHNC for approval and for system and mission compatibility. All GIS data for formal submittals will be on either eight millimeter NT 10 Gigabyte tape, PC 3.5" floppies or PC CD-ROM. The PC CD-ROM is the preferred format, supplemented with 10 Gigabyte tape for larger data sets.

8.0 WORK, DATA, AND COST MANAGEMENT PLAN

8.1 PROJECT MANAGEMENT APPROACH

Effective management is an essential element in the delivery of a quality product. TtEC is committed to providing a management structure that meets this goal and is tailored to the operational requirements of the project. Figure 2-1 depicts the management team that TtEC will utilize throughout the execution of this project. This team provides the appropriate level of management, safety, and quality oversight to ensure that all work will be performed in an efficient, safe, and cost-effective manner. As discussed previously, the field staff will report directly to the TtEC Project Manager, who will in turn report to the CEHNC Project Manager to ensure effective communication of technical and management issues throughout the performance of work. All support personnel required will report to the appropriate member of the management team as identified in the SSWP. The project management will ensure the topics listed below are managed and products delivered on time.

8.2 SUBCONTRACTOR MANAGEMENT

All subcontractors will be monitored by the SUXOS and PM for their quality of work and following their contract. Issues with the subcontractors will be handled by the SUXOS and field staff first and then elevated to the PM if the problems are not solved at the site level.

8.3 SCHEDULE

The schedule will be used to track the work progress on each task and to identify issues that have, or have the potential to, impact the project schedule. Schedule impacts will be immediately discussed with the CEHNC Project Manager along with proposed resolutions. As stated in the SOW the overall completion date for this task order is May 30, 2006. A schedule is included as Figure 8-1.

8.4 COST CONTROLS

This is performance based contract and cost control will be handled internal to TtEC.

8.5 DELIVERABLES

Schedule (Final due 30 days prior to starting field work)
Telephone Conversation and Correspondence Log (IAW DID MR-055)
Project Status Report (IAW DID MR -085)
SSWP (Draft 15 days after award)
Site Specific Final Report (30 days after completion of field work)

Figure 8-1 Project Schedule

9.0 QUALITY CONTROL PLAN

9.1 GENERAL

This Quality Control (QC) Plan has been prepared in accordance with the SOW and contract specifications. All QC documentation will be submitted as part of or as supporting documentation for the final report. All QC records and documentation will be kept on site and made available for government inspection upon request.

9.1.1 TtEC Personnel and QC

All TtEC personnel involved in the Bains Gap operations will implement this Quality Control Plan per DID MR-005-11 and specific TtEC Corporate procedures found in the Tetra Tech EC Corporate Reference Library (CRL). (The CRL is internal to TtEC). The PM will make all CRL references available to the Contracting Officer. The CRL procedures applicable to the Quality Control effort are listed in Table 9-1.

Table 9-1
Tetra Tech EC Corporate Procedures

PO-8	Document Control
QPM-1	Quality Program Manual
QP-3	Qualification/Certification Quality Program Audit Personnel
QP-9	Construction Quality Control
QP-10	Control of Measuring and Testing Equipment
QP-11	Control of Nonconforming Conditions
QP-12	Corrective Action
ENG-3	Developing and Issuing Engineering Documents (FCR)
QP-14	Lessons Learned Procedure

9.2 DUTIES AND RESPONSIBILITIES

9.2.1 UXO Quality Control Specialist

The UXOQCS is independent from the PM and reports directly to the UXO Quality Control Program Manager. The UXO QC Program Manager has a separate reporting line from the PM and is responsible for management of the UXO QC Program. Although the UXOQCS is separate and independent from the Project Manager, he is part of the problem resolution process and must maintain close and open communication with the PM. The UXOQCS is responsible for:

- Issuing Stop Work Requests (See Appendix D) when conditions warrant.
- Implementing the Quality Control Plan.

- Conducting quality control indoctrination training for project personnel and for site visitors.
- Initiating QC surveillance and inspection consistent with project QC Plan and program QC policies and procedures.
- Identifying, evaluating, initiating, and approving corrective action to ensure work complies with the contract.
- Recommending changes to the Quality Control Plan.
- Providing weekly project QC update to PM.
- Directly communicating with client QA project oversight.
- Conducting inspection and surveillance activity.
- Completing reports and other documentation; maintaining a daily log of activities.
- Implementing the three-phase control process: preparatory, initial, and follow up inspections.

9.2.2 Stop Work Authority

The UXOQCS has the authority to stop-work whenever a condition is identified that has a negative effect on the quality of the product we are delivering.

9.2.3 Stop-Work Request

A Stop-Work Request may be issued for a portion of a process, limiting the Stop-Work Request to that portion of the process that is not in compliance. If the SUXOS does not support a stop-work decision, the UXOQCS will document the request and communicate the request to the PM and UXO QC Program Manager. The UXOQCS will document this action on the Stop Work Request Form and will maintain a compilation of the stop work actions on the Stop Work Request Log. The Stop Work Request Form and the Stop Work Request Log forms are in Appendix F.

9.3 AUDIT PROCEDURES

Audits will be conducted and Audit records maintained per TtEC Procedure QPM-1: Quality Program Manual. Audits will be conducted by personnel qualified in accordance with TtEC Corporate Procedure QP-3: Qualification/Certification of Quality Program Audit Personnel

9.4 QUALITY CONTROL PROCESS

Quality Control on this project will be carried out using two different types of procedures, process and product Quality Control. The first, process QC is conducted using a three-phase control process; preparatory, initial, and follow-up inspections to ensure processes are in control and opportunities for improving processes are captured and implemented. The second, product QC is carried out using a sampling procedure to verify the product meets the requirements of this WP. Personnel conducting Quality Control have stop-work authority and are organizationally independent from the processes.

9.4.1 Process QC

9.4.1.1 Preparatory Phase

9.4.1.1.1 A preparatory phase inspection will be performed prior to beginning each definable feature of work. The purpose of this inspection will be to review applicable specifications and verify that the necessary resources, conditions, and controls are in place and compliant before the start of work activities. The QC personnel will perform the following actions:

9.4.1.1.2 The following QC actions are performed by the QC Staff for each preparatory phase inspection:

- Verify that appropriate plans and procedures are developed, approved and are available;
- Verify personnel identified are available and meet the requirements/qualifications for the position or waivers obtained from the client;
- Verify that the required training has been performed
- Verify identified equipment is available, functional, and appropriate for the job;
- Verify that the preliminary work and coordination have been accomplished
- Verify that level of quality expected is understood;
- Verify Work Plan and applicable SOP's have been reviewed and understood by the workers; and
- Brief process improvement program.

9.4.1.1.3 The specific QC activities performed during the preparatory phase and results of those activities will be documented on the Preparatory Phase Inspection Report, which will be attached to the Daily Quality Control Report.

9.4.1.1.4 Discrepancies between existing conditions and approved plans/ procedures will be resolved and corrective actions taken for unsatisfactory and nonconforming conditions identified during a preparatory phase inspection.

9.4.1.1.5 The UXOSO will discuss job hazards with site personnel and verify that the necessary safety measures are in place and ready for use.

9.4.1.2 Initial Phase Inspection

9.4.1.2.1 An initial phase inspection will be performed the first time a definable feature of work is performed. The purpose of the inspection will be to check the preliminary work for the compliance with procedures and contract specifications. Another aim is to establish the acceptable level of workmanship, check safety compliance, review the preparatory phase inspection, and check for omissions and resolve differences of interpretation.

9.4.1.2.2 The following will be performed for each definable feature of work:

- Deficiencies identified during the preparatory phase have been corrected;
- Requirements of quality of workmanship will be established;
- Completion of readiness review actions verified;
- Differences of interpretation will be resolved;
- Work Plan and applicable documents reviewed to ensure that the requirements are being met; and
- Performance of work will be observed and adequacy of work verified.

9.4.1.2.3 Discrepancies between site practices and approved plans/procedures will be resolved. Corrective actions for unsatisfactory conditions or practices will be verified by the UXOQC or his designee, prior to granting approval to proceed.

9.4.1.2.4 The specific QC activities performed during the initial phase, and results of those activities, will be documented on an Initial Phase Inspection Report and attached to the Daily Quality Control Report.

9.4.1.3 Follow-up Phase Inspection (Surveillance)

9.4.1.3.1 The follow-up phase inspection is performed on a scheduled and unscheduled basis. The purpose of the inspection is to ensure a level of continuous compliance and workmanship. The UXOQC is responsible for on-site monitoring of the practices and operations taking place and verification of continued compliance with the specifications and requirements of the statement of work and approved SOP's. The following will be performed for each definable feature of work:

- Inspections/surveillance to ensure that the work is in compliance with the statement of work and work plans;
- Inspections/surveillance to ensure the required level of workmanship is maintained;
- Inspections/surveillance to ensure each project log book is properly filled out and maintained;
- Inspections/surveillance to ensure data management system is properly tracked and backed up; and
- Inspections/surveillance to check the "false positive" anomalies.

9.4.1.3.2 Follow-up results will be documented on a Surveillance Report and attached to the Daily Quality Control Report.

9.4.2 Product QC

9.4.2.1 The Bains Gap Road and St. Clair Road removal area will use the sampling protocols contained within the Military Standard (MIL-STD) 1916 for product QC. The MIL-STD sampling protocols will be used to determine the number of grids per lot and the number of lanes per lot that will be randomly sampled. The method of conducting the product QC will be to determine the number of lanes that need to be resurveyed using the MIL-STD, then resurvey those lanes using the same type equipment as the field teams used in the initial removal action, process the data, identify anomalies, and excavate the anomalies to determine what the anomaly is. We will use Verification Level (VL) III, Code Letter (CL) A as the standard for performance IAW with the MIL-STD. The failure criteria for the Bains Gap Road and St. Clair Road removal area is:

"No ferrous objects with a "width" (diameter) between a 37 mm projectile and a 155 mm projectile at a depth of less than 11 diameters of the object."

9.4.2.2 Criteria for accepting lots that have completed sub-surface clearance are no ferrous items that meet the above criteria.

9.5 CORRECTIVE ACTION PROCEDURES

9.5.1 Deficiencies and nonconforming conditions will be managed in accordance with TtEC Procedure QP-11, Control of Nonconforming Conditions, and QP-12, Corrective Action. Deficiencies discovered during inspection or other Project QC functions will be documented on a Deficiency Notice (DN) form. (See Appendix F) Nonconforming conditions will be documented on a Nonconformance Report (NCR). (See Appendix F) All deficiencies will be resolved prior to completion of the project and in the timeliest manner possible. The Daily QC Report will include a report on each deficiency / nonconforming condition and the corrective action that was completed and closed out for the day. A corrective action request is required for deficiencies identified from the following sources.

- TtEC Quality Program Audits
- Management Assessments
- Audits performed by Program QC in accordance with project specific plans
- Audits of TtEC, performed by the client or regulatory agency

9.5.2 The Corrective Action Request will be documented on a Corrective Action Request form in Appendix F. The UXOQCS will maintain a log of deficiencies using the CAR Status Log in Appendix F.

9.5.3 It is the responsibility of all personnel on the project to identify deficiencies and nonconforming conditions to their supervisor or manager as soon as they are identified. Deficiencies and nonconforming conditions are not necessarily a "bad thing" and should not have a negative connotation. Deficiencies and nonconforming conditions should be considered opportunities to improve the process.

9.6 ROOT CAUSE ANALYSIS

9.6.1 Both the deficiency and nonconformance report forms contain an area for the entry of information regarding the cause of the problem and proposed resolution. The determination of the root cause of a deficiency or nonconformance is an integral part of the QC process. The depth and extent of the root cause analysis depends on the situation. It may be as simple (minor) as an overlooked step or procedure or be a complicated process. Root cause analysis is the responsibility of the functional manager or his/her designee with the assistance of the UXOQC. Criteria considered in the analysis will include:

- Staff qualifications and training;
- Adequacy of procedures;
- Adequacy of equipment; and

- Adequacy of QC measures.

9.6.2 Input will be obtained as necessary from field personnel and technical advisors in order to identify the factors, which led to the problem.

9.6.3 The root cause is always "upstream" from where the problem was detected. Two strategies that will be employed for determining the root cause of a deficiency or nonconforming condition for this project are: 1) tracing the problem back to the source, and 2) evaluation of the cause using basic questions such as who, what, when, where, why, and how. Why, is probably the most beneficial question, when attempting to arrive at a root cause. This question may need to be asked multiple times before the cause is identified. For example "*Why did A happen?"* Answer: *"Because of B," "Why did B happen?"* Answer: "*Because of C."* This process is carried on until the real cause is identified

9.7 FIELD OPERATIONS

All QC procedures are detailed in the Surveillance Checklist. This Checklist outlines the definable features of work and its corresponding QC procedures to include the corrective action criteria for each one. This will ensure the specific definable features of work are conforming to specifications. The Surveillance Checklist is contained in Appendix F.

9.8 GEOPHYSICAL OPERATIONS

The processes to assure quality during geophysical operations, to include anomaly acquisition and reacquisition, are contained in Section 6.

9.8.1 "No Dig" to "Dig" A minimum of 10% of all anomalies designated as "No Dig"s by the interpreting geophysicists, will be randomly picked and changed to "Dig"s to validate the interpreting geophysicist's pick process. These "No Dig"s to "Dig"s shall be changed by the database manager prior to the dig sheet being provided to the intrusive team. It will also be notated as a QC pick in the project database's geophysical data table. Statistics, results and nonconforming conditions will be provided to the site QC specialists and geophysicist and published in the site specific final removal report.

9.9 EQUIPMENT FUNCTION CHECKS AND CALIBRATION

Equipment function testing and calibration are major elements in the process QC for this project. Effective identification of MEC/UXO relies heavily on properly functioning detection equipment. All MEC/UXO detection equipment will be function tested daily utilizing an on-site test bed or other approved methods. Instruments will be function tested in accordance with the manufacturer's recommendation unless otherwise approved. Equipment that is not functioning

properly will not be used until it has been repaired or replaced and proper function has been demonstrated.

9.10 CONTRACT DELIVERABLES

9.10.1 Document Control

The PM will establish a document control plan in accordance with TtEC Procedure PO-8, Document Control. Preparation, review, approval, and issuance of documents (including revisions) affecting quality will be controlled to the extent necessary to determine the documents include the specified requirements and provide adequate procedures or guidelines to perform the intended activities. Such documents may include, but are not limited to, drawings, specifications, calculations, procedures, plans, and reports. The UXOQCS will review the documents to verify the inclusion of appropriate quality requirements.

9.10.2 Document Review

It is the policy of TtEC to consistently provide scientific and engineering work products that meet the required level of quality; that are in compliance with applicable laws and regulations; and that are legible, error-free and consistent with project-defined scope, schedule, budget, and other contractual obligation. To ensure that documents are technically correct, complete and consistent with project objectives, TtEC has established an internal procedure detailing the requirements for technical review and approval of all engineering work products.

9.10.3 Independent Technical Review

Each work product, or applicable sections thereof, will undergo an appropriate level of technical review and approval by qualified professional(s) other than the originator(s). This Independent Technical Review (ITR) will include reviewing, inspecting otherwise verifying the assumptions, accuracy, level of complexity, correctness, completeness compliance of methods, data, calculations with approved plans and accepted engineering procedures, standards and guidelines. In addition, the ITR will be performed for the purpose of confirming the proper application of criteria, regulations, laws, codes, principles and professional procedures. A "qualified professional" shall be a competent individual within the appropriate discipline who has technical qualifications and experience that are equal to or exceed those of the originator.

9.11 LESSONS LEARNED

Lessons learned will be captured, documented and submitted in the Final Report using TtEC Procedure QP-14 Lessons Learned Procedure. The Lessons Learned Report Form is found in Appendix D. The UXOQCS will attach the completed Lessons Learned Report forms to daily and weekly QC reports. The UXOQCS will recap all such Lessons Learned in the Final Report

9.12 TRAINING

9.12.1 The UXOQCS will verify site personnel have the following training as required:

- Qualification per DID OE-025 for the position assigned.
- 40-Hour HAZWOPER Course.
- 8 Hours HAZWOPER Annual Refresher Course if applicable.
- Site Specific Quality Control procedures and pass/fail criteria.

9.12.2 The UXOQCS will conduct periodic quality related briefings during the morning safety meeting. These briefings will cover quality related topics provided by the UXO QC Program Manager and as determined by the UXOQCS. Suggested topics include, but are not limited to, results from QC activity such as surveillance, inspections, the three-phase control process, process improvement, changes to procedures and approved FCRs.

9.13 DATA QUALITY

9.13.1 All personnel will receive training, during their initial site training, on the importance of data quality. This training will include how to label and describe all ordnance and related items recovered. The SUXOS will be tested with verifying the quality of the data collected by the intrusive team leaders. On a regular basis (weekly), the UXOQC will do surveillance on previously collected data to ensure the quality of that data, and to verify the SUXOS is checking the data. This process will be explained during the intrusive teams' preparatory inspection. Geophysical data will be handled in the same manner, with the exception that a Senior Geophysicist in Denver will verify the data.

10.0 ENVIRONMENTAL PROTECTION PLAN

10.1 PROCEDURES

This Environmental Protection Plan (EPP) has been developed to minimize any potential adverse effects to the environment occurring as a result of MEC investigations at Fort McClellan. Specifically, this EPP will describe sensitive natural resources within the Bains Gap Road and St. Clair Road area and will set forth methods to protect and conserve those resources during the MEC removal action.

Where impacts to sensitive biological resources cannot be avoided, this EPP outlines potential measures that can be implemented to mitigate such impacts. These mitigation measures were developed based upon a site-specific analysis that addressed unique concerns at Fort McClellan and incorporate more general best management procedures and guidelines that have been implemented at Ft. McClellan for MEC removal actions.

10.2 ENDANGERED/THREATENED SPECIES

Three species listed as endangered or threatened by the United States Fish and Wildlife Service have been recorded on Fort McClellan (Table 10-1). One of these species, the red-cockaded woodpecker, has not been found on the installation since 1968. The installation has prepared an Endangered Species Management Plan that is designed to manage at the community or systems level for federal and state listed species, as well as unusual or sensitive species on the installation. Two other species, Mohr's barbara buttons and Tennessee yellow-eyed grass have been identified at Pelham Range, but not on the Main Post. However, due to the proximity of Pelham Range to the Main Post, the potential exists that these species may also be present on the Main Post.

Within Alabama, the blue shiner is currently restricted to Weogufka and Choccolocco Creeks as well as the lower reaches of the Little River. Approximately two miles of the Choccolocco Creek flow through the Choccolocco Corridor. The entire length of the stream within this corridor is considered optimal habitat for the blue shiner (DOE, 1996).

Historically, longleaf pine forests on the Main Post were known to contain red-cockaded woodpeckers. The lack of fires coupled with the removal of longleaf pine (as a result of historical land clearing and forestry activities) resulted in the decline of this species. In fact, the last remaining active red-cockaded woodpecker cluster on Fort McClellan was recorded in 1968. Subsequent surveys in 1972, 1982, 1985 and 1997 failed to identify any birds or significant suitable habitat and the cluster was classified as inactive (DOE, 1996).

Table 10-1
Federally Listed Species Occurring on Ft. McClellan

Common Name	Scientific Name	Federal Status	Location
Blue shiner	*Cyprinella caerulea*	Threatened	Choccolocco Creek
Red-cockaded woodpecker	*Picoides borealis*	Endangered	Main Post
Gray Bat	*Myotis grisescens*	Endangered	Main Post
Mohr's barbara buttons	*Marshallia mohrii*	Threatened	See note 1 below
Tennessee yellow-eyed grass	*Zyris tennesseensis*	Endangered	See note 1 below

Source: Fort McClellan Directorate of Environment, 1996
[1]These species have been identified at Pelham Range, but not on the Main Post at Fort McClellan. However, due to the proximity of Pelham Range to the Main Post, the potential exists that these species may also be present on the Main Post.

10.2.1 Other Special Status Species

A total of five species that have been found on the site are state candidate species for future potential listing (Table 10-2). Fort McClellan pro-actively manages these species and their associated communities as Special Interest Natural Areas under their Endangered Species Management Plan.

Table 10-2
State Candidate Species Identified on the Site

Common Name	Scientific Name	Special Interest Natural Area
Appalachian cottontail	*Syvilagus obscurus*	Mountain Longleaf Community Complex
Diana butterfly	*Speyeria diana*	Marcheta Hill Orchid Seep
Carlson's caddisfly	*Polycentropus carlsoni*	Bains Gap Seep and Cave Creek Seep
Fraser's loosestrife	*Lysimachia fraseri*	Bains Gap Seep
White fringeless orchid*	*Platanthera integrilabia*	Marcheta Hill Orchid and Cave Creek Seeps
Coldwater darter	*Etheostoma ditrema*	See note 1 below

Source: DOE, 1996
* Expected to soon be listed as a threatened and endangered species.
[1] This species has been identified at Pelham Range, but not on the Main Post at Fort McClellan. However, due to the proximity of Pelham Range to the Main Post, the potential exists that this species may also be present on the Main Post.

The white-fringeless orchid (*Platanthera intergrilabia*) is a federal candidate species. This perennial herb has either a leafy flowering stem 1 to 2 ft (6 dm) tall, or a single, strap-shaped basal leaf, all attached to tuberous, fleshy roots. It flowers mid-July to late August and bears fruit during September-October. It is typically found in red maple/black gum swamps and along sandy, damp stream margins. It also is found on seepy, rocky, thinly vegetated slopes. It is often associated with other orchids, white violets, cowbane, and grass-of-parnassas.

In addition to the species listed above the Mountain Longleaf Pine is located in and around the Bains Gap Road and St. Clair Road removal area. As the key species in what is the MLNWR now the U.S. Fish and Wildlife Service has asked that special consideration be given to any Mountain Longleaf Pine that are present in the clearance area. TtEC has worked in and around this area and identification of the pine will be included in the site specific training. TtEC's brush removal sub will also be briefed on the pine and will take special care to disturb as few of the pines as possible while still preparing the site for the removal action that will follow.

10.3 WETLANDS

The Bains Gap Road and St. Clair Road removal area does not contain any wetland areas.

10.4 CULTURAL, ARCHAEOLOGICAL, AND WATER RESOURCES

There are no cultural, archaeological or water resource issues within the Bains Gap Road and St. Clair Road removal area.

10.5 COASTAL ZONES

There are no coastal zones within the Bains Gap Road and St. Clair Road removal area.

10.6 TREE AND SHRUB REMOVAL

The land use in the Bains Gap Road and St. Clair Road removal area is a wildlife refuge. The removal of trees will be limited to trees with a diameter of less than 4 inches at 1 foot above ground height.

10.7 EXISTING WASTE DISPOSAL SITES

There are no known waste disposal sites within the Bains Gap Road and St. Clair Road removal area.

10.8 MITIGATION PROCEDURES

TtEC will ensure the implementation of the procedures outlined in this section in order to minimize potential impacts to environmentally sensitive resources during all phases of the removal. Activities will be conducted in compliance with all applicable federal and state regulations and this document. Every effort will be made to protect human health and safety, as well as air, water, land, cultural, and biological resources.

10.8.1 Burning Activities

There are no planned burn activities during the removal action.

10.8.2 Dust and Emissions Control

It is not expected that removal activities will cause a significant increase in dust or air emissions. Vehicular traffic to and from the site will utilize paved roadways to minimize the possibility of dust suspended particles.

10.8.3 Storage and Temporary Facilities

The investigation activities will avoid all storage areas, therefore mitigation with regard to such areas will not be required

10.8.4 Access Routes

The removal action will have no affect on existing access routes because the road is currently closed to traffic.

10.8.5 Control of Water Run-off

The proposed activities at the site are not expected to significantly alter the amount of impervious area.

10.8.6 Decontamination and Disposal of Equipment

Equipment decontamination and disposal will be conducted in accordance with the Personnel and Equipment Decontamination Procedures identified in the SSHP.

10.8.7 Minimizing Areas of Disturbance

All areas that will potentially be disturbed as part of the investigation activities will be minimized, to the extent possible. Special efforts to minimize disturbance will be made in areas that contain or potentially contain plant and animal species of special concern or their associated habitat

10.9 POST ACTIVITY CLEANUP

All areas will be cleaned of investigation caused debris and all holes will be back filled to original grade. Anomalies that are excavated within the road bed will backfilled utilizing the following guidance. Excavations in the road will be backfilled with structural fill. "Structural fill" shall consist of a locally available borrow material herein specified as a silty or clayey sand containing less than 90 percent passing a No. 40 sieve, and less than 40 percent passing the No. 200 sieve, by weight. The Liquid Limit and Plastic Limit of the material shall be less than or equal to 40 and 10 percent, respectively. Maximum loose lift thicknesses of 12 inches shall be compacted to 95 percent of the soil's Standard Proctor Density as per ASTM D-698. The final 6" to reach adjacent finished grade will use compacted aggregate, ALDOT #67 crushed stone.

10.10 AIR MONITORING PLAN

No air monitoring is planned for this task order.

11.0 INVESTIGATIVE DERIVED WASTE (IDW) PLAN

No IDW is expected during the performance of this task order. If IDW is created a field change request will be submitted to add an IDW plan to this SSWP.

12.0 INTERIM HOLDING FACILITY SITING PLAN FOR RCWM PROJECT SITES

No Interim Holding Facility Siting Plan is needed for this task order.

13.0 PHYSICAL SECURITY PLAN FOR RCWM PROJECT SITES

No Physical Security Plan is needed for this task order.

14.0 REFERENCES

Draft Site Specific Final Report, U.S Fish and Wildlife Roads, Firebreaks, and High Use Areas, TtEC May 2005.

Performance Work Statement, Bains Gap Road MEC Removal Action, September 2005

Appendix A Task Order Scope of Work

Appendix B Site Maps

Appendix C Local Points of Contact

Appendix D Accident Prevention Plan

Appendix E Munitions Constituents Sampling and Analysis Plan

Appendix F Contractor Forms

Appendix G MSD Calculation Sheets

Appendix H Resumes

Appendix I Final Geophysical Prove-Out Work Plan