Final

Site Specific Final Report Addendum
Construction Debris Removal Area
of the Eastern Bypass
Fort McClellan, Alabama

Task Order 0010
Contract Number DACA87-99-D-0010

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CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

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Program Manager

TABLE OF CONTENTS
(Continued)

List of Tables

List of Appendices

List of Figures

TABLE OF CONTENTS
(Continued)

Contents of Compact Disk

ACRONYMS AND ABBREVIATIONS

ADEM	Alabama Department of Environmental Management
ALDOT	Alabama Department of Transportation
CL	Code Letters
DGM	Digital Geophysical Mapping
DGPS	Digital Global Positioning System
EBP	Eastern Bypass
EM	Electro Magnetic
ESS	Explosives Safety Submission
Ft	feet
IAW	in accordance with
Kg	Kilogram
MD	Munitions Debris
MEC	Munitions and Explosives of Concern
MIL STD	Military Standard
mm	millimeter
mV	milivolt
NAD	North American Datum
OC	Operating Characteristics
OSHA	Occupational Safety and Health Administration
PPR	Porta Potty Road
QA	Quality Assurance
QC	Quality Control
RFP	Request for Proposal
ROW	Right-of-way
RTS	Robotic Total Station
SOW	Statement of Work
SSWP	Site Specific Work Plan
SWWP	Site Wide Work Plan
SUXOS	Senior Unexploded Ordnance Supervisor
TDEM	Time Domain Electromagnetic
TF	Transition Force
TtEC	Tetra Tech EC, Inc.
USAESCH	U. S. Army Corps of Engineers, Engineering and Support Center, Huntsville
UXO	Unexploded Ordnance
UXOQC	Unexploded Ordnance Quality Control Specialist
UXOSO	Unexploded Ordnance Site Safety and Health Officer
VL	Verification Level
WP	Work Plan

1.0 INTRODUCTION

1.0.1 This document will discuss the objectives, procedures and results of the Munitions and Explosives of Concern (MEC) Removal action performed on the areas known as the Construction Debris Area located within the ROW of the proposed Eastern Bypass by Tetra Tech EC, Inc. (TtEC) at Fort McClellan, Alabama between June 2005 and August 2005. During this period, the objective of conducting an MEC Removal was successfully accomplished. A portion of the proposed Eastern Bypass (EBP) known as Ordnance and Explosives Site 2 (OES2) had a removal action performed between 2001 and 2004. This previous clearance action identified an area within the EBP Right of Way (ROW) that contained a large amount of construction debris that had been used as fill for the construction of Iron Mountain Road during the 1950's. This document will discuss the unique operational procedures and the results for the removal of the fill and subsequent MEC removal action that took place on the ground under the fill.

1.1 OBJECTIVE AND SCOPE

1.1.1 The objective of this task order was to perform a Clearance to Depth within the Construction Debris Removal Area in OES2 of the planned EBP ROW at Fort McClellan, Alabama. This particular area was not cleared during the previous EBP removal actions because it contained large amounts of construction debris that were used as fill during the construction of Iron Mountain Road. In discussions with the Alabama Department of Transportation (ALDOT) and the Alabama Department of Environmental Management (ADEM) it was determined that any area within the EBP ROW that would not receive at least 4 feet of fill during the bypass construction had to have a MEC removal action performed. Based on this input ALDOT provided the engineering design plans for the EBP to the U.S. Army Transition Force (TF) at Ft. McClellan. This information was used to develop a plan that was then presented and accepted by both ALDOT and ADEM. The area that required a removal action can be seen in Figure 4-1.

1.1.2 The Statement of Work (SOW) associated with this Task Order included:

- Construction Debris Removal.

Task 22 – Clear selected construction debris grids, perform quality control, and prepare work plan and addendum to Site Specific Final Report.

1.2 SUBMITTALS, APPROVALS, AND AUTHORIZATION

1.2.1 In February 2001, TtEC began work on the EBP MEC removal action. In April 2002 the US Army Corps of Engineers, Engineering and Support Center modified the SOW by adding 40 additional acres to the EBP ROW clearance area. In May 2002 57 full and partial grids were removed from the SOW because they contained large amounts of construction debris that was used as fill during the construction of Iron Mountain Road in the 1950's. These grids are the basis for this addendum to the final report. In November 2002 the USAESCH again modified the SOW to add a Mechanical Removal Area. This area was a very heavily MEC contaminated area within the EBP ROW that conventional methods of removal were inadequate to handle. Fieldwork on the EBP removal was completed in June 2003.

1.2.2 During discussions with the ALDOT and ADEM it was determined that the areas that had been removed from the scope of work because of the large amounts of construction debris would have to have an MEC removal action completed before construction of the EBP could commence. The USAESCH and the Ft. McClellan TF held discussions with the ALDOT and ADEM and it was agreed that any of the area not cleared previously that would not receive at least four feet of fill by ALDOT, during the construction of the EBP, would have to be cleared. ALDOT provided the engineering drawing for the EBP to the Army and a plan was developed and accepted by both ALDOT and ADEM. TtEC was contracted to perform the removal action on those areas. Figure 4-1 shows the EBP ROW and the grids that were not previously cleared. It also shows the portions of those grids that required a removal action under this new task order. A site-specific work plan was written and approved in June 2005. A limited Notice to Proceed with non-intrusive activities was received in May 2005, and site preparation and equipment mobilization was initiated. The Conventional Explosive Safety Submission was amended and approved by the Department of Defense Explosive Safety Board in June 2005. Notice to Proceed was received in June 2005 and work on site commenced.

1.3 SITE LOCATION

1.3.1 The EBP ROW is located along the western portion of Ft. McClellan and traverses a variety of terrains in a north-south direction. The portion of the EBP ROW covered under this Task Order is very steep and rocky along and below Iron Mountain Road. Figure 4-1 shows this location. The highest elevation within the EBP ROW is Iron Mountain with an elevation of 1250 feet above msl. This elevation decreases to 716 feet above msl in and along the lower edge of Iron Mountain in the southern portion of the EBP ROW.

2.0 DISCUSSION

2.0.1 Iron Mountain Road dissects the EBP ROW from the north to the south. The terrain is very steep where Iron Mountain Road skirts Iron Mountain. In this area large amounts of concrete rubble and other construction debris were encountered. An attempt to clear several of the grids in this area resulted in the removal of several tons of concrete and other debris from single dig locations during the original EBP removal. The grids in question were discussed with both the USAESCH project staff and the Ft. McClellan TF and it was determined these areas should be removed from the SOW and are known as the Construction Debris Area.

2.0.2 In follow on discussions between the Army, ALDOT and ADEM it was determined that some of these grids would require MEC to be removed before ALDOT would be able to start the construction of the EBP. Based on this need the ALDOT, USAESCH, Ft. McClellan TF, and ADEM came up with a plan that was acceptable to all that required all areas that would not have four feet of fill put on them, during the construction of the EBP, would have to be cleared. Figure 4-1 shows these areas.

2.0.3 In order to clear this area the first thing that was required was to remove the large amounts of construction debris that were used to construct Iron Mountain Road. It was determined that the best way to remove this debris was to use commercial earth moving equipment (CAT 325 excavator and CAT 350 off road dump truck). In discussions with the USAESCH it was determined that this earth moving equipment would need to be armored to protect the operator from harm in the case of an inadvertent detonation during the fill removal. Once the fill was removed the soil underneath underwent a full MEC removal that included geophysical mapping.

2.0.4 Within the grids not originally cleared ALDOT identified several areas that required a removal action. These included all areas that would not be covered by at least 4 feet of fill during the follow on construction of the EBP. Within these areas ALDOT identified two areas as locations for culverts. There was also one area that was thought to be a possible natural spring location that would require a spring box. The spring was in a known general location, but the actual location was thought to be under Iron Mountain Road and was unknown. TtEC was tasked to find the source of the spring and clear an area for the installation of spring box if needed. The remainder of this report gives the detail of these actions.

2.1 SITE PREPARATION ACTIVITIES

2.1.1 Location Surveys

2.1.1.1 Boundary Setout. Boundary Setout was conducted by a sub-contract Registered Professional Land Surveyor (Skipper Engineering Inc., Rainbow City, Alabama, License Number 20141). All work was carried out in accordance with the requirements of the "Minimum Technical Standards for the Practice of Land Surveying in the State of Alabama". The boundary of the areas to be cleared were set out as detailed in the figures in the Final Site Specific Work Plan. All coordinates were based on the

State Plane Grid System to the North American Datum of 1983 (NAD83). TtEC UXO Technicians provided anomaly avoidance for the survey crew in order to ensure that each survey location was clear of sub-surface anomalies.

2.1.1.2 Grid Setout. Since the areas to be cleared were relatively small in area and all geophysical mapping was to be done using either Digital Global Positioning System (DGPS) or Robotic Total Station (RTS) surveying of internal grids was not needed by TtEC. In order to allow for consistent reporting (by grid) and to allow the USAESCH to blind seed the removal area grid corners were placed using the DGPS system that was on site.

2.1.2 Brush Clearance

2.1.2.1 No formal brush removal was completed as part of this task order. The brush that was present within the areas cleared was removed by the excavator during the fill removal.

2.1.3 Surface Clearance

2.1.3.1 No formal surface clearance activity was performed as part of this task order because a surface sweep was performed during a previous removal action in this area and because the surface area was disturbed or completely removed during the fill removal process using the armored excavator.

2.2 CONSTRUCTION DEBRIS REMOVAL

2.2.1 The removal of the fill, or construction debris, was completed using commercially available earth moving equipment that was armored to protect the operator. On this task order we used a Caterpillar 325 Excavator and 350 Off Road Dump. Both pieces of equipment had the original cabs removed and an armored replacement cab installed. These armored cabs were made from T1 armor and bullet resistant glass. The cabs used were rated to withstand the detonation of a 81mm mortar.

2.2.2 The amount of fill that had to be removed was estimated to be 40,000 cubic yards. At the end of the fill removal, we estimate, based upon the number of dump truck loads removed and the amount of fill moved separately out of the area by the excavator alone, that 43,000 cubic yards of fill were actually removed to conduct this removal activity. During the fill removal the equipment operator ensured that he was removing fill and was not actively digging the native soil that was under the fill. The fill was removed from the clearance area and left within other areas of the EBP ROW. The fill received a visual inspection daily in accordance with the SSWP. This procedure is described in detail in paragraph 2.3.20.3 of the Site Specific Work Plan, Amendment 2, Eastern Bypass OE Removal Area, May 2005. This entire process was observed by a safety observer who was located in an armored booth overlooking the project area. Photographs of this process are located in Appendix B-5 on the accompanying CD-ROM.

2.2.3 The area designated as the spring box in the work plan figures was excavated to locate the source of the spring. In removing fill to trace out the source of water TtEC discovered the source of the water was an existing culvert under Iron Mountain Road and was not a spring. Since no spring was present and therefore no spring box was needed no removal action was performed in this area. Photographs of this culvert can be seen in Appendix B-5 or on the accompanying CD-ROM.

2.3 GEOPHYSICAL MAPPING

2.3.1 A Geophysical Prove Out (GPO) was performed prior to conducting the geophysical survey. A GPO work plan and GPO report were written and approved by the USAESCH prior to beginning actual fieldwork. The work plan and report are located in Appendix B-2e.

2.3.2 TtEC performed the geophysical mapping of the construction debris area. All data acquisition, data processing and interpretation, was managed by a qualified geophysicist. There were a few small areas that were not geophysically mapped due to the characteristics of the terrain that precluded safely carrying the EM-61 coil. These characteristics were steep and rocky slopes. These areas were cleared using a mag and dig protocol utilizing a handheld Vallon VMX2. Each area that was cleared with the Vallon is shown on the geophysical maps that are located in Appendix D-3. Geophysical data was collected utilizing a Time Domain Electromagnetic (TDEM) method. The EM-61 is manufactured by Geonics LTD. The EM-61 system was used in conjunction with the DPGS or RTS for positional data within the area. The DGPS positioning system was used in open areas where satellite availability was good. The RTS, which utilizes line-of-sight, was used in areas where satellite coverage was poor.

2.3.3 One TtEC team trained in geophysical mapping carried out the geophysical mapping operation within the area.

2.3.4 The geophysical data and positional data from the RTS and DGPS were both collected and submitted to the on-site geophysicist for processing and interpretation.

2.3.5 All data was processed and analyzed in accordance with (IAW) the general processing/analysis sequence portrayed in the General Site-Wide Work Plan and Site Specific Work Plan. Target selection criteria was based on the smallest MEC object of the site, which was the 37mm projectile. The selection of a target was based on the relationships between the signal intensities of Channel 1 and 2, data acquisition path geometry, surrounding background characteristics, and the shape of the potential target. In addition the areas that would not have four feet of fill, ALDOT identified a culvert that crossed the entire area that would require a clearance action. This culvert spanned several grids and was 20 feet wide. Fill was removed from the area and the ground cleared in the same manner as the other areas

2.3.6 Each of the items intrusively investigated in the survey grids were compared against the geophysical anomaly characteristics to ensure that the item(s) removed from the excavation were consistent with the geophysical anomaly characteristics, as well as the geophysical classification (i.e., "dig" or "no dig"). The primary tool used to derive qualitative and quantitative relationships between items of different sizes and shapes and the geophysical anomaly characteristics is the data from the GPO. Additional information that can also be useful in the assessment is comparison of intrusive results and geophysical anomaly characteristics from other task orders and site-specific GPO's.

2.3.7 While it is not possible in all cases to exactly quantify the interpretation criteria due to the complex interrelationships between the data characteristics (signal intensity, acquisition path geometry, anomaly shape, influence of surrounding anomalies) and the influence of the site characteristics (topography, vegetation, cultural features), the following general guidelines were implemented during the interpretation process to select targets for excavation:

- Channel 2_366 time gate signal intensity > 3 mV above the local background
- Anomaly apparent on minimum of two adjacent data acquisition transects
- Ratio between minor and major axes of anomaly from ~ 0.5-1.5; edges of anomaly are definitive.
- Minimum interference from adjacent anomalies. Where interference from other anomalies is present (e.g., debris area), Channel 2 signal intensity decreased.

2.3.8 Processed EM61 data was generated on individual (by grid) color-contour maps, where the color contours represent the signal intensity. The locations of anomalies selected for reacquisition are indicated on the maps. These anomaly maps are included in Appendix D-3.

2.3.9 Dig sheet comments are used to aid intrusive teams. The comment "ok" refers to an anomaly representative of the selection criteria in Section 2.3.7. Comments such as "small" or "may be debris" are used to describe anomalies that are generally not representative of the anomaly selection criteria discussed in Section 2.3.7.

2.4 ANOMALY REACQUISITION

2.4.1 A two-man TtEC team using the DGPS or RTS performed anomaly reacquisition. This two-man team included the project geophysicist. The procedure for reacquiring the location of the anomalies was to obtain the State Plane coordinates of the anomalies in question from the geophysically interpreted dig sheets and place yellow flags in the ground at the designated locations. The yellow surveyor's flags had the grid and anomaly number marked on them with indelible pen. An anomaly was defined as a location on the ground with a 50-centimeter radius that was likely to contain the item of interest. A Vallon VMX2 was used by the reacquire team to locate the sub surface anomaly. On flat, level areas there was no notable offset, however on steep slopes, the location of the anomaly was shifted due to the projection of the positioning sensor relative to the ground (tilted). It was noted that the offset from the selected location was consistent in areas with similar slopes. The project geophysicist utilized the geophysical maps to assist in determining the expected response from the Vallon. There were two cases where the response did not match the expected response. In these cases, the EM-61 was used to reacquire the anomaly. In both cases, a large, deep item was pin pointed by the EM-61. There were anomalies that produced no response from the handheld unit (no finds). In most cases, these anomalies correlated with environmental features such as logs, fallen trees, or pits that are clearly areas were possible coil bumps may have occurred.

2.5 MEC INTRUSIVE OPERATIONS

2.5.1 The objective of the intrusive operations was to investigate and remove all MEC items. The geophysical mapping indicated the location of the target anomaly, although it was not possible to ascertain whether there were individual or multiple targets in many cases. Removal of all metallic items in a radius around each flagged anomaly was necessary as a small shallow target produces a similar handheld instrument response to a deeper, larger target. In many cases, the anomaly location contained several metallic items at varying depths and due to technological limitations, it was not possible to ascertain with any certainty, whether the first target excavated was the item of interest. The only way to assure that the target anomaly location was fully explored was to clear the radius of all metallic anomalies. Intrusive operations were carried out using TtEC UXO Technicians. A total of 236 anomalies were chosen as digs by the geophysicist. Of the 236 anomalies investigated none were MEC or UXO, and only 14 were Munitions Debris (MD). Of the 14, five were seed items placed by USAESCH for QA purposes. The remaining anomalies were non-munitions related.

2.5.2 The following paragraphs explain the intrusive excavation process followed.

2.5.3 The Senior UXO Supervisor (SUXOS) planned the work location of the intrusive team taking into account availability of dig sheets, equipment availability and the required exclusion zones and team separation. After the morning safety brief each day, the SUXOS allocated individual grids and documentation to the intrusive team leader for their days work.

2.5.4 After they had received their briefings and conducted their daily vehicle and equipment checks in the compound, the intrusive team mobilized to the work-site and commenced preparation of their equipment. Concurrent to this preparation, personnel allocated by the SUXOS conducted an area search within the EBP ROW work area and around it to ensure that unauthorized personnel were not present within the exclusion zones. After the check was conducted and any necessary road guards posted, the SUXOS proceeded to give the intrusive teams authorization to commence intrusive operations for the day.

2.5.5 Within each grid, the intrusive team leader allocated anomaly flags for members of the team to excavate. The instrument used by each team member was the Vallon VMX2 handheld detector. The team leader was responsible for ensuring that each excavation hole was cleared of metallic anomalies before moving to the next anomaly.

2.5.6 As each anomaly was excavated, the team leader recorded the items found at each anomaly flag. A geophysical map and hardcopy dig sheet were continuously reviewed to ensure that the correct number of anomalies was excavated. In the instance where an anomaly flag had been displaced or was missing, the SUXOS was contacted and an anomaly reacquisition team was scheduled to replace the anomaly flag.

2.5.7 Items excavated from the anomaly locations could be described as MEC, UXO, MD, or Non MD. MEC is defined as an ordnance item containing an energetic material. UXO items are defined as ordnance items that have been fuzed and fired but did not function as intended. Any scrap item that is munitions related that does not contain energetic material is defined as MD, while scrap that is not munitions related is defined as Non MD. No MEC items were found during this removal action.

2.5.8 In the instance where nothing was found at the anomaly location, the anomaly was annotated as a No Find. Instances where this occurred were investigated to confirm this categorization and the item was reacquired and re-dug if it was deemed necessary. Reasons for the No Find were attributed to several factors including the anomaly being removed during the excavation of adjacent targets, data aberrations due to geological conditions and data aberrations due to the coil hitting the ground during data collection in steep and challenging terrain. Table 2-1 below summarizes the results of the reinvestigation of No Find anomalies.

Table 2-1
Reinvestigated No Find Anomalies

Grid	Anomaly	Target Response (mV)	C1/C2 Ratio	Comment
D34	D34-001	3.21	0.95	Broad, low mV, looks like soil
SA2	SA2-257	3.57	1.15	Coil bump
SA2	SA2-261	3.57	1.20	Same as SA-70 (wire)
PPR	PPR-001	10.37	0.96	Construction debris
PPR	PPR-005	15.94	0.99	Construction debris
SA	SA-021	3.80	1.33	See QC
SA	SA-023	4.65	0.97	Very small, single line
SA	SA-045	6.49	1.01	Very small, single line
SA	SA-051	12.07	1.17	Coil bump
SA	SA-074	21.82	1.17	Coil bump
SA	SA-079	20.14	0.96	Construction debris

2.5.9 Table 2-2 summarizes the results of the investigation.

Table 2-2
Results of Investigation

Items Recovered	Number of Items	Percentage of Total Anomalies
MEC/UXO	0	0.0%
MD	9	3.3 %
Non MD	222	81.9 %
Seeded Items	5	1.9 %
No Finds	35	12.9 %

2.5.10 Every anomaly, which was investigated, had many characteristics which were important to track for this report. These included such things as: what exactly the item was; if MD, the type of munitions the item was related to; Depth, and others as noted in the appendix C-1 table that describes the anomalies. Below is a list of the types of items found during this removal action.

- MEC/UXO. No MEC or UXO items were found during this removal action;
- MD. These items were discovered throughout the area and were free of energetic materials and included;

  Projectile, 37mm, AP-T, expended
  Mortar, Fins
  Grenade, Rifle, Expended

- Non MD. Approximately 183 pounds of Non MD Scrap was discovered within the right-of-way and included:

  Rebar;
  Small Arms Brass;
  Reinforced concrete debris; and
  Miscellaneous metallic trash

2.5.11 A complete list of each anomaly investigated is supplied in Appendix C-1.

3.0 PROJECT QUALITY ACTIVITIES

3.1 QUALITY CONTROL (QC)/QUALITY ASSURANCE (QA)

3.1.1 Quality Control tasks were performed by TtEC, while Quality Assurance tasks were performed by USAESCH. The entire project demonstrated a high standard using the sampling protocols contained within Military Standard (MIL STD) 1916, DoD Test Method Standard, DoD Preferred Methods for Acceptance of Product (approved for use by all Departments and Agencies of the DoD).

3.1.2 *Quality Control*. The QC function on this entire removal action included the three phases of QC inspection (Preparatory, Initial, and Follow-up), also known as Process QC. The acceptance sampling, or Product QC, was performed using MIL STD 1916.

3.1.3 *Quality Assurance*. The QA function consisted of planned and systematic actions designed to verify that the quality met requirements in the plan. QA is an independent function designed to assess and report on both whether the project quality function, as well as the project itself, achieve quality and project objectives. The USAESCH QA process was used to ensure that the contractor's entire process worked and to allow the contractor to successfully turn over the area to USAESCH. The remainder of this section describes QC and QA processes used.

3.2 PROCESS QUALITY CONTROL

3.2.1 Process QC is concerned with improving the efficiency and effectiveness of the processes. This can be considered a prevention approach to QC because it aims to detect problems early and improve processes before the final product is produced. The Process QC consisted of Preparatory, Initial, and Follow-Up Inspections on teams conducting key processes and specific process checks for different field processes.

3.2.1 Preparatory Phase Inspections

3.2.1.1 Preparatory Phase Inspections were performed before starting each key process identified in the Quality Planning Phase. The purpose of these inspections was to review applicable specifications and verify that the necessary resources, conditions, and controls were in place and compliant before the start of work activities. The specific QC checklist items assessed during the Preparatory Phase, and the results of those activities were documented on QC Surveillance Reports contained in Appendix B-2a.

3.2.2 Initial Phase Inspections

3.2.2.1 Initial Phase Inspections were performed the first time a type of work was performed under key processes. The inspections were conducted to check preliminary work for compliance with procedures and contract specifications. Other objectives include establishing and agreeing to the acceptable level of workmanship, checking safety compliance, reviewing the Preparatory Phase Inspection, checking for omissions, and resolving differences of interpretation. The Initial Phase Inspections conducted were documented on QC Surveillance Reports contained in Appendix B-2a.

3.2.3 Follow-Up Phase Inspections

3.2.3.1 Follow-Up Phase Inspections were performed on a scheduled and unscheduled basis. The purpose of these inspections was to ensure a continuous level of compliance and workmanship based on the quality levels established during the Preparatory and Initial Phase Inspections. The UXOQC Specialist and his designees were responsible for on-site monitoring of practices and operations taking place and for verification of continued compliance with the specifications and requirements. Details of the Follow-Up Phase Inspections were documented on QC Surveillance Reports contained in Appendix B-2a.

3.2.4 Hand-Held Instrument Tests

3.2.4.1 During the course of the Removal Action, the team was responsible for conducting daily hand-held instrument tests on the test grid before mobilizing to their daily work location. These daily checks are detailed in the team leaders' logbook in Appendix C-2.

3.2.5 Geophysical Field QC Procedures

3.2.5.1 The geophysicist used a series of QC steps in the daily process of collecting, processing and interpreting the data. An explanation of these steps is provided below.

- Synchronize computer and data logger clocks +- 1 s (time shift correction);
- Static test for minimum of 30 seconds prior to and at the end of each data acquisition session (repeatability);
- A Static response test at first and last grid of day (each test is performed for 3 minutes) (repeatability);
- Daily shake tests were performed. On the morning of August 5th, 2005 a shake test revealed a bad battery. A connector within the battery was loose and would disconnect when shaken. Following discovery of the faulty component, TtEC followed internal corrective action procedures and revisited the GPO Test Grid with a new battery inserted. Data was collected and analyzed. It was concluded by two (2) senior geophysicists that the problem had correctly been identified and the faulty battery was sent off for repair and the team resumed collecting geophysical data. A full description of the shake test can be found in the GPO WP;
- While collecting EM data, walk over chain or rebar 3 times, straight lines (side-middle-side) at start and end of every data acquisition session to correct for drift and/or shift in synchronized clocks;
- Walk diagonal across grid at end of survey OR repeat first acquisition line, whichever is more time effective (repeatability); and

- Use intelligible and repeatable file naming convention (date, team, grid, easily differentiate multiple files within same grid).

3.2.5.2 The geophysical processing QC procedures included:

- Turn Oasis log file on and save as same name as *.xyz file for each sampling grid.(data tracking);
- Use Oasis master database to keep track of processed individual *.xyz files, and window this database to generate *.xyz file for each sampling grid. Each sampling grid was placed in a separate folder with all interpreted files in this folder (i.e., run scripts from this folder). This data was made available over the network for each sampling grid. For master database, GDB header can be edited and changed for each *.xyz file to track progress of the survey, as well as to generate a master map of % complete. (data tracking); and
- All data (*.txt, * g61, *.xyz, *.dat, and excavation results when available) was delivered to the USAESCH representative on a weekly basis via CDROM. Delivery confirmation for these data was recorded in the project database.

3.2.5.3 Excavation results were reviewed by the site geophysicist for all of the grids to ensure the recovered item was representative of the original selected anomaly.

3.2.6 Internal and External Process Quality Check for Geophysical Interpretation

3.2.6.1 Quality checks of the Geophysical Interpretation Process were conducted by senior TtEC geophysicists and also separately by USAESCH. This included a review of the daily static and static response tests. These tests were performed prior to each data collection session. The results of these tests are posted on the geophysical maps in appendix D and the digital results were submitted to USAECH for their review.

3.2.6.2 TtEC recovered 5 inert MEC seed items emplaced by the USAESCH Safety Representative during the removal process. Table 3-1 shows the seeded items recovered.

Table 3-1
Seeded Items Recovered

Item	Location	Grid	X	Y
37mm projectile	CULVERT	D75	664402.40	1161202.60
60mm mortar	SA	D22	664811.54	1160434.28
2.36" rocket *	R18	R18	665063.81	1160763.82
MKII hand grenade*	R18	R18	665080.15	1160716.18
MKII hand grenade*	PPR	S02	664262.46	1161090.71
***Found utilizing Digital Geophysical Mapping (DGM)**				

3.3 PRODUCT QUALITY CONTROL –ACCEPTANCE SAMPLING

3.3.1 Product QC is concerned with conducting an Acceptance Inspection on the final product after all the change or value-added processes have been completed, and it is otherwise ready for delivery. It should be noted that extensive Process QC procedures are required to ensure that the quality of the product sampled is high enough to consistently pass the sampling. Formal Acceptance Sampling was carried out on completed grids in accordance with the sampling protocols contained within MIL STD 1916, DoD Test Method Standard, DoD Preferred Methods for Acceptance of Product (approved for use by all Departments and Agencies of the Department of Defense). Details of the MIL STD 1916 Acceptance Sampling are presented in the following sections.

3.3.2 A Sampling Plan is a procedure for selecting samples from a lot or population of material to be sampled and for using the results of that sampling to make an "accept" or a "reject" decision. On this project, the work area was broken in to grids, each containing survey lanes corresponding to the area covered by a single pass of the EM61 at 2 feet wide. Each lane is a unit of production, and a number of these make up a lot. The MIL STD has two tables that are used to define the Sampling Plan. Table 3-2 (Table 1 in the standard) guides lot size selection; Table 3-3 (Table 2 in the standard) guides the sample size selection. Selection of lot size is a tradeoff between efficient sampling in the case of lot acceptance and the amount of re-screening in case of lot rejection. For example, if a lot size of 500 lanes (10 grids) was chosen and the lot was rejected during inspection, then those 10 grids would be re-screened (Geophysically re-surveyed) after a thorough root cause analysis. If, on the other hand, the lot passed, then those 10 grids would be cleared for turnover to USAESCH QA.

Table 3-2
Code Letters (CL) for Entry into the Sampling Tables

Lot Size	Verification Levels						
	VII	VI	V	IV	III	II	I
2-170	A	A	A	A	A	A	A
171-288	A	A	A	A	A	A	B
289-544	A	A	A	A	A	B	C
545-960	A	A	A	A	B	C	D
961-1,632	A	A	A	B	C	D	E
1,633-3,072	A	A	B	C	D	E	E
3,073-5,440	A	B	C	D	E	E	E
5,441-9,216	B	C	D	E	E	E	E
9,217-17,408	C	D	E	E	E	E	E
17,409-30,720	D	E	E	E	E	E	E
30,721 and larger	E	E	E	E	E	E	E

Table 3-3
Attributes Sampling Plans

CL	Verification Level								
	T	VII	VI	V	IV	III	II	I	R
	Sample Size (n)								
A	3072	1280	512	192	80	32	12	5	3
B	4096	1536	640	256	96	40	16	6	3
C	5120	2048	768	320	128	48	20	8	3
D	6144	2560	1024	384	160	64	24	10	4
E	8192	3072	1280	512	192	80	32	12	5

Notes:
1/ When the lot size is less than or equal to the sample size, 100 percent attributes inspection is required.
2/ One verification level (VL) to the left/right of the specified normal VL is the respective tightened/reduced plan. Tightened inspection of VL-VII is T, reduced inspection of VL-I is R.

3.3.3 In accordance with the above discussion, the Sampling Plan that was selected was Verification Level (III), Code Letter (A) with switching procedures. The following sections present some basic information behind the Sampling Plan selection, implementation, and evaluation under the MIL STD. For further detail, refer to the MIL STD or other technical publications such as a Quality Engineer’s Handbook.

3.3.4 Under this plan 32 random lanes were generated for the selected lot. These in turn were geophysically surveyed. TtEC utilized an internally developed program to randomly select the lanes to be sampled. The program utilizes the surveyed coordinates for the area to be sampled and outputs the coordinates for the start and end points of the randomly selected lanes. The lanes were marked by the QC survey team using the DGPS to mark the end of the lanes. The lanes were marked with pin flags, which were left in place in case they were needed to reacquire an anomaly on that lane. In addition, spray paint was used in some areas to mark the lanes because it was not easy to see the pin flags due to the terrain. The QC geophysical survey team collected the data using the EM-61 in conjunction with the DGPS and RTS positioning systems. The data was interpreted by a qualified geophysicist and returned to project database manager. If anomalies were selected as "dig" anomalies by the geophysicist, then the item was reacquired and dug as part of the QC process.

3.4 GEOPHYSICAL QC

3.4.1 To conduct the Acceptance Inspection, the selected proportion of lanes within each lot was geophysically re-surveyed to acquire new geophysical data. The anomaly locations identified from the new data are reacquired and excavated using the same equipment and procedures as the initial work. The results from each lot are compared with the following criterion:

- Accept Criterion: That no ferrous items are found within the project defined size-depth parameters in each lot or grid.
- Reject Criterion: That one or more ferrous items are found within the project defined size-depth parameters in each lot or grid.

In the case of acceptance, the lot is turned over to USAESCH for government QA; in case of rejection, the lot is returned to the SUXOS from the UXOQC with the reason for rejection. A thorough root cause analysis would be conducted to identify the reason for failure and corrective action taken.

3.5 RESULTS OF QUALITY CONTROL

3.5.1 There were no QC failures during the performance of this task order.

3.6 USAESCH QUALITY ASSURANCE

3.6.1 The on-site USAESCH Safety Representative performed QA of each grid. This consisted of surveying a portion of (i.e., approximately 10%) each grid with a hand held geophysical instrument. These hand held instruments received an equipment functional test prior to use each day. The standard USAESCH Quality Assurance Check is 10 percent of each grid or 10 percent check of the overall project.

3.6.2 In addition to the on site Safety Specialist QA checks the USAESCH blind seeded inert MEC items throughout the area.

3.6.3 Completed and signed USAESCH Form 948's certifying QA acceptance of each grid is provided in Appendix B-3. The USAESCH QA report is also provided in Appendix B-3.

4.0 DOCUMENTATION

4.1 MAPS

4.1.1 There is one site map provided, Figure 4-1.

4.2 REACQUISITION SHEETS (DIG SHEETS)

4.2.1 Anomalies selected for reacquisition are listed in the intrusive investigation results which are tabulated in Appendix C-1.

4.3 GRID MAPS

4.3.1 To facilitate the reacquisition process, color-coded anomaly maps were prepared for each grid. These maps were prepared using Oasis Montaj software and provide locations for each anomaly. The maps are included in Appendix D-3.

4.4 SITE QC DOCUMENTATION

4.4.1 Site QC documentation is included in Appendix B-2.

4.5 SITE SAFETY DOCUMENTATION

4.5.1 Site safety records are included in Appendix B-4.

4.6 DAILY SITE ACTIVITY REPORTS

4.6.1 Daily activities reports are included in Appendix B-1.

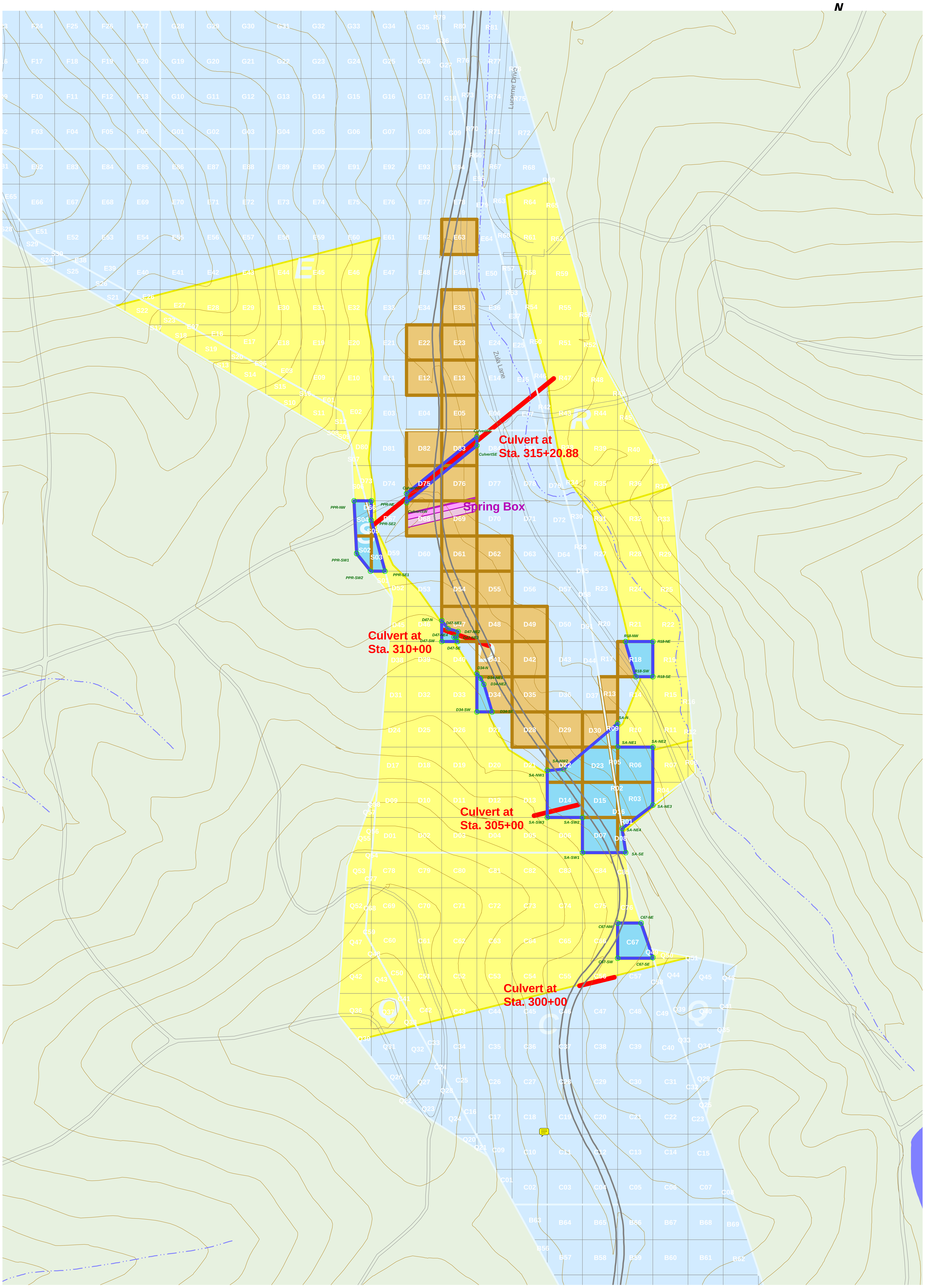
4.7 PHOTOGRAPHS

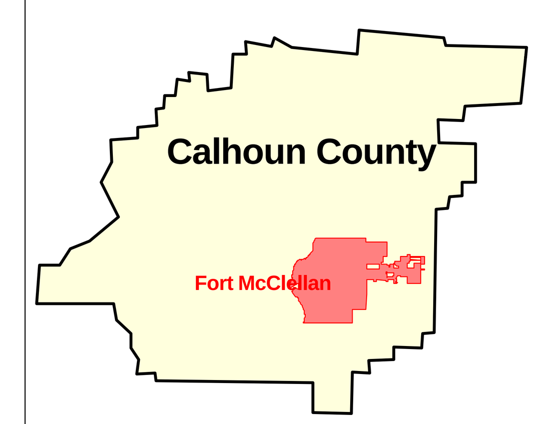
4.7.1 All the site photographs are included on the attached CD.

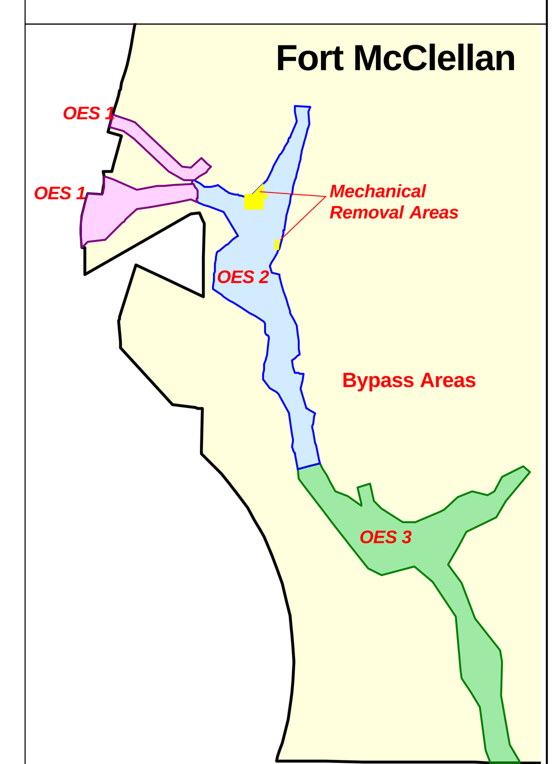
4.8 FINANCIAL BREAKDOWN

4.8.1 No financial records are provided. This task was Firm Fixed Price.

Figure 4-1 Construction Debris and Culvert Information







LEGEND

- Clearance Survey Points
- Culverts
- Bypass Grids
- Spring Box
- 15ft. Clearance at Station 314+00
- 40ft. Clearance at Station 314+00
- Clearance Areas
- 4ft. of Fill Grids
- Construction Debris Grids
- Bypass R.O.W. Area

- Buildings
- Roads
- Lakes
- Streams
- 25' Contours
- Fort McClellan

0 50 100 150 200 250 300 350 400 450 500 ft

Scale: 1" = 100'

Contour interval 25 Ft

Eastern Bypass

Figure 4-1
Construction Debris and Culvert Information

May 2006

5.0 SUMMARY

5.0.1 A MEC removal action was performed on a portion of the Construction Debris Removal Area within the EBP ROW at Fort McClellan. This particular area was not cleared during the previous EBP removal actions because it contained large amounts of construction debris that were used as fill during construction in the 1950's of Iron Mountain Road. The removal action was performed prior to the construction of the EBP by the ALDOT. The fieldwork began June 2005 and was completed in August 2005. The work was performed by TtEC and approved subcontractors in accordance with approved work plans. The action completed the removal action alternative of *Clearance to Depth* as required by the SOW for those areas that will not receive at least 4 feet of fill during follow on construction of the EBP.

5.0.2 The work was performed in sequential steps of preparing the site by surveying the site boundaries, removing construction debris, geophysical mapping except for some steep and rocky slopes where mag and dig was used, anomaly reacquisition, and intrusive investigation. No UXO or other MEC items were discovered during the intrusive investigation. There were 14 (5 of which were USAESCH seed items) munitions debris items found. There was 187 pounds of non munitions debris (cultural scrap) found. Additionally, approximately 43,000 cubic yards of fill were removed to conduct this removal activity.

5.0.3 The area within a portion of the Construction Debris Area cleared under this task order has been cleared to depth. It is impossible to guarantee complete and total removal of all MEC items. Therefore, some limited residual risk may still remain within the boundaries of this area. Clearance was not performed in the remainder of the construction debris area where ALDOT determined there would be four feet or more of fill deposited over the existing construction debris during construction of the Eastern Bypass. This area will be noted in the deed and the Army will provide construction support and removal to detection depth, as appropriate.

6.0 REFERENCES

Tetra Tech EC, Inc. 2004, Final Site Specific Removal Report, Eastern Bypass, Ft. McClellan, Alabama

Appendices Table of Contents

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