Final
Conventional Explosives Safety Submission
Ordnance and Explosives (OE) Removal Action
for the
Water Tank Construction Sites
in the Bravo Area
of
Fort McClellan, Alabama

Task Order 0022

Contract Number DACA87-99-D-0010

U.S. Army Corps of Engineers

Engineering and Support Center

Huntsville, Alabama

Geographical Corps District:

US Army Corps of Engineers, Mobile District

Prepared by:

Foster Wheeler Environmental Corporation

Fort McClellan, Alabama

November 2003

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TABLE OF CONTENTS

1.0 INTRODUCTION 1
2.0 REASON FOR ORDNANCE AND EXPLOSIVES 1
3.0 AMOUNT AND TYPE OF OE 2
3.1 ENGINEERING EVALUATION/COST ANALYSIS (EE/CA) REPORTS 2
3.2 MOST PROBABLE MUNITION 3
4.0 START DATE 3
5.0 FROSTLINE 3
6.0 CLEARANCE TECHNIQUES 4
6.1 DETECTION METHODS 4
6.2 RECOVERY AND DISPOSAL 4
6.3 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) PLAN 5
6.4 OE SCRAP EXPLOSIVE HAZARDS 6
7.0 ALTERNATE TECHNIQUES 6
8.0 OFFSITE DESTRUCTION 6
9.0 TECHNICAL SUPPORT 6
10.0 LAND USE RESTRICTIONS 6
10.1 INTENDED LAND USE 6
11.0 PUBLIC INVOLVMENT 6
12.0 MAPS 7
12.1 REGIONAL MAP 7
12.2 SITE MAP 7
12.3 Q-D MAP 7
12.4 Q-D MAP FOR EXPLOSIVE MAGAZINE 7
13.0 QUANTITY-DISTANCE 12
13.1 OE AREAS 12
13.2 MAGAZINES 12

LIST OF TABLES

Table 3-1 Types of OE/UXO Found During the Bravo EE/CA in the Water Tower Area 2
Table 3-2 MPM and MSD 3

LIST OF FIGURES

Figure 12-1 Water Tank Construction Sites Removal Overview 8
Figure 12-2 Water Tank Construction Sites Removal Area 9
Figure 12-3 Water Tank Construction Sites Q-D Arcs Overview 10
Figure 12-4 Q-D Arcs of Magazine Storage Area 11

APPENDIX

Appendix A Calculation Sheet for MPM

LIST OF ACRONYMS

BRAC	Base Realignment and Closure
CWM	Chemical Warfare Materiel
DDESB	Department of Defense Explosives Safety Board
DOD / DoD	Department Of Defense
EE/CA	Engineering Evaluation/Cost Analysis
ESS	Explosives Safety Submission
EZ	Exclusion Zone
ft	Foot / Feet
FWENC	Foster Wheeler Environmental Corporation
IAW	In Accordance With
Lb	pound
MOFB	Mini Open Front Barricade
mm	Millimeter
MPH	Miles Per Hour
MPM	Most Probable Munition
MSD	Minimum Separation Distance
NEW	Net Explosive Weight
OE	Ordnance and Explosives
OFB	Open Front Barricade
QA	Quality Assurance
QC	Quality Control
Q-D	Quantity-Distance
RLS	Registered Land Surveyor
SSWP	Site Specific Work Plan
SUXOS	Senior UXO Supervisor
U.S.	United States
USACE	U.S. Army Corps of Engineers
USAESCH	U.S. Army Engineering Support Center, Huntsville
UXO	Unexploded Ordnance
UXOQCS	UXO Quality Control Specialist
UXOSO	UXO Safety Officer

1.0 INTRODUCTION

1.1 This Explosives Safety Submission (ESS) has been prepared for the OE Ordnance and Explosives) Removal on the Water Tank Construction Areas located at Fort McClellan, Alabama. This ESS is prepared in accordance with the DDESB Memorandum, Subject: Guidance for Clearance Plans dated 27 Jan 98. The purpose of the removal action is to perform a clearance to depth within the area defined as the Water Tank Construction Areas. This ESS covers the Water Tank Construction Areas only. See Figure 12-1, Water Board Construction Sites Removal Overview, for a general layout of the Bravo Area of Fort McClellan and Figure 12-2, Water Tank Construction Areas Removal, for specific details of the area covered in this document. This OE removal is being accomplished in advance of the final Engineering Evaluation/Cost Analysis (EE/CA) and Action Memorandum for the Bravo Area in order to support the Anniston Water Works and Sewer Board's request to use this property for locating future water tanks. Completion of the OE removal over these limited areas can expedite the Anniston Water Works and Sewer Board's efforts in locating water tanks on these sites prior to final OE removal actions being completed over the remainder of the Bravo Area. This ESS is being prepared under the Rewrite Department of Defense (DoD) 6055.9-STD Revision 3, 1 September 2003.

1.2 The clearance as described in this ESS does not include right of way easements or pipelines from the proposed tank areas to the area in need of future water. Any easements or pipelines that are needed will be put in existing areas which have been previously cleared or will have a clearance performed under a separate task order. The storage magazine for explosives is located within the boundary of Site C. This particular site will not be transferred until all Corps related removals are completed.

1.3 Sites A and C have within them small areas which will not be cleared as part of this task order. Site A contains an existing water tank that will not be removed. The clearance will be done around the tank, but not under the tank, as the tank currently sits on the ground. Site C contains the magazine used for the storage of explosives for use at Fort McClellan. This area was cleared during the explosive siting process that took place in 2001.

1.4 This project is Task Order 0022, under contract DACA87-99-D-0010, Ordnance and Explosives Response at Fort McClellan, Alabama. Under the task order, a Site Specific Work Plan (SSWP) and this ESS are being prepared for this work.

2.0 REASON FOR ORDNANCE AND EXPLOSIVES

2.1 Fort McClellan has been used for artillery training of troops and the National Guard 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 Chemical Biological-Radiological Agency was moved to Edgewood Arsenal. In 1979, the U.S. Army Chemical Corps School re-established along with a Training Brigade for Basic Training and One Station Unit Training (OSUT). In September of 1999 Fort McClellan was closed under the Base Realignment and Closure (BRAC) Act.

2.2. The Water Tank Construction Areas are three separate sites located within three separate risk sectors within the Bravo Area of Fort McClellan. These three sectors are the M3-1H Mixed Use Area, M3-1H Hand Grenade Area and M4-1H Mixed Use Area and the three sites have been designated Water Tank Sites A, B, and C. Site A lies within the M3-1H Mixed Use Area and M3-1H Hand Grenade Area, while Site B and C lie within the M4-1H Mixed Use Area. Within the Bravo Area boundaries there are documented training areas based on previous investigations and studies conducted at Fort McClellan. The OE located was described as high explosive, practice, training, and expended. See Table 3-1 for a listing of the types of OE and OE Scrap that were discovered around the Water Tank Construction Areas (information gathered from the Draft-Final Bravo Area EE/CA investigation report).

3.0 AMOUNT AND TYPE OF OE

3.1 ENGINEERING EVALUATION/COST ANALYSIS (EE/CA) REPORTS

3.1.1 The Bravo Area EE/CA report currently being prepared by Foster Wheeler Environmental Corporation (FWENC) indicates the presence of OE and Unexploded Ordnance (UXO) around the Water Tank Construction Areas. The properties within the Bravo Area encompass known impact areas. Table 3-1 is a general listing of the types of OE/UXO and OE Scrap previously located in areas adjacent to the Water Tank Construction Areas during the EE/CA. A complete listing of items discovered is available in the Draft-Final EE/CA Report for the Bravo Area.

3.1.2 Clearance to depth is the recommended risk reduction alternative for these specific areas, based on the findings presented in the EE/CA report and the intended use. Table 3-1 below supports a clearance to depth without the need for follow-on UXO construction support. All OE/UXO found was above the maximum detection depths as shown in Table 3-1. At this time the Bravo Area EE/CA report has not been finalized and Action Memorandums have not been signed. These specific areas were selected for a removal action based on the Anniston Water Works and Sewer Board's request to use these properties for the placement of water tanks. Figure 12-1 illustrates the three sites that have been recommended for clearance actions in support of the Anniston Water Works and Sewer Board's request.

Table 3-1

Types of OE/UXO Found During the Bravo EE/CA in the Water Tower Area

Item Description All items listed were found in all sectors.	**Max Depth Discovered (in Inches)**	**Max Detection Depth (in Inches)**
OE/UXO Items		
MORTAR, 81mm HE, M43	21	35
PROJECTILE, 75mm SHRAPNEL	20	32.5
MORTAR, 3in STOKES, MKI, PRACTICE	18	33
PROJECTILE, 37mm HE	0	16
ROCKET, HEAT, 2.36in, M6	13	26
GRENADE, RIFLE, SMOKE	0	24
GRENADE, HAND, PRACTICE, M69, w/LIVE FUZE	6	20

3.2 MOST PROBABLE MUNITION

3.2.1 The most probable munition (MPM) will be established by risk area as explained in the Bravo EE/CA report. The two areas are the M3-1H Mixed Use Area and the M4-1H Mixed Use Area. Within this ESS, only the Water Tank Construction Areas recommended for a clearance alternative will be cleared, not the entire risk area. There are three separate areas within this removal, and two different minimum separation distances (MSD). The MSD will also be used as the daily Exclusion Zone (EZ) for removal activities. The calculation sheets for the established MPMs are included as Appendix A. Calculation sheets for all expected items have been prepared and are available on site. The two risk areas and their prospective MPM and MSD are:

Table 3-2: MPM & MSD

Sector	MPM	MSD
Site A, B & C	MORTAR, 81mm HE, M43	1395 feet

Each team working within the boundary will maintain the standard U.S. Army Corps of Engineers (USACE) 200-foot distance between teams. The Water Tank Construction Areas fall within the Bravo Area, which is semi-permanently barricaded and gated. At Site C, the MSD for this area extends into the Alpha and Charlie Areas, which are also semi-permanently barricaded and gated. If it is determined that a road is not blocked by an existing gate or barrier, a barrier will be placed as needed by the intrusive team prior to beginning work for the day. This will preclude excessive time spent setting up the EZ each day. If during the course of the investigation OE with a greater fragment range is discovered, the Q-D (Quantity-Distance) arc will be adjusted and an amendment to the ESS submitted for approval. While awaiting approval, the distances from Rewrite Department of Defense (DoD) 6055.9-STD Revision 3, 1 September 2003, Table C9.T1. HD 1.1 IBD and PTRD or C9.T2. HD 1.1 HFD will be used for the item in question. See Figure 12-3, Water Tank Construction Areas Q-D Arcs Overview, for further details of the exclusion zones.

3.2.2 If an inhabited building is located within an exclusion zone, the procedures in Section 6.2 will be followed.

4.0 START DATE

4.1 Site preparation activities including surveying and vegetation removal will commence after approval of the SSWP, which is estimated to be in January 2004. The OE Removal portion will not begin prior to approval of this document.

5.0 FROSTLINE

5.1 Fort McClellan has a six-inch frost depth. The expected detection depth is below the six-inch frost line.

6.0 CLEARANCE TECHNIQUES

6.1 DETECTION METHODS

6.1.1 All three sites within the Water Tank Construction Areas will be cleared of OE using a mix of two methods. One method involves digital geophysical mapping of the area, while the other method uses hand held instruments to mag and dig the areas which could not be geophysically mapped. The primary method involves using a single EM-61 instrument carried by a person. This method collects geophysical data, which then has to be interpreted and verified by a qualified geophysicist. The second method using a hand held instrument to mag and dig an area will only be used in those areas that are not conducive to geophysical mapping due to terrain or other features. The smallest item we are required to detect is a 37mm projectile to a depth of 11 times the diameter of the item, or to a depth of 407 mm (approximately 16 inches). The EM-61 has been shown to reliably detect items this size to this depth on current and past projects at Fort McClellan and will be tested during the geophysical prove-out, which is scheduled to be completed prior to collecting geophysical data in these areas.

6.1.2 Prior to the geophysical mapping, a Registered Land Surveyor (RLS) will survey in grids based on pre-existing boundary markers. These grid corners will be marked with wooden corner stakes and steel nails. The survey team will be escorted by a UXO qualified person conducting anomaly avoidance procedures.

6.1.3 A surface clearance will be accomplished prior to brush cutting. Brush cutting will be done with a mix of mechanical equipment and manual brush clearing. Geophysical mapping will be completed after the brush clearance task is complete.

6.2 RECOVERY AND DISPOSAL

6.2.1 For intrusive operations the MSD listed in Section 3 of the ESS will be used. Since the entire Alpha, Bravo, and Charlie Areas are securely gated, there should be only occasional instances where the MSD for the intrusive operations will have an exclusion zone (EZ) that extends outside the secured area. This could occur at site A of the Water Board Sites. If for any reason the EZ should extend into an area that is not secured or is inhabited, FWENC will request approval from USACE Huntsville OE Safety to use the Range to No More Than 1 Hazardous Fragment per 600 square feet (1/600) distance to reduce the EZ to this lessened, but approved distance. This approval will be based on intrusive information gathered up to that point. This decision will be based on there being a sufficient distance between the beginning of the EZ (the point at which it will extend off post) and the last piece of OE/UXO discovered. If for any reason the 1/600 rule is requested and not granted a Miniature Open Front Barricade (MOFB) or Open Front Barricade (OFB), as appropriate, will be used for all excavations made as part of intrusive operations where the Quantity-Distance (Q-D) Arc extends beyond secure areas. For buildings on Fort McClellan, which are still within the 1/600 distance or the EZ for the selected engineering control, we will schedule our intrusive operations to occur on days when the facility is not occupied. This scheduling will occur with assistance from both USAESCH and the Fort McClellan Transition Force. Appendix A of the ESS shows reduced distances, which vary depending on the Most Probable Munition (MPM) and the engineering control.

6.2.2 Because of the distance between the three sites and the travel time required, all OE items are scheduled to be disposed of once per week. All items will be sandbagged and left in place until demolition is carried out. The area is secured by locked gates, is not accessible to the public and is patrolled by security. As a result, there will be no requirement for guards or other protective measures. On scheduled days demolition operations will begin when all personnel are out of the MSD of the ordnance being detonated. If personnel are located within the MSD and cannot be evacuated or moved, a determination will be made to move the OE to a safer location or to use approved engineering controls (i.e. sandbags) to reduce the MSD. An MSD sheet has been prepared by USACE for all OE/UXO discovered on Fort McClellan to date. If an item is discovered that 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 blown in place (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 Senior UXO Supervisor (SUXOS). Along with the demolition team members, only the UXO Safety Officer (UXOSO) is required to be on-site during disposal operations, the SUXOS will be in the local area, but is not required to be present at the exact location of the demolition operation.

6.2.3 The operation will be performed under the direction and supervision of the Demolition Team Leader, who is charged with the responsibility to ensure that procedures contained in the work plan and referenced documents are followed. The UXOSO will monitor compliance with the safety measures contained in the work plan and associated documents, and in the event of noncompliance, is vested with the authority to stop or suspend demolition operations.

6.2.4 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.

6.3 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) PLAN

6.3.1 QC is conducted using a three-phase control process; preparatory, initial, and follow-up inspection/audits to ensure processes are in control and opportunities for improving processes are captured and implemented. The UXO Quality Control Specialist (UXOQCS) has stop-work authority and is organizationally independent from the processes.

6.3.2 A QC inspection will be conducted by a FWENC approved UXOQCS. The method of conducting the inspection will be to sample 10 percent of the areas completed. This sampling will be performed using the same type of equipment as the field teams used to do the initial work. The specific QC procedures will be explained in the SSWP.

6.3.3 The failure criteria for Contractor QC and Government QA processing of land parcels that have completed sub-surface clearance are: “No ferrous objects with a “width” (diameter) between a 37mm projectile and a 3.8 in projectile, at a depth of less than 11 diameters of the object.” All grids that fail the grid QA criteria will be evaluated and addressed in accordance with the contracting officer’s determination. All QA failures will be documented with the corrective action taken reported in the Site-Specific Removal Report.

6.4 OE SCRAP EXPLOSIVE HAZARDS

6.4.1 OE Intrusive Teams will locate, excavate, identify, and mark ordnance related materials where they are located. Clearly identifiable Non OE scrap will be segregated from OE scrap and each type will be consolidated for transport to the scrap metal processing area. The leader of the OE Intrusive Team will inspect the items and declare each item free of energetic material to the best of his/her ability. These items will be transported to the Fort McClellan Scrap Processing Area. FWENC is the operator of this Scrap Metal Processing Area. If an ordnance item cannot be determined to be free of explosive, it will be explosively vented. If the item is not positively identified and may be a chemical munition, no venting will be conducted, and instructions in Section 9.0 Technical Support will be followed for suspect recovered Chemical Warfare Materiel (CWM).

6.4.2 In the Scrap Processing Area, the designated UXO Technician will remove the items from the containers transported from the grids. He/she will re-inspect each item to assure that they are free of energetic material to the best of his/her ability. This scrap will be demilitarized and processed for turnover to a scrap processing facility under a separate Task Order.

7.0 ALTERNATE TECHNIQUES

7.1 There are no alternate techniques planned for destruction of OE onsite.

8.0 OFFSITE DESTRUCTION

8.1 Offsite disposal will not be used to destroy OE recovered on site.

9.0 TECHNICAL SUPPORT

9.1 FWENC and its sub-contractors will provide the technical support required during the removal action. If recovered OE is identified or suspected of containing CWM, all intrusive activities will cease and the site will be evacuated in an upwind direction and secured. The USAESCH Safety Representative and Fort McClellan Transition Force Operations will be notified and disposition instructions requested.

10.0 LAND USE RESTRICTIONS

10.1 INTENDED LAND USE

10.1.1 As discussed in section 1.0, these sites are expected to be turned over to the Anniston Water Works and Sewer Board for construction of water tanks.

11.0 PUBLIC INVOLVMENT

11.1 There are some inhabited buildings along the northern boundary of Site A. If OE that requires demolition is encountered, then the MSD for intentional detonations will be used unless reduced by approved engineering controls. The buildings will be evacuated, if necessary, during the disposal or venting operation. As necessary, guards may be stationed at the perimeter to ensure that the exclusion zones are maintained. If the area cannot be evacuated and control maintained,

approved engineering controls (i.e. sandbags) will be employed to further protect personnel and structures.

12.0 MAPS

12.1 REGIONAL MAP

12.1.1 Figure 12-1, Water Board Construction Sites Removal Overview, shows the regional location of the Water Tank Construction Areas within the Fort McClellan, Anniston, Alabama area.

12.2 SITE MAP

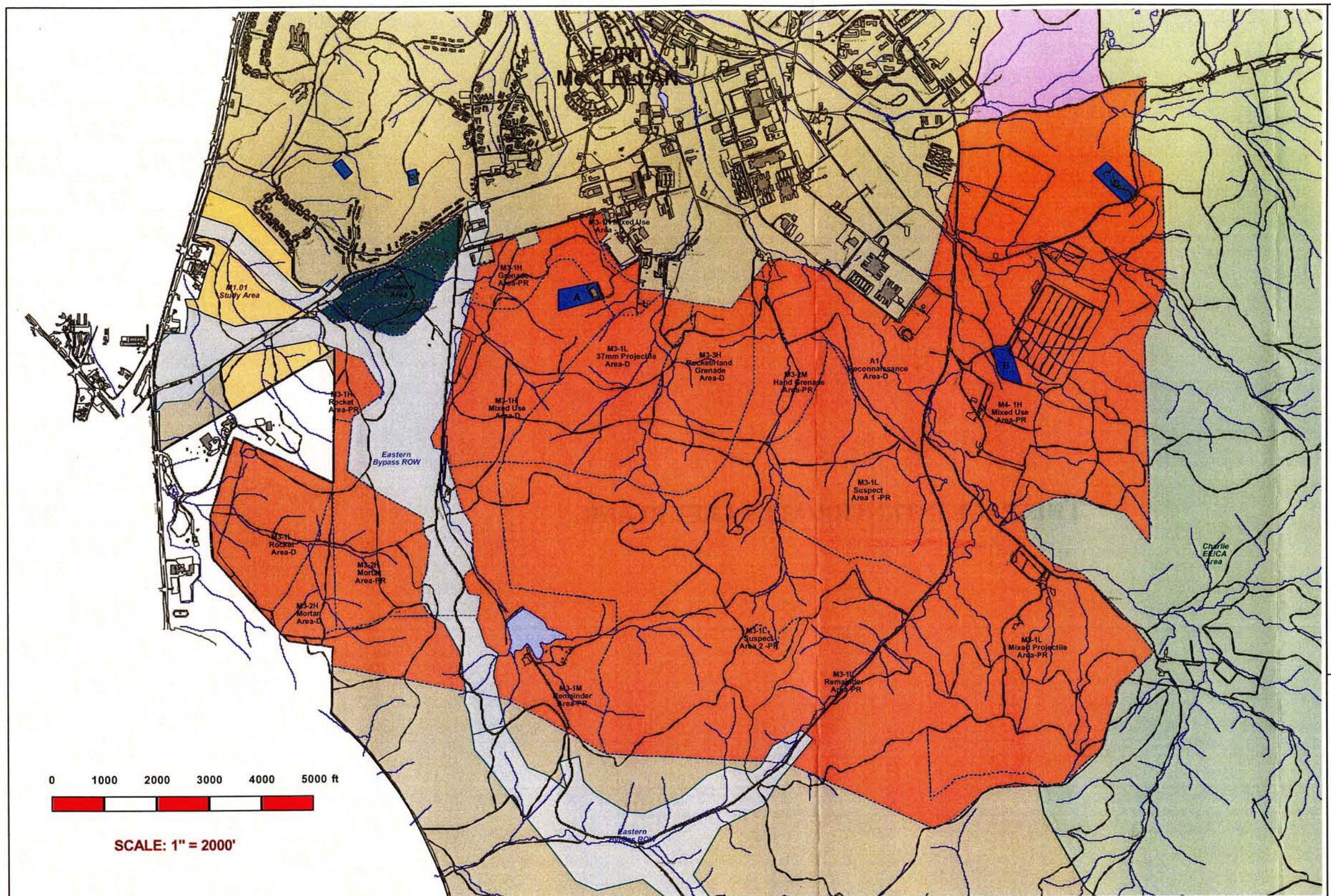
12.2.1 Figure 12-2, Water Tank Construction Sites Removal Area, shows the detailed location of the Water Tank Construction Areas to be cleared.

12.3 Q-D MAP

12.3.1 Figure 12-3 is the Water Tank Construction Areas Q-D Arcs Overview. Each OE Area covered under this submission, as well as the magazines for storage of demolition material, and the scrap holding area are annotated on this map. The Water Tank Construction Areas exclusion zone is marked and the inhabited buildings within the exclusion zone are shown on Figure 12-3.

12.4 Q-D Map for Explosive Magazine

12.4.1 Figure 12-4 shows the Q-D arc for the magazine used to store explosives on Fort McClellan.



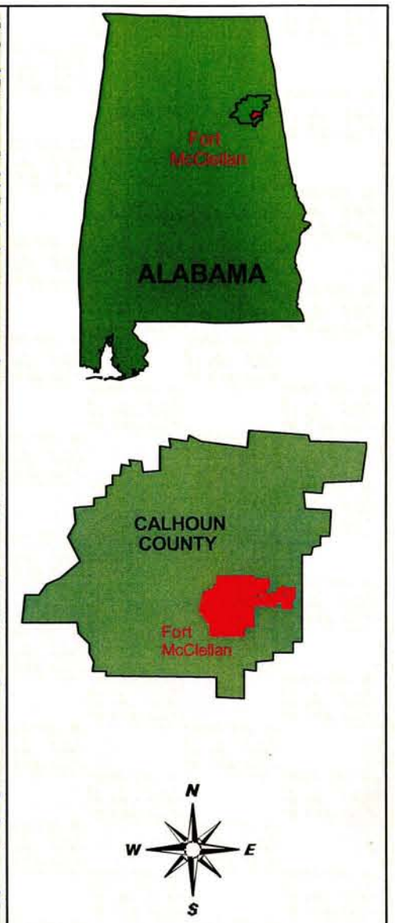


Figure 12- 1

Water Tank Construction Sites Removal Overview

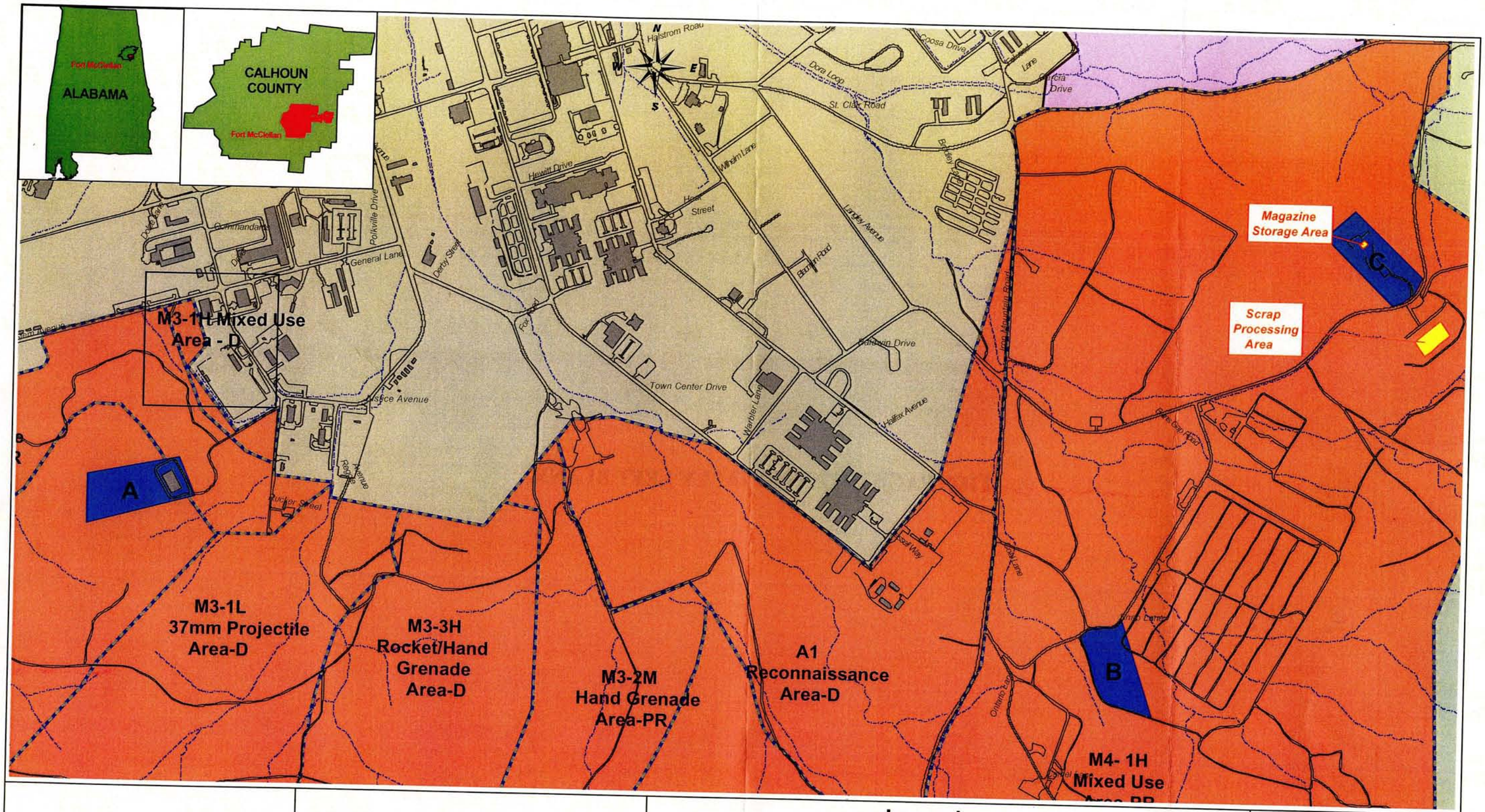
Fort McClellan
Calhoun County
Alabama

November 2003

FOSTER WHEELER ENVIRONMENTAL CORPORATION

Legend

- Water Tank Sites
- "Y" Removal Area
- M1.01 Study Area
- Bypass ROW
- Bravo EE/CA Area and Sectors
- Alpha EE/CA Area
- Charlie EE/CA Area
- Fort McClellan
- Roads
- Buildings
- Streams
- Lakes



FOSTER WHEELER ENVIRONMENTAL CORPORATION

FM:WWM

0 400 800 1200 1600 2000 ft

SCALE: 1" = 800'

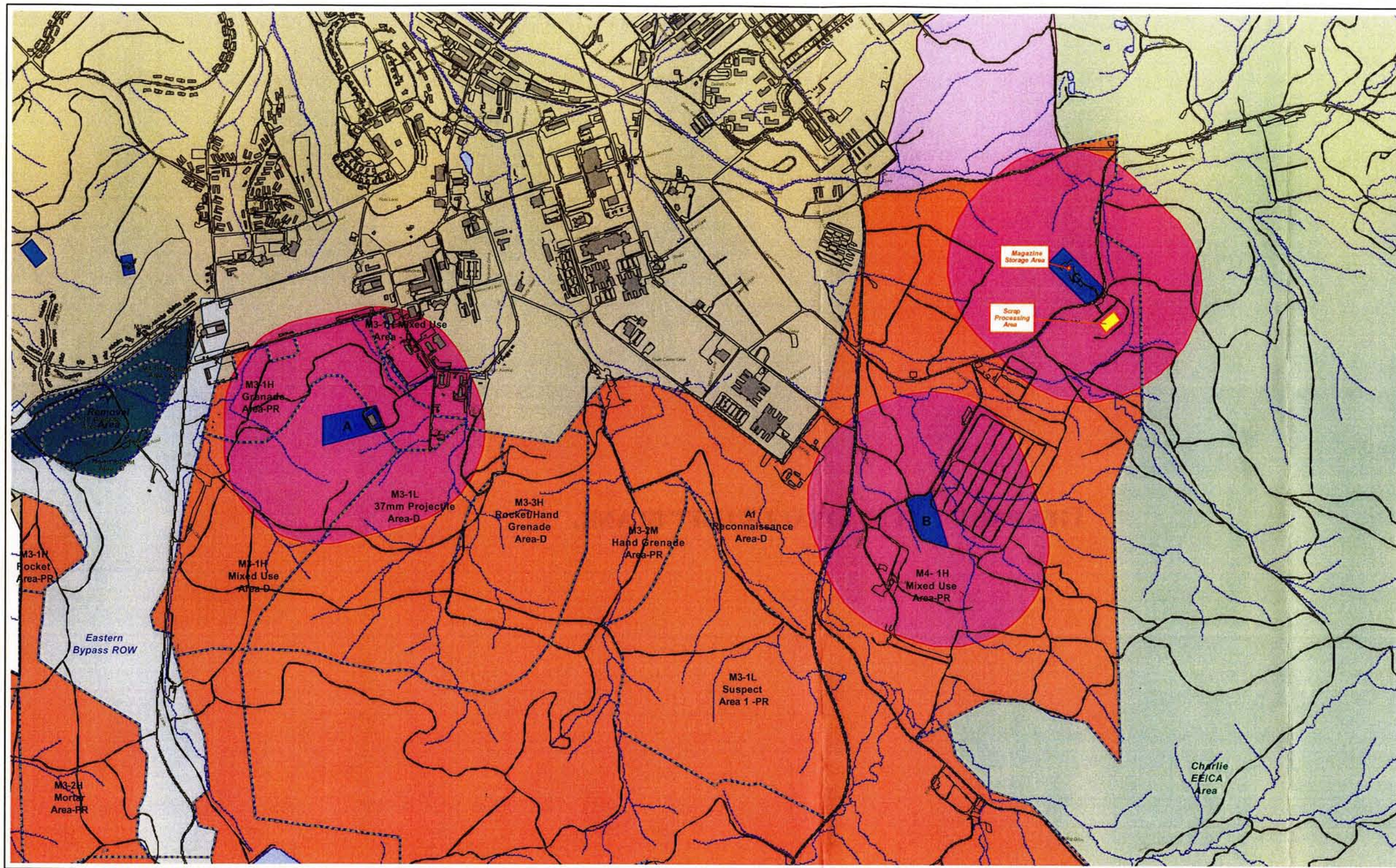
Legend

- Bravo Area Water Tank Sites
- Magazine/Scrap Processing Areas
- "Y" Removal Area
- Bypass ROW
- Bravo EE/CA Area and Sectors
- Alpha EE/CA Area
- Charlie EE/CA Area
- Fort McClellan
- Roads
- Buildings
- Streams
- Lakes/Ponds

Figure 12-2

Water Tank Construction Sites Removal Area

Fort McClellan, Calhoun County
Anniston, Alabama
November 2003



FOSTER WHEELER ENVIRONMENTAL CORPORATION

FM: WWM

0 750 1500 2250 3000 3750 ft

SCALE: 1" = 1500'

LEGEND

- EZ (1395') for MPM 81mm Mortar
- Magazine Storage / Scrap Processing Areas
- Bravo Area Watertank Sites
- Bravo EE/CA Area and Sectors
- "Y"Removal Area
- Bypass ROW
- Alpha EE/CA Area
- Charlie EE/CA Area
- Fort McClellan
- Roads
- Buildings
- Streams
- Lakes

Figure 12-3

Water Tank Construction Sites Q-D Arcs Overview

Fort McClellan Calhoun County Alabama

November 2003

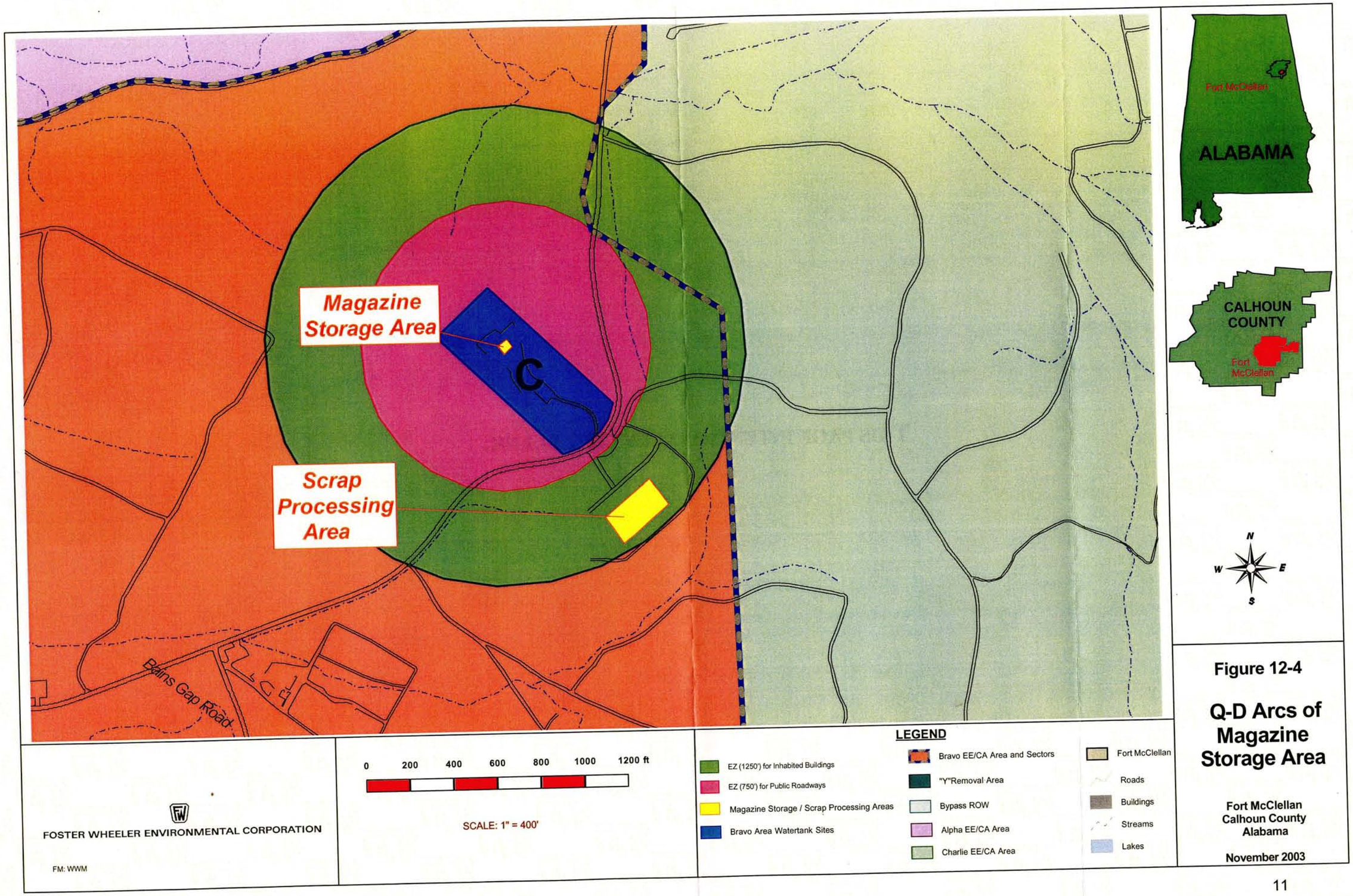


Figure 12-4

Q-D Arcs of Magazine Storage Area

Fort McClellan
Calhoun County
Alabama

November 2003

13.0 QUANTITY-DISTANCE

13.1 OE AREAS

13.1.1 Through the use of barricades and locked gates, the Water Tank Construction Areas will be securely contained. The barricade and gate locations are used in conjunction with those barricades found in the adjoining Alpha, Bravo and Charlie areas to secure the area. The keys for these gates will be under the control of FWENC during working hours.

13.2 MAGAZINES

13.2.1 All demolition materiel will be stored in FWENC's approved magazine located on Fort McClellan. The two magazines have been approved for use by Memorandum, Department of Defense Explosives Safety Board (DDESB), DDESB-KO, 31 October 2001, Subject: Site Plan and Final Safety Submission for Storage Facility for Ordnance and Explosives Disposal Support, Fort McClellan, AL. Magazine 1 has a 280-lb Net Explosive Weight (NEW) HD 1.1 limit; magazine 2 has a 20-lb limit. An Inhabited Building Distance IBD arc of 1085 feet applies.

13.2.2 Explosives will be transported in closed vehicles whenever possible. The load shall be well braced and, except when in closed vehicles, covered with a fire-resistant tarpaulin or in an appropriate shipping container.

13.2.3 Transportation of OE and donor explosives will comply with all federal, state, and local regulations. For transportation of OE and explosives to disposal sites, FWENC and its sub-contractor will comply with regulatory requirements and the following:

1. Initiating explosives, such as blasting caps, will remain separated at all times. Blasting caps may be transported in the same vehicle as long as they are in a separate container (C770 Day Box) and secured away from other items;

2. Compatibility requirements including Category Z storage authorization requirements will be observed;

3. Only UXO Technician II and above may be issued and transport explosive materials. The receiving party shall sign the receipt documents for accountability;

4. Operators transporting explosives will have a valid driver's license;

5. Drivers will comply with posted speed limits but will not exceed a safe and reasonable speed for the prevailing conditions. Vehicles transporting explosives off-road will not exceed 25 miles per hour;

6. Personnel will not ride in the cargo compartment with explosives or OE;

7. Vehicles transporting donor explosives or OE will be inspected daily, and will be properly placarded;

8. Vehicle engine will not be running when loading/unloading explosives;

9. Beds of vehicles will have either a wooden bed liner, dunnage, or sand bags to protect the explosives from contact with the metal bed and fittings; and

10. Vehicles transporting explosives will have a first aid kit, two 10 lb., Class B/C rated fire extinguishers, and communications capability.

13.2.4 OE will be disposed of or vented in place where it is encountered unless movement is authorized by the SUXOS.

Appendix A

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Minimum Separation Distances
Ft. McClellan
81mm M43
22 May 2003

REQUESTED BY: Dan Copeland
PREPARED BY: Michelle Crull, PhD, PE

This form shows calculated distances only. It does not constitute approval. Concurrence of CEHNC-OE-S is required to determine the applicable distance for a specific site.

In accordance with (IAW) EM 1110-1-4009, the minimum separation distance for unintentional detonations shall be the largest of the maximum fragment range, the K50 ($50W^{1/3}$ where W is the total net explosive weight for the detonation) overpressure distance or 200 ft. In accordance with (IAW) EM 1110-1-4009, use of the range to no more than 1 hazardous fragment/600 sq ft as the minimum separation distance for unintentional detonations requires written justification, a risk analysis, calculation of this distance by CEHNC-ED-CS-S, and concurrence of CEHNC-OE-S.

IAW EM 1110-1-4009, the minimum separation distance for intentional detonations shall be the largest of the maximum fragment range, the K328 ($328W^{1/3}$ where W is the total net explosive weight for the detonation) overpressure distance or 200 ft.

CALCULATED FRAGMENT DISTANCES

Maximum Fragment Range = 1395 ft
Range to No More Than 1 Hazardous Fragment/600 sq ft = 230 ft

CALCULATED OVERPRESSURE DISTANCES BASED ON OE ITEM'S EXPLOSIVE WEIGHT ONLY (i.e. NO DONOR CHARGE)

Range to 0.9 psi Overpressure (K50) = 61 ft
K328 Overpressure Range = 403 ft (based on munition NEW only, no donor)

The primary fragmentation characteristics used in the calculation of the values listed above were computed IAW CEHNC-ED-CS-S-98-1. The maximum fragment range was calculated using the maximum weight fragment and the initial velocity from these characteristics in the computer software TRAJ. The range to no more than 1 hazardous fragment/600 sq ft was calculated IAW CEHNC-ED-CS-S-98-2.

NOTE THAT ALL MITIGATION METHODS FOR INTENTIONAL DETONATIONS ARE BASED ON THE USE OF COMMERCIAL SHAPED CHARGES FOR INITIATION. IF ANY OTHER DONOR CHARGE IS TO BE USED THIS INFORMATION MUST BE PROVIDED TO CEHNC WITH A REQUEST FOR NEW CALCULATIONS!

Minimum Separation Distances
Ft. McClellan
81mm M43
22 May 2003

SANDBAG ENCLOSURE FOR INTENTIONAL DETONATIONS

Required Sandbag Thickness = 24 in. with 6" standoff between munition and sandbags
Sandbag Throw Distance = 125 ft
Minimum Separation Distance = 200 ft

The required sandbag thickness and the sandbag throw distance were calculated IAW CEHNC-ED-CS-S-98-7. A copy of HNC-ED-CS-S-98-7, "Use of Sandbags for Mitigation of Fragmentation and Blast Effects Due to Intentional Detonation of Munitions" must be available on site.

WATER MITIGATION FOR INTENTIONAL DETONATIONS

Water Containment System (see HNC-ED-CS-S-00-3)	Minimum Separation Distance (ft)
1100 gallon tank	200

The water containment system and the minimum separation distance were determined IAW HNC-ED-CS-S-00-3. A copy of HNC-ED-CS-S-00-3, "Use of Water for Mitigation of Fragmentation and Blast Effects Due to Intentional Detonation of Munitions" must be available on site

MINIMUM SEPARATION DISTANCES WHILE USING MOFB DURING INTRUSIVE ACTIVITIES

Design of the Miniature Open Front Barricade (MOFB) is in accordance with HNC-ED-CS-S-98-8, "Miniature Open Front Barricade". A copy of this report must be available on site. DDESB has placed certain restrictions on the approved usage of the MOFB. These are listed in the approval letter in the front of the report.

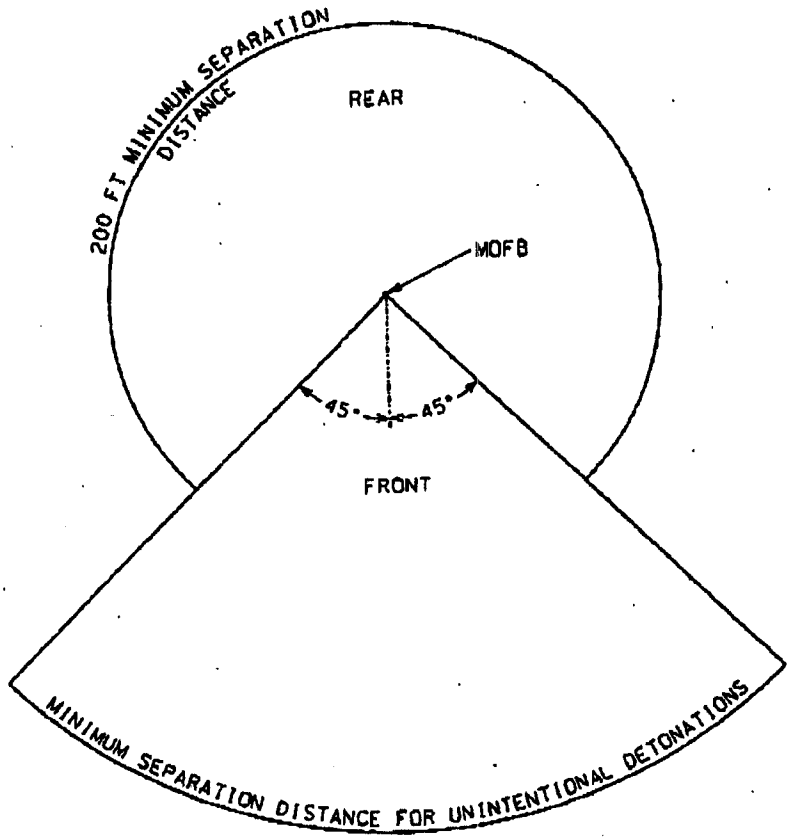
Thickness of Aluminum Required to Prevent Perforation = 1.43 in

The MOFB is designed to defeat fragments to the rear and sides of the MOFB in the case of an accidental/unintentional detonation during intrusive activities. The fragment distances to the front of the MOFB are the same as the fragment distances without the MOFB (see figure). The MOFB is not designed to reduce the effects of blast overpressure. The MOFB may not be used for intentional detonations. The minimum separation distances to the rear and sides of the

Minimum Separation Distances
Ft. McClellan
81mm M43
22 May 2003

MOFB must be maintained based on the expected throw distance of the MOFB itself.

Minimum Separation Distance to sides and rear = 200 ft
Minimum Separation Distance to front = 1395 ft
K50 distance = 61 ft



MINIMUM SEPARATION DISTANCE FOR UNINTENTIONAL DETONATIONS
USING MINIATURE OPEN FRONT BARRICADE DURING INTRUSIVE ACTIVITIES

SIGNATURES:

Michelle Crull 5/22/03
Subject Matter Expert Date

Sherene Opichka 5/22/03
QA Reviewer Date

FORM DATE 30 SEPTEMBER 2002

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