

APPENDIX D

CEHNC Most Probable Munitions Calculation Sheets

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REVIEW DATE: 19 March 2001
 REVIEW NAME: Michelle Crull, PhD, PE (256) 895-1653

- DESIGN REVIEW COMMENTS**
- SITE DEV & GEO
 - MECHANICAL
 - SAFETY
 - SYSTEMS ENG
 - ENVIR PROT & UTIL
 - MFG TECHNOLOGY
 - ADV TECH
 - VALUE ENG
 - ARCHITECTURAL
 - ELECTRICAL
 - ESTIMATING
 - OTHER
 - STRUCTURAL
 - INST & CONTROLS
 - SPECIFICATIONS

ACTION

ITEM	DRAWING NO. OR REFERENCE	COMMENT																														
1		<p>The potential OE items for each sector of the Bravo Area at Ft. McClellan are shown on the attached sector analysis provided by Foster Wheeler. Based on this list, the MPM for each sector is shown below.</p> <table border="1"> <thead> <tr> <th>Sector</th> <th>MPM</th> <th>MSD</th> </tr> </thead> <tbody> <tr> <td>M3-1H/1M</td> <td>3.5" Rocket</td> <td>1420 ft</td> </tr> <tr> <td>M3-2H</td> <td>90 mm M71</td> <td>1955 ft</td> </tr> <tr> <td>M3-3H</td> <td>3.5" Rocket</td> <td>1420 ft</td> </tr> <tr> <td>M3-1M</td> <td>90 mm M71</td> <td>1955 ft</td> </tr> <tr> <td>M3-2M</td> <td>3.5" Rocket</td> <td>1420 ft</td> </tr> <tr> <td>M3-1L</td> <td>60 mm M49A3</td> <td>1080 ft</td> </tr> <tr> <td>M4-1H</td> <td>3"/50 AP Mk 29</td> <td>1595 ft</td> </tr> <tr> <td>M4-2H</td> <td>75 mm M48</td> <td>1701 ft</td> </tr> <tr> <td>M4-1M</td> <td>75 mm M48</td> <td>1701 ft</td> </tr> </tbody> </table>	Sector	MPM	MSD	M3-1H/1M	3.5" Rocket	1420 ft	M3-2H	90 mm M71	1955 ft	M3-3H	3.5" Rocket	1420 ft	M3-1M	90 mm M71	1955 ft	M3-2M	3.5" Rocket	1420 ft	M3-1L	60 mm M49A3	1080 ft	M4-1H	3"/50 AP Mk 29	1595 ft	M4-2H	75 mm M48	1701 ft	M4-1M	75 mm M48	1701 ft
Sector	MPM	MSD																														
M3-1H/1M	3.5" Rocket	1420 ft																														
M3-2H	90 mm M71	1955 ft																														
M3-3H	3.5" Rocket	1420 ft																														
M3-1M	90 mm M71	1955 ft																														
M3-2M	3.5" Rocket	1420 ft																														
M3-1L	60 mm M49A3	1080 ft																														
M4-1H	3"/50 AP Mk 29	1595 ft																														
M4-2H	75 mm M48	1701 ft																														
M4-1M	75 mm M48	1701 ft																														

ACTION CODES
 W - WITHDRAWN
 A - ACCEPTED/CONCUR N - NON-CONCUR
 D - ACTION DEFERRED VE - VE POTENTIAL/VEP ATTACHED

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Minimum Separation Distances
Ft. McClellan
3.5" M28A2 Rocket Case
7 February 2001

REQUESTED BY: Dan Copeland
PREPARED BY: Sherene Rizvi

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) OE Center of Expertise Interim Guidance Document 00-01, use of the range to no more than 1 hazardous fragment/600 sq ft as the minimum separation distance for accidental detonations requires written justification, a risk analysis, calculation of this distance by CEHNC-ED-CS-S, and concurrence of CEHNC-OE-S.

• CALCULATIONS FOR UNINTENTIONAL DETONATIONS

Maximum Fragment Range = 1420 ft
Range to No More Than 1 Hazardous Fragment/600 sq ft = 235 ft
Range to 0.9 psi Overpressure = 70 ft

IAW OE Center of Expertise Interim Guidance Document 00-01, the minimum separation distance for intentional detonations may not be less than the default distance provided in DoD 6055.9-STD or the maximum fragment range or the K328 overpressure distance.

CALCULATIONS FOR INTENTIONAL DETONATIONS

Maximum Fragment Range = 1420 ft
K328 Overpressure Range = 457 ft

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.

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

Minimum Separation Distances
Ft. McClellan
3.5" M28A2 Rocket Case
7 February 2001

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. This report may be downloaded from the USAESCH homepage at <http://www.hnd.usace.army.mil/oew/tech/AnalyticalTools/analindx.htm>. The first time you access the site you will have to register. You will be notified by e-mail when your login and password have been activated. You must have a login and password to download the report.

SIGNATURES:

Sherrill Riggs 2/7/01
Subject Matter Expert
Michelle Crull 2/8/01

CEHNC-ED-CS-S Branch Chief

Minimum Separation Distances
Ft. McClellan
90mm M71
22 February 2001

REQUESTED BY: Copeland
PREPARED BY: Sherene Rizvi

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In accordance with (IAW) OE Center of Expertise Interim Guidance Document 00-01, use of the range to no more than 1 hazardous fragment/600 sq ft as the minimum separation distance for accidental detonations requires written justification, a risk analysis, calculation of this distance by CEHNC-ED-CS-S, and concurrence of CEHNC-OE-S.

CALCULATIONS FOR UNINTENTIONAL DETONATIONS

Maximum Fragment Range = 1955 ft
Range to No More Than 1 Hazardous Fragment/600 sq ft = 250 ft
Range to 0.9 psi Overpressure = 67 ft

IAW OE Center of Expertise Interim Guidance Document 00-01, the minimum separation distance for intentional detonations may not be less than the default distance provided in DoD 8055.9-STD or the maximum fragment range or the K328 overpressure distance.

CALCULATIONS FOR INTENTIONAL DETONATIONS

Maximum Fragment Range = 1955 ft
K328 Overpressure Range = 437 ft

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.

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

Minimum Separation Distances

Ft. McClellan

90mm M71

22 February 2001

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. This report may be downloaded from the USAESCH homepage at <http://www.hnd.usace.army.mil/oew/tech/AnalyticalTools/analindx.htm>. The first time you access the site you will have to register. You will be notified by e-mail when your login and password have been activated. You must have a login and password to download the report.

SIGNATURES:

Sherene Rizin 2/22/01
Subject Matter Expert

Michelle Cruell 2/23/01
acting CEHNC-ED-CS-S Branch Chief

Minimum Separation Distances
Ft. McClellan
60mm M49A3
7 February 2001

REQUESTED BY: Dan Copeland
PREPARED BY: Sherene Rizvi

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In accordance with (IAW) OE Center of Expertise Interim Guidance Document 00-01, use of the range to no more than 1 hazardous fragment/600 sq ft as the minimum separation distance for accidental detonations requires written justification, a risk analysis, calculation of this distance by CEHNC-ED-CS-S, and concurrence of CEHNC-OE-S.

• CALCULATIONS FOR UNINTENTIONAL DETONATIONS

Maximum Fragment Range = 1080 ft
Range to No More Than 1 Hazardous Fragment/600 sq ft = 200 ft
Range to 0.9 psi Overpressure = 42 ft

IAW OE Center of Expertise Interim Guidance Document 00-01, the minimum separation distance for intentional detonations may not be less than the default distance provided in DoD 6055.9-STD or the maximum fragment range or the K328 overpressure distance.

CALCULATIONS FOR INTENTIONAL DETONATIONS

Maximum Fragment Range = 1080 ft
K328 Overpressure Range = 277 ft

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.

SANDBAG ENCLOSURE FOR INTENTIONAL DETONATIONS

Required Sandbag Thickness = 12 in. with 6" standoff between munition and sandbags
Sandbag Throw Distance = 25 ft
Minimum Separation Distance = 200 ft

Minimum Separation Distances
Ft. McClellan
60mm M49A3
7 February 2001

The required sandbag thickness and the sandbag throw distance were calculated IAW CEHNC-ED-CS-S-98-7. The minimum separation distance is based on the largest of the sandbag throw distance from test data based on the total NEW (munition plus donor charge) or 200 ft. 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. This report may be downloaded from the USAESCH homepage at <http://www.hnd.usace.army.mil> Select "Product Lines", "Ordnance and Explosives", "Innovative Technology", then "Analytical Tools". The first time you access the site you will have to register. You will be notified by e-mail when your login and password have been activated. You must have a login and password to download the report.

MINIMUM SEPARATION DISTANCES WHILE USING MOFB DURING INTRUSIVE ACTIVITIES

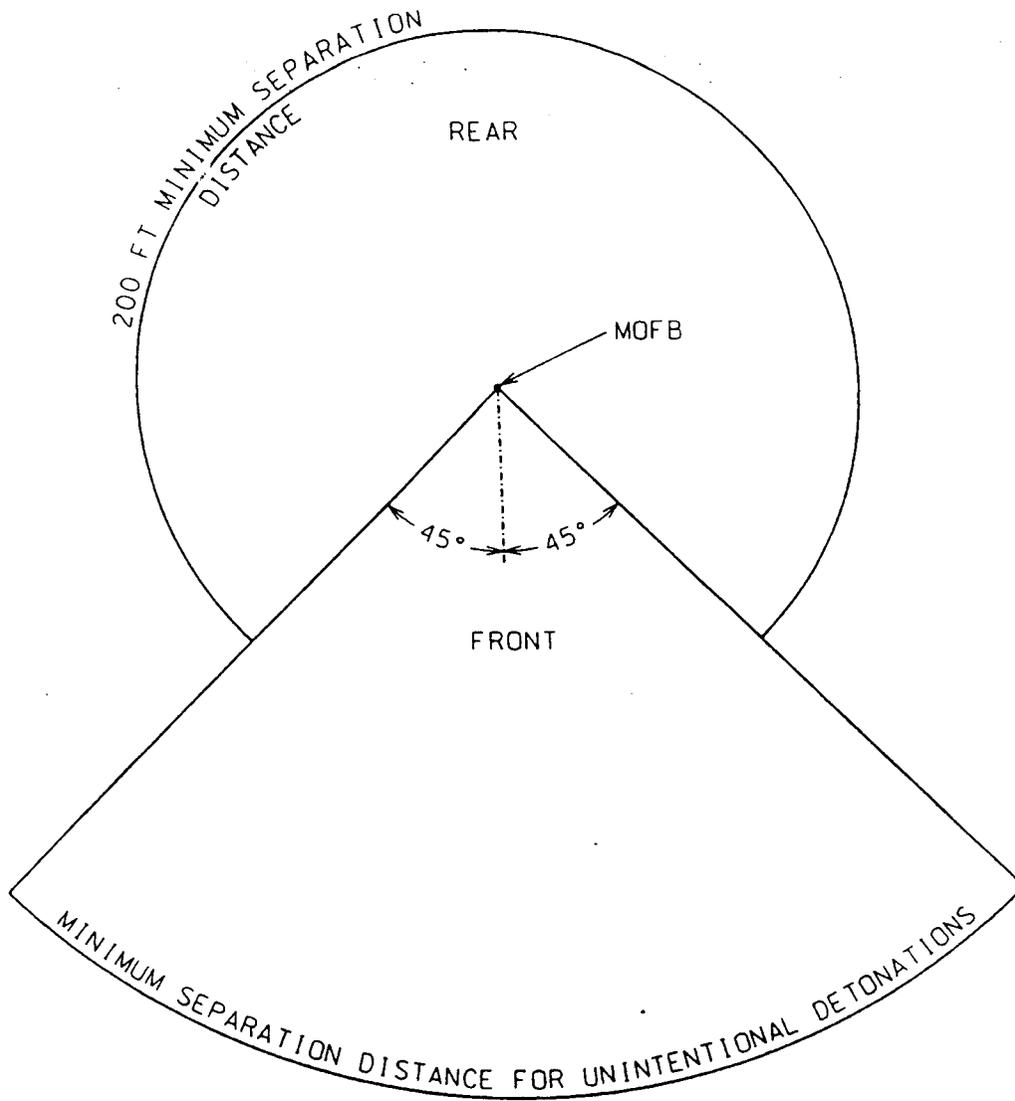
Design of the Miniature Open Front Barricade (MOFB) is in accordance with HNC-ED-CS-S-98-8, "Miniature Open Front Barricade". This document was approved by the DDESB. It may be found on HNC's website at www.hnd.usace.army.mil and select "Product Lines", "Ordnance & Explosives", "Innovative Technology", and "Analytical Tools". 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 = 1.14 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 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 = 1080 ft
K50 distance = 42 ft

Minimum Separation Distances
Ft. McClellan
60mm M49A3
7 February 2001



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

SIGNATURES:

Shauna Kizza 2/7/01
Subject Matter Expert

Michelle Cull 2/8/01

William A. Zatarale 2/8/01
CEHNC-ED-CS-S Branch Chief

Minimum Separation Distances
Ft. McClellan
3"/50 AP Mk 29
8 February 2001

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) OE Center of Expertise Interim Guidance Document 00-01, use of the range to no more than 1 hazardous fragment/600 sq ft as the minimum separation distance for accidental detonations requires written justification, a risk analysis, calculation of this distance by CEHNC-ED-CS-S, and concurrence of CEHNC-OE-S.

CALCULATIONS FOR UNINTENTIONAL DETONATIONS

Maximum Fragment Range = 1595 ft
Range to No More Than 1 Hazardous Fragment/600 sq ft = 200 ft
Range to 0.9 psi Overpressure = 26 ft

IAW OE Center of Expertise Interim Guidance Document 00-01, the minimum separation distance for intentional detonations may not be less than the default distance provided in DoD 6055.9-STD or the maximum fragment range or the K328 overpressure distance.

CALCULATIONS FOR INTENTIONAL DETONATIONS

Maximum Fragment Range = 1595 ft
K328 Overpressure Range = 171 ft

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.

SANDBAG ENCLOSURE FOR INTENTIONAL DETONATIONS

Required Sandbag Thickness = 12 in. with 6" standoff between munition and sandbags
Sandbag Throw Distance = 25 ft
Minimum Separation Distance = 200 ft

Minimum Separation Distances
Ft. McClellan
3"/50 AP Mk 29
8 February 2001

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. This report may be downloaded from the USAESCH homepage at <http://www.hnd.usace.army.mil/oew/tech/AnalyticalTools/analindx.htm>. The first time you access the site you will have to register. You will be notified by e-mail when your login and password have been activated. You must have a login and password to download the report.

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". This document was approved by the DDESB. This report may be downloaded from the USAESCH homepage at <http://www.hnd.usace.army.mil/oew/tech/AnalyticalTools/analindx.htm>. The first time you access the site you will have to register. You will be notified by e-mail when your login and password have been activated. You must have a login and password to download the report. 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 = 1.11 in

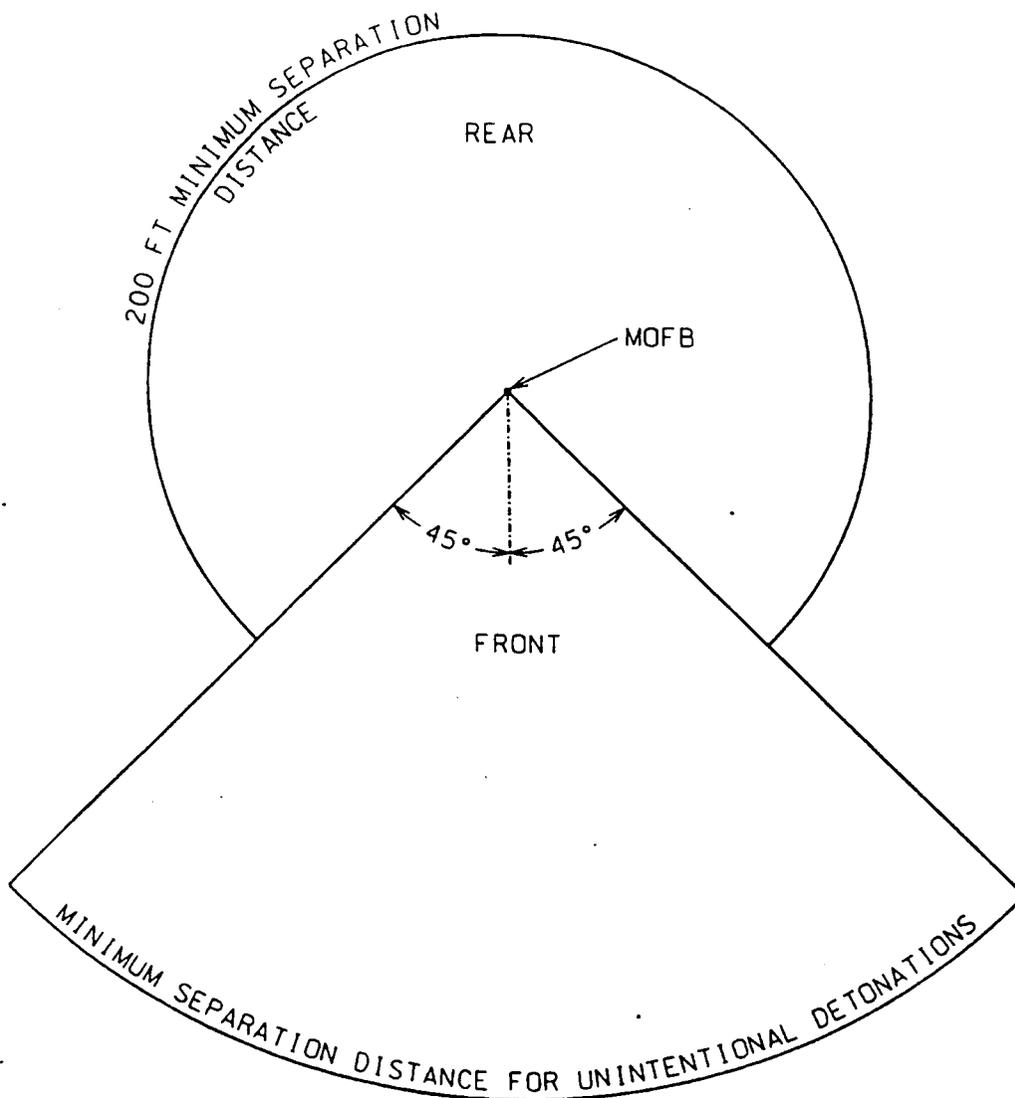
The MOFB is designed to defeat fragments to the rear and sides of the MOFB in the case of an accidental/unintentional detonation during intrusive activities. The fragment distances to the front of the MOFB are the same as the fragment distances without the MOFB (see figure). The MOFB is not designed 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 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 = 1595 ft

K50 distance = 26 ft

Minimum Separation Distances
Ft. McClellan
3"750 AP Mk 29
8 February 2001



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

SIGNATURES:

Michelle Crull 2/8/01
Subject Matter Expert

William A. D'Amico 2/8/01
CEHNC-ED-CS-S Branch Chief

Minimum Separation Distances

Ft. McClellan

75 mm M48

7 February 2001

REQUESTED BY: Dan Copeland

PREPARED BY: Sherene Rizvi

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In accordance with (IAW) OE Center of Expertise Interim Guidance Document 00-01, use of the range to no more than 1 hazardous fragment/600 sq ft as the minimum separation distance for accidental detonations requires written justification, a risk analysis, calculation of this distance by CEHNC-ED-CS-S, and concurrence of CEHNC-OE-S.

* CALCULATIONS FOR UNINTENTIONAL DETONATIONS

Maximum Fragment Range = 1701 ft

Range to No More Than 1 Hazardous Fragment/600 sq ft = 234 ft

Range to 0.9 psi Overpressure = 60 ft

IAW OE Center of Expertise Interim Guidance Document 00-01, the minimum separation distance for intentional detonations may not be less than the default distance provided in DoD 6055.9-STD or the maximum fragment range or the K328 overpressure distance.

CALCULATIONS FOR INTENTIONAL DETONATIONS

Maximum Fragment Range = 1701 ft

K328 Overpressure Range = 396 ft

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.

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

Minimum Separation Distances
Ft. McClellan
75 mm M48
7 February 2001

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. This report may be downloaded from the USAESCH homepage at <http://www.hnd.usace.army.mil/ow/tech/AnalyticalTools/analindx.htm>. The first time you access the site you will have to register. You will be notified by e-mail when your login and password have been activated. You must have a login and password to download the report.

MINIMUM SEPARATION DISTANCES WHILE USING MOFB DURING
INTRUSIVE ACTIVITIES

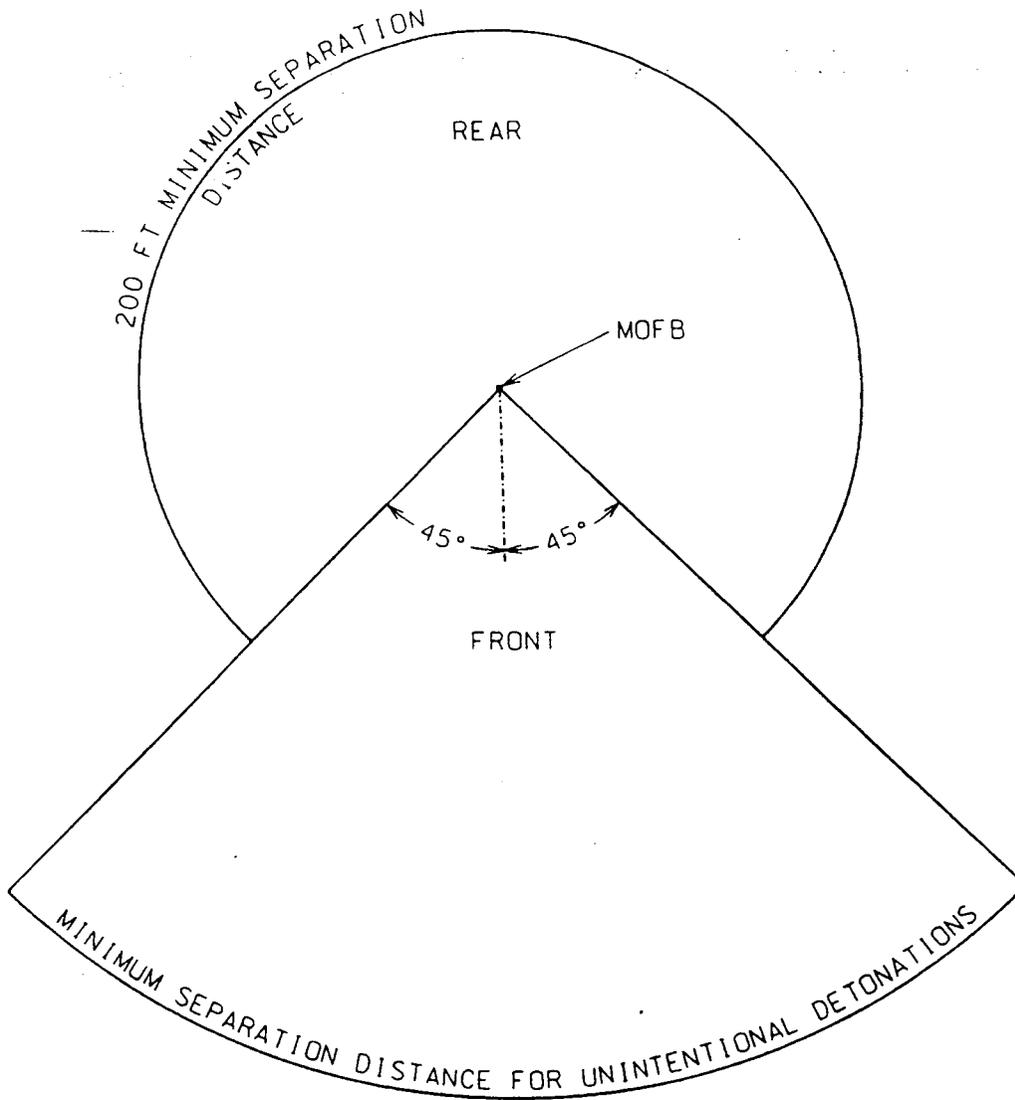
Design of the Miniature Open Front Barricade (MOFB) is in accordance with HNC-ED-CS-S-98-8, "Miniature Open Front Barricade". This document was approved by the DDESB. This report may be downloaded from the USAESCH homepage at <http://www.hnd.usace.army.mil/ow/tech/AnalyticalTools/analindx.htm>. The first time you access the site you will have to register. You will be notified by e-mail when your login and password have been activated. You must have a login and password to download the report. 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 = 1.45 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 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 = 1701 ft
K50 distance = 60 ft

Minimum Separation Distances
Ft. McClellan
75 mm M48
7 February 2001



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

SIGNATURES:

Shirani Rizvi 2/7/01
Subject Matter Expert
Michelle Crull 2/8/01

Jellie a. Doherty 2/8/01
CEHNC-ED-CS-S Branch Chief

Minimum Separation Distances
Ft. McClellan
37 mm Mk II
9 January 2002

REQUESTED BY: Suzanne Murdock
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, use of the range to no more than 1 hazardous fragment/600 sq ft as the minimum separation distance for accidental detonations requires written justification, a risk analysis, calculation of this distance by CEHNC-ED-CS-S, and concurrence of CEHNC-OE-S.

CALCULATIONS FOR UNINTENTIONAL DETONATIONS

Maximum Fragment Range = 980 ft
Range to No More Than 1 Hazardous Fragment/600 sq ft = 200 ft
Range to 0.9 psi Overpressure (K50) = 20 ft

IAW EM 1110-1-4009, the minimum separation distance for intentional detonations may not be less than the default distance provided in DoD 6055.9-STD or the maximum fragment range or the K328 overpressure distance.

CALCULATIONS FOR INTENTIONAL DETONATIONS

Maximum Fragment Range = 980 ft
K328 Overpressure Range = 131 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
37 mm Mk II
9 January 2002

SANDBAG ENCLOSURE FOR INTENTIONAL DETONATIONS

Required Sandbag Thickness = 12 in. with 6" standoff between munition and sandbags

Sandbag Throw Distance = 25 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. This report may be downloaded from the USAESCH homepage at <http://www.hnd.usace.army.mil/ocw/tech/AnalyticalTools/analindx.htm>.

WATER MITIGATION FOR INTENTIONAL DETONATIONS

Water Containment System (see HNC-ED-CS-S-00-3)	Minimum Separation Distance (ft)
5 gallon carboys	200
Inflatable pool	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. This report may be downloaded from the USAESCH homepage at <http://www.hnd.usace.army.mil/ocw/tech/AnalyticalTools/analindx.htm>.

MINIMUM SEPARATION DISTANCES WHILE USING MOFB DURING INTRUSIVE ACTIVITIES

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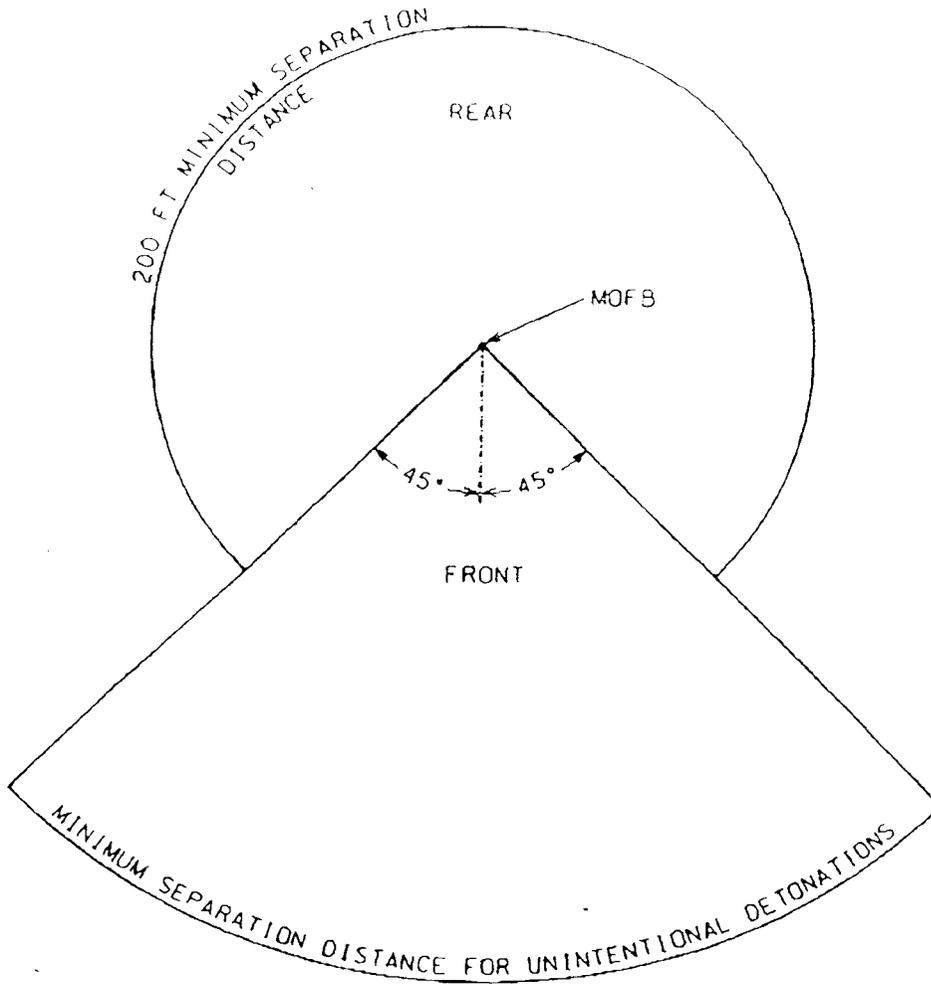
Thickness of Aluminum Required to Prevent Perforation = 0.79 in

Minimum Separation Distances
Ft. McClellan
37 mm Mk II
9 January 2002

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 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 = 980 ft
K50 distance = 20 ft

Minimum Separation Distances
Ft. McClellan
37 mm Mk II
9 January 2002



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

SIGNATURES:

Michelle Crull 1/9/02
Subject Matter Expert

[Signature] 1/10/02
CEHNC-ED-CS-S Branch Chief

Minimum Separation Distances
Ft. McClellan
155 mm M107
9 January 2002

REQUESTED BY: Suzanne Murdock
PREPARED BY: Michelle Crull, PhD, PE

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CALCULATIONS FOR UNINTENTIONAL DETONATIONS

Maximum Fragment Range = 2577 ft
Range to No More Than 1 Hazardous Fragment/600 sq ft = 447 ft
Range to 0.9 psi Overpressure = 141 ft

IAW EM 1110-1-4009, the minimum separation distance for intentional detonations may not be less than the default distance provided in DoD 6055.9-STD or the maximum fragment range or the K328 overpressure distance.

CALCULATIONS FOR INTENTIONAL DETONATIONS

Maximum Fragment Range = 2577 ft
K328 Overpressure Range = 922 ft (based on NEW of munition 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
155 mm M107
9 January 2002

SANDBAG ENCLOSURE FOR INTENTIONAL DETONATIONS

Required Sandbag Thickness = 36 in. with 6" standoff between munition and sandbags

Sandbag Throw Distance = 220 ft

Minimum Separation Distance = 220 ft

The required sandbag thickness and the sandbag throw distance were calculated IAW CEHNC-ED-CS-S-98-7. The minimum separation distance is based on the largest of the sandbag throw distance or 200 ft or the K328 distance for the total NEW (munition plus donor charge). 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. This report may be downloaded from the USAESCH homepage at <http://www.hnd.usace.army.mil/ocw/tech/AnalyticalTools/analindx.htm>. The first time you access the site you will have to register. You will be notified by e-mail when your login and password have been activated. You must have a login and password to download the report.

WATER MITIGATION FOR INTENTIONAL DETONATIONS

Water Containment System (see HNC-ED-CS-S-00-3)	Minimum Separation Distance (ft)
1100 gallon tank	275

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. This report may be downloaded from the USAESCH homepage at <http://www.hnd.usace.army.mil/ocw/tech/AnalyticalTools/analindx.htm>. The first time you access the site you will have to register. You will be notified by e-mail when your login and password have been activated. You must have a login and password to download the report.

MINIMUM SEPARATION DISTANCES WHILE USING OFB DURING INTRUSIVE ACTIVITIES

Design of the Open Front Barricade (OFB) is in accordance with HNC-ED-CS-S-99-1, "Open Front and Enclosed Barricades". This document was approved by the DDESB. It may be found on HNC's website at www.hnd.usace.army.mil and select "Product Lines", "Ordnance & Explosives", "Innovative Technology", and

Minimum Separation Distances
Ft. McClellan
155 mm M107
9 January 2002

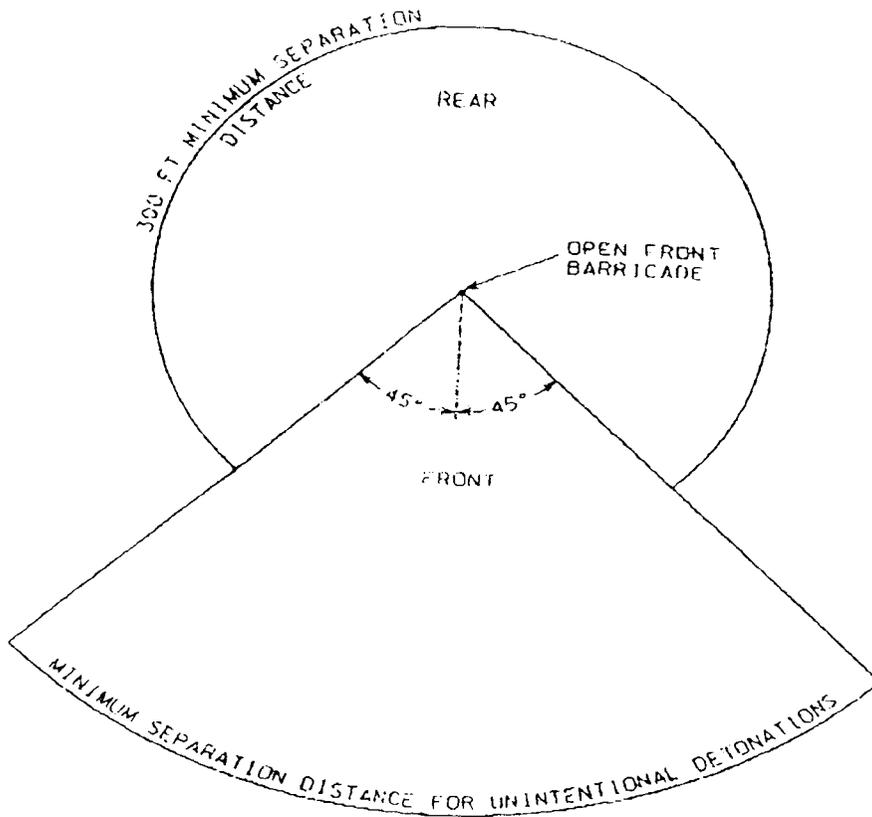
"Analytical Tools". DDESB has placed certain restrictions on the approved usage of the OFB. These are listed in the approval letter in the front of the report.

Thickness of Aluminum Required to Prevent Perforation = 2.59 in
Thickness of Steel Required to Prevent Perforation = 1.27 in

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

Minimum Separation Distance to sides and rear = 300 ft
Minimum Separation Distance to front = 2577 ft
K50 distance = 141 ft

Minimum Separation Distances
Fl. McClellan
155 mm M107
9 January 2002



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

SIGNATURES:

Michelle Cudd 1/9/02
Subject Matter Expert

[Signature] 1/9/02
CEHNC-ED-CS-S Branch Chief

APPENDIX E

**Standard Operating Procedure for Intrusive Sampling/ Removal
Unexploded Ordnance Investigation**

STANDARD OPERATING PROCEDURE
FOR INTRUSIVE SAMPLING/REMOVAL UNEXPLODED ORDNANCE
INVESTIGATION

FORT MCCLELLAN
FORT MCCLELLAN, ALABAMA

CONTRACT NUMBER
DACA87-99-D-0010

REVISION 1

FOSTER WHEELER ENVIRONMENTAL CORPORATION

4 April, 2001

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1. INTRUSIVE ACTIVITIES CHECKLIST
2. HEALTH AND SAFETY EQUIPMENT CHECKLIST
3. INTRUSIVE INVESTIGATIONS DATA FORM

ACRONYMS AND ABBREVIATIONS

BIP	Blow in Place
CFR	Code of Federal Regulation
CGI	Combustible gas indicator
CQC	Contractor Quality Control
CSO	Caretaker Support Office
EOD	Explosive Ordnance Disposal
HS	Health and safety
ID	Identification
LEL	Lower explosive limit
O/E	Ordnance and explosives
PPE	Personal protective equipment
ppm	parts per million
PVC	polyvinyl chloride
QC	Quality control
SCBA	Self-contained breathing apparatus
SHSO	Site Health and Safety Officer
SHSP	Site-Specific Health and Safety Plan
SOP	Standard Operating Procedure
USFWS	U.S. Fish and Wildlife Service
UXO	Unexploded ordnance

1.0 PURPOSE

The purpose of this standard operating procedure (SOP) is to provide site-specific procedures for unexploded ordnance (UXO) intrusive sampling of selected anomalies at Fort McClellan, Alabama in accordance with the *Site-Specific Work Plan* and to provide site-specific procedures for conducting intrusive investigation in support of construction support task.

2.0 SCOPE

This SOP provides detailed information required to reacquire, excavate, and record subsurface anomalies. Specific requirements are defined for community notification/coordination, personnel, training, equipment/material, and intrusive sampling activities. The intrusive sampling section includes procedures for daily sector briefing/verification; exclusion zone establishment; anomaly acquisition; excavation; located UXO procedures; handling, transportation, and storage of UXO and ordnance and explosives (OE); disposition of located anomalies; sector demobilization; and data collection and recording. Data analysis, interpretation, and selection of sector/anomalies to be intrusively sampled will be completed under separate portions of the *Site-Specific Work Plan*.

3.0 DEFINITIONS

- **Anomaly** – An object or location shown on the dig map as a possible UXO object resulting from interpretation of the geophysical survey data. Anomalies selected for possible excavation will have an assigned anomaly identification (ID) number.
- **Exclusion Zone** – Areas where contamination (hazards) are known or likely to be present, or because of activity, have the potential to cause harm to personnel. The exclusion zone shall be large enough to protect other personnel from the blast and fragmentation hazards of accidental detonation. The minimum exclusion zone for UXO operations will be 200 feet.
- **Expended Ordnance** – A munition that has functioned as designed, leaving the shell or container behind. This shell of container may or may not contain explosive/pyrotechnic/toxic residue. This material would not be considered inert, and could not be salvaged as scrap without appropriate visual inspection, sampling, and/or treatment.
- **Explosive Ordnance Disposal Personnel** – Active duty military personnel who have completed the training course at the U.S. Naval School, Explosive Ordnance Disposal (EOD), Indian Head, Maryland / Eglin Air Force Base, Florida and are currently assigned to a military EOD unit.
- **Foster Wheeler Environmental Command Center** – A designated location staffed by personnel to relay and control all communications/activities of field personnel and other units.
- **Inert Ordnance**—Ordnance that never contained explosives, or ordnance items which have had all explosive components removed and certified safe.
- **Intrusive Investigation** – Excavating for suspected UXO items or for plotted anomalies. Excavation will be by hand, or utilizing heavy equipment as deemed appropriate.
- **Non-Intrusive Investigation** – Locating/investigating UXO on the surface of the ground where excavation is not required.
- **Non-Ordnance and Explosive Metal Debris** – Metal debris recovered during operations which is not ordnance related, such as metal rebar, angle iron, sheet metal and bar stock, etc.

- **Ordnance and Explosives** – Bombs, guided and ballistic missiles, artillery, mortars, rocket ammunition, small arms ammunition, antipersonnel and antitank mines, demolition charges, pyrotechnics, grenades, sea mines, torpedoes, depth charges, containerized and non-containerized high explosives and propellants, depleted uranium rounds, military chemical agents, and all similar components related to munitions that were designed to cause damage to personnel or material through explosive force, incendiary action, or toxic effects. Non-containerized high explosives, propellants, or soils contaminated with explosive constituents are considered explosives if the concentration of explosive material is 10 percent or higher.
- **Ordnance and Explosive Metal Debris** – Ordnance materials which have not been in direct contact with the energetic materials of the ordnance, such as bomb fins, grenade spoons, shipping containers, etc.
- **Ordnance and Explosive-Related Scrap**– Ordnance materials which have been in direct contact with the energetic materials of the ordnance, such as, expended rocket motors, shell casings, warhead fragments, powder containers, etc.
- **Practice Ordnance** – Munitions that demonstrate similar characteristics as their high explosive counterparts, and may or may not contain pyrotechnic, explosive, or chemical (e.g., titanium tetrachloride) spotting charges.
- **Unexploded Ordnance** – Military munitions that have been primed, fuzed, armed, or otherwise prepared for action, and have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installation, personnel, or material, and remain unexploded either by malfunction, design, or any other cause. For the purpose of this project, the definition of UXO is limited to items larger than 50-caliber.
- **UXO Personnel** – Any former member of the armed forces who has graduated from the U.S. Naval School, Explosive Ordnance Disposal, Indian Head, Maryland, served in EOD billets and assignments while on active military duty, and now works as a civilian specialist with UXO items/materials.

4.0 NOTIFICATION/COORDINATION PROCESS

Coordination of all personnel assigned to Fort McClellan will be vital to the safe and efficient intrusive sampling process. The ongoing UXO investigation effort by Foster Wheeler Environmental and its subcontractors will ensure that Fort McClellan will continue to be a safe place to occupy. Assistance of all contractors and Activity personnel is encouraged to ensure that the intrusive sampling effort will be completed in the shortest possible time.

Coordination activities will begin with a series of meetings with U.S. Army Engineering and Support Center, Huntsville (CEHNC) and Fort McClellan Transition Force Operations (FMCTFO), to identify shared and individual responsibilities of each organization. The community will be informed of the project schedule and the expected impacts through a public meeting presentation. The coordination, notification, and verification activities are outlined below.

- **Coordination Meeting** – Before the intrusive sampling is scheduled to begin, a coordination meeting will be conducted to establish roles and responsibilities. The meeting will address specific elements of planning and could involve CEHNC, FMCTFO, Foster Wheeler Environmental, and community support personnel. Topics will include:
 - Dig permits;
 - Hazardous material characterization and handling;
 - Notifications;
 - Maintenance of exclusion zone; and

- Community impact.
- **Town Meeting** – A town meeting will be held, if required, prior to commencing intrusive activities. A Foster Wheeler Environmental representative will present a brief detailing the sequential steps involved with the scheduled activities. Topics will include:
 - Daily hours of operation
 - Requirements for evacuation and road closures
 - Exclusion zone procedures
 - Emergency procedures.
- **Notifications** – The Foster Wheeler Environmental command center will notify CEHNC and FMCTFO a minimum of 24 hours prior to scheduled intrusive activities to facilitate timely coordination arrangements for the evacuation of designated areas and closure of required roads. Foster Wheeler Environmental UXO personnel will ensure that the following agencies are informed of the schedule and prepared to respond as necessary for emergency assistance:
 - Hospital- Stringfellow Memorial (256) 235-8900
 - Anniston Fire Department - (256) 237-3541
 - Anniston Police Department - (256) 237-1800
- **Exclusion Zone Information Package** – Foster Wheeler Environmental will provide to CEHNC one copy of the exclusion zone map for each sector prior to excavation.
 - CEHNC and FMCTFO will coordinate evacuations and road closures with all personnel in the affected areas.
 - Foster Wheeler Environmental will erect exclusion zones and be responsible for road closures during intrusive activities.
 - Special access to the intrusive sampling exclusion zone will be coordinated through Foster Wheeler Environmental on-site personnel. Field logbook entries will be used for personnel accountability.
 - Exclusion zones will remain in effect until proper notification by the Foster Wheeler Environmental command center.
- **Daily Verification** – Prior to each day’s activities, the SUXOS will verify with Foster Wheeler Environmental, Command Center that the following have been performed:
 - Emergency response activities have been notified and are available
 - Work areas have been evacuated as required.

5.0 PERSONNEL REQUIREMENTS

The Senior UXO Supervisor will be in charge of all UXO intrusive activities. The UXOQC Representative will ensure that

all work within the exclusion zone is performed in accordance with the approved *Site-Specific Work Plan*. In addition, one or more UXO teams will be utilized for the intrusive phase. Each UXO team will consist of the following members, at a minimum:

- UXO Supervisor
- 2-UXO Specialist

The intrusive sampling effort will be supported by a team of laborers (if required) who will assist in the exclusion zone set up at the start of the day and the breakdown of the exclusion zone at the close of intrusive activities.

6.0 TRAINING REQUIREMENTS

All personnel assigned to the intrusive investigation teams and other site personnel involved with the intrusive investigation will attend a site-specific orientation. The purpose of this orientation will be to review site-specific and emergency response procedures. The topics to be covered during the orientation are listed below. Course attendance sheets with attached curriculums will be used to document completion of each orientation session.

TRAINING SCHEDULE

- A. Introduction
 - 1. Project summary
- B. Presentation
 - 1. *Site-Specific Health and Safety Plan (SHSP)* review
 - 2. Review SOP
 - 3. Equipment training
 - a. Differential GPS training
 - b. Metal Locator training
 - c. Heavy Equipment training
 - 4. Emergency procedures
 - a. Review emergency response equipment
 - b. Talk/walk through of emergency procedures
 - c. Emergency drill

7.0 EQUIPMENT/MATERIAL REQUIREMENTS

Each UXO Specialist will inspect health and safety and intrusive equipment prior to commencing operations. An equipment checklist is included as Attachment 2. A checklist of health and safety equipment is included as Attachment 3. It is anticipated that all tasks will be performed in Level D personal protective equipment (PPE).

The following publications are required to be on-site during intrusive operations:

- Approved Work Plans
- Approved dig permit for the areas of planned intrusive activities.

8.0 INTRUSIVE INVESTIGATION

This procedure will cover intrusive investigation for geophysical surveys and procedures for construction support and removal activities. For geophysical surveys, intrusive sampling of selected anomalies will be performed to identify UXO from the surface to a specified depth below grade. This sampling will characterize homogeneous areas of the site and provide statistical data (e.g., density and UXO type) that will be used to conduct a risk analysis. This procedure also covers intrusive removal of all selected anomalies during removal actions and in support of construction support task.

Notification procedures will be recorded on the Intrusive Activities Checklist by the Senior UXO Supervisor . Following completion of UXO intrusive investigation of the selected anomalies, all recorded data will be delivered to the data entry technician for entry into the data base.. The Senior UXO Supervisor will provide information on the anomalies to be excavated to each UXO Supervisor prior to intrusive activities.

The following procedures describe the specific activities required for intrusive sampling/removal of selected anomalies, including daily briefing/verification; exclusion zone establishment; anomaly acquisition; excavation; located UXO procedures; disposition of located anomalies; demobilization; and data collection and recording.

8.1 DAILY SECTOR BRIEFING/VERIFICATION

The Senior UXO Supervisor will receive a package for the selected sampling areas within each sector and verify that CEHNC and FMCTFO received an exclusion zone map at least 24 hours prior to intrusive activities. The Senior UXO Supervisor will assign selected areas to each of the UXO teams for intrusive sampling/removal and will also provide a daily briefing to the intrusive teams which includes the following:

- Review emergency procedures;
- Discuss previously located UXO; and
- Describe any known utilities.

The Senior UXO Supervisor will complete the top portion of the Intrusive Activities Checklist for each area and transfer it to the assigned UXO Supervisor for completion. Attachment (1)

The UXO Supervisor is responsible for completing the Intrusive Activities Checklist received from the Senior UXO Supervisor and will brief the UXO team on potential hazards identified in their particular area. The checklist includes the following activities:

- Verify dig permit has been issued.
- Verify that roads have been closed.
- Verify exclusion zone boundaries.
- Complete Health and Safety and Intrusive Equipment Checklists
- Ensure the Foster Wheeler Environmental Command Center has completed the notification checklist:
 - CEHNC;
 - FMCTFO;
 - Medical Facility;

- Fire Department; and
- Security Department.
- Perform daily tailgate safety briefing:
 - Designate emergency vehicles;
 - Designate emergency evacuation route; and
 - Review emergency response procedures.
- Conduct QC operational check of locator equipment in test grid and record results.
- Verify daily equipment inspection.
- Verify with FMCTFO engineering that underground utilities have been secured.
- Verify with designated personnel that the area has been evacuated.
- Notify the Foster Wheeler Environmental Command Center that intrusive investigations are commencing.
- Start intrusive activities.
- Request the SSHO/QC Representative check area.
- Stop intrusive activities.
- Request CEHNC conduct a QA check (if required).
- Verify that the Foster Wheeler Environmental Command Center notifies the following upon completion of the days activities:
 - CEHNC.
 - FMCTFO.
 - Medical Facility.
 - Fire Department.
 - Security Department.
- Fill all dig sites and smooth area.
- Demobilize the area.
- Provide packet to the data entry technician for database entry.
 - The UXOQC Representative is responsible for conducting daily inspections of each intrusive site to ensure compliance with the SHSP. The SSHO/QC Representative has stop work authority in case of imminent safety hazards or potentially dangerous situations. After stopping work, the SSHO/QC Representative will immediately notify the Senior UXO Supervisor. Additionally, the SSHO/QC Representative will conduct QC checks at the completion of each sector and will escort CEHNC personnel assigned for quality assurance inspections.

8.2 EXCLUSION ZONE ESTABLISHMENT

All exclusion zones for UXO operations will be in accordance with DOD 6055.9 or as calculated by USACE CEHNC Engineering Branch for the most probable munition.

An exclusion zone will be established around each area prior to conducting intrusive activities. The exclusion zone will vary because of terrain and cultural features around each area. Road barricades will be utilized to block road access and warning tape will restrict access areas as required. Exclusion zones will remain in effect until notification by the Foster Wheeler Environmental command center to CEHNC and FMCTFO upon completion of intrusive activities. Special access within the exclusion zone will be controlled through the sign-in/sign-out log (field log) only when the UXO team is not actually digging. A minimum distance of 200 feet should be maintained between each UXO team.

8.3 ANOMALY ACQUISITION

Suspected subsurface UXO locations (geophysical anomalies) will be presented as coordinate locations in the intrusive sector package provided to the Senior UXO Supervisor. The Senior UXO Supervisor will provide the coordinates to each team for anomaly acquisition. The designated anomalies will be acquired and marked with pin flags using DGPS or conventional surveying procedures. The operator will locate the plotted anomaly position and place a numbered pin flag corresponding to the anomaly identification located at that position. The reacquisition will be accomplished prior to assigning an UXO Team to intrusively investigate. For construction support task, the area of investigation will be delineated and divided into a grid system. A "mag" and dig procedure will be used to locate subsurface anomalies.

8.4 EXCAVATION

Each selected anomaly will be investigated and recorded. Hand excavation is the safest and most reliable method for uncovering UXO; however, unless the UXO is very near the surface, hand excavation exposes more people to the hazard of detonation for a longer period of time than any other method.

Earth moving machinery may be used to excavate anomalies deeper than 12 inches. Earth moving machinery should not be used to excavate within 12 inches of UXO. When excavation is within approximately 12 inches of the anomaly, hand excavation will be used to uncover the item. During excavation operations, only those personnel absolutely necessary for the operation will be within the exclusion zone. Excavation and trenching shall comply with the provisions of 29 Code of Federal Regulations (CFR) 1926, Subpart P.

8.4.1 EXCAVATION OF UXO

During mechanical excavation, the Senior UXO Supervisor will be in a position to observe the operator and the excavation process. A third UXO specialist will be positioned at the edge of the exclusion zone to observe activities and provide assistance if required. The area of the pin flag will be probed if possible with the fiberglass probes to determine the depth of each anomaly.

When the anomaly is detected, 4-inch layers of soil will be carefully excavated to within 12 inches of the anomaly by hand excavation methods or by using earth moving machinery. Hand excavation will be used within 12 inches of the anomaly until the anomaly is exposed and identified. When the anomaly has been removed, the excavated area will be checked with a locator to verify that the area is clean.

If the selected anomaly is a surface feature that cannot be removed, the UXO Supervisor will excavate around the feature to determine if additional anomalies are below the feature. Excavation will be stopped at a depth specified in the scope of work.

If recovered UXO/OE is identified as Recovered Chemical Warfare Material (RCWM) all intrusive activities will cease, the site will be evacuated in an upwind direction, and secured. The CEHNC safety Specialist will be notified and disposition instructions requested. Foster Wheeler Environmental personnel will not participate in any RCWM disposal work unless approval is given by the UXO/OE Operations Manager and the Project HSM, and the SHERP is amended to account for these new activities.

8.4.2 ANOMALIES OTHER THAN UXO

It is anticipated that during the UXO intrusive investigation hazardous material other than UXO will be located, including underground utilities, chemicals, and other hazards.

- **Underground Utilities** – In an attempt to avoid underground utilities, a dig permit will be obtained from FMCTFO for each area that will be intrusively investigated.. The Schonstedt locator will be used during intrusive activities to locate energized power lines. Indication from the Schonstedt locator or uncovering a tell-tale tape will require immediate suspension of intrusive activities
- **Chemicals** – During intrusive activities, locating industrial type chemicals is a possibility. If any evidence of chemical contamination is detected, all intrusive activities will cease and the Foster Wheeler Environmental command center will notify CEHNC and FMCTFO. The FMCTFO environmental response team will evaluate the situation and perform first response functions as required. Foster Wheeler Environmental UXO personnel will escort all personnel entering the exclusion zone. Other site personnel will assist FMCTFO as required. The evacuated area will be evaluated by the Senior UXO Supervisor, and the SSHO. Operations will continue only when it is safe to proceed.
- **Other Hazards** – In the event that sealed drums, contaminated soils, or other suspect materials or conditions are encountered during the intrusive investigation that would indicate a potential health or safety hazard, work efforts will stop and the FMCTFO environmental response team will be notified. Work will not continue until an evaluation by the Senior UXO Supervisor and SSHO Representative is made. Operations will continue only when it is safe to proceed.

8.5 LOCATED UXO PROCEDURES

- The safest procedure for personnel when encountering UXO/OE is to destroy the UXO/OE in place using explosives (Blow in Place BIP); however this is not always practical. Located UXO/OE will be handled in accordance with the UXO Demolition Procedures.

8.6 HANDLING, TRANSPORTATION, AND STORAGE OF UXO/OE

All handling of UXO/OE will be in accordance with accepted safety precautions found in AR 385-64, ETL-385-1-1, EODB 60A-1-1-31 and EODB 60A-1-1-22.

8.7 DISPOSITION OF LOCATED ANOMALIES

All excavated anomalies (e.g., UXO, and UXO related material,) will be identified and disposed of in accordance with the *Site-Specific Work Plan* and the SOP for OE Disposal.

Anomalies identified as UXO will be disposed of daily in the grids / areas they were located in.

Non-UXO/OE anomalies will be categorized and disposed as outlined below:

- **Non-Ordnance and Explosives Metal Debris** – If visual inspection determines the item does not contain waste residue, waste is non-hazardous scrap metal. Collect and store for recycling.
- **Ordnance and Explosive Metal Debris** – If visual inspection determines the item was not in contact with energetic materials, waste is non-hazardous scrap metal. Collect and store for recycling.
- **Ordnance and Explosive-Related Scrap** – If visual inspection determines the material was in direct contact with energetic materials (explosives/pyrotechnics) it will be collected, containerized and managed in the Material Processing Area as a dangerous waste until final treatment is performed by FWENC.

Recovered UXO/OE will be tracked from discovery to disposal. Each aspect of UXO/OE handling and disposal will be documented using the UXO Acquisition and Accountability Log, as described in the *Site-Specific Work Plan*.

8.8 AREA DEMOBILIZATION

Following intrusive sampling in each area, all signs and barricades will be removed and the excavated area will be back-filled. Backfill material will consist of native soil from the excavation if required.

8.9 DATA COLLECTION AND RECORDING

The UXO Supervisor will record all data on the Intrusive Investigation Data Form. This data will be turned over to the GIS technician who will enter it into the database. All electronic data will be turned over to the SSHO/QC Representative or designated individual. The data form includes the following information:

All items marked with a check (✓) are required for all anomalies, other items are required only for UXO and UXO-related materials.

- ✓ Sector ID – Verify using the dig package map or area designation.
- ✓ Anomaly ID – Enter ID from dig package map or area designation.
- ✓ Survey method – Three-tape pull, conventional ground survey, or DGPS.
- ✓ Accuracy – If the actual location varies from the projected location by > 12 inches, enter distance in inches and approximate direction (e.g., 18 inches SE) Geophysical investigation only.
- ✓ Depth at center of mass (inches) – Use English unit measuring tape to measure depth of anomaly center of mass to the estimated ground surface.
- Orientation – Estimate degrees from magnetic north (e.g., N 45 degrees E).
- Inclination (degrees from horizontal) – Visually estimate degrees from horizontal (0 to 90°).
- Object length (inches) – Measure the maximum dimension (length) of the object.
- ✓ Object size – Estimate size as small (≤ 60 mm), medium (> 60 mm to ≤ 155 mm), or large (> 155 mm).
- Diameter (inches) – Measure the diameter of the object using calipers.
- ✓ Ferrous Object – Indicate whether object is ferrous.
- ✓ Anomaly type – Identify type of anomaly (e.g., UXO, scrap).
- Photograph number – Identify photograph number for each excavated anomaly.
- Description – Observed characteristics of the object or type of object if non-ordnance.

9.0 QUALITY CONTROL

For geophysical investigation quality control is performed to ensure that the targeted anomaly is recovered or determined to exist below the Scope of Work limit of excavation. Because non-targeted anomalies may exist near the dig site, limited

lateral excavation is authorized. The UXO Supervisor will determine the area of excavation and search.

The UXOQC Representative will ensure that the procedures are implemented and are being followed as defined in the *Site-Specific Work Plan* and listed below.

- Perform follow-up QC on dig procedures.
- Conduct surveillance on a periodic basis
- Ensure proper exclusion zone controls.
- Ensure excavation is performed in accordance with this SOP.
- Ensure the proper use of probes to locate anomaly depth.
- Complete data entry on intrusive investigation anomaly form.
- Perform QC checks on 10% of all anomalies in each sector prior to backfill operations and/or perform QC investigation in accordance with site specific work plan.
- Escort designated QA representatives to perform QA checks prior to backfill operations, if required.

10.0 REFERENCES

- U.S. Department of Defense. 1997. DOD Ammunition and Explosives Safety Standards. DOD 6055.9-STD, July 1997. The Office of the Under Secretary of Defense, Washington, D.C.
- U.S. Army. 1987. Ammunition and Explosives Safety Standards. Army Regulation 385-64, 22 May 1987. Headquarters Department of the Army, Washington, D.C.
- Navy Explosive Ordnance Disposal. 1990. Explosive Ordnance Disposal Procedures, Protection of Personnel and Property. Bulletin 60A-1-1-4, Revision 2, 24 September 1990. Naval Explosive Ordnance Disposal Technology Division. Indian Head, Maryland.
- Navy Explosive Ordnance Disposal. 1994. Explosive Ordnance Disposal Procedures, General Information on EOD Disposal Procedures. Bulletin 60A-1-1-31, Revision 0, 31 May 1994. Naval Explosive Ordnance Disposal Technology Division, Indian Head, Maryland.
- U.S. Army Corps of Engineers. 1996. Safety and Health Requirements Manual. EM 385-1-1, September 1996. Department of the Army, Washington, D.C.

Attachment 1

INTRUSIVE ACTIVITIES CHECKLIST

Date _____ Team _____

FUNCTION	DATE/TIME	SIGNATURE
Senior UXO Supervisor		
Assign UXO Intrusive Team		
Brief Intrusive Team Review emergency procedures Discuss OE/UXO located in area Describe known utilities		
Inspect exclusion zone upon completion of operations		
Intrusive Team Supervisor		
Verify dig permit has been issued		
Verify roads are closed		
Verify exclusion zone boundaries in place		
Complete health and safety and equipment checklists		
Ensure command center has completed the verification checklist CEHNC FTMCTFO EOD- If a local unit is available. Medical Facility Fire Department Security/Police Department		
Intrusive Supervisor tailgate safety brief: Designate emergency vehicles Designate emergency evacuation route Review emergency response procedures		
Verify daily equipment inspection		
Verify that exclusion zone has been set		
Verify that area has been evacuated		
Notify command center that operations are commencing		
Start Intrusive activities		
Stop Intrusive activities		
QC check performed		
QA check by CEHNC (if required)		
Foster Wheeler command center notify upon completion: CEHNC FTMCTFO EOD Medical Facility Fire Department Security/Police Department		
Complete OE/UXO Accountability Log		
Demobilize		
Record data on anomaly acquisition sheet		

Attachment 2
Health and Safety Equipment Checklist

DATE: _____

TEAM: _____

X	ITEM	QTY	Location	Notes
	Pruning Shears			2 per Team
	Mattock			3 per Team
	Saw			2 per Team
	Shovel, large handle			2 per Team, (1) QC (1) Safety Vehicle
	Shovel, Sharpshooter			1 per team
	Spare Tire			1 Per Vehicle
	Spray Bottle, (8 oz)			1 per Team
	Spray Tank (5 gal)			2 with the Demo Equip/Back Pack
	Rope, Line, 1/4" Nylon			1200'
	Sunscreen			1 per Team
	Tape Measure, 16'			1 Demo Equipment
	Tape Measure, 100'			2 per Team
	Tape Measure, 200'			2 per Team
	Tie Down Straps			6 per Team
	Trash Bags			6 per Team
	Toilet Paper			2 rolls per Team
	Tool Box			1 per Safety Vehicle
	Tow Strap			1 per Safety Vehicle
	Wasp Spray			1 per Team
	Machete			2 per Team
	Rain Suits			1 per Team Member (Lg, XLg, XXLg)
	Safety Glasses			2 per Team Member (1 Clear, 1 Sunglass)
	Safety Vests			1 per Team Member
	Stretcher			1 per Safety Vehicle
	Water Containers			1 per Team (5 Gallon)
	Water Containers			1 per Team Member (Back Pack)

Attachment 3

INTRUSIVE (REACQUISITION & EXCAVATION) INVESTIGATION DATA FORM

REACQUISITION

Grid ID / AREA	
Anomaly ID (e.g., 4):	
Reacquisition Method (e.g., EM61 HH w/ USRADS, etc.)	
Reacquisition; Positive Instrument Indication of magnetic and/or conductive material present	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unsure Flag # placed in ground <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> # _____
~ Accuracy (inches) and Azimuth (degrees) { <u>Digsheet coordinates to inferred location</u> , e.g., 12" @ 270}	
Reacquisition Comments	
EXCAVATION	
Depth of anomaly (inches) at center of mass (e.g., 17"):	
Orientation (NSEW +degrees) (e.g., N 45° E) (Ordnance only):	
Inclination (degrees) (0 to 90° up/down) (Ordnance only):	
~ Object description (2D or 3D measurements) (inches) (e.g., 2 " D x 10 " L rebar)	
Estimated Weight (lbs):	
Ferrous (magnetic) Object?	
Item Removed?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Photograph Number/Digital Photo Disk #	<input type="checkbox"/> UXO Fired <input type="checkbox"/> UXO Abandoned <input type="checkbox"/> OE-related scrap <input type="checkbox"/> OE Debris <input type="checkbox"/> Non OE Scrap <input type="checkbox"/> Practice Ordnance <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> No metal material present in excavation
Review (Initial):	<input type="checkbox"/> Other
<input type="checkbox"/> UXO Supervisor <input type="checkbox"/> Geophysics	<input type="checkbox"/> Other
<input type="checkbox"/> QC	<input type="checkbox"/> Other

STANDARD OPERATING PROCEDURE
**INTRUSIVE SAMPLING/REMOVAL
UNEXPLODED ORDNANCE INVESTIGATION**

**US ARMY CORPS OF ENGINEERS
AND
FOSTER WHEELER ENVIRONMENTAL CORPORATION**

CONTRACT NUMBER DACA87-99-D-0010

**FORT McCLELLAN
FORT McCLELLAN, ALABAMA**

REVISION 0

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APPENDIX F
Activity Hazard Analysis

ACTIVITY HAZARD ANALYSIS

Project: <u>Bravo EE/CA, Clearance Activities</u>		Location: <u>Fort McClellan, Anniston, Alabama</u>	
Activity: <u>Mobilization /Demobilization</u>			
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS	ANALYZED BY/ DATE
1. Mobilization/ demobilization of equipment and supplies.	1. Back Injuries	1. Site personnel will be instructed on proper lifting techniques; mechanical devices should be used to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available.	JS 03/14/01
	2. Heavy Equipment Operation	2. Follow procedures in Section 6.15.2 of the General Site-Wide Work Plan, equipment will have rollover protective structures and seat belts; operators shall wear seat belts when operating equipment; do not operate equipment on grades which exceed manufacturer's recommendations; equipment will have guards, canopies or grills to protect from flying objects; ground personnel will stay clear of all suspended loads; all slings chains and ropes will be rated for the load in which it is expected to lift; spills and absorbent materials will be readily available; drip pans, polyethylene sheeting or other means will be used for secondary containment; eye contact with operators will be made before approaching equipment; equipment will not be approached on blind sides; avoid equipment swing areas; know hand signals; all equipment will be equipped with backup alarms, and all equipment will be outfitted with fire extinguishers.	JS 03/14/01
	3. Temperature Extremes	3. Site personnel will be trained about signs and symptoms of heat and cold stress; FWENC Program EHS 4-6 will be followed.	JS 03/14/01
	4. Slips/Trips/Falls	4. Maintain work areas safe and orderly; unloading areas should be on even terrain; watch for uneven terrain, stumps, and vegetation in walk areas; mark tripping hazards and repair if possible.	JS 03/14/01
	5. Vehicular Traffic	5. Spotters will be used when backing up trucks and heavy equipment; trucks and heavy equipment will be equipped with back up alarms; traffic cones/vests will be used when working in public traffic areas.	JS 03/14/01
	6. Overhead Hazards	6. Personnel will be required to wear hard hats.	JS 03/14/01
	7. Dropped Objects	7. Composite toe boots will be worn.	JS 03/14/01
	8. Noise	8. Hearing protection with a noise reduction rating capable of maintaining personal exposure below 85 dBA (ear muffs or plugs) will be worn as needed during heavy equipment operations; all equipment will be equipped with manufacturer's required mufflers.	JS 03/14/01
	9. Eye Injuries	9. Safety glasses will be worn during all field activities including escort, data acquisition, reacquire, and intrusive activities. A portable eye wash station will be located adjacent to work activities.	JS 03/14/01
	10. Sharp Objects	10. Cut resistant work gloves will be worn; All hand and power tools will be maintained in safe condition; first aid kits will be available by work area.	JS 03/14/01
	11. Fire	11. 10 lb. ABC type fire extinguisher will be located adjacent to work area; all gasoline-powered equipment will be grounded.	JS 03/14/01
	12. Spills	12. Spill and absorbent materials will be readily available. All waste materials generated will be contained in 55-gallon drums.	JS 03/14/01
	13. Biological Hazards	13. Follow procedures outlined in Section 6.4.3 of the General Site-Wide Work Plan.	JS 03/14/01
	14. Hand and Power Tools	14. The proper tools will be used for each task, all tools will be inspected before each use, damaged tools will be removed from service, and tools will be used in accordance with manufacturer's instructions.	JS 03/14/01

EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
<ol style="list-style-type: none"> 1. Level D PPE 2. First Aid Kits 3. Portable Eyewash 4. Fire Extinguishers 5. Heavy Equipment 6. Hand and Power Tools 	<ol style="list-style-type: none"> 1. Pre-use inspection 2. Inspect first aid kits monthly. 3. Inspect portable eyewash monthly 4. Inspect fire extinguishers monthly 5. Conduct pre-use inspections 6. Conduct pre-use inspections 	<ol style="list-style-type: none"> 1. Personnel have read and comply with SSHP 2. Site-specific training 3. At least 2 individuals on-site will have current CPR and First Aid training 4. Instruct personnel on proper use of fire extinguishers 5. Competent operators will be used 6. Instruct personnel on proper use of hand and power tools

ACTIVITY HAZARD ANALYSIS

Project: <u>Bravo EE/CA, Clearance Activities</u>		Location: <u>Fort McClellan, Anniston, Alabama</u>	
Activity: <u>OE surface survey</u>			
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/ CONTROLS	ANALYZED BY/ DATE
1. Initial/surficial OE survey of study areas.	1. Exposure to OE/chemical hazards	1. Wear Level D PPE per Section 6.0; follow procedures in the UXO/OE Operational Plan; practice contamination avoidance; follow good personal hygiene practices.	JS 03/14/01
	2. Back Injuries	2. Site personnel will be instructed on proper lifting techniques; Mechanical devices should be used to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available.	JS 03/14/01
	3. Temperature Extremes	3. Site personnel will be trained about signs and symptoms of heat and cold stress; FWENC Program EHS 4-6 will be followed.	JS 03/14/01
	4. Slips/Trips/Falls	4. Maintain work areas safe and orderly; unloading areas should be on even terrain; watch for uneven terrain, stumps, and vegetation in walk areas; mark tripping hazards and repair if possible.	JS 03/14/01
	5. Overhead Hazards	5. Personnel will be required to wear hard hats.	JS 03/14/01
	6. Dropped Objects	6. Composite toe boots will be worn.	JS 03/14/01
	7. Hand and Power Tools	7. The proper tools will be used for each task, all tools will be inspected before each use, damaged tools will be removed from service, and tools will be used in accordance with manufacturer's instructions.	JS 03/14/01
	8. Eye Injuries	8. Safety glasses will be worn. A portable eye wash station will be located adjacent to work activities.	JS 03/14/01
	9. Sharp Objects	9. Cut resistant work gloves will be worn; All hand and power tools will be maintained in safe condition; first aid kits will be available by work area.	JS 03/14/01
	10. Biological Hazards	10. Follow control measures outlined in Section 6.4.3 of the General Site-Wide Work Plan	JS 03/14/01
EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS	
1. Level D PPE 2. First Aid Kits 3. Portable Eyewash 4. Fire Extinguishers 5. Geophysical Survey Equipment 6. Hand and Power Tools	1. Pre-use inspection 2. Inspect first aid kits monthly. 3. Inspect portable eyewash monthly 4. Inspect fire extinguishers monthly 5. Conduct pre-use inspections 6. Conduct pre-use inspections	1. Personnel have read and comply with SSHP 2. Site specific training 3. At least 2 individuals on-site will have current CPR and First Aid training 4. Instruct personnel on proper use of fire extinguishers 5. Competent operators will be used 6. Instruct personnel on proper use of hand and power tools	

ACTIVITY HAZARD ANALYSIS

Project: <u>Bravo EE/CA, Clearance Activities</u>		Location: <u>Fort McClellan, Anniston, Alabama</u>	
Activity: <u>Survey study areas, establish corners and boundaries</u>			
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS	ANALYZED BY/ DATE
1. Conventional survey of study areas, establish corners and bounds.	1. Exposure to OE/chemical hazards	1. Wear Level D PPE per Section 6.0; follow procedures in the UXO/OE Operational Plan; practice contamination avoidance; follow good personal hygiene practices.	JS 03/14/01
	2. Back Injuries	2. Site personnel will be instructed on proper lifting techniques; Mechanical devices should be used to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available.	JS 03/14/01
	3. Temperature Extremes	3. Site personnel will be trained about signs and symptoms of heat and cold stress; FWENC Program EHS 4-6 will be followed.	JS 03/14/01
	4. Slips/Trips/Falls	4. Maintain work areas safe and orderly; unloading areas should be on even terrain; watch for uneven terrain, stumps, and vegetation in walk areas; mark tripping hazards and repair if possible.	JS 03/14/01
	5. Dropped Objects	5. Composite toe boots will be worn.	JS 03/14/01
	6. Hand and Power Tools	6. The proper tools will be used for each task, all tools will be inspected before each use, damaged tools will be removed from service, and tools will be used in accordance with manufacturer's instructions.	JS 03/14/01
	7. Eye Injuries	7. Safety glasses will be worn. A portable eye wash station will be located adjacent to work activities.	JS 03/14/01
	8. Sharp Objects	8. Cut resistant work gloves will be worn; All hand and power tools will be maintained in safe condition; first aid kits will be available by work area.	JS 03/14/01
	9. Biological Hazards	9. Follow control measures outlined in Section 6.4.3 of the General Site-Wide Work Plan. If poisonous plants are present, PPE will be upgraded to include tyvek and gloves.	JS 03/14/01
	EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
1. Level D PPE 2. First Aid Kits 3. Portable Eyewash 4. Fire Extinguishers 5. Conventional Survey Equipment 6. Hand and Power Tools	1. Pre-use inspection 2. Inspect first aid kits monthly. 3. Inspect portable eyewash monthly 4. Inspect fire extinguishers monthly 5. Conduct pre-use inspections 6. Conduct pre-use inspections	1. Personnel have read and comply with SSHP 2. Site specific training 3. At least 2 individuals on-site will have current CPR and First Aid training 4. Instruct personnel on proper use of fire extinguishers 5. Competent operators will be used 6. Instruct personnel on proper use of hand and power tools	

ACTIVITY HAZARD ANALYSIS

Project: <u>Bravo EE/CA, Clearance Activities</u>		Location: <u>Fort McClellan, Anniston, Alabama</u>	
Activity: <u>Brush clearance</u>			
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS	ANALYZED BY / DATE
1. Tree and Brush Trimming	1. Exposure to OE/chemical hazards	1. Wear Level D PPE per Section 6.0; follow procedures in the UXO/OE Operational Plan; practice contamination avoidance; follow good personal hygiene practices.	JS 03/14/01
	2. Back Injuries	2. Site personnel will be instructed on proper lifting techniques; Mechanical devices should be used to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available.	JS 03/14/01
	3. Heavy Equipment Operation	3. A small tractor and a Brush hog or similar equipment will be used on the Bravo EE/CA. Follow procedures in Section 6.15.2 of the General Site-Wide Work Plan, equipment will have rollover protective structures and seat belts; operators shall wear seat belts when operating equipment; do not operate equipment on grades which exceed manufacturer's recommendations; equipment will have guards, canopies or grills to protect from flying objects; ground personnel will stay clear of all suspended loads; all slings chains and ropes will be rated for the load in which it is expected to lift; spills and absorbent materials will be readily available; drip pans, polyethylene sheeting or other means will be used for secondary containment; eye contact with operators will be made before approaching equipment; equipment will not be approached on blind sides; avoid equipment swing areas; know hand signals; all equipment will be equipped with backup alarms, and all equipment will be outfitted with fire extinguishers.	JS 03/14/01
	4. Temperature Extremes	4. Site personnel will be trained about signs and symptoms of heat and cold stress; FWENC Program EHS 4-6 will be followed.	JS 03/14/01
	5. Slips/Trips/Falls	5. Maintain work areas safe and orderly; unloading areas should be on even terrain; watch for uneven terrain, stumps, and vegetation in walk areas; mark tripping hazards and repair if possible.	JS 03/14/01
	6. Vehicular Traffic	6. Spotters will be used when backing up trucks and heavy equipment; trucks and heavy equipment will be equipped with back up alarms; traffic cones/vests will be used when working in public traffic areas.	JS 03/14/01
	7. Overhead Hazards	7. Personnel will be required to wear hard hats.	JS 03/14/01
	8. Dropped Objects	8. Composite toe boots will be worn.	JS 03/14/01
	9. Noise	9. Hearing protection with a noise reduction rating capable of maintaining personal exposure below 85 dBA (ear muffs or plugs) will be worn as needed during heavy equipment operations and during power tool use; all equipment will be equipped with manufacturer's required mufflers.	JS 03/14/01
	10. Eye Injuries	10. Face shield and safety glasses will be worn by all personnel engaged in tree and brush trimming operations. A portable eye wash station will be located adjacent to work activities.	JS 03/14/01
	11. Sharp Objects/Cuts	11. Kevlar chaps and cut-resistant work gloves will be worn; All hand and power tools will be maintained in safe condition; first aid kits will be available by work area.	JS 03/14/01
	12. Fire	12. 10 lb. ABC type fire extinguisher will be located adjacent to work area; all gasoline-powered equipment will be grounded.	JS 03/14/01
	13. Spills	13. Spill and absorbent materials will be readily available; all waste materials generated will be contained in 55-gallon drums.	JS 03/14/01
	14. Biological Hazards	14. Follow control measures outlined in Section 6.4.3 of the General Site-Wide Work Plan. If poisonous plants are present, PPE will be upgraded to include tyvek and gloves.	JS 03/14/01
	15. Hand and Power Tools	15. The proper tools will be used for each task, all tools will be inspected before each use, damaged tools will be removed from service, and tools will be used in accordance with manufacturer's instructions. Follow procedures in Sections 8.4.2.5 through 8.4.2.10 of the Site-Specific SSHP	JS 03/14/01

EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
<ol style="list-style-type: none"> 1. Level D PPE 2. First Aid Kits 3. Portable Eyewash 4. Fire Extinguishers 5. Heavy Equipment 6. Hand and Power Tools 	<ol style="list-style-type: none"> 1. Pre-use inspection 2. Inspect first aid kits monthly. 3. Inspect portable eyewash monthly 4. Inspect fire extinguishers monthly 5. Conduct pre-use inspections 6. Conduct pre-use inspections 	<ol style="list-style-type: none"> 1. Personnel have read and comply with SSHP 2. Site specific training 3. At least 2 individuals on-site will have current CPR and First Aid training 4. Instruct personnel on proper use of fire extinguishers 5. Competent operators will be used 6. Instruct personnel on proper use of hand and power tools

ACTIVITY HAZARD ANALYSIS

Project: <u>Bravo EE/CA, Clearance Activities</u>		Location: <u>Fort McClellan, Anniston, Alabama</u>	
Activity: <u>Establish geophysical test lines and grids</u>			
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS	ANALYZED BY / DATE
1. Establish geophysical test lines and grids in study areas.	1. Exposure to OE/chemical hazards	1. Wear Level D PPE per Section 6.0; follow procedures in the UXO/OE Operational Plan; practice contamination avoidance; follow good personal hygiene practices.	JS 03/14/01
	2. Back Injuries	2. Site personnel will be instructed on proper lifting techniques; Mechanical devices should be used to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available.	JS 03/14/01
	3. Temperature Extremes	3. Site personnel will be trained about signs and symptoms of heat and cold stress; FWENC Program EHS 4-6 will be followed.	JS 03/14/01
	4. Slips/Trips/Falls	4. Maintain work areas safe and orderly; unloading areas should be on even terrain; watch for uneven terrain, stumps, and vegetation in walk areas; mark tripping hazards and repair if possible.	JS 03/14/01
	5. Hand and Power Tools	5. The proper tools will be used for each task, all tools will be inspected before each use, damaged tools will be removed from service, and tools will be used in accordance with manufacturer's instructions.	JS 03/14/01
	6. Dropped Objects	6. Composite toe boots will be worn.	JS 03/14/01
	7. Eye Injuries	7. Safety glasses will be worn. A portable eye wash station will be located adjacent to work activities.	JS 03/14/01
	8. Sharp Objects	8. Cut resistant work gloves will be worn; All hand and power tools will be maintained in safe condition; first aid kits will be available by work area.	JS 03/14/01
	9. Biological hazards	9. Follow control measures outlined in Section 6.4.3 of the General Site-Wide Work Plan.	JS 03/14/01
	EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
1. Level D PPE 2. First Aid Kits 3. Portable Eyewash 4. Fire Extinguishers 5. Conventional Survey Equipment 6. Hand and Power Tools	1. Pre-use inspection 2. Inspect first aid kits monthly. 3. Inspect portable eyewash monthly 4. Inspect fire extinguishers monthly 5. Conduct pre-use inspections 6. Conduct pre-use inspections	1. Personnel have read and comply with SSHP 2. Site specific training 3. At least 2 individuals on-site will have current CPR and First Aid training 4. Instruct personnel on proper use of fire extinguishers 5. Competent operators will be used 6. Instruct personnel on proper use of hand and power tools	

ACTIVITY HAZARD ANALYSIS

Project: <u>Bravo EE/CA, Clearance Activities</u>		Location: <u>Fort McClellan, Anniston, Alabama</u>	
Activity: <u>Conduct geophysical surveys</u>			
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS	ANALYZED BY / DATE
1. Conduct geophysical survey in study areas.	1. Exposure to OE/chemical hazards	1. Wear Level D PPE per Section 6.0; follow procedures in the UXO/OE Operational Plan; practice contamination avoidance; follow good personal hygiene practices.	JS 03/14/01
	2. Back Injuries	2. Ensure that USRAD equipment system/harnesses are properly donned and balanced. Site personnel will be instructed on proper lifting techniques; Mechanical devices should be used to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available.	JS 03/14/01
	3. Temperature Extremes	3. Site personnel will be trained about signs and symptoms of heat and cold stress; FWENC Program EHS 4-6 will be followed.	JS 03/14/01
	4. Slips/Trips/Falls	4. Ensure area has been adequately cleared of tree/brush prior to starting; maintain work areas safe and orderly; unloading areas should be on even terrain; watch for uneven terrain, stumps, and vegetation in walk areas; mark tripping hazards and repair if possible.	JS 03/14/01
	5. Hand and Power Tools	5. The proper tools will be used for each task, all tools will be inspected before each use, damaged tools will be removed from service, and tools will be used in accordance with manufacturer's instructions.	JS 03/14/01
	6. Dropped Objects	6. Composite toe boots will be worn.	JS 03/14/01
	7. Eye Injuries	7. Safety glasses will be worn. A portable eye wash station will be located adjacent to work activities.	JS 03/14/01
	8. Biological Hazards	8. Follow control measures outlined in Section 6.4.3 of the General Site-Wide Work Plan.	JS 03/14/01
EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS	
1. Level D PPE 2. First Aid Kits 3. Portable Eyewash 4. Fire Extinguishers 5. USRAD Equipment 6. Hand and Power Tools	1. Pre-use inspection 2. Inspect first aid kits monthly. 3. Inspect portable eyewash monthly 4. Inspect fire extinguishers monthly 5. Conduct pre-use inspections 6. Conduct pre-use inspections	1. Personnel have read and comply with SSHP 2. Site specific training 3. At least 2 individuals on-site will have current CPR and First Aid training 4. Instruct personnel on proper use of fire extinguishers 5. Competent operators will be used 6. Instruct personnel in proper use of hand and power tools	

ACTIVITY HAZARD ANALYSIS

Project: <u>Bravo EE/CA, Clearance Activities</u>		Location: <u>Fort McClellan, Anniston, Alabama</u>	
Activity: <u>Excavate Anomalies</u>			
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS	ANALYZED BY / DATE
1. Excavation of magnetic anomalies in study areas.	1. Exposure to OE/chemical hazards	1. Wear Level D PPE per Section 6.0; follow procedures in the UXO/OE Operational Plan; practice contamination avoidance; follow good personal hygiene practices.	JS 03/14/01
	2. Back Injuries	2. Site personnel will be instructed on proper lifting techniques; Mechanical devices should be used to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available.	JS 03/14/01
	3. Temperature Extremes	3. Site personnel will be trained about signs and symptoms of heat and cold stress; FWENC Program EHS 4-6 will be followed.	JS 03/14/01
	4. Slips/Trips/Falls	4. Maintain work areas safe and orderly; unloading areas should be on even terrain; watch for uneven terrain, stumps, and vegetation in walk areas; mark tripping hazards and repair if possible.	JS 03/14/01
	5. Overhead Hazards	5. Personnel will be required to wear hard hats.	JS 03/14/01
	6. Dropped Objects	6. Composite toe boots will be worn.	JS 03/14/01
	7. Eye Injuries	7. Safety glasses will be worn. A portable eye wash station will be located adjacent to work activities.	JS 03/14/01
	8. Sharp Objects	8. Cut resistant work gloves will be worn; All hand and power tools will be maintained in safe condition; first aid kits will be available by work area.	JS 03/14/01
	9. Fire	9. 10 lb. ABC type fire extinguisher will be located adjacent to work area; all gasoline powered equipment will be grounded.	JS 03/14/01
	10. Spills	10. Spill and absorbent materials will be readily available; all waste materials generated will be contained in 55-gallon drums.	JS 03/14/01
	11. Hand Tools	11. The proper tools will be used for each task, all tools will be inspected before each use, damaged tools will be removed from service, and tools will be used in accordance with manufacturer's instructions.	JS 03/14/01
	12. Biological Hazards	12. Follow control measures outlined in Section 6.4.3 of the General Site-Wide Work Plan. If poisonous plants are present, PPE will be upgraded to include tyvek and gloves.	JS 03/14/01
	EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
1. Level D PPE 2. First Aid Kits 3. Portable Eyewash 4. Fire Extinguishers 5. Heavy Equipment 6. Hand and Power Tools	1. Pre-use inspection 2. Monthly inspections will be performed on first aid kits. 3. Portable eye wash will be inspected monthly. 4. Monthly inspections will be performed on fire extinguishers 5. Conduct pre-use inspections	1. Personnel have read and comply with SSHP 2. Site specific training 3. At least 2 individuals on-site will have current CPR and First Aid training 4. Instruct personnel on proper use of fire extinguishers 5. Competent operators will be used 6. Instruct personnel in proper use of hand and power tools	

ACTIVITY HAZARD ANALYSIS

Project: <u>Bravo EE/CA, Clearance Activities</u> Activity: <u>Decontaminate heavy equipment</u>		Location: <u>Fort McClellan, Anniston, Alabama</u>	
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS	ANALYZED BY / DATE
1. Steam clean heavy equipment and accessories (Hazards and controls 1 –14 apply)	1. Back Injuries	1. Site personnel will be instructed on proper lifting techniques; mechanical devices should be used to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available.	JS 03/14/01
	2. Slips/Trips/Falls	2. Maintain work areas safe and orderly; unloading areas should be on even terrain; mark and repair if possible tripping hazards.	JS 03/14/01
	3. Vehicular Traffic	3. Spotters will be used when backing up trucks and heavy equipment and moving equipment. When working on or near roadways, the area will be clearly marked with traffic cones or high visibility fencing. Workers will wear high-visibility, traffic, safety vests. Work done in the roadway proper will be limited. Coordinate with facility personnel if road closings are necessary.	JS 03/14/01
	4. Overhead Hazards	4. Personnel will be required to wear hard hats that meet ANSI Standard Z89.1. All ground personnel will stay clear of suspended loads and equipment swing areas. All equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects. All overhead hazards will be identified prior to commencing work operations.	JS 03/14/01
	5. Dropped Objects	5. Composite toe boots meeting ANSI Standard Z41 will be worn during all site activities.	JS 03/14/01
	6. Chemical Hazards	6. Wear PPE per Table 6-1; practice contamination avoidance; follow good personal hygiene practices	JS 03/14/01
	7. Steam/Heat/Splashing	7. Use face shield and safety glasses or goggles; stay out of the splash/steam radius; do not direct steam at anyone; do not hold objects with your foot and steam area near it; ensure that direction of spray minimizes spread of constituents of concern; use shielding as necessary, personnel will be trained on the proper operation of pressure washer, pressure washer wand will be equipped with a dead man's switch.	JS 03/14/01
	8. Pinch/Cut/Smash	8. Use hand tools properly and wear appropriate protective equipment, cut resistant work gloves will be worn when dealing with sharp objects; all hand and power tools will be maintained in safe condition; guards will be kept in place while using hand and power tools.	JS 03/14/01
	9. Temperature Extremes	9. Drink plenty of fluids; train personnel of signs/symptoms of heat/cold stress; monitor air temperatures when extreme weather conditions are present; stay in visual and verbal contact with your buddy; and use Temperature Extremes program EHS 4-6.	JS 03/14/01
	10. Hand and Power Tools	10. Daily inspections will be performed; remove broken or damaged tools from service; use the tool for its intended purpose; and use in accordance with manufacturer's instructions.	JS 03/14/01
	11. Inclement Weather	11. Monitor weather conditions daily.	JS 03/14/01
	12. Eye Injuries	12. Face shields and safety glasses meeting ANSI Standard Z87 will be worn.	JS 03/14/01
	13. Heavy Equipment Operation	13. Equipment will have seat belts; operators shall wear seat belts when operating equipment; do not operate equipment on grades which exceed manufacturer's recommendations; equipment will have guards, canopies or grills to protect from flying objects; ground personnel will stay clear of all suspended loads; spill and absorbent materials will be readily available; drip pans, polyethylene sheeting or other	JS 03/14/01

Project: <u>Bravo EE/CA, Clearance Activities</u>		Location: <u>Fort McClellan, Anniston, Alabama</u>	
Activity: <u>Decontaminate heavy equipment</u>			
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS	ANALYZED BY / DATE
		means will be used for secondary containment; ground personnel will stay out of the swing radius; eye contact with operators will be made before approaching equipment; equipment will not be approached on blind sides; all equipment will be equipped with backup alarms.	
	14. Struck by/Burns	14. Personnel operating the pressure washer will use the lowest effective pressure and temperature settings on the pressure washer. Pressure washer spray/stream will not be aimed at people. Personnel using pressure washer will not use hands, feet or knees to brace or hold material to be pressure washed. Pressure washer will not be used to clean personnel boots. Thermal/insulated boots may be used during pressure washing operations.	JS 03/14/01
EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS	
1. Heavy equipment 2. Pressure washer 3. Appropriate PPE	1. Initial inspection of heavy equipment will be performed upon arriving on-site. 2. Pressure washers will be inspected daily, prior to each day's use. 3. PPE will be inspected before and after each use.	1. Personnel have read and will comply with SSHP. 2. Personnel will receive Site specific training. 3. Only qualified operators can operate heavy equipment or vehicles. 4. Personnel will have knowledge of proper use of pressure washer. 5. At least 2 individuals on-site will have current CPR and first aid training.	

APPENDIX G
Emergency Hospital Route

Fort McClellan
Bravo EECA Evac Routes
Map Date: 2 April 01
HU:DCR Foster Wheeler

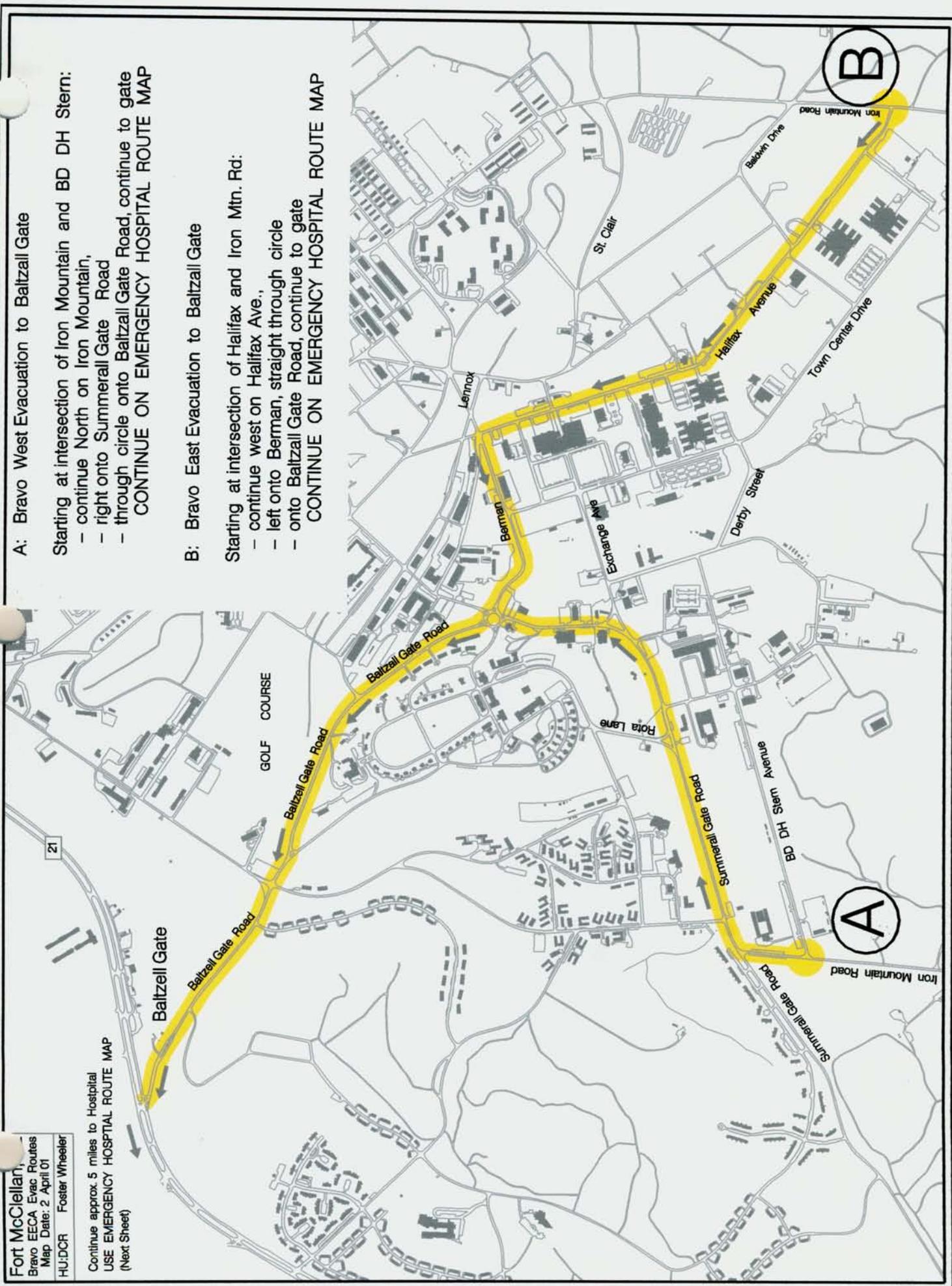
Continue approx. 5 miles to Hospital
USE EMERGENCY HOSPITAL ROUTE MAP
(Next Sheet)

A: Bravo West Evacuation to Baltzell Gate

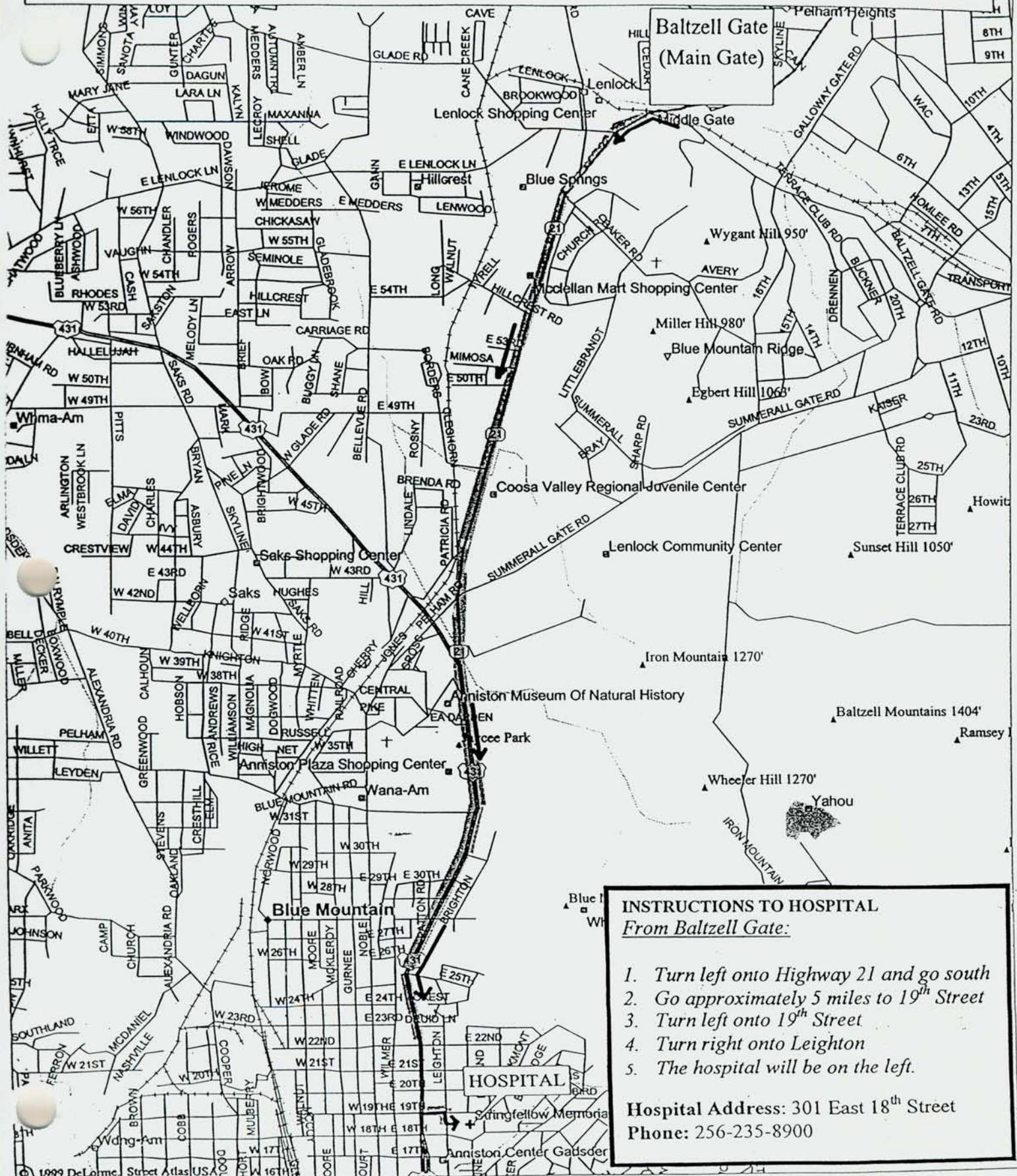
- Starting at intersection of Iron Mountain and BD DH Stern:
- continue North on Iron Mountain,
 - right onto Summerall Gate Road
 - through circle onto Baltzell Gate Road, continue to gate
- CONTINUE ON EMERGENCY HOSPITAL ROUTE MAP

B: Bravo East Evacuation to Baltzell Gate

- Starting at intersection of Halifax and Iron Mtn. Rd.:
- continue west on Halifax Ave.,
 - left onto Berman, straight through circle
 - onto Baltzell Gate Road, continue to gate
- CONTINUE ON EMERGENCY HOSPITAL ROUTE MAP



Emergency Hospital Route



INSTRUCTIONS TO HOSPITAL
From Baltzell Gate:

1. Turn left onto Highway 21 and go south
2. Go approximately 5 miles to 19th Street
3. Turn left onto 19th Street
4. Turn right onto Leighton
5. The hospital will be on the left.

Hospital Address: 301 East 18th Street
Phone: 256-235-8900

APPENDIX H

**Deficiency Report,
Nonconformance Report,
Deficiency/ NCR Action Log, and
QC Surveillance Report**

**DEFICIENCY REPORT
DACA87-99-D-0010
Former Ft. McClellan**

Corrective Action Request		
CAR/Deficiency Number:	Date:	
Organization/Project/Team/Activity:	Person Contacted:	
Observation/Condition/Deficiency:		
Reference:		
Corrective Action Recommendation:		
Originator:	Signature:	
Site QC Representative:	Signature:	Date:
Corrective Action Response		
Responsible Manager/Designee:	Date:	Telephone/Email Address:
Immediate Action Taken:		
Root Cause:		
Corrective Action Taken to Prevent Reoccurrence:		
Corrective Action Taken By:	Signature:	Date:
Evaluation		
Responsible Manager:	Signature:	Date:
QC Comments:		
Site QC Representative:	Signature:	Date:
<input type="checkbox"/> Acceptable <input type="checkbox"/> Unacceptable		
Distribution		
<input type="checkbox"/> PM <input type="checkbox"/> DOM <input type="checkbox"/> CEHNC <input type="checkbox"/> Site Superintendent <input type="checkbox"/> SUXOSS <input type="checkbox"/> Program QC Manager <input type="checkbox"/> Other:		

NONCONFORMANCE REPORT
DACA87-99-D-0010
Former Ft. McClellan

Corrective Action Request		
Nonconformance Report Number:	Date:	
Organization/Project/Team/Activity:	Person Contacted:	
Nonconformance:		
Reference:		
Corrective Action Recommendation:		
Originator:	Signature:	
Site QC Representative:	Signature:	Date:
Corrective Action Response		
Responsible Manager/Designee:	Date:	Telephone/Email Address:
Immediate Action Taken:		
Root Cause:		
Corrective Action Taken to Prevent Reoccurrence:		
Corrective Action Taken By:	Signature:	Date:
Evaluation		
Responsible Manager:	Signature:	Date:
QC Comments:		
Site QC Representative:	Signature:	Date:
<input type="checkbox"/> Acceptable <input type="checkbox"/> Unacceptable		
Distribution		
<input type="checkbox"/> PM <input type="checkbox"/> DOM <input type="checkbox"/> CEHNC <input type="checkbox"/> Site Superintendent <input type="checkbox"/> SUXOSS <input type="checkbox"/> Program QC Manager <input type="checkbox"/> Other:		

DEFICIENCY/NCR ACTION LOG
DACA87-99-D-0010
Former Ft McClellan

Deficiency #:	Date:	Description:	Responsible Party:	Closed Date:
NCR #:	QC Rep:		Due Date:	Closed By:
Deficiency #:	Date:	Description:	Responsible Party:	Closed Date:
NCR #:	QC Rep:		Due Date:	Closed By:
Deficiency #:	Date:	Description:	Responsible Party:	Closed Date:
NCR #:	QC Rep:		Due Date:	Closed By:
Deficiency #:	Date:	Description:	Responsible Party:	Closed Date:
NCR #:	QC Rep:		Due Date:	Closed By:
Deficiency #:	Date:	Description:	Responsible Party:	Closed Date:
NCR #:	QC Rep:		Due Date:	Closed By:
Deficiency #:	Date:	Description:	Responsible Party:	Closed Date:
NCR #:	QC Rep:		Due Date:	Closed By:
Deficiency #:	Date:	Description:	Responsible Party:	Closed Date:
NCR #:	QC Rep:		Due Date:	Closed By:
Deficiency #:	Date:	Description:	Responsible Party:	Closed Date:
NCR #:	QC Rep:		Due Date:	Closed By:

QC SURVEILLANCE REPORT
DACA87-99-D-0010
Former Ft. McClellan

1 - Definable Feature of Work			
<input type="checkbox"/> Project Management	<input type="checkbox"/> Geophysical Investigation	<input type="checkbox"/> Data Management	<input type="checkbox"/> Brush Cutting/Clearing
<input type="checkbox"/> Intrusive Investigation	<input type="checkbox"/> UXO Avoidance	<input type="checkbox"/> Demolition	<input type="checkbox"/> Other:
2 - Phase			
<input type="checkbox"/> Preparatory	<input type="checkbox"/> Initial	<input type="checkbox"/> Follow up	
3 - References			
4 - Observed Condition/Activities:			
5 - Comments:			
6 - Results of Surveillance			
<input type="checkbox"/> Acceptable	<input type="checkbox"/> Unacceptable	Deficiency #: NCR #:	
Conducted By:	Signature:	Date:	
7- Site QC Representative Comments			
8 - Site QC Representative Review			
<input type="checkbox"/> Concur <input type="checkbox"/> Non-Concur	Signature:	Date	
9 - Distribution			
<input type="checkbox"/> PM	<input type="checkbox"/> DOM	<input type="checkbox"/> CEHNC	<input type="checkbox"/> Site Superintendent
<input type="checkbox"/> SUXOSS	<input type="checkbox"/> Program QC Manager	<input type="checkbox"/> Other:	