

1 **12.0 M3-1H-Rocket Area-D**

2 **12.1 DESCRIPTION AND HISTORY**

3 This sector consists of approximately 13 acres located north and adjacent to the Eastern Bypass,
4 which bisects the Bravo Area. This sector has a projected land use of Retail. Portions of a
5 Machine Gun Range (OA-2) and Combat Range #2 (OA-52) were historically located in this
6 sector. The Machine Gun Range, used during WWII, was part of Combat Range #2. It was used
7 as a rifle grenade range during WWII and was abandoned in 1958.

8 12.1.1 Clearance to Depth was performed within M3-1H-Rocket Area-D, as part of an interim
9 removal action of the EBP "Y" Area Junction between April and November 2003 (see section on
10 Interim Removal Actions in Chapter 2). The final report is in Draft Final form and there is
11 currently no statement of clearance.

12 **12.2 INVESTIGATION RESULTS**

13 During the site characterization of Bravo, 2 grids in this OE Risk Assessment Sector were
14 geophysically mapped and both of these grids were then intrusively investigated. Delineation
15 transects were a second investigation method used specifically to characterize suspected areas
16 with a high likelihood of containing OE in this OE Risk Assessment Sector. The following
17 delineation transects were placed in this OE Risk Assessment Sector: M31H008, part of
18 M31H009, and part of M31M008. The following data collection transects (or clusters),
19 consisting of a series of 200-foot long, parallel segments spaced 25 to 50 feet apart, were
20 investigated: part of M31M107, part of M31M117, M31M118, part of M31M123, and
21 M31M124. A total of 1.06 acres in grids and 0.95 acres in transects were geophysically mapped.
22 A total of 1.03 acres in grids and 0.28 acres in transects were intrusively investigated.

23 12.2.1 Ten UXO items were found on the surface and at depths to 18 inches. Approximately
24 102, OE Scrap items, with some additional indeterminate amounts of OE, were found on the
25 surface, at shallow depths, and a few items at depths up to 18 inches. In addition, IT found one
26 OE Scrap item on the surface. Table 12-1 contains a list of OE and OE Scrap items found within
27 this OE Risk Assessment Sector. Figure B-2 in Appendix B presents an overview figure of the
28 Bravo Area with this OE Risk Assessment Sector and Appendix F contains a list of all items
29 from the database developed for this OE Risk Assessment Sector.

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Table 12-1
List of OE and OE Scrap Items Found in M3-1H Rocket Area-D

Item Description	Quantity	Depth (inches)	Target Type	Grid ID/Transect	Anomaly ID
UXO Items:					
MORTAR, 3in STOKES, MKI, PRACTICE	1	2	UXO	190	11
ROCKET MOTOR, 2.36in	3	8	UXO	190	20
ROCKET, HEAT, 2.36in, M6	1	18	UXO	190	39
ROCKET MOTOR, 2.36in	1	18	UXO	190	39
FUZE, 2.36in ROCKET, LIVE	1	1	UXO	190	43
FUZE, 2.36in ROCKET, LIVE	1	5	UXO	190	47
ROCKET MOTOR, 2.36in	1	5	UXO	190	47
ROCKET, HEAT, 2.36in, M6	1	0	UXO	M31m107	4
OE Scrap Items:					
GRENADE FUZES	2	0	OE Scrap	189	3
ROCKET MOTOR, 2.36in, EXPENDED	1	1	OE Scrap	189	4
SIGNAL, ILLUMINATION, GROUND, M127 SERIES, EXPENDED	1	4	OE Scrap	189	5
ROCKET MOTOR, 2.36in, EXPENDED,	1	1	OE Scrap	189	6
GRENADE SPOONS	2	1	OE Scrap	189	6
GRENADE SPOON	1	2	OE Scrap	189	7
SIGNAL, ILLUMINATION, GROUND, M127 SERIES, EXPENDED	1	1	OE Scrap	189	8
GRENADE SPOON	1	1	OE Scrap	189	8
SIGNAL, ILLUMINATION, GROUND, M127 SERIES, EXPENDED	1	1	OE Scrap	189	9
SIGNAL, ILLUMINATION, GROUND, M127 SERIES, EXPENDED	1	2	OE Scrap	189	10
GROUND ILLUMINATOR BRACKET	1	6	OE Scrap	189	11
GRENADE SPOON	1	6	OE Scrap	189	11
GROUND ILLUMINATOR FUZES	2	2	OE Scrap	189	12
ROCKET MOTOR, 2.36in, EXPENDED	1	3	OE Scrap	189	13
GROUND ILLUMINATOR FUZE	1	2	OE Scrap	189	16
ROCKET MOTOR, 2.36in, EXPENDED	1	1	OE Scrap	189	17
FRAGMENTATION	1	1	OE Scrap	189	17
GRENADE FUZE	1	2	OE Scrap	189	18
GRENADE FUZE	1	2	OE Scrap	189	19
GRENADE SPOON	1	1	OE Scrap	189	20
ROCKET MOTOR, 2.36in, EXPENDED	1	1	OE Scrap	189	21
GRENADE FUZE	1	0	OE Scrap	189	23
GROUND ILLUMINATOR PIECES	*	1	OE Scrap	189	23
ROCKET MOTOR, 2.36in	1	18	OE Scrap	190	39
ROCKET MOTOR, 2.36in, EXPENDED	1	2	OE Scrap	190	2
SIGNAL, SMOKE, GROUND, M62 SERIES, EXPENDED	1	2	OE Scrap	190	4
ROCKET MOTOR, 2.36in, EXPENDED	1	1	OE Scrap	190	5
ROCKET MOTOR, 2.36in, EXPENDED	1	2	OE Scrap	190	6
ROCKET MOTOR, 2.36in, EXPENDED	1	2	OE Scrap	190	7
ROCKET MOTOR, 2.36in, EXPENDED	1	0	OE Scrap	190	8

Table 12-1
List of OE and OE Scrap Items Found in M3-1H Rocket Area-D

Item Description	Quantity	Depth (inches)	Target Type	Grid ID/Transect	Anomaly ID
ROCKET MOTOR, 2.36in, EXPENDED	1	4	OE Scrap	190	9
ROCKET MOTOR, 2.36in, EXPENDED	1	2	OE Scrap	190	10
ROCKET MOTOR, 2.36in, EXPENDED	1	4	OE Scrap	190	12
ROCKET MOTOR, 2.36in, EXPENDED	1	1	OE Scrap	190	13
ROCKET MOTOR, 2.36in, EXPENDED	1	2	OE Scrap	190	15
ROCKET FRAGMENTATION, PRACTICE, 2.36in, M7	1	3	OE Scrap	190	15
ROCKET MOTOR, 2.36in, EXPENDED	1	3	OE Scrap	190	16
ROCKET MOTOR, 2.36in, EXPENDED	1	0	OE Scrap	190	17
ROCKET MOTOR, 2.36in, EXPENDED	1	1	OE Scrap	190	18
ROCKET MOTORS, 2.36in, EXPENDED	2	2	OE Scrap	190	19
ROCKET MOTORS, 2.36in, EXPENDED	2	3	OE Scrap	190	20
ROCKET MOTOR, 2.36in, EXPENDED	1	3	OE Scrap	190	21
FRAGMENTATION	2	3	OE Scrap	190	21
ROCKET MOTOR, 2.36in, EXPENDED	1	2	OE Scrap	190	22
ROCKET FRAGMENTATION	**	14	OE Scrap	190	23
ROCKET MOTOR, 2.36in, EXPENDED	1	3	OE Scrap	190	24
ROCKET FRAGMENTATION	**	7	OE Scrap	190	25
ROCKET FRAGMENTATION	**	4	OE Scrap	190	26
SIGNAL, ILLUMINATION, GROUND, M127 SERIES, EXPENDED	1	1	OE Scrap	190	27
ROCKET MOTOR, 2.36in, EXPENDED	1	0	OE Scrap	190	28
ROCKET MOTOR, 2.36in, EXPENDED	2	2	OE Scrap	190	29
ROCKET MOTOR, 2.36in, EXPENDED	1	2	OE Scrap	190	30
ROCKET MOTOR, 2.36in, EXPENDED	1	8	OE Scrap	190	31
ROCKET MOTOR, 2.36in, EXPENDED	1	4	OE Scrap	190	32
ROCKET MOTOR, 2.36in, EXPENDED	1	1	OE Scrap	190	32
FRAGMENTATION	1	1	OE Scrap	190	32
ROCKET MOTOR, 2.36in, EXPENDED	1	6	OE Scrap	190	33
ROCKET MOTOR, 2.36in, EXPENDED,	1	4	OE Scrap	190	34
ROCKET FRAGMENTATION	**	4	OE Scrap	190	34
ROCKET MOTOR, 2.36in, EXPENDED	1	6	OE Scrap	190	35
ROCKET MOTOR, 2.36in, EXPENDED	2	6	OE Scrap	190	36
FRAGMENTATION	3	6	OE Scrap	190	36
ROCKET MOTOR, 2.36in, EXPENDED	1	3	OE Scrap	190	37
ROCKET MOTOR, 2.36in, EXPENDED	2	18	OE Scrap	190	38
ROCKET MOTOR, 2.36in, EXPENDED	1	2	OE Scrap	190	40
GRENADE SPOON	1	3	OE Scrap	190	41
GRENADE FUZE	1	3	OE Scrap	190	41
ROCKET MOTOR, 2.36in, EXPENDED	1	3	OE Scrap	190	41
MORTAR BASE, 3in STOKES, MKI	1	6	OE Scrap	190	42
ROCKET MOTOR, 2.36in, EXPENDED	1	11	OE Scrap	190	44
FRAGMENTATION	3	11	OE Scrap	190	44
PROJECTILE FRAGMENTATION	**	9	OE Scrap	190	45
STOKES MORTAR FRAGMENTATION	**	6	OE Scrap	190	46
ROCKET MOTOR, 2.36in, EXPENDED	1	8	OE Scrap	190	48
ROCKET MOTOR, 2.36in, EXPENDED	1	2	OE Scrap	190	49

**Table 12-1
List of OE and OE Scrap Items Found in M3-1H Rocket Area-D**

Item Description	Quantity	Depth (inches)	Target Type	Grid ID/ Transect	Anomaly ID
GRENAD PINS	3	2	OE Scrap	190	49
FRAGMENTATION	2	2	OE Scrap	190	49
FRAGMENTATION	2	6	OE Scrap	190	50
ROCKET FRAGMENTATION	**	3	OE Scrap	190	51
ROCKET FRAGMENTATION, 2.36in	**	2	OE Scrap	190	52
FRAGMENTATION	1	2	OE Scrap	190	53
ROCKET MOTOR, 2.36in, EXPENDED	1	1	OE Scrap	190	54
ROCKET MOTOR, 2.36in, EXPENDED	1	4	OE Scrap	190	55
ROCKET FRAGMENTATION, 2.36in	**	3	OE Scrap	190	56
ROCKET FRAGMENTATION, 2.36in	**	4	OE Scrap	190	57
ROCKET PARTS, 2.36in	**	0	OE Scrap	190	186
ROCKET, PRACTICE, 2.36in, M7	1	0	OE Scrap	190	187
ROCKET MOTORS, 2.36in, EXPENDED	**	0	OE Scrap	190	188
60mm ILLUM	1	0	OE Scrap	M31m008	67
ROCKET, PRACTICE, 2.36in, M7	1	0	OE Scrap	M31m107	2
MORTAR, 3in STOKES, MKI, PRACTICE	1	0	OE Scrap	M31m107	5
SIGNAL, SMOKE, GROUND, M62 SERIES, EXPENDED	1	2	OE Scrap	M31m117	1
FRAGMENTATION	1	2	OE Scrap	M31m117	2
ROCKET MOTOR, 2.36in, EXPENDED	1	3	OE Scrap	M31m117	4
SIGNAL, SMOKE, GROUND, M62 SERIES, EXPENDED	1	1	OE Scrap	M31m117	5
SIGNAL, SMOKE, GROUND, M62 SERIES, EXPENDED	1	1	OE Scrap	M31m117	6
FRAGMENTATION	1	4	OE Scrap	M31m117	8
SIGNAL, SMOKE, GROUND, M62 SERIES, EXPENDED	1	1	OE Scrap	M31m117	10
Data Provided by Other Subcontractors:*					
ROCKET MOTOR, 2.36in	1	0	OE Scrap	IT23	N/A
Note: This table does not list small arms finds.					
Note: IT# = IT Corporation finds. PBP# = Parsons Burn Pit finds.					
*TtEC did not independently verify the accuracy nor currency of information supplied by client or by any of clients contractors, vendors, or consultants.					
** Indeterminate amount.					

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2 12.3 DESCRIPTION OF HAZARDS OF SPECIFIC OE ENCOUNTERED

3 UXO items encountered during the site characterization of this OE Risk Assessment Sector
4 include MKI 3in practice Stokes Mortar rounds and 2.36in M6 rockets.

5 12.3.1 The 2.36-inch rocket consists of three parts: the high-explosive head, the stabilizer tube,
6 and the fin assembly. This rocket has a 0.5 pound 50/50 pentolite with a 10/90 pentolite booster.
7 The rocket can penetrate three inches of homogenous-steel armor plate at all ranges and at angles
8 of impact as low as 90 degrees. The propellant consists of five sticks of ballistite. The fuze

1 generally consists of a steel firing pin that slips into the central cavity of the fuze body. The fuze
2 body contains the detonator of M18 of lead azide and a tetryl, and the booster charge of tetryl. It
3 was determined that these items had a HEAT or shape charge with the potential to produce
4 explosive fragments. Other OE items related to the 2.36-inch rockets were also found in this OE
5 Risk Assessment Sector such as live fuzes and motors from the rockets.

6 12.3.2 The MKI practice 3in Stokes Mortar shell consists of a cylindrical steel casing, having a
7 steel base and steel head screwed on at each end of the casing. The steel head seats the booster
8 jacket and MK VI setback-armed, impact-inertia fired, all-way trench mortar fuze. The steel
9 base seats the cartridge container. Although the practice mortar is filled with 2.1 ponds of sand,
10 the MK VI fuze combined with the booster contain approximately 65 g of black powder. The
11 ignition cartridge contained 45 g of smokeless powder. The fuze safety pin and ring are removed
12 before firing, leaving the set-back pellet supported by friction until the shell leaves the barrel.
13 Upon acceleration the safety fork is ejected and the striker is free to reach the detonating pellet or
14 percussion element upon impact. This fuze has a double percussion element which functions
15 irrespective of the shells position upon impact (all-way). The fuze was painted black and
16 stamped with manufacturer's symbols, and month and year of loading. The shell head was
17 stamped with the name/Mk#, lot #, inspector's stamp, and manufacturer's symbol. The case
18 painted dark blue with white stenciling. The ignition cartridge has a green case with a brass
19 base, the bottom of which is stamped with manufacturer's information and the item's MK#.

20 12.4 RISK ASSESSMENT

21 Figure 12-1, located at the end of this chapter, presents the CSM for potential exposures to OE in
22 OE Risk Assessment Sector M3-1H-Rocket Area-D in Redevelopment Parcel M3. The primary
23 sources include a range safety fan and combat range/training areas located within the sector. OE
24 may be present in the range safety fan as a result of firing. OE may be present in the combat
25 range/training areas as a result of firing or poor housekeeping, mishandling, or loss. These
26 releases likely result in OE being present on the ground surface or in the subsurface soils of the
27 sector. Additionally, there was the potential for release to the limited surface water or sediments
28 in this area. This CSM also indicates the principal mechanisms by which ordnance items may
29 migrate from one location to another in the sector, shift from one depth in the soil to another, or
30 migrate from one medium to another. These potential transport and migration mechanisms
31 include mechanical redistribution, human activity, precipitation run-off, and (in limited, specific
32 locations) erosion and frost heave. The original deposition of the ordnance items and the
33 localized transport and migration processes result in a new distribution of OE items in the soil,
34 surface water, or sediments which may be locations of direct contact exposure by current or
35 reasonably foreseeable future receptors associated with reuse of the area. Potential direct contact
36 with the surface water and sediments (as possible exposure media) is indicated, but OE presence
37 in these media has not been confirmed (represented as a dashed box in Figure 12-1, located at the
38 end of this chapter). Receptors may include commercial workers, and construction workers
39 associated with the redevelopment and land re-use associated with planned retail areas.
40 Terrestrial and aquatic wildlife may also be exposed to ordnance items present in the sector.

1 **12.5 COMPARATIVE ANALYSIS OF RESPONSE ACTION ALTERNATIVES**

2 **12.5.1 Effectiveness**

3 The OERIA risk assessment process addresses the combined criteria of overall protectiveness to
4 human health and the environment and long-term effectiveness and permanence. The results of
5 the risk assessment performed for the M3-1H-Rocket Area-D sector using this process are
6 presented in Figure 12-2, located at the end of this chapter,. Based on these results, the most
7 effective alternatives for the protection of human health and the environment were judged to be
8 the removal alternatives. Alternative 6-Clearance to Depth was projected to provide the highest
9 level of protectiveness throughout the sector, while Alternative 5-Clearance to 1 Foot Depth was
10 judged to provide a lower level of protectiveness due to the indicated depth of OE in this area
11 relative to the indicated future use for development. Both OE and OE Scrap was found in this
12 sector on the surface and within the first 18 inches of soil below the ground surface. OE was
13 generally found in this sector on the surface and within the first twelve inches below land
14 surface, while one OE item was found 18 inches below the ground surface. Alternative 4-
15 Surface Clearance received a low ranking because it would not be expected to remove OE from
16 depths where it is indicated to be present and where future users of the area may disturb.
17 Alternative 3-Construction Support is considered to be protective, but only within the future
18 construction footprints within the sector where clearance of OE would be selectively performed.
19 Alternative 2-Area-Specific Land Use Controls was considered to be less effective than any of
20 the removal alternatives except for the case when Surface Clearance would be performed alone.
21 Alternative 1-No Further Action was considered to be the least effective. Since development /
22 redevelopment activities are planned for this sector, Alternative 6 would provide the highest
23 level of protectiveness, followed by Alternative 5.

24 12.5.1.1 With respect to the other effectiveness criteria, Alternative 1 - No Further Action,
25 clearly has the least short-term impacts since No Further Action is being taken that might affect
26 on local workers or the public. Alternative 2 - Area-Specific Land Use Controls, also presents
27 little short-term effects since the only activity that might have impact on the workers or the
28 public involves installation of a limited number of warning signs. The removal alternatives
29 (Alternatives 3, 4, 5, and 6) have the greatest potential impact on the workers and public since
30 each involves the potential of more direct contact with OE. Overall, Alternative 1 will have the
31 least short-term impacts, followed by Alternatives 2 and 3, and then Alternatives 4, 5, and 6.
32 Among the latter three alternatives, the short-term effects will increase from Alternatives 4 to 6,
33 since each has a potential for longer and more intense exposure to OE. With respect to the
34 compliance with ARARs criterion, each alternative will comply.

35 **12.5.2 Implementability**

36 12.5.2.1 Technical Feasibility

37 All six alternatives are technically feasible with Alternative 1 being the most technically feasible
38 since there is No Further Action required at the site (i.e., investigation or removal actions).
39 Alternative 2 is the second most technically feasible alternative. It requires that technical actions
40 be taken at the site (i.e., installation of signage at the site). The remaining alternatives are each
41 technically feasible but less so than Alternatives 1 and 2 because they each involve more intense

1 site activities and dependence on technology. In summary, Alternative 1 will be the most
2 technically feasible, Alternative 2 next, followed by Alternatives 3, 4, 5 and 6.

3 12.5.2.2 Administrative Feasibility

4 All six alternatives will require the preparation and DDESB-approval of an ESS document.
5 Alternatives 3 through 6 will each require the preparation and approval of a work plan since each
6 alternative involves onsite OE activities. Alternatives 2, 3, 4, and 5 will also require compliance
7 with the LUCAP for Fort McClellan, since each involves the implementation of land use
8 controls. In summary, considering these requirements, Alternative 1 will be the simplest to
9 administer, with Alternative 6 next, and Alternatives 2, 3, 4, and 5 being the most difficult of the
10 alternatives to administer due to the inclusion of land use controls and the requirements to
11 comply with the LUCAP.

12 12.5.2.3 Availability of Services and Materials

13 Services and materials are required and are readily available for preparing the plans mentioned
14 above and to complete the fieldwork associated with Alternatives 3 through 6. Based on the
15 levels of services needed, Alternative 1 will require the least services and materials since it only
16 requires effort to prepare the ESS. More services and materials will be required for the
17 implementation of Alternative 2 since it requires the preparation of the ESS, installation of signs,
18 as well as coordination with the LUCAP. Additional services and materials will be required for
19 Alternative 3 since it requires a work plan to agreement construction support activities and the
20 field service activities to provide the actual construction support. Alternative 4 will be similar to
21 Alternative 3 in scope of required services and materials. Alternatives 5 and 6 will require the
22 most in services and materials. In summary, Alternative 1 will require the least in services and
23 materials to implement, with Alternative 2 next. Alternatives 3 and 4 will require a higher level
24 of services and materials than Alternatives 1 and 2, but less than Alternatives 5 and 6.

25 12.5.2.4 Regulatory and Community Acceptance

26 The level of regulatory and/or community acceptance for each alternative can be expected to
27 largely depend on the protection that each alternative offers. For this sector, UXO has been
28 detected on the surface and at depths extending below one foot and a large amount of OE Scrap
29 was found, in an area where the future land use is projected to be Development (i.e., Retail).
30 Alternative 1-No Further Action does not to provide a higher degree of protection than current
31 conditions and therefore is unlikely to be accepted by the regulatory community or the public.
32 Alternative 2-Area-Specific Land Use Controls would probably not be received favorably since
33 it will provide only limited protection to workers involved in intrusive construction activities
34 (i.e., excavations, etc.). Alternative 3-Construction Support may be received favorably since it
35 provides protection to construction workers and to the public in that it also includes the land use
36 controls of Alternative 2. Alternative 4-Surface Clearance may be expected to receive a similar
37 level of acceptance as Alternative 3. It includes removal of potential OE from the surface (not
38 subsurface) across the entire sector, not just within construction footprints and is accompanied by
39 land use controls. However, the belief that significant numbers of subsurface OE may be present
40 may lead to reduced acceptance of this alternative. Alternative 5-Clearance to One Foot Depth
41 and Alternative 6-Clearance to Depth may receive the highest level of acceptance by both
42 regulators and the public since they both involve a subsurface removal of potential OE in an area

1 expected to experience significant subsurface excavations during construction and installation of
2 utilities.

3 12.5.2.4.1 In summary, the alternatives that may be best received by the regulators and/or public
4 would be Alternative 5-Clearance to One Foot Depth and Alternative 6-Clearance to Depth,
5 followed in order by Alternative 4-Surface Clearance, Alternative 3-Construction Support,
6 Alternative 2-Area-Specific Land Use Controls, and lastly, Alternative 1-No Further Action.

7 **12.5.3 Cost**

8 The projected costs to implement the alternatives in this 13-acre sector are summarized below:

- 9 • Alternative 1 - No Further Action – \$5,000. An ESS (preparation, draft, and final) will be
10 prepared for a group of sectors. This is an approximation of one sector's portion of the total
11 cost.
- 12 • Alternative 2 - Area-Specific Land Use Controls – \$17,000. This cost includes planning and
13 installation of signage. No annual maintenance costs are included.
- 14 • Alternative 3 - Construction Support – \$74,421. This estimate includes management,
15 planning, and UXO support.
- 16 • Alternative 4 - Surface Clearance – \$144,595. This cost includes management and planning,
17 OE removal activities, and reporting.
- 18 • Alternative 5 - Clearance to One-Foot Depth – \$333,145. This cost includes management
19 and planning, OE removal activities, and reporting.
- 20 • Alternative 6 - Clearance to Depth – \$355,970. This cost includes management and
21 planning, OE removal activities, and reporting.

22 **12.6 RECOMMENDATION**

23 The recommended alternative for M3-1H-Rocket Area-D is Alternative 6-Clearance to Depth.
24 Components of this alternative will include land surveying and brush clearing operations to
25 prepare the site. Due to the requirement to detect items potentially deeper than one foot, this
26 alternative will be performed using sensitive instruments capable of detecting anomalies at
27 greater depths. Using a suitably sensitive detection system, the entire study area will be
28 surveyed to locate potential OE items. The anomalies will then be investigated to identify them
29 as UXO, OE Scrap, or Non-OE Scrap (metallic scrap). After identification, the items will be
30 disposed of as scrap or OE in accordance with the previously-approved OE operations work
31 plan.

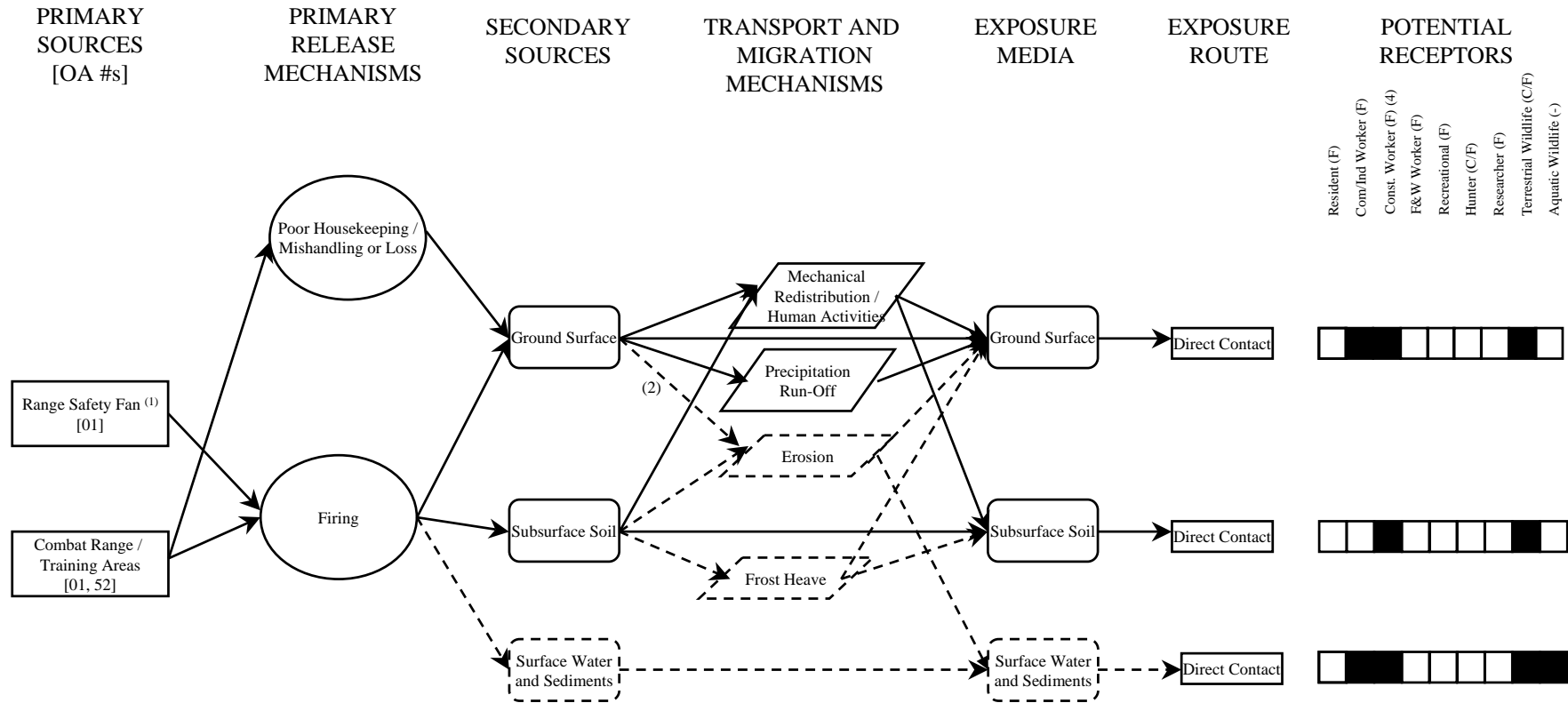
32 12.6.1 Planning for this response action will require preparation of an ESS and a site-
33 specific removal action work plan. The estimated cost to implement this alternative is \$355,970.

1 **12.7 SUPPORTING RATIONALE**

2 The risk analysis and the comparative analysis indicated that Alternative 6-Clearance to Depth
3 should provide sufficient protection for this sector. During the sampling conducted in this sector
4 as part of the Bravo EE/CA sampling, UXO was found on the surface and at depths up to 18
5 inches. A large amount of OE Scrap was found on the surface, at shallow depths and a few items
6 at depths up to 18 inches.

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**Figure 12-1
M3-1H-Rocket Area-D
CONCEPTUAL SITE MODEL**



NOTES:

- (1) For non-Small Arms munitions.
- (2) Dashed boxes or lines indicate a potential source area or linkage that requires further verification or is a linkage that is indicated to be present in only a small number of specific locations.
- (3) Plate numbers obtained from the Fort McClellan Archives Search Report
- (4) Within footprint of future development activity
- C = Current Receptor
- F = Potential Future Receptor
- = Not plausible for this sector

PLATE NO. (3)	OA#	NAME (Other Names)	ORDNANCE AND EXPLOSIVES ASSOCIATED WITH AREA
4,10	52	Combat Range #2 (a.k.a. Rocket Range; Machine Gun Range; 2 Rifle Grenade Ranges)	Rockets; Small Arms; Rifle Grenades
5,10	01	Rocket Range	2.36" Rockets (Bazookas); 3"-5" Rockets

Figure 12-2 OERIA TABLE FOR SECTOR M3-1H-ROCKET AREA-D																			
AREA:		BRAVO																	
SECTOR:		M3-1H-Rocket Area-D																	
TOTAL SECTOR AREA:		13 acres																	
AREA GEOPHYSICALLY SURVEYED:		2.02 acres [3]																	
AREA INTRUSIVELY INVESTIGATED:		1.31 acres (equivalent) [4]																	
	ORDNANCE							SITE		HUMAN CURRENT USE			HUMAN FUTURE USE			OVERALL RANK			
	HE Items Found? [Yes]	OE Type [7]		OE Sensitivity [7]		OE Item Depth Distribution		OE Item Density	OE Site Access	OE Site Stability	Activity	OE Contact Probability Level	Exposed Population (Number or Freq. Of Use)	Activity	OE Contact Probability Level	Exposed Population (Number or Freq. Of Use)	Likelihood of Near Term Reuse	CURRENT LAND USE	FUTURE LAND USE
	HE Debris Found? [Yes]		(%)		(%)	Depth Range	% [9]	(Items/Acre) [8,9,12]											
Baseline Risk Assessment (Existing Conditions)		Cat. 3	27	Cat. 3	27	Surface	18.2 / (10.6)	0.99 / (5.94)	No Restriction to Site	Site Stable	Recreational [13,17]	Significant [18]	Occasional [19]	Development [16,33]	Significant [16]	Frequent	High		
		Cat. 2	55	Cat. 2	55	0 to 1' bgs	63.6 / (86.7)	5.34 / (74.6)											
		Cat. 1	18	Cat. 1	18	1' to Depth	18.2 / (2.65)	1.53 / (2.29)											
		Cat. 0	*	Cat. 0	*	Overall [11]	8.39 / (86.3)												
						90% CI on Overall OE Item Density [10]	5.4 - 13.6												
Alternative 1 - No Further Action		No Impact		No Impact		No Impact		No Impact	No Impact		No Impact	No Impact	No Impact	No Impact	No Impact		BASELINE	BASELINE	
Alternative 2 - Land Use Controls		No Impact		No Impact		No Impact		No Impact	No Impact		No Impact	B	No Impact	No Impact	B		LOW	LOW	
Alternative 3 - Construction Support		No Impact		No Impact		A [21]		No Impact	No Impact		A [21]	A [21]		A [21]	A [21]		MODERATE [20]	MODERATE [20]	
Alternative 4 - Surface Clearance		No Impact		No Impact		C		No Impact	No Impact		B	A [23]		C	A [23]		LOW	LOW	
Alternative 5 - Clearance to 1 Foot Depth		No Impact		No Impact		B		No Impact	No Impact		A	A [22]		B	A [22]		HIGH	MODERATE [37]	
Alternative 6 - Clearance to Depth		A		A		A		No Impact	No Impact		A	A [22]		A	A [22]		HIGH	HIGH	
NOTES																			
3 The Geophysically Surveyed Area includes the area associated with the transects within this specific sector.																			
4 Based on the fraction of identified target anomalies intrusively investigated in each geophysically surveyed grid and/or transect segment.																			
7 Percentages classify OE items found. If no OE items are found, Category 0 is 100% and Categories 1 - 3 are noted with a "**". If OE items are found, Category 0 is noted with a "*".																			
8 OE Density values shown are the straight average value = # of OE Items / Acres in which they were found.																			
9 Densities and depth range percentages shown in italics and curly brackets indicate characteristics of the OE debris.																			
10 The OE Density range shown represents a 90% confidence interval on the OE Item density calculated using UXO Calculator Version 1.4.2.																			
11 Overall OE item density is based on all OE items found in the area intrusively investigated.																			
12 The surface OE item density is based on the area geophysically surveyed and the 0-1' and 1'-Depth OE item densities are based on the area intrusively investigated.																			
13 Specific activities identified for the recreational current land use include hunting, hiking, and short cuts.																			
16 Development land use was assumed to be associated with routine interaction with the surface and near-surface soils by the employees of the new facilities. In addition, the construction of new facilities, structures, or underground utilities and the maintenance or replacement of existing structures or utilities was assumed to be reasonably associated with this land use.																			
17 Exposure to terrestrial wildlife is also assumed.																			
18 Based on the depth of intrusion associated with the identified activities - See Table 5 of USACE OERIA Interim Guidance (3/27/01).																			
19 The frequency of site usage is currently classified as rare and the number of site users is currently classified as low due to restrictions that have been placed on the site (i.e., no hunting or hiking) since the remediation activities began. The current frequency of usage would be classified as occasional if these recreational activities took place.																			
20 Indicated to be the most protective alternative within the construction footprint.																			
21 Risk factor score indicated applies only within the construction footprint.																			
22 No increased protectiveness relative to alternatives with a shallower clearance depth due to the depth distribution of OE items found.																			
23 Removal of surface OE items or debris may reduce the number of potential exposures to souvenir hunters.																			
33 Future Development activities are projected to be associated with Retail Use.																			
37 Protectiveness may be greater given the effect of the deed restriction prohibiting digging.																			
IMPACT CODE																			
A = Signifies the greatest impact on reducing potential exposures to OE; Relatively less impact as the letter ranking goes to B, C, and subsequent letters.																			
HIGH - Most protective relative to projected land use.																			
LOW - Least protective relative to projected land use.																			
MODERATE - Protectiveness level between Low and High.																			
BASELINE - Protectiveness level associated with Alternative 1 - No Further Action.																			

1 **13.0 M3-1H-Rocket Area-PR**

2 **13.1 DESCRIPTION AND HISTORY**

3 This sector consists of approximately 20 acres located on the western border of the Bravo Area.
4 Portions of a 60mm Mortar Range (OA-53) was historically located in this sector. The 60mm
5 Mortar Range was established during WWII and abandoned between 1958 and 1967. The
6 projected land use of this sector is Passive Recreation.

7 **13.2 INVESTIGATION RESULTS**

8 During the site characterization of Bravo, 1 grid in this OE Risk Assessment Sector was
9 geophysically mapped and this grid was also then intrusively investigated. Delineation transects
10 were a second investigation method used specifically to characterize suspected areas with a high
11 likelihood of containing OE in this OE Risk Assessment Sector. The following delineation
12 transects were placed in this OE Risk Assessment Sector: M32H016 and M32H018. The
13 following data collection transects (or clusters), consisting of a series of 200-foot long, parallel
14 segments spaced 25 to 50 feet apart, were investigated: M31M023, M31M024, and M31M125.
15 A total of 0.25 acres in grids and 0.72 acres in transects were geophysically mapped. A total of
16 0.25 acres in grids and 0.50 acres in transects were intrusively investigated.

17 13.2.1 No UXO items were found in this OE Risk Assessment Sector. Approximately 9 OE
18 Scrap items, with some indeterminate amounts of OE Scrap, were found on the surface and at
19 shallow depths (no greater than four inches). Table 13-1 contains a list of OE Scrap items found
20 within this OE Risk Assessment Sector. Figure B-2 in Appendix B presents an overview figure
21 of the Bravo Area with this OE Risk Assessment Sector and Appendix F contains a list of all
22 items from the database found within this OE Risk Assessment Sector.

23 **13.3 DESCRIPTION OF HAZARDS OF SPECIFIC OE ENCOUNTERED**

24 OE Scrap items encountered during the site characterization of this OE Risk Assessment Sector
25 include expended 2.36in rockets. The 2.36-inch rocket consists of three parts: the high-explosive
26 head, the stabilizer tube, and the fin assembly. This rocket has a 0.5 pound 50/50 pentolite with
27 a 10/90 pentolite booster. The rocket can penetrate three inches of homogenous-steel armor
28 plate at all ranges and at angles of impact as low as 90 degrees. The propellant consists of five
29 sticks of ballistite. The fuze generally consists of a steel firing pin that slips into the central
30 cavity of the fuze body. The fuze body contains the detonator of M18 of lead azide, and a
31 booster charge of tetryl.

Table 13-1
List of OE Scrap Items Found in M3-1H Rocket Area-PR

Item Description	Quantity	Depth (inches)	Target Type	Grid ID/Transect	Anomaly ID
OE Scrap Items:					
ROCKET MOTOR, 2.36in, EXPENDED	1	4	OE Scrap	131	1
ROCKET MOTOR, 2.36in, EXPENDED	1	4	OE Scrap	131	2
ROCKET MOTOR, 2.36in, EXPENDED	1	2	OE Scrap	M31m023	3
FRAGMENTATION	**	2	OE Scrap	M31m023	4
ROCKET MOTOR, 2.36in, EXPENDED	1	2	OE Scrap	M31m023	5
ROCKET MOTOR, 2.36in, EXPENDED	1	0	OE Scrap	M31m023	6
ROCKET MOTOR, 2.36in, EXPENDED	1	0	OE Scrap	M31m024	3
ROCKET MOTOR, 2.36in, EXPENDED	1	0	OE Scrap	M31m024	5
ROCKET MOTOR, 2.36in, EXPENDED	1	0	OE Scrap	M31m024	7
ROCKET MOTOR, 2.36in, EXPENDED	1	2	OE Scrap	M31m024	10

*TtEC did not independently verify the accuracy nor currency of information supplied by client or by any of clients contractors, vendors, or consultants.
 ** Indeterminate amount.

1 13.4 RISK ASSESSMENT

2 Figure 13-1, located at the end of this chapter, presents the CSM for potential exposures to OE in
 3 OE Risk Assessment Sector M3-1H-Rocket Area-PR in Redevelopment Parcel M3. The primary
 4 sources include various range safety fans located throughout the sector. OE may be present in
 5 the range safety fans as a result of firing. These releases likely result in OE being present on the
 6 ground surface or in the subsurface soils of the sector. Additionally, there was the potential for
 7 release to the limited surface water or sediments in this area. This CSM also indicates the
 8 principal mechanisms by which ordnance items may migrate from one location to another in the
 9 sector, shift from one depth in the soil to another, or migrate from one medium to another. These
 10 potential transport and migration mechanisms include mechanical redistribution, human activity,
 11 precipitation run-off, and (in limited, specific locations) erosion and frost heave. The original
 12 deposition of the ordnance items and the localized transport and migration processes result in a
 13 new distribution of OE items in the soil, surface water, or sediments which may be locations of
 14 direct contact exposure by current or reasonably foreseeable future receptors associated with
 15 reuse of the area. Potential direct contact with the surface water and sediments (as potential
 16 exposure media) is indicated, but OE presence in these media has not been confirmed
 17 (represented as a dashed box in Figure 13-1, located at the end of this chapter). Receptors may
 18 include Passive Recreational users of the area. No significant construction activity is projected
 19 to be associated with this land use. However, soil disturbance within a specified area may be
 20 considered on an infrequent and spatially limited basis. As such, a construction worker would
 21 not be a routine receptor relative to the entire sector. Terrestrial and aquatic wildlife may also be
 22 exposed to ordnance present in the sector.

23 13.5 COMPARATIVE ANALYSIS OF RESPONSE ACTION ALTERNATIVES

24 13.5.1 Effectiveness

25 The OERIA risk assessment process addresses the combined criteria of overall protectiveness to
 26 human health and the environment and long-term effectiveness and permanence. The results of

1 the risk assessment performed for the M3-1H-Rocket Area-PR sector using this process are
2 presented in Figure 13-2, located at the end of this chapter. Based on these results, any removal
3 alternative was judged to be effective for the protection of human health and the environment.
4 Alternative 6-Clearance to Depth, Alternative 5-Clearance to 1 Foot Depth, and Alternative 4-
5 Surface Clearance were all projected to provide the highest level of protectiveness throughout
6 the sector relative to the indicated future use for passive recreation. No OE items were found on
7 the surface or in the subsurface, and OE debris was only found within the top 4 inches of soil
8 beneath the ground surface. Alternative 3-Construction Support also is considered to be
9 protective within any potential future construction footprint within the sector where clearance of
10 OE would be selectively performed. Alternative 2-Area-Specific Land Use Controls was
11 considered to be less effective than any of the removal alternatives, but still providing a moderate
12 level of protection given the indicated lack of OE. Alternative 1-No Further Action was
13 considered to be the least effective. It is possible that some of the debris found in this sector may
14 be related to the OE found within the adjacent Eastern Bypass. Since Passive Recreation
15 activities are planned for this sector, Alternative 5-Clearance to 1 Foot Depth was considered to
16 provide a high level of protectiveness given the indicated presence of OE debris beneath the
17 ground surface, with Alternative 6 providing only an incremental increase in protectiveness.

18 13.5.1.1 With respect to the other effectiveness criteria, Alternative 1-No Further Action
19 clearly has the least short-term impacts since No Further Action is being taken that might affect
20 on local workers or the public. Alternative 2-Area-Specific Land Use Controls also presents little
21 short-term effects since the only activity that might have impact on the workers or the public
22 involves installation of a limited number of warning signs. The removal alternatives
23 (Alternatives 3, 4, 5, and 6) have the greatest potential impact on the workers and public since
24 each involves the potential of more direct contact with OE. In summary, Alternative 1 will have
25 the least short-term impacts, followed by Alternatives 2 and 3, and then Alternatives 4, 5, and 6.
26 Among the latter three alternatives, the short-term effects would generally increase from
27 Alternatives 4 to 6, since each has the potential for longer and more intense exposure to OE.
28 With respect to the compliance with ARARs criterion, each alternative will comply.

29 **13.5.2 Implementability**

30 13.5.2.1 Technical Feasibility

31 All six alternatives are technically feasible with Alternative 1 being the most technically feasible
32 since there is No Further Action required at the site (i.e., investigation or removal actions).
33 Alternative 2 is the second most technically feasible alternative. It requires that technical actions
34 be taken at the site (e.g., installation of signage at the site). The remaining alternatives are each
35 technically feasible but less so than Alternatives 1 and 2, because they each involve more intense
36 site activities and dependence on technology. In summary, Alternative 1 will be the most
37 technically feasible, Alternative 2 next, followed by Alternatives 3, 4, 5, and 6.

38 13.5.2.2 Administrative Feasibility

39 All six alternatives will require the preparation and DDESB-approval of an ESS document.
40 Alternatives 3 through 6 will each require the preparation and approval of a work plan since each
41 alternative involves onsite OE activities. Alternatives 2, 3, 4, and 5 will also require compliance

1 with the LUCAP for Fort McClellan, since each involves the implementation of land use
2 controls. In summary, considering these requirements, Alternative 1 will be the simplest to
3 administer, with Alternative 6 next, and Alternatives 2, 3, 4, and 5 being the most difficult of the
4 alternatives to administer due to the inclusion of land use controls and the requirements to
5 comply with the LUCAP.

6 13.5.2.3 Availability of Services and Materials

7 Services and materials will be required and are readily available for preparing the plans
8 mentioned above and to complete the fieldwork associated with Alternatives 3 through 6. Based
9 on the levels of services needed, Alternative 1 will require the least services and materials since
10 it only requires effort to prepare the ESS. More services and materials will be required for the
11 implementation of Alternative 2 since it requires the preparation of the ESS, installation of signs,
12 as well as coordination with the LUCAP. Even more services and materials will be required for
13 Alternative 3 since it requires a work plan to support construction support activities and the field
14 service activities to provide the actual construction support. Alternative 4 will be similar in scope
15 of required services and materials. Alternatives 5 and 6 will require the most in services and
16 materials. In summary, Alternative 1 will require the least in services and materials to
17 implement, with Alternative 2 next. Alternatives 3 and 4 will require a higher level of services
18 and materials than Alternatives 1 and 2, but less than Alternatives 5 and 6.

19 13.5.2.4 Regulatory and Community Acceptance

20 The level of regulatory and/or community acceptance for each alternative can be expected to
21 largely depend on the protection that each alternative offers. For this sector, no OE was found,
22 but OE Scrap, indicating the potential for high explosives in the area, was found on the surface
23 and within one foot beneath the surface. The future land use for this area is projected to be
24 Passive Recreation. This sector is located adjacent to the Bypass Corridor. Alternative 1-No
25 Further Action does nothing to provide any degree of protection and, therefore, is unlikely to be
26 accepted by the regulatory community or the public. Alternative 2-Area-Specific Land Use
27 Controls would probably be received more favorably since it will provide some degree of
28 protection. However, since it leaves potential OE in place, it may be received poorly by both
29 regulators and the public. Alternative 3-Construction Support may receive similar levels of
30 acceptance as Alternative 2. Alternative 3 provides protection to construction workers and
31 removes OE within the construction footprint. The projected future land use is Passive
32 Recreation, with little expected construction activities. Alternative 4-Surface Clearance may be
33 expected to receive an even higher level of acceptance than any of the previous alternatives since
34 it includes actual removal of potential OE from the surface and is accompanied by land use
35 controls. On the other hand, the belief that significant numbers of subsurface OE may be present,
36 may lead to reduced acceptance of this alternative. Alternative 5 (Clearance to One-Foot Depth)
37 and Alternative 6-Clearance to Depth may receive the highest level of acceptance by both
38 regulators and the public since they both involve a subsurface removal of potential OE.

39 13.5.2.4.1 In summary, the alternatives that may be best received by the regulators and/or public
40 would be Alternative 5-Clearance to One Foot Depth and Alternative 6-Clearance to Depth,
41 followed in order by Alternative 4-Surface Clearance, Alternative 2-Area-Specific Land Use
42 Controls, Alternative 3-Construction Support, and lastly, Alternative 1-No Further Action.

1 **13.5.3 Cost**

2 The projected costs to implement the alternatives in this 20-acre sector are summarized below:

- 3 • Alternative 1 - No Further Action – \$5,000. An ESS (preparation, draft, and final) will be
4 prepared for a group of sectors. This is an approximation of one sector's portion of the total
5 cost.
- 6 • Alternative 2 - Area-Specific Land Use Controls – \$17,000. This cost includes planning and
7 installation of signage. No annual maintenance costs are included.
- 8 • Alternative 3 - Construction Support – \$101,032. This estimate includes management,
9 planning, and UXO support.
- 10 • Alternative 4 - Surface Clearance – \$150,916. This cost includes management and planning,
11 OE removal activities, and reporting.
- 12 • Alternative 5 - Clearance to One-Foot Depth – \$482,616. This cost includes management
13 and planning, OE removal activities, and reporting.
- 14 • Alternative 6 - Clearance to Depth – \$506,316. This cost includes management and
15 planning, preparation of an ESS, preparation of a site-specific work plan, OE removal
16 activities, and reporting.

17 **13.6 RECOMMENDATION**

18 The recommended alternative for M3-1H-Rocket Area-PR is Alternative 5-Clearance to One
19 Foot. Components of this alternative will include land surveying and brush clearing operations to
20 prepare the site. Where technically feasible, suitably sensitive detection instruments will be used
21 to survey the study area and locate subsurface anomalies, which will be investigated down to 12
22 inches. After identification, the item will be disposed of as scrap or OE in accordance with a
23 previously-approved OE operations work plan. A deed restriction that prohibits digging in this
24 sector without construction support by UXO-qualified personnel will also be included.

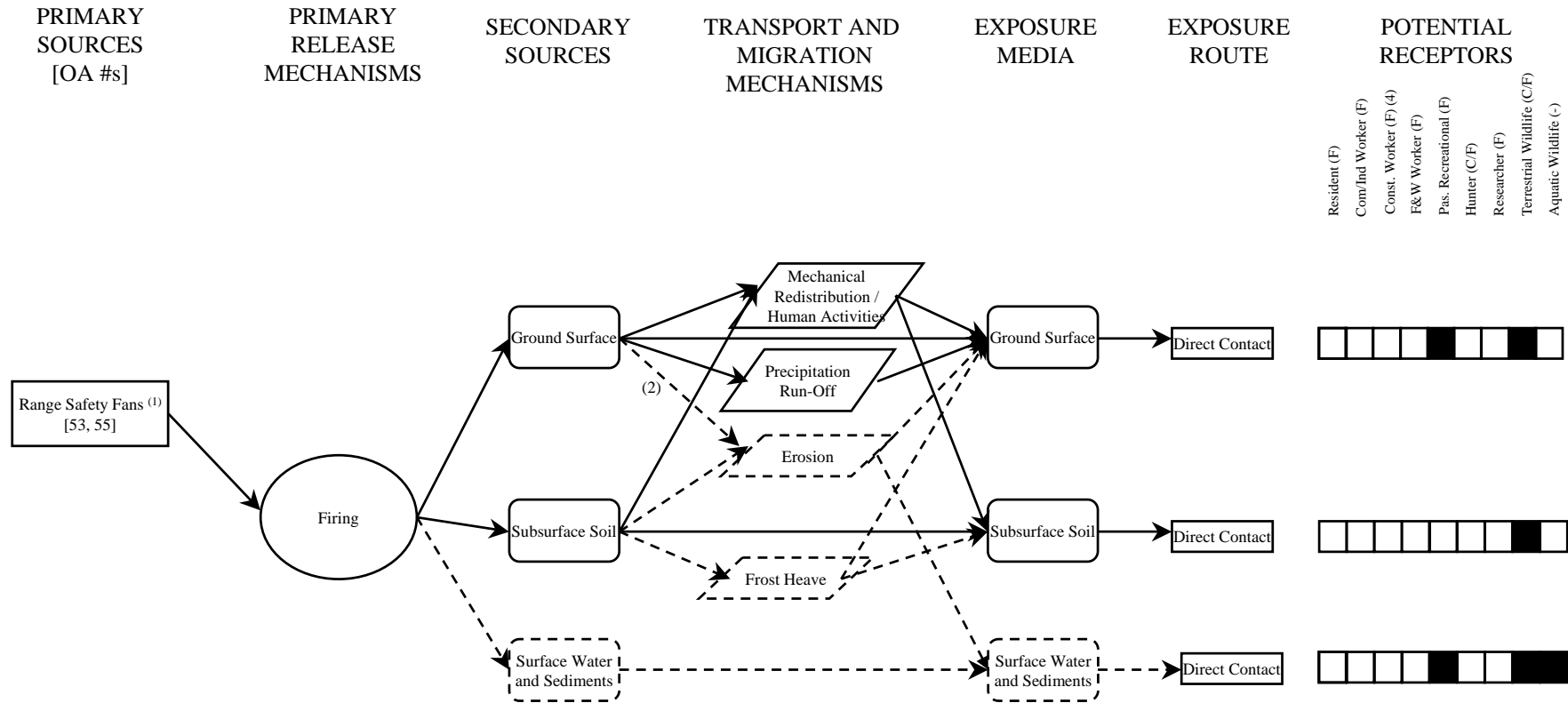
25 13.6.1 Planning for this response action will require preparation of an ESS and a site-
26 specific work plan. The estimated cost to implement this alternative is \$482,616.

27 **13.7 SUPPORTING RATIONALE**

28 The risk analysis and the comparative analysis indicated that clearance to one foot should
29 provide sufficient protection for this sector. The roughly ten OE Scrap items found in this sector
30 during sampling activities were found at the surface and down to a maximum of four inches.
31 Further, the projected land use for this sector is Passive Recreation, associated with activities
32 such as hiking, walking, and biking. No significant construction of recreational facilities or
33 underground utilities is associated with this land use. Consistent with the Passive Recreation
34 land use is the occasional incidental interaction with surface and very near surface (0 – 6 inches)
35 soils. The recommendation of clearance to one foot provides a small safety buffer beyond the
36 expected depth (6 inches) of contact. Since all items found were near the surface, other items are

- 1 expected to be near the surface, and the projected land use is Passive Recreation, the clearance to
- 2 one foot should be sufficiently protective.

Figure 13-1
M3-1H-Rocket Area-PR
CONCEPTUAL SITE MODEL



NOTES:

- (1) For non-Small Arms munitions.
- (2) Dashed boxes or lines indicate a potential source area or linkage that requires further verification or is a linkage that is indicated to be present in only a small number of specific locations.
- (3) Plate numbers obtained from the Fort McClellan Archives Search Report
- (4) No significant construction activity is expected for this land use. Limited disturbance of the soil may be considered within a specific footprint for the installation of facilities associated with the land use.
- C = Current Receptor
- F = Potential Future Receptor
- = Not plausible for this sector

PLATE NOS. (3)	OA#	NAME (Other Names)	ORDNANCE AND EXPLOSIVES ASSOCIATED WITH AREA
5, 6, 10	53	60mm Mortar Range	60mm HE Mortars
5, 6, 10	55	Old Range 12 (Range 12; Rifle Field Firing)	Small Arms

Figure 13-2

OERIA TABLE FOR SECTOR M3-1H-ROCKET AREA-PR

AREA: BRAVO SECTOR: M3-1H-Rocket Area-PR TOTAL SECTOR AREA: 20 acres AREA GEOPHYSICALLY SURVEYED: 0.97 acres [3] AREA INTRUSIVELY INVESTIGATED: 0.75 acres (equivalent) [4]																			
	ORDNANCE								SITE		HUMAN CURRENT USE			HUMAN FUTURE USE			OVERALL RANK		
	HE Items Found? [No]	OE Type [7]		OE Sensitivity [7]		OE Item Depth Distribution		OE Item Density	OE Site Access	OE Site Stability	Activity	OE Contact Probability Level	Exposed Population (Number or Freq. Of Use)	Activity	OE Contact Probability Level	Exposed Population (Number or Freq. Of Use)	Likelihood of Near Term Reuse	CURRENT LAND USE	FUTURE LAND USE
	HE Debris Found? [Yes]		(%)		(%)	Depth Range	% [9]	(Items/Acre) [8,9,12]											
Baseline Risk Assessment (Existing Conditions)		Cat. 3	*	Cat. 3	*	Surface	- / (40)	- / (4,12)	No Restriction to Site	Site Stable	Recreational [13,17]	Significant [18]	Occasional [19]	Passive Recreation [14]	Significant [18]	Occasional [19]	High		
		Cat. 2	*	Cat. 2	*	0 to 1' bgs	- / (60)	- / (8,0)											
		Cat. 1	*	Cat. 1	*	1' to Depth	- / (-)	- / (-)											
		Cat. 0	100	Cat. 0	100	Overall [11]	- / (13,3)	- / (13,3)											
						90% CI on Overall OE Item Density [10]	0 - 3.02												
Alternative 1 - No Further Action		No Impact		No Impact		No Impact		No Impact	No Impact		No Impact	No Impact		No Impact	No Impact		BASELINE	BASELINE	
Alternative 2 - Land Use Controls		No Impact		No Impact		No Impact		No Impact	No Impact		No Impact	B		No Impact	B		MODERATE	MODERATE	
Alternative 3 - Construction Support		No Impact		No Impact		No Impact		No Impact	No Impact		A [21]	No Impact		A [21]	No Impact		HIGH [20]	HIGH [20]	
Alternative 4 - Surface Clearance		No Impact		No Impact		No Impact		No Impact	No Impact		B [34]	A [23]		B [34]	A [23]		HIGH	HIGH	
Alternative 5 - Clearance to 1 Foot Depth		No Impact		No Impact		No Impact		No Impact	No Impact		A	A [22]		A	A [22]		HIGH	HIGH	
Alternative 6 - Clearance to Depth		No Impact		No Impact		No Impact		No Impact	No Impact		A	A [22]		A	A [22]		HIGH	HIGH	
NOTES 3 The Geophysically Surveyed Area includes the area associated with the transects within this specific sector. 4 Based on the fraction of identified target anomalies intrusively investigated in each geophysically surveyed grid and/or transect segment. 7 Percentages classify OE items found. If no OE items are found, Category 0 is 100% and Categories 1 - 3 are noted with a ***. If OE items are found, Category 0 is noted with a **. 8 OE Density values shown are the straight average value = # of OE Items / Acres in which they were found. 9 Densities and depth range percentages shown in italics and curly brackets indicate characteristics of the OE debris. 10 The OE Density range shown represents a 90% confidence interval on the OE Item density calculated using UXO Calculator Version 1.4.2. 11 Overall OE item density is based on all OE Items found in the area intrusively investigated. 12 The surface OE item density is based on the area geophysically surveyed and the 0-1' and 1'-Depth OE item densities are based on the area intrusively investigated. 13 Specific activities identified for the recreational current land use include hunting, hiking, and short cuts. 14 Specific activities associated with the passive recreation future land use are hiking, walking, biking, picnicking, horseback riding, and other non-motorized activities. 17 Exposure to terrestrial wildlife is also assumed. 18 Based on the depth of intrusion associated with the identified activities - See Table 5 of USACE OERIA Interim Guidance (3/27/01). 19 The frequency of site usage is currently classified as rare and the number of site users is currently classified as low due to restrictions that have been placed on the site (i.e., no hunting or hiking) since the remediation activities began. The current frequency of usage would be classified as occasional if these recreational activities took place. 20 Indicated to be the most protective alternative within the construction footprint. 21 Risk factor score indicated applies only within the construction footprint. 22 No increased protectiveness relative to alternatives with a shallower clearance depth due to the depth distribution of OE items found. 23 Removal of surface OE items or debris may reduce the number of potential exposures to souvenir hunters. 34 The level of protectiveness associated with this risk factor for this response action alternative may be greater given that no OE items were found in this area during the investigation. - = Not applicable as no energetic OE items were found.																			
IMPACT CODE A = Signifies the greatest impact on reducing potential exposures to OE; Relatively less impact as the letter ranking goes to B, C, and subsequent letters. HIGH - Most protective relative to projected land use. LOW - Least protective relative to projected land use. MODERATE - Protectiveness level between Low and High. BASELINE - Protectiveness level associated with Alternative 1 - No Further Action.																			

1 **14.0 M3-1L-37mm Projectile Area-D**

2 **14.1 DESCRIPTION AND HISTORY**

3 This sector consists of approximately 180 acres in the central portion of the Bravo Area. The
4 projected land use for this sector is Development Reserve. The western side of Range 16 (OA-
5 45) was historically located in this area. Range 16 dates to WWII when it was used as a grenade
6 court. In 1958, the range was divided into a Rocket Launcher (Bazooka) area (Range 16) and a
7 Rifle Grenade Area (Range 17). In 1967, the range was consolidated into one range used for
8 rocket launches and 40mm grenade launches. The ASR Plates depict the firing fans of five
9 historical small arms ranges extending into this area. They are machine gun range (OA-2),
10 Range 12 (OA-48), Range 13 (OA-49), Range 19 (OA-50), and Old Range 12 (OA-55).

11 **14.2 INVESTIGATION RESULTS**

12 During the site characterization of Bravo, 10 grids in this OE Risk Assessment Sector were
13 geophysically mapped and all 10 grids were then intrusively investigated. A total of 4.91 acres
14 in grids and 0.0088 acres in transects were geophysically mapped. A total of 4.91 acres were
15 intrusively investigated in grids.

16 14.2.1 Five UXO items were identified during intrusive activities in this OE Risk Assessment
17 Sector at shallow depths, no greater than four inches. Thirty OE Scrap items, with some
18 indeterminate amounts, were found at depths ranging from one inch to ten inches. One UXO
19 item was found by IT. Table 14-1 contains a list of OE and OE Scrap items found within this
20 OE Risk Assessment Sector. Figure B-2 in Appendix B presents an overview figure of the
21 Bravo Area with this OE Risk Assessment Sector and Appendix F contains a list of all items
22 from the database developed for this OE Risk Assessment Sector.

23 **14.3 DESCRIPTION OF HAZARDS OF SPECIFIC OE ENCOUNTERED**

24 UXO items encountered during the site characterization of this OE Risk Assessment Sector were
25 MKII 37mm projectiles. The MKII 37mm projectile shell is made of bar steel and has an
26 explosive charge of 0.06 pounds of TNT. It is 4.45 inches long and has an ogive radius of 2.25
27 calibers. Since it is adapted for a base-detonating fuze, the nose is continued to a rounded point.
28 The projectile is longer and has thinner walls than the L.E. shell. The total weight of the
29 projectile with fuze and bursting charge is about 1 pounds. It uses an M38A1 base-detonating
30 fuze. This fuze is constructed of brass. It is set-back armed and employs inertia to drive the
31 firing pin into the detonator upon impact. This projectile was painted olive drab and stenciled in
32 yellow. The MK II is 0.549 inches longer than the MK I and employs the M38A1 base-
33 detonating fuze instead of the MK I base-percussion fuze. The practice projectile is identical to
34 the H.E. projectile except that the bursting charge consists of 0.05 pounds of black powder instead
35 of 0.06 pounds of TNT and it uses the M38 base-percussion fuze to ignite the black powder
36 charge. It is also painted blue with white stenciling.

37

1

Table 14-1
List of OE and OE Scrap Items Found in M3-1L 37mm Projectile Area-D

Item Description	Quantity	Depth (inches)	Target Type	Grid ID/ Transect	Anomaly ID
UXO Items:					
PROJECTILE, 37mm HE MKII	1	3	UXO	506	4
PROJECTILE, 37mm HE MKII	1	3	UXO	510	7
PROJECTILE, 37mm HE MKII	1	1	UXO	510	10
PROJECTILE, 37mm HE MKII	1	4	UXO	510	12
PROJECTILE, 37mm HE MKII	1	3	UXO	571	7
Data Provided by Other Subcontractors:*					
Unidentified ordnance item, possible grenade, 3in rocket motor	1	0	UXO	IT32	N/A
105mm PROJECTILE	1	0	Unknown	IT33	N/A
OE Scrap Items:					
FRAGMENTATION, 37mm	**	1	OE Scrap	502	1
FRAGMENTATION, 37mm	**	2	OE Scrap	502	3
FRAGMENTATION, 37mm, HE	**	2	OE Scrap	502	4
FRAGMENTATION, 37mm, HE	**	3	OE Scrap	502	5
FRAGMENTATION 57mm, HE	**	3	OE Scrap	502	5
UNKNOWN FRAGMENTATION	**	3	OE Scrap	502	5
FRAGMENTATION, 37mm, HE	**	2	OE Scrap	502	7
GRENADE, CS, FUNCTIONED	1	6	OE Scrap	502	8
FRAGMENTATION, 37mm, HE	**	2	OE Scrap	502	8
MORTAR, 4.2in	1	0	OE Scrap	502	264
PROJECTILE, 37mm, TPT, M51A2	1	5	OE Scrap	509	2
PROJECTILE, 37mm, TPT, M51A2	1	6	OE Scrap	510	2
PROJECTILE, 37mm APT, M80	1	6	OE Scrap	510	3
PROJECTILE, 37mm APT, M80	1	5	OE Scrap	510	4
PROJECTILE, 37mm APT, M80	1	5	OE Scrap	510	6
PROJECTILE, 37mm, TPT, M51A2	1	4	OE Scrap	510	9
PROJECTILE, 37mm, TPT, M51A2	1	1	OE Scrap	510	11
PROJECTILE, 37mm, TPT, M51A2	1	10	OE Scrap	510	14
FRAGMENTATION, 37mm, HE	**	5	OE Scrap	510	16
FRAGMENTATION	**	6	OE Scrap	510	18
PROJECTILE, 37mm, TPT, M51A2	1	4	OE Scrap	511	4
GRENADE, RIFLE, ILLUMINATION	1	1	OE Scrap	512	1
FRAGMENTATION, 37mm, HE	**	4	OE Scrap	512	3
GRENADE, RIFLE, ILLUMINATION	1	4	OE Scrap	512	4
PROJECTILE, 37mm, TPT, M51A2	1	1	OE Scrap	517	5
FRAGMENTATION, 75mm SHRAPNEL SPITBACK TUBE	1	4	OE Scrap	517	7
PROJECTILE, 37mm APT, M80	1	7	OE Scrap	517	8
75mm SHRAP SPITBACK TUBE	1	0	OE Scrap	517	9
PROJECTILE, 37mm, TPT, M51A2	1	1	OE Scrap	519	2
3.5" ROCKET, NOSE CONE BROKEN	1	6	OE Scrap	569	1
ROCKET MOTOR M73, SUBCALIBER, PRACTICE	1	0	OE Scrap	569	3
PROJECTILE, 37mm APT, M80	1	6	OE Scrap	569	4

**Table 14-1
List of OE and OE Scrap Items Found in M3-1L 37mm Projectile Area-D**

Item Description	Quantity	Depth (inches)	Target Type	Grid ID/Transect	Anomaly ID
ROCKET, PRACTICE, 3.5in, M29A2	1	0	OE Scrap	569	13
PROJECTILE, 37mm, TPT, M51A2	1	8	OE Scrap	571	1
PROJECTILE, 37mm, TPT, M51A2	1	0	OE Scrap	571	2
PROJECTILE, 37mm, TPT, M51A2	1	8	OE Scrap	571	3
PROJECTILE, 37mm, TPT, M51A2	1	10	OE Scrap	571	4
PROJECTILE, 37mm, TPT, M51A2	1	2	OE Scrap	571	5
PROJECTILE, 37mm APT, M80	1	2	OE Scrap	571	6
PROJECTILE, 37mm, TPT, M51A2	1	2	OE Scrap	571	10
PROJECTILE, 37mm, TPT, M51A2	1	5	OE Scrap	571	11

Note: This table does not list small arms finds.

Note: IT# = IT Corporation finds. PBP# = Parsons Burn Pit finds.

*TtEC did not independently verify the accuracy nor currency of information supplied by client or by any of clients contractors, vendors, or consultants.

** Indeterminate amount.

1

2 14.4 RISK ASSESSMENT

3 Figure 14-1, located at the end of this chapter, presents the CSM for potential exposures to OE in
 4 OE Risk Assessment Sector M3-1L-37mm Projectile Area-D in Redevelopment Parcel M3.
 5 Various firing points and range safety fans located throughout the sector and a combat range
 6 were identified as sources. OE would be deposited into the range safety fans by firing. At the
 7 firing points, ordnance may be present as a result of mishandling, poor housekeeping, or loss.
 8 OE may be present in the combat range area as a result of firing or poor housekeeping,
 9 mishandling, or loss. These releases likely result in OE being present on the ground surface or in
 10 the subsurface soils of the sector. This CSM also indicates the principal mechanisms by which
 11 ordnance items may migrate or move from one location to another in the sector or shift from one
 12 depth in the soil to another. These potential transport and migration mechanisms include
 13 mechanical redistribution, human activity, precipitation run-off, and (in limited, specific
 14 locations) erosion and frost heave. The original deposition of the ordnance items and the
 15 localized transport and migration processes result in a new distribution of OE items in the soil
 16 which may be locations of direct contact exposure by current or reasonably foreseeable future
 17 receptors associated with reuse of the area. Receptors may include commercial workers, and
 18 construction workers associated with the potential redevelopment and land re-use. Terrestrial
 19 wildlife may also be exposed to ordnance items present in the sector.

20 14.5 COMPARATIVE ANALYSIS OF RESPONSE ACTION ALTERNATIVES

21 14.5.1 Effectiveness

22 The OERIA risk assessment process addresses the combined criteria of overall protectiveness to
 23 human health and the environment and long-term effectiveness and permanence. The results of

1 the risk assessment performed for the M3-1L-37mm Projectile Area-D sector using this process
2 are presented in Figure 14-2, located at the end of this chapter. Based on these results, the most
3 effective alternatives for the protection of human health and the environment were judged to be
4 the removal alternatives. Alternative 6-Clearance to Depth was projected to provide the highest
5 level of protectiveness throughout the sector, while Alternative 5-Clearance to 1 Foot Depth and
6 Alternative 4-Surface Clearance received a lower ranking because they would not be expected to
7 remove OE from depths where it is indicated to be present and where future users of the area
8 may disturb. OE was found on the surface and within 4 inches of soil below the ground surface,
9 while OE debris were found in this sector on the surface and within the first 10 inches of soil
10 below the ground surface. Alternative 3-Construction Support is considered to be protective, but
11 only within the future construction footprints within the sector where clearance of OE would be
12 selectively performed. Alternative 2-Area-Specific Land Use Controls was considered to be less
13 effective than any of the removal alternatives. Alternative 1-No Further Action was considered
14 to be the least effective. Since development / redevelopment activities are planned for this
15 sector, Alternative 6 would provide the highest level of protectiveness, followed by Alternative
16 5.

17 14.5.1.1 With respect to the other effectiveness criteria, Alternative 1 No Further Action
18 clearly has the least short-term impacts since No Further Action is being taken that might affect
19 on local workers or the public. Alternative 2 Area-Specific Land Use Controls also presents little
20 short-term effects since the only activity that might have impact on the workers or the public
21 involves installation of a limited number of warning signs. The removal alternatives
22 (Alternatives 3, 4, 5, and 6) have the greatest potential impact on the workers and public since
23 each involves the potential of more direct contact with OE. In summary, Alternative 1 will have
24 the least short-term impacts, followed by Alternatives 2 and 3, and then Alternatives 4, 5, and 6.
25 Among the latter three alternatives, the short-term effects will increase from Alternatives 4 to 6,
26 since each has the potential for longer and more intense exposure to OE. With respect to the
27 compliance with ARARs criterion, each alternative will comply.

28 **14.5.2 Implementability**

29 14.5.2.1 Technical Feasibility

30 All six alternatives are technically feasible with Alternative 1 being the most technically feasible
31 since there is No Further Action required at the site (i.e., investigation or removal actions).
32 Alternative 2 is the second most technically feasible alternative. It requires that technical actions
33 be taken at the site (e.g., installation of signage at the site). The remaining alternatives are each
34 technically feasible but less so than Alternatives 1 and 2, because they each involve more intense
35 site activities and dependence on technology. In summary, Alternative 1 will be the most
36 technically feasible, Alternative 2 next, followed by Alternatives 3, 4, 5, and 6.

37 14.5.2.2 Administrative Feasibility

38 All six alternatives will require the preparation and DDESB-approval of an ESS document.
39 Alternatives 3 through 6 will each require the preparation and approval of a work plan since each
40 alternative involves onsite OE activities. Alternatives 2, 3, 4, and 5 will also require compliance
41 with the LUCAP for Fort McClellan, since each involves the implementation of land use

1 controls. In summary, considering these requirements, Alternative 1 will be the simplest to
2 administer, with Alternative 6 next, and Alternatives 2, 3, 4, and 5 being the most difficult of the
3 alternatives to administer due to the inclusion of land use controls and the requirements to
4 comply with the LUCAP.

5 14.5.2.3 Availability of Services and Materials

6 Services and materials will be required and are readily available for preparing the plans
7 mentioned above and to complete the fieldwork associated with Alternatives 3 through 6. Based
8 on the levels of services needed, Alternative 1 will require the least services and materials since
9 it only requires effort to prepare the ESS. More services and materials will be required for the
10 implementation of Alternative 2 since it requires the preparation of the ESS, installation of signs,
11 as well as coordination with the LUCAP. Even more services and materials will be required for
12 Alternative 3 since requires a work plan to support construction support activities and the field
13 service activities to provide the actual construction support. Alternative 4 will be similar in scope
14 of required services and materials. Alternatives 5 and 6 will require the most in services and
15 materials. In summary, Alternative 1 will require the least in services and materials to
16 implement, with Alternative 2 next. Alternatives 3 and 4 will require a higher level of services
17 and materials than Alternatives 1 and 2, but less than Alternatives 5 and 6.

18 14.5.2.4 Regulatory and Community Acceptance

19 The level of regulatory and/or community acceptance for each alternative can be expected to
20 largely depend on the protection that each alternative offers. For this sector, UXO has been
21 detected down to three inches below land surface and OE Scrap was found down to ten inches
22 below the land surface, in an area where the future land use is projected to be Development.
23 Alternative 1-No Further Action does nothing to provide any degree of protection and therefore,
24 is unlikely to be accepted by the regulatory community or the public. Alternative 2-Area-Specific
25 Land Use Controls would probably be received more favorably since it will provide some degree
26 of protection. However, since this alternative leaves potentially hazardous OE in place, it may
27 be received poorly by both regulators and the public. Alternative 3-Construction Support may
28 receive similar levels of acceptance as Alternative 2. Alternative 3 provides protection to
29 construction workers and removes OE within the construction footprint. The projected future
30 land use is Development. Alternative 4-Surface Clearance may be expected to receive an even
31 higher level of acceptance than any of the previous alternatives since it includes actual removal
32 of potential OE from the surface and is accompanied by land use controls. On the other hand, the
33 belief that significant numbers of subsurface OE may be present, may lead to reduced acceptance
34 of this alternative. Alternative 5 (Clearance to One-Foot Depth) and Alternative 6-Clearance to
35 Depth may receive the highest level of acceptance by both regulators and the public since they
36 both involve a subsurface removal of potential OE.

37 14.5.2.4.1 In summary, the alternatives that may be best received by the regulators and/or public
38 would be Alternative 5-Clearance to One Foot Depth and Alternative 6-Clearance to Depth,
39 followed in order by Alternative 4-Surface Clearance, Alternative 3-Construction Support,
40 Alternative 2-Area-Specific Land Use Controls, and lastly, Alternative 1-No Further Action.

1 **14.5.3 Cost**

2 The projected costs to implement the alternatives in this 180-acre sector are summarized below:

- 3 • Alternative 1 - No Further Action – \$5,000. An ESS (preparation, draft, and final) will be
4 prepared for a group of sectors. This is an approximation of one sector's portion of the total
5 cost.
- 6 • Alternative 2 - Area-Specific Land Use Controls – \$17,000. This cost includes planning and
7 installation of signage. No annual maintenance costs are included.
- 8 • Alternative 3 - Construction Support – \$709,288. This estimate includes management,
9 planning, and UXO support.
- 10 • Alternative 4 - Surface Clearance – \$1,131,244. This cost includes management and
11 planning, OE removal activities, and reporting.
- 12 • Alternative 5 - Clearance to One-Foot Depth – \$3,226,544. This cost includes management
13 and planning, OE removal activities, and reporting.
- 14 • Alternative 6 - Clearance to Depth – \$3,440,494. This cost includes management and
15 planning, OE removal activities, and reporting.

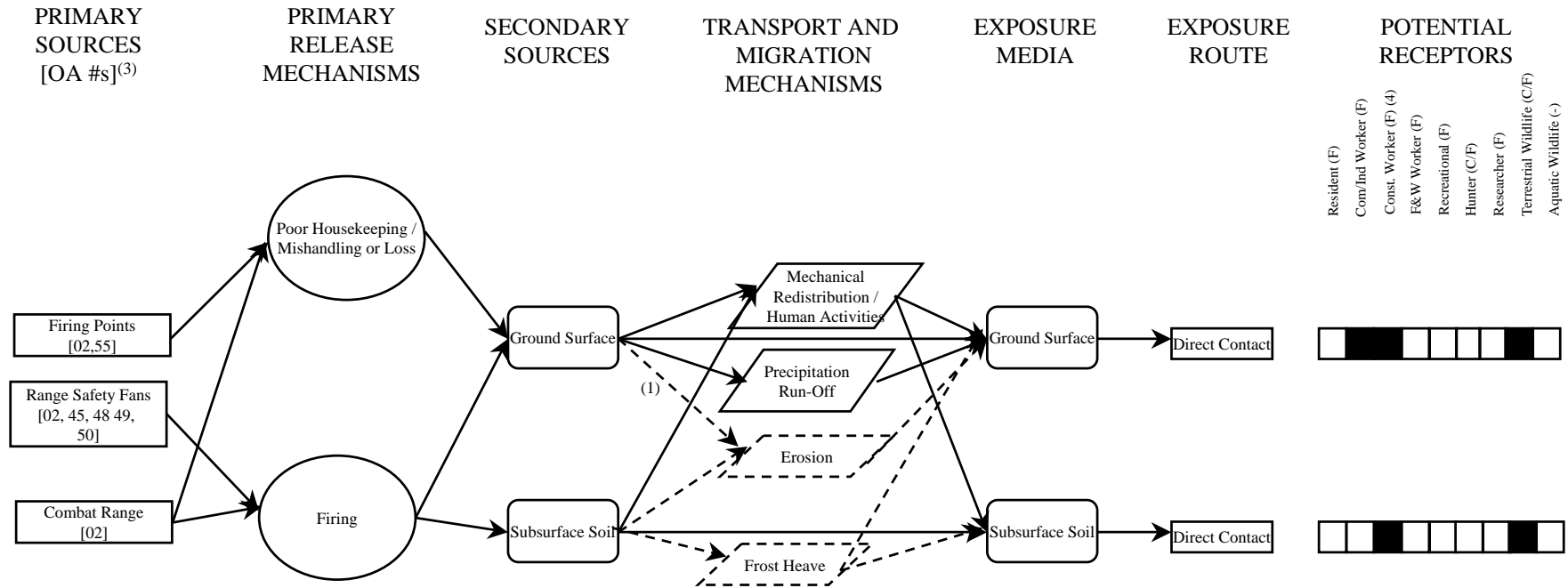
16 **14.6 RECOMMENDATION**

17 The recommended alternative for M3-1L-37mm Projectile Area-PR is Alternative 6-Clearance to
18 Depth. Components of this alternative will include land surveying and brush clearing operations
19 to prepare the site. Due to the requirement to detect items potentially deeper than one foot, this
20 alternative will be performed using sensitive instruments capable of detecting anomalies at
21 greater depths. Using a suitably sensitive detection system, the entire study area will be
22 surveyed to locate potential OE items. The anomalies will then be investigated to identify them
23 as UXO, OE Scrap, or Non-OE Scrap (metallic scrap). After identification, the items will be
24 disposed of as scrap or OE in accordance with the previously-approved OE operations work
25 plan. Planning for this response action will require preparation of an ESS and a site-specific
26 work plan. The estimated cost to implement this alternative is \$3,440,494.

27 **14.7 SUPPORTING RATIONALE**

28 The risk analysis and the comparative analysis indicated that clearance to depth should provide
29 sufficient protection for this sector. Five UXO items were found at shallow depths (maximum of
30 four inches). The majority of OE Scrap items found in this sector were at depths ranging from
31 one to six inches. Two items were at ten inches. The projected land use for this sector is
32 Development. The construction and maintenance of facilities or structures required for this land
33 use will require deeper intrusion into the soil. The documented historical use of this area,
34 combined with the OE items found in this area, and with the planned future use, all support the
35 proposed removal action.

Figure 14-1
M3-1L-37mm Projectile Area-D
CONCEPTUAL SITE MODEL



NOTES:

- (1) Dashed boxes or lines indicate a potential source area or linkage that requires further verification or is a linkage that is indicated to be present in only a small number of specific locations.
- (2) Plate numbers obtained from the Fort McClellan Archives Search Report
- (3) Ordnance Area identification numbers obtained from the Archives Search Report.
- (4) Within footprint of potential future development activity
- C = Current Receptor
- F = Potential Future Receptor
- = Not plausible for this sector

PLATE NOS. (2)	OA# (3)	NAME (Other Names)	ORDNANCE AND EXPLOSIVES ASSOCIATED WITH AREA
5	-	Submachine Gun Range	Small Arms
5, 10	02	Machine Gun Range	Small Arms
5, 6, 7, 10	45	Range 16 (originally, later Rocket Launcher/Bazooka Range and Range17 (Rifle Grenade))	Grenade Court; Small Arms; 40mm grenades (launched); Rockets
5, 6, 10	55	Old Range 12 (Range 12; Rifle Field Firing)	Small Arms
6, 7, 10	48	Range 12 (a.k.a. Range 14)	Small Arms; Light Anti-Tank Weapon; Anti-Tank; 60mm Projectiles; Rockets
6, 7, 10	49	Range 13	Small Arms; Light Anti-Tank Weapon
6, 7, 10	50	Range 19	Small Arms

Figure 14-2 OERIA TABLE FOR SECTOR M3-1L-37MM PROJECTILE AREA-D																			
AREA:		BRAVO																	
SECTOR:		M3-1L-37mm Projectile Area-D																	
TOTAL SECTOR AREA:		178 acres																	
AREA GEOPHYSICALLY SURVEYED:		4.92 acres [3]																	
AREA INTRUSIVELY INVESTIGATED:		4.91 acres (equivalent) [4]																	
	ORDNANCE							SITE		HUMAN CURRENT USE			HUMAN FUTURE USE			OVERALL RANK			
	HE Items Found? [Yes]	OE Type [7]		OE Sensitivity [7]		OE Item Depth Distribution		OE Item Density	OE Site Access	OE Site Stability	Activity	OE Contact Probability Level	Exposed Population (Number or Freq. Of Use)	Activity	OE Contact Probability Level	Exposed Population (Number or Freq. Of Use)	Likelihood of Near Term Reuse	CURRENT LAND USE	FUTURE LAND USE
	HE Debris Found? [Yes]	(%)	(%)	Depth Range	% [9]	(Items/Acre) [8,9,12]													
Baseline Risk Assessment (Existing Conditions)		Cat. 3	100	Cat. 3	100	Surface	28.6 / (14)	0.41 / (1.22)	No Restriction to Site	Site Stable	Recreational [13,17]	Significant [18]	Occasional [19]	Development [16,33]	Significant [18]	Occasional [19]	High		
		Cat. 2	0.0	Cat. 2	0.0	0 to 1' bgs	71.4 / (86)	1.02 / (7.54)											
		Cat. 1	0.0	Cat. 1	0.0	1' to Depth	- / (-)	- / (-)											
		Cat. 0	*	Cat. 0	*	Overall [11]	1.43 / (8.76)												
						90% CI on Overall OE Item Density [10]	0.81 - 2.66												
Alternative 1 - No Further Action		No Impact		No Impact		No Impact		No Impact	No Impact		No Impact	No Impact		No Impact	No Impact		BASELINE	BASELINE	
Alternative 2 - Land Use Controls		No Impact		No Impact		No Impact		No Impact	No Impact		No Impact	B		No Impact	B		LOW	LOW	
Alternative 3 - Construction Support		No Impact		No Impact		A [21]		No Impact	No Impact		A [21]	A [21]		A [21]	A [21]		MODERATE [20]	MODERATE [20]	
Alternative 4 - Surface Clearance		No Impact		No Impact		B		No Impact	No Impact		B	A [23]		B	A [23]		HIGH	MODERATE	
Alternative 5 - Clearance to 1 Foot Depth		A		A		A		No Impact	No Impact		A	A		B	A		HIGH	MODERATE [24]	
Alternative 6 - Clearance to Depth		A [22]		A [22]		A [22]		No Impact	No Impact		A	A [22]		A	A [22]		HIGH	HIGH	
<p>NOTES</p> <p>3 The Geophysically Surveyed Area includes the area associated with the transects within this specific sector.</p> <p>4 Based on the fraction of identified target anomalies intrusively investigated in each geophysically surveyed grid and/or transect segment.</p> <p>7 Percentages classify OE items found. If no OE items are found, Category 0 is 100% and Categories 1 - 3 are noted with a "***". If OE items are found, Category 0 is noted with a "*".</p> <p>8 OE Density values shown are the straight average value = # of OE Items / Acres in which they were found.</p> <p>9 Densities and depth range percentages shown in italics and curly brackets indicate characteristics of the OE debris.</p> <p>10 The OE Density range shown represents a 90% confidence interval on the OE Item density calculated using UXO Calculator Version 1.4.2.</p> <p>11 Overall OE item density is based on all OE items found in the area intrusively investigated.</p> <p>12 The surface OE item density is based on the area geophysically surveyed and the 0-1' and 1'-Depth OE item densities are based on the area intrusively investigated.</p> <p>13 Specific activities identified for the recreational current land use include hunting, hiking, and short cuts.</p> <p>14 Specific activities associated with the passive recreation future land use are hiking, walking, biking, picnicking, horseback riding, and other non-motorized activities.</p> <p>16 Development land use was assumed to be associated with routine interaction with the surface and near-surface soils by the employees of the new facilities. In addition, the construction of new facilities, structures, or underground utilities and the maintenance or replacement of existing structures or utilities was assumed to be reasonably associated with this land use.</p> <p>17 Exposure to terrestrial wildlife is also assumed.</p> <p>18 Based on the depth of intrusion associated with the identified activities - See Table 5 of USACE OERIA Interim Guidance (3/27/01).</p> <p>19 The frequency of site usage is currently classified as rare and the number of site users is currently classified as low due to restrictions that have been placed on the site (i.e., no hunting or hiking) since the remediation activities began. The current frequency of usage would be classified as occasional if these recreational activities took place.</p> <p>20 Indicated to be the most protective alternative within the construction footprint.</p> <p>21 Risk factor score indicated applies only within the construction footprint.</p> <p>22 No increased protectiveness relative to alternatives with a shallower clearance depth due to the depth distribution of OE items found.</p> <p>23 Removal of surface OE items or debris may reduce the number of potential exposures to souvenir hunters.</p> <p>24 Protectiveness based on intrusion depth; Given the observed depth distribution of OE Items, the level of protectiveness associated with this alternative may be greater.</p> <p>33 Future Development activities are projected to be associated with Developmental Reserve Use.</p> <p>- = Not applicable as no energetic OE items were found.</p> <p>IMPACT CODE</p> <p>A = Signifies the greatest impact on reducing potential exposures to OE; Relatively less impact as the letter ranking goes to B, C, and subsequent letters.</p> <p>HIGH - Most protective relative to projected land use.</p> <p>LOW - Least protective relative to projected land use.</p> <p>MODERATE - Protectiveness level between Low and High.</p> <p>BASELINE - Protectiveness level associated with Alternative 1 - No Further Action.</p>																			

1 **15.0 M3-1L-Mixed Projectile Area-PR**

2 **15.1 DESCRIPTION AND HISTORY**

3 This sector consists of approximately 370 acres in the southeastern portion of the Bravo Area.
4 The southern portion of the WWI Artillery Range (OA-29/39) extends into this sector. Artillery
5 and mortar was used at the WWI Artillery Range from 1912 to the beginning of WWII. Range
6 32 (OA-74), a Hand Grenade Range, is centrally located within this OE Risk Assessment Sector.
7 Range 32 was in use from the 1980's until base closure. The firing fans of three small arms
8 ranges also extend into this area. They are the Washington Rifle Range (OA-44), Range 15
9 (OA-47), and Range 12 (OA-48). The Washington Rifle Range (OA-44), also referred to as
10 Range 18, was constructed during WWII and was continuously used as a rifle range. Range 15
11 dates to WWII and has a safety fan similar to ones used for rifle and machine gun live fire.
12 Range 12 was built after WWII and was used as a competitive pistol range. The projected land
13 use for this sector is Passive Recreation.

14 **15.2 INVESTIGATION RESULTS**

15 During the site characterization of Bravo, 14 grids in this OE Risk Assessment Sector were
16 geophysically mapped and 3 of these grids were then intrusively investigated. Delineation
17 transects were a second investigation method used specifically to characterize suspected areas
18 with a high likelihood of containing OE present. The following delineation transects were
19 placed in this OE Risk Assessment Sector: M31L001 – M31L013 and part of M42H001.
20 Mountain transects were another investigation method used in areas with slopes greater than 40
21 degrees and was selected for a wide coverage across mountainsides. The following mountain
22 transects were placed in this OE Risk Assessment Sector: T20, part of T21, and T23. A total of
23 7.00 acres in grids and 3.30 acres in transects were geophysically mapped. A total of 0.53 acres
24 in grids and 0.17 acres in transects were intrusively investigated.

25 15.2.1 One UXO item was identified at a depth of two inches during intrusive activities.
26 Approximately 60, OE Scrap, items with some indeterminate amounts, were found primarily on
27 the surface and at shallow depths within this OE Risk Assessment Sector. Of the 60, only 6 OE
28 Scrap items were found below nine inches. The deepest OE Scrap was found at 36 inches.
29 Table 15-1 contains a list of OE and OE Scrap items found within this OE Risk Assessment
30 Sector. Figure B-2 in Appendix B presents an overview figure of the Bravo Area with this OE
31 Risk Assessment Sector and Appendix F contains a list of all items from the database found
32 within this OE Risk Assessment Sector.

33 **15.3 DESCRIPTION OF HAZARDS OF SPECIFIC OE ENCOUNTERED**

34 The only UXO item encountered during the site characterization of this OE Risk Assessment
35 Sector was a M1907M fuze. The 75mm shrapnel projectile consists of a steel case, near the base
36 of which a shoulder is formed on the interior surface. Three ounces of black powder is packed
37 beneath a diaphragm of steel which rests on the shoulder. This diaphragm also supports a flash
38 tube, the upper end of which is flared out into a smaller thin diaphragm. Between the two
39 diaphragms is held a charge of melted resin which holds 270 lead balls suspended within it
40

1

Table 15-1
List of OE and OE Scrap Items Found in M3-1L Mixed Projectile Area-PR

Item Description	Quantity	Depth (inches)	Target Type	Grid ID/Transect	Anomaly ID
UXO Items:					
FUZE, M1907M, COMBINATION	1	2	UXO	T21	T21A01
OE Scrap Items:					
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	0	OE Scrap	167	182
SIGNAL, SMOKE, GROUND, M62 SERIES, EXPENDED	3	0	OE Scrap	527	268
FLARE, SURFACE, TRIP, M49A1	2	0	OE Scrap	527	269
SIGNAL, ILLUMINATION, GROUND, M127 SERIES, EXPENDED	1	0	OE Scrap	527	270
SIGNAL, SMOKE, GROUND, M62 SERIES, EXPENDED	1	0	OE Scrap	528	275
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	3	0	OE Scrap	532	273
PUSHER PLATE, 155mm	1	4	OE Scrap	542	2
PROJECTILE, 155mm SHRAPNEL, MKI, EXPENDED	1	18	OE Scrap	542	3
PUSHER PLATE, 155mm	1	0	OE Scrap	542	5
PUSHER PLATE, 155mm	1	0	OE Scrap	542	6
FLASH TUBE, 155mm	1	0	OE Scrap	542	7
PROJECTILE, 155mm SHRAPNEL, MKI, EXPENDED	1	24	OE Scrap	542	9
FLASH TUBE, 155mm	1	0	OE Scrap	542	11
PROJECTILE, 155mm SHRAPNEL, MKI, EXPENDED	1	36	OE Scrap	542	12
PROJECTILE, 155mm SHRAPNEL, MKI, EXPENDED	1	20	OE Scrap	542	16
PROJECTILE, 155mm SHRAPNEL, MKI, EXPENDED	1	30	OE Scrap	542	17
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	0	OE Scrap	561	276
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	24	OE Scrap	563	14
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	2	OE Scrap	563	26
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	6	OE Scrap	563	27
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	6	OE Scrap	566	11
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	9	OE Scrap	566	41
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED w/FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	7	OE Scrap	566	42
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	7	OE Scrap	566	48
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	8	OE Scrap	566	85

Table 15-1
List of OE and OE Scrap Items Found in M3-1L Mixed Projectile Area-PR

Item Description	Quantity	Depth (inches)	Target Type	Grid ID/Transect	Anomaly ID
EXPENDED					
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	8	OE Scrap	566	120
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	5	OE Scrap	566	133
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	6	OE Scrap	566	150
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	9	OE Scrap	566	157
FRAGMENTATION	**	9	OE Scrap	566	157
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	9	OE Scrap	566	162
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	0	OE Scrap	566	231
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	15	0	OE Scrap	566	274
PROJECTILE DEBRIS, 155mm	**	0	OE Scrap	T20	T20AS1
FRAGMENTATION, 155mm	**	2	OE Scrap	T21	T21B03
SHRAPNEL BALL	1	4	OE Scrap	T21	T21C04
SPTIBACK TUBE, 75mm SHRAPNEL ROUND	1	6	OE Scrap	T21	T21D05
SPTIBACK TUBE, 75mm PROJECTILE	1	5	OE Scrap	T21	T21E06
SHRAPNEL BALL	1	4	OE Scrap	T21	T21H07
SPTIBACK TUBE, 75mm PROJECTILE	1	5	OE Scrap	T21	T21I08
FRAGMENTATION	**	5	OE Scrap	T21	T21I09
FUZE PIECE	1	3	OE Scrap	T21	T21J11
FUZE PIECES	**	2	OE Scrap	T21	T21J12
FUZE PIECES	**	2	OE Scrap	T21	T21J13
FUZE, M1907M, COMBINATION	1	0	OE Scrap	T21	T21JS1
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	6	OE Scrap	T23	T23A01
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	5	OE Scrap	T23	T23B02
FRAGMENTATION	**	2	OE Scrap	T23	T23C03
FRAGMENTATION, PROJECTILE	**	3	OE Scrap	T23	T23D04

*TtEC did not independently verify the accuracy nor currency of information supplied by client or by any of clients contractors, vendors, or consultants.

** Indeterminate amount.

1 weighing 6 ponds, 7 ounces. The top of the case is closed by a steel head finely threaded to the
 2 top, and which is adapted to the fuze with a coarse thread. It employs the 21-Second
 3 Combination Fuze M1907M which is covered with a metallic moisture proof cap. Either
 4 burning of the time element or firing of the percussion element on impact will ignite a black
 5 powder charge in the fuze. The flame from the magazine charge of the fuze flashes down the
 6 flash tube and ignites the base charge. Explosion of this charge forces the lower diaphragm,
 7 matrix and balls, and flash tube upward, blowing off the fuze and head as a unit. The resin
 8 matrix is ignited and the lead balls are ejected. The lead balls have a velocity of 350 feet/second

1 in addition to the velocity of the projectile at the time of bursting. It was painted red and
2 stenciled in black.

3 **15.4 RISK ASSESSMENT**

4 Figure 15-1, located at the end of this chapter, presents the CSM for potential exposures to OE in
5 OE Risk Assessment Sector M3-1L-Mixed Projectile Area-PR in Redevelopment Parcel M3.
6 Various firing points and range safety fans located throughout the sector, an impact/target area,
7 and a combat range were identified as sources. OE would be deposited into the range safety fans
8 and impact/target area by firing. At the firing points, ordnance may be present as a result of
9 mishandling, poor housekeeping, or loss. OE may be present in the combat range area as a result
10 of firing or poor housekeeping, mishandling, or loss. These releases likely result in OE being
11 present on the ground surface or in the subsurface soils of the sector. This CSM also indicates
12 the principal mechanisms by which ordnance items may migrate or move from one location to
13 another in the sector or shift from one depth in the soil to another. These potential transport and
14 migration mechanisms include mechanical redistribution, human activity, precipitation run-off,
15 and (in limited, specific locations) erosion and frost heave. The original deposition of the
16 ordnance items and the localized transport and migration processes result in a new distribution of
17 OE items in the soil which may be locations of direct contact exposure by current or reasonably
18 foreseeable future receptors associated with reuse of the area. Receptors may include future
19 Passive Recreational users of the area. No significant construction activity is projected to be
20 associated with this land use. However, soil disturbance within a specified area may be
21 considered on an infrequent and spatially limited basis. As such, a construction worker would
22 not be a routine receptor relative to the entire sector. Terrestrial wildlife may also be exposed to
23 ordnance present in the sector.

24 **15.5 COMPARATIVE ANALYSIS OF RESPONSE ACTION ALTERNATIVES**

25 **15.5.1 Effectiveness**

26 The OERIA risk assessment process addresses the combined criteria of overall protectiveness to
27 human health and the environment and long-term effectiveness and permanence. The results of
28 the risk assessment performed for the M3-1L-Mixed Projectile Area-PR sector using this process
29 are presented in Figure 15-2, located at the end of this chapter. Based on these results, the most
30 effective alternatives for the protection of human health and the environment were judged to be
31 the removal alternatives. Both Alternative 6-Clearance to Depth and Alternative 5-Clearance to 1
32 Foot Depth were projected to provide the highest level of protectiveness throughout the OE Risk
33 Sector, while Alternative 4- Surface Clearance was judged to provide a lower level of
34 protectiveness due to the indicated depth of OE in this area relative to the indicated future use for
35 passive recreation. The only OE item found in this area was located two inches below the
36 ground surface, while the majority of the OE Scrap was found on the surface and within 9 inches
37 of the ground surface (although some OE Scrap items were found between 18 and 36 inches
38 below the ground surface). Alternative 3-Construction Support is considered to be protective,
39 but only within any potential future construction footprint within the sector where clearance of
40 OE would be selectively performed. Alternative 2-Area-Specific Land Use Controls was
41 considered to be less effective than any of the removal alternatives except for the case when
42 Surface Clearance would be performed alone. Alternative 1-No Further Action was considered

1 to be the least effective. Since Passive Recreation activities are planned for this sector,
2 Alternative 5-Clearance to 1 Foot Depth was considered to provide a high level of
3 protectiveness, with Alternative 6 providing only an incremental increase in protectiveness.

4 15.5.1.1 With respect to the other effectiveness criteria, Alternative 1-No Further Action
5 clearly has the least short-term impacts since No Further Action is being taken that might impact
6 local workers or the public. Alternative 2-Area-Specific Land Use Controls also presents little
7 short-term effects since the only activity that might have impact on the workers or the public
8 involves installation of a limited number of warning signs. The removal alternatives
9 (Alternatives 3, 4, 5, and 6) have the greatest potential impact on the workers and public since
10 each involves the potential of more direct contact with OE. In summary, Alternative 1 will have
11 the least short-term impacts, followed by Alternatives 2 and 3, and then Alternatives 4, 5, and 6.
12 Among the latter three alternatives, the short-term effects will increase from Alternatives 4 to 6,
13 since each has the potential for longer and more intense exposure to OE. With respect to the
14 compliance with ARARs criterion, each alternative will comply.

15 **15.5.2 Implementability**

16 15.5.2.1 Technical Feasibility

17 All six alternatives are technically feasible with Alternative 1 being the most technically feasible
18 since there is No Further Action required at the site (i.e., investigation or removal actions).
19 Alternative 2 is the second most technically feasible alternative. It requires that technical actions
20 be taken at the site (e.g., installation of signage at the site). The remaining alternatives are each
21 technically feasible but less so than Alternatives 1 and 2, because they each involve more intense
22 site activities and dependence on technology. In summary, Alternative 1 will be the most
23 technically feasible, Alternative 2 next, followed by Alternatives 3, 4, 5, and 6.

24 15.5.2.2 Administrative Feasibility

25 All six alternatives will require the preparation and DDESB-approval of an ESS document.
26 Alternatives 3 through 6 will each require the preparation and approval of a work plan since each
27 alternative involves onsite OE activities. Alternatives 2, 3, 4, and 5 will also require compliance
28 with the LUCAP for Fort McClellan, since each involves the implementation of land use
29 controls. In summary, considering these requirements, Alternative 1 will be the simplest to
30 administer, with Alternative 6 next, and Alternatives 2, 3, 4, and 5 being the most difficult of the
31 alternatives to administer due to the inclusion of land use controls and the requirements to
32 comply with the LUCAP.

33 15.5.2.3 Availability of Services and Materials

34 Services and materials are required and are readily available for preparing the plans mentioned
35 above and to complete the fieldwork associated with Alternatives 3 through 6. Based on the
36 levels of services needed, Alternative 1 will require the least services and materials since it only
37 requires effort to prepare the ESS. More services and materials will be required for the
38 implementation of Alternative 2 since it requires the preparation of the ESS, installation of signs,
39 as well as coordination with the LUCAP. Even more services and materials will be required for

1 Alternative 3 since requires a work plan to support construction support activities and the field
2 service activities to provide the actual construction support. Alternative 4 will be similar in scope
3 of required services and materials. Alternatives 5 and 6 will require the most in services and
4 materials. In summary, Alternative 1 will require the least in services and materials to
5 implement, with Alternative 2 next. Alternatives 3 and 4 will require a higher level of services
6 and materials than Alternatives 1 and 2, but less than Alternatives 5 and 6.

7 15.5.2.4 Regulatory and Community Acceptance

8 The level of regulatory and/or community acceptance for each alternative can be expected to
9 largely depend on the protection that each alternative offers. For this sector, one OE item was
10 found two inches below ground surface. Alternative 1-No Further Action does nothing to
11 provide any degree of protection and therefore is unlikely to be accepted by the regulatory
12 community or the public. Alternative 2-Area-Specific Land Use Controls would probably be
13 received more favorably since it will provide some degree of protection, however, since it leaves
14 potential OE in place, it may be received poorly by both regulators and the public. Alternative 3-
15 Construction Support may receive similar levels of acceptance as Alternative 2. Alternative 3
16 provides protection to construction workers and removes OE within the construction footprint.
17 The projected future land use is Passive Recreation, with little expected construction activities.
18 Alternative 4-Surface Clearance may be expected to receive an even higher level of acceptance
19 than any of the previous alternatives since it includes actual removal of potential OE from the
20 surface and is accompanied by land use controls. On the other hand, the belief that significant
21 numbers of subsurface OE may be present may lead to a reduced acceptance of this alternative.
22 Alternative 5-Clearance to One-Foot Depth and Alternative 6-Clearance to Depth may receive
23 the highest level of acceptance by both regulators and the public since they both involve a
24 subsurface removal of potential OE. OE Scrap, indicating the presence of other high explosives,
25 was found on the surface and up to 36 inches below ground surface in this sector. Clearance to
26 depth would provide the highest level of acceptance, but since the projected future land use is
27 Passive Recreation, the regulators and/or the public may consider Alternative 6 to be more than
28 what is necessary and prefer not to disturb the habitat and environment to the degree required for
29 clearance to depth.

30 15.5.2.4.1 In summary, the alternatives that may be best received by the regulators and/or public
31 would be Alternative 5-Clearance to One Foot Depth and Alternative 6-Clearance to Depth,
32 followed in order by Alternative 4-Surface Clearance, Alternative 2-Area-Specific Land Use
33 Controls, Alternative 3-Construction Support, and lastly, Alternative 1-No Further Action.

34 **15.5.3 Cost**

35 The projected costs to implement the alternatives in this 370-acre sector are summarized below:

- 36 • Alternative 1 - No Further Action – \$5,000. An ESS (preparation, draft, and final) will be
37 prepared for a group of sectors. This is an approximation of one sector's portion of the total
38 cost.
- 39 • Alternative 2 - Area-Specific Land Use Controls – \$17,000. This cost includes planning and
40 installation of signage. No annual maintenance costs are included.

- 1 • Alternative 3 - Construction Support – \$1,431,592. This estimate includes management,
2 planning, and UXO support.
- 3 • Alternative 4 - Surface Clearance – \$2,299,947. This cost includes management and
4 planning, OE removal activities, and reporting.
- 5 • Alternative 5 - Clearance to One-Foot Depth – \$6,596,447. This cost includes management
6 and planning, OE removal activities, and reporting.
- 7 • Alternative 6 - Clearance to Depth – \$7,026,147. This cost includes management and
8 planning, preparation of an ESS, preparation of a site-specific work plan, OE removal
9 activities, and reporting.

10 **15.6 RECOMMENDATION**

11 The recommended alternative for M3-1L-Mixed Projectile Area-PR is Alternative 5-Clearance to
12 One Foot. Components of this alternative will include land surveying and brush clearing
13 operations to prepare the site. Where technically feasible, suitably sensitive detection instruments
14 will be used to survey the study area and locate subsurface anomalies, which subsequently will
15 be investigated down to 12 inches. After identification, the item will be disposed of as scrap or
16 OE in accordance with a previously-approved OE operations work plan. A deed restriction that
17 prohibits digging in this sector without construction support by UXO-qualified personnel will
18 also be included.

19 15.6.1 Planning for this response action will require preparation of an ESS and a site-
20 specific work plan. The estimated cost to implement this alternative is \$6,596,447.

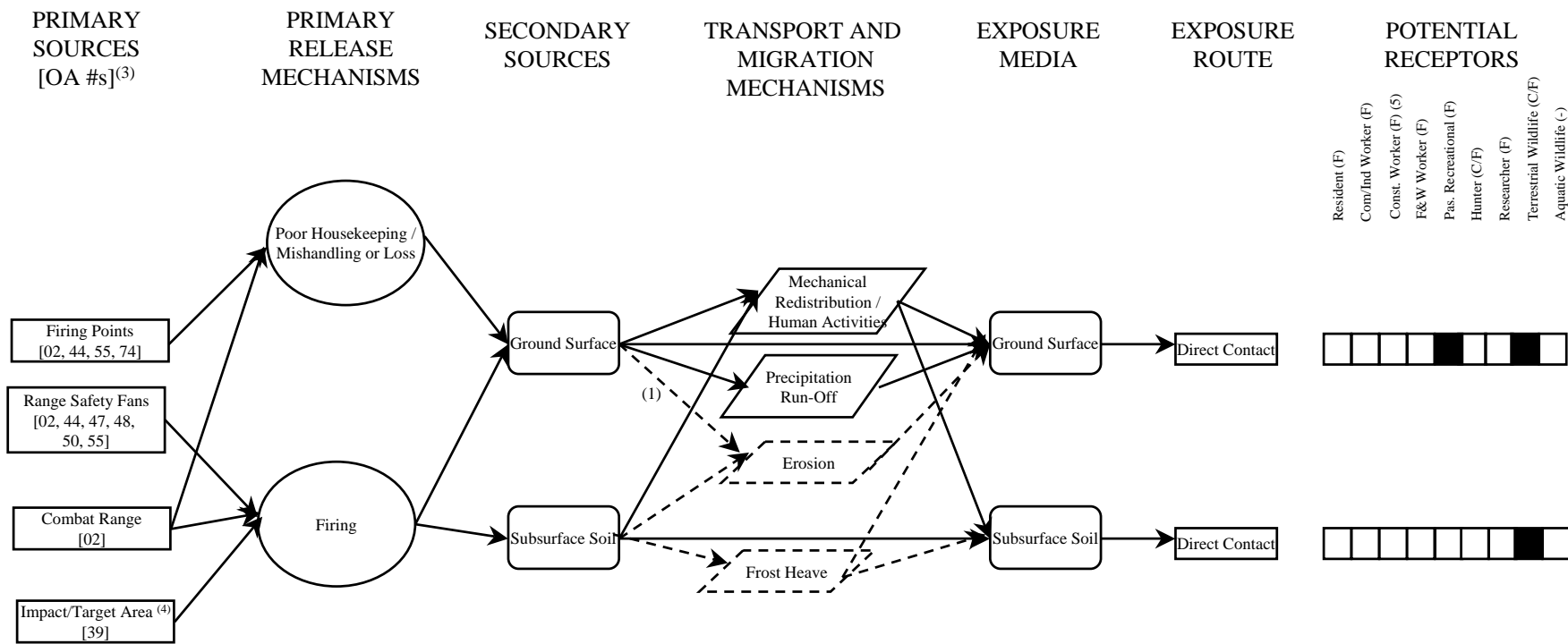
21 **15.7 SUPPORTING RATIONALE**

22 The risk analysis and the comparative analysis indicated that Alternative 5-Clearance to One
23 Foot should provide sufficient protection for this OE Risk Sector. One UXO item was found at a
24 depth of 2 inches in this sector. A large amount of OE Scrap was identified during sampling
25 activities primarily on the surface and at shallow depths. Only six OE Scrap items were found
26 below one foot. Further, the projected land use for this sector is Passive Recreation associated
27 with activities such as hiking, walking, and biking. No significant construction of recreational
28 facilities or underground utilities is associated with this land use. Consistent with the Passive
29 Recreation land use is the occasional incidental interaction with surface and very near surface (0
30 – 6 inches) soils. The recommendation of clearance to one foot provides a safety buffer of 2
31 beyond the expected depth (6 inches) of contact. Since the projected land use is Passive
32 Recreation, the clearance to one foot will be protective for that land use.

1

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Figure 15-1
M3-1L-Mixed Projectile Area-PR
CONCEPTUAL SITE MODEL



NOTES:

- (1) Dashed boxes or lines indicate a potential source area or linkage that requires further verification or is a linkage that is indicated to be present in only a small number of specific locations.
- (2) Plate numbers obtained from the Fort McClellan Archives Search Report
- (3) Ordnance Area identification numbers obtained from the Archives Search Report.
- (4) For Non-Small Arms Munitions.
- (5) No significant construction activity is expected for this land use. Limited disturbance of the soil may be considered within a specific footprint for the installation of facilities associated with the land use.
- C = Current Receptor
- F = Potential Future Receptor
- = Not plausible for this sector

PLATE NOS. (2)	OA# (3)	NAME (Other Names)	ORDNANCE AND EXPLOSIVES ASSOCIATED WITH AREA
3, 4, 10 5	39 -	World War I Artillery Range (South Half) Submachine Gun Range	Artillery Munitions; Mortars Small Arms
5, 10	02	Machine Gun Range	Small Arms
5, 6, 7, 10	44	Washington Rifle Range (Range 18)	Small Arms
5, 6, 10	55	Old Range 12 (Range 12; Rifle Field Firing)	Small Arms
6, 10	47	Range 15 (a.k.a. Combat Village)	Small Arms; Light Anti-Tank Weapon
6, 7, 10	48	Range 12 (a.k.a. Range 14)	Small Arms; Light Anti-Tank Weapon; Anti-Tank; 60mm Projectiles; Rockets
6, 7, 10	50	Range 19	Small Arms
7, 10	74	Hand Grenade Range (Range 32)	Hand Grenades

Figure 15-2

OERIA TABLE FOR SECTOR M3-1L-MIXED PROJECTILE AREA-PR

AREA:		BRAVO																	
SECTOR:		M3-1L-Mixed Projectile Area-PR																	
TOTAL SECTOR AREA:		370 acres																	
AREA GEOPHYSICALLY SURVEYED:		10.30 acres [3]																	
AREA INTRUSIVELY INVESTIGATED:		0.70 acres (equivalent) [4]																	
	ORDNANCE								SITE		HUMAN CURRENT USE			HUMAN FUTURE USE			OVERALL RANK		
	HE Items Found? [No]	OE Type [7]		OE Sensitivity [7]		OE Item Depth Distribution		OE Item Density	OE Site Access	OE Site Stability	Activity	OE Contact Probability Level	Exposed Population (Number or Freq. Of Use)	Activity	OE Contact Probability Level	Exposed Population (Number or Freq. Of Use)	Likelihood of Near Term Reuse	CURRENT LAND USE	FUTURE LAND USE
	HE Debris Found? [Yes]		(%)		(%)	Depth Range	% [9]	(Items/Acre) [8,9,12]											
Baseline Risk Assessment (Existing Conditions)		Cat. 3	0.0	Cat. 3	0.0	Surface	- / (49.3)	- / (3.30)	No Restriction to Site	Site Stable	Recreational [13,17]	Significant [18]	Occasional [19]	Passive Recreation [14]	Significant [18]	Occasional [19]	High		
		Cat. 2	100	Cat. 2	100	0 to 1' bgs	100 / (42)	1.45 / (42)											
		Cat. 1	0.0	Cat. 1	0.0	1' to Depth	- / (8.70)	- / (8.57)											
		Cat. 0	*	Cat. 0	*	Overall [11]	1.43 / (98.6)												
						90% CI on Overall OE Item Density [10]	0.51 - 6.87												
Alternative 1 - No Further Action		No Impact		No Impact		No Impact		No Impact	No Impact		No Impact	No Impact	No Impact	No Impact	No Impact		BASELINE	BASELINE	
Alternative 2 - Land Use Controls		No Impact		No Impact		No Impact		No Impact	No Impact		No Impact	B	No Impact	B		LOW	LOW		
Alternative 3 - Construction Support		No Impact		No Impact		A [21]		No Impact	No Impact		A [21]	A [21]		A [21]	A [21]		MODERATE [20]	MODERATE [20]	
Alternative 4 - Surface Clearance		No Impact		No Impact		No Impact		No Impact	No Impact		B	A [23]		B	A [23]		LOW	LOW	
Alternative 5 - Clearance to 1 Foot Depth		A		A		A		No Impact	No Impact		A	A		A	A		HIGH	HIGH	
Alternative 6 - Clearance to Depth		A [22]		A [22]		A [22]		No Impact	No Impact		A	A [22]		A	A [22]		HIGH	HIGH	
NOTES																			
3 The Geophysically Surveyed Area includes the area associated with the grids and transects within this specific sector.																			
4 Based on the fraction of identified target anomalies intrusively investigated in each geophysically surveyed grid and/or transect segment.																			
7 Percentages classify OE items found. If no OE items are found, Category 0 is 100% and Categories 1 - 3 are noted with a ***. If OE items are found, Category 0 is noted with a ***.																			
8 OE Density values shown are the straight average value = # of OE Items / Acres in which they were found.																			
9 Densities and depth range percentages shown in italics and curly brackets indicate characteristics of the OE debris.																			
10 The OE Density range shown represents a 90% confidence interval on the OE Item density calculated using UXO Calculator Version 1.4.2.																			
11 Overall OE item density is based on all OE Items found in the area intrusively investigated.																			
12 The surface OE item density is based on the area geophysically surveyed and the 0-1' and 1'-Depth OE item densities are based on the area intrusively investigated.																			
13 Specific activities identified for the recreational current land use include hunting, hiking, and short cuts.																			
14 Specific activities associated with the passive recreation future land use are hiking, walking, biking, picnicking, horseback riding, and other non-motorized activities.																			
17 Exposure to terrestrial wildlife is also assumed.																			
18 Based on the depth of intrusion associated with the identified activities - See Table 5 of USACE OERIA Interim Guidance (3/27/01).																			
19 The frequency of site usage is currently classified as rare and the number of site users is currently classified as low due to restrictions that have been placed on the site (i.e., no hunting or hiking) since the remediation activities began. The current frequency of usage would be classified as occasional if these recreational activities took place.																			
20 Indicated to be the most protective alternative within the construction footprint.																			
21 Risk factor score indicated applies only within the construction footprint.																			
22 No increased protectiveness relative to alternatives with a shallower clearance depth due to the depth distribution of OE items found.																			
23 Removal of surface OE items or debris may reduce the number of potential exposures to souvenir hunters.																			
- = Not applicable as no energetic OE items were found.																			
IMPACT CODE																			
A = Signifies the greatest impact on reducing potential exposures to OE; Relatively less impact as the letter ranking goes to B, C, and subsequent letters.																			
HIGH - Most protective relative to projected land use.																			
LOW - Least protective relative to projected land use.																			
MODERATE - Protectiveness level between Low and High.																			
BASELINE - Protectiveness level associated with Alternative 1 - No Further Action.																			

1 **16.0 M3-Remainder Area-PR**

2 **16.1 DESCRIPTION AND HISTORY**

3 This OE Risk Assessment Sector consists of 1,043 acres in the central and southern portion of
4 the Bravo Area. The Eastern Bypass Corridor splits this sector into two pieces. This sector is
5 located in the area where Range 12 (OA-48), Range 13 (OA-49), Range 15 (OA-47), the
6 Washington Tank Range (OA-54), and the 60mm Mortar Range (OA-53) were historically
7 located. The southern extent of Range 16 (OA-45) touches the edge of this sector, the
8 southwestern extent of the WWI Artillery Range (OA-29/39), also extends into this area.

9 16.1.1 Range 12 was built after WWII and was used as a competitive pistol range. Range 13,
10 the Washington Pistol Qualification Range, was established during the Vietnam War and was
11 active until the base closed. Range 15 dates to WWII and has a safety fan similar to ones used
12 for rifle and machine gun live fire. The Washington Tank Range was initiated in 1958 and
13 abandoned by 1967. The 60mm Mortar Range was established during WWII and abandoned
14 sometime between 1958 and 1967. Range 16 was established during WWII as a grenade court. In
15 1958, the range was divided into a Rocket Launcher (Bazooka) area (Range 16) and a Rifle
16 Grenade area (Range 17). In 1967, the two ranges were again consolidated and used for rocket
17 launchers and 40mm grenade launchers. The Washington Tank Range was instituted in 1958
18 and abandoned by 1967. Use of this range is unknown, but its use may have been associated with
19 the reserve units located on Highway 21.

20 16.1.2 The firing fans of five small arms ranges extend into this area. They are machine gun
21 range (OA-2), Washington Rifle Range (OA-44), Range 15 (OA-47), Range 12 (OA-48), and
22 Old Range 12 (OA-55). The Machine Gun Range, used during WWII, was part of Combat
23 Range #2. It was used as a rifle grenade range during WWII and was abandoned in 1958. The
24 Washington Rifle Range (OA-44), also referred to as Range 18, was constructed during WWII
25 and was continuously used as a rifle range. Range 15 dates to WWII and has a safety fan similar
26 to ones used for rifle and machine gun live fire. Range 12 was built after WWII and was used as
27 a competitive pistol range. Old Range 12 was built during WWII as a landscape range and was
28 abandoned by 1967. By 1958, the range was referred to as Range 12, Rifle Field Firing. The
29 projected land use for this sector is Passive Recreation or alternately, Residential.

30 **16.2 INVESTIGATION RESULTS**

31 A total of 14.71 acres in grids and 19.78 acres in transects were geophysically mapped. A total
32 of 14.71 acres in grids and 11.43 acres in transects were intrusively investigated. (These values
33 include the additional grid and transect sampling acreages discussed below). The Minimum
34 Discrimination Sub Module of the UXO Calculator and a target value of 0.1 OE per acre were
35 used to calculate that a minimum of 22.79 acres must undergo intrusive investigation. Including
36 the supplemental transects, a total of 26.14 acres were intrusively investigated. This provides a
37 higher degree of confidence than the 90% assumed that enough sampling was done to determine
38 there are no more than 0.1 UXO/acre in the entire AOI (i.e., one UXO in 10 acres on average).

39

40

1

Area Values are in Acres

Total Sector Area	Total Area Geophysically Surveyed	Percent of Total Sector Geophysically Surveyed	Area Intrusively Investigated As Grids	Area Intrusively Investigated As Transects
1,043	34.49	3.31%	14.71	11.43
Total Area Intrusively Investigated	Percent of Total Sector Intrusively Investigated	Minimum Intrusive Sampling Area Required to Test Target Density of 1.0 Items/Acre with 90% Confidence	Minimum Intrusive Sampling Area Required to Test Target Density of 0.1 Items/Acre with 90% Confidence	Intrusive Work To Date Sufficient to Test Target Density of 0.1 Items/Acre with 90% Confidence?
26.14	2.51%	2.31	22.79	YES

2

3 16.2.1 During the April 2001 to August 2002 site characterization of Bravo, 26 grids in this
4 OE Risk Assessment Sector were geophysically mapped and then intrusively investigated.
5 Delineation transects were a second investigation method used specifically to characterize
6 suspected areas with a high likelihood of containing OE in this OE Risk Assessment Sector. The
7 following delineation transects were placed partly in this OE Risk Assessment Sector: M32H001
8 – M32H003, M32H005, M32H007, M32H009, M32H020, M32H022, and M32H024. Mountain
9 transects were another investigation method used in areas with slopes greater than 40 degrees
10 and was selected for a wide coverage across mountainsides.

11 16.2.2 The following mountain transects were placed in this OE Risk Assessment Sector: T1 –
12 T12, T14 – T16, part of T17 – T19, T22, and T24 – T65. The following data collection transects
13 (or clusters), consisting of a series of 200-foot long, parallel segments spaced 25 to 50 feet apart,
14 were investigated: part of M31M019, M31M020, M31M021, M31M027, M31M028, M31M036,
15 M31M037, M31M039, M31M041 – M31M052, M31M061 – M31M064, part of M31M066,
16 M31M068, M31M070, M31M073, part of M31M075, M31M079 – M31M081, M31M088,
17 M31M089, M31M095, part of M31M127, and M31M128 – M31M133.

18 16.2.3 Additional meetings between TtEC, Fort McClellan Transition Force, and the Corps of
19 Engineers, Huntsville Center highlighted the need for additional sampling in the M3-1L Area of
20 Bravo to further and more accurately delineate the boundaries between the areas of “High
21 Likelihood” and “Low Likelihood” of OE present. TtEC performed additional intrusive
22 activities in 32 selected Grids. This sampling was conducted as Modification 12 to the existing
23 task order. These selected grids were grids that had been geophysically mapped and some
24 anomalies intrusively investigated during the site characterization. It was decided that all
25 primary and secondary anomalies previously identified in each of these grids would be
26 intrusively investigated. Grids 502, 508, 509, 510, 511, 512, 513, 514, 517, 518, 519, 523, 525,
27 531, 544, 545, 548, 549, 550, 551, 553, 555, 556, 559, 564, 567, 569, 570, 571, and 574 were
28 investigated from July 15 through July 25, 2002. Grids 171 and 526 were investigated from
29 August 1 through August 5, 2002. All data collected from these grids was incorporated into the
30 existing data from Bravo. Please reference Appendix F for the table of findings. Table 16-1
31 contains a list of OE Scrap findings found in this OE Risk Assessment Sector during additional
32 grid sampling.

1 16.2.4 During a November 18, 2003 meeting with ADEM, data gaps were noted within the No
 2 Further Action area, and it was determined that sampling of additional Mountain Transects
 3 should be conducted. In a February 2004 meeting, ADEM representatives worked with TtEC to
 4 position the supplemental Mountain Transects in areas to identify potential OE. This sampling
 5 was performed in July 2004. The work plan addendum stated that all anomalies up to a total of
 6 40 within each 290-foot segment of each supplemental transect would be dug, then every other
 7 anomaly beyond that up to a total of 100, then every third for the remainder of each segment.
 8 However, field crews did not find 40 or more anomalies in any segment of any supplemental
 9 transect; as such, every anomaly located in every supplemental transect was dug. Table 16-2
 10 lists the supplemental transects, the number of anomalies (equal to the number of digs) in each
 11 transect, and the number of OE Scrap items found. Crews dug 212 items in the 41 supplemental
 12 transects, found 6 OE Scrap items (all were 37mm Target Practice Tracing (TPT)), and 206 non-
 13 OE Scrap items. No OE or UXO was found. According to the agreement with ADEM, OE and
 14 OE Scrap were to be logged while non-OE items were counted as items found but were not
 15 recorded. Please reference Appendix F for further information concerning the supplemental
 16 transects. Table 16-1 contains a list of OE Scrap findings found in the OE Risk Assessment
 17 Sector during the supplemental transect sampling.

18 16.2.5 A portion of the safety fan for Range 16 falls within the M3-Remainder Area-PR risk
 19 sector. Sensitive 40mm HE grenades along with other OE items have been found on Range 16.
 20 It was determined that the area of the Range 16 safety fan that is located in the M3-Remainder
 21 Area-PR risk sector was too steep for the grid method. Therefore, transects were the selected
 22 method of investigation. In the meeting on February 6, 2004, ADEM and TtEC positioned
 23 supplemental transects T33, T40, T41, and T57 in the portion of the Range 16 safety fan that
 24 falls within this risk sector. The crews investigated every foot of these transects and did not find
 25 any anomalies in T33, T40, and T41. In T57, two anomalies were identified as Non OE Scrap.

26 16.2.6 No UXO items were identified during intrusive activities. Approximately 94 OE Scrap
 27 items, with some indeterminate amounts, were found primarily on the surface and at shallow
 28 depths within this OE Risk Assessment Sector. One OE Scrap item was found at 14 inches and
 29 one OE Scrap item was found at 23 inches. Table 16-1 contains a list of OE Scrap items found
 30 in this OE Risk Assessment Sector. Figure B-2 in Appendix B presents an overview figure of
 31 the Bravo Area with this OE Risk Assessment Sector and Appendix F contains a list of all items,
 32 OE related as well as non-OE related, from the database found within this OE Risk Assessment
 33 Sector.

34

Table 16-1
List of OE Scrap Items Found in M3-Remainder Area-PR

Item Description	Quantity	Depth (inches)	Target Type	Grid ID/Transect	Anomaly ID
OE Scrap Items:					
PROJECTILE, 37mm, TPT, M51A2	1	6	OE Scrap	171	2
RIFLE GRENADE, SIGNAL, ILLUMINATION	1	1	OE Scrap	171	3
PROJECTILE, 37mm, TPT, M51A2	1	14	OE Scrap	171	7
RIFLE GRENADE, SIGNAL ILLUMINATION	1	2	OE Scrap	525	1
RIFLE GRENADE, SIGNAL ILLUMINATION	1	6	OE Scrap	525	3

Table 16-1
List of OE Scrap Items Found in M3-Remainder Area-PR

Item Description	Quantity	Depth (inches)	Target Type	Grid ID/Transect	Anomaly ID
RIFLE GRENADE, SIGNAL ILLUMINATION	1	5	OE Scrap	525	4
PROJECTILE, 37mm APT, M80	1	1	OE Scrap	526	2
PROJECTILE, 37mm, TPT, M51A2	1	4	OE Scrap	526	3
PROJECTILE, 37mm, TPT, M51A2	1	8	OE Scrap	526	5
SIGNAL, SMOKE, GROUND, M62 SERIES, EXPENDED	1	3	OE Scrap	541	1
SIGNAL, SMOKE, GROUND, M62 SERIES, EXPENDED	1	2	OE Scrap	541	2
SIGNAL, SMOKE, GROUND, M62 SERIES, EXPENDED	1	3	OE Scrap	541	3
RIFLE GRENADE, SIGNAL ILLUMINATION	1	3	OE Scrap	544	1
RIFLE GRENADE, SIGNAL ILLUMINATION	1	2	OE Scrap	544	2
RIFLE GRENADE, SIGNAL ILLUMINATION	1	2	OE Scrap	544	3
GRENADE, RIFLE, SIGNAL ILLUMINATION	1	6	OE Scrap	545	1
GRENADE, RIFLE, SIGNAL ILLUMINATION	1	6	OE Scrap	545	3
MK 2, HAND GRENADE, PRACTICE	1	8	OE Scrap	548	3
PROJECTILE, 37mm APT, M80	1	5	OE Scrap	549	1
PROJECTILE, 37mm, TPT, M51A2	1	1	OE Scrap	549	1
PROJECTILE, 37mm, TPT, M51A2	1	3	OE Scrap	550	2
PROJECTILE, 37mm, TPT, M51A2	1	2	OE Scrap	550	3
GRENADE, RIFLE, SIGNAL ILLUMINATION	1	2	OE Scrap	553	4
MK 2 HAND GRENADE, PRACTICE	1	6	OE Scrap	555	1
PROJECTILE, 37mm, TPT, M51A2	1	4	OE Scrap	556	1
SIGNAL, ILLUMINATION, GROUND, M127 SERIES, EXPENDED	1	1	OE Scrap	556	2
PROJECTILE, 37mm APT, M80	1	4	OE Scrap	556	3
RIFLE GRENADE, TAILBOOM, SMOKE	1	1	OE Scrap	556	8
GRENADE SPOONS	**	3	OE Scrap	556	14
FUZE, GRENADE, FUNCTIONED, BURN PIT	1	0	OE Scrap	556	23
RIFLE GRENADE BODY, ILLUMINATION, FUNCTIONED	2	2	OE Scrap	556	24
RIFLE GRENADE BODY, ILLUMINATION, FUNCTIONED	1	2	OE Scrap	556	25
RIFLE GRENADE TAILBOOM, SMOKE	1	2	OE Scrap	556	29
GRENADE SPOON	1	5	OE Scrap	557	7
SIGNAL, ILLUMINATION, GROUND, M127 SERIES, EXPENDED	1	0	OE Scrap	557	277
SIMULATOR, ALUMINUM, FUNCTIONED	1	1	OE Scrap	559	4
FLARE, SURFACE, TRIP, M49A1	1	0	OE Scrap	559	279
PROJECTILE, 37mm, TPT, M51A2	1	4	OE Scrap	564	2
PROJECTILE, 37mm, TPT, M51A2	1	4	OE Scrap	564	5
PROJECTILE, 37mm, TPT, M51A2	1	10	OE Scrap	567	1
PROJECTILE, 37mm APC, M51	1	0	OE Scrap	M31m020	1
PROJECTILE, 37mm APC, M51	1	5	OE Scrap	M31m020	2
PROJECTILE, 37mm APC, M51	1	0	OE Scrap	M31m020	51
PROJECTILE, 37mm APC, M51	1	23	OE Scrap	M31m027	1
PROJECTILE, 37mm APC, M51	1	2	OE Scrap	M31m027	3

Table 16-1
List of OE Scrap Items Found in M3-Remainder Area-PR

Item Description	Quantity	Depth (inches)	Target Type	Grid ID/Transect	Anomaly ID
PROJECTILE, 37mm APC, M51	1	1	OE Scrap	M31m027	4
PROJECTILE, 37mm APC, M51	1	6	OE Scrap	M31m027	5
PROJECTILE, 37mm APC, M51	1	1	OE Scrap	M31m036	1
PROJECTILE, 37mm APC, M51	1	1	OE Scrap	M31m037	1
PROJECTILE, 37mm APC, M51	1	0	OE Scrap	M31m042	1
GRENADE SPOON	1	3	OE Scrap	M31m043	20
GRENADE FUZE	1	1	OE Scrap	M31m043	29
SMOKE POT	1	0	OE Scrap	M31m043	61
SIGNAL, SMOKE, GROUND, M62 SERIES, EXPENDED	1	3	OE Scrap	M31m047	1
SIGNAL, SMOKE, GROUND, M62 SERIES, EXPENDED	1	0	OE Scrap	M31m047	2
SIGNAL, SMOKE, GROUND, M62 SERIES, EXPENDED	1	2	OE Scrap	M31m051	1
SIGNAL, SMOKE, GROUND, M62 SERIES, EXPENDED	1	2	OE Scrap	M31m052	4
SMOKE GRENADE SPOON	1	0	OE Scrap	M31m061	6
SIGNAL, SMOKE, GROUND, M62 SERIES, EXPENDED	1	0	OE Scrap	M31m131	2
GRENADE, HAND, SMOKE	1	0	OE Scrap	M31m131	6
PROJECTILE, 37mm, APT, M80	1	3	OE Scrap	T01	T01D04
PROJECTILE, 37mm, TPT, M51A2	1	6	OE Scrap	T01	T01F06
PROJECTILE, 37mm, TPT, M51A2	1	1	OE Scrap	T01	T01G07
PROJECTILE, 37mm, TPT, M51A2	1	1	OE Scrap	T02	T02A01
PROJECTILE, 37mm, TPT, M51A2	1	1	OE Scrap	T02	T02B02
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	1	0	OE Scrap	T02	T02S1
MINE, ANTI PERSONNEL, BOUNDING, M8	1	0	OE Scrap	T02	T02S2
PROJECTILE, 37mm, TPT, M51A2	1	3	OE Scrap	T03	T03A01
PROJECTILE, 37mm, TPT, M51A2	1	2	OE Scrap	T03	T03B02
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	0	OE Scrap	T03	T03S1
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	0	OE Scrap	T03	T03S2
GRENADE, HAND, SMOKE, M18	1	0	OE Scrap	T04	T04S1
PROJECTILE, 60mm, ILLUMINATING, M721	1	0	OE Scrap	T04	T04S2
FUZE, HAND GRENADE, M201A1	1	0	OE Scrap	T04	T04S3
SHAPE CHARGE SLUG	1	3	OE Scrap	T05	T05B02
PROJECTILE, 37mm, TPT, M51A2	1	3	OE Scrap	T05	T05C03
PROJECTILE, 37mm, TPT, M51A2	1	2	OE Scrap	T05	T05F06
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	0	OE Scrap	T06	T06S1
PROJECTILE, 37mm, TPT, M51A2	1	1	OE Scrap	T07	T07C03
PROJECTILE, 37mm, TPT, M51A2	1	2	OE Scrap	T07	T07D04
PROJECTILE, 37mm, TPT, M51A2	1	1	OE Scrap	T07	T07E05
PROJECTILE, 37mm, TPT, M51A2	1	0	OE Scrap	T07	T07G07
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	0	OE Scrap	T08	T08S1

Table 16-1
List of OE Scrap Items Found in M3-Remainder Area-PR

Item Description	Quantity	Depth (inches)	Target Type	Grid ID/Transect	Anomaly ID
SIGNAL, ILLUMINATION, GROUND, M127 SERIES, EXPENDED	1	0	OE Scrap	T08	T08S2
FRAGMENTATION	**	2	OE Scrap	T10	T10D02
FRAGMENTATION	**	2	OE Scrap	T10	T10E04
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	0	OE Scrap	T10	T10S1
PUSHER PLATE	1	0	OE Scrap	T10	T10S2
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	0	OE Scrap	T12	T12S1
PROJECTILE, 37mm, TPT, M51A2	1	2	OE Scrap	T16	T16A01
FUZE PIECES	**	2	OE Scrap	T21	T21K14
37mm TPT	1	3	OE Scrap	T30	T30-1A
37mm TPT	1	2	OE Scrap	T31	T31-2A
37mm TPT	1	0	OE Scrap	T31	T31-4A
37mm TPT	1	2	OE Scrap	T31	T31-4B
37mm TPT	1	0	OE Scrap	T44	T44-1A
37mm TPT	1	0	OE Scrap	T63	T63-1A

*TtEC did not independently verify the accuracy nor currency of information supplied by client or by any of clients contractors, vendors, or consultants.
** Indeterminate amount.

1

2 16.2.7 During a separate removal action in the EBP, a 40mm HE round was identified in Grid
3 C85 within EBP boundaries. This EBP grid is located near the boundary of the M3-Remainder
4 Area-PR Sector within the Bravo Area. Historical records do not indicate a reason for the 40mm
5 item to be located in this area. Further, no other OE items were found in a 200 foot area of the
6 EPB to the north, west, and south of Grid C85. At a meeting with ADEM in February 2004,
7 ADEM and the U.S. Army agreed to investigate a 50 foot by 50 foot grid around the location of
8 the 40mm item. The location where the 40mm item was identified was used as the center of the
9 western border of the grid. The EE/CA Overview Map, Figure B-2, in Appendix B depicts the
10 location of grid. The following items were found during the investigation of the 50 foot by 50
11 foot grid: 4 OE Scrap items, 54 Non-OE Scrap items, and 20 construction debris items. No OE
12 was identified during the investigation. A large number of the OE Scrap items found in this
13 sector were APC and TPT rounds. APC, or armor piercing capped, are rounds that basically
14 consist of a metal slug with a thin-walled cap for ballistics trajectory. The only propellant
15 associated with the APC is in the cartridge casing and is used to project the practice round from
16 the tube. The 37mm APC only contains a small amount of pyrotechnic composition with
17 minimal energetic material. There are no explosives encased in the round. The TPT, or target
18 practice with tracer, round is also a practice item. The TPT is solid steel and the only
19 pyrotechnic material is in the tail. It contains a small amount (1.6 ounces) of a pyrotechnic
20 material which provides a method to track the practice round at night to confirm its trajectory.
21 Please reference Appendix F for information concerning the EBP finding.

1 16.2.8 The A2 Area (included in Task Order 006, Construction Support/Anomaly Avoidance)
 2 borders the southern side of M3-Remainder Area-PR. The A2 Area was investigated during a
 3 Field Reconnaissance. No OE items were found in the entire area. The fact sheet, included in
 4 Appendix C, concluded that the probability of further OE discoveries in the A2 area is low.

5

Table 16-2 Anomalies (Digs) in Supplemental Transects								
Transect	Date	No. of Anomalies (Digs)	No. of OE Scrap Items		Transect	Date	No. of Anomalies (Digs)	No. of OE Scrap Items
T25	7/7/2004	0	-		T48	7/13/2004	10	-
T26	7/7/2004	0	-		T49	7/13/2004	15	-
T27	7/27/2004	1	-		T49	7/12/2004	0	-
T28	7/26/2004	1	-		T50	7/15/2004	25	-
T29	7/26/2004	2	-		T51	7/15/2004	20	-
T30	7/7/2004	2	1		T52	7/14/2004	2	-
T31	7/6/2004	1	2		T53	7/27/2004	0	-
T31	7/7/2004	5	1		T54	7/14/2004	1	-
T32	7/19/2004	0	-		T55	7/20/2004	0	-
T33	7/12/2004	0	-		T56	7/14/2004	1	-
T34	7/12/2004	0	-		T57	7/14/2004	2	-
T35	7/28/2004	2	-		T57	7/13/2004	0	-
T36	7/22/2004	9	-		T58	7/13/2004	10	-
T37	7/26/2004	0	-		T59	7/20/2004	18	-
T38	7/21/2004	1	-		T59	7/19/2004	10	-
T39	7/21/2004	3	-		T60	7/22/2004	11	-
T40	7/13/2004	0	-		T60	7/21/2004	8	-
T41	7/13/2004	0	-		T61	7/21/2004	12	-
T42	7/15/2004	0	-		T61	7/20/2004	8	-
T43	7/28/2004	0	-		T62	7/19/2004	15	-
T44	7/14/2004	0	1		T63	7/7/2004	1	1
T45	7/15/2004	0	-		T64	7/7/2004	0	-
T46	7/12/2004	8	-		T65	7/7/2004	1	-
T47	7/12/2004	7	-					
Total Digs = 212								

6

7 **16.3 DESCRIPTION OF HAZARDS OF SPECIFIC OE ENCOUNTERED**

8 No OE or UXO were encountered during the site characterization of this OE Risk Assessment
 9 Sector. OE Scrap items found, to a depth of 23 inches, were indicative of maneuver training
 10 activities and not of target areas.

11 **16.4 RISK ASSESSMENT**

12 Figure 16-1, located at the end of this chapter, presents the CSM that was developed for potential
 13 exposures to OE in OE Risk Assessment Sector M3-Remainder Area-PR in Redevelopment
 14 Parcel M3. The CSM was developed in recognition of the multiple uses of this area over time, as

1 depicted in the inserted table in Figure 16-1, located at the end of this chapter (Note: Plate 3 of
2 the ASR indicates the earliest activities in the area and more recent periods of use can be found
3 on subsequent plates, through Plate 10). The primary sources were various firing points and
4 range safety fans located throughout the sector, as well as an impact/target area. OE would have
5 been deposited into the range safety fans and the impact/target area by firing. At the firing
6 points, ordnance may also have been released as a result of mishandling, poor housekeeping, or
7 loss. OE may be present in the combat range area as a result of firing or poor housekeeping,
8 mishandling, or loss. These releases likely would have resulted in OE being present on the
9 ground surface or in the subsurface soils of the sector. Additionally, there was the potential for
10 release to the surface water or sediments in this area. This CSM also indicates the principal
11 mechanisms by which ordnance items may migrate or move from one location to another in the
12 sector or shift from one depth in the soil to another. These potential transport and migration
13 mechanisms include mechanical redistribution and human activity, precipitation run-off, and (in
14 limited, specific locations) erosion and frost heave. The original deposition of the ordnance
15 items and the localized transport and migration processes could have resulted in a new
16 distribution of OE items in the soil, surface water, or sediments which may be locations of direct
17 contact exposure by current or reasonably foreseeable future receptors associated with reuse of
18 the area. Potential direct contact with the surface water and sediments is indicated as potential
19 exposure media, but OE presence in these areas has not been confirmed (represented as a dashed
20 box on Figure 16-1, located at the end of this chapter). Receptors may include Passive
21 Recreational users of the area with occasional, incidental interaction with surface and very near-
22 surface soils, i.e., 0-6inches below ground surface (Section 4.2.2.4). No significant construction
23 activity is projected to be associated with this land use. However, soil disturbance within a
24 specified area may be considered on an infrequent and spatially limited basis. As such, a
25 construction worker would not be a routine receptor relative to the entire sector. Given an
26 identified possibility for residential redevelopment and unrestricted use in this sector, a resident
27 and a residential re-use construction worker are also indicated on Figure 16-1, located at the end
28 of this chapter, as potential future receptors to be considered. Receptors would include
29 residential and construction workers with unrestricted use of soils to any depth. Terrestrial and
30 aquatic wildlife may also be exposed to ordnance present in the sector.

31 **16.5 COMPARATIVE ANALYSIS OF RESPONSE ACTION ALTERNATIVES**

32 **16.5.1 Effectiveness**

33 The OERIA risk assessment process addresses the combined criteria of overall protectiveness to
34 human health and the environment and long-term effectiveness and permanence. The results of
35 the risk assessment performed for the M3-Remainder Area-PR sector using this process in
36 consideration of the planned future use of passive recreation are presented in Figure 16-2 located
37 at the end of this chapter. No OE items were found on the surface or in the subsurface, and OE
38 debris was found within the top 23 inches of soil beneath the ground surface. Approximately
39 85% of these OE debris items were found in the top 12 inches of soil. The OE debris found was
40 classified as Category 0. No items with an explosive hazard, i.e., nothing that would cause
41 injury, were found in the M3-Remainder Area-PR sector. The 75 mm shrapnel projectiles had
42 no residual explosive hazard and thus were classified as OE scrap. Given these findings of the
43 field investigations, no residual explosive was indicated to be present. The discovery of OE
44 debris in the area indicates that the possibility that some hazardous OE items may be present

1 cannot be ruled out with complete certainty. Given a conservative interpretation of the results,
2 the removal alternatives (Alternatives 6, 5, and 4) would provide the greatest level of confidence
3 that no OE-related explosive hazard exists. Relative to these very high levels of protective
4 certainty linked to physical removal, land use controls and taking No Further Action would
5 reflect a slightly lower level of certainty regarding the absence of OE and associated hazard.
6 This notwithstanding, the sampling conducted and the lack of OE finds in this area still indicates
7 a very high level of confidence that the OE density in this area, if OE are in fact present, does not
8 currently exceed the minor use target benchmark levels typically associated with Passive
9 Recreation.

10 16.5.1.1. An alternate unrestricted residential future use for this sector has been discussed. An
11 OERIA risk assessment also was performed relative to this future use. These results are
12 presented in Figure 16-3, located at the end of this chapter. Given that no OE items were found
13 in this area, the OERIA results for a residential reuse and for passive recreation future use are
14 very similar. As seen in Figure 16-3, located at the end of this chapter, the alternatives most
15 likely to increase the level of confidence that no explosive hazard exists given a conservative
16 interpretation of the field results to be the removal alternatives. No OE-related explosive hazard
17 exists. Relative to these very high levels of protective certainty linked to physical removal, land
18 use controls and taking No Further Action would reflect a slightly lower level of certainty
19 regarding the absence of OE and associated hazard. This notwithstanding, the sampling
20 conducted and the lack of OE finds in this area still indicates a high level (90%) of confidence
21 that the OE density in this area, if OE in fact are present, does not currently exceed the
22 significant public use target benchmark levels typically associated with residential reuse.

23 **16.5.2 Implementability**

24 16.5.2.1 Technical Feasibility

25 All six alternatives are technically feasible with Alternative 1 being the most technically feasible
26 since there is No Further Action required at the site (i.e., investigation or removal actions).
27 Alternative 2 is the second most technically feasible alternative. It requires that technical actions
28 be taken at the site (e.g., installation of signage at the site). The remaining alternatives are each
29 technically feasible but less so than Alternatives 1 and 2, because they each involve more intense
30 site activities and dependence on technology. In summary, Alternative 1 will be the most
31 technically feasible, Alternative 2 next, followed by Alternatives 3, 4, 5, and 6.

32 16.5.2.2 Administrative Feasibility

33 All six alternatives will require the preparation and DDESB approval of an ESS document.
34 Alternatives 3 through 6 will each require the preparation and approval of a work plan since each
35 alternative involves onsite OE activities. Alternatives 2, 3, 4, and 5 will also require compliance
36 with the LUCAP for Fort McClellan, since each involves the implementation of land use
37 controls. In summary, considering these requirements, Alternative 1 will be the simplest to
38 administer, with Alternative 6 next, and Alternatives 2, 3, 4, and 5 being the most difficult of the
39 alternatives to administer due to the inclusion of land use controls and the requirements to
40 comply with the LUCAP.

1 16.5.2.3 Availability of Services and Materials

2 Services and materials will be required and are readily available for preparing the plans
3 mentioned above and to complete the fieldwork associated with Alternatives 3 through 6. Based
4 on the levels of services needed, Alternative 1 will require the least services and materials since
5 it only requires effort to prepare the ESS. More services and materials will be required for the
6 implementation of Alternative 2 since it requires the preparation of the ESS, installation of signs,
7 as well as coordination with the LUCAP. Even more services and materials will be required for
8 Alternative 3 since it requires a work plan to support construction support activities and the field
9 service activities to provide the actual construction support. Alternative 4 will be similar in scope
10 of required services and materials. Alternatives 5 and 6 will require the most in services and
11 materials. In summary, Alternative 1 will require the least in services and materials to
12 implement, with Alternative 2 next. Alternatives 3 and 4 will require a higher level of services
13 and materials than Alternatives 1 and 2, but less than Alternatives 5 and 6.

14 16.5.2.4 Regulatory and Community Acceptance

15 The level of regulatory and/or community acceptance for each alternative can be expected to
16 largely depend on the protection that each alternative offers. For this sector, no OE was found
17 and the OE Scrap found was located on the surface or up to ten inches below land surface, in a
18 remote area. The projected future land use is Passive Recreation or alternately, unrestricted
19 Residential. A small area within this sector is now included as part of the Eastern Bypass.
20 Alternative 1-No Further Action does not provide certainty based on physical removal.
21 Although no OE-related explosive hazard exists; this alternative may not be received favorably
22 due to the lower level of certainty than the other alternatives. Alternative 2-Area-Specific Land
23 Use Controls would probably be received more favorably since it will provide some degree of
24 protection, however, since it potentially leaves OE items in place (although not assured), it may
25 be received poorly by both regulators and the public. Alternative 3-Construction Support may
26 receive similar levels of acceptance as Alternative 2. Alternative 3 provides protection to
27 construction workers and removes OE within the construction footprint. The projected future
28 land use is Passive Recreation, with little expected construction activities or alternately
29 Residential use which is unrestricted and includes construction activity and human occupancy
30 and use. Alternative 4-Surface Clearance may be expected to receive an even higher level of
31 acceptance than any of the previous alternatives since it includes actual removal of potential OE
32 from the surface and is accompanied by land use controls. On the other hand, the belief that
33 significant numbers of subsurface OE may be present may lead to a reduced acceptance of this
34 alternative. Alternative 5 (Clearance to One-Foot Depth) and Alternative 6-Clearance to Depth
35 may receive the highest level of acceptance by both regulators and the public since they both
36 involve a subsurface removal of potential OE.

37 16.5.2.4.1 In summary, the alternatives that may be best received by the regulators and/or public
38 would be Alternative 5-Clearance to One Foot Depth and Alternative 6-Clearance to Depth,
39 followed in order by Alternative 4-Surface Clearance, Alternative 2-Area-Specific Land Use
40 Controls, Alternative 3-Construction Support, and lastly, Alternative 1-No Further Action.

1 **16.5.3 Cost**

2 The projected costs to implement the alternatives in this 1,043-acre sector are summarized
3 below:

- 4 • Alternative 1 - No Further Action – \$5,000. An ESS (preparation, draft, and final) will be
5 prepared for a group of sectors. This is an approximation of one sector’s portion of the total
6 cost.
- 7 • Alternative 2 - Area-Specific Land Use Controls – \$17,000. This cost includes planning and
8 installation of signage. No annual maintenance costs are included.
- 9 • Alternative 3 - Construction Support – \$3,990,069. This estimate includes management,
10 planning, and UXO support.
- 11 • Alternative 4 - Surface Clearance – \$6,243,772. This cost includes management and
12 planning, OE removal activities, and reporting.
- 13 • Alternative 5 - Clearance to One-Foot Depth – \$18,308,423. This cost includes management
14 and planning, OE removal activities, and reporting.
- 15 • Alternative 6 - Clearance to Depth – \$19,469,852. This cost includes management and
16 planning, OE removal activities, and reporting.

17 **16.6 RECOMMENDATION**

18 The recommended alternative for M3-Remainder Area-PR is Alternative 1-No Further Action.
19 This alternative requires No Further Action at the site. Although the possibility that some OE
20 items may be present cannot be ruled out with complete certainty, the characterization results
21 indicated that no residual explosives were present. This alternative does not impose any land use
22 controls. However, this alternative will include a deed notice in the property transfer documents
23 that informs future property owners of the historical OE use and provides notification procedures
24 in the event an OE item is discovered.

25 16.6.1 The estimated cost to implement this alternative is \$5,000.

26 **16.7 SUPPORTING RATIONALE**

27 The risk analysis and the comparative analysis indicated that No Further Action should provide
28 sufficient protection for either Passive Recreation or unrestricted Residential use of this sector.
29 During the site characterization of the Bravo Area, the Additional Sampling in grids, and the
30 Supplemental Mountain Transect Sampling, no OE or UXO items were identified in this sector.
31 OE Scrap was identified on the surface, at shallow depths, and one item at 23 inches. The types
32 of OE Scrap items that were found in this sector included 75mm shrapnel projectiles, signal
33 illumination grenades, smoke signal items, flares, and practice items.

1 16.7.1 In a February 2004 meeting, ADEM representatives worked with TtEC to position the
 2 supplemental Mountain Transects in areas to identify potential OE. Table 16-3 indicates the
 3 rationale for placement of the supplemental transects.

4 16.7.2 No OE or UXO was identified during the further investigation of Grid C85 in the EBP.
 5 Only OE Scrap, non-OE Scrap, and construction debris items were found.

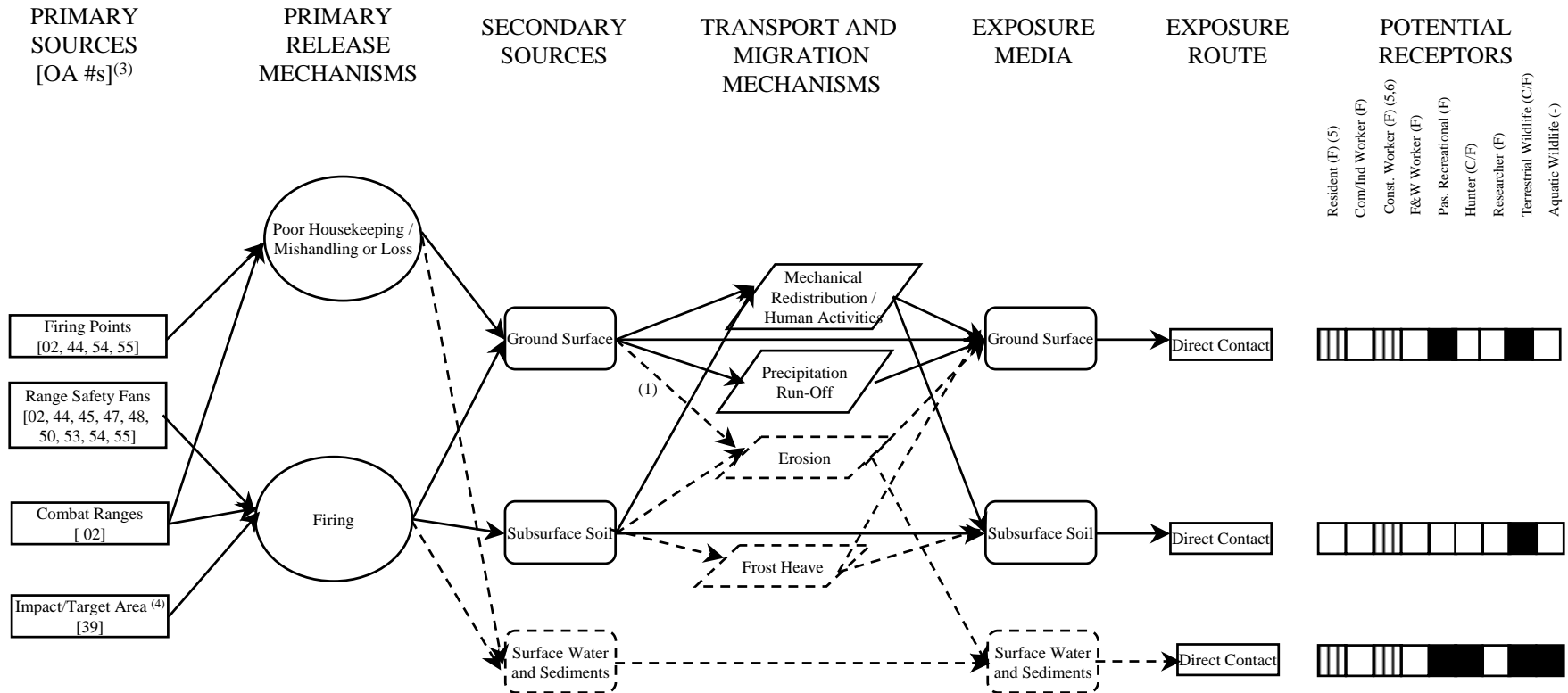
6 16.7.3 The Task Order 06 A2 area bounds the southern portion of the M3-Remainder Area-PR.
 7 The A2 area was investigated during a field reconnaissance and no OE items were found. The
 8 fact sheet at Appendix C concluded that the probability of further OE discoveries in the A2 area
 9 were low. TtEC performed a removal action on the 22-acre portion of the Eastern Bypass
 10 Corridor that divides this sector. No OE items were identified in the portion of the EBP defined
 11 by extending the boundary of the western portion of the NFA area until it contacts the eastern portion at
 12 the same azimuth (where the northernmost grid is C23). In this area of the EBP, there were no UXO or
 13 OE located between the two parts of the NFA area. Additionally, TtEC did not find any OE or UXO in
 14 the A2 area or in the part of the Bypass that splits the A2 area.”. The documented historical use of this
 15 area, combined with the types of practice items found in this area, and given the planned future
 16 use for this area, all support the recommendation for No Further Action.

17

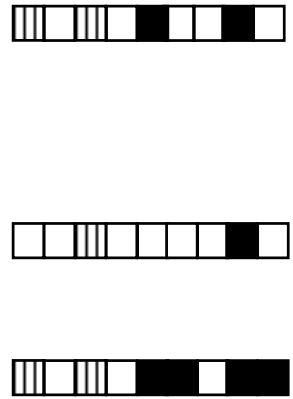
Table 16-3 Rationale for Placement of Supplemental Transects		
Findings In EE/CA Investigation	Identified in	Transects For Further Investigation
APT OE Scrap	Grid 549	None
APT OE Scrap	Grid 556	T51 and T60
APT OE Scrap	MT01	T30, T31, T33
APC OE Scrap	Transect M31m020	T63
APC OE Scrap	Transect M31m027	T32
APC OE Scrap	Transect M31m036	None (Grid 564 near)
APC OE Scrap	Transect M31m037	T29 and T32
APC OE Scrap	Transect M31m042	T28 (many transects nearby)
Fuzes and Fuze Pieces	Transect M31m043	T28
Fuzes and Fuze Pieces	T04 and T06	T33 and T34
Fuzes and Fuze Pieces	T21	T60, T61, and T62
Fragmentation	T10	T40, T41, and T57

18

**Figure 16-1
M3-Remainder Area-PR
CONCEPTUAL SITE MODEL**



- Resident (F) (5)
- Com/Ind Worker (F)
- Const. Worker (F) (5,6)
- F&W Worker (F)
- Pas. Recreational (F)
- Hunter (C/F)
- Researcher (F)
- Terrestrial Wildlife (C/F)
- Aquatic Wildlife (-)



NOTES:

- (1) Dashed boxes or lines indicate a potential source area or linkage that requires further verification or is a linkage that is indicated to be present in only a small number of specific locations.
- (2) Plate numbers obtained from the Fort McClellan Archives Search Report
- (3) Ordnance Area identification numbers obtained from the Archives Search Report.
- (4) For Non-Small Arms Munitions.
- (5) A possible residential use scenario also was considered and represented with striped boxes.
- (6) No significant construction activity is expected for the passive recreation land use. Limited disturbance of the soil may be considered within a specific footprint for the installation of facilities associated with the land use.
- C = Current Receptor
- F = Potential Future Receptor
- = Not plausible for this sector

PLATE NOS. (2)	OA# (3)	NAME (Other Names)	ORDNANCE AND EXPLOSIVES ASSOCIATED WITH AREA
3, 4, 10 5, 10 5, 6, 7, 10 5, 6, 7, 10	39 02 44 45	World War I Artillery Range (South Half) Machine Gun Range Washington Rifle Range (Range 18) Range 16 (originally, later Rocket Launcher/Bazooka Range and Range17 (Rifle Grenade))	Artillery Munitions; Mortars Small Arms Small Arms Grenade Court; Small Arms; 40mm grenades (launched); Rockets
5, 6, 10 5, 6, 10 6, 10	53 55 47	60mm Mortar Range Old Range 12 (Range 12; Rifle Field Firing) Range 15 (a.k.a. Combat Village)	60mm HE Mortars Small Arms Small Arms; Light Anti-Tank Weapon
6, 7, 10	48	Range 12 (a.k.a. Range 14)	Small Arms; Light Anti-Tank Weapon; Anti-Tank; 60mm Projectiles; Rockets
6, 7, 10 6, 10	50 54	Range 19 Washington Tank Range (Tank Table 1-2-3)	Small Arms Small Arms; 37mm Sub Caliber Rounds; 75mm Projectile; 90mm Projectiles

Figure 16-2 OERIA TABLE FOR SECTOR M3-REMAINDER AREA-PR																			
AREA:		BRAVO																	
SECTOR:		M3-Remainder Area-PR																	
TOTAL SECTOR AREA:		1043 acres																	
AREA GEOPHYSICALLY SURVEYED:		37.41 acres [3]																	
AREA INTRUSIVELY INVESTIGATED:		27.05 acres (equivalent) [4]																	
	ORDNANCE							SITE		HUMAN CURRENT USE			HUMAN FUTURE USE			OVERALL RANK			
	HE Items Found? [No]	OE Type [7]		OE Sensitivity [7]		OE Item Depth Distribution		OE Item Density	OE Site Access	OE Site Stability	Activity	OE Contact Probability Level	Exposed Population (Number or Freq. Of Use)	Activity	OE Contact Probability Level	Exposed Population (Number or Freq. Of Use)	Likelihood of Near Term Reuse	CURRENT LAND USE	FUTURE LAND USE
	HE Debris Found? [Yes]		(%)		(%)	Depth Range	% [9]	(Items/Acre) [8,9,12]											
Baseline Risk Assessment (Existing Conditions)		Cat. 3	*	Cat. 3	*	Surface	- / (26.5)	- / (0.82)	No Restriction to Site	Site Stable	Recreational [13,17]	Significant [18]	Occasional [19]	Passive Recreation [14]	Significant [18]	Occasional [19]	High		
		Cat. 2	*	Cat. 2	*	0 to 1' bgs	- / (67.5)	- / (2.92)											
		Cat. 1	*	Cat. 1	*	1' to Depth	- / (5.98)	- / (0.26)											
		Cat. 0	100	Cat. 0	100	Overall [11]	- / (4.32)												
						90% CI on Overall OE Item Density [10]	0 - 0.064												
Alternative 1 - No Further Action		No Impact		No Impact		No Impact		No Impact	No Impact		No Impact	No Impact		No Impact	No Impact		BASELINE	BASELINE	
Alternative 2 - Land Use Controls		No Impact		No Impact		No Impact		No Impact	No Impact		No Impact	B		No Impact	B		MODERATE	MODERATE	
Alternative 3 - Construction Support		No Impact		No Impact		No Impact		No Impact	No Impact		A [21]	No Impact		A [21]	No Impact		HIGH [20]	HIGH [20]	
Alternative 4 - Surface Clearance		No Impact		No Impact		No Impact		No Impact	No Impact		B [34]	A [23]		B [34]	A [23]		HIGH	HIGH	
Alternative 5 - Clearance to 1 Foot Depth		No Impact		No Impact		No Impact		No Impact	No Impact		A	A [22]		A	A [22]		HIGH	HIGH	
Alternative 6 - Clearance to Depth		No Impact		No Impact		No Impact		No Impact	No Impact		A	A [22]		A	A [22]		HIGH	HIGH	
NOTES																			
3 The Geophysically Surveyed Area includes the area associated with the transects within this specific sector.																			
4 Based on the fraction of identified target anomalies intrusively investigated in each geophysically surveyed grid and/or transect segment.																			
7 Percentages classify OE items found. If no OE items are found, Category 0 is 100% and Categories 1 - 3 are noted with a ***. If OE items are found, Category 0 is noted with a ***.																			
8 OE Density values shown are the straight average value = # of OE Items / Acres in which they were found.																			
9 Densities and depth range percentages shown in italics and curly brackets indicate characteristics of the OE debris.																			
10 The OE Density range shown represents a 90% confidence interval on the OE Item density calculated using UXO Calculator Version 1.4.2.																			
11 Overall OE item density is based on all OE Items found in the area intrusively investigated.																			
12 The surface OE item density is based on the area geophysically surveyed and the 0-1' and 1'-Depth OE item densities are based on the area intrusively investigated.																			
13 Specific activities identified for the recreational current land use include hunting, hiking, and short cuts.																			
14 Specific activities associated with the passive recreation future land use are hiking, walking, biking, picnicking, horseback riding, and other non-motorized activities.																			
17 Exposure to terrestrial wildlife is also assumed.																			
18 Based on the depth of intrusion associated with the identified activities - See Table 5 of USACE OERIA Interim Guidance (3/27/01).																			
19 The frequency of site usage is currently classified as rare and the number of site users is currently classified as low due to restrictions that have been placed on the site (i.e., no hunting or hiking) since the remediation activities began. The current frequency of usage would be classified as occasional if these recreational activities took place.																			
20 Indicated to be the most protective alternative within the construction footprint.																			
21 Risk factor score indicated applies only within the construction footprint.																			
22 No increased protectiveness relative to alternatives with a shallower clearance depth due to the depth distribution of OE items found.																			
23 Removal of surface OE items or debris may reduce the number of potential exposures to souvenir hunters.																			
34 The level of protectiveness associated with this risk factor for this response action alternative may be greater given that no OE items were found in this area during the investigation.																			
- = Not applicable as no energetic OE items were found.																			
IMPACT CODE																			
A = Signifies the greatest impact on reducing potential exposures to OE; Relatively less impact as the letter ranking goes to B, C, and subsequent letters.																			
HIGH - Most protective relative to projected land use.																			
LOW - Least protective relative to projected land use.																			
MODERATE - Protectiveness level between Low and High.																			
BASELINE - Protectiveness level associated with Alternative 1 - No Further Action.																			

Figure 16-3 OERIA TABLE FOR SECTOR M3-REMAINDER AREA-R																			
AREA:		BRAVO																	
SECTOR:		M3-Remainder Area-R																	
TOTAL SECTOR AREA:		1043 acres																	
AREA GEOPHYSICALLY SURVEYED:		34.49 acres [3]																	
AREA INTRUSIVELY INVESTIGATED:		26.14 acres (equivalent) [4]																	
	ORDNANCE						SITE		HUMAN CURRENT USE			HUMAN FUTURE USE			OVERALL RANK				
	HE Items Found? [No]	OE Type [7]		OE Sensitivity [7]		OE Item Depth Distribution		OE Item Density	OE Site Access	OE Site Stability	Activity	OE Contact Probability Level	Exposed Population (Number or Freq. Of Use)	Activity	OE Contact Probability Level	Exposed Population (Number or Freq. Of Use)	Likelihood of Near Term Reuse	CURRENT LAND USE	FUTURE LAND USE
	HE Debris Found? [Yes]		(%)		(%)	Depth Range	% [9]	(Items/Acre) [8,9,12]											
Baseline Risk Assessment (Existing Conditions)		Cat. 3	*	Cat. 3	*	Surface	- / (26.5)	- / (0.89)	No Restriction to Site	Site Stable	Recreational [13,17]	Significant [18]	Occasional [19]	Residential [35]	Significant [18]	Frequent [6]	High		
		Cat. 2	*	Cat. 2	*	0 to 1' bgs	- / (67.5)	- / (3.02)											
		Cat. 1	*	Cat. 1	*	1' to Depth	- / (5.98)	- / (0.27)											
		Cat. 0	100	Cat. 0	100	Overall [11]	- / (4.47)	90% CI on Overall OE Item Density [10]											
Alternative 1 - No Further Action		No Impact		No Impact		No Impact		No Impact	No Impact		No Impact	No Impact		No Impact	No Impact			BASELINE	BASELINE
Alternative 2 - Land Use Controls		No Impact		No Impact		No Impact		No Impact	No Impact		No Impact	B		No Impact	B			MODERATE	MODERATE
Alternative 3 - Construction Support		No Impact		No Impact		No Impact		No Impact	No Impact		A [21]	No Impact		A [21]	No Impact			HIGH [20]	HIGH [20]
Alternative 4 - Surface Clearance		No Impact		No Impact		No Impact		No Impact	No Impact		B [34]	A [23]		B [34]	A [23]			HIGH	HIGH
Alternative 5 - Clearance to 1 Foot Depth		No Impact		No Impact		No Impact		No Impact	No Impact		A	A [22]		A	A [22]			HIGH	HIGH
Alternative 6 - Clearance to Depth		No Impact		No Impact		No Impact		No Impact	No Impact		A	A [22]		A	A [22]			HIGH	HIGH
NOTES																			
3 The Geophysically Surveyed Area includes the area associated with the transects within this specific sector.																			
4 Based on the fraction of identified target anomalies intrusively investigated in each geophysically surveyed grid and/or transect segment.																			
7 Percentages classify OE items found. If no OE items are found, Category 0 is 100% and Categories 1 - 3 are noted with a ***. If OE items are found, Category 0 is noted with a ***.																			
8 OE Density values shown are the straight average value = # of OE Items / Acres in which they were found.																			
9 Densities and depth range percentages shown in italics and curly brackets indicate characteristics of the OE debris.																			
10 The OE Density range shown represents a 90% confidence interval on the OE Item density calculated using UXO Calculator Version 1.4.2.																			
11 Overall OE item density is based on all OE items found in the area intrusively investigated.																			
12 The surface OE item density is based on the area geophysically surveyed and the 0-1' and 1'-Depth OE item densities are based on the area intrusively investigated.																			
13 Specific activities identified for the recreational current land use include hunting, hiking, and short cuts.																			
14 Specific activities associated with the passive recreation future land use are hiking, walking, biking, picnicking, horseback riding, and other non-motorized activities.																			
17 Exposure to terrestrial wildlife is also assumed.																			
18 Based on the depth of intrusion associated with the identified activities - See Table 5 of USACE OERIA Interim Guidance (3/27/01).																			
19 The frequency of site usage is currently classified as rare and the number of site users is currently classified as low due to restrictions that have been placed on the site (i.e., no hunting or hiking) since the remediation activities began. The current frequency of usage would be classified as occasional if these recreational activities took place.																			
20 Indicated to be the most protective alternative within the construction footprint.																			
21 Risk factor score indicated applies only within the construction footprint.																			
22 No increased protectiveness relative to alternatives with a shallower clearance depth due to the depth distribution of OE items found.																			
23 Removal of surface OE items or debris may reduce the number of potential exposures to souvenir hunters.																			
34 The level of protectiveness associated with this risk factor for this response action alternative may be greater given that no OE items were found in this area during the investigation.																			
35 Specific activities identified for the residential future use include lawn mowing, landscaping and gardening.																			
- = Not applicable as no energetic OE items were found.																			
IMPACT CODE																			
A = Signifies the greatest impact on reducing potential exposures to OE; Relatively less impact as the letter ranking goes to B, C, and subsequent letters.																			
HIGH - Most protective relative to projected land use.																			
LOW - Least protective relative to projected land use.																			
MODERATE - Protectiveness level between Low and High.																			
BASELINE - Protectiveness level associated with Alternative 1 - No Further Action.																			

1 **17.0 M3-1L-Rocket Area-D**

2 **17.1 DESCRIPTION AND HISTORY**

3 This sector consists of approximately 115 acres in the southwestern portion of the Bravo Area.
4 This OE Risk Assessment Sector is on the western border of the Bravo Area. Several historic
5 impact areas and ranges extend into this area, including the 60mm Mortar Range (OA-53), the
6 Washington Tank Range (OA-54), and the 1950 Rocket Launcher Range (OA-57). The ranges
7 include: a WWI Machine Gun Camp (OA-56) and Old Range 12 (OA-55). Old Range 12 was
8 built during WWII as a landscape range and was abandoned by 1967. The projected land use for
9 this sector is Cultural (i.e., some development).

10 **17.2 INVESTIGATION RESULTS**

11 During the site characterization of Bravo, 3 grids were geophysically mapped in this OE Risk
12 Assessment Sector. Data collection transects (or clusters) were a second investigation method
13 used to collect data. Twenty-four clusters consisting of a series of 200-foot long, parallel
14 segments spaced 25 to 50 feet apart were planned for this OE Risk Assessment Sector. A total of
15 1.47 acres in grids and 4.91 acres in transects were geophysically mapped. A total of 0.49 acres
16 in grids were intrusively investigated. Of the 24 clusters planned, the following were not
17 investigated due to boundary issues: M31L405 through M31L410, M31L413 through M31L416,
18 M31L418, M31L421, M31L422, M31L424 through M31L427, M31D429, and M31L433.

19 17.2.1 Since this OE Risk Assessment Sector comprises the eastern border of Fort McClellan,
20 intrusive activities were difficult to plan due to public roadways and a museum that would have
21 been within the exclusion zone for field activities. Intrusive sampling in this OE Risk
22 Assessment Sector would have required closing the roads and public facilities within the
23 exclusion zone and the evacuation of people. Instead, items identified during the surface
24 clearance (prior to geophysical mapping and intrusive activities) played a primary role in
25 characterizing this area. Part of 2 different delineation transects extend into this area. Finds
26 from IT Corporation also were incorporated into the findings in this OE Risk Assessment Sector
27 to assist with characterization. Twenty-eight UXO items were found by IT Corporation on the
28 surface during their HTRW field investigation. During the sampling conducted by TtEC, no
29 UXO items were found and twelve OE Scrap items, with some indeterminate amounts of scrap,
30 were found on the surface down to four inches. Table 17-1 contains a list of OE and OE Scrap
31 items found within this OE Risk Assessment Sector. Figure B-2 in Appendix B presents an
32 overview figure of this OE Risk Assessment Sector within the Bravo Area and Appendix F
33 contains a list of all items from the database found within this OE Risk Assessment Sector.

34

1

**Table 17-1
List of OE and OE Scrap Items Found in M3-1L Rocket Area-D**

Item Description	Quantity	Depth (inches)	Target Type	Grid ID/Transect	Anomaly ID
UXO Items:					
Data Provided by Other Subcontractors:*					
ROCKET, 2.36in	1	0	UXO	IT09	N/A
ROCKET, 2.36in, HEAT	1	0	UXO	IT10	N/A
ROCKET, 2.36in, HEAT	1	0	UXO	IT11	N/A
ROCKET, 2.36in, HEAT	1	0	UXO	IT12	N/A
ROCKET, 2.36in	1	0	UXO	IT13	N/A
ROCKET, 2.36in, HEAT	5	0	UXO	IT14	N/A
ROCKET, 2.36in, HEAT	4	0	UXO	IT15	N/A
ROCKET, 2.36in, HEAT	2	0	UXO	IT16	N/A
ROCKET, 2.36in, HEAT	2	0	UXO	IT17	N/A
ROCKET, 2.36in, HEAT	3	0	UXO	IT18	N/A
ROCKET, 2.36in	3	0	UXO	IT19	N/A
ROCKET, 2.36in	1	0	UXO	IT20	N/A
MORTAR, 60mm	1	0	UXO	IT21	N/A
MORTAR, 60mm	1	0	UXO	IT29	N/A
MORTAR, 60mm	1	0	UXO	IT30	N/A
OE Scrap Items:					
ROCKET, PRACTICE, 2.36in, M7	1	0	OE Scrap	577	4
ROCKETS, PRACTICE, 2.36in, M7	3	0	OE Scrap	577	16
FRAGMENTATION	**	4	OE Scrap	578	1
MINES, AP, BOUNDING, M2, EXPENDED	2	0	OE Scrap	M311411	191
SIGNAL, SMOKE, GROUND, M62 SERIES, EXPENDED	1	0	OE Scrap	M311412	190
ROCKET, PRACTICE, 2.36in, M7	1	0	OE Scrap	M311417	7
ROCKETS, PRACTICE, 2.36in, M7	2	0	OE Scrap	M311417	189
ROCKET, PRACTICE, 2.36in, M7	1	0	OE Scrap	M311419	8
ROCKET PARTS, 2.36in	**	0	OE Scrap	M311419	192
ROCKET, PRACTICE, 2.36in, M7	1	0	OE Scrap	M311419	193
Note: This table does not list small arms finds.					
Note: IT# = IT Corporation finds. PBP# = Parsons Burn Pit finds.					
*TtEC did not independently verify the accuracy nor currency of information supplied by client or by any of clients contractors, vendors, or consultants.					
** Indeterminate amount.					

2

3 17.3 DESCRIPTION OF HAZARDS OF SPECIFIC OE ENCOUNTERED

4 No UXO items were encountered by TtEC personnel during the site characterization of this OE
5 Risk Assessment Sector; instead OE Scrap items such as 2.36in practice M7 rockets were
6 identified. Also, IT personnel reported the presence of 2.36in HEAT rockets. The 2.36in rocket
7 consists of three parts: the high-explosive head, the stabilizer tube, and the fin assembly. This
8 rocket has a 0.5 pound 50/50 pentolite with a 10/90 pentolite booster. The rocket can penetrate

1 three inches of homogenous-steel armor plate at all ranges and at angles of impact as low as 90
2 degrees. The propellant consists of five sticks of ballistite. The fuze generally consists of a steel
3 firing pin that slips into the central cavity of the fuze body. The fuze body contains the
4 Detonator of M18 of lead azide and a tetryl, and the booster charge of tetryl. It was determined
5 that these items had a high explosive anti-tank (HEAT) or Shape charge with the potential to
6 produce explosive fragments.

7 **17.4 RISK ASSESSMENT**

8 Figure 17-1, located at the end of this chapter, presents the CSM for potential exposures to OE in
9 OE Risk Assessment Sector M3-1L-Rocket Area-D in Redevelopment Parcel M3. Various
10 firing points and range safety fans located throughout the sector and an impact/target area were
11 identified as sources. OE would be deposited into the range safety fans and impact/target area by
12 firing. At the non-small arms firing points, ordnance may be present as a result of mishandling,
13 poor housekeeping, or loss. These releases likely result in OE being present on the ground
14 surface or in the subsurface soils of the sector. This CSM also indicates the principal
15 mechanisms by which ordnance items may migrate or move from one location to another in the
16 sector or shift from one depth in the soil to another. These potential transport and migration
17 mechanisms include mechanical redistribution, human activity, precipitation run-off, and (in
18 limited, specific locations) erosion and frost heave. The original deposition of the ordnance items
19 and the localized transport and migration processes result in a new distribution of OE items in
20 the soil which may be locations of direct contact exposure by current or reasonably foreseeable
21 future receptors associated with reuse of the area. Receptors may include commercial workers,
22 and construction workers associated with the planned cultural redevelopment and land re-use.
23 Terrestrial wildlife may also be exposed to ordnance items present in the sector.

24 **17.5 COMPARATIVE ANALYSIS OF RESPONSE ACTION ALTERNATIVES**

25 **17.5.1 Effectiveness**

26 The OERIA risk assessment process addresses the combined criteria of overall protectiveness to
27 human health and the environment and long-term effectiveness and permanence. The results of
28 the risk assessment performed for the M3-1L-Rocket Area-D sector using this process are
29 presented in Figure 17-2, located at the end of this chapter. Based on these results, the most
30 effective alternatives for the protection of human health and the environment were judged to be
31 the removal alternatives. Alternative 6-Clearance to Depth was projected to provide the highest
32 level of protectiveness throughout the sector, while Alternative 5-Clearance to 1 Foot Depth was
33 judged to provide a potentially lower level of protectiveness due to the indicated depth of OE in
34 this area relative to the indicated future use for development. OE was only found on the surface,
35 while OE Scrap was found at the surface as well as within 4 inches of the ground surface.
36 However, since no intrusive investigations were conducted in this area and a number of OE
37 debris items were found within the top 12 inches of soil beneath the ground surface, there is a
38 potential for OE to be present at depth. Alternative 4-Surface Clearance received a low ranking
39 because it would not be expected to remove OE from depths where it is indicated to be present
40 and where future users of the area may disturb. Alternative 3-Construction Support is considered
41 to be protective, but only within the future construction footprints within the sector where
42 clearance of OE would be selectively performed. Alternative 2-Area-Specific Land Use

1 Controls was considered to be less effective than any of the removal alternatives except for the
2 case when Surface Clearance would be performed alone. Alternative 1-No Further Action was
3 considered to be the least effective. Since development / redevelopment activities are planned
4 for this sector, Alternative 6 would provide the highest level of protectiveness, followed by
5 Alternative 5.

6 17.5.1.1 With respect to the other effectiveness criteria, Alternative 1-No Further Action
7 clearly has the least short-term impacts since No Further Action is being taken that might impact
8 local workers or the public. Alternative 2-Area-Specific Land Use Controls also presents little
9 short-term impact since the only activity that might affect the workers or the public involves
10 installation of a limited number of warning signs. The removal alternatives (Alternatives 3, 4, 5,
11 and 6) have the greatest potential the workers and public since each involves the potential of
12 more direct contact with OE. Overall, Alternative 1 will have the least short-term impacts,
13 followed by Alternatives 2 and 3, and then Alternatives 4, 5, and 6. Among the latter three
14 alternatives, the short-term effects will increase from Alternative 4 to 6, since each has a
15 potential for longer and more intense exposure to OE. With respect to the compliance with
16 ARARs criterion, each alternative will comply.

17 **17.5.2 Implementability**

18 17.5.2.1 Technical Feasibility

19 All six alternatives are technically feasible with Alternative 1 being the most technically feasible
20 since there is No Further Action required at the site (i.e., investigation or removal actions).
21 Alternative 2 is the second most technically feasible alternative. It requires that technical actions
22 be taken at the site (i.e., installation of signage at the site). The remaining alternatives are each
23 technically feasible but less so than Alternatives 1 and 2, because they each involve more intense
24 site activities and dependence on technology. In summary, Alternative 1 will be the most
25 technically feasible, Alternative 2 next, followed by Alternatives 3, 4, 5, and 6.

26 17.5.2.2 Administrative Feasibility

27 All six alternatives will require the preparation and DDESB-approval of an ESS document.
28 Alternatives 3 through 6 will each require the preparation and approval of a work plan since each
29 alternative involves onsite OE activities. Alternatives 2, 3, 4, and 5 will also require compliance
30 with the LUCAP for Fort McClellan, since each involves the implementation of land use
31 controls. In summary, considering these requirements, Alternative 1 will be the simplest to
32 administer, with Alternative 6 next, and Alternatives 2, 3, 4, and 5 being the most difficult of the
33 alternatives to administer due to the inclusion of land use controls and the requirements to
34 comply with the LUCAP.

35 17.5.2.3 Availability of Services and Materials

36 Services and materials will be required and are readily available for preparing the plans
37 mentioned above and to complete the fieldwork associated with Alternatives 3 through 6. Based
38 on the levels of services needed, Alternative 1 will require the least services and materials since
39 it only requires effort to prepare the ESS. More services and materials will be required for the

1 implementation of Alternative 2 since it requires the preparation of the ESS, installation of signs,
2 as well as coordination with the LUCAP. Even more services and materials will be required for
3 Alternative 3 since it requires a work plan to support construction support activities and the field
4 service activities to provide the actual construction support. Alternative 4 will be similar in scope
5 of required services and materials. Alternatives 5 and 6 will require the most in services and
6 materials. In summary, Alternative 1 will require the least in services and materials to
7 implement, with Alternative 2 next. Alternatives 3 and 4 will require a higher level of services
8 and materials than Alternatives 1 and 2, but less than Alternatives 5 and 6.

9 17.5.2.4 Regulatory and Community Acceptance

10 The level of regulatory and/or community acceptance for each alternative can be expected to
11 largely depend on the protection that each alternative offers. For this sector, OE was found on the
12 surface, in an area where the future land use is projected to be Development. However, no
13 intrusive investigations were conducted in this area and a number of OE items were found by IT.
14 Alternative 1-No Further Action does nothing to provide any degree of protection and therefore
15 is unlikely to be accepted by the regulatory community or the public. Alternative 2-Area-Specific
16 Land Use Controls would probably not be received favorably since it will provide only limited
17 protection to members of the public involved in intrusive activities (i.e., excavations).
18 Alternative 3-Construction Support may be received favorably since it provides protection to
19 construction workers and to the public in that it also includes the land use controls associated
20 with Alternative 2. Alternative 4-Surface Clearance may be expected to receive a similar level of
21 acceptance as Alternative 3. It includes removal of potential OE from the surface (not
22 subsurface) across the entire sector, not just within construction footprints and is accompanied by
23 land use controls. However, the belief that significant numbers of subsurface OE may be present
24 may lead to reduced acceptance of this alternative. Alternative 5-Clearance to One Foot Depth
25 and Alternative 6-Clearance to Depth may receive the highest level of acceptance by both
26 regulators and the public since they both involve a subsurface removal of potential OE in an area
27 expected to experience significant subsurface excavations during development.

28 17.5.2.4.1 In summary, the alternatives that may be best received by the regulators and/or public
29 would be Alternative 5-Clearance to One Foot Depth and Alternative 6-Clearance to Depth,
30 followed in order by Alternative 4-Surface Clearance, Alternative 3-Construction Support,
31 Alternative 2-Area-Specific Land Use Controls, and lastly, Alternative 1-No Further Action.

32 **17.5.3 Cost**

33 The projected costs to implement the alternatives in this 115-acre sector are summarized below:

- 34 • Alternative 1 - No Further Action – \$5,000. An ESS (preparation, draft, and final) will be
35 prepared for a group of sectors. This is an approximation of one sector's portion of the total
36 cost.
- 37 • Alternative 2 - Area-Specific Land Use Controls – \$27,800. This cost includes planning and
38 installation of signage. No annual maintenance costs are included.
- 39 • Alternative 3 - Construction Support – \$462,184. This estimate includes management,
40 planning, and UXO support.

- 1 • Alternative 4 - Surface Clearance – \$807,267. This cost includes management and planning,
2 OE removal activities, and reporting.
- 3 • Alternative 5 - Clearance to One-Foot Depth – \$2,279,117. This cost includes management
4 and planning, OE removal activities, and reporting.
- 5 • Alternative 6 - Clearance to Depth – \$2,461,267. This cost includes management and
6 planning, OE removal activities, and reporting.

7 **17.6 RECOMMENDATION**

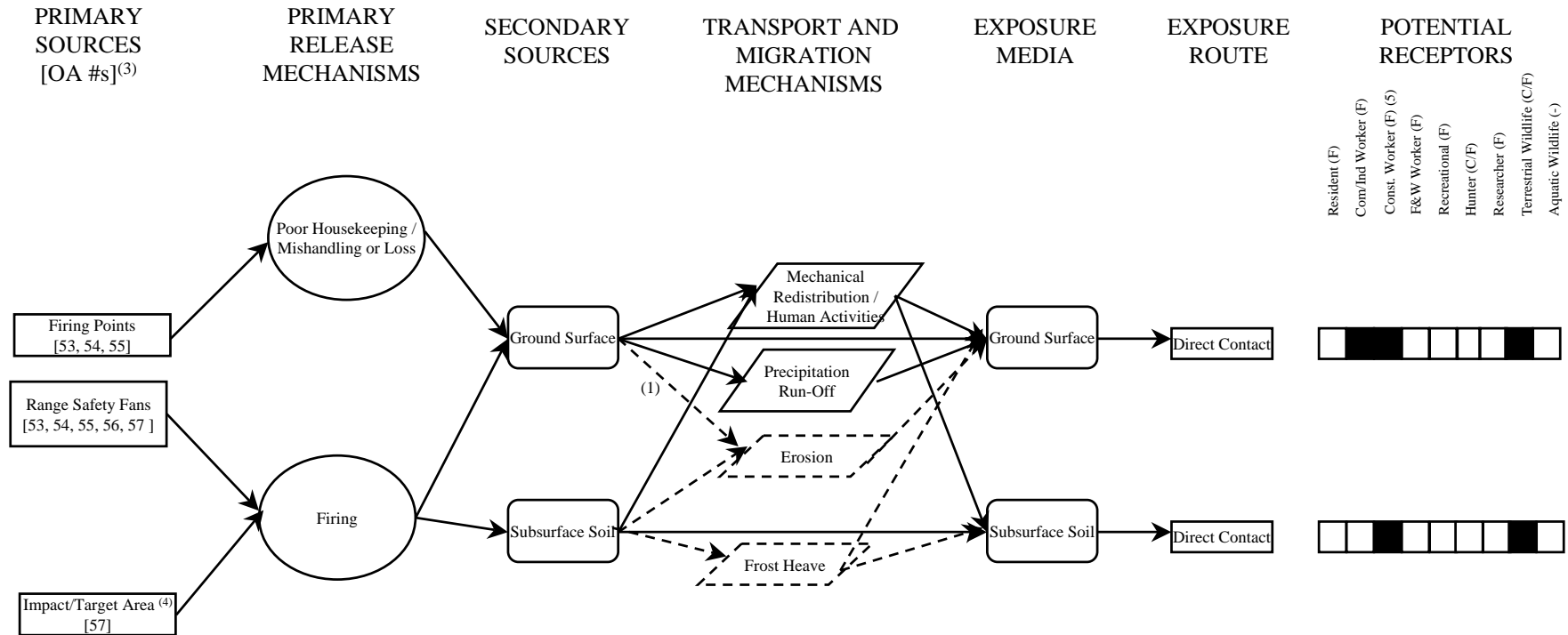
8 The recommended alternative for M3-1L-Rocket Area-D is Alternative 6-Clearance to Depth.
9 Components of this alternative will include land surveying and brush clearing operations to
10 prepare the site. Due to the requirement to detect items potentially deeper than one foot, this
11 alternative will be performed using sensitive instruments capable of detecting anomalies at
12 greater depths. Using a suitably sensitive detection system, the entire study area will be
13 surveyed to locate potential OE items. The anomalies will then be investigated to identify them
14 as UXO, OE Scrap, or Non-OE Scrap (metallic scrap). After identification, the items will be
15 disposed of as scrap or OE in accordance with the previously-approved OE operations work
16 plan.

17 17.6.1 Planning for this response action will require preparation of an ESS and a site-
18 specific removal action work plan. The estimated cost to implement this alternative is
19 \$2,461,267.

20 **17.7 SUPPORTING RATIONALE**

21 The risk analysis and the comparative analysis indicated that clearance to depth should provide
22 sufficient protection for this sector. During the sampling conducted in this sector as part of the
23 Bravo EE/CA, one UXO item was found on the surface and OE Scrap was found at a maximum
24 depth of four inches. However, minimal intrusive investigations were conducted in this area and
25 a number of UXO items were found by IT Corporation as part of UXO avoidance during the
26 HTRW investigations in this area. Therefore, there is a potential for UXO at depth. The
27 documented historical use of this area, combined with the OE items found within this area, and
28 with this area being so close to a major highway, all support the proposed removal action.

**Figure 17-1
M3-1L-Rocket Area-D
CONCEPTUAL SITE MODEL**



NOTES:

- (1) Dashed boxes or lines indicate a potential source area or linkage that requires further verification or is a linkage that is indicated to be present in only a small number of specific locations.
- (2) Plate numbers obtained from the Fort McClellan Archives Search Report
- (3) Ordnance Area identification numbers obtained from the Archives Search Report.
- (4) For Non-Small Arms Munitions.
- (5) Within footprint of future development activity
- C = Current Receptor
- F = Potential Future Receptor
- = Not plausible for this sector

PLATE NOS. (2)	OA# (3)	NAME (Other Names)	ORDNANCE AND EXPLOSIVES ASSOCIATED WITH AREA
3, 10	56	World War I Machine Gun Camp	Small Arms
5, 6, 10	53	60mm Mortar Range	60mm HE Mortars
5, 6, 10	55	Old Range 12 (Range 12; Rifle Field Firing)	Small Arms
5, 6, 10	57	1950 Rocket Launcher Range	2.36" Rockets
6, 10	54	Washington Tank Range (Tank Table 1-2-3)	Small Arms; 37mm Sub Caliber Rounds; 75mm Projectile; 90mm Projectiles

Figure 17-2

OERIA TABLE FOR SECTOR M3-1L-ROCKET AREA-D

AREA: BRAVO
 SECTOR: M3-1L-Rocket Area-D
 TOTAL SECTOR AREA: 115 acres
 AREA GEOPHYSICALLY SURVEYED: 6.38 acres [3]
 AREA INTRUSIVELY INVESTIGATED: 0.49 acres (equivalent) [4]

	ORDNANCE						SITE		HUMAN CURRENT USE			HUMAN FUTURE USE			OVERALL RANK				
	HE Items Found? [Yes]	OE Type [7]		OE Sensitivity [7]		OE Item Depth Distribution		OE Item Density	OE Site Access	OE Site Stability	Activity	OE Contact Probability Level	Exposed Population (Number or Freq. Of Use)	Activity	OE Contact Probability Level	Exposed Population (Number or Freq. Of Use)	Likelihood of Near Term Reuse	CURRENT LAND USE	FUTURE LAND USE
	HE Debris Found? [Yes]		(%)		(%)	Depth Range	% [9]	(Items/Acre) [8,9,12]											
Baseline Risk Assessment (Existing Conditions)		Cat. 3	90	Cat. 3	90	Surface	100 / (91)	4.86 / (1.57)	No Restriction to Site	Site Stable	Recreational [13,17]	Significant [18]	Occasional [19]	Development [16,33]	Significant [18]	Frequent	High		
		Cat. 2	0.0	Cat. 2	0.0	0 to 1' bgs	- / (9.0)	- / (2.04)											
		Cat. 1	10	Cat. 1	10	1' to Depth	- / (-)	- / (-)											
		Cat. 0	*	Cat. 0	*	Overall [11]	4.86 [27] / (22.4)												
		90% CI on Overall OE Item Density [10]						47.6 - 85.3											
Alternative 1 - No Further Action		No Impact		No Impact		No Impact		No Impact	No Impact		No Impact	No Impact		No Impact	No Impact		BASELINE	BASELINE	
Alternative 2 - Land Use Controls		No Impact		No Impact		No Impact		No Impact	No Impact		No Impact	B		No Impact	B		LOW	LOW	
Alternative 3 - Construction Support		No Impact		No Impact		A [21]		No Impact	No Impact		A [21]	A [21]		A [21]	A [21]		MODERATE [20]	MODERATE [20]	
Alternative 4 - Surface Clearance		No Impact		No Impact		A		No Impact	No Impact		B	A [23]		B	A [23]		MODERATE	LOW	
Alternative 5 - Clearance to 1 Foot Depth		No Impact		No Impact		A [22]		No Impact	No Impact		A	A [22]		B	A [22]		MODERATE [24]	LOW [24]	
Alternative 6 - Clearance to Depth		A [22]		A [22]		A [22]		No Impact	No Impact		A	A [22]		A	A [22]		HIGH	HIGH	

NOTES

3 The Geophysically Surveyed Area includes the area associated with the transects within this specific sector.

4 Based on the fraction of identified target anomalies intrusively investigated in each geophysically surveyed grid and/or transect segment.

7 Percentages classify OE items found. If no OE items are found, Category 0 is 100% and Categories 1 - 3 are noted with a ***. If OE items are found, Category 0 is noted with a ***.

8 OE Density values shown are the straight average value = # of OE Items / Acres in which they were found.

9 Densities and depth range percentages shown in italics and curly brackets indicate characteristics of the OE debris.

10 The OE Density range shown represents a 90% confidence interval on the OE Item density calculated using LUXO Calculator Version 1.4.2.

11 Overall OE item density is based on all OE items found in the area intrusively investigated.

12 The surface OE item density is based on the area geophysically surveyed and the 0-1' and 1'-Depth OE item densities are based on the area intrusively investigated.

13 Specific activities identified for the recreational current land use include hunting, hiking, and short cuts.

16 Development land use was assumed to be associated with routine interaction with the surface and near-surface soils by the employees of the new facilities. In addition, the construction of new facilities, structures, or underground utilities and the maintenance or replacement of existing structures or utilities was assumed to be reasonably associated with this land use.

17 Exposure to terrestrial wildlife is also assumed.

18 Based on the depth of intrusion associated with the identified activities - See Table 5 of USACE OERIA Interim Guidance (3/27/01).

19 The frequency of site usage is currently classified as rare and the number of site users is currently classified as low due to restrictions that have been placed on the site (i.e., no hunting or hiking) since the remediation activities began. The current frequency of usage would be classified as occasional if these recreational activities took place.

20 Indicated to be the most protective alternative within the construction footprint.

21 Risk factor score indicated applies only within the construction footprint.

22 No increased protectiveness relative to alternatives with a shallower clearance depth due to the depth distribution of OE items found.

23 Removal of surface OE items or debris may reduce the number of potential exposures to souvenir hunters.

24 Protectiveness based on intrusion depth; Given the observed depth distribution of OE items, the level of protectiveness associated with this alternative may be greater.

27 OE Item Density reflects only surface density.

33 Future Development activities are projected to be associated with Cultural Use.

- = Not applicable as no energetic OE items were found.

IMPACT CODE

A = Signifies the greatest impact on reducing potential exposures to OE; Relatively less impact as the letter ranking goes to B, C, and subsequent letters.

HIGH - Most protective relative to projected land use.

LOW - Least protective relative to projected land use.

MODERATE - Protectiveness level between Low and High.

BASELINE - Protectiveness level associated with Alternative 1 - No Further Action.

1 **18.0 M3-1L-Suspect Area 1-PR**

2 **18.1 DESCRIPTION AND HISTORY**

3 This sector consists of approximately 193 acres in the central portion of the Bravo Area. The
4 projected land use for this sector is Passive Recreation. The western edge of the WWI Artillery
5 Range (OA-29/39) and the left side of Range 16 (OA-45) extends into this sector. Artillery and
6 mortar was used at the WWI Artillery Range from 1912 to the beginning of WWII. Range 16
7 was developed during WWII and used as a grenade court until 1967, at which time it was used
8 for rocket launchers and grenade launchers. The firing fans of two small arms ranges extend into
9 this area. They are Range 15 (OA-47) and Range 12 (OA-48).

10 **18.2 INVESTIGATION RESULTS**

11 During the site characterization of Bravo, 10 grids in this OE Risk Assessment Sector were
12 geophysically mapped and 8 of these grids were intrusively investigated. Mountain transects
13 were used to characterize areas with slopes greater than 40 degrees and was selected for a wide
14 coverage across mountainsides.. Mountain Transect T18 and a portion of T17 were investigated
15 within this OE Risk Assessment Sector. A total of 4.94 acres in grids and 0.42 acres in transects
16 were geophysically mapped. A total of 3.95 acres in grids and 0.14 acres in transects were
17 intrusively investigated.

18 18.2.1 In total, fourteen UXO items were found at depths ranging from the surface to a
19 maximum of four inches. Six of these UXO items were identified on the surface during the site
20 characterization and 2 UXO items were found during surface clearance activities. During
21 additional grid sampling in the M3-1L area, 8 UXO items were found at shallow depths.
22 Eighty-six OE Scrap items, with some indeterminate amounts, were found on the surface and the
23 subsurface. The majority of these OE Scrap items were found on the surface or to a depth of 6
24 inches, with a few OE Scrap items found deeper. Table 18-1 contains a detailed list of OE and
25 OE Scrap items found within this OE Risk Assessment Sector. Figure B-2 in Appendix B
26 presents an overview figure of this OE Risk Assessment Sector within the Bravo Area and
27 Appendix F contains a list of all items from the database found within this OE Risk Assessment
28 Sector.

29 **18.3 DESCRIPTION OF HAZARDS OF SPECIFIC OE ENCOUNTERED**

30 UXO items encountered during the site characterization of this OE Risk Assessment Sector
31 include MKII 37mm HE projectiles, MKI 75mm shrapnel projectiles, and 60mm M302 smoke
32 mortars.

33 18.3.1 This MKII 37mm projectile shell is made of bar steel and has an explosive charge of
34 0.06 ponds of TNT. It is 4.45 inches long and has an ogive radius of 2.25 calibers. Since it is
35 adapted for a base-detonating fuze, the nose is continued to a rounded point. The projectile is
36 longer and has thinner walls than the L.E. shell. The total weight of the projectile with fuze and
37 bursting charge is about 1 ponds. It uses an M38A1 base-detonating fuze. This fuze is
38 constructed of brass. It is set-back armed and employs inertia to drive the firing pin into the
39 detonator upon impact. This projectile was painted olive drab and stenciled in yellow. The MK
40 II is .549" longer than the MK I and employs the M38A1 base-detonating fuze instead of the MK
41 I base-percussion fuze. The practice projectile is identical to the H.E. projectile except that the
42

Table 18-1
List of OE and OE Scrap Items Found in M3-1L Suspect Area 1-PR

Item Description	Quantity	Depth (inches)	Target Type	Grid ID/Transect	Anomaly ID
UXO Items:					
PROJECTILE, 37mm HE MKII	1	1	UXO	514	4
PROJECTILE, 37mm HE MKII	1	0	UXO	514	36
PROJECTILE, 37mm HE MKII	1	4	UXO	518	23
PROJECTILE, 37mm HE MKII	1	2	UXO	518	27
PROJECTILE, 75mm SHRAPNEL, MKI	1	0	UXO	523	9
PROJECTILE, 37mm HE MKII	1	4	UXO	524	3
PROJECTILE, 37mm HE MKII	1	1	UXO	524	5
PROJECTILE, 75mm SHRAPNEL, MKI,	1	4	UXO	570	32
MORTARS, 60mm SMOKE, WP, M302	3	0	UXO	574	280
PROJECTILE, 75mm SHRAPNEL, MKI	1	0	UXO	T18	T18H09
PROJECTILE, 75mm SHRAPNEL, MKI	1	0	UXO	T18	T18HS1
PROJECTILE, 75mm SHRAPNEL, MKI	1	0	UXO	T18	T18HS2
OE Scrap Items:					
SHRAPNEL PUSHER PLATE, 75mm	1	3	OE Scrap	508	2
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	1	OE Scrap	508	3
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	1	OE Scrap	508	4
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	1	OE Scrap	508	5
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	2	OE Scrap	508	6
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	1	OE Scrap	508	8
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	1	OE Scrap	508	9
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	1	OE Scrap	508	10
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	1	OE Scrap	508	11
PROJECTILE PUSHER PLATE, 75mm EJECTION	1	2	OE Scrap	508	12
PROJECTILE PUSHER PLATE, 75mm EJECTION	1	1	OE Scrap	508	13
FRAGMENTATION, 37mm, HE	**	3	OE Scrap	508	14
PROJECTILE PUSHER PLATE, 75mm EJECTION	1	2	OE Scrap	513	4
PROJECTILE, 37mm, TPT, M51A2	1	2	OE Scrap	513	7
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	2	OE Scrap	513	9
PROJECTILE, 75mm SHRAPNEL, MKI	1	12	OE Scrap	514	2

Table 18-1
List of OE and OE Scrap Items Found in M3-1L Suspect Area 1-PR

Item Description	Quantity	Depth (inches)	Target Type	Grid ID/Transect	Anomaly ID
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	2	OE Scrap	514	3
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	2	OE Scrap	514	5
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	6	OE Scrap	514	6
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	4	OE Scrap	514	7
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	2	OE Scrap	514	8
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	1	OE Scrap	514	9
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	2	OE Scrap	514	10
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	2	OE Scrap	514	12
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	2	OE Scrap	514	13
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	2	OE Scrap	514	14
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	2	OE Scrap	514	15
PROJECTILE, 75mm SHRAPNEL, MKI	1	18	OE Scrap	514	18
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	2	OE Scrap	514	19
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	2	OE Scrap	514	20
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	2	OE Scrap	514	22
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	3	OE Scrap	514	23
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	2	OE Scrap	514	25
PROJECTILE, 37mm, TPT, M51A2	1	2	OE Scrap	514	26
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	2	OE Scrap	514	27
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	2	OE Scrap	514	28
FRAGMENTATION, 57mm HE	**	2	OE Scrap	514	30
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	2	OE Scrap	514	31
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	2	OE Scrap	514	32
PROJECTILE, 75mm SHRAPNEL, MKI	1	2	OE Scrap	514	33
FUZE ADAPTER, 75mm PROJECTILE	1	1	OE Scrap	514	34
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	5	OE Scrap	518	1

Table 18-1
List of OE and OE Scrap Items Found in M3-1L Suspect Area 1-PR

Item Description	Quantity	Depth (inches)	Target Type	Grid ID/Transect	Anomaly ID
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	6	OE Scrap	518	2
FRAGMENTATION, 37mm	**	4	OE Scrap	518	2
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	4	OE Scrap	518	3
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	6	OE Scrap	518	4
FRAGMENTATION, 37mm	**	2	OE Scrap	518	5
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	4	OE Scrap	518	5
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	2	OE Scrap	518	6
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	2	OE Scrap	518	7
FRAGMENTATION, 37mm	**	2	OE Scrap	518	8
FUZE, M1907 POWDER TRAIN TIME, 75mm PROJECTILE, FUNCTIONED	1	2	OE Scrap	518	9
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	4	OE Scrap	518	10
FUZE, POWDER TRAIN TIME, M1907, 75mm PROJECTILE, FUNCTIONED	1	12	OE Scrap	518	13
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	7	OE Scrap	518	14
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	5	OE Scrap	518	15
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	5	OE Scrap	518	16
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	8	OE Scrap	518	17
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	4	OE Scrap	518	18
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	4	OE Scrap	518	20
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	3	OE Scrap	518	24
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	4	OE Scrap	518	25
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	3	OE Scrap	518	28
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	6	OE Scrap	518	30
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	2	OE Scrap	523	1
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	2	OE Scrap	523	10
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	2	OE Scrap	523	13
FUZE M1907 POWDER TRAIN TIME, 90mm PROJECTILE, FUNCTIONED	1	6	OE Scrap	524	1

Table 18-1
List of OE and OE Scrap Items Found in M3-1L Suspect Area 1-PR

Item Description	Quantity	Depth (inches)	Target Type	Grid ID/Transect	Anomaly ID
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	2	OE Scrap	524	2
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	2	OE Scrap	524	7
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	1	OE Scrap	570	1
PROJECTILE, 75mm SHRAPNEL, MKI	1	1	OE Scrap	570	3
PROJECTILE, 75mm SHRAPNEL, MKI	1	1	OE Scrap	570	4
PROJECTILE, 75mm SHRAPNEL, MKI	1	2	OE Scrap	570	11
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	0	OE Scrap	570	14
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	4	OE Scrap	570	24
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	2	OE Scrap	570	29
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	4	OE Scrap	570	34
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	2	OE Scrap	570	36
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	1	OE Scrap	570	37
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	4	OE Scrap	570	38
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	2	OE Scrap	570	40
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	2	OE Scrap	570	55
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	0	OE Scrap	570	230
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	2	OE Scrap	574	1
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	2	OE Scrap	574	2
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	2	OE Scrap	574	5
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	2	OE Scrap	574	6
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	1	OE Scrap	574	7
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	2	OE Scrap	574	8
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	1	OE Scrap	574	9
FRAGMENTATION, 37mm, HE	**	1	OE Scrap	574	10
FRAGMENTATION	**	2	OE Scrap	T19	T19D02

*TtEC did not independently verify the accuracy nor currency of information supplied by client or by any of clients contractors, vendors, or consultants.

** Indeterminate amount.

1 bursting charge consists of 0.05 ponds of black powder instead of 0.06 ponds of TNT and it uses
2 the M38 base-percussion fuze to ignite the black powder charge. It is also painted blue with
3 white stenciling.

4 18.3.2 The 75mm shrapnel projectile consists of a steel case, near the base of which a shoulder
5 is formed on the interior surface. Three ounces of black powder is packed beneath a diaphragm
6 of steel which rests on the shoulder. This diaphragm also supports a flash tube, the upper end of
7 which is flared out into a smaller thin diaphragm. The top of the case is closed by a steel head
8 finely threaded to the top, and which is adapted to the fuze with a coarse thread. It employs the
9 21-Second Combination Fuze M1907M which is covered with a metallic moisture proof cap.
10 Either burning of the time element or firing of the percussion element on impact will ignite a
11 black powder charge in the fuze. The flame from the magazine charge of the fuze flashes down
12 the flash tube and ignites the base charge. Explosion of this charge forces the lower diaphragm,
13 matrix and balls, and flash tube upward, blowing off the fuze and head as a unit. The resin
14 matrix is ignited and the lead balls are ejected. The lead balls have a velocity of 350 feet/second
15 in addition to the velocity of the projectile at the time of bursting. It was painted red and
16 stenciled in black.

17 18.3.3 The M302 shell is a thin-walled steel casing with cylindrical side wall, and conical base
18 which has a threaded hot to receive the fin assembly shaft. The front end of the shell is closed by
19 a steel adapter which holds the fuze and the burster casing which holds the 12 grain M19 burster
20 charge. The main filler is 0.765 ponds of white phosphorus. The mortar is painted light green
21 with white stenciled markings and a yellow band indicating the presence of H.E. in the burster
22 tube. This mortar employs the M82 or M527 PD fuze. These fuzes are constructed of metal and
23 both have the following features in common: safety wire, bore-rider safety pin, slider plug,
24 striker plunger, unpainted body with stamped markings. The M527 has a pull wire attached to
25 the safety wire and it also has a wrench flat near the top of the fuze. Both fuzes require removal
26 of the safety wire before being dropped into the mortar tube. When the mortar's primer strikes
27 the firing pin at the bottom of the mortar tube, the propellant is ignited and the mortar is ejected
28 from the tube. Setback causes the bore-rider safety pin to be release and ejected when the mortar
29 leaves the tube. Ejection of the bore-rider safety pin allows the arming sequence to continue to
30 completion. Upon impact the firing pin under the striker plunger is driven into a detonator
31 causing the burster tube to detonate, rupture the mortar casing and expel white phosphorus into
32 the air where it spontaneously combusts creating copious amounts of white smoke.

33 **18.4 RISK ASSESSMENT**

34 Figure 18-1, located at the end of this chapter, presents the CSM for potential exposures to OE in
35 OE Risk Assessment Sector M3-1L-Suspect Area 1-PR in Redevelopment Parcel M3. Various
36 firing points and range safety fans located throughout the sector and impact/target areas were
37 identified as sources. OE would be deposited into the range safety fans and impact/target areas
38 by firing. At the firing points, ordnance may be present as a result of mishandling, poor
39 housekeeping, or loss. These releases likely result in OE being present on the ground surface or
40 in the subsurface soils of the sector. This CSM also indicates the principal mechanisms by
41 which ordnance items may migrate or move from one location to another in the sector or shift
42 from one depth in the soil to another. These potential transport and migration mechanisms
43 include mechanical redistribution, human activity, precipitation run-off, and (in limited, specific
44 locations) erosion and frost heave. The original deposition of the ordnance items and the

1 localized transport and migration processes result in a new distribution of OE items in the soil
2 which may be locations of direct contact exposure by current or reasonably foreseeable future
3 receptors associated with reuse of the area. Receptors may include Passive Recreational users of
4 the area. No significant construction activity is projected to be associated with this land use.
5 However, soil disturbance within a specified area may be considered on an infrequent and
6 spatially limited basis. As such, a construction worker would not be a routine receptor relative to
7 the entire sector. Terrestrial wildlife may also be exposed to ordnance present in the sector.

8 **18.5 COMPARATIVE ANALYSIS OF RESPONSE ACTION ALTERNATIVES**

9 **18.5.1 Effectiveness**

10 The OERIA risk assessment process addresses the combined criteria of overall protectiveness to
11 human health and the environment and long-term effectiveness and permanence. The results of
12 the risk assessment performed for the M3-1L-Suspect Area 1-PR sector using this process are
13 presented in Figure 18-2, located at the end of this chapter. Based on these results, the most
14 effective alternatives for the protection of human health and the environment were judged to be
15 the removal alternatives. Both Alternative 6-Clearance to Depth and Alternative 5-Clearance to 1
16 Foot Depth were projected to provide the highest level of protectiveness throughout the sector,
17 while Alternative 4- Surface Clearance was judged to provide a somewhat lower level of
18 protectiveness due to the indicated depth of OE in this area relative to the indicated future use for
19 passive recreation. OE items were found on the surface and within the top 4 inches of the soil.
20 OE debris items were found down from the surface to a depth of 18 inches below the ground
21 surface. Alternative 4-Surface Clearance received the lower ranking (compared to Alternatives 5
22 and 6) because it would not be expected to remove OE from depths where it is indicated to be
23 present and where future users of the area may disturb. Alternative 3-Construction Support is
24 considered to be protective, but only within any potential future construction footprint within the
25 sector where clearance of OE would be selectively performed. Alternative 2-Area-Specific Land
26 Use Controls was considered to be less effective than any of the removal alternatives.
27 Alternative 1-No Further Action was considered to be the least effective. Since passive
28 recreation activities are planned for this sector, Alternative 5-Clearance to 1 Foot Depth was
29 considered to provide a high level of protectiveness, with Alternative 6 providing only an
30 incremental increase in protectiveness.

31 18.5.1.1 With respect to the other effectiveness criteria, Alternative 1-No Further Action
32 clearly has the least short-term effectiveness since No Further Action is being taken that might
33 affect on local workers or the public. Alternative 2-Area-Specific Land Use Controls also
34 presents little short-term effectiveness since the only activity that might have impact the workers
35 or the public involves installation of a limited number of warning signs. The removal alternatives
36 (Alternatives 3, 4, 5, and 6) have the greatest potential impact on the workers and public since
37 each involves the potential of more direct contact with OE. In summary, Alternative 1 will have
38 the least short-term effectiveness, followed by Alternatives 2 and 3, and then Alternatives 4, 5,
39 and 6. Among the latter three alternatives, the short-term effectiveness will increase from
40 Alternatives 4 to 6, since each has the potential for longer and more intense exposure to OE.
41 With respect to the compliance with ARARs criterion, each alternative will comply.

1 **18.5.2 Implementability**

2 18.5.2.1 Technical Feasibility

3 All six alternatives are technically feasible with Alternative 1 being the most technically feasible
4 since there is No Further Action required at the site (i.e., investigation or removal actions).
5 Alternative 2 is the second most technically feasible alternative. It requires that technical actions
6 be taken at the site (e.g., installation of signage at the site). The remaining alternatives are each
7 technically feasible but less so than Alternatives 1 and 2, because they each involve more intense
8 site activities and dependence on technology. In summary, Alternative 1 will be the most
9 technically feasible, Alternative 2 next, followed by Alternatives 3, 4, 5, and 6.

10 18.5.2.2 Administrative Feasibility

11 All six alternatives will require the preparation and DDESB-approval of an ESS document.
12 Alternatives 3 through 6 will each require the preparation and approval of a work plan since each
13 alternative involves onsite OE activities. Alternatives 2, 3, 4, and 5 will also require compliance
14 with the LUCAP for Fort McClellan, since each involves the implementation of land use
15 controls. In summary, considering these requirements, Alternative 1 will be the simplest to
16 administer, with Alternative 6 next, and Alternatives 2, 3, 4, and 5 being the most difficult of the
17 alternatives to administer due to the inclusion of land use controls and the requirements to
18 comply with the LUCAP.

19 18.5.2.3 Availability of Services and Materials

20 Services and materials are required and are readily available for preparing the plans mentioned
21 above and to complete the fieldwork associated with Alternatives 3 through 6. Based on the
22 levels of services needed, Alternative 1 will require the least services and materials since it only
23 requires effort to prepare the ESS. More services and materials will be required for the
24 implementation of Alternative 2 since it requires the preparation of the ESS, installation of signs,
25 as well as coordination with the LUCAP. Even more services and materials will be required for
26 Alternative 3 since it requires a work plan to support construction support activities and the field
27 service activities to provide the actual construction support. Alternative 4 will be similar in scope
28 of required services and materials. Alternatives 5 and 6 will require the most in services and
29 materials. In summary, Alternative 1 will require the least in services and materials to
30 implement, with Alternative 2 next. Alternatives 3 and 4 will require a higher level of services
31 and materials than Alternatives 1 and 2, but less than Alternatives 5 and 6.

32 18.5.2.4 Regulatory and Community Acceptance

33 The level of regulatory and/or community acceptance for each alternative can be expected to
34 largely depend on the protection that each alternative offers. For this sector, OE has been
35 detected on the surface, in an area where the future land use is projected to be Passive
36 Recreation. Alternative 1-No Further Action does nothing to provide any degree of protection
37 and therefore is unlikely to be accepted by the regulatory community or the public. Alternative 2-
38 Area-Specific Land Use Controls would probably be received more favorably since it will
39 provide some degree of protection, however, since it leaves potential OE in place, it may be

1 received poorly by both regulators and the public. Alternative 3-Construction Support may
2 receive similar levels of acceptance as Alternative 2. Alternative 3 provides protection to
3 construction workers and removes OE within the construction footprint. The projected future
4 land use is Passive Recreation, with little expected construction activities. Alternative 4-Surface
5 Clearance may be expected to receive an even higher level of acceptance than any of the
6 previous alternatives since it includes actual removal of potential OE from the surface and is
7 accompanied by land use controls. On the other hand, the belief that significant numbers of
8 subsurface OE may be present, may lead to reduced acceptance of this alternative.

9 18.5.2.4.1 Alternative 5-Clearance to One-Foot Depth and Alternative 6-Clearance to Depth
10 may receive the highest level of acceptance by both regulators and the public since they both
11 involve a subsurface removal of potential OE. However, at the same time, since the projected
12 future land use is Passive Recreation, the regulators and/or the public may consider Alternative 6
13 to be more than what is necessary and prefer not to disturb the habitat and environment to the
14 extent necessary to accomplish this alternative.

15 18.5.2.4.2 In summary, the alternatives that may be best received by the regulators and/or public
16 would be Alternative 5-Clearance to One Foot Depth and Alternative 6-Clearance to Depth,
17 followed in order by Alternative 4-Surface Clearance, Alternative 2-Area-Specific Land Use
18 Controls, Alternative 3-Construction Support, and lastly, Alternative 1-No Further Action.

19 **18.5.3 Cost**

20 The projected costs to implement the alternatives in this 193-acre sector are summarized below:

- 21 • Alternative 1 - No Further Action – \$5,000. An ESS (preparation, draft, and final) will be
22 prepared for a group of sectors. This is an approximation of one sector's portion of the total
23 cost.
- 24 • Alternative 2 - Area-Specific Land Use Controls – \$17,000. This cost includes planning and
25 installation of signage. No annual maintenance costs are included.
- 26 • Alternative 3 - Construction Support – \$758,709. This estimate includes management,
27 planning, and UXO support.
- 28 • Alternative 4 - Surface Clearance – \$1,215,840. This cost includes management and
29 planning, OE removal activities, and reporting.
- 30 • Alternative 5 - Clearance to One-Foot Depth – \$3,521,129. This cost includes management
31 and planning, OE removal activities, and reporting.
- 32 • Alternative 6 - Clearance to Depth – \$3,773,506. This cost includes management and
33 planning, OE removal activities, and reporting.

34 **18.6 RECOMMENDATION**

35 The recommended alternative for M3-1L-Suspect Area 1-PR is Alternative 5-Clearance to One
36 Foot. Components of this alternative will include land surveying and brush clearing operations to

1 prepare the site. Where technically feasible, suitably sensitive detection instruments will be used
2 to survey the study area and locate subsurface anomalies, which subsequently will be
3 investigated down to 12 inches. After identification, the item will be disposed of as scrap or OE
4 in accordance with a previously-approved OE operations work plan. A deed restriction that
5 prohibits digging in this sector without construction support by UXO-qualified personnel will
6 also be included.

7 18.6.1 Planning for this response action will require preparation of an ESS and a site-
8 specific work plan. The estimated cost to implement this alternative is \$3,521,129.

9 **18.7 SUPPORTING RATIONALE**

10 The risk analysis and the comparative analysis indicated that Alternative 5-Clearance to One
11 Foot should provide sufficient protection for this sector. All of the OE items found in this sector
12 were at or near the surface. OE Scrap was found primarily on the surface or at shallow depths,
13 with only one item at a depth of 18 inches. Further, the projected land use for this sector is
14 Passive Recreation associated with activities such as hiking, walking, and biking. No significant
15 construction of recreational facilities or underground utilities is associated with this land use.
16 Consistent with the Passive Recreation land use is the occasional incidental interaction with
17 surface and very near surface (0 – 6 inches) soils. The recommendation of clearance to one foot
18 provides a safety buffer beyond the expected depth (6 inches) of contact. Since all the OE items
19 found were at or near the surface, other items are expected to be near the surface, and the
20 projected land use is Passive Recreation, the recommendation of clearance to one foot should be
21 sufficiently protective.

Figure 18-1
M3-1L-Suspect Area 1-PR
CONCEPTUAL SITE MODEL

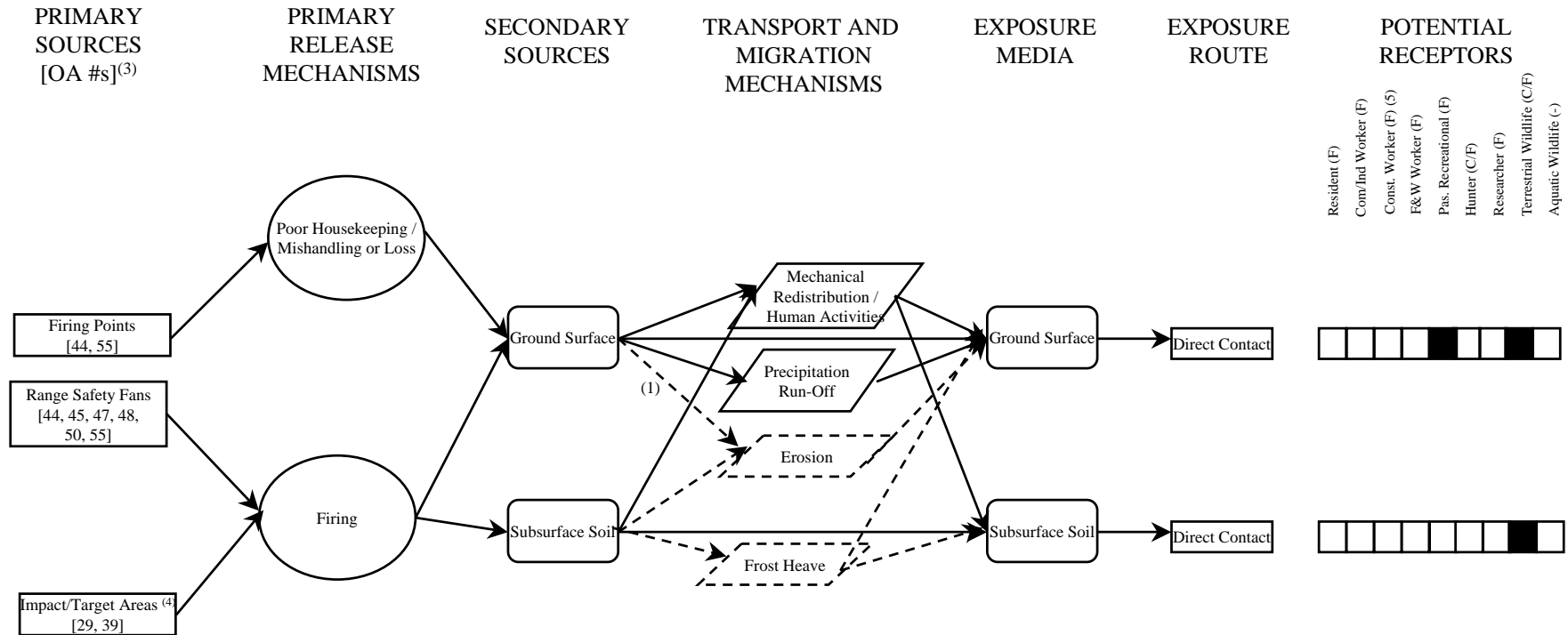


PLATE NOS. (2)	OA# (3)	NAME (Other Names)	ORDNANCE AND EXPLOSIVES ASSOCIATED WITH AREA
3, 4, 10 3, 4, 10 5, 6, 7, 10 5, 6, 7, 10	29 39 44 45	World War I Artillery Range (North Half) World War I Artillery Range (South Half) Washington Rifle Range (Range 18) Range 16 (originally, later Rocket Launcher/Bazooka Range and Range 17 (Rifle Grenade))	Artillery Munitions; Mortars Artillery Munitions; Mortars Small Arms Grenade Court; Small Arms; 40mm grenades (launched); Rockets
5, 6, 10 6, 10	55 47	Old Range 12 (Range 12; Rifle Field Firing) Range 15 (a.k.a. Combat Village)	Small Arms Small Arms; Light Anti-Tank Weapon
6, 7, 10	48	Range 12 (a.k.a. Range 14)	Small Arms; Light Anti-Tank Weapon; Anti-Tank; 60mm Projectiles; Rockets
6, 7, 10	50	Range 19	Small Arms

NOTES:

- (1) Dashed boxes or lines indicate a potential source area or linkage that requires further verification or is a linkage that is indicated to be present in only a small number of specific locations.
- (2) Plate numbers obtained from the Fort McClellan Archives Search Report
- (3) Ordnance Area identification numbers obtained from the Archives Search Report.
- (4) For Non-Small Arms Munitions.
- (5) No significant construction activity is expected for this land use. Limited disturbance of the soil may be considered within a specific footprint for the installation of facilities associated with the land use.
- C = Current Receptor
- F = Potential Future Receptor
- = Not plausible for this sector

Figure 18-2 OERIA TABLE FOR SECTOR M3-1L-SUSPECT AREA 1-PR																			
AREA:		BRAVO																	
SECTOR:		M3-1L-Suspect Area 1-PR																	
TOTAL SECTOR AREA:		193 acres																	
AREA GEOPHYSICALLY SURVEYED:		5.38 acres [3]																	
AREA INTRUSIVELY INVESTIGATED:		4.09 acres (equivalent) [4]																	
	ORDNANCE								SITE		HUMAN CURRENT USE			HUMAN FUTURE USE			OVERALL RANK		
	HE Items Found? [Yes]	OE Type [7]		OE Sensitivity [7]		OE Item Depth Distribution		OE Item Density	OE Site Access	OE Site Stability	Activity	OE Contact Probability Level	Exposed Population (Number or Freq. Of Use)	Activity	OE Contact Probability Level	Exposed Population (Number or Freq. Of Use)	Likelihood of Near Term Reuse	CURRENT LAND USE	FUTURE LAND USE
	HE Debris Found? [Yes]		(%)		(%)	Depth Range	% [9]	(Items/Acre) [8,9,12]											
Baseline Risk Assessment (Existing Conditions)		Cat. 3	79	Cat. 3	79	Surface	57.1 / (2.15)	1.49 / (0.37)	No Restriction to Site	Site Stable	Recreational [13,17]	Significant [18]	Occasional [19]	Passive Recreation [14]	Significant [18]	Occasional [19]	High		
		Cat. 2	21	Cat. 2	21	0 to 1' bgs	42.9 / (96.8)	1.47 / (2.2)											
		Cat. 1	0.0	Cat. 1	0.0	1' to Depth	- / (1.08)	- / (0.24)											
		Cat. 0	-	Cat. 0	-	Overall [11]	3.42 / (22.7)												
						90% CI on Overall OE Item Density [10]	2.27 - 5.33												
Alternative 1 - No Further Action		No Impact		No Impact		No Impact			No Impact	No Impact		No Impact	No Impact	No Impact	No Impact		BASELINE	BASELINE	
Alternative 2 - Land Use Controls		No Impact		No Impact		No Impact			No Impact	No Impact		B		No Impact	B		LOW	LOW	
Alternative 3 - Construction Support		No Impact		No Impact		A [21]			No Impact	No Impact		A [21]	A [21]		A [21]	A [21]		MODERATE [20]	MODERATE [20]
Alternative 4 - Surface Clearance		No Impact		No Impact		B			No Impact	No Impact		B	A [23]		B	A [23]		MODERATE	MODERATE
Alternative 5 - Clearance to 1 Foot Depth		A		A		A			No Impact	No Impact		A	A		A	A		HIGH	HIGH
Alternative 6 - Clearance to Depth		A [22]		A [22]		A [22]			No Impact	No Impact		A	A [22]		A	A [22]		HIGH	HIGH
<p>NOTES</p> <p>3 The Geophysically Surveyed Area includes the area associated with the transects within this specific sector.</p> <p>4 Based on the fraction of identified target anomalies intrusively investigated in each geophysically surveyed grid and/or transect segment.</p> <p>7 Percentages classify OE items found. If no OE items are found, Category 0 is 100% and Categories 1 - 3 are noted with a ***. If OE items are found, Category 0 is noted with a ***.</p> <p>8 OE Density values shown are the straight average value = # of OE Items / Acres in which they were found.</p> <p>9 Densities and depth range percentages shown in italics and curly brackets indicate characteristics of the OE debris.</p> <p>10 The OE Density range shown represents a 90% confidence interval on the OE Item density calculated using UXO Calculator Version 1.4.2.</p> <p>11 Overall OE item density is based on all OE Items found in the area intrusively investigated.</p> <p>12 The surface OE item density is based on the area geophysically surveyed and the 0-1' and 1'-Depth OE item densities are based on the area intrusively investigated.</p> <p>13 Specific activities identified for the recreational current land use include hunting, hiking, and short cuts.</p> <p>14 Specific activities associated with the passive recreation future land use are hiking, walking, biking, picnicking, horseback riding, and other non-motorized activities.</p> <p>17 Exposure to terrestrial wildlife is also assumed.</p> <p>18 Based on the depth of intrusion associated with the identified activities - See Table 5 of USACE OERIA Interim Guidance (3/27/01).</p> <p>19 The frequency of site usage is currently classified as rare and the number of site users is currently classified as low due to restrictions that have been placed on the site (i.e., no hunting or hiking) since the remediation activities began. The current frequency of usage would be classified as occasional if these recreational activities took place.</p> <p>20 Indicated to be the most protective alternative within the construction footprint.</p> <p>21 Risk factor score indicated applies only within the construction footprint.</p> <p>22 No increased protectiveness relative to alternatives with a shallower clearance depth due to the depth distribution of OE items found.</p> <p>23 Removal of surface OE items or debris may reduce the number of potential exposures to souvenir hunters.</p> <p>- = Not applicable as no energetic OE items were found.</p> <p>IMPACT CODE</p> <p>A = Signifies the greatest impact on reducing potential exposures to OE; Relatively less impact as the letter ranking goes to B, C, and subsequent letters.</p> <p>HIGH - Most protective relative to projected land use.</p> <p>LOW - Least protective relative to projected land use.</p> <p>MODERATE - Protectiveness level between Low and High.</p> <p>BASELINE - Protectiveness level associated with Alternative 1 - No Further Action.</p>																			

1 19.0 M3-1L-Suspect Area 2-PR

2 19.1 DESCRIPTION AND HISTORY

3 This area consists of approximately 9 acres in the central to southern portion of the Bravo Area.
 4 The northern edge of the historical Washington Tank Range (OA-54) impact area is within the
 5 boundaries of this sector. The firing fans of three historical small arms ranges also extend into
 6 this area. They are machine gun range (OA-2), Range 15 (OA-47), and Old Range 12 (OA-55)
 7 The Machine Gun Range, used during WWII, was part of Combat Range #2. It was used as a
 8 rifle grenade range during WWII and was abandoned in 1958. Range 15 dates to WWII and has
 9 a safety fan similar to ones used for rifle and machine gun live fire. Old Range 12 was built
 10 during WWII as a landscape range and was abandoned by 1967. By 1958, the range was
 11 referred to as Range 12, Rifle Field Firing. The projected land use for this sector is Passive
 12 Recreation.

13 19.2 INVESTIGATION RESULTS

14 During the site characterization of Bravo, one mountain transect (T13) was investigated within
 15 this OE Risk Assessment Sector. A total of 0.11 acres were geophysically mapped and 0.019
 16 acres were intrusively investigated. One UXO item was found during intrusive activities at three
 17 inches below grade and one OE Scrap item was identified during the surface clearance on the
 18 surface. Table 19-1 contains a detailed list of OE and OE Scrap items found within this OE Risk
 19 Assessment Sector. Figure B-2 in Appendix B presents an overview figure of this OE Risk
 20 Assessment Sector within the Bravo Area and Appendix F contains a list of all items from the
 21 database found within this OE Risk Assessment Sector.

Table 19-1
List of OE and OE Scrap Items Found in M3-1L Suspect Area 2-PR

Item Description	Quantity	Depth (inches)	Target Type	Grid ID/Transect	Anomaly ID
UXO Items:					
PROJECTILE, 37mm, HE-T, M54	1	3	UXO	T13	T13C03
OE Scrap Items:					
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	0	OE Scrap	T13	T13S1
*TtEC did not independently verify the accuracy nor currency of information supplied by client or by any of clients contractors, vendors, or consultants. ** Indeterminate amount.					

22

23 19.3 DESCRIPTION OF HAZARDS OF SPECIFIC OE ENCOUNTERED

24 The only UXO item encountered during the site characterization of this OE Risk Assessment
 25 Sector was a 37mm M54 HE-T projectile. The finding of this one UXO was believed to be an
 26 anomalous finding. There were no other findings in the surrounding area, either in grids or
 27 transects. To be conservative, the Army delineated the area as risk sector M3-1L-Suspect Area
 28 2-PR and recommended clearance. When the future clearance is performed, the boundaries will

1 be extended until a minimum of 200 feet is clear of UXO. The M54 HE Projectile was used
2 primarily against aircraft and was fitted with a supersensitive type of superquick fuze named
3 M56 (SQ)PD. The projectile consists of a relatively thin-walled shell body, a tetryl bursting
4 charge, the M56 (SQ)PD fuze, and a shell-destroying tracer. The nose is threaded to receive the
5 fuze and the “boat-tailed” base is threaded to receive a tracer assembly containing a relay
6 housing, an igniter charge, and a rely igniting charge. These charges connect the tracer with a
7 black powder pellet in the base end of the bursting charge cavity. The tracer burns for about 8
8 seconds, equivalent to 3,500 yards, when the relay pellet is ignited and causes the bursting
9 charge to detonate if prior functioning has not been caused by impact. Should the tracer element
10 fail to cause detonation, the maximum theoretical range for the projectile is 9,050 yards. The
11 M56 (SQ)PD fuze is constructed of aluminum and is unpainted. It is stamped with fuze
12 designation and loading information. The surface about the body flange is coated with orange-
13 tinted clear lacquer. The fuze require setback and centrifugal force to complete arming.

14 **19.4 RISK ASSESSMENT**

15 Figure 19-1, located at the end of this chapter, presents the CSM for potential exposures to OE in
16 OE Risk Assessment Sector M3-1L-Suspect Area 2-PR in Redevelopment Parcel M3. Various
17 firing points and range safety fans located throughout the sector and a combat range were
18 identified as sources. OE would be deposited into the range safety fans by firing. At the firing
19 points, ordnance may be present as a result of mishandling, poor housekeeping, or loss. OE may
20 be present in the combat range as a result of firing or poor housekeeping, mishandling, or loss.
21 These releases likely result in OE being present on the ground surface or in the subsurface soils
22 of the sector. This CSM also indicates the principal mechanisms by which ordnance items may
23 migrate or move from one location to another in the sector or shift from one depth in the soil to
24 another. These potential transport and migration mechanisms include mechanical redistribution,
25 human activity, precipitation run-off, and (in limited, specific locations) erosion and frost heave.
26 The original deposition of the ordnance items and the localized transport and migration processes
27 result in a new distribution of OE items in the soil which may be locations of direct contact
28 exposure by current or reasonably foreseeable future receptors associated with reuse of the area.
29 Receptors may include Passive Recreational users of the area. No significant construction
30 activity is projected to be associated with this land use. However, soil disturbance within a
31 specified area may be considered on an infrequent and spatially limited basis. As such, a
32 construction worker would not be a routine receptor relative to the entire sector. Terrestrial
33 wildlife may also be exposed to ordnance present in the sector.

34 **19.5 COMPARATIVE ANALYSIS OF RESPONSE ACTION ALTERNATIVES**

35 **19.5.1 Effectiveness**

36 The OERIA risk assessment process addresses the combined criteria of overall protectiveness to
37 human health and the environment and long-term effectiveness and permanence. The results of
38 the risk assessment performed for the M3-1L-Suspect Area 2-PR sector using this process are
39 presented in Figure 19-2, located at the end of this chapter. Based on these results, the most
40 effective alternatives for the protection of human health and the environment were judged to be
41 the removal alternatives. Both Alternative 6-Clearance to Depth and Alternative 5-Clearance to 1
42 Foot Depth were projected to provide the highest level of protectiveness throughout the sector,

1 while Alternative 4- Surface Clearance was judged to provide a lower level of protectiveness due
2 to the indicated depth of OE in this area relative to the indicated future use for passive recreation.
3 The only OE item found in this area was located three inches below the ground surface, while
4 OE Scrap was only found on the surface. Alternative 3-Construction Support is considered to be
5 protective within any potential future construction footprint within the sector where clearance of
6 OE would be selectively performed. Alternative 2-Area-Specific Land Use Controls was
7 considered to be less effective than any of the removal alternatives except for the case when
8 Surface Clearance would be performed alone. Alternative 1-No Further Action was considered
9 to be the least effective. Since Passive Recreation activities are planned for this sector,
10 Alternative 5-Clearance to 1 Foot Depth was considered to provide a high level of
11 protectiveness, with Alternative 6 providing only an incremental increase in protectiveness.

12 19.5.1.1 With respect to the other effectiveness criteria, Alternative 1-No Further Action clearly
13 has the least short-term effectiveness since No Further Action is being taken that might affect
14 local workers or the public. Alternative 2-Area-Specific Land Use Controls also presents little
15 short-term impacts since the only activity that might have impact on the workers or the public
16 involves installation of a limited number of warning signs. The removal alternatives
17 (Alternatives 3, 4, 5, and 6) have the greatest potential impact on the workers and public since
18 each involves the potential of more direct contact with OE. In summary, Alternative 1 will have
19 the least short-term impacts, followed by Alternatives 2 and 3, and then Alternatives 4, 5, and 6.
20 Among the latter three alternatives, the short-term effects will increase from Alternative 4 to 6,
21 since each has the potential for longer and more intense exposure to OE. With respect to the
22 compliance with ARARs criterion, each alternative will comply.

23 **19.5.2 Implementability**

24 19.5.2.1 Technical Feasibility

25 All six alternatives are technically feasible with Alternative 1 being the most technically feasible
26 since there is No Further Action required at the site (i.e., investigation or removal actions).
27 Alternative 2 is the second most technically feasible alternative. It requires that technical actions
28 be taken at the site (e.g., installation of signage at the site). The remaining alternatives are each
29 technically feasible but less so than Alternatives 1 and 2, because they each involve more intense
30 site activities and dependence on technology. In summary, Alternative 1 will be the most
31 technically feasible, Alternative 2 next, followed by Alternatives 3, 4, 5, and 6.

32 19.5.2.2 Administrative Feasibility

33 All six alternatives will require the preparation and DDESB-approval of an ESS document.
34 Alternatives 3 through 6 will each require the preparation and approval of a work plan since each
35 alternative involves onsite OE activities. Alternatives 2, 3, 4, and 5 will also require compliance
36 with the LUCAP for Fort McClellan, since each involves the implementation of land use
37 controls. In summary, considering these requirements, Alternative 1 will be the simplest to
38 administer, with Alternative 6 next, and Alternatives 2, 3, 4, and 5 being the most difficult of the
39 alternatives to administer due to the inclusion of land use controls and the requirements to
40 comply with the LUCAP.

1 19.5.2.3 Availability of Services and Materials

2 Services and materials will be required and are readily available for preparing the plans
3 mentioned above and to complete the fieldwork associated with Alternatives 3 through 6. Based
4 on the levels of services needed, Alternative 1 will require the least services and materials since
5 it only requires effort to prepare the ESS. More services and materials will be required for the
6 implementation of Alternative 2 since it requires the preparation of the ESS, installation of signs,
7 as well as coordination with the LUCAP. Even more services and materials will be required for
8 Alternative 3 since it requires a work plan to support construction support activities and the field
9 service activities to provide the actual construction support. Alternative 4 will be similar in scope
10 of required services and materials. Alternatives 5 and 6 will require the most in services and
11 materials. In summary, Alternative 1 will require the least in services and materials to
12 implement, with Alternative 2 next. Alternatives 3 and 4 will require a higher level of services
13 and materials than Alternatives 1 and 2, but less than Alternatives 5 and 6.

14 19.5.2.4 Regulatory and Community Acceptance

15 The level of regulatory and/or community acceptance for each alternative can be expected to
16 largely depend on the protection that each alternative offers. For this sector, OE was located
17 three inches below land surface and OE Scrap was found on the surface. The future land use is
18 projected to be Passive Recreation. Alternative 1-No Further Action does nothing to provide any
19 degree of protection and, therefore, is unlikely to be accepted by the regulatory community or the
20 public. Alternative 2-Area-Specific Land Use Controls would probably be received more
21 favorably since it will provide some degree of protection. However, since it leaves potentially
22 hazardous OE in place, it may be received poorly by both regulators and the public. Alternative
23 3-Construction Support may receive similar levels of acceptance as Alternative 2. Alternative 3
24 provides protection to construction workers and removes OE within the construction footprint.
25 The projected future land use is Passive Recreation, with little expected construction activities.
26 Alternative 4-Surface Clearance may be expected to receive an even higher level of acceptance
27 than any of the previous alternatives since it includes actual removal of potential OE from the
28 surface and is accompanied by land use controls. On the other hand, the belief that significant
29 numbers of subsurface OE may be present may lead to a reduced acceptance of this alternative.
30 Alternative 5 (Clearance to One-Foot Depth) and Alternative 6-Clearance to Depth may receive
31 the highest level of acceptance by both regulators and the public since they both involve a
32 subsurface removal of potential OE. Since the projected future land use is Passive Recreation,
33 the regulators and/or the public may consider Alternative 6 to be more than what is necessary
34 and prefer not to disturb the habitat and environment to the extent necessary to accomplish this
35 alternative.

36 19.5.2.4.1 In summary, the alternatives that may be best received by the regulators and/or public
37 would be Alternative 5-Clearance to One Foot Depth and Alternative 6-Clearance to Depth,
38 followed in order by Alternative 4-Surface Clearance, Alternative 2-Area-Specific Land Use
39 Controls, Alternative 3-Construction Support, and lastly, Alternative 1-No Further Action.

1 **19.5.3 Cost**

2 The projected costs to implement the alternatives in this 9-acre sector are summarized below:

- 3 • Alternative 1 - No Further Action – \$5,000. An ESS (preparation, draft, and final) will be
4 prepared for a group of sectors. This is an approximation of one sector's portion of the total
5 cost.
- 6 • Alternative 2 - Area-Specific Land Use Controls – \$17,000. This cost includes planning and
7 installation of signage. No annual maintenance costs are included.
- 8 • Alternative 3 - Construction Support – \$59,214. This estimate includes management,
9 planning, and UXO support.
- 10 • Alternative 4 - Surface Clearance – \$112,912. This cost includes management and planning,
11 OE removal activities, and reporting.
- 12 • Alternative 5 - Clearance to One-Foot Depth – \$251,603. This cost includes management
13 and planning, OE removal activities, and reporting.
- 14 • Alternative 6 - Clearance to Depth – \$270,861. This cost includes management and
15 planning, OE removal activities, and reporting.

16 **19.6 RECOMMENDATION**

17 The recommended alternative for M3-1L-Suspect Area 2-PR is Alternative 5-Clearance to One
18 Foot. Components of this alternative will include land surveying and brush clearing operations to
19 prepare the site. Where technically feasible, suitably sensitive detection instruments will be used
20 to survey the study area and locate subsurface anomalies, which subsequently will be
21 investigated down to 12 inches. After identification, the item will be disposed of as scrap or OE
22 in accordance with a previously-approved OE operations work plan. A deed restriction that
23 prohibits digging in this sector without construction support by UXO-qualified personnel will
24 also be included.

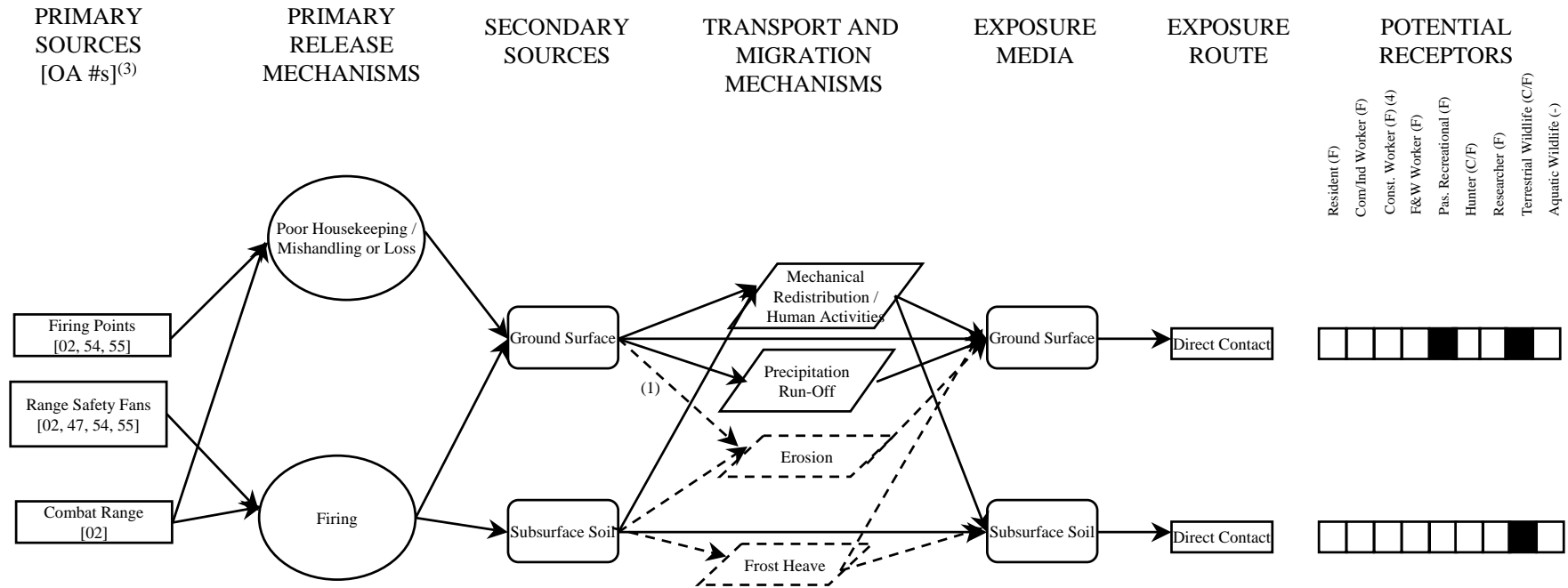
25 19.6.1 Planning for this response action will require preparation of an ESS and a site-
26 specific work plan. The estimated cost to implement this alternative is \$251,603.

27 **19.7 SUPPORTING RATIONALE**

28 The risk analysis and the comparative analysis indicated that Alternative 5-Clearance to One
29 Foot should provide sufficient protection for this sector. The one OE Scrap item was found
30 during the surface clearance and the one UXO item was found at a depth of 3 inches in this
31 sector. Further, the projected land use for this sector is Passive Recreation associated with
32 activities such as hiking, walking, and biking. No significant construction of recreational
33 facilities or underground utilities is associated with this land use. Consistent with the Passive
34 Recreation land use is the occasional incidental interaction with surface and very near surface
35 (0–6 inches) soils. The recommendation of clearance to one foot provides a safety buffer beyond
36 the expected depth (6 inches) of contact. Since the items found were near the surface, other

- 1 items are expected to be near the surface, and the projected land use is Passive Recreation, the
- 2 clearance to one foot should be sufficiently protective.

Figure 19-1
M3-1L-Suspect Area 2-PR
CONCEPTUAL SITE MODEL



NOTES:

- (1) Dashed boxes or lines indicate a potential source area or linkage that requires further verification or is a linkage that is indicated to be present in only a small number of specific locations.
- (2) Plate numbers obtained from the Fort McClellan Archives Search Report.
- (3) Ordnance Area identification numbers obtained from the Archives Search Report.
- (4) No significant construction activity is expected for this land use. Limited disturbance of the soil may be considered within a specific footprint for the installation of facilities associated with the land use.
- C = Current Receptor
- F = Potential Future Receptor
- = Not plausible for this sector

PLATE NOS. (2)	OA# (3)	NAME (Other Names)	ORDNANCE AND EXPLOSIVES ASSOCIATED WITH AREA
5, 10	02	Machine Gun Range	Small Arms
5, 6, 10	55	Old Range 12 (Range 12; Rifle Field Firing)	Small Arms
6, 10	47	Range 15 (a.k.a. Combat Village)	Small Arms; Light Anti-Tank Weapon
6, 10	54	Washington Tank Range (Tank Table 1-2-3)	Small Arms; 37mm Sub Caliber Rounds; 75mm Projectile; 90mm Projectiles

Figure 19-2

OERIA TABLE FOR SECTOR M3-1L-SUSPECT AREA 2-PR

AREA: BRAVO
 SECTOR: M3-1L-Suspect Area 2-PR
 TOTAL SECTOR AREA: 9 acres
 AREA GEOPHYSICALLY SURVEYED: 0.11 acres [3]
 AREA INTRUSIVELY INVESTIGATED: 0.019 acres (equivalent) [4]

	ORDNANCE						SITE		HUMAN CURRENT USE			HUMAN FUTURE USE			OVERALL RANK				
	HE Items Found? [Yes]	OE Type [7]		OE Sensitivity [7]		OE Item Depth Distribution		OE Item Density	OE Site Access	OE Site Stability	Activity	OE Contact Probability Level	Exposed Population (Number or Freq. Of Use)	Activity	OE Contact Probability Level	Exposed Population (Number or Freq. Of Use)	Likelihood of Near Term Reuse	CURRENT LAND USE	FUTURE LAND USE
	HE Debris Found? [Yes]		(%)		(%)	Depth Range	% [9]	(Items/Acre) [8,9,12]											
Baseline Risk Assessment (Existing Conditions)		Cat. 3	100	Cat. 3	100	Surface	- / (100)	- / (9.1)	No Restriction to Site	Site Stable	Recreational [13,17]	Significant [18]	Occasional [19]	Passive Recreation [14]	Significant [18]	Occasional [19]	High		
		Cat. 2	0.0	Cat. 2	0.0	0 to 1' bgs	100 / (-)	52.6 / -											
		Cat. 1	0.0	Cat. 1	0.0	1' to Depth	- / (-)	- / (-)											
		Cat. 0	*	Cat. 0	*	Overall [11]	52.6 / (52.6)												
						90% CI on Overall OE Item Density [10]	18.7 - 249												
Alternative 1 - No Further Action		No Impact		No Impact		No Impact		No Impact	No Impact		No Impact	No Impact		No Impact	No Impact		BASELINE	BASELINE	
Alternative 2 - Land Use Controls		No Impact		No Impact		No Impact		No Impact	No Impact		No Impact	B		No Impact	B		LOW	LOW	
Alternative 3 - Construction Support		No Impact		No Impact		A [21]		No Impact	No Impact		A [21]	A [21]		A [21]	A [21]		MODERATE [20]	MODERATE [20]	
Alternative 4 - Surface Clearance		No Impact		No Impact		No Impact		No Impact	No Impact		B	A [23]		B	A [23]		LOW	LOW	
Alternative 5 - Clearance to 1 Foot Depth		A		A		A		No Impact	No Impact		A	A		A	A		HIGH	HIGH	
Alternative 6 - Clearance to Depth		A [22]		A [22]		A [22]		No Impact	No Impact		A	A [22]		A	A [22]		HIGH	HIGH	

NOTES

- 3 The Geophysically Surveyed Area includes the area associated with the transects within this specific sector.
- 4 Based on the fraction of identified target anomalies intrusively investigated in each geophysically surveyed grid and/or transect segment.
- 7 Percentages classify OE items found. If no OE items are found, Category 0 is 100% and Categories 1 - 3 are noted with a ***. If OE items are found, Category 0 is noted with a ***.
- 8 OE Density values shown are the straight average value = # of OE Items / Acres in which they were found.
- 9 Densities and depth range percentages shown in italics and curly brackets indicate characteristics of the OE debris.
- 10 The OE Density range shown represents a 90% confidence interval on the OE item density calculated using UXO Calculator Version 1.4.2.
- 11 Overall OE item density is based on all OE items found in the area intrusively investigated.
- 12 The surface OE item density is based on the area geophysically surveyed and the 0-1' and 1'-Depth OE item densities are based on the area intrusively investigated.
- 13 Specific activities identified for the recreational current land use include hunting, hiking, and short cuts.
- 14 Specific activities associated with the passive recreation future land use are hiking, walking, biking, picnicking, horseback riding, and other non-motorized activities.
- 17 Exposure to terrestrial wildlife is also assumed.
- 18 Based on the depth of intrusion associated with the identified activities - See Table 5 of USACE OERIA Interim Guidance (3/27/01).
- 19 The frequency of site usage is currently classified as rare and the number of site users is currently classified as low due to restrictions that have been placed on the site (i.e., no hunting or hiking) since the remediation activities began. The current frequency of usage would be classified as occasional if these recreational activities took place.
- 20 Indicated to be the most protective alternative within the construction footprint.
- 21 Risk factor score indicated applies only within the construction footprint.
- 22 No increased protectiveness relative to alternatives with a shallower clearance depth due to the depth distribution of OE items found.
- 23 Removal of surface OE items or debris may reduce the number of potential exposures to souvenir hunters.
- = Not applicable as no energetic OE items were found.

IMPACT CODE

A = Signifies the greatest impact on reducing potential exposures to OE; Relatively less impact as the letter ranking goes to B, C, and subsequent letters.
 HIGH - Most protective relative to projected land use.
 LOW - Least protective relative to projected land use.
 MODERATE - Protectiveness level between Low and High.
 BASELINE - Protectiveness level associated with Alternative 1 - No Further Action.

1 **20.0 M3-2H-Mortar Area-D**

2 **20.1 DESCRIPTION AND HISTORY**

3 This sector consists of approximately 42 acres located in the southwestern portion of the Bravo
4 Area. Several historic impact areas were located in this area. These include the 1950 Rocket
5 Launcher Range (OA-57), the 60mm Mortar Range (OA-53), and the Washington Tank (OA-54)
6 Range. The 1950 Rocket Launcher Range appears on a 1950 range map but was abandoned
7 sometime before 1958. The 60mm Mortar Range was established during WWII and later
8 abandoned between 1958 and 1967. The use of the Washington Tank Range may have even
9 associated with the reserve unit located on Highway 21. The firing fan of one historical small
10 arms range (OA-55) also extends into this area. The range is Old Range 12 (OA-55), which was
11 built during WWII as a landscape range and was abandoned by 1967. By 1958, the range was
12 referred to as Range 12, Rifle Field Firing. This sector has a projected land use of Cultural (i.e.,
13 some development).

14 **20.2 INVESTIGATION RESULTS**

15 During the site characterization of Bravo, 2 grids were geophysically mapped and 1 of these
16 grids was then intrusively investigated. Delineation transects were used specifically to
17 characterize suspected areas with a high likelihood of containing OE. The following delineation
18 transects were placed in this OE Risk Assessment Sector: part of M32H002, part of M32H004,
19 part of M32H006, part of M32H010, and M32H001. Data collection transects (clusters),
20 consisting of a series of 200-foot long, parallel segments spaced 25 to 50 feet apart, were planned
21 for this OE Risk Assessment Sector. The following clusters were placed in this OE Risk
22 Assessment Sector: M31M084, M31M085, M31M091, M31M092, M31M093, M31M134,
23 M31M135, M31L434. A total of 0.74 acres in grids and 1.89 acres in transects were
24 geophysically mapped. A total of 0.017 acres in grids and 0.20 acres in transects were
25 intrusively investigated.

26 20.2.1 Nineteen UXO items were found on the surface and at depths to twelve inches. Eight
27 UXO items were found by IT Corporation. Eighteen OE Scrap items, with some indeterminate
28 amounts of Scrap, were also found on the surface and at shallow depths. One OE Scrap item was
29 found at a depth of 14 inches. Table 20-1 contains a list of OE and OE Scrap items found within
30 this OE Risk Assessment Sector. Figure B-2 in Appendix B presents an overview figure of this
31 OE Risk Assessment Sector within the Bravo Area and Appendix F contains a list of all items
32 from the database found within this OE Risk Assessment Sector.

33

1

Table 20-1
List of OE and OE Scrap Items Found in M3-2H Mortar Area-D

Item Description	Quantity	Depth (inches)	Target Type	Grid ID/Transect	Anomaly ID
UXO Items:					
MORTAR, 60mm, HE, M49	1	0	UXO	124	1
MORTAR, 60mm, HE, M49	1	0	UXO	124	2
MORTAR, 60mm, HE, M49	1	0	UXO	124	9
MORTAR, 60mm	1	2	UXO	124	15
MORTAR, 60mm	1	12	UXO	124	18
MORTARS 60mm, HE, M49	2	0	UXO	124	20
MORTAR, 60mm SMOKE, WP, M302	1	4	UXO	124	25
MORTAR FINS, 60mm	6	4	UXO	124	25
MORTAR, 60mm SMOKE, WP, M302	1	3	UXO	124	29
MORTAR, 60mm, HE, M49	1	0	UXO	124	32
MORTAR, 60mm SMOKE, WP, M302	1	5	UXO	124	35
MORTAR, 60mm	1	0	UXO	575	15
MORTAR, 60mm HE, M49	1	1	UXO	M311434	1
Data Provided by Other Subcontractors:*					
MORTAR, 60mm, HE, FUZED	1	0	UXO	IT01	N/A
MORTAR, 60mm, HE, FUZED	1	0	UXO	IT02	N/A
MORTAR, 60mm	1	0	UXO	IT03	N/A
MORTAR, 60mm	1	0	UXO	IT04	N/A
MORTAR, 60mm, HE	1	0	UXO	IT05	N/A
MORTAR, 60mm, HE	1	0	UXO	IT06	N/A
MORTAR, 60mm, HE	1	0	UXO	IT07	N/A
MORTAR, 60mm, HE	1	0	UXO	IT08	N/A
OE Scrap Items:					
MORTAR, 60mm, PRACTICE, M69	1	14	OE Scrap	124	12
MORTAR FINS, 60mm, FRAGMENTATION	7	5	OE Scrap	124	14
MORTAR FINS, 60mm	5	0	OE Scrap	124	23
LOCKING DEVICE	1	0	OE Scrap	124	23
FRAGMENTATION	**	4	OE Scrap	124	25
MORTAR, 60mm	1	0	OE Scrap	M31m134	3
MORTAR, 60mm	1	0	OE Scrap	M31m134	63
MORTAR, 60mm	1	0	OE Scrap	M31m134	195
ROCKET, PRACTICE, 3.5in, M29A	1	0	OE Scrap	M32h001	79
Note: This table does not list small arms finds.					
Note: IT# = IT Corporation finds. PBP# = Parsons Burn Pit finds.					
*TtEC did not independently verify the accuracy nor currency of information supplied by client or by any of clients contractors, vendors, or consultants.					
** Indeterminate amount.					

1 **20.3 DESCRIPTION OF HAZARDS OF SPECIFIC OE ENCOUNTERED**

2 UXO items encountered during the site characterization of this OE Risk Assessment Sector
3 include 60mm mortar rounds, M49. This round is fired in 60mm mortars M2 or M19 for use
4 against personnel and material. The complete mortar round consists of a projectile body, a point-
5 detonating fuze, a fin assembly, four increments of propellant charge, an ignition cartridge, and a
6 percussion primer. This round has both fragmentation and blast effect. These items were
7 determined to be high explosive (HE) rounds. Three 60mm mortar rounds, smoke, White
8 Phosphorous (WP), M302 were also found at various shallow depths in Grid 124. This smoke
9 round is also fired in 60mm mortars M2 or M19. The complete round consists of a projectile
10 with a point detonation (PD) fuze, a fin assembly, four propellant increments, an ignition
11 cartridge, and a percussion primer. This round is used for screening and spotting. The
12 functioning of this round consists of detonation of the burster charge, which ruptures the
13 projectile and disperses the white phosphorous filler. The white phosphorous ignites on contact
14 with air producing a smoke cloud.

15 **20.4 RISK ASSESSMENT**

16 Figure 20-1, located at the end of this chapter, presents the CSM for potential exposures to OE in
17 OE Risk Assessment Sector M3-2H-Mortar Area-D in Redevelopment Parcel M3. The primary
18 sources were a firing point, various range safety fans located throughout the sector, and
19 impact/target areas. OE may be present in the range safety fans and the impact/target areas as
20 the result of firing. At the firing point, ordnance may be present due to mishandling, poor
21 housekeeping, or loss. These releases likely result in OE being present on the ground surface or
22 in the subsurface soils of the sector. This CSM also indicates the principal mechanisms by
23 which ordnance items may migrate from one location to another in the sector or shift from one
24 depth in the soil to another. These potential transport and migration mechanisms include
25 mechanical redistribution, human activity, precipitation run-off, and (in limited, specific
26 locations) erosion and frost heave. The original deposition of the ordnance items and the
27 localized transport and migration processes result in a new distribution of OE items in the soil,
28 which may be locations of direct contact exposure by current or reasonably foreseeable future
29 receptors associated with reuse of the area. Receptors may include commercial workers, and
30 construction workers associated with the cultural redevelopment and land re-use. Terrestrial
31 wildlife may also be exposed to ordnance items present in the sector.

32 **20.5 COMPARATIVE ANALYSIS OF RESPONSE ACTION ALTERNATIVES**

33 **20.5.1 Effectiveness**

34 The OERIA risk assessment process addresses the combined criteria of overall protectiveness to
35 human health and the environment and long-term effectiveness and permanence. The results of
36 the risk assessment performed for the M3-2H-Mortar Area-D sector using this process are
37 presented in Figure 20-2, located at the end of this chapter. Based on these results, the most
38 effective alternatives for the protection of human health and the environment were judged to be
39 the removal alternatives. Alternative 6-Clearance to Depth was projected to provide the highest
40 level of protectiveness throughout the sector, while Alternative 5-Clearance to 1 Foot Depth and
41 Alternative 4-Surface Clearance received a lower ranking because they would not be expected to

1 remove OE from depths where it is indicated to be present and where future users of the area
2 may disturb. OE was found on the surface and up to one foot below the ground surface. OE
3 Scrap was found on the surface and up to 14 inches below the ground surface. Alternative 3-
4 Construction Support is considered to be protective, but only within the future construction
5 footprints within the sector where clearance of OE would be selectively performed. Alternative
6 2-Area-Specific Land Use Controls was considered to be less effective than any of the removal
7 alternatives. Alternative 1-No Further Action was considered to be the least effective. Since
8 development / redevelopment activities are planned for this sector, Alternative 6 would provide
9 the highest level of protectiveness, followed by Alternative 5.

10 20.5.1.1 With respect to the other effectiveness criteria, Alternative 1-No Further Action
11 clearly has the least short-term impact since No Further Action is being taken that might affect
12 on local workers or the public. Alternative 2-Area-Specific Land Use Controls also presents little
13 short-term effects since the only activity that might have impact on the workers or the public
14 involves installation of a limited number of warning signs. The removal alternatives
15 (Alternatives 3, 4, 5, and 6) have the greatest potential impact on the workers and public since
16 each involves the potential of more direct contact with OE. Overall, Alternative 1 will have the
17 least short-term impacts, followed by Alternative 2 and 3, and then Alternatives 4, 5, and 6.
18 Among the latter three alternatives, the short-term effects will increase from Alternatives 4 to 6,
19 since each has a potential for longer and more intense exposure to OE. With respect to the
20 compliance with ARARs criterion, each alternative will comply.

21 **20.5.2 Implementability**

22 20.5.2.1 Technical Feasibility

23 All six alternatives are technically feasible with Alternative 1 being the most technically feasible
24 since there is No Further Action required at the site (i.e., investigation or removal actions).
25 Alternative 2 is the second most technically feasible alternative. It requires that technical actions
26 be taken at the site (i.e., installation of signage at the site). The remaining alternatives are each
27 technically feasible but less so than Alternatives 1 and 2, because they each involve more intense
28 site activities and dependence on technology. In summary, Alternative 1 will be the most
29 technically feasible, Alternative 2 next, followed by Alternatives 3, 4, 5, and 6.

30 20.5.2.2 Administrative Feasibility

31 All six alternatives will require the preparation and DDESB-approval of an ESS document.
32 Alternatives 3 through 6 will each require the preparation and approval of a work plan since each
33 alternative involves onsite OE activities. Alternatives 2, 3, 4, and 5 will also require compliance
34 with the LUCAP for Fort McClellan, since each involves the implementation of land use
35 controls. In summary, considering these requirements, Alternative 1 will be the simplest to
36 administer, with Alternative 6 next, and Alternatives 2, 3, 4, and 5 being the most difficult of the
37 alternatives to administer due to the inclusion of land use controls and the requirements to
38 comply with the LUCAP.

39 20.5.2.3 Availability of Services and Materials

40 Services and materials will be required and are readily available for preparing the plans
41 mentioned above and to complete the fieldwork associated with Alternatives 3 through 6. Based

1 on the levels of services needed, Alternative 1 will require the least services and materials since
2 it only requires effort to prepare the ESS. More services and materials will be required for the
3 implementation of Alternative 2 since it requires the preparation of the ESS, installation of signs,
4 as well as coordination with the LUCAP. Even more services and materials will be required for
5 Alternative 3 since it requires a work plan to support construction support activities and the field
6 service activities to provide the actual construction support. Alternative 4 will be similar in scope
7 of required services and materials. Alternatives 5 and 6 will require the most in services and
8 materials. In summary, Alternative 1 will require the least in services and materials to
9 implement, with Alternative 2 next. Alternatives 3 and 4 will require a higher level of services
10 and materials than Alternatives 1 and 2, but less than Alternatives 5 and 6.

11 20.5.2.4 Regulatory and Community Acceptance

12 The level of regulatory and/or community acceptance for each alternative can be expected to
13 largely depend on the protection that each alternative offers. For this sector, OE has been
14 detected on the surface and within one foot below land surface in an area where the future land
15 use is projected to be Development. OE Scrap was found on the surface and at depths extending
16 below one foot. Alternative 1-No Further Action does nothing to provide any degree of
17 protection and therefore is unlikely to be accepted by the regulatory community or the public.
18 Alternative 2-Area-Specific Land Use Controls would probably not be received favorably since
19 it will provide only limited protection to members of the public involved in intrusive activities
20 (i.e., excavations). Alternative 3-Construction Support may be received favorably since it
21 provides protection to construction workers and to the public in that it also includes the land use
22 controls of Alternative 2. Alternative 4-Surface Clearance may be expected to receive a similar
23 level of acceptance as Alternative 3. It includes removal of potential OE from the surface (not
24 subsurface) across the entire sector, not just within construction footprints and is accompanied by
25 land use controls. However, the belief that significant numbers of subsurface OE may be present
26 may lead to reduced acceptance of this alternative. Alternative 5-Clearance to One Foot Depth
27 and Alternative 6-Clearance to Depth may receive the highest level of acceptance by both
28 regulators and the public since they both involve a subsurface removal of potential OE in an area
29 expected to experience subsurface excavations during development.

30 20.5.2.4.1 In summary, the alternatives that may be best received by the regulators and/or public
31 would be Alternative 5-Clearance to One Foot Depth and Alternative 6-Clearance to Depth,
32 followed in order by Alternative 4-Surface Clearance, Alternative 3-Construction Support,
33 Alternative 2-Area-Specific Land Use Controls, and lastly, Alternative 1-No Further Action.

34 **20.5.3 Cost**

35 The projected costs to implement the alternatives in this 42-acre sector are summarized below:

- 36 • Alternative 1 - No Further Action – \$5,000. An ESS (preparation, draft, and final) will be
37 prepared for a group of sectors. This is an approximation of one sector's portion of the total
38 cost.
- 39 • Alternative 2 - Area-Specific Land Use Controls – \$17,000. This cost includes planning and
40 installation of signage. No annual maintenance costs are included.

- 1 • Alternative 3 - Construction Support – \$184,667. This estimate includes management,
2 planning, and UXO support.
- 3 • Alternative 4 - Surface Clearance – \$401,924. This cost includes management and planning,
4 OE removal activities, and reporting.
- 5 • Alternative 5 - Clearance to One-Foot Depth – \$972,676. This cost includes management
6 and planning, OE removal activities, and reporting.
- 7 • Alternative 6 - Clearance to Depth – \$1,050,647. This cost includes management and
8 planning, OE removal activities, and reporting.

9 **20.6 RECOMMENDATION**

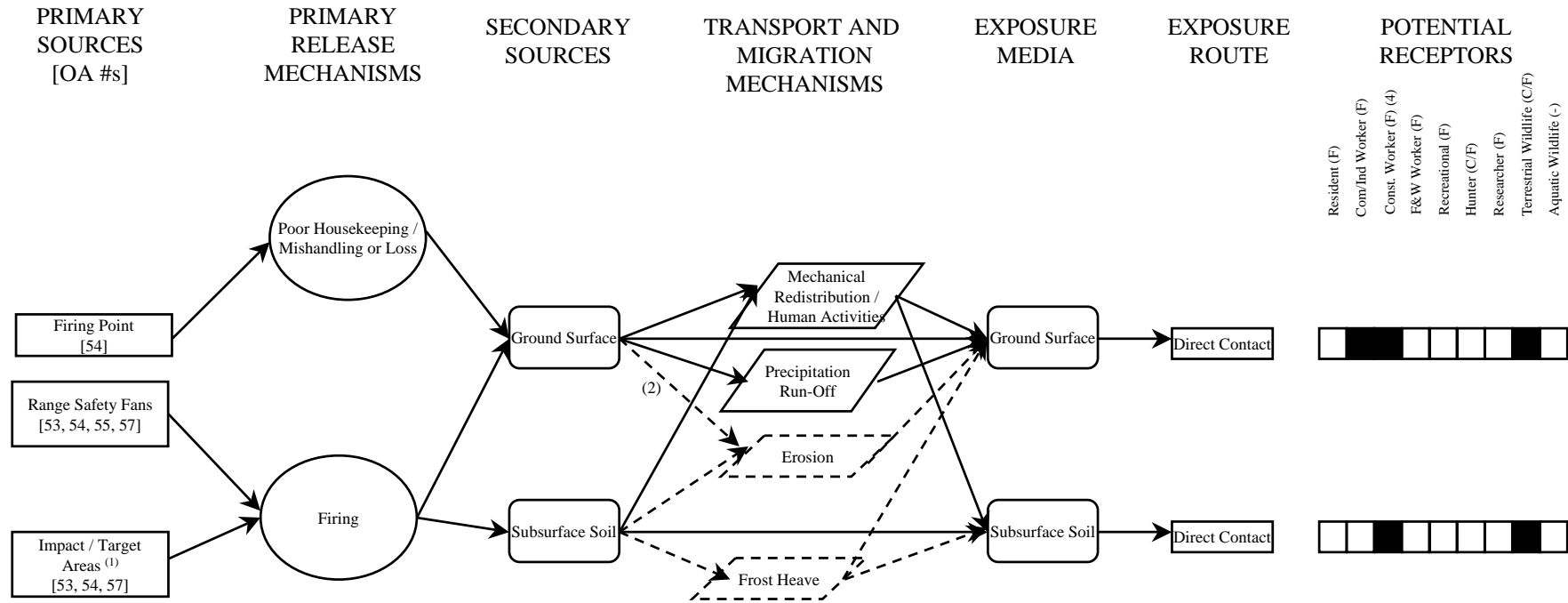
10 The recommended alternative for M3-2H-Mortar Area-D is Alternative 6-Clearance to Depth.
11 Components of this alternative will include land surveying and brush clearing operations to
12 prepare the site. Due to the requirement to detect items potentially deeper than one foot, this
13 alternative will be performed using sensitive instruments capable of detecting anomalies at
14 greater depths. Using a suitably sensitive detection system, the entire study area will be
15 surveyed to locate potential OE items. The anomalies will then be investigated to identify them
16 as UXO, OE Scrap, or Non-OE Scrap (metallic scrap). After identification, the items will be
17 disposed of as scrap or OE in accordance with the previously-approved OE operations work
18 plan.

19 20.6.1 Planning for this response action will require preparation of an ESS and a site-specific
20 removal action work plan. The estimated cost to implement this alternative is \$1,050,647.

21 **20.7 SUPPORTING RATIONALE**

22 The risk analysis and the comparative analysis indicated that Alternative 6-Clearance to Depth
23 should provide sufficient protection for this sector. This was based on the information that UXO
24 was found from the surface down to a depth of 12 inches. During the site characterization by
25 Foster Wheeler Environmental, nineteen UXO items were found at depths ranging from the
26 surface down to a maximum of twelve inches. All of the UXO items were 60mm. OE Scrap
27 was found either on the surface or to depths of fourteen inches. During their HTRW
28 investigation, IT Corporation identified eight UXO items on the surface in this sector. The
29 projected land use for this sector is Development. Development is associated with surface, near
30 surface, and deep soil disturbance. Due to the potentially dangerous nature of the OE items that
31 were found (i.e., 3.5-inch rockets and 60mm Mortars), the potential depth at which these items
32 may be present, the land use designation of Development, the Clearance to Depth response
33 action was determined to be the most appropriate response action.

**Figure 20-1
M3-2H-Mortar Area-D
CONCEPTUAL SITE MODEL**



NOTES:

- (1) For non-Small Arms munitions.
- (2) Dashed boxes or lines indicate a potential source area or linkage that requires further verification or is a linkage that is indicated to be present in only a small number of specific locations.
- (3) Plate numbers obtained from the Fort McClellan Archives Search Report
- (4) Within footprint of future development activity
- C = Current Receptor
- F = Potential Future Receptor
- = Not plausible for this sector

PLATE NOS. (3)	OA#	NAME (Other Names)	ORDNANCE AND EXPLOSIVES ASSOCIATED WITH AREA
5	-	Multiple Small Arms Ranges	Small Arms
5, 6, 10	53	60mm Mortar Range	60mm HE Mortars
5, 6, 10	55	Old Range 12 (Range 12; Rifle Field Firing)	Small Arms
5, 6, 10	57	1950 Rocket Launcher Range	2.36" Rockets
6, 10	54	Washington Tank Range (Tank Table 1-2-3)	Small Arms; 37mm Sub Caliber

Figure 20-2

OERIA TABLE FOR SECTOR M3-2H-MORTAR AREA-D

AREA: SECTOR: TOTAL SECTOR AREA: AREA GEOPHYSICALLY SURVEYED: AREA INTRUSIVELY INVESTIGATED:		BRAVO M3-2H-Mortar Area-D 42 acres 2.84 acres [3] 0.22 acres (equivalent) [4]																	
	ORDNANCE								SITE		HUMAN CURRENT USE			HUMAN FUTURE USE			OVERALL RANK		
	HE Items Found? [Yes]	OE Type [7]		OE Sensitivity [7]		OE Item Depth Distribution		OE Item Density	OE Site Access	OE Site Stability	Activity	OE Contact Probability Level	Exposed Population (Number or Freq. Of Use)	Activity	OE Contact Probability Level	Exposed Population (Number or Freq. Of Use)	Likelihood of Near Term Reuse	CURRENT LAND USE	FUTURE LAND USE
	HE Debris Found? [Yes]	(%)	(%)	Depth Range	% [9]	(Items/Acre) [8,9,12]													
Baseline Risk Assessment (Existing Conditions)		Cat. 3	64	Cat. 3	64	Surface	53.6 / (52.6)	5.88 / (3.78)	No Restriction to Site	Site Stable	Recreational [13,17]	Significant [18]	Occasional [19]	Development [16,33]	Significant [18]	Frequent	High		
		Cat. 2	36	Cat. 2	36	0 to 1' bgs	46.4 / (42.1)	59.1 / (36.4)											
		Cat. 1	0.0	Cat. 1	0.0	1' to Depth	- / (5.26)	- / (4.54)											
		Cat. 0	-	Cat. 0	-	Overall [11]	127 / (86.4)												
						90% CI on Overall OE Item Density [10]	94.4 - 174												
Alternative 1 - No Further Action		No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact		BASELINE	BASELINE
Alternative 2 - Land Use Controls		No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	B		No Impact	B			LOW	LOW	
Alternative 3 - Construction Support		No Impact	No Impact	A [21]	No Impact	No Impact	A [21]	A [21]			A [21]	A [21]		A [21]	A [21]		MODERATE [20]	MODERATE [20]	
Alternative 4 - Surface Clearance		No Impact	No Impact	B	No Impact	No Impact	B	A [23]			B	A [23]		B	A [23]		HIGH	MODERATE	
Alternative 5 - Clearance to 1 Foot Depth		A	A	A	No Impact	No Impact	A	A [22]			B	A [22]		B	A [22]		HIGH	MODERATE [24]	
Alternative 6 - Clearance to Depth		A [22]	A [22]	A [22]	No Impact	No Impact	A	A [22]			A	A [22]		A	A [22]		HIGH	HIGH	
NOTES																			
3 The Geophysically Surveyed Area includes the area associated with the transects within this specific sector.																			
4 Based on the fraction of identified target anomalies intrusively investigated in each geophysically surveyed grid and/or transect segment.																			
7 Percentages classify OE items found. If no OE items are found, Category 0 is 100% and Categories 1 - 3 are noted with a "***". If OE items are found, Category 0 is noted with a "-".																			
8 OE Density values shown are the straight average value = # of OE Items / Acres in which they were found.																			
9 Densities and depth range percentages shown in italics and curly brackets indicate characteristics of the OE debris.																			
10 The OE Density range shown represents a 90% confidence interval on the OE Item density calculated using UXO Calculator Version 1.4.2.																			
11 Overall OE item density is based on all OE items found in the area intrusively investigated.																			
12 The surface OE item density is based on the area geophysically surveyed and the 0-1' and 1'-Depth OE item densities are based on the area intrusively investigated.																			
13 Specific activities identified for the recreational current land use include hunting, hiking, and short cuts.																			
16 Development land use was assumed to be associated with routine interaction with the surface and near-surface soils by the employees of the new facilities. In addition, the construction of new facilities, structures, or underground utilities and the maintenance or replacement of existing structures or utilities was assumed to be reasonably associated with this land use.																			
17 Exposure to terrestrial wildlife is also assumed.																			
18 Based on the depth of intrusion associated with the identified activities - See Table 5 of USACE OERIA Interim Guidance (3/27/01).																			
19 The frequency of site usage is currently classified as rare and the number of site users is currently classified as low due to restrictions that have been placed on the site (i.e., no hunting or hiking) since the remediation activities began. The current frequency of usage would be classified as occasional if these recreational activities took place.																			
20 Indicated to be the most protective alternative within the construction footprint.																			
21 Risk factor score indicated applies only within the construction footprint.																			
22 No increased protectiveness relative to alternatives with a shallower clearance depth due to the depth distribution of OE items found.																			
23 Removal of surface OE items or debris may reduce the number of potential exposures to souvenir hunters.																			
24 Protectiveness based on intrusion depth. Given the observed depth distribution of OE items, the level of protectiveness associated with this alternative may be greater.																			
33 Future Development activities are projected to be associated with Cultural Use.																			
- = Not applicable as no energetic OE items were found.																			
IMPACT CODE																			
A = Signifies the greatest impact on reducing potential exposures to OE; Relatively less impact as the letter ranking goes to B, C, and subsequent letters.																			
HIGH - Most protective relative to projected land use.																			
LOW - Least protective relative to projected land use.																			
MODERATE - Protectiveness level between Low and High.																			
BASELINE - Protectiveness level associated with Alternative 1 - No Further Action.																			

1 **21.0 M3-2H-Mortar Area-PR**

2 **21.1 DESCRIPTION AND HISTORY**

3 This sector consists of approximately 104 acres located in the southwestern portion of the Bravo
4 Area. The sector has a projected land use of Passive Recreation. Several historic impact areas
5 are located in this OE Risk Assessment Sector. These include the 1950 Rocket Launcher Range
6 (OA-57), the 60mm Mortar Range (OA-53), and the Washington Tank Range (OA-54). The
7 1950 Rocket Launcher Range appears on a 1950 range map but was abandoned sometime before
8 1958. The 60mm Mortar Range was established during WWII and later abandoned between
9 1958 and 1967. The use of the Washington Tank Range may have associated with the reserve
10 unit located on Highway 21. The firing fan of one small arms range also extends into this area.
11 The range is Old Range 12 (OA-55), which was built during WWII as a landscape range and was
12 abandoned by 1967. By 1958, the range was referred to as Range 12, Rifle Field Firing.

13 **21.2 INVESTIGATION RESULTS**

14 During the site characterization of Bravo, 7 grids in this OE Risk Assessment Sector were
15 geophysically mapped and 1 of these grids was then intrusively investigated. Delineation
16 transects were a second investigation method used specifically to characterize suspected areas
17 with a high likelihood of containing OE in this OE Risk Assessment Sector. The following
18 delineation transects were placed in this OE Risk Assessment Sector: M32H002, M32H004,
19 M32H006, M32H008, M32H010, M32H012, M32H014, M32H0003, M32H005, and M32H007.
20 Data collection transects (clusters), consisting of a series of 200-foot long, parallel segments
21 spaced 25 to 50 feet apart, were also planned for this OE Risk Assessment Sector. The following
22 clusters were placed in this OE Risk Assessment Sector: M31M029, M31M030, M31M031,
23 M31M032, M31M033, M31M034, and M31M035. A total of 1.51 acres in grids and 2.98 acres
24 in transects were geophysically mapped. A total of 0.25 acres in grids and 0.32 acres in transects
25 were intrusively investigated.

26 21.2.1 Three UXO items were found on the surface and six at shallow depths. Eight OE
27 Scrap items, with additional indeterminate amounts of OE Scrap were found at shallow depths.
28 The Eastern Bypass Study Area borders the eastern boundary of this OE Risk Assessment
29 Sector. Table 21-1 contains a list of OE and OE Scrap items found within this OE Risk
30 Assessment Sector. Figure B-2 in Appendix B presents an overview figure of this OE Risk
31 Assessment Sector within the Bravo Area and Appendix F contains a list of all items from the
32 database found within this sector.
33

1

Table 21-1
List of OE and OE Scrap Items Found in M3-2H Mortar Area-PR

Item Description	Quantity	Depth (inches)	Target Type	Grid ID/Transect	Anomaly ID
UXO Items:					
MORTAR, 60mm, HE, M49	1	0	UXO	123	19
MORTAR, 60mm, HE, M49	1	0	UXO	123	31
MORTAR, 60mm HE, M49 w/FUZE	1	8	UXO	M31m033	3
MORTAR, 60mm, HE, M49	1	6	UXO	M31m034	4
MORTAR, 60mm, HE, M49	1	8	UXO	M31m034	7
MORTAR, 60mm, HE, M49	1	8	UXO	M31m034	24
MORTAR, 60mm, HE, M49 w/FUZE	1	8	UXO	M31m034	37
MORTAR, 60mm, HE, M49	1	8	UXO	M31m034	84
MORTAR, 60mm	1	0	UXO	M32h004	33
OE Scrap Items:					
SIGNAL, ILLUMINATION, GROUND, M127 SERIES, EXPENDED	1	2	OE Scrap	126	2
MORTAR, 60mm, PRACTICE, M69	1	4	OE Scrap	126	3
SIGNAL, ILLUMINATION, GROUND, M127 SERIES, EXPENDED	1	2	OE Scrap	126	4
SIGNAL, ILLUMINATION, GROUND, M127 SERIES, EXPENDED	1	2	OE Scrap	126	5
MORTAR FINS, 60mm	**	8	OE Scrap	126	6
MORTAR FRAGMENTATION, 60mm	**	1	OE Scrap	M31m030	2
FRAGMENTATION	**	2	OE Scrap	M31m031	7
MORTAR, 60mm, ILLUMINATION, M721, EXPENDED	1	0	OE Scrap	M31m031	18
MORTAR FRAGMENTATION, 60mm	**	0	OE Scrap	M31m033	1
MORTAR FINS, 60mm	**	5	OE Scrap	M31m033	4
MORTAR FINS, 60mm	**	5	OE Scrap	M31m033	5
MORTAR FINS, 60mm	**	3	OE Scrap	M31m033	6
MORTAR FINS, 60mm	**	3	OE Scrap	M31m033	7
MORTAR FINS, 60mm	**	3	OE Scrap	M31m033	8
MORTAR FRAGMENTATION, 60mm	**	3	OE Scrap	M31m033	8
MORTAR FINS, 60mm	**	3	OE Scrap	M31m033	9
MORTAR FINS, 60mm	**	8	OE Scrap	M31m033	10
MORTAR FINS, 60mm	**	3	OE Scrap	M31m033	12
MORTAR FINS, 60mm	**	4	OE Scrap	M31m034	12
MORTAR FUZE PARTS, 60mm	**	4	OE Scrap	M31m034	12
MORTAR FINS, 60mm	**	8	OE Scrap	M31m034	19
FRAGMENTATION	**	8	OE Scrap	M31m034	19
MORTAR FINS, 60mm	**	8	OE Scrap	M31m034	37
MORTAR FINS, 60mm	**	8	OE Scrap	M31m034	47
MORTAR FINS, 60mm	**	8	OE Scrap	M31m034	62
MORTAR FINS, 60mm	**	8	OE Scrap	M31m034	71
ROCKET, PRACTICE, 35mm, SUBCALIBER, M73, FUNCTIONED	1	0	OE Scrap	M32h004	80
GRENADE FRAGMENTATION, 40mm	1	0	OE Scrap	M32h004	81
60mm ILLUM	1	0	OE Scrap	M32h008	56
*tTEC did not independently verify the accuracy nor currency of information supplied by client or by any of clients contractors, vendors, or consultants.					
** Indeterminate amount.					

2

1 **21.3 DESCRIPTION OF HAZARDS OF SPECIFIC OE ENCOUNTERED**

2 UXO items encountered during the site characterization of this OE Risk Assessment Sector
3 include M49 60mm mortars rounds. This round is fired in 60mm mortars M2 or M19 for use
4 against personnel and material. The complete mortar round consists of a projectile body, a point-
5 detonating fuze, a fin assembly, four increments of propellant charge, an ignition cartridge, and a
6 percussion primer. This round has both fragmentation and blast effect. These items were
7 determined to be HE rounds.

8 **21.4 RISK ASSESSMENT**

9 Figure 21-1, located at the end of this chapter, presents the CSM for potential exposures to OE in
10 OE Risk Assessment Sector M3-2H-Mortar Area-PR in Redevelopment Parcel M3. The primary
11 sources were a firing point, various range safety fans located throughout the sector, and
12 impact/target areas. OE may be present in the range safety fans and the impact/target areas as
13 the result of firing. At the firing point, ordnance may be present due to mishandling, poor
14 housekeeping, or loss. These releases likely result in OE being present on the ground surface or
15 in the subsurface soils of the sector. This CSM also indicates the principal mechanisms by
16 which ordnance items may migrate from one location to another in the sector or shift from one
17 depth in the soil to another. These potential transport and migration mechanisms include
18 mechanical redistribution, human activity, precipitation run-off, and (in limited, specific
19 locations) erosion and frost heave. The original deposition of the ordnance items and the
20 localized transport and migration processes result in a new distribution of OE items in the soil,
21 which may be locations of direct contact exposure by current or reasonably foreseeable future
22 receptors associated with reuse of the area. Receptors may include Passive Recreational users of
23 the area. No significant construction activity is projected to be associated with this land use.
24 However, soil disturbance within a specified area may be considered on an infrequent and
25 spatially limited basis. As such, a construction worker would not be a routine receptor relative to
26 the entire sector. Terrestrial wildlife may also be exposed to ordnance present in the sector.

27 **21.5 COMPARATIVE ANALYSIS OF RESPONSE ACTION ALTERNATIVES**

28 **21.5.1 Effectiveness**

29 The OERIA risk assessment process addresses the combined criteria of overall protectiveness to
30 human health and the environment and long-term effectiveness and permanence. The results of
31 the risk assessment performed for the M3-2H-Mortar Area-PR sector using this process are
32 presented in Figure 21-2, located at the end of this chapter. Based on these results, the most
33 effective alternatives for the protection of human health and the environment were judged to be
34 the removal alternatives. Both Alternative 6-Clearance to Depth and Alternative 5-Clearance to 1
35 Foot Depth were projected to provide the highest level of protectiveness throughout the sector,
36 while Alternative 4-Surface Clearance was judged to provide a somewhat lower level of
37 protectiveness due to the indicated depth of OE in this area relative to the indicated future use for
38 passive recreation. Both OE and OE Scrap were found on the surface and to a depth of eight
39 inches below the ground surface. Alternative 4-Surface Clearance received the lower ranking
40 (compared to Alternatives 5 and 6) because it would not be expected to remove OE from depths
41 where it is indicated to be present and where future users of the area may disturb. Alternative 3-
42 Construction Support is considered to be protective, but only within any potential future

1 construction footprint within the sector where clearance of OE would be selectively performed.
2 Alternative 2-Area-Specific Land Use Controls was considered to be less effective than any of
3 the removal alternatives. Alternative 1-No Further Action was considered to be the least
4 effective. Since passive recreation activities are planned for this sector, Alternative 5-Clearance
5 to 1 Foot Depth was considered to provide a high level of protectiveness, with Alternative 6
6 providing only an incremental increase in protectiveness.

7 21.5.1.1 With respect to the other effectiveness criteria, Alternative 1-No Further Action
8 clearly has the least short-term impacts since No Further Action is being taken that might affect
9 on local workers or the public. Alternative 2-Area-Specific Land Use Controls also presents little
10 short-term effects since the only activity that might have impact on the workers or the public
11 involves installation of a limited number of warning signs. The removal alternatives
12 (Alternatives 3, 4, 5, and 6) have the greatest potential impact on the workers and public since
13 each involves the potential of more direct contact with OE. In summary, Alternative 1 will have
14 the least short-term impacts, followed by Alternative 2 and 3, and then Alternatives 4, 5, and 6.
15 Among the latter three alternatives, the short-term effects will increase from Alternatives 4 to 6,
16 since each has the potential for longer and more intense exposure to OE. With respect to the
17 compliance with ARARs criterion, each alternative will comply.

18 **21.5.2 Implementability**

19 21.5.2.1 Technical Feasibility

20 All six alternatives are technically feasible with Alternative 1 being the most technically feasible
21 since there is No Further Action required at the site (i.e., investigation or removal actions).
22 Alternative 2 is the second most technically feasible alternative. It requires that technical actions
23 be taken at the site (e.g., installation of signage at the site). The remaining alternatives are each
24 technically feasible but less so than Alternatives 1 and 2, because they each involve more intense
25 site activities and dependence on technology. In summary, Alternative 1 will be the most
26 technically feasible, Alternative 2 next, followed by Alternatives 3, 4, 5, and 6.

27 21.5.2.2 Administrative Feasibility

28 All six alternatives will require the preparation and DDESB-approval of an ESS document.
29 Alternatives 3 through 6 will each require the preparation and approval of a work plan since each
30 alternative involves onsite OE activities. Alternatives 2, 3, 4, and 5 will also require compliance
31 with the LUCAP for Fort McClellan, since each involves the implementation of land use
32 controls. In summary, considering these requirements, Alternative 1 will be the simplest to
33 administer, with Alternative 6 next, and Alternatives 2, 3, 4, and 5 being the most difficult of the
34 alternatives to administer due to the inclusion of land use controls and the requirements to
35 comply with the LUCAP.

36 21.5.2.3 Availability of Services and Materials

37 Services and materials will be required and are readily available for preparing the plans
38 mentioned above and to complete the fieldwork associated with Alternatives 3 through 6. Based
39 on the levels of services needed, Alternative 1 will require the least services and materials since

1 it only requires effort to prepare the ESS. More services and materials will be required for the
2 implementation of Alternative 2 since it requires the preparation of the ESS, installation of signs,
3 as well as coordination with the LUCAP. Even more services and materials will be required for
4 Alternative 3 since it requires a work plan to support construction support activities and the field
5 service activities to provide the actual construction support. Alternative 4 will be similar in scope
6 of required services and materials. Alternatives 5 and 6 will require the most in services and
7 materials. In summary, Alternative 1 will require the least in services and materials to
8 implement, with Alternative 2 next. Alternatives 3 and 4 will require a higher level of services
9 and materials than Alternatives 1 and 2, but less than Alternatives 5 and 6.

10 21.5.2.4 Regulatory and Community Acceptance

11 The level of regulatory and/or community acceptance for each alternative can be expected to
12 largely depend on the protection that each alternative offers. For this sector, OE has been
13 detected on the surface and within one foot below land surface, in an area where the future land
14 use is projected to be Passive Recreation. Alternative 1-No Further Action does nothing to
15 provide any degree of protection and therefore is unlikely to be accepted by the regulatory
16 community or the public. Alternative 2-Area-Specific Land Use Controls would probably be
17 received more favorably since it will provide some degree of protection. However, since it
18 leaves potentially hazardous OE in place, it may be received poorly by both regulators and the
19 public. Alternative 3-Construction Support may receive similar levels of acceptance as
20 Alternative 2. Alternative 3 provides protection to construction workers and removes OE within
21 the construction footprint. The projected future land use is Passive Recreation, with little
22 expected construction activities. Alternative 4-Surface Clearance may be expected to receive an
23 even higher level of acceptance than any of the previous alternatives since it includes actual
24 removal of potential OE from the surface and is accompanied by land use controls. On the other
25 hand, the belief that significant numbers of subsurface OE may be present may lead to a reduced
26 acceptance of this alternative. Alternative 5 (Clearance to One-Foot Depth) and Alternative 6-
27 Clearance to Depth may receive the highest level of acceptance by both regulators and the public
28 since they both involve a subsurface removal of potential OE.

29 21.5.2.4.1 In summary, the alternatives that may be best received by the regulators and/or public
30 would be Alternative 5-Clearance to One Foot Depth and Alternative 6-Clearance to Depth,
31 followed in order by Alternative 4-Surface Clearance, Alternative 2-Area-Specific Land Use
32 Controls, Alternative 3-Construction Support, and lastly, Alternative 1-No Further Action.

33 21.5.3 Cost

34 The projected costs to implement the alternatives in this 104-acre sector are summarized below:

- 35 • Alternative 1 - No Further Action – \$5,000. An ESS (preparation, draft, and final) will be
36 prepared for a group of sectors. This is an approximation of one sector's portion of the total
37 cost.
- 38 • Alternative 2 - Area-Specific Land Use Controls – \$17,000. This cost includes planning and
39 installation of signage. No annual maintenance costs are included.

- 1 • Alternative 3 - Construction Support – \$420,366. This estimate includes management,
2 planning, and UXO support.
- 3 • Alternative 4 - Surface Clearance – \$986,763. This cost includes management and planning,
4 OE removal activities, and reporting.
- 5 • Alternative 5 - Clearance to One-Foot Depth – \$2,365,189. This cost includes management
6 and planning, OE removal activities, and reporting.
- 7 • Alternative 6 - Clearance to Depth – \$2,526,794. This cost includes management and
8 planning, OE removal activities, and reporting.

9 **21.6 RECOMMENDATION**

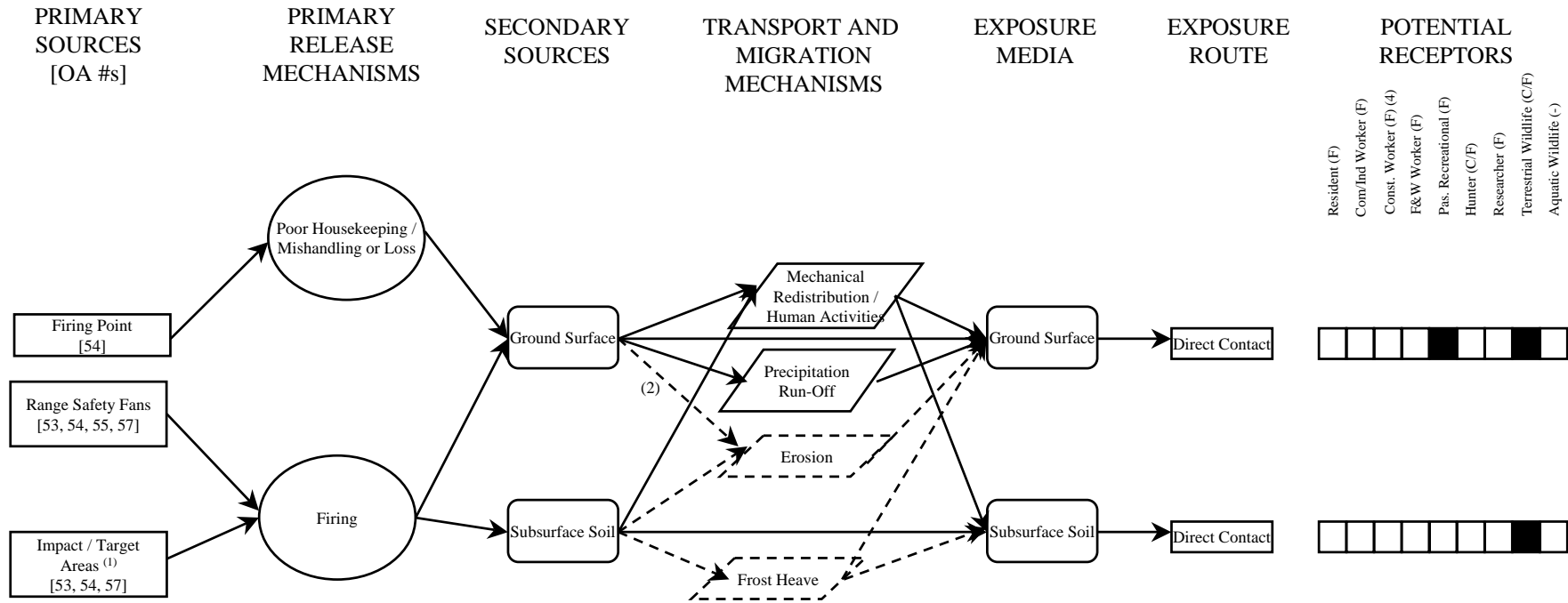
10 The recommended alternative for M3-2H-Mortar Area-PR is Alternative 5-Clearance to One
11 Foot. Components of this alternative will include land surveying and brush clearing operations to
12 prepare the site. Where technically feasible, suitably sensitive detection instruments will be used
13 to survey the study area and locate subsurface anomalies, which subsequently will be
14 investigated down to 12 inches. After identification, the item will be disposed of as scrap or OE
15 in accordance with a previously-approved OE operations work plan. A deed restriction that
16 prohibits digging in this sector without construction support by UXO-qualified personnel will
17 also be included.

18 21.6.1 Planning for this response action will require preparation of an ESS and a site-
19 specific work plan. The estimated cost to implement this alternative is \$2,365,189.

20 **21.7 SUPPORTING RATIONALE**

21 The risk analysis and the comparative analysis indicated that Alternative 5-Clearance to One
22 Foot should provide sufficient protection for this sector. A number of OE Scrap items and nine
23 UXO items were found in this OE risk assessment. All items were found eight inches or less
24 below the ground surface. Further, the projected land use for this sector is Passive Recreation,
25 associated with activities such as hiking, walking, and biking. No significant construction of
26 recreational facilities or underground utilities is associated with this land use. Consistent with
27 the Passive Recreation land use is the occasional incidental interaction with surface and very
28 near surface (0 – 6 inches) soils. The recommendation of clearance to one foot provides a safety
29 buffer beyond the expected depth (6 inches) of contact. Since all items found were near the
30 surface, other items are expected to be near the surface, and the projected land use is Passive
31 Recreation, recommendation for clearance to one foot was determined to be the most appropriate
32 removal action.

**Figure 21-1
M3-2H-Mortar Area-PR
CONCEPTUAL SITE MODEL**



NOTES:

- (1) For non-Small Arms munitions.
- (2) Dashed boxes or lines indicate a potential source area or linkage that requires further verification or is a linkage that is indicated to be present in only a small number of specific locations.
- (3) Plate numbers obtained from the Fort McClellan Archives Search Report
- (4) No significant construction activity is expected for this land use. Limited disturbance of the soil may be considered within a specific footprint for the installation of facilities associated with the land use.
- C = Current Receptor
- F = Potential Future Receptor
- = Not plausible for this sector

PLATE NOS. (3)	OA#	NAME (Other Names)	ORDNANCE AND EXPLOSIVES ASSOCIATED WITH AREA
5	-	Multiple Small Arms Ranges	Small Arms
5, 6, 10	53	60mm Mortar Range	60mm HE Mortars
5, 6, 10	55	Old Range 12 (Range 12; Rifle Field Firing)	Small Arms
5, 6, 10	57	1950 Rocket Launcher Range	2.36" Rockets
6, 10	54	Washington Tank Range (Tank Table 1-2-3)	Small Arms; 37mm Sub Caliber

Figure 21-2

OERIA TABLE FOR SECTOR M3-2H-MORTAR AREA-PR

OERIA TABLE FOR SECTOR M3-2H-MORTAR AREA-PR																			
AREA: SECTOR: TOTAL SECTOR AREA: AREA GEOPHYSICALLY SURVEYED: AREA INTRUSIVELY INVESTIGATED:		BRAVO M3-2H-Mortar Area-PR 104 acres 4.48 acres [3] 0.57 acres (equivalent) [4]																	
	ORDNANCE						SITE		HUMAN CURRENT USE			HUMAN FUTURE USE			OVERALL RANK				
	HE Items Found? [Yes]	OE Type [7]		OE Sensitivity [7]		OE Item Depth Distribution		OE Item Density	OE Site Access	OE Site Stability	Activity	OE Contact Probability Level	Exposed Population (Number or Freq. Of Use)	Activity	OE Contact Probability Level	Exposed Population (Number or Freq. Of Use)	Likelihood of Near Term Reuse	CURRENT LAND USE	FUTURE LAND USE
	HE Debris Found? [Yes]		(%)		(%)	Depth Range	% [9]	(Items/Acre) [8,9,12]											
Baseline Risk Assessment (Existing Conditions)		Cat. 3	100	Cat. 3	100	Surface	33.3 / (17.2)	0.67 / (1.12)	No Restriction to Site	Site Stable	Recreational [13,17]	Significant [18]	Occasional [19]	Passive Recreation [14]	Significant [18]	Occasional [19]	High		
		Cat. 2	0.0	Cat. 2	0.0	0 to 1' bgs	66.7 / (82.8)	10.5 / (42.1)											
		Cat. 1	0.0	Cat. 1	0.0	1' to Depth	- / (-)	- / (-)											
		Cat. 0	*	Cat. 0	*	Overall [11]	15.8 / (50.9)												
		90% CI on Overall OE Item Density [10]						9.53 - 27.5											
Alternative 1 - No Further Action		No Impact		No Impact		No Impact		No Impact	No Impact		No Impact	No Impact		No Impact	No Impact		BASELINE	BASELINE	
Alternative 2 - Land Use Controls		No Impact		No Impact		No Impact		No Impact	No Impact		No Impact	B		No Impact	B		LOW	LOW	
Alternative 3 - Construction Support		No Impact		No Impact		A [21]		No Impact	No Impact		A [21]	A [21]		A [21]	A [21]		MODERATE [20]	MODERATE [20]	
Alternative 4 - Surface Clearance		No Impact		No Impact		B		No Impact	No Impact		B	A [23]		B	A [23]		MODERATE	MODERATE	
Alternative 5 - Clearance to 1 Foot Depth		A		A		A		No Impact	No Impact		A	A [22]		A	A [22]		HIGH	HIGH	
Alternative 6 - Clearance to Depth		A [22]		A [22]		A [22]		No Impact	No Impact		A	A [22]		A	A [22]		HIGH	HIGH	
<p>NOTES</p> <p>3 The Geophysically Surveyed Area includes the area associated with the transects within this specific sector.</p> <p>4 Based on the fraction of identified target anomalies intrusively investigated in each geophysically surveyed grid and/or transect segment.</p> <p>7 Percentages classify OE items found. If no OE items are found, Category 0 is 100% and Categories 1 - 3 are noted with a "***". If OE items are found, Category 0 is noted with a "**".</p> <p>8 OE Density values shown are the straight average value = # of OE Items / Acres in which they were found.</p> <p>9 Densities and depth range percentages shown in italics and curly brackets indicate characteristics of the OE debris.</p> <p>10 The OE Density range shown represents a 90% confidence interval on the OE Item Density calculated using UXO Calculator Version 1.4.2.</p> <p>11 Overall OE item density is based on all OE items found in the area intrusively investigated.</p> <p>12 The surface OE item density is based on the area geophysically surveyed and the 0-1' and 1'-Depth OE item densities are based on the area intrusively investigated.</p> <p>13 Specific activities identified for the recreational current land use include hunting, hiking, and short cuts.</p> <p>14 Specific activities associated with the passive recreation future land use are hiking, walking, biking, picnicking, horseback riding, and other non-motorized activities.</p> <p>17 Exposure to terrestrial wildlife is also assumed.</p> <p>18 Based on the depth of intrusion associated with the identified activities - See Table 5 of USACE OERIA Interim Guidance (3/27/01).</p> <p>19 The frequency of site usage is currently classified as rare and the number of site users is currently classified as low due to restrictions that have been placed on the site (i.e., no hunting or hiking) since the remediation activities began. The current frequency of usage would be classified as occasional if these recreational activities took place.</p> <p>20 Indicated to be the most protective alternative within the construction footprint.</p> <p>21 Risk factor score indicated applies only within the construction footprint.</p> <p>22 No increased protectiveness relative to alternatives with a shallower clearance depth due to the depth distribution of OE items found.</p> <p>23 Removal of surface debris may reduce the number of potential exposures to souvenir hunters.</p> <p>- = Not applicable as no energetic OE items were found.</p> <p>IMPACT CODE</p> <p>A = Signifies the greatest impact on reducing potential exposures to OE; Relatively less impact as the letter ranking goes to B, C, and subsequent letters.</p> <p>HIGH - Most protective relative to projected land use.</p> <p>LOW - Least protective relative to projected land use.</p> <p>MODERATE - Protectiveness level between Low and High.</p> <p>BASELINE - Protectiveness level associated with Alternative 1 - No Further Action.</p>																			

1 **22.0 M3-2M-Hand Grenade Area-PR**

2 **22.1 DESCRIPTION AND HISTORY**

3 This sector consists of approximately 70 acres in the northern portion of the Bravo Area. This
4 sector is located within the Range 16 (OA-45) impact area and the Washington Rifle Range
5 (OA-44). The firing fans for three small arms ranges also extend into this area: Range 13 (OA-
6 49), Range 19 (OA-50), and Old Range 12 (OA-55). Range 13, the Washington Pistol
7 Qualification Range, was established during the Vietnam War and was active until base closure.
8 Range 19 was built during the Vietnam War as a 10m Machine Gun Range and was later used as
9 a Pistol Qualification Range. Old Range 12 was built during WWII as a landscape range and
10 was abandoned by 1967. By 1958, the range was referred to as Range 12, Rifle Field Firing.
11 The projected land use for this sector is Passive Recreation.

12 **22.2 INVESTIGATION RESULTS**

13 During the site characterization of Bravo, 6 grids in this OE Risk Assessment Sector were
14 geophysically mapped and data collection transects (clusters) were planned. Further mapping
15 and intrusive activities were planned in additional grids; but sampling activities were curtailed in
16 this OE Risk Assessment Sector and the adjacent OE Risk Assessment Sector due to the
17 presence of 40mm ordnance. Delineation transects were used specifically to characterize
18 suspected areas with a high likelihood of containing OE in this OE Risk Assessment Sector. The
19 following delineation transects were placed in this OE Risk Assessment Sector: M33H002,
20 M33H004, M33H006, part of M33H008, and M33H005. Work in many of the delineation
21 transects and surface clearance in some grids and cluster was completed prior to the discovery of
22 the 40mm items. Once it was determined that 40mm items were present throughout the area, the
23 area was closed and no further mapping or intrusive activities were performed. Approximately
24 40 OE items, including 3.5-inch rockets and 40mm grenades, were found during the surface
25 clearance activities in this OE Risk Assessment Sector and the adjacent M3-3H Rocket and Hand
26 Grenade Area-D. Therefore, this OE Risk Assessment Sector was characterized based on these
27 surface finds. Prior to ceasing intrusive activities in this OE Risk Assessment Sector, a total of
28 3.00 acres in grids and 2.57 acres in transects were geophysically mapped and three UXO items
29 were identified in Grid 151. Thirty-five OE Scrap items, with additional indeterminate amounts
30 of OE Scrap, were also identified on the surface within this OE Risk Assessment Sector
31 including 40mm ordnance. Table 3-1 contains a list of OE and OE Scrap items found within this
32 OE Risk Assessment Sector. Figure B-2 in Appendix B presents an overview figure of this OE
33 Risk Assessment Sector within the Bravo Area and Appendix F contains a list of all items from
34 the database found within this OE Risk Assessment Sector. Characterized grids are depicted
35 with pink shading on the figure.

36

1

Table 22-1
List of OE and OE Scrap Items Found in M3-2M Hand Grenade Area-PR

Item Description	Quantity	Depth (inches)	Target Type	Grid ID/Transect	Anomaly ID
UXO Items:					
PROJECTILE, 37mm HE, M54	1	0	UXO	151	75
ROCKET, HEAT, 2.36in, M6	1	0	UXO	151	76
ROCKET, HEAT, 2.36in, M6	1	0	UXO	151	77
OE Scrap Items:					
FUZES, POWDER TRAIN TIME, M1907, FUNCTIONED	2	0	OE Scrap	147	71
PROJECTILE, 37mm APC, M51	1	0	OE Scrap	150	72
MORTAR, 3in STOKES, MKI, PRACTICE	1	0	OE Scrap	151	73
SIGNAL, ILLUMINATION, GROUND, M127 SERIES, EXPENDED	1	0	OE Scrap	151	74
MORTARS, 3in STOKES, MK1, PRACTICE	3	0	OE Scrap	151	253
ROCKET, PRACTICE, 3.5in, M29A2	1	0	OE Scrap	515	267
GRENADE, RIOT CONTROL, M7	1	0	OE Scrap	M32m356	107
ROCKET, PRACTICE, 3.5in, M29A2	1	0	OE Scrap	M33h002	44
GRENADE, 40mm	1	0	OE Scrap	M33h002	45
ROCKET, PRACTICE, 3.5in, M29A2	1	0	OE Scrap	M33h004	46
MORTARS, 3in STOKES, MKI, PRACTICE	18	0	OE Scrap	M33h004	211
ROCKET, PRACTICE, 35mm, SUBCALIBER, M73, FUNCTIONED	1	0	OE Scrap	M33h004	218
SIGNALS, SMOKE, GROUND, M62 SERIES, EXPENDED	**	0	OE Scrap	M33h006	212
ROCKETS, PRACTICE, 3.5in, M29A2	**	0	OE Scrap	M33h006	213
ROCKET, PRACTICE, 3.5in, M29A2	1	0	OE Scrap	M33h006	214
MORTAR, 60mm	1	0	OE Scrap	M33h006	215
GRENADES, 40mm	**	0	OE Scrap	M33h006	216
SIGNALS, SMOKE, GROUND, M62 SERIES, EXPENDED	**	0	OE Scrap	M33h006	217
ROCKET, PRACTICE, 35mm, SUBCALIBER, M73, FUNCTIONED	1	0	OE Scrap	M33h006	219
*TtEC did not independently verify the accuracy nor currency of information supplied by client or by any of clients contractors, vendors, or consultants.					
** Indeterminate amount.					

2

3 22.3 DESCRIPTION OF HAZARDS OF SPECIFIC OE ENCOUNTERED

4 UXO items encountered during the site characterization of this OE Risk Assessment Sector
5 include 2.36in M6 rockets and 37mm M54 HE projectile. The 2.36in rocket consists of three
6 parts: the high-explosive head, the stabilizer tube, and the fin assembly. This rocket has a 0.5
7 pound 50/50 pentolite with a 10/90 pentolite booster. The rocket can penetrate three inches of
8 homogenous-steel armor plate at all ranges and at angles of impact as low as 90 degrees. The
9 propellant consists of five sticks of ballistite. The fuze generally consists of a steel firing pin that
10 slips into the central cavity of the fuze body. The fuze body contains the detonator of M18 of

1 lead azide and a booster charge of tetryl. It was determined that these items had a HEAT or
2 shape charge with the potential to produce explosive fragments.

3 22.3.1 The M54 HE Projectile was used primarily against aircraft and was fitted with a
4 supersensitive type of superquick fuze named M56 (SQ)PD. The projectile consists of a
5 relatively thin-walled shell body, a tetryl bursting charge, the M56 (SQ)PD fuze, and a shell-
6 destroying tracer. The nose is threaded to receive the fuze and the "boat-tailed" base is threaded
7 to receive a tracer assembly containing a relay housing, an igniter charge, and a rely igniting
8 charge. These charges connect the tracer with a black powder pellet in the base end of the
9 bursting charge cavity. The tracer burns for about 8 seconds, equivalent to 3,500 yards, when the
10 relay pellet is ignited and causes the bursting charge to detonate if prior functioning has not been
11 caused by impact. Should the tracer element fail to cause detonation, the maximum theoretical
12 range for the projectile is 9,050 yards. The M56 (SQ)PD fuze is constructed of aluminum and is
13 unpainted. It is stamped with fuze designation and loading information. The surface about the
14 body flange is coated with orange-tinted clear lacquer. The fuze require setback and centrifugal
15 force to complete arming.

16 **22.4 RISK ASSESSMENT**

17 Figure 22-1, located at the end of this chapter, presents the CSM for potential exposures to OE in
18 OE Risk Assessment Sector M3-2M-Hand Grenade Area-PR in Redevelopment Parcel M3. The
19 primary sources were a firing point, various range safety fans located throughout the sector, and
20 an impact/target area. At the firing point, ordnance may have been released due to mishandling,
21 poor housekeeping, or loss. OE may be present in the range safety fans and the impact/target
22 area as a result of firing. These releases likely result in OE being present on the ground surface
23 or in the subsurface soils of the sector. This CSM also indicates the principal mechanisms by
24 which ordnance items may migrate from one location to another in the sector or shift from one
25 depth in the soil to another. These potential transport and migration mechanisms include
26 mechanical redistribution and human activity, precipitation run-off, and (in limited, specific
27 locations) erosion and frost heave. The original deposition of the ordnance items and the
28 localized transport and migration processes result in a new distribution of OE items in the soil
29 that may be locations of direct contact exposure by current or reasonably foreseeable future
30 receptors associated with reuse of the area. Receptors may include Passive Recreational users of
31 the area. No significant construction activity is projected to be associated with this land use.
32 However, soil disturbance within a specified area may be considered on an infrequent and
33 spatially limited basis. As such, a construction worker would not be a routine receptor relative to
34 the entire sector. Terrestrial wildlife may also be exposed to ordnance present in the sector.

35 **22.5 COMPARATIVE ANALYSIS OF RESPONSE ACTION ALTERNATIVES**

36 **22.5.1 Effectiveness**

37 The OERIA risk assessment process addresses the combined criteria of overall protectiveness to
38 human health and the environment and long-term effectiveness and permanence. The results of
39 the risk assessment performed for the M3-2M-Hand Grenade Area-PR sector using this process
40 are presented in Figure 22-2, located at the end of this chapter. Based on these results, the most
41 effective alternatives for the protection of human health and the environment were judged to be
42 the removal alternatives. Both Alternative 6-Clearance to Depth and Alternative 5-Clearance to 1

1 Foot Depth were projected to provide the highest level of protectiveness throughout the sector,
2 while Alternative 4-Surface Clearance was judged to provide a somewhat lower level of
3 protectiveness due to the indicated depth of OE in this area relative to the indicated future use for
4 passive recreation. OE items and OE debris found in this sector were located on the surface, but
5 no intrusive investigations were conducted in this sector. Alternative 4-Surface Clearance
6 received the lower ranking (compared to Alternatives 5 and 6) because it may not remove OE
7 from depths where it may be present and where future users of the area may disturb. Alternative
8 3-Construction Support is considered to be protective, but only within any potential future
9 construction footprint within the sector where clearance of OE would be selectively performed.
10 Alternative 2-Area-Specific Land Use Controls was considered to be less effective than any of
11 the removal alternatives. Alternative 1-No Further Action was considered to be the least
12 effective. Since passive recreation activities are planned for this sector, Alternative 5-Clearance
13 to 1 Foot Depth was considered to provide a high level of protectiveness, with Alternative 6
14 providing only an incremental increase in protectiveness.

15 22.5.1.1 With respect to the other effectiveness criteria, Alternative 1-No Further Action
16 clearly has the least short-term impacts since No Further Action is being taken that might affect
17 on local workers or the public. Alternative 2-Area-Specific Land Use Controls also presents little
18 short-term effects since the only activity that might have impact the workers or the public
19 involves installation of a limited number of warning signs. The removal alternatives
20 (Alternatives 3, 4, 5, and 6) have the greatest potential impact on the workers and public since
21 each involves the potential of more direct contact with OE. In summary, Alternative 1 will have
22 the least short-term impacts, followed by Alternative 2 and 3, and then Alternatives 4, 5, and 6.
23 Among the latter three alternatives, the short-term effects will increase from Alternatives 4 to 6,
24 since each has the potential for longer and more intense exposure to OE. With respect to the
25 compliance with ARARs criterion, each alternative will comply.

26 **22.5.2 Implementability**

27 22.5.2.1 Technical Feasibility

28 All six alternatives are technically feasible with Alternative 1 being the most technically feasible
29 since there is No Further Action required at the site (i.e., investigation or removal actions).
30 Alternative 2 is the second most technically feasible alternative. It requires that technical actions
31 be taken at the site (e.g., installation of signage at the site). The remaining alternatives are each
32 technically feasible but less so than Alternatives 1 and 2, because they each involve more intense
33 site activities and dependence on technology. In summary, Alternative 1 will be the most
34 technically feasible, Alternative 2 next, followed by Alternatives 3, 4, 5, and 6.

35 22.5.2.2 Administrative Feasibility

36 All six alternatives will require the preparation and DDESB-approval of an ESS document.
37 Alternatives 3 through 6 will each require the preparation and approval of a work plan since each
38 alternative involves onsite OE activities. Alternatives 2, 3, 4, and 5 will also require compliance
39 with the LUCAP for Fort McClellan, since each involves the implementation of land use
40 controls. In summary, considering these requirements, Alternative 1 will be the simplest to
41 administer, with Alternative 6 next, and Alternatives 2, 3, 4, and 5 being the most difficult of the

1 alternatives to administer due to the inclusion of land use controls and the requirements to
2 comply with the LUCAP.

3 22.5.2.3 Availability of Services and Materials

4 Services and materials are required and are readily available for preparing the plans mentioned
5 above and to complete the fieldwork associated with Alternatives 3 through 6. Based on the
6 levels of services needed, Alternative 1 will require the least services and materials since it only
7 requires effort to prepare the ESS. More services and materials will be required for the
8 implementation of Alternative 2 since it requires the preparation of the ESS, installation of signs,
9 as well as coordination with the LUCAP. Even more services and materials will be required for
10 Alternative 3 since it requires a work plan to support construction support activities and the field
11 service activities to provide the actual construction support. Alternative 4 will be similar in scope
12 of required services and materials. Alternatives 5 and 6 will require the most in services and
13 materials. In summary, Alternative 1 will require the least in services and materials to
14 implement, with Alternative 2 next. Alternatives 3 and 4 will require a higher level of services
15 and materials than Alternatives 1 and 2, but less than Alternatives 5 and 6.

16 22.5.2.4 Regulatory and Community Acceptance

17 The level of regulatory and/or community acceptance for each alternative can be expected to
18 largely depend on the protection that each alternative offers. For this sector, OE has been
19 detected on the surface, in an area where the future land use is projected to be Passive
20 Recreation. But no intrusive investigations occurred in this sector due to the 40-mm ordnance
21 items found. Alternative 1-No Further Action does nothing to provide any degree of protection
22 and therefore, is unlikely to be accepted by the regulatory community or the public. Alternative
23 2-Area-Specific Land Use Controls would probably be received more favorably since it will
24 provide some degree of protection. However, since it leaves potentially hazardous OE in place,
25 this alternative may be received poorly by both regulators and the public. Alternative 3-
26 Construction Support may receive similar levels of acceptance as Alternative 2. Alternative 3
27 provides protection to construction workers and removes OE within the construction footprint.
28 The projected future land use is Passive Recreation, with little expected construction activities.
29 Alternative 4-Surface Clearance may be expected to receive an even higher level of acceptance
30 than any of the previous alternatives since it includes actual removal of potential OE from the
31 surface and is accompanied by land use controls. On the other hand, the belief that significant
32 numbers of subsurface OE may be present may lead to a reduced acceptance of this alternative.
33 Alternative 5-Clearance to One-Foot Depth and Alternative 6-Clearance to Depth may receive
34 the highest level of acceptance by both regulators and the public since they both involve a
35 subsurface removal of potential OE.

36 22.5.2.4.1 In summary, the alternatives that may be best received by the regulators and/or public
37 would be Alternative 5-Clearance to One Foot Depth and Alternative 6-Clearance to Depth,
38 followed in order by Alternative 4-Surface Clearance, Alternative 2-Area-Specific Land Use
39 Controls, Alternative 3-Construction Support, and lastly, Alternative 1-No Further Action.

1 **22.5.3 Cost**

2 The projected costs to implement the alternatives in this 70-acre sector are summarized below:

- 3 • Alternative 1 - No Further Action – \$5,000. An ESS (preparation, draft, and final) will be
4 prepared for a group of sectors. This is an approximation of one sector's portion of the total
5 cost.
- 6 • Alternative 2 - Area-Specific Land Use Controls – \$17,000. This cost includes planning and
7 installation of signage. No annual maintenance costs are included.
- 8 • Alternative 3 - Construction Support – \$291,112. This estimate includes management,
9 planning, and UXO support.
- 10 • Alternative 4 - Surface Clearance – \$455,206. This cost includes management and planning,
11 OE removal activities, and reporting.
- 12 • Alternative 5 - Clearance to One-Foot Depth – \$1,400,698. This cost includes management
13 and planning, OE removal activities, and reporting.
- 14 • Alternative 6 - Clearance to Depth – \$1,529,196. This cost includes management and
15 planning, OE removal activities, and reporting.

16 **22.6 RECOMMENDATION**

17 The recommended alternative for M3-2M Hand Grenade Area-PR is Alternative 5-Clearance to
18 One Foot. Components of this alternative will include land surveying and brush clearing
19 operations to prepare the site. Where technically feasible, suitably sensitive detection instruments
20 will be used to survey the study area and locate subsurface anomalies, which subsequently will
21 be investigated down to 12 inches. After identification, the item will be disposed of as scrap or
22 OE in accordance with a previously-approved OE operations work plan. A deed restriction that
23 prohibits digging in this sector without construction support by UXO-qualified personnel will
24 also be included.

25 22.6.1 Planning for this response action will require preparation of an ESS and a site-
26 specific work plan. The estimated cost to implement this alternative is \$1,400,698.

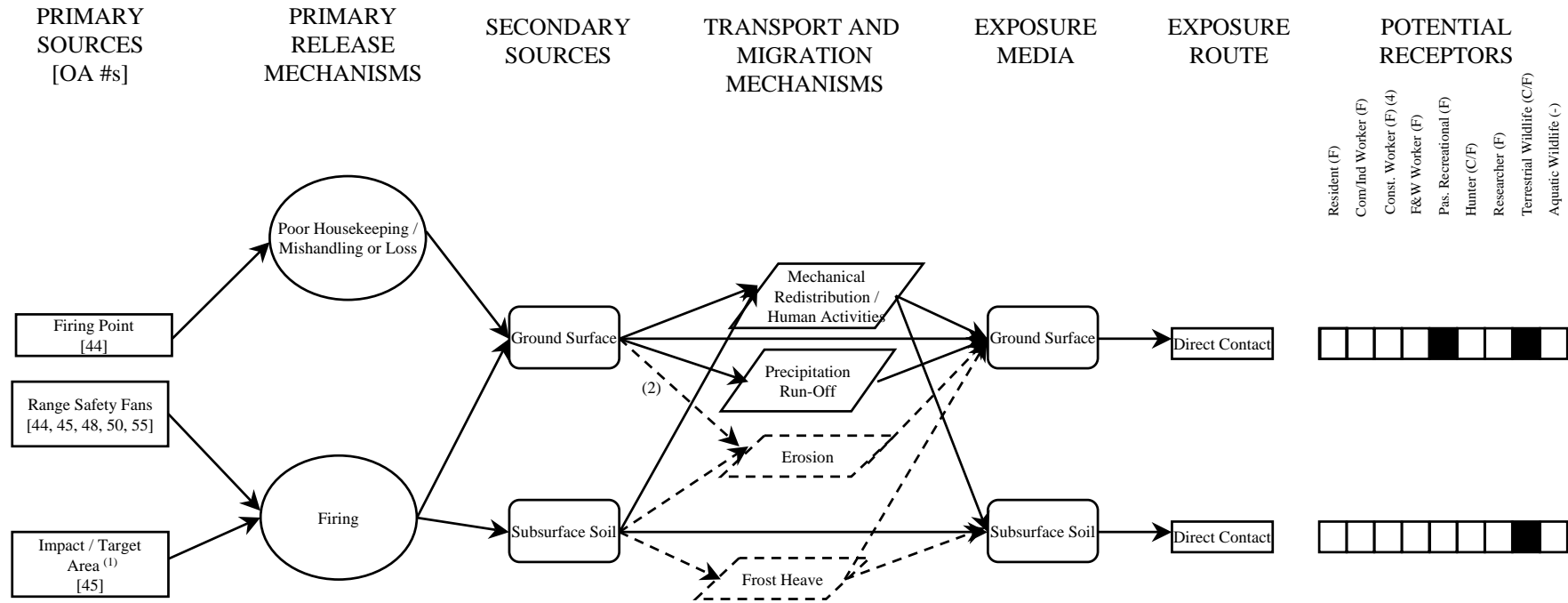
27 **22.7 SUPPORTING RATIONALE**

28 The risk analysis and the comparative analysis indicated that Alternative 5-Clearance to One
29 Foot should provide sufficient protection for this sector. All of the OE Scrap items and UXO
30 items were found during the surface clearance in this sector. The grids in this sector were not
31 intrusively investigated due to the presence of 40mm ordnance (safety restraints). The projected
32 land use for this sector is Passive Recreation, associated with activities such as hiking, walking,
33 and biking. No significant construction of recreational facilities or underground utilities is
34 associated with this land use. Consistent with the Passive Recreation land use is the occasional
35 incidental interaction with surface and very near surface (0–6 inches) soils. The
36 recommendation of clearance to one foot provides a safety buffer beyond the expected depth (6

1 inches) of contact. The documented historical use of this area (Range 16), combined with the
2 OE items found in this area (40mm), and this area being so close to the main cantonment area, all
3 support the recommended removal action. Clearance to one foot should be sufficiently
4 protective since items are expected to be near the surface and the projected land use is Passive
5 Recreation.

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**Figure 22-1
M3-2M-Hand Grenade Area-PR
CONCEPTUAL SITE MODEL**



NOTES:

- (1) For non-Small Arms munitions.
 - (2) Dashed boxes or lines indicate a potential source area or linkage that requires further verification or is a linkage that is indicated to be present in only a small number of specific locations.
 - (3) Plate numbers obtained from the Fort McClellan Archives Search Report
 - (4) No significant construction activity is expected for this land use. Limited disturbance of the soil may be considered within a specific footprint for the installation of facilities associated with the land use.
- C = Current Receptor
 F = Potential Future Receptor
 - = Not plausible for this sector

PLATE NOS. (3)	OA#	NAME (Other Names)	ORDNANCE AND EXPLOSIVES ASSOCIATED WITH AREA
5, 6, 7, 10	44	Washington Rifle Range (a.k.a. Range 18)	Small Arms
5, 6, 7, 10	45	Range 16 (originally, later Rocket Launcher / Bazooka Range and Range 17 (Rifle Grenade Range))	Rockets; Small Arms; 40mm Grenades
5, 6, 10	55	Old Range 12 (Range 12; Rifle Field Firing)	Small Arms
6, 7, 10	48	Range 12 (a.k.a. Range 14)	Small Arms; Light Anti-Tank Weapon; Anti-Tank; 60mm Projectiles; Rockets
6, 7, 10	50	Range 19	Small Arms

Figure 22-2

OERIA TABLE FOR SECTOR M3-2M-HAND GRENADE AREA-PR

AREA:		BRAVO																	
SECTOR:		M3-2M-Hand Grenade Area-PR																	
TOTAL SECTOR AREA:		70 acres																	
AREA GEOPHYSICALLY SURVEYED:		5.57 acres [3]																	
AREA INTRUSIVELY INVESTIGATED:		0 acres (equivalent) [4]																	
	ORDNANCE						SITE		HUMAN CURRENT USE			HUMAN FUTURE USE			OVERALL RANK				
	HE Items Found? [Yes]	OE Type [7]		OE Sensitivity [7]		OE Item Depth Distribution		OE Site Access	OE Site Stability	Activity	OE Contact Probability Level	Exposed Population (Number or Freq. Of Use)	Activity	OE Contact Probability Level	Exposed Population (Number or Freq. Of Use)	Likelihood of Near Term Reuse	CURRENT LAND USE	FUTURE LAND USE	
	HE Debris Found? [Yes]		(%)		(%)	Depth Range	% [9]	(Items/Acre) [8,9,12]											
Baseline Risk Assessment (Existing Conditions)		Cat. 3	60	Cat. 3	60	Surface	100 / (100)	0.90 / (7.90)	No Restriction to Site	Site Stable	Recreational [13,17]	Significant [18]	Occasional [19]	Passive Recreation [14]	Significant [18]	Occasional [19]	High		
		Cat. 2	20	Cat. 2	20	0 to 1' bgs	- / (-)	- / [35]											
		Cat. 1	20	Cat. 1	20	1' to Depth	- / (-)	- / [35]											
		Cat. 0	*	Cat. 0	*	Overall [11]	0.90 [27] / (7.90) [36]												
						90% CI on Overall OE Item Density [10]	[35]												
Alternative 1 - No Further Action		No Impact		No Impact		No Impact		No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	BASELINE	BASELINE	
Alternative 2 - Land Use Controls		No Impact		No Impact		No Impact		No Impact	No Impact	No Impact	B	No Impact	B	No Impact	B	LOW	LOW		
Alternative 3 - Construction Support		No Impact		No Impact		A [21]		No Impact	No Impact	A [21]	A [21]	A [21]	A [21]	A [21]	A [21]	MODERATE [20]	MODERATE [20]		
Alternative 4 - Surface Clearance		No Impact [22, 35]		No Impact [22, 35]		A		No Impact	No Impact	B	A [23]	B	A [23]	B	A [23]	MODERATE [24]	MODERATE [24]		
Alternative 5 - Clearance to 1 Foot Depth		No Impact [22, 35]		No Impact [22, 35]		A [22]		No Impact	No Impact	A	A [22]	A	A [22]	A	A [22]	HIGH	HIGH		
Alternative 6 - Clearance to Depth		A [22]		A [22]		A [22]		No Impact	No Impact	A	A [22]	A	A [22]	A	A [22]	HIGH	HIGH		
NOTES																			
3 The Geophysically Surveyed Area includes the area associated with the transects within this specific sector.																			
4 Based on the fraction of identified target anomalies intrusively investigated in each geophysically surveyed grid and/or transect segment.																			
7 Percentages classify OE items found. If no OE items are found, Category 0 is 100% and Categories 1 - 3 are noted with a ***. If OE items are found, Category 0 is noted with a ***.																			
8 OE Density values shown are the straight average value = # of OE Items / Acres in which they were found.																			
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13 Specific activities identified for the recreational current land use include hunting, hiking, and short cuts.																			
14 Specific activities associated with the passive recreation future land use are hiking, walking, biking, picnicking, horseback riding, and other non-motorized activities																			
17 Exposure to terrestrial wildlife is also assumed.																			
18 Based on the depth of intrusion associated with the identified activities - See Table 5 of USACE OERIA Interim Guidance (3/27/01).																			
19 The frequency of site usage is currently classified as rare and the number of site users is currently classified as low due to restrictions that have been placed on the site (i.e., no hunting or hiking) since the remediation activities began. The current frequency of usage would be classified as occasional if these recreational activities took place.																			
20 Indicated to be the most protective alternative within the construction footprint.																			
21 Risk factor score indicated applies only within the construction footprint.																			
22 No increased protectiveness relative to alternatives with a shallower clearance depth due to the depth distribution of OE items found.																			
23 Removal of surface OE items or debris may reduce the number of potential exposures to souvenir hunters.																			
24 Protectiveness based on intrusion depth; Given the observed depth distribution of OE Items, the level of protectiveness associated with this alternative may be greater.																			
27 OE Item Density reflects only surface density.																			
35 No subsurface investigation was performed.																			
36 OE Debris Density reflects only surface density.																			
- = Not applicable as no energetic OE items were found.																			
IMPACT CODE																			
A = Signifies the greatest impact on reducing potential exposures to OE; Relatively less impact as the letter ranking goes to B, C, and subsequent letters.																			
HIGH - Most protective relative to projected land use.																			
LOW - Least protective relative to projected land use.																			
MODERATE - Protectiveness level between Low and High.																			
BASELINE - Protectiveness level associated with Alternative 1 - No Further Action.																			

1 **23.0 M3-3H-Rocket/Hand Grenade Area-D**

2 **23.1 DESCRIPTION AND HISTORY**

3 This area consists of approximately 97 acres along the northern border of the Bravo Area. This
4 OE Risk Assessment Sector is located within the impact area of historic Range 16 (OA-45).
5 Range 16 was established during WWII as a grenade court but was also used during later years
6 as a Rocket Launcher Area and a Rifle Grenade Area. In 1967, it was consolidated into a 40mm
7 Grenade Launcher Area. The firing fans for three small arms ranges also extend into this area:
8 Range 13 (OA-49), Range 19 (OA-50), and Old Range 12 (OA-55). Range 13, the Washington
9 Pistol Qualification Range, was established during the Vietnam War and was active until base
10 closure. Range 19 was built during the Vietnam War as a 10m Machine Gun Range and was
11 later used as a Pistol Qualification Range. Old Range 12 was built during WWII as a landscape
12 range and was abandoned by 1967. By 1958, the range was referred to as Range 12, Rifle Field
13 Firing. The projected land use for this sector is Development.

14 **23.2 INVESTIGATION RESULTS**

15 During the site characterization of Bravo, 1 grid in this OE Risk Assessment Sector was
16 geophysically mapped and data collection transects (clusters) were planned. Further mapping
17 and intrusive activities were planned in additional grids. However, sampling activities were
18 curtailed in this OE Risk Assessment Sector and an adjacent sector due to the presence of 40mm
19 ordnance. Delineation transects were used specifically to characterize suspected areas with a
20 high likelihood of containing OE in this OE Risk Assessment Sector. The following delineation
21 transects were placed in this OE Risk Assessment Sector: M33H001, part of M33H002, most of
22 M33H003, part of M33H004, part of M33H006, and most of M33H008. Work in many of the
23 delineation transects and surface clearance in some grids and cluster was completed prior to the
24 discovery of the 40mm items. Once it was determined that 40mm items were present throughout
25 the area, the area was closed and no further mapping or intrusive activities were performed.
26 Approximately 40 OE items, including 3.5-inch rockets and 40mm grenades, were found during
27 the surface clearance activities in this OE Risk Assessment Sector and the adjacent M3-2M Hand
28 Grenade Area-PR. Therefore, this OE Risk Assessment Sector was characterized based on these
29 surface finds. Prior to ceasing intrusive activities in this area, a total of 0.50 acres in grids and
30 8.72 acres in transects were geophysically mapped; 2.26 acres in transects were intrusively
31 investigated; and 20 UXO items were identified in Grid 145 and in the clusters in the northern
32 portion of the OE Risk Assessment Sector. Two hundred and forty-six OE Scrap items, with
33 additional indeterminate amounts of OE Scrap, were found mostly at shallow depths during field
34 activities in this OE Risk Assessment Sector. Approximately five OE Scrap items were found at
35 a depth of 15 inches. Table 23-1 contains a list of OE and OE Scrap items found within this OE
36 Risk Assessment Sector. Figure B-2 in Appendix B presents an overview figure of this OE Risk
37 Assessment Sector within the Bravo Area and Appendix F contains a list of all items from the
38 database found within this OE Risk Assessment Sector. Characterized grids are depicted with
39 pink shading on the figure.

40

1

Table 23-1
List of OE and OE Scrap Items Found in M3-3H Rocket/Hand Grenade Area-D

Item Description	Quantity	Depth (inches)	Target Type	Grid ID/Transect	Anomaly ID
UXO Items:					
LAW ROCKET, 66mm, WH	1	0	UXO	145	69
ROCKET, 3.5in	1	0	UXO	145	70
GRENADE, HAND, PRACTICE, M69, w/LIVE FUZE	1	2	UXO	M32m312	8
ROCKET, HEAT, 66mm, M72	1	0	UXO	M32m332	221
ROCKET, HEAT, 66mm, M72	1	0	UXO	M32m333	135
ROCKET, HEAT, 66mm, M72	1	0	UXO	M32m335	139
ROCKET, HEAT, 66mm, M72	1	0	UXO	M32m336	143
ROCKET, HEAT, 66mm, M72	1	0	UXO	M32m337	147
ROCKET, HEAT, 66mm, M72	1	0	UXO	M32m338	151
GRENADE, 40mm, HE	1	0	UXO	M32m339	94
ROCKET, HEAT, 66mm, M72	1	0	UXO	M32m343	208
GRENADES, 40mm, HE	6	0	UXO	M32m345	98
ROCKET, HEAT, 66mm, M72	1	0	UXO	M32m346	99
GRENADE, 40mm, HE	1	0	UXO	M32m346	102
ROCKET, HEAT, 66mm, M72	1	0	UXO	M32m347	103
OE Scrap Items:					
GRENADE FRAGMENTATION, 40mm	1	0	OE Scrap	113	34
GRENADE FRAGMENTATION, 40mm	1	0	OE Scrap	115	35
GRENADE FRAGMENTATION, 40mm	1	0	OE Scrap	116	36
RIFLE GRENADE FRAGMENTATION, PRACTICE, M11	1	0	OE Scrap	116	37
GRENADE FRAGMENTATION, 40mm	1	0	OE Scrap	117	38
GRENADE FRAGMENTATION, 40mm	1	0	OE Scrap	118	39
GRENADE FRAGMENTATION, 40mm	1	0	OE Scrap	119	40
GRENADE FRAGMENTATION, 40mm	1	0	OE Scrap	119	41
M38 SUBMUNITION	1	0	OE Scrap	119	42
M38 SUBMUNITION PARTIAL	1	0	OE Scrap	119	285
GRENADE FRAGMENTATION, 40mm	**	0	OE Scrap	119	286
RIFLE GRENADE FRAGMENTATION, PRACTICE, M11	2	0	OE Scrap	121	43
SIGNAL, GROUND, SMOKE, M62 SERIES, EXPENDED	1	0	OE Scrap	142	12
ROCKETS, PRACTICE, 3.5in, M29A2	3	0	OE Scrap	145	68
ROCKET FRAGMENTATION, PRACTICE, 3.5in, M29A2	1	0	OE Scrap	168	78
ROCKETS, PRACTICE, 3.5in, M29A2	2	0	OE Scrap	169	108
ROCKET, PRACTICE, 3.5in, M29A2	1	0	OE Scrap	169	109
35mm SUB CAL	1	0	OE Scrap	169	110
VARIOUS ORDNANCE SCRAP	**	0	OE Scrap	M32m301	198
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	1	2	OE Scrap	M32m307	1
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	1	8	OE Scrap	M32m307	3

Table 23-1
List of OE and OE Scrap Items Found in M3-3H Rocket/Hand Grenade Area-D

Item Description	Quantity	Depth (inches)	Target Type	Grid ID/Transect	Anomaly ID
GRENADE FUZE, HAND	1	3	OE Scrap	M32m308	1
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	2	6	OE Scrap	M32m308	2
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	3	4	OE Scrap	M32m308	3
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	2	5	OE Scrap	M32m308	4
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	2	4	OE Scrap	M32m308	5
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	2	6	OE Scrap	M32m308	6
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	1	6	OE Scrap	M32m308	7
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	1	1	OE Scrap	M32m309	1
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	1	3	OE Scrap	M32m309	2
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	3	3	OE Scrap	M32m309	3
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	2	6	OE Scrap	M32m309	5
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	6	0	OE Scrap	M32m309	7
ROCKETS, 3.5in,	**	15	OE Scrap	M32m310	1
ROCKET WARHEADS, 3.5in, OJIVE	2	15	OE Scrap	M32m310	1
ROCKET MOTORS, 3.5in	3	15	OE Scrap	M32m310	1
GRENADE FUZES, thermite grenade pit	4	6	OE Scrap	M32m310	2
GRENADE END CAPS, thermite grenade pit	5	6	OE Scrap	M32m310	2
SLAG, thermite grenade pit	**	6	OE Scrap	M32m310	2
WARHEADS, 3.5in	1	6	OE Scrap	M32m310	4
LAW ROCKET SUBCAL	2	6	OE Scrap	M32m310	4
FRAGMENTATIONS	3	6	OE Scrap	M32m310	4
LAW LAUNCHER TUBE END CAPS	6	2	OE Scrap	M32m310	5
LAW LAUNCHER TUBE END CAPS	25	3	OE Scrap	M32m310	6
LAW LAUNCHER TUBE END CAPS	12	3	OE Scrap	M32m310	7
LAW LAUNCHER TUBE END CAPS	16	3	OE Scrap	M32m310	8
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	9	1	OE Scrap	M32m311	1
GRENADE FUZES	11	1	OE Scrap	M32m311	1
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	1	0	OE Scrap	M32m311	82
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	7	4	OE Scrap	M32m312	1
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	3	4	OE Scrap	M32m312	2
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	1	6	OE Scrap	M32m312	3
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	1	4	OE Scrap	M32m312	4

Table 23-1
List of OE and OE Scrap Items Found in M3-3H Rocket/Hand Grenade Area-D

Item Description	Quantity	Depth (inches)	Target Type	Grid ID/Transect	Anomaly ID
FUNCTIONED					
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	1	4	OE Scrap	M32m312	5
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	2	6	OE Scrap	M32m312	6
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	2	2	OE Scrap	M32m312	7
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	1	2	OE Scrap	M32m312	8
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	1	0	OE Scrap	M32m312	9
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	1	0	OE Scrap	M32m312	83
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	1	0	OE Scrap	M32m315	3
LAW LAUNCHER END CAP	1	0	OE Scrap	M32m315	4
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	1	0	OE Scrap	M32m318	1
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	1	0	OE Scrap	M32m319	2
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	1	0	OE Scrap	M32m319	3
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	1	0	OE Scrap	M32m319	4
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	2	0	OE Scrap	M32m319	5
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	1	0	OE Scrap	M32m319	6
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	1	1	OE Scrap	M32m320	2
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	1	1	OE Scrap	M32m321	1
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	13	0	OE Scrap	M32m321	84
GRENADE, 40mm	1	0	OE Scrap	M32m322	85
ROCKET, PRACTICE, 35mm, SUBCALIBER, M73, FUNCTIONED	1	0	OE Scrap	M32m322	86
ROCKET, PRACTICE, 35mm, SUBCALIBER, M73, FUNCTIONED	1	0	OE Scrap	M32m322	87
ROCKET, PRACTICE, 3.5in, M29A2	1	0	OE Scrap	M32m322	88
ROCKET, PRACTICE, 35mm, SUBCALIBER, M73, FUNCTIONED	1	0	OE Scrap	M32m322	200
ROCKET, PRACTICE, 35mm, SUBCALIBER, M73, FUNCTIONED	1	0	OE Scrap	M32m322	201
ROCKET, PRACTICE, 3.5in, M29A2	1	0	OE Scrap	M32m322	202
GRENADE FRAGMENTATION, 40mm	1	0	OE Scrap	M32m327	89
ROCKET FRAGMENTATION, PRACTICE, 3.5in, M29A2	1	0	OE Scrap	M32m327	121

Table 23-1
List of OE and OE Scrap Items Found in M3-3H Rocket/Hand Grenade Area-D

Item Description	Quantity	Depth (inches)	Target Type	Grid ID/ Transect	Anomaly ID
ROCKET, PRACTICE, 3.5in, M29A2	1	0	OE Scrap	M32m327	122
ROCKET, PRACTICE, 3.5in, M29A2	1	0	OE Scrap	M32m329	123
ROCKET, PRACTICE, 35mm, SUBCALIBER, M73, FUNCTIONED	1	0	OE Scrap	M32m329	124
LAW PARTS	**	0	OE Scrap	M32m329	125
GRENADE FRAGMENTATION, 40mm	1	0	OE Scrap	M32m329	126
FRAGMENTATION, LAW	1	0	OE Scrap	M32m330	127
ROCKET, PRACTICE, 35mm, SUBCALIBER, M73, FUNCTIONED	1	0	OE Scrap	M32m330	128
ROCKET, PRACTICE, 3.5in, M29A2	1	0	OE Scrap	M32m330	129
FRAGMENTATION, LAW	1	0	OE Scrap	M32m331	130
ROCKET, PRACTICE, 35mm, SUBCALIBER, M73, FUNCTIONED	1	0	OE Scrap	M32m331	131
ROCKET, PRACTICE, 3.5in, M29A2	1	0	OE Scrap	M32m331	132
GRENADE FRAGMENTATION, 40mm	1	0	OE Scrap	M32m331	133
GRENADE, 40mm, PRACTICE	1	0	OE Scrap	M32m332	199
ROCKET, PRACTICE, 35mm, SUBCALIBER, M73, FUNCTIONED	1	0	OE Scrap	M32m332	222
ROCKET, PRACTICE, 3.5in, M29A2	1	0	OE Scrap	M32m332	223
GRENADE, 40mm, PRACTICE	1	0	OE Scrap	M32m333	134
ROCKET, PRACTICE, 35mm, SUBCALIBER, M73, FUNCTIONED	1	0	OE Scrap	M32m333	136
ROCKET, PRACTICE, 3.5in, M29A2	1	0	OE Scrap	M32m333	137
ROCKET, PRACTICE, 3.5in, M29A2	1	0	OE Scrap	M32m334	138
ROCKET, PRACTICE, 35mm, SUBCALIBER, M73, FUNCTIONED	1	0	OE Scrap	M32m335	140
ROCKET FRAGMENTATION, PRACTICE, 3.5in, M29A2	1	0	OE Scrap	M32m335	141
GRENADE FRAGMENTATION, 40mm, PRACTICE	1	0	OE Scrap	M32m335	142
ROCKET, PRACTICE, 35mm, SUBCALIBER, M73, FUNCTIONED	1	0	OE Scrap	M32m336	144
ROCKET, PRACTICE, 3.5in, M29A2	1	0	OE Scrap	M32m336	145
GRENADE FRAGMENTATION, 40mm, PRACTICE	1	0	OE Scrap	M32m336	146
ROCKET, PRACTICE, 35mm, SUBCALIBER, M73, FUNCTIONED	1	0	OE Scrap	M32m337	148
ROCKET, PRACTICE, 3.5in, M29A2	1	0	OE Scrap	M32m337	149
GRENADE FRAGMENTATION, 40mm, PRACTICE	1	0	OE Scrap	M32m337	150
ROCKET, PRACTICE, 35mm, SUBCALIBER, M73, FUNCTIONED	1	0	OE Scrap	M32m338	152
ROCKET, PRACTICE, 3.5in, M29A2	1	0	OE Scrap	M32m338	153
GRENADE FRAGMENTATION, 40mm	1	0	OE Scrap	M32m338	154
ROCKET, PRACTICE, 3.5in, M29A2	1	0	OE Scrap	M32m339	91
ROCKET, PRACTICE, 35mm, SUBCALIBER, M73, FUNCTIONED	1	0	OE Scrap	M32m339	92
ROCKET PARTS, HEAT, 66mm, M72	**	0	OE Scrap	M32m339	93

Table 23-1
List of OE and OE Scrap Items Found in M3-3H Rocket/Hand Grenade Area-D

Item Description	Quantity	Depth (inches)	Target Type	Grid ID/Transect	Anomaly ID
ROCKET, PRACTICE, 3.5in, M29A2	1	0	OE Scrap	M32m340	95
ROCKET, PRACTICE, 35mm, SUBCALIBER, M73, FUNCTIONED	1	0	OE Scrap	M32m340	96
LAW PARTS	**	0	OE Scrap	M32m340	97
GRENADE PARTS, 40mm	**	0	OE Scrap	M32m340	203
ROCKET, PRACTICE, 3.5in, M29A2	1	0	OE Scrap	M32m341	204
ROCKET, PRACTICE, 3.5in, M29A2	1	0	OE Scrap	M32m342	205
ROCKET, PRACTICE, 3.5in, M29A2	1	0	OE Scrap	M32m343	206
ROCKET, PRACTICE, 35mm, SUBCALIBER, M73, FUNCTIONED	1	0	OE Scrap	M32m343	207
GRENADE PARTS, 40mm	**	0	OE Scrap	M32m343	209
ROCKET, PRACTICE, 35mm, SUBCALIBER, M73, FUNCTIONED	1	0	OE Scrap	M32m346	100
ROCKET FRAGMENTATION, PRACTICE, 3.5in, M29A2	1	0	OE Scrap	M32m346	101
ROCKET, PRACTICE, 35mm, SUBCALIBER, M73, FUNCTIONED	1	0	OE Scrap	M32m347	104
ROCKET, PRACTICE, 3.5in, M29A2	1	0	OE Scrap	M32m347	105
GRENADE, 40mm, PRACTICE	1	0	OE Scrap	M32m347	106
ROCKET, PRACTICE, 3.5in, M29A2	1	0	OE Scrap	M33h001	210
*TtEC did not independently verify the accuracy nor currency of information supplied by client or by any of clients contractors, vendors, or consultants.					
** Indeterminate amount.					

1

2 23.3 DESCRIPTION OF HAZARDS OF SPECIFIC OE ENCOUNTERED

3 UXO items encountered during the site characterization of this OE Risk Assessment Sector
4 include 66mm, M72 Rockets, HEAT; 40mm grenades; 3.5 inch rockets; and practice hand
5 grenades, M69. The 66mm, M72 Rockets, HEAT were found on the surface in the data
6 collection transects. The primary use of the 66mm, M72 Rocket was to penetrate armored
7 targets. The compact, portable weapon was issued as a single shot, shoulder-fired launcher with
8 a HEAT rocket and sling assembly. The fin stabilized rocket contained a shaped charge warhead
9 with a point initiating base detonating (PIBD) fuze with composition A5 (tetryl) as the booster
10 explosive. The Explosive charge is type 60/40 octol at a weight of 0.67 ponds. At target impact,
11 the fuze train detonates a charge, extremely hot, high velocity gases melt a hole in the target, the
12 body and ogive blast into small fragments by the detonated octol charge.

13 23.3.1 There are many different models of the 40mm grenade, but in general the 40mm round
14 is a high explosive, impact-type round. It is a fixed round of ammunition with a steel projectile
15 body containing a high explosive charge of Comp A5 (approximately 38 grams). Some versions
16 of this munition have an always acting/graze sensitive fuze, which means no matter which angle
17 it impacts the target or surface, the fuze will function. The reason this is a major concern is if the
18 munition is jarred or dropped during excavation or assessment it can inadvertently detonate. A
19 cartridge case assembly is crimped to the projectile, which contains a propelling charge and is

1 sealed at the rear. A percussion primer is fixed into the center of the base of the cartridge casing.
2 The fuze arms after the projectile has traveled a distance of 18 to 40 meters and has received the
3 required centrifugal forces to rotate the detonator in line with the firing pin. Upon impact, a six-
4 sided weighted cam is driven into the firing pin, which is then driven into the detonator and the
5 main charge is initiated. Detonation of the main charge provides fragmentation of the projectile
6 body and has a casualty radius of up to 35 meters. The munition is 40 mm in diameter and is
7 between 3.894 inches to 4.415 inches in length, in the unfired condition. The ogive is anodized
8 aluminum with a gold color for the highly sensitive HE versions and blue for practice version.
9 Under prolonged exposure to sunlight and the environment however, the gold and blue bleach to
10 a silver color. This makes it difficult to distinguish between live and practice versions of this
11 munition.

12 23.3.2 The 3.5in rocket consists of a warhead (HEAT, smoke, or practice), a base-detonating
13 fuze, and an electrically initiated rocket motor. All three use the same motor. The M28A2
14 HEAT, M29A1 and M29A2 Practice, M30(WP) each weigh 9 pounds and are 23.6” long. The
15 warhead is 3.5” in diameter. The warhead of the HEAT and WP models are constructed of steel.
16 The practice warhead is made of cast iron. The HEAT model is painted olive drab with yellow
17 markings, the practice model is blue with white markings, and the WP is grey with yellow
18 markings. Before loading into a launcher, the safety band is removed allowing the ejection pin
19 to move outward 3/8”. Upon firing, setback frees the ejection pin to be discarded upon leaving
20 the launcher completing the arming sequence. Impact inertia completes the firing sequence and
21 fires the fuze detonator. The practice warhead has a dummy fuze that contains an ejection pin
22 mimicking the action of a live fuze.

23 23.3.3 The M69 is a standard-delay practice version of the M33 and M67 grenades. It uses the
24 M228 fuze which uses a primer, delay, and black powder igniter, each weighing less than 1
25 gram. The grenade is constructed of steel. It is painted blue with a brown band around the body
26 or neck. Markings, if any, are stenciled in white. The fuze nomenclature, lot number, and month
27 and year of loading are stenciled in black on the safety lever of the fuze. The grenade body is
28 spherical, empty, and has a hole in the bottom to vent the gases generated by the detonation of
29 the fuze and black powder charges. The grenade may be reloaded with a new fuze and safety
30 clip. The grenade is functioned by removing the safety pin and the safety clip freeing the safety
31 lever. When thrown, the lever is released allowing the spring loaded striker to strike the primer
32 igniting the 4 to 5 second delay. The igniter gives off a loud report, like that of a firecracker, and
33 a puff of white smoke.

34 **23.4 RISK ASSESSMENT**

35 Figure 23-1, located at the end of this chapter, presents the CSM for potential exposures to OE in
36 OE Risk Assessment Sector M3-3H-Rocket and Hand Grenade Area-D in Redevelopment Parcel
37 M3. The primary sources included various range safety fans located throughout the sector and
38 an impact/target area. OE may be present in the range safety fans and the impact/target area as a
39 result of firing. These releases likely result in OE being present on the ground surface or in the
40 subsurface soils of the sector. This CSM also indicates the principal mechanisms by which
41 ordnance items may migrate from one location to another in the sector or shift from one depth in
42 the soil to another. These potential transport and migration mechanisms include mechanical
43 redistribution and human activity, precipitation run-off, and (in limited, specific locations)
44 erosion and frost heave. The original deposition of the ordnance items and the localized

1 transport and migration processes result in a new distribution of OE items in the soil, which may
2 be locations of direct contact exposure by current or reasonably foreseeable future receptors
3 associated with reuse of the area. Receptors may include commercial or industrial workers, and
4 construction workers associated with the redevelopment and land re-use. Terrestrial wildlife
5 may also be exposed to ordnance items present in the sector.

6 **23.5 COMPARATIVE ANALYSIS OF RESPONSE ACTION ALTERNATIVES**

7 **23.5.1 Effectiveness**

8 The OERIA risk assessment process addresses the combined criteria of overall protectiveness to
9 human health and the environment and long-term effectiveness and permanence. The results of
10 the risk assessment performed for the M3-3H-Rocket/Hand Grenade Area-D sector using this
11 process are presented in Figure 23-2, located at the end of this chapter. Based on these results,
12 the most effective alternatives for the protection of human health and the environment were
13 judged to be the removal alternatives. Alternative 6-Clearance to Depth was projected to provide
14 the highest level of protectiveness throughout the sector, while Alternative 5-Clearance to 1 Foot
15 Depth and Alternative 4-Surface Clearance received a lower ranking because they would not be
16 expected to remove OE from depths where it is indicated to be present and where future users of
17 the area may disturb. The majority of the OE found in this sector was located on the surface, and
18 the rest was found at two inches below the ground surface. OE Scrap was found up to fifteen
19 inches below the ground surface. Limited intrusive investigations were performed in this sector.
20 Alternative 3-Construction Support is considered to be protective, but only within the future
21 construction footprints within the sector where clearance of OE would be selectively performed.
22 Alternative 2-Area-Specific Land Use Controls was considered to be less effective than any of
23 the removal alternatives. Alternative 1-No Further Action was considered to be the least
24 effective. Since development / redevelopment activities are planned for this sector, Alternative 6
25 would provide the highest level of protectiveness, followed by Alternative 5.

26 23.5.1.1 With respect to the other effectiveness criteria, Alternative 1-No Further Action
27 clearly has the least short-term impacts since No Further Action is being taken that might impact
28 local workers or the public. Alternative 2-Area-Specific Land Use Controls also presents little
29 short-term effects since the only activity that might have an impact on the workers or the public
30 involves installation of a limited number of warning signs. The removal alternatives
31 (Alternatives 3, 4, 5, and 6) have the greatest potential impact on the workers and public since
32 each involves the potential of more direct contact with OE. Overall, Alternative 1 will have the
33 least short-term impacts, followed by Alternative 2 and 3, and then Alternatives 4, 5, and 6.
34 Among the latter three alternatives, the short-term effects will increase from Alternatives 4 to 6,
35 since each has a potential for longer and more intense exposure to OE. With respect to the
36 compliance with ARARs criterion, each alternative will comply.

37 **23.5.2 Implementability**

38 23.5.2.1 Technical Feasibility

39 All six alternatives are technically feasible with Alternative 1 being the most technically feasible
40 since there is No Further Action required at the site (i.e., investigation or removal actions).

1 Alternative 2 is the second most technically feasible alternative. It requires that technical actions
2 be taken at the site (i.e., installation of signage at the site). The remaining alternatives are each
3 technically feasible but less so than Alternatives 1 and 2, because they each involve more intense
4 site activities and dependence on technology. In summary, Alternative 1 will be the most
5 technically feasible, Alternative 2 next, followed by Alternatives 3, 4, 5, and 6.

6 23.5.2.2 Administrative Feasibility

7 All six alternatives will require the preparation and DDESB-approval of an ESS document.
8 Alternatives 3 through 6 will each require the preparation and approval of a work plan since each
9 alternative involves onsite OE activities. Alternatives 2, 3, 4, and 5 will also require compliance
10 with the LUCAP for Fort McClellan, since each involves the implementation of land use
11 controls. In summary, considering these requirements, Alternative 1 will be the simplest to
12 administer, with Alternative 6 next, and Alternatives 2, 3, 4, and 5 being the most difficult of the
13 alternatives to administer due to the inclusion of land use controls and the requirements to
14 comply with the LUCAP.

15 23.5.2.3 Availability of Services and Materials

16 Services and materials will be required and are readily available for preparing the plans
17 mentioned above and to complete the fieldwork associated with Alternatives 3 through 6. Based
18 on the levels of services needed, Alternative 1 will require the least services and materials since
19 it only requires effort to prepare the ESS. More services and materials will be required for the
20 implementation of Alternative 2 since it requires the preparation of the ESS, installation of signs,
21 as well as coordination with the LUCAP. Even more services and materials will be required for
22 Alternative 3 since it requires a work plan to support construction support activities and the field
23 service activities to provide the actual construction support. Alternative 4 will be similar in scope
24 of required services and materials. Alternatives 5 and 6 will require the most in services and
25 materials. In summary, Alternative 1 will require the least in services and materials to
26 implement, with Alternative 2 next. Alternatives 3 and 4 will require a higher level of services
27 and materials than Alternatives 1 and 2, but less than Alternatives 5 and 6.

28 23.5.2.4 Regulatory and Community Acceptance

29 The level of regulatory and/or community acceptance for each alternative can be expected to
30 largely depend on the protection that each alternative offers. For this sector, OE has been
31 detected on the surface and within one foot below land surface and OE Scrap was found at
32 depths extending below one foot (i.e., 2 inches). The future land use is projected to be
33 Development. However, limited intrusive investigations occurred in this sector due to 40-mm
34 ordnance being found. Alternative 1-No Further Action does nothing to provide any degree of
35 protection and therefore is unlikely to be accepted by the regulatory community or the public.
36 Alternative 2-Area-Specific Land Use Controls would probably not be received favorably since
37 it will provide only limited protection to members of the public involved in intrusive activities
38 (i.e., excavations, etc.). Alternative 3-Construction Support may be received favorably since it
39 provides protection to construction workers and to the public in that it also includes the land use
40 controls of Alternative 2. Alternative 4-Surface Clearance may be expected to receive a similar
41 level of acceptance as Alternative 3. It includes removal of potential OE from the surface (not
42 subsurface) across the entire sector, not just within construction footprints and is accompanied by

1 land use controls. However, the belief that significant numbers of subsurface OE may be present
2 may lead to reduced acceptance of this alternative. Alternative 5-Clearance to One Foot Depth
3 and Alternative 6-Clearance to Depth may receive the highest level of acceptance by both
4 regulators and the public since they both involve a subsurface removal of potential OE in an area
5 expected to experience significant subsurface excavations during development.

6 23.5.2.4.1 In summary, the alternatives that may be best received by the regulators and/or public
7 would be Alternative 5-Clearance to One Foot Depth and Alternative 6-Clearance to Depth,
8 followed in order by Alternative 4-Surface Clearance, Alternative 3-Construction Support,
9 Alternative 2-Area-Specific Land Use Controls, and lastly, Alternative 1-No Further Action.

10 **23.5.3 Cost**

11 The projected costs to implement the alternatives in this 97-acre sector are summarized below:

- 12 • Alternative 1 - No Further Action – \$5,000. An ESS (preparation, draft, and final) will be
13 prepared for a group of sectors. This is an approximation of one sector's portion of the total
14 cost.
- 15 • Alternative 2 - Area-Specific Land Use Controls – \$17,000. This cost includes planning and
16 installation of signage. No annual maintenance costs are included.
- 17 • Alternative 3 - Construction Support – \$393,755. This estimate includes management,
18 planning, and UXO support.
- 19 • Alternative 4 - Surface Clearance – \$902,443. This cost includes management and planning,
20 OE removal activities, and reporting.
- 21 • Alternative 5 - Clearance to One-Foot Depth – \$2,348,054. This cost includes management
22 and planning, OE removal activities, and reporting.
- 23 • Alternative 6 - Clearance to Depth – \$2,521,316. This cost includes management and
24 planning, OE removal activities, and reporting.

25 **23.6 RECOMMENDATION**

26 The recommended alternative for M3-3H-Rocket and Hand Grenade Area-D is Alternative 6-
27 Clearance to Depth. Components of this alternative will include land surveying and brush
28 clearing operations to prepare the site. Due to the requirement to detect items potentially deeper
29 than one foot, this alternative will be performed using sensitive instruments capable of detecting
30 anomalies at greater depths. Using a suitably sensitive detection system, the entire study area
31 will be surveyed to locate potential OE items. The anomalies will then be investigated to
32 identify them as UXO, OE Scrap, or Non-OE Scrap (metallic scrap). After identification, the
33 items will be disposed of as scrap or OE in accordance with the previously-approved OE
34 operations work plan.

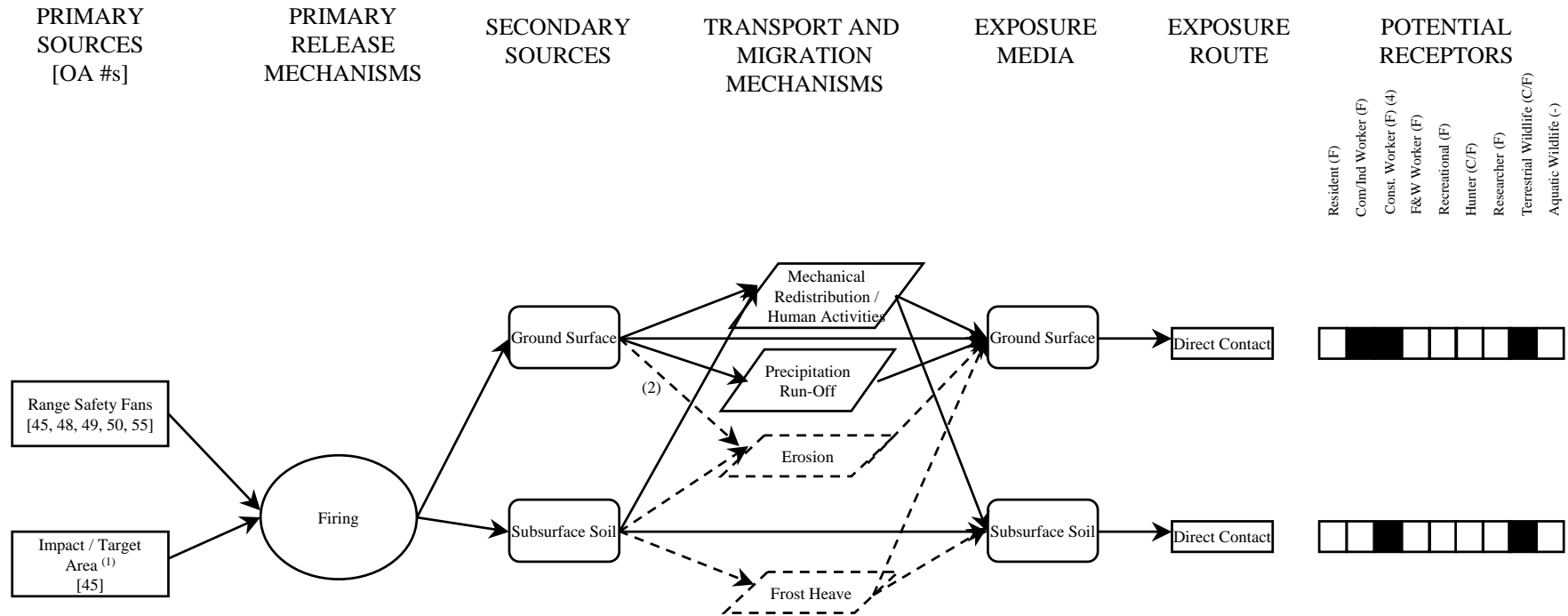
1 23.6.1 Planning for this response action will require preparation of an ESS and a site-
2 specific removal action work plan. The estimated cost to implement this alternative is
3 \$2,521,316.

4 **23.7 SUPPORTING RATIONALE**

5 The risk analysis and the comparative analysis indicated that Alternative 6-Clearance to Depth
6 should provide sufficient protection for this sector. During the site characterization conducted in
7 this sector as part of the Bravo EE/CA, no UXO or OE Scrap was found deeper than 15 inches.
8 Twenty UXO items were found, mostly on the surface, in this sector, with one of the UXO items
9 found at a depth of 2 inches. Typical items included 40mm grenades, 66mm rockets, and 3.5-
10 inch rockets. A large amount of OE Scrap was found to a depth of 15 inches in this sector.
11 Intrusive activities in this sector were stopped in some of the grids due to 40mm ordnance safety
12 constraints, therefore, some of the grids in this sector were considered characterized. The
13 documented historical use of this area (Range 16) and the projected land use of development,
14 combined with the OE items found (40 mm), and this area being so close to the main cantonment
15 area, all support the recommended removal action.

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Figure 23-1
M3-3H-Rocket and Hand Grenade Area-D
CONCEPTUAL SITE MODEL



NOTES:
(1) For non-Small Arms munitions.
(2) Dashed boxes or lines indicate a potential source area or linkage that requires further verification or is a linkage that is indicated to be present in only a small number of specific locations.
(3) Plate numbers obtained from the Fort McClellan Archives Search Report
(4) Within footprint of potential future development activity
C = Current Receptor
F = Potential Future Receptor
- = Not plausible for this sector

PLATE NOS. (3)	OA#	NAME (Other Names)	ORDNANCE AND EXPLOSIVES ASSOCIATED WITH AREA
5, 6, 7, 10	45	Range 16 (originally, later Rocket Launcher / Bazooka Range and Range 17 (Rifle Grenade))	Small Arms; 40mm Grenades; Grenade Court; Rockets
5, 6, 10	55	Old Range 12 (Range 12; Rifle Field Firing)	Small Arms
6, 7, 10	48	Range 12 (a.k.a. Range 14)	Small Arms; Light Anti-Tank Weapon; Anti-Tank;
6, 7,10	49	Range 13	60mm Projectiles; Rockets
6, 7,10	50	Range 19	Small Arms; Light Anti-Tank Weapon
			Small Arms

Figure 23-2 OERIA TABLE FOR SECTOR M3-3H-ROCKET AND HAND GRENADE AREA-D																			
AREA:		BRAVO																	
SECTOR:		M3-3H-Rocket and Hand Grenade Area-D																	
TOTAL SECTOR AREA:		97 acres																	
AREA GEOPHYSICALLY SURVEYED:		9.22 acres [3]																	
AREA INTRUSIVELY INVESTIGATED:		2.26 acres (equivalent) [4]																	
	ORDNANCE						SITE		HUMAN CURRENT USE			HUMAN FUTURE USE			OVERALL RANK				
	HE Items Found? [Yes]	OE Type [7]		OE Sensitivity [7]		OE Item Depth Distribution		OE Item Density	OE Site Access	OE Site Stability	Activity	OE Contact Probability Level	Exposed Population (Number or Freq. Of Use)	Activity	OE Contact Probability Level	Exposed Population (Number or Freq. Of Use)	Likelihood of Near Term Reuse	CURRENT LAND USE	FUTURE LAND USE
	HE Debris Found? [Yes]		(%)		(%)	Depth Range	% [9]	(Items/Acre) [8,9,12]											
Baseline Risk Assessment (Existing Conditions)		Cat. 3	51	Cat. 3	51	Surface	94.6 / (38.5)	3.79 / (9.65)	No Restriction to Site	Site Stable	Recreational [13,17]	Significant [18]	Occasional [19]	Development [16,33]	Significant [18]	Frequent	High		
		Cat. 2	5.4	Cat. 2	5.4	0 to 1' bgs	5.41 / (58.9)	0.88 / (60.2)											
		Cat. 1	43	Cat. 1	43	1' to Depth	- / (2.60)	- / (2.65)											
		Cat. 0	*	Cat. 0	*	Overall [11]	16.4 / (102)												
		90% CI on Overall OE Item Density [10]						12.6 - 21.5											
Alternative 1 - No Further Action		No Impact		No Impact		No Impact		No Impact	No Impact		No Impact	No Impact		No Impact	No Impact		BASELINE	BASELINE	
Alternative 2 - Land Use Controls		No Impact		No Impact		No Impact		No Impact	No Impact		No Impact	B		No Impact	B		LOW	LOW	
Alternative 3 - Construction Support		No Impact		No Impact		A [21]		No Impact	No Impact		A [21]	A [21]		A [21]	A [21]		MODERATE [20]	MODERATE [20]	
Alternative 4 - Surface Clearance		No Impact		No Impact		B		No Impact	No Impact		B	A [23]		B	A [23]		MODERATE	MODERATE	
Alternative 5 - Clearance to 1 Foot Depth		A		A		A		No Impact	No Impact		A	A		B	A		HIGH	MODERATE [24]	
Alternative 6 - Clearance to Depth		A [22]		A [22]		A [22]		No Impact	No Impact		A [22]	A [22]		A	A [22]		HIGH	HIGH	
NOTES																			
3 The Geophysically Surveyed Area includes the area associated with the transects within this specific sector.																			
4 Based on the fraction of identified target anomalies intrusively investigated in each geophysically surveyed grid and/or transect segment.																			
7 Percentages classify OE items found. If no OE items are found, Category 0 is 100% and Categories 1 - 3 are noted with a "**". If OE items are found, Category 0 is noted with a "**".																			
8 OE Density values shown are the straight average value = # of OE Items / Acres in which they were found.																			
9 Densities and depth range percentages shown in italics and curly brackets indicate characteristics of the OE debris.																			
10 The OE Density range shown represents a 90% confidence interval on the OE Item density calculated using UXO Calculator Version 1.4.2.																			
11 Overall OE item density is based on all OE Items found in the area intrusively investigated.																			
12 The surface OE item density is based on the area geophysically surveyed and the 0-1' and 1'-Depth OE item densities are based on the area intrusively investigated.																			
13 Specific activities identified for the recreational current land use include hunting, hiking, and short cuts.																			
16 Development land use was assumed to be associated with routine interaction with the surface and near-surface soils by the employees of the new facilities. In addition, the construction of new facilities, structures, or underground utilities and the maintenance or replacement of existing structures or utilities was assumed to be reasonably associated with this land use.																			
17 Exposure to terrestrial wildlife is also assumed.																			
18 Based on the depth of intrusion associated with the identified activities - See Table 5 of USACE OERIA Interim Guidance (3/27/01).																			
19 The frequency of site usage is currently classified as rare and the number of site users is currently classified as low due to restrictions that have been placed on the site (i.e., no hunting or hiking) since the remediation activities began. The current frequency of usage would be classified as occasional if these recreational activities took place.																			
20 Indicated to be the most protective alternative within the construction footprint.																			
21 Risk factor score indicated applies only within the construction footprint.																			
22 No increased protectiveness relative to alternatives with a shallower clearance depth due to the depth distribution of OE items found.																			
23 Removal of surface OE items or debris may reduce the number of potential exposures to souvenir hunters.																			
24 Protectiveness based on intrusion depth; Given the observed depth distribution of OE Items, the level of protectiveness associated with this alternative may be greater.																			
33 Future Development activities are projected to be associated with Developmental Reserve Use.																			
- = Not applicable as no energetic OE items were found.																			
IMPACT CODE																			
A = Signifies the greatest impact on reducing potential exposures to OE; Relatively less impact as the letter ranking goes to B, C, and subsequent letters.																			
HIGH - Most protective relative to projected land use.																			
LOW - Least protective relative to projected land use.																			
MODERATE - Protectiveness level between Low and High.																			
BASELINE - Protectiveness level associated with Alternative 1 - No Further Action.																			

1 **24.0 M4-1H-Mixed Use Area-PR**

2 **24.1 DESCRIPTION AND HISTORY**

3 This sector consists of approximately 623 acres in the northeastern portion of the Bravo Area.
4 This sector is in an area where several impact and small arms training ranges were historically
5 located. The impact areas located in this area were the WWI Artillery Range (OA-29/39), a
6 Weapons Demo Area (OA-73), and Combat Range #1 (OA-43). Artillery and mortar was used
7 at the World War I Artillery Range from 1912 to the beginning of World War II. This range,
8 also known as Range 29, was an active range from 1976 until base closure. Historically the
9 weapons used on this range were .38/.45 caliber pistol, M16A1, M60, MG, M72, LAW, and
10 M203 for demonstration purposes only. This course appears on the 1949 aerial photograph and
11 the 1958 and 1967 Range Maps. The course was in use until base closure. Combat Range #1
12 was built during the Inter-War period and was used for 37mm anti-tank guns and 75mm artillery
13 guns. The small arms training ranges included Old Range 21 (OA-42), Range 22 (OA-33),
14 Range 23 (OA-41), Old Range 27 (OA-35), the Bandholtz Rifle Range (OA-37), the Infiltration
15 Course (Range 26) (OA-58), and the Blank Fire and Maneuver Range (Range 28) (OA-72). The
16 firing fans of four small arms ranges also extend into this area. They are Range 12 (OA-48),
17 Range 13 (OA-49), Range 19 (OA-50), and Old Range 12 (OA-55). Range 12 was built after
18 WWII and was used as a competitive pistol range. Range 13, the Washington Pistol
19 Qualification Range, was established during the Vietnam War and was active until base closure.
20 Range 19 was built during the Vietnam War as a 10m Machine Gun Range and was later used as
21 a Pistol Qualification Range. Old Range 12 was built during WWII as a landscape range and
22 was abandoned by 1967. By 1958, the range was referred to as Range 12, Rifle Field Firing. An
23 infiltration course (OA-70) and three bivouac areas (OA-36, OA-38, and OA-65) were also
24 historically located in this area. The projected land use for this sector is Passive Recreation.

25 24.1.1 Clearance to Depth was performed within a portion of M4-1H-Mixed Use Area-PR as
26 part of an interim removal action of the Water Tank Construction Sites between December 2003
27 and May 2004 (see section on Interim Removal Actions in Chapter 2). The final report is in
28 Final (February 2006) form.

29 **24.2 INVESTIGATION RESULTS**

30 During the site characterization of Bravo, 89 grids in this OE Risk Assessment Sector were
31 geophysically mapped and 19 of these grids were then intrusively investigated. Eight additional
32 grids in this area were characterized based on finds during the surface clearance. Delineation
33 transects were a second investigation method used specifically to characterize areas with a high
34 likelihood of containing OE in this OE Risk Assessment Sector. The following delineation
35 transects were placed in this OE Risk Assessment Sector: M41H001, M41H003, M41H005,
36 M41H007, M41H009, M41H002, M41H004, M41H006, M41H008, M41H010, M41H012,
37 M42H001, M42H003, M42H005, M42H007, M42H009, M42H002, M42H004, M42H006,
38 M42H008, M42H010. A total of 41.4 acres in grids and 4.29 acres in transects were
39 geophysically mapped. A total of 6.01 acres in grids were intrusively investigated.

40 24.2.1 Thirty-three UXO items were identified on the surface, at predominantly shallow
41 depths, and to a maximum depth of 21 inches below the surface during intrusive activities and
42 227 OE Scrap items were found at varying depths within this OE Risk Assessment Sector. Table

- 1 24-1 contains a list of UXO and OE Scrap items found within this OE Risk Assessment Sector.
- 2 Figure B-2 in Appendix B presents an overview figure of this OE Risk Assessment Sector within
- 3 the Bravo Area and Appendix F contains a list of all items from the database found within this
- 4 OE Risk Assessment Sector.

Table 24-1
List of OE and OE Scrap Items Found in M4-1H Mixed Use Area-PR

Item Description	Quantity	Depth (inches)	Target Type	Grid ID/Transect	Anomaly ID
UXO Items:					
PROJECTILE, 75mm SHRAPNEL, MKI	1	6	UXO	3	4
PROJECTILE, 75mm SHRAPNEL, MKI	1	20	UXO	3	5
PROJECTILE, 75mm SHRAPNEL, MKI	1	2	UXO	16	7
GRENADE, RIFLE, SMOKE	1	0	UXO	20	22
PROJECTILE, 37mm, MKII A1 w/LE CHARGE	1	2	UXO	20	35
MORTAR, 3in STOKES, MKI, PRACTICE	1	3	UXO	47	6
MORTARS, 3in STOKES, MKI, PRACTICE	13	0	UXO	55	168
PROJECTILES, 75mm SHRAPNEL, MKI	3	0	UXO	55	169
MORTAR, 81mm HE, M43	1	21	UXO	57	1
MORTARS, 3in STOKES, MKI, PRACTICE	2	0	UXO	91	175
GRENADE, HAND, PRACTICE, M69, w/LIVE FUZE	1	6	UXO	102	4
PROJECTILE, 37mm, MKII	1	0	UXO	111	117
MORTAR, 3in STOKES, MKI, PRACTICE	1	12	UXO	177	2
MORTAR, 3in STOKES, MKI, PRACTICE	1	18	UXO	177	3
MORTAR, 3in STOKES, MKI, PRACTICE	1	12	UXO	177	11
MORTAR, 3in STOKES, MKI, PRACTICE	1	0	UXO	179	183
GRENADES, 40mm	2	0	UXO	M42h003	225
OE Scrap Items:					
GRENADE FRAGMENTATION, 40mm	1	0	OE Scrap	1	155
GRENADE FRAGMENTATION, 40mm	1	0	OE Scrap	2	156
PROJECTILE FRAGMENTATION, 37mm	**	1	OE Scrap	3	2
SIGNAL, ILLUMINATION, GROUND, M127 SERIES, EXPENDED	1	3	OE Scrap	3	6
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	30	OE Scrap	3	7
PROJECTILE, 3.8in SHRAPNEL, MKI, EXPENDED	1	30	OE Scrap	3	7
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	2	OE Scrap	3	8
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	4	OE Scrap	3	9
PUSHER PLATE, 75mm	1	2	OE Scrap	3	10
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	2	OE Scrap	3	11
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	4	OE Scrap	3	12
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	4	OE Scrap	3	13
POINT DETONATING FUZE, M46	1	2	OE Scrap	3	14
FRAGMENTATION	**	6	OE Scrap	3	15

Table 24-1
List of OE and OE Scrap Items Found in M4-1H Mixed Use Area-PR

Item Description	Quantity	Depth (inches)	Target Type	Grid ID/Transect	Anomaly ID
PUSHER PLATE	1	0	OE Scrap	3	16
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	4	OE Scrap	3	20
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	1	OE Scrap	4	1
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	0	OE Scrap	4	2
FRAGMENTATION	**	4	OE Scrap	4	3
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	2	OE Scrap	4	5
PROJECTILE, 3.8in SHRAPNEL, MKI, EXPENDED	1	16	OE Scrap	4	7
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	6	OE Scrap	4	8
PROJECTILE, 3.8in SHRAPNEL, MKI, EXPENDED	1	6	OE Scrap	4	9
HAND GRENADE BASE, MKII	1	0	OE Scrap	4	11
GRENADE FRAGMENTATION, HAND, MKII	**	0	OE Scrap	4	11
PROJECTILE, 75mm SHRAPNEL	1	0	OE Scrap	4	12
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	1	OE Scrap	4	13
PROJECTILE, 3.8in SHRAPNEL, MKI, FRAGMENTATION	1	2	OE Scrap	4	14
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	6	OE Scrap	4	15
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	0	OE Scrap	4	250
ROCKET, 2.36in	1	2	OE Scrap	5	1
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	6	OE Scrap	5	10
MORTAR FRAGMENTATION, 3in STOKES	**	24	OE Scrap	5	12
PROJECTILE, 3.8in SHRAPNEL, MKI, EXPENDED	1	24	OE Scrap	5	12
ROCKETS, PRACTICE, 2.36in, M7	**	6	OE Scrap	5	15
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	2	OE Scrap	5	17
BLASTING CAP WIRE	1	1	OE Scrap	5	23
PROJECTILE FRAGMENTATION, 37mm	**	6	OE Scrap	5	31
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	1	OE Scrap	6	1
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	1	OE Scrap	6	2
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	1	OE Scrap	6	3
PROJECTILE FRAGMENTATION, 75mm	**	1	OE Scrap	6	4
PROJECTILE FRAGMENTATIONS, 37mm	2	2	OE Scrap	6	5
PUSHER PLATE	1	1	OE Scrap	6	6
PROJECTILE FRAGMENTATION, 3.8in SHRAPNEL, MKI, EXPENDED	1	1	OE Scrap	6	7
FUZE, POWDER TRAIN TIME, M1907,	1	0	OE Scrap	6	8

Table 24-1
List of OE and OE Scrap Items Found in M4-1H Mixed Use Area-PR

Item Description	Quantity	Depth (inches)	Target Type	Grid ID/Transect	Anomaly ID
FUNCTIONED					
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	0	OE Scrap	6	9
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	2	0	OE Scrap	6	10
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	3	OE Scrap	6	11
PROJECTILE FRAGMENTATION, 37mm	**	3	OE Scrap	6	11
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	0	OE Scrap	6	12
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	4	OE Scrap	6	13
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	8	OE Scrap	6	14
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	3	OE Scrap	6	15
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	1	OE Scrap	6	18
ROCKET, PRACTICE, 2.36in, M6	1	0	OE Scrap	6	157
MINE, M8 AP	1	0	OE Scrap	8	158
MINE, AT, M5, PRACTICE	1	0	OE Scrap	8	159
ROCKET FRAGMENTATION, 66mm, M74 TEA	1	0	OE Scrap	8	160
PROJECTILE, 3.8in SHRAPNEL, MKI, EXPENDED	1	4	OE Scrap	12	1
PROJECTILE PLATE, 3.8in SHRAPNEL, MKI, EXPENDED	1	3	OE Scrap	12	17
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	3	OE Scrap	16	2
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED, W/FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	18	OE Scrap	16	3
PROJECTILE BASE, 75mm SHRAPNEL, MKI, EXPENDED	1	2	OE Scrap	16	4
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	0	OE Scrap	16	6
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	6	OE Scrap	16	8
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	0	OE Scrap	16	9
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	2	OE Scrap	16	11
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	4	OE Scrap	16	12
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	2	OE Scrap	16	14
PROJECTILE FRAGMENTATION, 37mm	1	5	OE Scrap	16	15
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	3	OE Scrap	16	17
PUSHER PLATE, 3.8in SHRAPNEL	1	3	OE Scrap	16	18
FUZE, POWDER TRAIN TIME, M1907,	1	5	OE Scrap	16	19

Table 24-1
List of OE and OE Scrap Items Found in M4-1H Mixed Use Area-PR

Item Description	Quantity	Depth (inches)	Target Type	Grid ID/Transect	Anomaly ID
FUNCTIONED					
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	1	OE Scrap	16	20
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	2	OE Scrap	16	21
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	6	OE Scrap	16	22
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	15	OE Scrap	16	23
FUZE ADAPTER	1	0	OE Scrap	16	25
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	8	OE Scrap	16	26
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	6	OE Scrap	16	29
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	3	OE Scrap	16	31
PROJECTILES, 75mm SHRAPNEL, MKI, EXPENDED	2	0	OE Scrap	16	161
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	2	OE Scrap	20	1
ROCKET MOTOR, 2.36in, EXPENDED	1	2	OE Scrap	20	2
PUSHER PLATE, 75mm	1	2	OE Scrap	20	3
SHRAPNEL BALL	1	2	OE Scrap	20	4
SIGNAL, SMOKE, GROUND, M62 SERIES, EXPENDED	1	0	OE Scrap	20	5
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	2	OE Scrap	20	6
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	2	OE Scrap	20	7
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	1	OE Scrap	20	10
ROCKET, PRACTICE, 2.36in, M7	1	2	OE Scrap	20	12
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	1	OE Scrap	20	16
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED, w/FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	1	OE Scrap	20	21
FRAGMENTATION	**	1	OE Scrap	20	24
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	5	OE Scrap	20	26
PROJECTILE FRAGMENTATION, 37mm	*	5	OE Scrap	20	26
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	0	OE Scrap	20	27
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	1	OE Scrap	20	29
RIFLE SMOKE TAILBOOM	1	1	OE Scrap	20	31
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	1	OE Scrap	20	34
FUZE ADAPTER	1	1	OE Scrap	20	36
ROCKET MOTOR, 2.36in, M6	1	3	OE Scrap	20	38

Table 24-1
List of OE and OE Scrap Items Found in M4-1H Mixed Use Area-PR

Item Description	Quantity	Depth (inches)	Target Type	Grid ID/Transect	Anomaly ID
PROJECTILE, 37mm, PRACTICE, MKII A1 w/LE CHARGE, FUNCTIONED	1	1	OE Scrap	20	39
FUZE ADAPTER	1	2	OE Scrap	20	40
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	3	OE Scrap	20	41
PROJECTILE, 3.8in SHRAPNEL, MKI, EXPENDED	1	0	OE Scrap	23	263
GRENADE RESIDUE, 40mm	**	0	OE Scrap	24	228
GRENADE BODY, 40mm	1	0	OE Scrap	24	229
PROJECTILES, 75mm SHRAPNEL, MKI, EXPENDED	2	0	OE Scrap	28	162
PROJECTILES, 75mm SHRAPNEL, MKI, EXPENDED	2	0	OE Scrap	31	163
PROJECTILES, 75mm SHRAPNEL, MKI, EXPENDED	4	0	OE Scrap	34	164
PROJECTILE, 3.8in SHRAPNEL, MKI, EXPENDED	1	0	OE Scrap	34	165
FRAGMENTATION	**	2	OE Scrap	47	5
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	3	OE Scrap	47	11
PROJECTILE, 3.8in SHRAPNEL, MKI, EXPENDED,	1	2	OE Scrap	47	12
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	2	OE Scrap	47	12
BLANK FIRING ADAPTER	1	2	OE Scrap	47	12
PROJECTILE FRAGMENTATION, 37mm	**	4	OE Scrap	47	15
FRAGMENTATION	**	6	OE Scrap	47	16
SIGNAL, ILLUMINATION, GROUND, M127 SERIES, EXPENDED	2	0	OE Scrap	52	236
FRAGMENTATION, 37mm	7	0	OE Scrap	53	246
FRAGMENTATION, 37mm	*	0	OE Scrap	54	247
MORTAR, 3in STOKES, MKI, PRACTICE	2	0	OE Scrap	54	281
MORTAR, 3in STOKES, MKI, PRACTICE	2	0	OE Scrap	55	282
MORTAR, 3in STOKES, MKI, PRACTICE	1	0	OE Scrap	55	283
PROJECTILE, 37mm APC, M51	1	0	OE Scrap	56	170
M1907 FUZE ADAPTER	1	4	OE Scrap	57	2
FRAGMENTATION	**	4	OE Scrap	57	2
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	4	OE Scrap	57	3
FRAGMENTATION	**	3	OE Scrap	57	7
FRAGMENTATION	**	3	OE Scrap	57	8
FRAGMENTATION	**	3	OE Scrap	57	10
FUZE, POWDER TRAIN TIME, M1907, FUNCTIONED	1	3	OE Scrap	57	24
FUZE	1	1	OE Scrap	57	25
FRAGMENTATION	**	3	OE Scrap	57	27
GRENADE FUZE PIECES	**	0	OE Scrap	74	234
MORTAR, 3in STOKES, MKI, PRACTICE	1	0	OE Scrap	76	171
SIGNAL, ILLUMINATION, GROUND, M127 SERIES, EXPENDED	1	0	OE Scrap	81	172

Table 24-1
List of OE and OE Scrap Items Found in M4-1H Mixed Use Area-PR

Item Description	Quantity	Depth (inches)	Target Type	Grid ID/Transect	Anomaly ID
GRENADES, SMOKE	2	0	OE Scrap	82	173
GRENADES, SMOKE	2	0	OE Scrap	84	238
GRENADE SPOON	1	3	OE Scrap	86	4
MORTAR, 3in STOKES, MKI, PRACTICE	1	4	OE Scrap	86	7
MORTAR, 3in STOKES, MKI, PRACTICE	1	0	OE Scrap	87	174
MORTAR, 3in STOKES, MKI, PRACTICE	1	0	OE Scrap	87	239
SIGNALS, ILLUMINATION, GROUND, M127 SERIES, EXPENDED	**	0	OE Scrap	87	240
SIGNALS, ILLUMINATION, GROUND, M127 SERIES, EXPENDED	3	0	OE Scrap	93	176
SIGNALS, ILLUMINATION, GROUND, M127 SERIES, EXPENDED	2	0	OE Scrap	94	177
PROJECTILE, 3.8in SHRAPNEL, MKI, EXPENDED	1	0	OE Scrap	94	178
MORTAR, 3in STOKES, MKI, PRACTICE	1	0	OE Scrap	96	233
PROJECTILE, 75mm	8	0	OE Scrap	97	179
MORTAR, 3in STOKES, MKI, PRACTICE	1	0	OE Scrap	97	180
MORTAR, 60mm	1	0	OE Scrap	97	181
MORTAR, 3in STOKES, MKI, PRACTICE	1	0	OE Scrap	97	226
GRENADE, 40mm	1	0	OE Scrap	99	116
PROJECTILE, 3.8in SHRAPNEL, MK1, EXPENDED	1	0	OE Scrap	101	118
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	0	OE Scrap	101	119
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	1	2	OE Scrap	102	2
SIGNAL, SMOKE, GROUND, M62 SERIES, EXPENDED	1	3	OE Scrap	102	3
MORTAR, 60mm, PRACTICE, M69	1	0	OE Scrap	102	10
SIGNAL, ILLUMINATION, GROUND, M127 SERIES, EXPENDED	1	6	OE Scrap	102	14
SIGNAL, ILLUMINATION, GROUND, M127 SERIES, EXPENDED	1	0	OE Scrap	102	16
SIGNAL, ILLUMINATION, GROUND, M127 SERIES, EXPENDED	1	4	OE Scrap	102	20
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	1	5	OE Scrap	103	1
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	2	1	OE Scrap	103	2
PROJECTILE FRAGMENTATION	**	5	OE Scrap	103	3
SIGNAL, SMOKE, GROUND, M62 SERIES, EXPENDED	1	4	OE Scrap	103	4
SIGNAL, SMOKE, GROUND, M62 SERIES, EXPENDED	1	6	OE Scrap	103	5
PROJECTILE FRAGMENTATION, 37mm	1	6	OE Scrap	103	7
HAND GRENADE FUZE	1	5	OE Scrap	103	8
SIGNAL, ILLUMINATION, GROUND, M127 SERIES, EXPENDED	1	3	OE Scrap	103	9
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	1	0	OE Scrap	103	10

**Table 24-1
List of OE and OE Scrap Items Found in M4-1H Mixed Use Area-PR**

Item Description	Quantity	Depth (inches)	Target Type	Grid ID/Transect	Anomaly ID
PROJECTILE FRAGMENTATION	**	4	OE Scrap	103	17
SIGNAL, SMOKE, GROUND, M62 SERIES, EXPENDED	1	2	OE Scrap	103	20
PROJECTILE FRAGMENTATION, 40mm	1	3	OE Scrap	103	24
FRAGMENTATION	**	3	OE Scrap	104	1
FRAGMENTATION	**	4	OE Scrap	104	3
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	3	OE Scrap	104	4
PROJECTILE, 3.8in SHRAPNEL, MKI, EXPENDED	1	6	OE Scrap	104	5
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	2	OE Scrap	104	7
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	12	OE Scrap	104	8
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	6	OE Scrap	104	9
MORTAR, 3in STOKES	1	6	OE Scrap	104	10
PROJECTILE FRAGMENTATION, 37mm	1	5	OE Scrap	104	12
PROJECTILE, 75mm SHRAPNEL, MKI, EXPENDED	1	12	OE Scrap	104	13
FRAGMENTATION	**	5	OE Scrap	104	14
FRAGMENTATION	**	6	OE Scrap	104	16
PROJECTILE FRAGMENTATION, 37mm	**	5	OE Scrap	104	17
GRENADE FRAGMENTATION, MKII	**	5	OE Scrap	104	17
PROJECTILE FRAGMENTATION, 37mm	**	5	OE Scrap	104	18
FRAGMENTATION	**	4	OE Scrap	104	19
PROJECTILE FRAGMENTATION, 37mm	**	5	OE Scrap	104	23
FLARE CASE	1	1	OE Scrap	105	1
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	1	0	OE Scrap	105	2
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	1	1	OE Scrap	105	3
GRENADE SPOONS	**	6	OE Scrap	105	4
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	1	1	OE Scrap	105	6
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	1	6	OE Scrap	105	9
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	1	1	OE Scrap	105	12
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	1	1	OE Scrap	105	13
GRENADE SPOON	1	1	OE Scrap	105	15
BLASTING CAP SCRAP	**	1	OE Scrap	105	17
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	1	1	OE Scrap	105	18
PULL RING	1	1	OE Scrap	105	19
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	1	4	OE Scrap	105	29
FLARE CASE	1	4	OE Scrap	105	29
FRAGMENTATION	**	2	OE Scrap	105	31

Table 24-1
List of OE and OE Scrap Items Found in M4-1H Mixed Use Area-PR

Item Description	Quantity	Depth (inches)	Target Type	Grid ID/Transect	Anomaly ID
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	1	1	OE Scrap	105	35
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	1	1	OE Scrap	105	39
PROJECTILE, 37mm APC, M51	1	3	OE Scrap	108	1
PROJECTILE FRAGMENTATION, 37mm	1	3	OE Scrap	108	1
SIGNAL, ILLUMINATION, GROUND, M127 SERIES, EXPENDED	1	3	OE Scrap	108	1
SIGNAL, ILLUMINATION, GROUND, M127 SERIES, EXPENDED	1	0	OE Scrap	108	3
FRAGMENTATION, 37mm	1	0	OE Scrap	109	242
PROJECTILE, 37mm	1	2	OE Scrap	110	3
FRAGMENTATION	**	3	OE Scrap	110	4
FRAGMENTATION	**	2	OE Scrap	110	5
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	1	1	OE Scrap	110	6
FRAGMENTATION	**	3	OE Scrap	110	7
GRENADE FUZE, EXPENDED	1	0	OE Scrap	110	9
GRENADE, HAND, PRACTICE, M69, FUNCTIONED	1	0	OE Scrap	110	11
FRAGMENTATION	3	4	OE Scrap	110	12
FRAGMENTATION	**	12	OE Scrap	110	13
FRAGMENTATION	**	5	OE Scrap	110	15
MORTAR, 3in STOKES, MKI, PRACTICE	1	0	OE Scrap	110	284
MORTAR, 3in STOKES, MKI, PRACTICE	1	0	OE Scrap	175	184
MORTAR, 3in STOKES, MKI, PRACTICE	1	2	OE Scrap	177	4
MORTAR, 3in STOKES, MKI, PRACTICE	1	12	OE Scrap	177	5
MORTAR, 3in STOKES, MKI, PRACTICE	1	18	OE Scrap	177	6
MORTAR, 3in STOKES, MKI, PRACTICE	1	6	OE Scrap	179	10
SIGNALS, ILLUMINATION, GROUND, M127 SERIES, EXPENDED	3	0	OE Scrap	183	185
MORTAR, 3in STOKES, MKI, PRACTICE	3	0	OE Scrap	M41h012	120
ROCKET, PRACTICE, 2.36in, M7	1	0	OE Scrap	M42h003	224

Note: This table does not list small arms finds.

Note: IT# = IT Corporation finds. PBP# = Parsons Burn Pit finds.

*TtEC did not independently verify the accuracy nor currency of information supplied by client or by any of clients contractors, vendors, or consultants.

** Indeterminate amount.

- 1 An interim removal action was performed at the water tank construction sites to prevent conflicts
- 2 or delays with construction of new water towers within the Bravo EE/CA area. The work was
- 3 completed in sequential steps of site preparation: brush clearing, geophysical survey, and
- 4 intrusive operations between December 2003 and May 2004. Intrusive investigation of
- 5 anomalies resulted in the excavation of 19 OE items, 1,063 pounds of OE Scrap, and 18,323
- 6 pounds of Non OE Scrap. The final report is in Final form and a statement of clearance was
- 7 issued in June 2006. The response action was documented in the May 2006 *Final Site Specific*
- 8 *Final Report for the Water Tank Construction Sites.*

1 **24.3 DESCRIPTION OF HAZARDS OF SPECIFIC OE ENCOUNTERED**

2 UXO items encountered during the site characterization of this OE Risk Assessment Sector
3 include 75mm MK1 projectiles, 37mm MK1 projectiles (HE and practice), 81mm M43 mortar
4 round, practice hand grenades, M69, 40mm grenades, 3in Strokes Mortar, MK1 (Practice), and a
5 rifle smoke grenade.

6 24.3.1 The 75mm HE projectile steel shell has a radius of 1.5 calibers, a copper rotating band
7 with two grooves behind the band for stab crimping the cartridge case to the projectile, a square
8 base, and a base plate of brass covering a lead plate. The base plate is crimped to the base of the
9 projectile. The nose requires an adapter to which the fuze and booster (MK III) are fitted. The
10 bursting charge is 1.64 pounds of TNT. The projectile is painted olive drab and stenciled in
11 yellow with the designation of weapon, filler, complete round, and weight zone. It uses the M46
12 Point Detonating Instantaneous or M47 Point Detonating Short Delay (0.05 seconds) fuzes.
13 These fuzes are constructed of brass and have nomenclature and lot information stamped into the
14 fuze body. The M46 has a white painted tip to distinguish it from the M47 which has a black
15 painted tip. The M46 fuze is armed by centrifugal force and is fired by driving the firing pin into
16 the detonator upon impact. The M47 fuze is similarly armed but upon impact the firing pin is
17 driven into the 0.05 second delay element which in turn fires the detonator.

18 24.3.2 The MKI 37mm projectile is made of bar steel and is filled with .034 lbs of black
19 powder. It weighs approximately 1 lb. Since it is adapted for a base fuze its nose is continued to
20 a rounded point. The projectile is 3.56 inches long and has a radius of ogive of 2.25 calibers.
21 The fuze is a base percussion MK. I and is constructed of brass. It is an igniting fuze as
22 indicated by "percussion" in the nomenclature. Its explosive train consists of a priming mixture
23 and black powder which ignites the black powder bursting charge. The shell was painted red and
24 stenciled in black. The MK I Sand-loaded (practice) projectile is exactly the same except for the
25 fact that the black powder and live fuze of the L.E. shell were replaced by sand and an inert fuze.

26 24.3.3 The M43 mortar round consists of a projectile body, a point-detonating fuze, a fin
27 assembly, a propellant charge, and an ignition charge with a percussion primer. The projectile
28 body is filled with Composition B high explosive. The point detonation (PD) fuze functions on
29 impact detonating the fuze booster charge and, in turn, high explosive charge.

30 24.3.4 The M69 is a standard-delay practice version of the M33 and M67 grenades. It uses the
31 M228 fuze which uses a primer, delay, and black powder igniter, each weighing less than 1
32 gram. The grenade is constructed of steel. It is painted blue with a brown band around the body
33 or neck. Markings, if any, are stenciled in white. The fuze nomenclature, lot number, and month
34 and year of loading are stenciled in black on the safety lever of the fuze. The grenade body is
35 spherical, empty, and has a hole in the bottom to vent the gases generated by the detonation of
36 the fuze and black powder charges. The grenade may be reloaded with a new fuze and safety
37 clip. The grenade is functioned by removing the safety pin and the safety clip freeing the safety
38 lever. When thrown, the lever is released allowing the spring loaded striker to strike the primer
39 igniting the 4 to 5 second delay. The igniter gives off a loud report, like that of a firecracker, and
40 a puff of white smoke.

41 24.3.5 There are many different models of the 40mm grenade, but in general the 40mm round
42 is a high explosive, impact type round. It is a fixed round of ammunition with a steel projectile

1 body containing a high explosive charge of Comp A5 (approximately 38 grams). Some versions
2 of this munition have an always acting/graze sensitive fuze, which means no matter which angle
3 it impacts the target or surface, the fuze will function. The reason this is a major concern is if the
4 munition is jarred or dropped during excavation or assessment it can inadvertently detonate. A
5 cartridge case assembly is crimped to the projectile; which contains a propelling charge and is
6 sealed at the rear. A percussion primer is fixed into the center of the base of the cartridge casing.
7 The fuze arms after the projectile has traveled a distance of 18 to 40 meters and has received the
8 required centrifugal forces to rotate the detonator in line with the firing pin. Upon impact, a six-
9 sided weighted cam is driven into the firing pin, which is then driven into the detonator and the
10 main charge is initiated. Detonation of the main charge provides fragmentation of the projectile
11 body and has a casualty radius of up to 35 meters. The munition is 40 mm in diameter and is
12 between 3.894 inches to 4.415 inches in length, in the unfired condition. The ogive is anodized
13 aluminum with a gold color for the highly sensitive HE versions and blue for practice version.
14 Under prolonged exposure to sunlight and the environment however, the gold and blue bleach to
15 a silver color. This makes it difficult to distinguish between live and practice versions of this
16 munition.

17 24.3.6 The MKI practice 3in Stokes Mortar shell consists of a cylindrical steel casing, having a
18 steel base and steel head screwed on at each end of the casing. The steel head seats the booster
19 jacket and MK VI setback-armed, impact-inertia fired, all-way trench mortar fuze. The steel
20 base seats the cartridge container. Although the practice mortar is filled with 2.1 ponds of sand,
21 the MK VI fuze combined with the booster contain approximately 65 g of black powder. The
22 ignition cartridge contained 45 g of smokeless powder. The fuze safety pin and ring are removed
23 before firing, leaving the set-back pellet supported by friction until the shell leaves the barrel.
24 Upon acceleration the safety fork is ejected and the striker is free to reach the detonating pellet or
25 percussion element upon impact. This fuze has a double percussion element which functions
26 irrespective of the shells position upon impact (all-way). The fuze was painted black and
27 stamped with manufacturer's symbols, and month and year of loading. The shell head was
28 stamped with the name/Mk#, lot #, inspector's stamp, and manufacturer's symbol. The case
29 painted dark blue with white stenciling. The ignition cartridge has a green case with a brass
30 base, the bottom of which is stamped with manufacturer's information and the item's MK#.

31 24.3.7 The practice hand grenades are dummy (inert) grenade similar in size, shape, and
32 weight to the M9 HE Rifle Grenade. This item consists of two parts a head and a fin assembly
33 (replaceable). These grenades were used for target practice only. It has a sheet metal body and
34 weighs 1.5 ponds. It was fired using a special calibers. 0.30 carbine and rifle grenade launcher
35 attachment for the M1903A1 and M1917 U.S. calibers. 0.30 Rifle.

36 **24.4 RISK ASSESSMENT**

37 Figure 24-1, located at the end of this chapter, presents the CSM for potential exposures to OE in
38 OE Risk Assessment Sector M4-1H-Mixed Use Area-PR in Redevelopment Parcel M4. The
39 primary sources were various firing points and range safety fans located throughout the sector,
40 combat range/maneuvers areas, impact/target areas, a bivouac area, training areas, and a
41 demonstration/testing area. At the firing points, ordnance may be present due to mishandling,
42 poor housekeeping, or loss. OE may be present in the range safety fans and the impact/target
43 areas as a result of firing. OE may be present in the combat range/maneuvers areas and the
44 training areas as the result of firing, poor housekeeping, mishandling, or loss. OE may have been

1 purposefully placed or deposited in the bivouac area, or released as the result of poor
2 housekeeping, mishandling, or loss. OE may be present in the demonstration/testing area as the
3 result of kickouts or the incomplete destruction or disposal of items. These releases would likely
4 result in OE being present on the ground surface or in the subsurface soils of the sector. This
5 CSM also indicates the principal mechanisms by which ordnance items may migrate from one
6 location to another in the sector or shift from one depth in the soil to another. These potential
7 transport and migration mechanisms include mechanical redistribution, human activity,
8 precipitation run-off, and (in limited, specific locations) erosion and frost heave. The original
9 deposition of the ordnance items and the localized transport and migration processes result in a
10 new distribution of OE items in the soil which may be locations of direct contact exposure by
11 current or reasonably foreseeable future receptors associated with reuse of the area. Receptors
12 may include Passive Recreational users of the area. No significant construction activity is
13 projected to be associated with this land use. However, soil disturbance within a specified area
14 may be considered on an infrequent and spatially limited basis. As such, a construction worker
15 would not be a routine receptor relative to the entire sector. Terrestrial wildlife may also be
16 exposed to ordnance present in the sector.

17 **24.5 COMPARATIVE ANALYSIS OF RESPONSE ACTION ALTERNATIVES**

18 **24.5.1 Effectiveness**

19 The OERIA risk assessment process addresses the combined criteria of overall protectiveness to
20 human health and the environment and long-term effectiveness and permanence. The results of
21 the risk assessment performed for the M4-1H-Mixed Use Area-PR sector using this process are
22 presented in Figure 24-2, located at the end of this chapter. Based on these results, the most
23 effective alternatives for the protection of human health and the environment were judged to be
24 the removal alternatives. Both Alternative 6-Clearance to Depth and Alternative 5-Clearance to 1
25 Foot Depth were projected to provide the highest level of protectiveness throughout the sector,
26 while Alternative 4-Surface Clearance was judged to provide a lower level of protectiveness due
27 to the indicated depth of OE in this area relative to the indicated future use for passive recreation.
28 OE items were found in this area on the surface and down to a depth of 21 inches below the
29 ground surface. OE Scrap was found on the surface and to a depth of 30 inches below the
30 ground surface. Alternative 3-Construction Support is considered to be protective, but only
31 within any potential future construction footprint within the sector where clearance of OE would
32 be selectively performed. Alternative 2-Area-Specific Land Use Controls was considered to be
33 less effective than any of the removal alternatives except for the case when Surface Clearance
34 would be performed alone. Alternative 1-No Further Action was considered to be the least
35 effective. Since passive recreation activities are planned for this sector, Alternative 5-Clearance
36 to 1 Foot Depth was considered to provide a high level of protectiveness, with Alternative 6
37 providing only an incremental increase in protectiveness.

38 24.5.1.1 With respect to the other effectiveness criteria, Alternative 1-No Further Action
39 clearly has the least short-term impacts since No Further Action is being taken that might impact
40 local workers or the public. Alternative 2-Area-Specific Land Use Controls also presents little
41 short-term effects since the only activity that might have impact on the workers or the public
42 involves installation of a limited number of warning signs. The removal alternatives
43 (Alternatives 3, 4, 5, and 6) have the greatest potential impact on the workers and public since
44 each involves the potential of more direct contact with OE. In summary, Alternative 1 will have

1 the least short-term impacts, followed by Alternative 2 and 3, and then Alternatives 4, 5, and 6.
2 Among the latter three alternatives, the short-term effects will increase from Alternatives 4 to 6,
3 since each has the potential for longer and more intense exposure to OE. With respect to the
4 compliance with ARARs criterion, each alternative will comply.

5 **24.5.2 Implementability**

6 24.5.2.1 Technical Feasibility

7 All six alternatives are technically feasible with Alternative 1 being the most technically feasible
8 since there is No Further Action required at the site (i.e., investigation or removal actions).
9 Alternative 2 is the second most technically feasible alternative. It requires that technical actions
10 be taken at the site (e.g., installation of signage at the site). The remaining alternatives are each
11 technically feasible but less so than Alternatives 1 and 2, because they each involve more intense
12 site activities and dependence on technology. In summary, Alternative 1 will be the most
13 technically feasible, Alternative 2 next, followed by Alternatives 3, 4, 5, and 6.

14 24.5.2.2 Administrative Feasibility

15 All six alternatives will require the preparation and DDESB-approval of an ESS document.
16 Alternatives 3 through 6 will each require the preparation and approval of a work plan since each
17 alternative involves onsite OE activities. Alternatives 2, 3, 4, and 5 will also require compliance
18 with the LUCAP for Fort McClellan, since each involves the implementation of land use
19 controls. In summary, considering these requirements, Alternative 1 will be the simplest to
20 administer, with Alternative 6 next, and Alternatives 2, 3, 4, and 5 being the most difficult of the
21 alternatives to administer due to the inclusion of land use controls and the requirements to
22 comply with the LUCAP.

23 24.5.2.3 Availability of Services and Materials

24 Services and materials are required and are readily available for preparing the plans mentioned
25 above and to complete the fieldwork associated with Alternatives 3 through 6. Based on the
26 levels of services needed, Alternative 1 will require the least services and materials since it only
27 requires effort to prepare the ESS. More services and materials will be required for the
28 implementation of Alternative 2 since it requires the preparation of the ESS, installation of signs,
29 as well as coordination with the LUCAP. Even more services and materials will be required for
30 Alternative 3 since it requires a work plan to support construction support activities and the field
31 service activities to provide the actual construction support. Alternative 4 will be similar in scope
32 of required services and materials. Alternatives 5 and 6 will require the most in services and
33 materials. In summary, Alternative 1 will require the least in services and materials to
34 implement, with Alternative 2 next. Alternatives 3 and 4 will require a higher level of services
35 and materials than Alternatives 1 and 2, but less than Alternatives 5 and 6.

36 24.5.2.4 Regulatory and Community Acceptance

37 The level of regulatory and/or community acceptance for each alternative can be expected to
38 largely depend on the protection that each alternative offers. OE was found on the surface and at
39 depths extending to 21 inches below ground surface. OE Scrap was found on the surface, at
40 shallow depths, and at depths up to 30 inches. However, the majority of UXO and OE Scrap was

1 found on the surface or at shallow depths ranging from 1 to 12 inches. The projected future land
2 use for this area is Passive Recreation. Alternative 1-No Further Action does nothing to provide
3 any degree of protection and therefore is unlikely to be accepted by the regulatory community or
4 the public. Alternative 2-Area-Specific Land Use Controls would probably be received more
5 favorably since it will provide some degree of protection, however, since it leaves potential OE
6 in place, it may be received poorly by both regulators and the public. Alternative 3-Construction
7 Support may receive similar levels of acceptance as Alternative 2. Alternative 3 provides
8 protection to construction workers and removes OE within the construction footprint. The
9 projected future land use is Passive Recreation, with little expected construction activities.
10 Alternative 4-Surface Clearance may be expected to receive an even higher level of acceptance
11 than any of the previous alternatives since it includes actual removal of potential OE from the
12 surface and is accompanied by land use controls. On the other hand, the belief that significant
13 numbers of subsurface OE may be present may lead to a reduced acceptance of this alternative.

14 24.5.2.4.1 Alternative 5-Clearance to One-Foot Depth and Alternative 6-Clearance to Depth
15 may receive the highest level of acceptance by both regulators and the public since they both
16 involve a subsurface removal of potential OE. Since UXO was found down to 21 inches and OE
17 Scrap was found at depths up to 30 inches, clearance to depth would provide the highest level of
18 acceptance but since the projected future land use is Passive Recreation, the regulators and/or the
19 public may consider Alternative 6 to be more than what is necessary and prefer not to disturb the
20 habitat and environment to the degree required for clearance to depth.

21 24.5.2.4.2 In summary, the alternatives that may be best received by the regulators and/or public
22 would be Alternative 5-Clearance to One Foot Depth and Alternative 6-Clearance to Depth,
23 followed in order by Alternative 4-Surface Clearance, Alternative 2-Area-Specific Land Use
24 Controls, Alternative 3-Construction Support, and lastly, Alternative 1-No Further Action.

25 **24.5.3 Cost**

26 The projected costs to implement the alternatives in this 623-acre sector are summarized below:

- 27 • Alternative 1 - No Further Action – \$5,000. An ESS (preparation, draft, and final) will be
28 prepared for a group of sectors. This is an approximation of one sector's portion of the total
29 cost.
- 30 • Alternative 2 - Area-Specific Land Use Controls – \$17,000. This cost includes planning and
31 installation of signage. No annual maintenance costs are included.
- 32 • Alternative 3 - Construction Support – \$2,393,397. This estimate includes management,
33 planning, and UXO support.
- 34 • Alternative 4 - Surface Clearance – \$4,107,535. This cost includes management and
35 planning, OE removal activities, and reporting.
- 36 • Alternative 5 - Clearance to One-Foot Depth – \$12,077,035. This cost includes management
37 and planning, OE removal activities, and reporting.
- 38 • Alternative 6 - Clearance to Depth – \$12,905,735. This cost includes management and
39 planning, OE removal activities, and reporting.

1 24.6 RECOMMENDATION

2 The recommended alternative for M4-1H-Mixed Use Area-PR is Alternative 5-Clearance to One
3 Foot. Components of this alternative will include land surveying and brush clearing operations to
4 prepare the site. Where technically feasible, suitably sensitive detection instruments will be used
5 to survey the study area and locate subsurface anomalies, which subsequently will be
6 investigated down to 12 inches. After identification, the item will be disposed of as scrap or OE
7 in accordance with a previously-approved OE operations work plan. A deed restriction that
8 prohibits digging in this sector without construction support by UXO-qualified personnel will
9 also be included.

10 24.6.1 Planning for this response action will require preparation of an ESS and a site-
11 specific work plan. The estimated cost to implement this alternative is \$12,077,035.

12 24.7 SUPPORTING RATIONALE

13 The risk analysis and the comparative analysis indicated that Alternative 5-Clearance to One
14 Foot should provide sufficient protection for this sector. Several UXO items were found on the
15 surface, at shallow depths, and at a maximum depth of 21 inches. Intrusive activities in this
16 sector were stopped in some of the grids due to 40mm ordnance safety constraints, therefore,
17 some of the grids in this sector were considered characterized. The OE Scrap items were found
18 to a depth of 30 inches in this sector. Items found were typical of ordnance associated with the
19 historical activities. Further, the projected land use for this sector is Passive Recreation,
20 associated with activities such as hiking, walking, and biking. No significant construction of
21 recreational facilities or underground utilities is associated with this land use. Consistent with the
22 Passive Recreation land use is the occasional incidental interaction with surface and very near
23 surface (0–6 inches) soils. The recommendation of clearance to one foot provides a safety buffer
24 beyond the expected depth (6 inches) of contact. Since the projected land use is Passive
25 Recreation, the recommendation for clearance to one foot was determined to be the most
26 appropriate removal action.

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Figure 24-1
M4-1H-Mixed Use Area-PR
CONCEPTUAL SITE MODEL

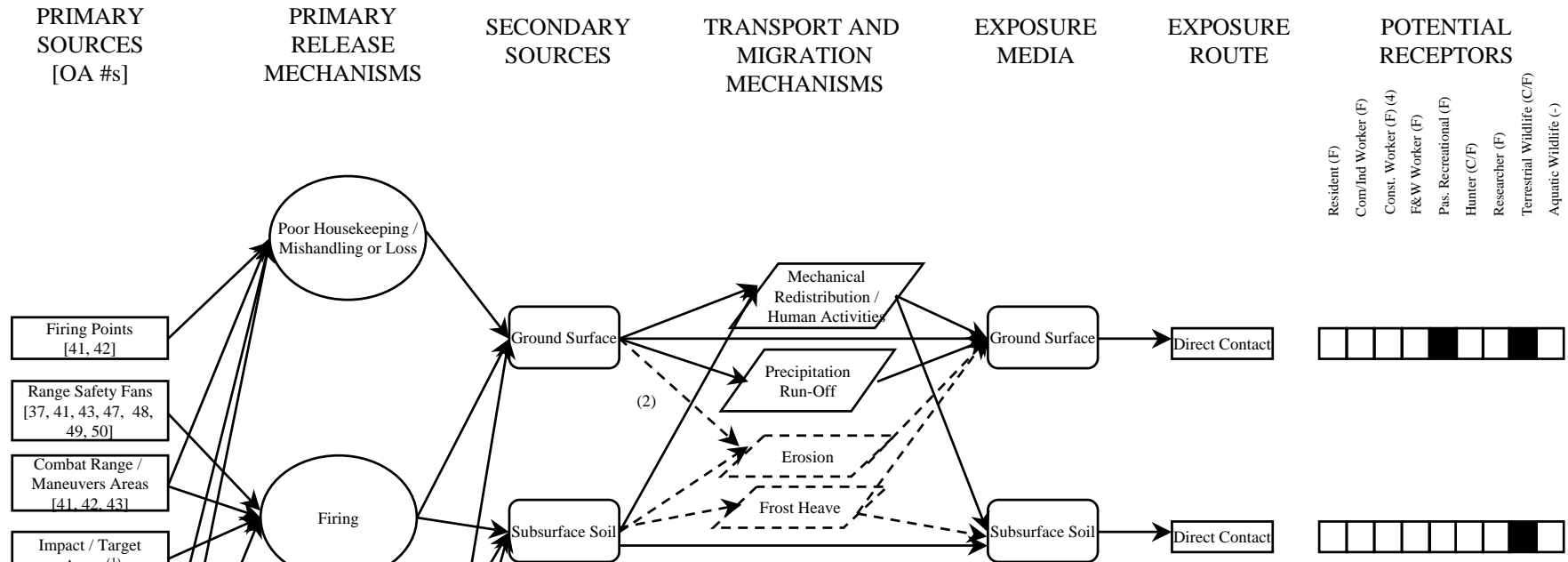


PLATE NOS. (3)	OA#	NAME (Other Names)	ORDNANCE AND EXPLOSIVES ASSOCIATED WITH AREA
3, 4, 10	29	World War I Artillery Range (North Half)	Artillery Munitions; Mortars
3, 4, 10	39	World War I Artillery Range (South Half)	Artillery Munitions; Mortars
4, 5, 6, 7, 10	37	Bandholtz Rifle Range (a.k.a Range 25)	Small Arms
4, 5, 6, 7, 10	41	Range 23 (Pistol Range; Rifle/ Machine Gun Range)	Small Arms; 81mm Mortar Rounds
4, 5, 10	43	Combat Range #1	37mm Anti-Tank; 75mm Artillery Guns; 81mm Mortar Rounds
5, 6, 10	42	Old Range 21	Small Arms
5, 6, 7, 10	58	Infiltration Course (a.k.a Range 26)	Small Arms; Pop-Up Flares
6, 10	47	Range 15 (a.k.a. Combat Village)	Small Arms; Light Anti-Tank Weapon
6, 7, 10	48	Range 12 (a.k.a Range 14)	Small Arms; Light Anti-Tank Weapon; 60mm Mortars; Rockets
6, 7, 10	49	Range 13	Small Arms; Light Anti-Tank Weapon
6, 7, 10	50	Range 19	Small Arms
7, 10	38	Bivouac Site B-23	Training Debris (Rifle Blanks); Pyrotechnic Devices (Smoke Grenades)
7, 10	70	Infiltration Course (Range 20)	M60 Machine Guns and Demolitions
7, 10	72	Blank Fire and Maneuver Range (a.k.a. Range 28)	M16A1; 81mm and 60mm Mortar Rounds; 3" Stokes Mortars; M18 Smoke Grenades; Livens Projectiles
7, 10	73	Weapons Demo (a.k.a. ITT Range; Range 29)	Small Arms; Light Anti-Tank Weapon; 40mm Grenades; AT-4; M203; 75 mm Projectile Fragments and Shrapnel

NOTES:

- (1) For non-Small Arms munitions.
 - (2) Dashed boxes or lines indicate a potential source area or linkage that requires further verification or is a linkage that is indicated to be present in only a small number of specific locations.
 - (3) Plate numbers obtained from the Fort McClellan Archives Search Report
 - (4) No significant construction activity is expected for this land use. Limited disturbance of the soil may be considered within a specific footprint for the installation of facilities associated with the land use.
- C = Current Receptor
 F = Potential Future Receptor
 - = Not plausible for this sector

Figure 24-2

OERIA TABLE FOR SECTOR M4-1H-MIXED USE AREA-PR

AREA:		BRAVO																	
SECTOR:		M4-1H-Mixed Use Area-PR																	
TOTAL SECTOR AREA:		623 acres																	
AREA GEOPHYSICALLY SURVEYED:		45.65 acres [3]																	
AREA INTRUSIVELY INVESTIGATED:		6.00 acres (equivalent) [4]																	
	ORDNANCE								SITE		HUMAN CURRENT USE			HUMAN FUTURE USE			OVERALL RANK		
	HE Items Found? [Yes]	OE Type [7]		OE Sensitivity [7]		OE Item Depth Distribution		OE Item Density	OE Site Access	OE Site Stability	Activity	OE Contact Probability Level	Exposed Population (Number or Freq. Of Use)	Activity	OE Contact Probability Level	Exposed Population (Number or Freq. Of Use)	Likelihood of Near Term Reuse	CURRENT LAND USE	FUTURE LAND USE
	HE Debris Found? [Yes]		(%)		(%)	Depth Range	% [9]	(Items/Acre) [8,9,12]											
Baseline Risk Assessment (Existing Conditions)		Cat. 3	23	Cat. 3	23	Surface	69.2 / (36.8)	0.59 / (2.10)	No Restriction to Site	Site Stable	Recreational [13,17]	Significant [18]	Occasional [19]	Passive Recreation [14]	Significant [18]	Occasional [19]	High		
		Cat. 2	13	Cat. 2	13	0 to 1' bgs	23.1 / (69.8)	1.50 / (26)											
		Cat. 1	64	Cat. 1	64	1' to Depth	7.69 / (3.45)	0.50 / (1.50)											
		Cat. 0	*	Cat. 0	*	Overall [11]	6.50 / (43.5)												
						90% CI on Overall OE Item Density [10]	5.04 - 8.48												
Alternative 1 - No Further Action		No Impact		No Impact		No Impact		No Impact	No Impact		No Impact	No Impact		No Impact	No Impact		BASELINE	BASELINE	
Alternative 2 - Land Use Controls		No Impact		No Impact		No Impact		No Impact	No Impact		No Impact	B		No Impact	B		LOW	LOW	
Alternative 3 - Construction Support		No Impact		No Impact		A [21]		No Impact	No Impact		A [21]	A [21]		A [21]	A [21]		MODERATE [20]	MODERATE [20]	
Alternative 4 - Surface Clearance		No Impact		No Impact		C		No Impact	No Impact		B	A [23]		B	A [23]		LOW	LOW	
Alternative 5 - Clearance to 1 Foot Depth		No Impact		No Impact		B		No Impact	No Impact		A	A		A	A		HIGH	HIGH	
Alternative 6 - Clearance to Depth		A		A		A		No Impact	No Impact		A	A [22]		A	A [22]		HIGH	HIGH	
NOTES																			
3 The Geophysically Surveyed Area includes the area associated with the transects within this specific sector.																			
4 Based on the fraction of identified target anomalies intrusively investigated in each geophysically surveyed grid and/or transect segment.																			
7 Percentages classify OE items found. If no OE items are found, Category 0 is 100% and Categories 1 - 3 are noted with a ***. If OE items are found, Category 0 is noted with a ***.																			
8 OE Density values shown are the straight average value = # of OE Items / Acres in which they were found.																			
9 Densities and depth range percentages shown in italics and curly brackets indicate characteristics of the OE debris.																			
10 The OE Density range shown represents a 90% confidence interval on the OE Item density calculated using UXO Calculator Version 1.4.2.																			
11 Overall OE item density is based on all OE items found in the area intrusively investigated.																			
12 The surface OE item density is based on the area geophysically surveyed and the 0-1' and 1'-Depth OE item densities are based on the area intrusively investigated.																			
13 Specific activities identified for the recreational current land use include hunting, hiking, and short cuts.																			
14 Specific activities associated with the passive recreation future land use are hiking, walking, biking, picnicking, horseback riding, and other non-motorized activities.																			
17 Exposure to terrestrial wildlife is also assumed.																			
18 Based on the depth of intrusion associated with the identified activities - See Table 5 of USACE OERIA Interim Guidance (3/27/01).																			
19 The frequency of site usage is currently classified as rare and the number of site users is currently classified as low due to restrictions that have been placed on the site (i.e., no hunting or hiking) since the remediation activities began. The current frequency of usage would be classified as occasional if these recreational activities took place.																			
20 Indicated to be the most protective alternative within the construction footprint.																			
21 Risk factor score indicated applies only within the construction footprint.																			
22 No increased protectiveness relative to alternatives with a shallower clearance depth due to the depth distribution of OE items found.																			
23 Removal of surface OE items or debris may reduce the number of potential exposures to souvenir hunters.																			
IMPACT CODE																			
A = Signifies the greatest impact on reducing potential exposures to OE; Relatively less impact as the letter ranking goes to B, C, and subsequent letters.																			
HIGH - Most protective relative to projected land use.																			
LOW - Least protective relative to projected land use.																			
MODERATE - Protectiveness level between Low and High.																			
BASELINE - Protectiveness level associated with Alternative 1 - No Further Action.																			

1 **25.0 RECURRING REVIEWS**

2 **25.1 FOLLOW-ON ACTIVITIES**

3 Follow-on activities associated with the Bravo Area at Fort McClellan, Alabama will be
4 conducted by the USACE in the form of recurring reviews. According to Engineering Pamphlet
5 75-1-4, recurring reviews associated with an OE response action are conducted to determine if
6 that action continues to be protective of human health, safety and the environment. Recurring
7 reviews will be conducted no less frequently than every five years following completion of the
8 response action (e.g., from the time of the Closeout Report).

9 25.1.1 Recurring reviews will be conducted at Fort McClellan to:

- 10 • Ensure that public health, safety, and the environment are being protected by the response
11 actions that were implemented;
- 12 • Verify the integrity of any site controls;
- 13 • Determine if new information has become available that was not available for consideration
14 during the EE/CA that may warrant further action; and
- 15 • Determine if there is any immediate threat to the public or environment that may require an
16 accelerated response.

17 25.1.2 The recurring review team will gather data to determine if any changes within sectors
18 are relevant and may affect the prior recommendations of the EE/CA. Changes to be evaluated
19 consist of:

- 20 • Physical conditions of the sector;
- 21 • Public accessibility and land use;
- 22 • New technology, techniques, or performance standards that have become available and may
23 warrant reconsideration or the EE/CA recommendations; and
- 24 • Effectiveness of the response action to reduce risk.

25 25.1.3 Data gathered during the review process will be used to determine if further action
26 needs to be taken to protect public safety and the human environment. If no changes have taken
27 place, the sector will continue to be monitored at the specified intervals. At the completion of
28 the review, a Recurring Review Report will be prepared and a public notice will be placed in the
29 local newspaper concerning the continued effectiveness of the OE response action.

30 25.1.4 The initial recurring review will be scheduled by the government after the completion
31 of the removal action phase to address the issues and evaluate the data as described above. The
32 estimated cost for the site visit and review is expected to be \$35,000.

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1 **26.0 REFERENCES**

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- 5 Tetra Tech FW, Inc., 2004. Final Site Specific Final Report Water Tank Construction Sites, Fort
6 McClellan, Alabama, February, 2006.
- 7 Tetra Tech FW, Inc., 2004 Addendum to Bravo Workplan. June, 2004.
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- 10 USACE, 1999b. Archives Search Report Conclusions and Recommendations. Fort McClellan,
11 Anniston, Alabama. Prepared by the St. Louis District (revised 2000 & 2001).
- 12 USACE, 2000. Ordnance and Explosives Response, Engineer Manual. EM 1110-1-4009. U.S.
13 Army Corps of Engineers, June 23, 2000.
- 14 USACE, 2001. Interim Guidance Ordnance and Explosives Risk Impact Assessment. March 27,
15 2001.

APPENDIX A

CONTRACT DOCUMENTS

- **Statement of Work, Modification 20**
- **ADEM Approval Letter**
- **Memorandum with Munitions
Response Terminology**

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STATEMENT OF WORK, MODIFICATION 20

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Statement of Work
Site Characterization at Fort McClellan, Alabama
Modification # 20
January 24, 2006

1.0 **Objective:** The objective of this task order is for the Contractor to characterize ranges possibly contaminated with Ordnance and Explosives (OE) at Fort McClellan, Alabama.

2.0 **Background:** Fort McClellan is a US Army facility under the control of the U.S. Army Training and Doctrine Command (TRADOC) and is scheduled to be closed under the Base Realignment and Closure (BRAC) program. Ordnance and Explosives (OE), including Chemical Warfare Materiel (CWM) are suspected to exist on this property.

2.1 **General:** The work required under this Scope of Work (SOW) falls under the BRAC program.

2.1.1 Ordnance and Explosives are a safety hazard and, if present, constitute a hazard to the public and the environment. The Contractor will perform this work in a manner consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and the National Contingency Plan (NCP). For any actions on site, administrative requirements of federal, state, or local permits are not required, but the substantive permit requirements shall be fulfilled. The provisions of 29 CFR 1910.120 apply to all actions taken at this site.

2.2 **Site Description:**

2.2.1 **Location:** Fort McClellan is located northeast of the City of Anniston, Calhoun County, Alabama. To the west are the areas known as Weaver and Blue Mountain. To the North is the City of Jacksonville. The Talladega Forest is to the east of the post.

2.2.2 **Site History:** Fort McClellan has been used for artillery training of troops and the National Guard as early as 1912 to present day. In 1941, McClellan became site of the Chemical Corps Training Command. In 1962, the U.S. Army Combat Developments Command Chemical Biological-Radiological Agency moved to Fort McClellan. In 1973, the Chemical Corps School along with the U.S. Army Combat Developments Command Chemical Biological-Radiological Agency closed. In 1979, the U.S. Army Chemical Corps School re-established along with a Training Brigade for Basic Training.

2.3 **Area of Concern:** The contractor shall characterize the following areas identified in the Conceptual Plan dated August 2000:

a. Alpha Area: This area consists of approximately 942 acres within which are three areas, M1.01, M5, and M6, identified in the Archives Search Report (ASR) as potentially contaminated with OE.

b. Bravo Area: This area consists of approximately 3,806 acres within two parcels, M3 and M4, identified in the ASR as potentially contaminated with OE.

3.0 **Tasks:**

3.1 **Task 1 (Firm Fixed Price) Site Visit:** The purpose of this task is to permit those members of the Contractor with direct project responsibility to gain necessary information about site conditions. A site visit is authorized to assist in preparing the work plan. The site visit team shall include one (1) Senior UXO Supervisor. The Contractor will coordinate the site visit with the Contracting Officer (CO) 10 days prior to arriving on site. The Contractor will prepare an abbreviated SSHP and submit it to the CO for review and approval prior to the visit. The Contractor shall ensure that the site visit is fully coordinated and that all members of the site visit team maintain compliance with the abbreviated SSHP.

3.2 **Task 2 (Firm Fixed Price) Work Plan:** The contractor shall prepare and submit a Site-Wide Work Plan that will provide the basis for performance of all following projects performed on Fort McClellan. The Site-Wide Work Plan shall incorporate all of the requirements contained in Data Item Descriptions within the general statement of work for the basic contract, and will reflect requirements as of October 1999. In addition, the contractor shall prepare and submit a site-specific work plan for each of the two areas under this project in accordance with DID OT-FMC-005-01 and this Task Order. The site specific work plan shall include all site specific details as required by OE-005-1 that are not covered by the site-wide work plan for Fort McClellan. The work plan shall propose site locations and the anticipated work that shall be conducted. The work plan shall include all necessary sub-plans in accordance with DID OT-FMC-005-01 and each required sub-plan's corresponding DID. The work conducted under

this work plan shall also be performed in accordance with the technical requirements as outlined in each DID. Specific requirements determined by the contractor as not applicable shall be clearly identified by the contractor in his work plan. The work plans shall include a conceptual site model for each of the areas to be characterized with the exception of the M1.01 Parcel. The contractor shall prepare a work plan addendum to the Final Site-Specific Work Plan for the Bravo Area EE/CA. The contractor shall prepare a work plan addendum to address the additional work to be performed under this modification.

3.3 Task 3, Option 1 (Firm Fixed Price) Phase I Site Characterization: The purpose of site characterization shall be to delineate the magnitude and extent of OE contamination for the areas identified in paragraph 2.3. The characterization shall produce sufficient information for the contractor to identify target anomalies, prepare risk assessments, evaluate alternatives for remediation, prepare cost analyses for each alternative, and recommend remediation alternatives. The contractor shall perform the first phase of site characterization for the area of concern as identified in this task order. The Phase I site characterization shall exclude removal of subsurface anomalies, except as delineated in the site-specific work plans. Typical activities that may be performed during the Phase I site characterization may include but are not limited to: historical data analysis, footprint reduction methodologies, field reconnaissance, assisted visual transects, and detection of OE. The performance of these activities may require surveying and mapping, brush clearing (including areas surrounding the grids), and/or removal and disposal or staging of surface OE or debris. The contractor shall perform delineation transects in suspected high-density areas within the Alpha EE/CA area and within the M3-1L sector of the Bravo EE/CA area. For characterization of the M1.01 Parcel, the contractor shall utilize data gathered by other contractors under work being performed for the Eastern Bypass. For characterization of all areas, the contractor shall also use the historical data analysis and field reconnaissance information gathered under a separate task order and reported in the Field Reconnaissance and Conceptual Plan dated August 2000. The contractor shall provide security for the suspect chemical warfare materiel that was found during the surface clearance, assist in determining procedures and regulatory requirements for demolition, perform demolition of the item, perform soil sampling, prepare a report on the demolition, and shall relocate work areas outside of exclusions zones surrounding any suspect CWM. The contractor shall perform characterization of approximately 11.8 miles of 5-foot wide transects. This characterization shall utilize a hand-held geophysical instrument with no brush clearing. A hand-held GPS unit may be used to record locations if coverage is available. Characterization shall include investigation of 100% of anomalies up to 40 per 290'; 50% of additional anomalies from 41 to 100 anomalies per 290'; and 30% of anomalies >100 per 290' (estimate anomaly investigation on a fixed unit cost basis). If upon investigation a UXO is identified, a 50' grid will be investigated surrounding the UXO (estimate on a fixed unit cost basis; assume 2 for initial cost estimating purposes). If a piece of HE fragmentation is discovered on a transect, a 50' star pattern transect, 25' lines 5 foot wide from the item found, will be investigated in 8 directions from the piece of fragmentation (estimate on a fixed unit cost basis; assume 10 for initial cost estimating purposes). All anomalies in the grid and star pattern transects will be investigated. If additional frag or UXO are found, the grid or star pattern transect will be repeated from that point. The process would continue until no frag or UXO is found. The contractor shall investigate six grids in the M1.01 area to evaluate the appropriateness of the one-foot clearance by determining if any ordnance items with an explosive hazard are located below one foot in those grids. The investigation shall include geophysical mapping and investigation of anomalies. The six grids as identified in the M1.01 removal report are: D-05, D-41, E-29, G-20, G-24, and G-64. QC of these grids will be performed using MIL STD 1916. **The QC failure criteria for this area shall be any item below a depth of 1 foot that meets the specified target item size of between a 37 mm and a 3" Stokes mortar.**

3.4 Task 4 (Time and Materials) Data Analysis and Validation: The contractor shall perform data validation for a subset of the subsurface anomalies identified during the Phase I site characterization. The contractor shall clearly identify his methodology. The contractor shall interrogate and excavate anomalies to validate his process. The description of terrain and vegetation and the assumptions regarding anomaly density given in Task 5 are applicable to this task. Typical activities that may be performed during data analysis and validation may include, but are not limited to: post-processing of geophysical data, reacquisition of selected anomalies, and excavating, identifying, and disposal of the selected anomalies. The contractor shall fabricate and mobilize two "Bud Lite" engineering control structures for use during the intrusive phase of the investigation, if required to minimize exclusion zones. The contractor may also be required to demobilize and relocate work areas outside of exclusions zones surrounding any suspect CWM.

3.5 Task 5, Option 2 (Time and Materials) Phase II Site Characterization: The contractor shall reacquire, excavate, identify, and dispose of a portion of the anomalies in grid areas not intrusively investigated in Tasks 3 or 4. The contractor shall assume that Phase II Site Characterization shall consist of statistical sampling and analysis of 296.5 acres. For purposes of preparing a cost estimate the contractor shall assume:

- 142 acres are heavily wooded,
- 77 acres are moderately wooded
- 18 acres are open and 59.5 are lightly wooded,
- 125 acres are steeply sloped terrain,
- 111.5 acres are moderately sloped hilly terrain,
- 60 acres are flat terrain,
- all subsurface anomalies to be removed were identified during the discrimination portion of the Data Validation task,
- each acre will require removal of 100 anomalies,
- depth of anomalies will be from **0.0** feet to 4.0 feet, uniform distribution,
- ***objective range for target anomalies will be determined on a site-specific basis through data validation,***
- five UXO per acre will be removed and disposed of, and
- all recovered scrap shall be removed and disposed of in accordance with the basic contract.

The characterization from both phases shall produce sufficient information for the contractor to identify target anomalies, prepare risk assessments, evaluate alternatives for remediation, prepare cost analyses for each alternative, and recommend remediation alternatives.

3.6 Task 6 (Firm Fixed Price) Data Management: The contractor shall manage all data in accordance with DID OT-FMC-005-14. This shall include incorporation of all reports, drawings, or data generated during this Task Order as well as mirroring all changes onto the Fort McClellan database located at USAESCH.

3.7 Task 7 (Firm Fixed Price) Prepare EE/CA Report:

3.7.1 The Contractor shall prepare and submit three EE/CA reports in accordance with DID OE-010. The reports shall contain the Contractor's conclusions as to the nature and extent of OE contamination, risk assessments for each area of concern, and provide recommendations for future work at Fort McClellan within these areas. The area of concern should be sufficiently characterized in the EE/CA. The textual portions of the report shall be fully supported with accompanying maps, charts, and tables as necessary to fully describe and document all work performed and all conclusions and recommendations presented. The M1.01 Parcel findings shall be contained in a stand-alone EE/CA document. The remaining Alpha Area and the Bravo Area shall comprise the other two EE/CAs. Information gathered by another contractor during the CWM EE/CA on the T-38 site and the R&S smoke ranges shall be incorporated into the Alpha area EE/CA and on the Old Burn Pit into the Bravo area EE/CA. The contractor shall evaluate information on ordnance found during actions taken by other contractors within the Alpha and Bravo areas and incorporate this information in the Bravo EE/CA report. The contractor will incorporate the new information into the Alpha EE/CA report, if the information impacts the recommended decisions already made in the Alpha EE/CA. The Contractor shall incorporate the additional sampling performed under the Phase II characterization into the EE/CA report for Alpha Area. The contractor shall incorporate the additional sampling performed under Phase II characterization into the Bravo EE/CA Report and produce an additional Internal Draft version of the Report. In addition, the contractor shall revise the risk assessment and EE/CA Report to redefine the risk sectors based on comments received from the government and produce an additional Draft version of the Bravo EE/CA. The Contractor shall provide an additional version of the Final Alpha EE/CA report to incorporate comments from ADEM and other reviewers. The Contractor shall also provide slippage changes to the Draft-Final Bravo EE/CA report necessary to make the Bravo EE/CA consistent with the Alpha EE/CA. The contractor shall provide revised cost estimates for all alternatives in the EE/CA Report. The contractor shall incorporate the data collected from the additional transects in the Bravo area and the revised Bravo area boundaries into a revised Bravo EE/CA. The contractor shall prepare a letter report as an addendum to the M1.01 Final Site-Specific Report documenting all work performed and the results of the investigation. The contractor shall report findings in accordance with DID OE 030.01. The contractor shall revise the Bravo EE/CA document to reorganize the general and overall Bravo Area process descriptions into each chapter and move the individual risk sector descriptions into tabs, including a table of findings for each sector. These changes shall be made for the remaining versions which include the Draft-Final and Final Bravo EE/CAs. The contractor shall also provide the Appendices on excel files on

CD to addressees, Dan Copeland and Lisa Holstein. **Ensure all QC information on supplemental transects is added to the EE/CA Report. Incorporate a description of how UXO Calculator acreage for grids and transects was calculated into the Bravo EE/CA. Create a summary “GPO” report for the one-week in-house geophysical training course that incorporates the specifics of the tests performed. Remove discussion of and conclusions based on UXO Calculator in the Bravo EE/CA except when used for determination of the initial acreage required for investigation. In the Bravo EE/CA, add a CSM and risk assessment using the residential use scenario for the NFA area. Revise the Bravo EE/CA Report in accordance with the attached outline. Revise EE/CA report per ADEM comments dated 28Mar05 and Army’s responses dated 3Aug05. Include in the report any information as required and as appropriate based on 3Aug05 responses to ADEM so the EE/CA report can be a stand-alone document without having to refer to responses to comments. Revise EE/CA report per ADEM comments dated 6Sep05. Include in the report any information as required and as appropriate to address the comments so the EE/CA report can be a stand-alone document without having to refer to responses to comments. General comment 5 and specific comments 1, 30, and 31 required efforts that are out of the current scope and will be addressed as follows:**

- Address general comment 5 by including OC/OA documentation for the supplemental transects as required by the current scope. ADEM and UXO Pro stated it was not necessary to provide QC documentation for the earlier Bravo EE/CA work.**
- Address specific comment 1 by revising the land use and risk assessment for residential use as stated above. Do not revise land use and risk assessment for the areas recommended for a clearance action.**
- The documentation sheets referenced on page 3-8 of the report and requested by specific comment 30 will not be added to the EE/CA report. Those are dig sheets, and the Army determined the cost is excessive for reproducing those dig sheets for inclusion in the EE/CA report. They were not required by the scope.**
- Specific comment 31 – see above.**

3.7.2 Evaluate Institutional Controls: The EE/CA reports shall fully evaluate physical removal and institutional controls as possible action alternatives. Basic data for the institutional analysis will be collected in accordance with DID OE-100

3.8 Task 8 (Firm Fixed Price) Prepare Action Memorandum: The EE/CAs will be provided to the public for their review and comments. The Contractor shall evaluate any public comments provided by the Contracting Officer and shall incorporate them where directed by the Contracting Officer. Afterwards, the Contractor shall prepare an Action Memorandum for each of the three EE/CAs describing the selected alternative.

3.9 Task 9 (Firm Fixed Price) Meetings/Public Affairs: The Contractor shall attend and participate in nine meetings with DoD, regulatory, and civilian agencies as directed by the CO. The meetings shall last one day each and be held at Fort McClellan, AL. The Contractor shall assist USAESCH Public Affairs Office (PAO) and the Corps of Engineers, Mobile District PAO in developing and executing a Public Affairs program to include public meetings and Restoration Advisory Board (RAB) meetings. **The contractor shall participate in 6 one-hour conference calls and be prepared to discuss Fort McClellan projects. The contractor shall attend and participate in two meetings with DoD, regulatory, and civilian agencies as directed by the CO. The meetings shall last one day each and be held at Fort McClellan, AL.**

3.10 Task 10 (Fixed Price) Delivery Order Administration: The Contractor shall provide all labor, facilities, equipment and materials to administer the Hazardous Pay Differential provisions of the Service Contract Act for all employees working under this Delivery Order.

4.0 Schedule of Deliverables:

4.1 Deliverables: The Contractor shall provide the indicated deliverables on the following schedule:

Deliverables	Days after NTP
Internal Draft M1.01 EE/CA	15 days after NTP
Draft M1.01 EE/CA	25 days after NTP
Draft Final M1.01 EE/CA	5 days after comments received
Draft M1.01 Action Memorandum	5 days after DF EE/CA received
Final M1.01 EE/CA	3 days after public meeting

Final M1.01 Action Memorandum	5 days after comments received
ASSHP	10 days prior
Draft Work Plan Alpha Area	20 days after award
Draft Work Plan Bravo Area	34 days after NTP
Final Work Plan Alpha Area, Bravo Area	5 days after comments received
Draft Bravo EE/CA Work Plan Addendum	10 days after NTP
Draft-Final Bravo EE/CA Work Plan Addendum	10 days after receipt of comments
Final Bravo EE/CA Work Plan Addendum	10 days after receipt of comments
M1.01 Work Plan Addendum	10 days after NTP
Internal Draft EE/CA Report Alpha Area, Bravo Area	15 days after receipt of CWM EE/CA data
Revised Internal Draft Bravo EE/CA Report	30 days after completion of fieldwork
Draft EE/CA Report Alpha Area, Bravo Area	35 days after field work completed
Revised Draft Bravo Area EE/CA Report	10 days after draft comments received
Draft-Final EE/CA Report Alpha Area, Bravo Area	10 days after draft comments received
Revised Draft Bravo Area EE/CA Report	30 days after completion of fieldwork
Revised Draft-Final Bravo Area EE/CA Report	10 days after comments received
Final EE/CA Report Alpha Area, Bravo Area	1 day after public comments received
Revised Final Alpha EE/CA Report	10 days after receipt of comments
M1.01 Letter Report	15 days after completion of field work
Action Memorandum-Draft Alpha Area, Bravo Area	10 days after F EECA received
Action Memorandum-Final Alpha Area, Bravo Area	10 days after draft comments received

Status Reports and Telephone/Conversation Reports are due monthly. The original of each of these reports shall be sent within 10 days of the end of the reporting period by normal mail to the project manager.

4.2 Addresses and Distribution: The Contractor shall furnish copies of the plans and reports as indicated to each addressee listed below in the quantities indicated. The following addresses shall be used in mailing submittals:

ADDRESSEE	Draft Submittals	Draft-Final & Final Submittals
Commander, US Army Engineering and Support Center Attn: CEHNC-OE-DC (Dan Copeland) 4820 University Square Huntsville, Alabama 35816-1822	6	6
Commander, US Army Engineering and Support Center Attn: CEHNC-CT-E (Frances Steel) 4820 University Square Huntsville, Alabama 35816-1822	1	1
Commander, US Army Engineer District, Mobile Attn: CESAM (Ellis Pope) PO Box 2288 Mobile, Alabama 36628-0001	3	3
Commander, US Army Engineer Division, South Atlantic Attn: CESAD-PM-H (S. Ernst) 77 Forsyth Street SW Atlanta, Georgia 30335-6801	NA	1
US Environmental Protection Agency Attn: Doyle Brittain 61 Forsyth Street SW Atlanta, Georgia 30303-3104	3	3

Alabama Department of Environmental Management Govt Facilities Section, Hazardous Waste Br, Land Division Attn: Shana Decker 1400 Coliseum Boulevard Montgomery, Alabama 36110-2059	3	3
US Army Garrison Attn: Lisa Holstein 291 Jimmy Parks Boulevard Fort McClellan, AL 36205-5000	9	15

5.0 Submittals and Correspondence:

5.1 Format and Content of Reports: All drawings shall be of engineering quality with sufficient details. The report shall consist of 8 1/2" X 11" sheets of paper. The report covers shall consist of durable binders and shall hold pages firmly while allowing easy removal, addition, or replacement of pages. A title shall identify the site, the Contractor, the Huntsville Center, and date. The Contractor's identification shall not dominate the title page.

5.2 Review Comments: The Contractor shall review all comments received from the Contracting Officer or the Contracting Officer's Representative and evaluate their appropriateness based upon their merit. The Contractor shall incorporate all applicable comments and provide a written response to each comment no later than 21 days after the Contractor receives the comment.

5.3 Identification of Responsible Personnel: Each submittal shall identify the specific members and title of the subcontractor and Contractor's staff that had significant input into the report.

5.4 Presentations: The Contractor shall make presentations of work performed and as directed by the CO. The presentation shall consist of a summary of the work accomplished and will be followed by an open discussion.

5.5 Minutes of Meetings: The Contractor shall prepare and submit minutes of all meetings and/or presentations within 10 working days to the CO.

5.6 Correspondence: The Contractor shall keep a record of phone conversations and written correspondence affecting decisions relating to the performance of this task order. A summary of the phone conversations and copies of written correspondence shall be submitted to the CO with the monthly progress report.

5.7 Monthly Progress Report: The Contractor shall prepare and submit monthly progress reports in accordance with DID OT-FMC-080.

5.8 Digital Data: All final text files generated by the Contractor under this task order shall be furnished to the CO in Word 97, IBM PC-compatible format. All drawings shall be on reproducible Mylar and digitized 3D design file in Intergraph Corporation format, compatible with USAESCH Graphics system. All field generated digital data shall be transmitted to the USAESCH technical representative on a weekly basis. The results of the excavations will include all pertinent features of the anomaly, to include items such as: type, condition, actual location, depth, size, mass, and any other information that would significantly assist in classifying the anomaly. The location in State Grid Plane Coordinates, the instrument response, anomaly code(s), and important information shall be provided in an Excel spreadsheet and data base listing, as a minimum; northing, easting, relative signal strength, measured signal strength, and any unusual or noteworthy attributes to facilitate excavation tracking. A standard structure and format shall be used to digitally track the results from the anomaly excavations.

6.0 Government Furnished Information: The government will provide the following information to the contractor:

- Draft Archive Search Report for Fort McClellan, 1998
- Planimetric mapping and contour files for Fort McClellan
- Historical Photographic coverage for area identified in paragraph 2.3

Upon award of the contract the government will also provide historical photo interpretation for the area identified in paragraph 2.3.

7.0 Performance Metrics: The performance and subsequently the evaluation of the contractor on this task order shall be based on certain performance metrics. At the completion of the Task Order a board consisting of at least two government personnel and one representative of the contractor will perform the contractor evaluation for

approval by the CO or his designated representative. The contractor representative will be selected by the CO. Appraisals will be issued to support exercising subsequent option periods using AFARS 42.15 and ER 715-1-19.

7.1 Safety.

7.1.1 Class A Accidents. Any Class A accident, which is the result of a safety violation by the contractor, will result in an unsatisfactory safety and overall rating.

7.1.2 Accident Prevention. The contractor will receive an excellent, satisfactory, or unsatisfactory rating based on his compliance with the Approved Work Plan and other safety regulations and guidance as applicable. This will be determined by the number and severity of safety violations issued by the USACE Safety Specialist as indicated below.

7.1.2.1 Each major safety violation (life threatening, normally associated with activities involving OE, and any recordable accident as specified by paragraph 3-3, AR 385-40 with USACE Supplement).

7.1.2.2 Each minor safety violation (non-life threatening, normally associated with non-OE activities, and any reportable accident as specified by paragraph 3-2, AR 385-40 with USACE Supplement).

7.2 The contractor must achieve at least a satisfactory rating on all safety metrics to achieve an overall excellent appraisal rating on the Task Order.

7.3 Quality.

7.3.1. Documentation. The contractor will receive an excellent, satisfactory or unsatisfactory rating based on the quality of all documentation including digital data submitted by the contractor. Factors that may be considered in the evaluation are: technical content, format, readability, appearance, and responsiveness to comments.

7.3.2. Field Work.

7.3.2.1 Detection. The contractor will receive an excellent, satisfactory or unsatisfactory rating based on his ability to detect target anomalies. This will be measured by the results of QA performed by the government or a representative of the government.

7.3.2.2 Reacquisition. The contractor will receive an excellent, satisfactory or unsatisfactory rating based on his ability to accurately determine the location of anomalies.

7.3.3 Processes. The contractor will receive an excellent, satisfactory or unsatisfactory rating based on the effectiveness of his processes utilized on the project. Factors that may be considered in the evaluation are: accuracy of characterization of areas potentially contaminated with OE, data capture, data management, teamwork, and integration of all processes utilized.

7.4 Schedule. The contractor will be rated on his ability to meet schedules on Final deliverables. This will be measured as a percentage of deliverables for this Task Order received on time. Schedule slippage beyond the control of the contractor shall be documented by the CO and new schedules shall be established with approval of the government.

7.5 Customer Satisfaction. A customer satisfaction survey developed by government with input from the contractor will be sent to the contractor’s customers who have been directly involved with part of the work performed under this Task Order. The contractor will be rated on each criterion using a scale of one to five. A cumulative score from one to five will be generated from the results of all the surveys.

7.6 Objective Metrics. The following objective metrics will be used for this Task Order to determine the contractor’s performance appraisal. Subjective metrics will be evaluated on a qualitative basis.

	Excellent	Satisfactory	Unsatisfactory
Safety			
Class A Accident, Contractor at Fault	0		1
# Major Safety Violations	0	1	>1
# Minor Safety Violations	1	2-4	>4
Quality			
Detection (% Grids Passing <i>QA</i>)	>99	95-99	<95
Reacquisition (% within +/- 0.5m)	>95	95-75	<75
Schedule			
Final Deliverables (% on schedule)	100	75-99	<75
Customer Satisfaction			

Customer Satisfaction Survey (rating)	>4.5-5	3-4.5	<3
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7.7 Incentives. Incentives shall be awarded to the contractor when he achieves a satisfactory or better performance rating on all of the Safety metrics and an excellent performance rating on at least 80% of the metrics for that Task Order. Incentives for excellent performance may include but are not limited to:

- Letters/Certificates of Commendation presented in public ceremonies by high level USAESCH officials
- Write-ups in USACE publications
- Posting of contractors "excellent" performance on the Huntsville Center's home page
- Exercising Option year on contract

7.8 The government reserves the right to give incentive awards for specific acts, within specific areas or to specific individuals as well as on a Task Order basis. Areas that will be given special consideration when determining if incentives are merited are safety, innovation, and continuous improvement.

7.9 Satisfactory Rating. *The contractor shall receive a satisfactory rating on this task order if he achieves a satisfactory of better performance rating on all the Safety metrics and a satisfactory rating on at least 80% of the metrics for this task order.*

7.10 Performance Improvement Plan. Any time the contractor receives an unsatisfactory rating on any performance metric, he will be required to develop a Performance Improvement Plan to correct any deficiencies in that area.

7.11 Disincentives. Disincentives for poor performance may include but are not limited to:

- Poor Performance Appraisals
- Awarding follow on Task Order work to others
- Not exercising Option years
- Redoing unsatisfactory work at no cost to the government
- Reporting the level of performance to higher level USAESCH authorities, including the Director of Contracting and the Commander

8.0 **Public Affairs:** The Contractor shall not publicly disclose any data generated or reviewed under this contract unless authorized by the CO. The Contractor shall refer all requests for information concerning the site condition to the USAESCH Project Manager. Reports and data generated under this task order are the property of the Department of Defense and distribution to any other sources by the Contractor, unless authorized by the CO, is prohibited.

9.0 **References:**

9.1 Archives Search Report for Fort McClellan, St. Louis District, 1999.

9.2 Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, Public Law (PL)96-510, 94 Stat 2767, 42 USC 9601.

9.3 NIOSH/OSHA/USCG/EPA Manual for Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, Oct. 85.

9.4 HQUSACE Letter, DACS-SF, Explosives Safety Policy for Real Property Containing Conventional Ordnance and Explosives.

9.5 HQDA Policy Memorandum, Interim Guidance for Biological Warfare Materiel (BWM) and Non-stockpile Chemical Warfare Materiel (CWM) Response Activities, 5 Sep 97.

9.6 EP 1110-1-18, Draft OE Response

9.7 AR 75-15, Responsibilities and Procedures for Explosive Ordnance Disposal (EOD).

9.8 AR 190-11, Physical Security of Arms, Ammunition, and Explosives.

9.9 AR 200-1, Environmental Protection and Enhancement.

9.10 AR 200-2, Environmental Effects of Army Actions.

9.11 AR 385-10, The Army Safety Program

9.12 AR 385-40, Accident Reporting and Records with USACE Supplement.

9.13 AR 385-61, The Army Chemical Agent Safety Program.

9.14 AR 385-63, Safety, Policies and Procedures for Firing Ammunition for Training, Target, Practice and Combat.

9.15 AR 385-64, U.S. Army Explosives Safety Program.

- 9.16 DA PAM 385-64, Ammunition and Explosives Safety Standards.
- 9.17 29 CFR 1910.120/1926, Occupational Safety and Health Standards.
- 9.18 32 CFR, Part 203, Technical Assistance for Public Participation (TAPP) in Defense Environmental Restoration Activities.
- 9.19 40 CFR, Parts 260 thru 270 plus 300, U. S. Printing Office latest edition.
- 9.20 40 CFR, Part 300, EPA National Oil and Hazardous Substance Pollution Contingency Plan (NCP)
- 9.21 DoD 6055.9-STD, DOD Ammunition and Explosives Safety Standards.
- 9.22 DoD 4160.21-M, Defense Utilization and Disposal Manual.
- 9.23 DoD 4160.21-M-1, Defense Demilitarization Manual.
- 9.24 EM 385-1-1, Safety and Health Requirements Manual.
- 9.25 ER 385-1-92, Engineering Regulations Safety and Occupational Health Document Requirement for HTRW and OE Activities.
- 9.26 ER 715-1-19, Service and Supply Contractor Performance Evaluations.
- 9.27 FAR 45.5 and its supplements, Federal Acquisition Regulation, Management of Government Property in the Possession of Contractors.
- 9.28 AFARS, Army Federal Acquisition Regulation Supplement
- 9.29 Pertinent government furnished unclassified TM 60-series publications.
- 9.30 TM 60A-1-1-22, EOD Procedures, General EOD Safety Precautions.
- 9.31 TM 60A-1-1-31, EOD Procedures, General Information on EOD Disposal Procedures.
- 9.32 CEHNC Safety Concepts & Basic Considerations for Unexploded Ordnance (UXO) Operations.
- 9.33 CEHNC UXO Personnel Database.
- 9.34 NTC Regulation 350-3.

ADEM APPROVAL LETTER

ADEM

ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

POST OFFICE BOX 301463 36130-1463 ♦ 1400 COLISEUM BLVD. 36110-2059

MONTGOMERY, ALABAMA

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(334) 271-7700

JAMES W. WARR
DIRECTOR

DON SIEGELMAN
GOVERNOR

October 12, 2001

Ronald M. Levy
BRAC Environmental Coordinator
Environmental Office, 291 Jimmy Parks Blvd.
US Army Garrison
Fort McClellan, Alabama 36205

Facsimiles: (334)
Administration: 271-7950
General Counsel: 394-4332
Air: 279-3044
Land: 279-3050
Water: 279-3051
Groundwater: 270-5631
Field Operations: 272-8131
Laboratory: 277-6718
Mining: 394-4326
Education/Outreach: 394-4383


RE: **ADEM Review and Concurrence:** *Final Site-Specific Work Plan for the Bravo Area Engineering Evaluation/Cost Analysis, Ordnance and Explosives Response* dated April 5, 2001. Fort McClellan, Calhoun County, Alabama

Dear Mr. Levy:

The Alabama Department of Environmental Management (ADEM or the Department) has reviewed the subject *Final Site-Specific Work Plan for the Bravo Area Engineering Evaluation/Cost Analysis, Ordnance and Explosives Response* dated April 5, 2001 for Fort McClellan. The Ordnance and Explosives Response component of the draft Bravo Area Engineering Evaluation/Cost Analysis was initially addressed in the March 27, 2001 Base Realignment and Closure Team (BCT) meeting at Fort McClellan. At the meeting, ADEM provided its comments on the Draft EE/CA. ADEM agrees that the Department's comments have been adequately addressed and changes have been appropriately incorporated into the document. Based on our review, we concur with the submittal and offer no further comments for Army review.

For any questions or concerns regarding this matter please contact Mr. Philip Stroud at 334-270-5646 or via email at pns@adem.state.al.us.

Sincerely,


Stephen A. Cobb, Chief
Hazardous Waste Branch
Land Division

SAC/ps

cc: Mr. Doyle Brittain/EPA Region 4
Mr. Dan Copeland/ CEHNC-OE-DC, Huntsville
Mr. Ellis Pope/USA COE, Mobile District
Mr. Jim Grassiano/ADEM

File: ADEM Land Division/Hazardous Waste Branch/Fort McClellan, Correspondence, 2001

RCVD OCT 25 '01 AM 8:15

**MEMORANDUM WITH MUNITIONS RESPONSE
TERMINOLOGY**



DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
INSTALLATIONS AND ENVIRONMENT
110 ARMY PENTAGON
WASHINGTON, DC 20310-0110

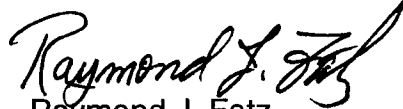
APR 21 2005

MEMORANDUM FOR THE ASSISTANT CHIEF OF STAFF FOR INSTALLATION
MANAGEMENT

SUBJECT: Munitions Response Terminology

1. This memorandum replaces my October 28, 2003 memorandum, subject: Definitions Related to Munitions Response Terms, and requests your office ensure that the enclosed terms and their definitions (Enclosure 1) are used, when appropriate, in correspondence (e.g., policies, guidance) and briefings concerning the Army's implementations of its Military Munitions Response Program (MMRP), Sustainable Range Management Program (SRMP) and, as appropriate, in other munitions-related matters.
2. In the past three years, the Department of Defense (DoD) has developed policies and guidance to implement its MMRP and SRMP. It has also worked to close a policy gap related to the management of material that may pose explosives hazards to DoD personnel and/or the public. During this period, DoD has been actively engaged, through the Munitions Response Committee (MRC), with the U.S. Environmental Protection Agency, Federal Land Managers, states, and with American Indians and Alaska Natives, to address issues related to the cleanup of munitions response sites.
3. To provide clarity and consistency in these efforts and in internal and external discussions, DoD has been working to establish and use common terms and definitions. The consistent use of accurate, descriptive terms, the definitions of which are commonly understood, is important to our dialogue with environmental regulators and safety officials, stakeholders, and the public.
4. Many of the terms that DoD has adopted for use in addressing munitions-related issues are now codified in Federal statute. On December 14, 2004, the Department of Defense Explosives Safety Board approved revisions to DoD 6055.9-STD, Ammunition and Explosives Safety Standards, using the enclosed terms.
5. The U.S. Army Technical Center for Explosives Safety, in coordination with other agencies, developed the enclosed matrix (Enclosure 2) to help the communities (e.g., operational, explosives safety, logistical, and cleanup) involved in addressing munitions-related operations to better understand how some of the new terms apply to actions they conduct.

6. Use of this terminology does not imply any specific funding authority, nor does it alter the DERP Management Guidance's program eligibility criteria.
7. My staff point of contact is J. C. King at (703) 697-5564 or jc.king@us.army.mil.



Raymond J. Fatz

Deputy Assistant Secretary of the Army
(Environment, Safety and Occupational Health)
OASA(I&E)

Enclosures

cf:

G-3

G-4

DAIM-BD

SFIM-OP

SAGC

OTJAG-ELD

NGB

CEMP-R

USACE

AEC

Enclosure 1: Military Munitions-Related Terms and Definitions

<u>Consolidated Definitions</u>
Anomaly Avoidance. Techniques employed on property known or suspected to contain UXO, other munitions that may have experienced abnormal environments (e.g., DMM), munitions constituents in high enough concentrations to pose an explosive hazard, or CA, regardless of configuration, to avoid contact with potential surface or subsurface explosive or CA hazards, to allow entry to the area for the performance of required operations.
Chain of Custody. The activities and procedures taken throughout the inspection, re-inspection and documentation process to maintain positive control of MPPEH to ensure the veracity of the process used to determine the status of material as to its explosive hazard. This includes all such activities from the time of collection through final disposition.
Chemical Agent (CA). A chemical compound (to include experimental compounds) that, through its chemical properties produces lethal or other damaging effects on human beings, is intended for use in military operations to kill, seriously injure, or incapacitate persons through its physiological effects. Excluded are research, development, testing and evaluation (RDTE) solutions; riot control agents; chemical defoliants and herbicides; smoke and other obscuration materials; flame and incendiary materials; and industrial chemicals.
Chemical Agent (CA) Hazard. A condition where danger exists because CA is present in a concentration high enough to present potential unacceptable effects (e.g., death, injury, damage) to people, operational capability, or the environment.
Chemical Agent (CA) Safety. A condition where operational capability and readiness, people, property, and the environment are protected from the unacceptable effects or risks of a mishap involving chemical warfare material (CWM) and CA in other than munitions configurations.
Chemical Warfare Material (CWM). Items generally configured as a munition containing a chemical compound that is intended to kill, seriously injure, or incapacitate a person through its physiological effects. CWM includes V- and G-series nerve agents or H-series (mustard) and L-series (lewisite) blister agents in other-than-munition configurations; and certain industrial chemicals (e.g., hydrogen cyanide (AC), cyanogen chloride (CK), or carbonyl dichloride (called phosgene or CG)) configured as a military munition. Due to their hazards, prevalence, and military-unique application, chemical agent identification sets (CAIS) are also considered CWM. CWM does not include: riot control devices; chemical defoliants and herbicides; industrial chemicals (e.g., AC, CK, or CG) not configured as a munition; smoke and other obscuration producing items; flame and incendiary producing items; or soil, water, debris or other media contaminated with low concentrations of chemical agents where no CA hazards exist.
Chemical Warfare Material (CWM) Response. Munitions responses and other responses to address the chemical safety; explosives safety, when applicable; human health; or environmental risks presented by CA-filled munitions and CA in other than munitions configurations. (See munitions response.)
Construction Support. Assistance provided by DoD EOD or UXO-qualified personnel and/or by personnel trained and qualified for operations involving CA, regardless of configuration, during intrusive construction activities on property known or suspected to contain UXO, other munitions that may have experienced abnormal environments (e.g., DMM), munitions constituents in high enough concentrations to pose an explosive hazard, or CA, regardless of configuration, to ensure the safety of personnel or resources from any potential explosive or CA hazards.
Cultural Debris. Debris found on operational ranges or munitions response sites, which may be removed to facilitate a range clearance or munitions response, that is not related to munitions or range operations. Such debris includes, but is not limited to: rebar, household items (refrigerators, washing machines, etc.), automobile parts and automobiles that were not associated with range targets, fence posts, and fence wire.
Defense Sites. Locations that are or were owned by, leased to, or otherwise possessed or used by the Department of Defense. The term does not include any operational range, operating storage or manufacturing facility, or facility that is used for or was permitted for the treatment or disposal of military munitions. (10 U.S.C. 2710(e)(1))
Discarded Military Munitions (DMM). Military munitions that have been abandoned without proper disposal or removed from storage in a military magazine or other storage area for the purpose of disposal. The term does not include unexploded ordnance, military munitions that are being held for future use or planned disposal, or military munitions that have been properly disposed of, consistent with applicable environmental laws and regulations. (10 U.S.C. 2710(e)(2))
Disposal. End of life tasks or actions for residual materials resulting from demilitarization or disposition operations.
Disposition. The process of reusing, recycling, converting, redistributing, transferring, donating, selling, demilitarizing, treating, destroying, or fulfilling other life-cycle guidance, for DoD property.

Enclosure 1: Military Munitions-Related Terms and Definitions

<p><u>Documentation of the Explosives Safety Status of Material.</u> Documentation attesting that material: (1) does not present an explosive hazard and is consequently safe for unrestricted transfer within or release from DoD control, or (2) is MPPEH, with the known or suspected explosive hazards stated, that is only transferable or releasable to a qualified receiver. This documentation must be signed by a technically qualified individual with direct knowledge of: (1) the results of both the material's 100 percent inspection and 100 percent re-inspection or of the approved process used and the appropriate level of re-inspection, and (2) the veracity of the chain-of-custody for the material. This signature is followed by the signature of another technically qualified individual who inspects the material on a sampling basis (sampling procedures are determined by DoD entity that is inspecting the material).</p>
<p><u>Environmental Regulators and Safety Officials.</u> Include, but may not be limited to environmental regulators, environmental coordinators or hazardous material coordinators, law enforcement officers, and safety personnel of the U.S. Environmental Protection Agency (USEPA), American Indians and Alaska Natives, other Federal Land Managers, and/or the States. When appropriate, public health officials of various agencies may also be involved.</p>
<p><u>Explosive Hazard.</u> A condition where danger exists because explosives are present that may react (e.g., detonate, deflagrate) in a mishap with potential unacceptable effects (e.g., death, injury, damage) to people, property, operational capability, or the environment.</p>
<p><u>Explosive Ordnance Disposal (EOD).</u> The detection, identification, on-site evaluation, rendering safe, recovery, and final disposal of unexploded ordnance and of other munitions that have become an imposing danger, for example, by damage or deterioration.</p>
<p><u>Explosive Ordnance Disposal (EOD) Personnel.</u> Military personnel who have graduated from the Naval School, Explosive Ordnance Disposal; are assigned to a military unit with a Service-defined EOD mission; and meet Service and assigned unit requirements to perform EOD duties. EOD personnel have received specialized training to address explosive and certain CA hazards during both peacetime and wartime. EOD personnel are trained and equipped to perform Render Safe Procedures (RSP) on nuclear, biological, chemical, and conventional munitions, and on improvised explosive devices.</p>
<p><u>Explosive Ordnance Disposal (EOD) Unit.</u> A military organization constituted by proper authority; manned with EOD personnel; outfitted with equipment required to perform EOD functions; and assigned an EOD mission.</p>
<p><u>Explosives or Munitions Emergency Response.</u> All immediate response activities by an explosives and munitions emergency response specialist to control, mitigate, or eliminate the actual or potential threat encountered during an explosives or munitions emergency. An explosives or munitions emergency response may include in-place render-safe procedures, treatment or destruction of the explosives or munitions, and/or transporting those items to another location to be rendered safe, treated, or destroyed. Any reasonable delay in the completion of an explosives or munitions emergency response caused by a necessary, unforeseen, or uncontrollable circumstance will not terminate the explosives or munitions emergency. Explosives and munitions emergency responses can occur on either public or private lands and are not limited to responses at RCRA facilities. (Military Munitions Rule, 40 CFR 260.10)</p>
<p><u>Explosives Safety.</u> A condition where operational capability and readiness, people, property, and the environment are protected from the unacceptable effects or risks of potential mishaps involving military munitions.</p>
<p><u>Interim Holding Facility (IHF).</u> A temporary storage facility designed to hold recovered chemical warfare material (RCWM).</p>
<p><u>Land Use Controls (LUC).</u> LUC are physical, legal, or administrative mechanisms that restrict the use of, or limit access to, real property, to manage risks to human health and the environment. Physical mechanisms encompass a variety of engineered remedies to contain or reduce contamination and/or physical barriers to limit access to real property, such as fences or signs.</p>
<p><u>Long-Term Management (LTMgt).</u> The period of site management (including maintenance, monitoring, record keeping, 5-year reviews, etc.) initiated after response (removal or remedial) objectives have been met (i.e., after Response Complete).</p>
<p><u>Material Potentially Presenting an Explosive Hazard (MPPEH).</u> Material potentially containing explosives or munitions (e.g., munitions containers and packaging material; munitions debris remaining after munitions use, demilitarization, or disposal; and range-related debris); or material potentially containing a high enough concentration of explosives such that the material presents an explosive hazard (e.g., equipment, drainage systems, holding tanks, piping, or ventilation ducts that were associated with munitions production, demilitarization or disposal operations). Excluded from MPPEH are munitions within DoD's established munitions management system and other hazardous items that may present explosion hazards (e.g., gasoline cans, compressed gas cylinders) that are not munitions and are not intended for use as munitions.</p>

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Military Munitions. Military munitions means all ammunition products and components produced for or used by the armed forces for national defense and security, including ammunition products or components under the control of the Department of Defense, the Coast Guard, the Department of Energy, and the National Guard. The term includes confined gaseous, liquid, and solid propellants; explosives, pyrotechnics, chemical and riot control agents, smokes, and incendiaries, including bulk explosives, and chemical warfare agents; chemical munitions, rockets, guided and ballistic missiles, bombs, warheads, mortar rounds, artillery ammunition, small arms ammunition, grenades, mines, torpedoes, depth charges, cluster munitions and dispensers, demolition charges; and devices and components thereof.

The term does not include wholly inert items; improvised explosive devices; and nuclear weapons, nuclear devices, and nuclear components, other than nonnuclear components of nuclear devices that are managed under the nuclear weapons program of the Department of Energy after all required sanitization operations under the Atomic Energy Act of 1954 (42 U.S.C. 2011 et seq.) have been completed. (10 U.S.C. 101(e)(4)(A) through (C))

Military Munitions Burial Site. A site, regardless of location, where military munitions or CA, regardless of configuration, were intentionally buried, with the intent to abandon or discard. This term includes burial sites used to dispose of military munitions or CA, regardless of configuration, in a manner consistent with applicable environmental laws and regulations or the national practice at the time of burial. It does not include sites where munitions were intentionally covered with earth during authorized destruction by detonation, or where in-situ capping is implemented as an engineered remedy under an authorized response action.

Minimum Separation Distance (MSD). MSD is the distance at which personnel in the open must be from an intentional or unintentional detonation.

Munition with the Greatest Fragmentation Distance (MGFD). The munition with the greatest fragment distance that is reasonably expected (based on research or characterization) to be encountered in any particular area.

Munitions and Explosives of Concern (MEC). This term, which distinguishes specific categories of military munitions that may pose unique explosives safety risks means: (A) Unexploded ordnance (UXO), as defined in 10 U.S.C. 101(e)(5); (B) Discarded military munitions (DMM), as defined in 10 U.S.C. 2710(e)(2); or (C) Munitions constituents (e.g., TNT, RDX), as defined in 10 U.S.C. 2710(e)(3), present in high enough concentrations to pose an explosive hazard.

Munitions Constituents (MC). Any materials originating from unexploded ordnance (UXO), discarded military munitions (DMM), or other military munitions, including explosive and non-explosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions. (10 U.S.C. 2710(e)(3)).

Munitions Debris. Remnants of munitions (e.g., fragments, penetrators, projectiles, shell casings, links, fins) remaining after munitions use, demilitarization, or disposal.

Munitions Response. Response actions, including investigation, removal actions and remedial actions to address the explosives safety, human health, or environmental risks presented by unexploded ordnance (UXO), discarded military munitions (DMM), or munitions constituents (MC), or to support a determination that no removal or remedial action is required.

Munitions Response Area (MRA). Any area on a defense site that is known or suspected to contain UXO, DMM, or MC. Examples include former ranges and munitions burial areas. A munitions response area is comprised of one or more munitions response sites.

Munitions Response Site (MRS). A discrete location within an MRA that is known to require a munitions response.

Mutual Agreement. A meeting of the minds on a specific subject, and a manifestation of intent of the parties to do or refrain from doing some specific act or acts. Inherent in any mutual agreement or collaborative process are the acknowledgement of each member's role in the process and their differing views of their authorities. The mutual agreement process will provide a means of resolving differences without denying the parties an opportunity to exercise their respective authorities should mutual agreement fail to be achieved.

One Percent Lethality Distance. A distance calculated from a given CA Maximum Credible Event (MCE) and meteorological conditions (temperature, wind speed, Pasquill stability factor) and established as the distance at which dosage from that MCE agent release would be 150 mg-min/m³ for H and HD agents, 75 mg-min/m³ for HT agent, 150 mg-min/m³ for Lewisite, 10 mg-min/m³ for GB agent, 4.3 mg-min/m³ for VX vapor, and 0.1 mg-min/m³ for inhalation and deposition of liquid VX.

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<p>On-call Construction Support. Construction support provided, on an as needed basis, where the probability of encountering UXO, other munitions that may have experienced abnormal environments (e.g., DMM), munitions constituents in high enough concentrations to pose an explosive hazard, or CA, regardless of configuration, has been determined to be low. This support can respond from off-site when called, or be on-site and available to provide required construction support.</p>
<p>On-site Construction Support. Dedicated construction support, where the probability of encountering UXO, other munitions that may have experienced abnormal environments (e.g., DMM), munitions constituents in high enough concentrations to pose an explosive hazard, or CA, regardless of configuration, has been determined to be moderate to high.</p>
<p>On-the-Surface. A situation in which UXO, DMM or CA, regardless of configuration, are: (A) entirely or partially exposed above the ground surface (i.e., the top of the soil layer); or (B) entirely or partially exposed above the surface of a water body (e.g., because of tidal activity).</p>
<p>Open Burn (OB). An open-air combustion process by which excess, unserviceable, or obsolete munitions are destroyed to eliminate their inherent explosive hazards.</p>
<p>Open Detonation (OD). An open-air process used for the treatment of excess, unserviceable or obsolete munitions whereby an explosive donor charge initiates the munitions being treated.</p>
<p>Operational Range. A range that is under the jurisdiction, custody, or control of the Secretary of Defense and that is used for range activities; or although not currently being used for range activities, that is still considered by the Secretary to be a range and has not been put to a new use that is incompatible with range activities. (10 U.S.C. 101(e)(3)(A) and (B)). Also includes “military range,” “active range,” and “inactive range” as those terms are defined in 40 CFR §266.201.</p>
<p>Primary Explosives. Primary explosives are highly sensitive compounds that are typically used in detonators and primers. A reaction is easily triggered by heat, spark, impact or friction. Examples of primary explosives are lead azide and mercury fulminate.</p>
<p>Public Access Exclusion Distance (PAED). The PAED is defined as longest distance of the hazardous fragment distance, inhabited building distance (IBD) for overpressure, or the One Percent Lethality Distance. For siting purposes, the PAED is analogous to the IBD for explosives; therefore, personnel not directly associated with the chemical operations are not to be allowed within the PAED.</p>
<p>Qualified Receiver. Entities that have personnel who are, or individuals who are, trained and experienced in the identification and safe handling of used and unused military munitions, and any known or potential explosive hazards that may be associated with the MPPEH they receive; and are licensed and permitted or otherwise qualified to receive, manage, and process MPPEH.</p>
<p>Range. A designated land or water area that is set aside, managed, and used for range activities of the Department of Defense. The term includes firing lines and positions, maneuver areas, firing lanes, test pads, detonation pads, impact areas, electronic scoring sites, buffer zones with restricted access, and exclusionary areas. The term also includes airspace areas designated for military use in accordance with regulations and procedures prescribed by the Administrator of the Federal Aviation Administration. (10 U.S.C. 101(e)(1)(A) and (B))</p>
<p>Range activities. Research, development, testing, and evaluation of military munitions, other ordnance, and weapons systems; and the training of members of the armed forces in the use and handling of military munitions, other ordnance, and weapons systems. (10 U.S.C. 101(e)(2)(A) and (B))</p>
<p>Range Clearance. The destruction, or removal and proper disposition of used military munitions (e.g., unexploded ordnance (UXO) and munitions debris) and other range-related debris (e.g., target debris, military munitions packaging and crating material) to maintain or enhance operational range safety or prevent the accumulation of such material from impairing or preventing operational range use. “Range clearance” does not include removal, treatment, or remediation of chemical residues or munitions constituents from environmental media, nor actions to address discarded military munitions (e.g., burial pits) on operational ranges.</p>
<p>Range-Related Debris. Debris, other than munitions debris, collected from operational ranges or from former ranges (e.g., target debris, military munitions packaging and crating material).</p>
<p>Recovered Chemical Warfare Material (RCWM). CWM used for its intended purpose or previously disposed of as waste, which has been discovered during a CWM response or by chance (e.g., accidental discovery by a member of the public), that DoD has either secured in place or placed under DoD control, normally in a DDESB-approved storage location or interim holding facility, pending final disposition.</p>

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<p><u>Render Safe Procedures (RSP).</u> The portion of EOD procedures that involves the application of special disposal methods or tools to interrupt the functioning or otherwise defeat the firing train of UXO from triggering an unacceptable detonation.</p>
<p><u>Secondary Explosives.</u> Secondary explosives are generally less sensitive to initiation than primary explosives and are typically used in booster and main charge applications. A severe shock is usually required to trigger a reaction. Examples are TNT, cyclo-1,3,5-trimethylene-2,4,6-trinitramine (RDX or cyclonite), HMX, and tetryl.</p>
<p><u>Small Arms Ammunition.</u> Ammunition, without projectiles that contain explosives (other than tracers), that is .50 caliber or smaller, or for shotguns.</p>
<p><u>Team Separation Distance (TSD).</u> The distance that munitions response teams must be separated from each other during munitions response activities involving intrusive operations.</p>
<p><u>Technical Escort Unit (TEU).</u> A DoD organization manned with specially trained personnel that provide verification, sampling, detection, mitigation, render safe, decontamination, packaging, escort and remediation of chemical, biological and industrial devices or hazardous material.</p>
<p><u>Technology-aided Surface Removal.</u> A removal of UXO, DMM or CWM on the surface (i.e., the top of the soil layer) only, in which the detection process is primarily performed visually, but is augmented by technology aids (e.g., hand-held magnetometers or metal detectors) because vegetation, the weathering of UXO, DMM or CWM, or other factors make visual detection difficult.</p>
<p><u>Time Critical Removal Action (TCRA).</u> Removal actions where, based on the site evaluation, a determination is made that a removal is appropriate, and that less than 6 months exists before on-site removal activity must begin. (40 CFR 300.5)</p>
<p><u>Unexploded Ordnance (UXO).</u> Military munitions that (A) have been primed, fuzed, armed, or otherwise prepared for action; (B) have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel, or material; and (C) remain unexploded whether by malfunction, design, or any other cause. (10 U.S.C. 101(e)(5)(A) through (C))</p>
<p><u>UXO Technicians.</u> Personnel who are qualified for and filling Department of Labor, Service Contract Act, Directory of Occupations, contractor positions of UXO Technician I, UXO Technician II, and UXO Technician III.</p>
<p><u>UXO-Qualified Personnel.</u> Personnel who have performed successfully in military EOD positions, or are qualified to perform in the following Department of Labor, Service Contract Act, Directory of Occupations, contractor positions: UXO Technician II, UXO Technician III, UXO Safety Officer, UXO Quality Control Specialist, or Senior UXO Supervisor.</p>
<p><u>Venting.</u> Exposing any internal cavities of MPPEH, to include training or practice munitions (e.g., concrete bombs), using DDES- or DoD Component-approved procedures, to confirm that an explosive hazard is not present.</p>

Military Munitions-Related Terms (1)
How do they apply to specific types of material?

Type of Material (These are only examples.)	What is it BEFORE it is inspected for explosives hazards? (2)		What is it AFTER it is inspected for explosive hazards?					
	MPPEH	Other	If it presents an explosive hazards?			If it does not present an explosive hazards?		
			MEC			MC (5)	Munitions Debris	Other
			UXO	DMM (3)	MC (4)			
Used military munition, on a range, fired	X		X			X		
Unused military munition, on a range, apparently discarded	X			X		X		
Used military munition, in a burial pit, on an operational range or on former ranges	X		X (6)			X		
Unused military munition, in a burial pit on an operational range or on former ranges	X			X (6)		X		
Explosives in the soil	X				X (7)	X		
Refrigerator, nails, soft drink cans, old fence wire, etc.		(8)	NA	NA	NA		(8)	
Used cartridge cases, from a range, with live unused munitions possibly mixed in	X			X			(9)	
Target from a range (other than small arms range)	X		(10)	(10)	(10)		(11)	
Remnants of munitions from an operational range or former range	X		X (12)	X (12)	X (12)	X (13)		
Kicked out military munition from a former open burn or open detonation ground	X			X (14)		X		
Residual MC in a melt kettle of a former (closed) explosive cast loading building	X		(15)	(15)	X (15)	X	X (16)	
Residual MC in a floor drain pipe from an explosives-laden wash water drain of a former (closed) explosives cast loading facility.	X		(15)	(15)	X (15)		X (16)	
Residual MC in cracks in floor slab (and in soil underneath floor cracks) in a former explosives manufacturing building	X		(15)	(15)	X (15)	X	X (16)	
Small arms bullets or lead particulates in the soil from small arms use at a former small arms range used only for firing small arms ammunition		X (17)	Not Applicable (17)		X			

Note: The examples in this table are not all inclusive. The numbers in the table refer to footnotes that are found on the next page. It is important to read the footnotes, as they provide additional information of importance to understanding.

Endnotes:

- (1) DoD has been working to standardize terms related to military munitions.
- (2) Before material that is considered MPPEH can be either transferred within or released from DoD, its explosives safety status must be determined (see definition--Documentation of the Explosives Safety Status of Material). The type material involved determines the type of inspection (e.g., visual examination, chemical analysis, X-ray) required. Personnel qualified to determine the status of the particular material being examined must perform required inspections. For example, EOD and UXO-qualified personnel may inspect UXO and DMM during a munitions response or during range clearance activities. A QASAS or certified Wage Grade ammunition operator may inspect steamed-out projectiles at a depot's steam-out operation. A laboratory technician may perform a chemical analysis of soil to determine the percent explosives in the soil.
- (3) Munitions generally considered as DMM include: buried munitions; un-recovered kick outs from open detonations; munitions left behind or discarded accidentally during munitions-related activities; munitions intentionally disposed of without authorization during munitions-related activities. Munitions removed from storage for the purpose of disposal that are awaiting disposal are not DMM.
- (4) This is MC that is both (a) an explosive; and (b) present in sufficient concentrations to present explosive hazards.
- (5) This is MC that is either (a) not an explosive (e.g., lead, beryllium, and cadmium); or (b) an explosive not present in sufficient concentrations to present explosive hazards.
- (6) Although military munitions in a burial pit will normally be DMM, some may be UXO. For explosives safety reasons, munitions in a burial pit should be approached as UXO until assessed by technically qualified personnel (e.g., EOD personnel, UXO-qualified personnel) and determined that they are not UXO or that they do not present explosive hazards similar to UXO.
- (7) Explosive soil is typically found in sumps and settling lagoons for explosives-laden wastewater, and in and around drainage ditches and pipes that carry the wastewater to such sumps and lagoons.
- (8) These items are cultural debris.
- (9) After determination of their explosives safety status, used cartridge cases documented as safe would, after any demilitarization required to remove their military characteristics, be available for release from DoD. In addition to these DoD requirements, other regulatory criteria may apply.
- (10) A target is a type of range-related debris. Although a target is not MEC, it may contain UXO, DMM, or MC. Prior to its release from DoD control, its explosives safety status must be documented.

- (11) A target's explosives safety status must be documented and any demilitarization required to remove its military characteristics must be performed prior to its release from DoD control.
- (12) UXO, DMM, or MC may be found on operational ranges and on former ranges (previously referred to as closed, transferring or transferred ranges). An inspection of the material will determine into which category this material falls. For example, if a projectile breaks apart on impact, one could find (a) a sheared-off fuze, which would be UXO or (b) explosive filler, which would be MC, that broke away from the projectile's open body. If during an open detonation of an unserviceable munition that is conducted on an operational range, the donor charge detonates, but the munition being destroyed breaks up, but does not detonate, the remnants of the munition would be DMM or, if explosive residue (e.g., clumps of TNT), MC.
- (13) After determination of its explosives safety status, scrap metal from used munitions on a range that is documented as safe would, after any demilitarization required to remove its military characteristics, be available for release from DoD control. In additions to these DoD requirements, other regulatory criteria may apply.
- (14) Prudent safety practice is to consider kick outs, which have experienced an unknown environment, to be equally dangerous and managed like UXO until technically qualified personnel assess and determine that they are not UXO or do not present explosive hazards similar to UXO.
- (15) Of itself, such material (e.g., mettle kettle, drainpipes, floor slabs) do not present an explosive hazard and would not be classified as UXO, DMM or MC. However, residual MC (e.g., TNT, RDX, HMX) could remain in such material in high enough concentrations to present an explosive hazard.
- (16) After determination of its explosives safety status, such material (e.g., mettle kettle, drainpipes, floor slabs) when documented as safe would be available for release from DoD control. In addition to this DoD requirement, other regulatory criteria may apply.
- (17) At operational ranges or former ranges used exclusively for live fire of small arms ammunition, some unfired small arms ammunition may be found. Although this ammunition is considered DMM and would be MPPEH, it is not considered to present a significant explosive hazard.