

Feasibility Study Results

at the former Camp Croft, South Carolina
FUDS No. I04SC001603

US Army Corps of Engineers (CESAS/CESAW/CESAC)

US Army Engineering and Support Center, Huntsville

February 2016



US Army Corps of Engineers
BUILDING STRONG

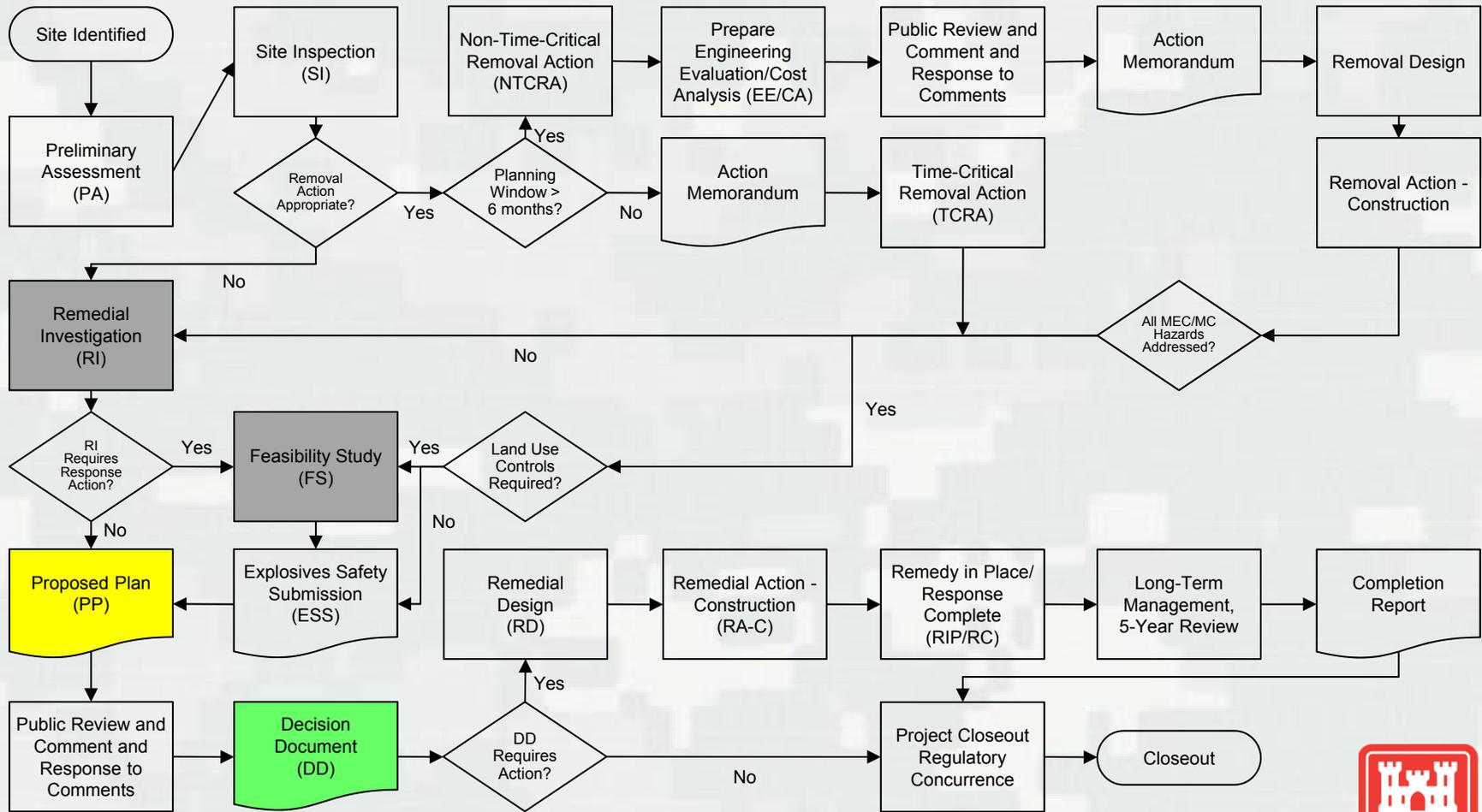


Agenda

- Legal framework and stakeholders
- Remedial Investigation (RI) results
- Feasibility Study (FS)
 - ▶ Purpose and Objective
 - ▶ Summary and Findings
 - ▶ Info Repository - 151 S. Church Street
(Kennedy Rm)
- Questions



CERCLA Process



Decision Makers

- Stakeholders involvement is key
 - ▶ USACE guides program / technical aspects
 - ▶ SC DHEC has actively participated in planning work and reviewing documents
 - ▶ Restoration Advisory Board has met consistently to monitor progress
 - ▶ Planning and reporting documents are provided to public at Information Repository
 - ▶ Proposed Plan Public Mtg in March 2016



RI Summary

- ~77% of investigation area contained only small arms / low quantities of munitions debris (MD).
- 8 areas contained **munitions and explosives of concern (MEC)** and/or very high MD concentrations.
- No munitions constituents (MC) risks were identified.
- 14 areas were investigated; 8 areas were retained for future action.



RI Munitions Categories

- Grenade – Mk I hand grenade (practice), Mk II hand grenade, M15 hand grenade (smoke), and M19 rifle grenade (illumination)
- Landmine – M1 anti-tank
- Mortar – 60mm [training, illumination, high explosive (HE)], 81mm (training, HE)
- Projectile – 37mm, 57mm, 105mm HE, 105mm Illumination
- Rocket – 2.36" Bazooka



Investigation Summary

Area	Size (acres)	Comments
MRS 1	23.8	No MEC/MD observed
MRS 2	24.9	Minimal access; Suspected grenade court
105mm Area	1,399.5	105mm projectiles (primary)
Maneuver Area	1,276.5	Mixed munitions use
60mm Mortar Area	303.4	Mixed munitions use; Primarily mortars
60/81mm Mortar Area	301.3	Mixed munitions use; Primarily mortars
Rocket & Rifle Grenade Area	108.5	Mixed munitions use
Rocket/Grenade Maneuver Area	126.3	Mixed munitions use; two mine fuzes
Remaining Lands	9,093.6	No MEC and minimal MD observed
Grenade Area	19.2	Minimal access; Suspected grenade court
AoPI 5	5.5	No MEC/MD observed

*RED TEXT – MEC observed during RI



Investigation Summary

Area	Size (acres)	Comments
AoPI 8	22.9	No MEC/MD observed
AoPI 9E	7.6	No MEC/MD observed
AoPI 9G	6.6	No MEC/MD observed
Rocket Area	93.9	Mixed munitions use; Primarily rockets
Grenade Maneuver Area	450.5	Mortars (and grenades) observed
Practice Grenade Area	6.4	Grenades observed
Mortar/Rifle Grenade Area	22.9	Mortars (and grenades) observed

*RED TEXT – MEC observed during RI



MEC Hazard Assessment

- MEC Hazard Assessment
 - ▶ Supports hazard management decision-making process
 - ▶ Addresses explosives safety concerns posed by MEC to human receptors
 - ▶ Does not address environmental or ecological concerns
 - ▶ Range of (possible) scores:
 - 1 (highest) to 4 (lowest)



MEC Hazard Assessment Scores

Area	Hazard Level Category	Score
105mm Area	1	950
Maneuver Area	1	1,000
60mm Mortar Area	3	705
60/81mm Mortar Area	1	965
Rocket & Rifle Grenade Area	1	905
Rocket/Grenade Maneuver Area	2	760
Grenade Maneuver Area	2	755

- Hazard Level Categories:
 - ▶ Level 1 – 1,000 to 840 (Highest Hazard)
 - ▶ Level 2 – 835 to 725 (High Hazard)
 - ▶ Level 3 – 720 to 530 (Moderate Hazard)
 - ▶ Level 4 – 525 and under (Low Hazard)



Area Disposition

Pre-RI Designation	Pre-RI Acreage	Revised Designation	Revised Acreage	Recommendation*
MRS 1	23.8	MRS 1	23.8	NFA; Address in DD
MRS 2	24.9	MRS 2	24.9	RI/FS, pending ROE allowance
MRS 3 (Land)	12,102.4	105mm Area	1,399.5	Included in FS
		Maneuver Area	1,276.5	Included in FS
		60mm Mortar Area	303.4	Included in FS
		60/81mm Mortar Area	301.3	Included in FS
		Rocket & Rifle Grenade Area	108.5	Included in FS
		Rocket/Grenade Maneuver Area	126.3	Included in FS
		Remaining Lands (Land + Water)	9,093.6	Included in FS
AoPI 3	11	Grenade Area	19.2	Included in FS
AoPI 5	5.5	AoPI 5	5.5	NFA; Address in DD
AoPI 8	23.9	AoPI 8	22.9	NFA; Address in DD
AoPI 9E	7.6	AoPI 9E	7.6	NFA; Address in DD
AoPI 9G	6.6	AoPI 9G	6.6	NFA; Address in DD
AoPI 10A	171.5	Rocket Area	93.9	Included in FS
AoPI 10B	33.6	Grenade Maneuver Area	450.5	Included in FS
AoPI 11B	343.7			
AoPI 11C	23	Practice Grenade Area	6.4	Included in FS
AoPI 11D	15.1	Mortar/Rifle Grenade Area	22.9	Included in FS
SUM =	12,669.2	SUM =	13,293.3	

* FS – Feasibility Study; NFA – No Further Action; DD – Decision Document; RI – Remedial Investigation; ROE – Right-of-Entry

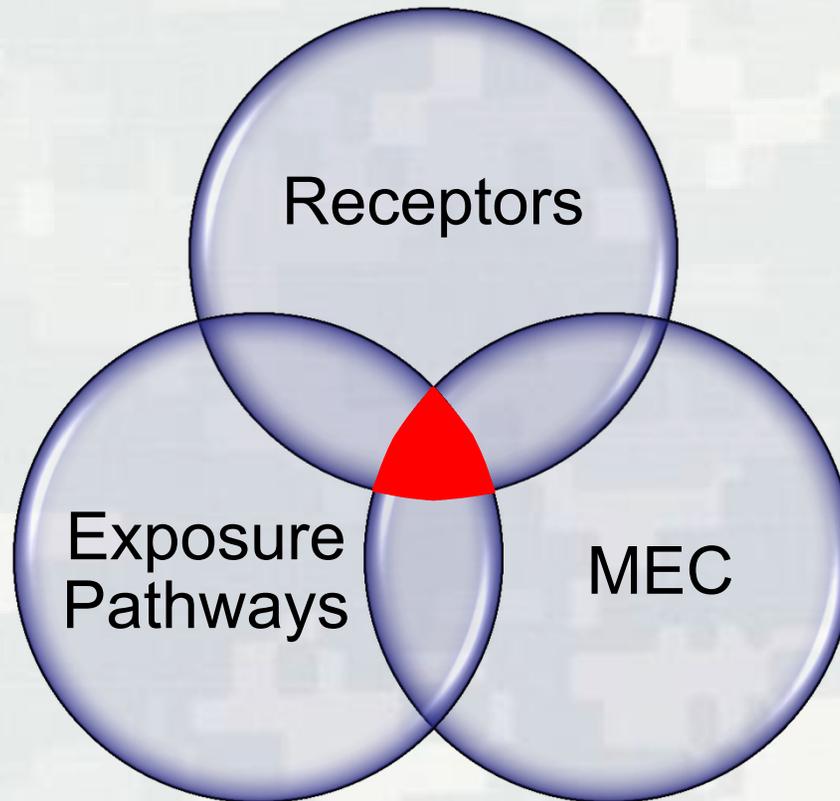


FS Purpose and Objective

- Feasibility Study (FS):
 - ▶ Purpose: **develop & evaluate** potential **response alternatives** to manage the MEC / MC hazards and risks to human health and the environment due to historical DoD usage.
 - ▶ Objective: **provide decision makers** the information needed to **support** the appropriate risk-management response alternative(s) for the site.



Risk Relationship



= Risk!



Generalized FS Process

- Uses RI findings / risk assessment
- Establishes remedial objectives
- Develop broad range of possible response actions (“alternatives”)
- Screening of possible alternatives
 - ▶ Effective?, Implementable?, Relative Cost?
- Retained alternatives are evaluated using Nine Evaluation Criteria



Remedial Action Objectives

- Reduce human health risk from exposure to potential surface and subsurface MEC by preventing residents, landowners, workers, recreational users, and the general public from contacting MEC and thus, minimizing the potential for direct contact exposures.



Preliminary Remediation Goals

- Manage MEC risk through a combination of removal/remediation, administrative controls, and public education; thereby rendering the sites as safe as reasonably possible to humans and the environment and conducive to the anticipated future land use.



Recommended RAOs

Area	Penetration Depth (bgs)^	Potential Receptor Type/Depth (bgs)*	Recommended RAO# Depth (bgs)
105mm Area	2 ft**	Residential / 2 ft	3 ft
60mm Mortar Area	6 in.	Residential / 2 ft	3 ft
60/81m Mortar Area	15 in.	Residential / 2 ft	3 ft
Grenade Area	2 ft**	Residential / 2 ft	3 ft
Grenade Maneuver Area	6 in.	Residential / 2 ft	3 ft
Maneuver Area	8 in.	Recreational / 1 ft	2 ft
Mortar/Rifle Grenade Area	-	Recreational / 1 ft	1 ft
Practice Grenade Area	-	Residential / 2 ft	2 ft
Remaining Lands	-	Residential / 2 ft	2 ft
Rocket Area	-	Residential / 2 ft	2 ft
Rocket/Grenade Maneuver Area	4 in.	Residential / 2 ft	3 ft
Rocket & Rifle Grenade Area	10 in.	Residential / 2 ft	3 ft



Range of Alternatives

- The following potential alternatives were screened:
 - ▶ **No Action** (required, under CERCLA)
 - ▶ **Land Use Controls (LUCs) and Long-Term Management (LTM)**
 - ▶ LUCs (Enhanced) and LTM
 - ▶ Analog Surface MEC Removal, LUCs, LTM
 - ▶ Analog Surface MEC Removal, LUCs (Enhanced), LTM
 - ▶ **Analog Surface and Subsurface MEC Removal, LUCs, LTM**
 - ▶ Analog Surface and Subsurface MEC Removal, LUCs (Enhanced), LTM
 - ▶ Digital Surface and Subsurface MEC Removal, LUCs, LTM
 - ▶ Digital Surface and Subsurface MEC Removal, LUCs (Enhanced), LTM
 - ▶ **Digital Advanced Classification Surface and Subsurface MEC Removal to Support Unlimited Use / Unrestricted Exposure**

***Bolded** alternatives were retained for detailed analysis



Nine Evaluation Criteria

- Overall Protection of Human Health and the Environment
 - ▶ Assesses how well an alternative achieves and maintains protection of human health and the environment
- Compliance with ARARs
 - ▶ Assesses how the alternatives comply with location-, chemical-, and action-specific ARARs; there are no ARARs
- Long-Term Effectiveness and Permanence
 - ▶ Evaluates the effectiveness of the alternatives in protecting human health and the environment after response objectives have been met



Nine Evaluation Criteria (con't.)

- Reduction of Toxicity, Mobility, or Volume with Treatment
 - ▶ Addresses the preference for selecting remedial actions that employ removal action technologies that permanently and significantly reduce the toxicity, mobility, or volume of the hazardous substance
- Short-Term Effectiveness
 - ▶ Examines the effectiveness of the alternatives in protecting human health and the environment during the construction and implementation of a remedy until objectives have been met
- Implementability
 - ▶ Assesses the technical and administrative feasibility of an alternative and the availability of required goods and services



Nine Evaluation Criteria (con't.)

- **Cost**
 - ▶ Evaluates the capital, and operation and maintenance costs of each alternative
- **State Acceptance**
 - ▶ Considers the state's preferences among or concerns about the alternatives; addressed following SCDHEC review of FS and PP
- **Community Acceptance**
 - ▶ Considers the community's preferences among or concerns about the alternatives; addressed following community's review of FS and PP



Comparative Analysis

EPA's Nine CERCLA Evaluation Criteria	<u>Alternative 1</u> No Action (Baseline Condition)	<u>Alternative 2</u> Land Use Controls (LUCs; Limited) and Long-Term Management (LTM)	<u>Alternative 3</u> Analog Surface & Subsurface MEC Removal, LUCs (Limited), and LTM	<u>Alternative 4</u> Digital Advanced Classification Surface & Subsurface MEC Removal for Unlimited Use / Unrestricted Exposure
Overall Protectiveness of Human Health and the Environment	Not protective	Protective	Protective	Protective
Compliance with ARARs	N/A	N/A	N/A	N/A
Long-Term Effectiveness and Permanence	○	○/●	●/●	●
Reduction of Toxicity, Mobility, or Volume through Treatment	○	○	○	●
Short-Term Effectiveness	○	○	●/●	●
Implementability	○	●	○	●/●
Cost [^]	N/A	\$	\$\$/\$\$\$	\$\$
State Acceptance*	No	Yes	Yes	Yes
Community Acceptance*	No	Yes	Yes	Yes

[^]Cost - Based on overall cost (not cost per acre)

*State and Community Acceptance cannot be evaluated until comments on the FS/PP are received. SCDHEC is hesitant to support any alternative with the goal of Unlimited Use / Unrestricted Exposure, without some type of land use controls.

N/A – Not Applicable

Symbols: ● – Relatively High; ○/● – Relatively Moderate; ○ – Relatively Low to none

Cost: \$ – Low or minimal costs; \$\$ – Moderate costs; \$\$\$ – High costs



Cost Summary

MRSs	Acres	MEC Factor	Alt #1 No Action	Alt #2 Land Use Controls (LUCs; Limited) & Long-Term Management (LTM)	Alt #3 Analog Surface & Subsurface MEC Removal, LUCs (Limited) & LTM	Alt #4 Digital Advanced Classification Surface & Subsurface MEC Removal for Unlimited Use / Unrestricted Exposure
105mm Area	1,399.5	1	\$0.00	\$5,077,151	\$11,549,498	\$9,325,693
60mm Mortar Area	303.4	1	\$0.00	\$1,100,527	\$2,503,478	\$2,021,444
60/81mm Mortar Area	301.3	1	\$0.00	\$1,092,910	\$2,486,150	\$2,007,453
Grenade Area	19.2	0.5	\$0.00	\$34,822	\$79,214	\$63,961
Grenade Maneuver Area	450.5	1	\$0.00	\$1,634,105	\$3,717,260	\$3,001,518
Maneuver Area	1,276.5	1	\$0.00	\$4,630,266	\$10,532,925	\$8,504,856
Mortar/Rifle Grenade Area	22.9	0.5	\$0.00	\$41,533	\$94,479	\$76,287
Practice Grenade Area	6.4	0.5	\$0.00	\$11,607	\$26,405	\$21,320
Remaining Lands	9,093.6	0.5	\$0.00	\$16,492,307	\$37,516,685	\$30,293,012
Rocket Area	93.9	0.5	\$0.00	\$170,302	\$387,404	\$312,811
Rocket/Grenade Maneuver Area	126.3	1	\$0.00	\$458,130	\$1,042,153	\$841,491
Rocket & Rifle Grenade Area	108.5	1	\$0.00	\$393,564	\$895,278	\$722,896

Bolded areas contained observed MEC.

MEC Factor used to adjust “conceptual” cost estimate (Appendix A) to former Camp Croft Area.



Upcoming Schedule

- Tentative dates for upcoming documents
 - ▶ March 2016 – Proposed Plan
 - Suggests preferred alternatives
 - Public Meeting held to present recommendations; public feedback incorporated into final document
 - ▶ April 2016 – Decision Document
 - Documents selected response alternatives



Safety

- UXO Safety Procedures

- ▶ The Three R's

- **Recognize** – Military munitions/ordnance becomes a danger only when it is disturbed. When you see an item, STOP.
- **Retreat** – Do not move closer to get a better look! Never attempt to remove anything near it. Do not touch, move, or disturb. MOVE AWAY.
- **Report** – Immediately report any suspected military munitions. **CALL 911**



Questions?

