

Appendix D - Introduction to Feasibility Study Report
June 30, 2011 Minutes
Community Interest Group
Ricochet Area Munitions Response Site in State Game Lands 211



Fort Indiantown Gap, Pennsylvania Military Munitions Response Program



Ricochet Area Introduction to Feasibility Study Report

30 June 2011



The Trusted Integrator for Sustainable Solutions

Overview

- Feasibility Study Remedial Alternatives
- Feasibility Study Example
 - Tobyhanna Artillery Range (TOAR) Formerly Used Defense Site (FUDS)

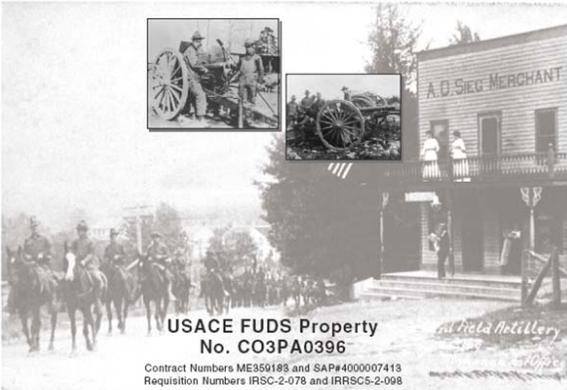
Remedial Alternatives

- No action
- Containment and controls
- MEC removal actions with containment and controls

Example: Tobyhanna Artillery Range FS

**FINAL
FEASIBILITY STUDY**

TOBYHANNA ARTILLERY RANGE FORMERLY USED DEFENSE SITE
TOBYHANNA, PENNSYLVANIA



**USACE FUDS Property
No. CO3PA0396**

Contract Numbers ME550189 and SAP#4000007413
Requisition Numbers IRSC-2-078 and IRRSC5-2-098

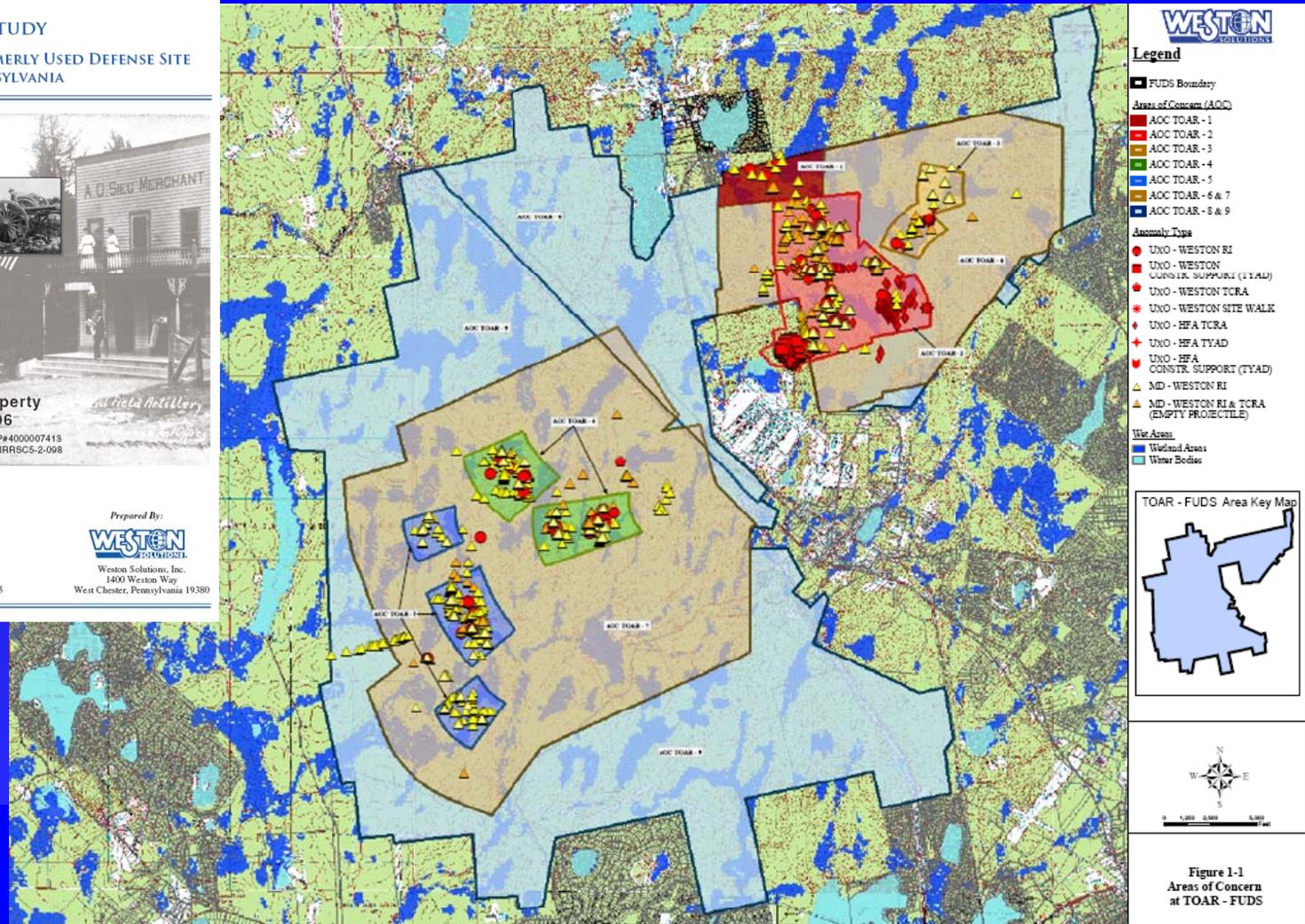
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TOAR FS - Technologies

- Identification of technologies for MEC Removal Actions
 - MEC detection
 - digital geophysical mapping and analog and positioning systems
 - MEC removal
 - hand, mechanical, sifting, magnetically assisted, remotely operated
 - MEC/MD disposal
 - RSP, BIP, consolidation, CDCs
 - Waste stream treatment - Chemical decontamination, shredders and crushers, flashing furnaces, recycling
- Screening criteria for technologies
 - Effectiveness
 - Implementability
 - Cost

Viability Technologies for the TOAR-FUDS

UXO Detection		UXO Removal	UXO Disposal	
Geophysical Detection	Positioning		Disposal	Waste Stream Treatment
<ul style="list-style-type: none"> • Digital (DGM) • Analog (M&D) 	<ul style="list-style-type: none"> • Robotic Total Station (with DGM) • Fiducial Method (with DGM) • Acoustic Method (with DGM) • Conventional Survey (with M&D) 	<ul style="list-style-type: none"> • Hand excavation • Mechanical excavation to within 12 inches of anomalies, followed by hand excavation (only for anomalies deeper than 12 inches) 	<ul style="list-style-type: none"> • A combination of the following methods, based on UXO item evaluation in the field by qualified UXO technicians: <ul style="list-style-type: none"> – Blow in Place – Consolidate and Blow 	<ul style="list-style-type: none"> • MD and non-MEC-related material recovered from UXO disposal will be sent to a local metals recycler. • Munitions constituents recovered from UXO disposal will be addressed as appropriate, and treated if necessary, using one of the following methods: <ul style="list-style-type: none"> • Chemical decontamination • Shredding or crushing • Flash furnace

Development of Alternatives

- Combine general response actions and technologies deemed viable for the sites:
 - Alternative 1 – No Action
 - Alternative 2 – Land Use Controls
 - Alternative 3 – Surface Removal with Land Use Controls
 - Alternative 4 – Subsurface Removal to 1 foot with Land Use Controls
 - Alternative 5 – Subsurface Removal to Instrument Detection Depth with Land Use Controls

Alternative 2 – Land Use Controls (LUCs)

- Reduce exposure risk through public awareness
- Will need to be maintained to ensure long-term effectiveness and permanence
- Land Use Controls may include:
 - Signs
 - Notification during permitting
 - Brochures and fact sheets
 - Newspaper articles
 - Information packages to public officials and emergency management agencies
 - Visual and audio media
 - Internet website
 - Public meetings

Alternative 3 – Surface Removal of MEC with LUCs

- Removal of MEC detected on the ground surface and breaching the ground surface
- Includes:
 - Mobilization
 - Survey/ positioning
 - Brush clearing and grubbing
 - MEC detection using visual magnetometer assisted
 - MEC removal
 - MEC disposal
 - Scrap disposal
 - Demobilization
 - Land Use Controls

Alternative 4 – Removal of MEC to One Foot with LUCs

- Removal of MEC and MD detected to 1 foot below ground surface.
- 95% of UXO found were located within 1 foot during RI of the TOAR FUDS

Digital Geophysical Mapping:

- Mobilization
- Survey/ positioning
- DGM
- Data analysis
- Anomaly reacquisition
- MEC and MD removal
- MEC disposal
- Waste stream disposal
- Demobilization
- LUCs

Mag & Dig Surveys:

- Mobilization
- Survey/ positioning
- MEC and MD detection using analog instruments
- MEC and MD removal
- MEC disposal
- Waste stream disposal
- Demobilization
- LUCs

Alternative 5 – Removal of MEC to Detection Depth with LUCs

- Removal of MEC and MD detected to instrument detection depth
- Similar to Alternative 4 however, MEC and MD detected deeper than 12 inches will be excavated
- Mechanized support may be used to remove overburden from the item

Screening of Removal Activities for AOCs

- See PDFs of detailed alternative analysis

Evaluation Criteria – Compared to Each Alternative

1. Overall protection of human health and the environment
2. Compliance with applicable or relevant and appropriate requirement (ARARs)
3. Long-term effectiveness and performance
4. Reduction of toxicity, mobility, or volume
5. Short-term effectiveness
6. Implementability
7. Cost
8. State (support agency) acceptance
9. Community acceptance

Cost Estimates

- Alternative 1 – No Action: \$94,575
- Alternative 2 – Land Use Controls: \$1,228,602
- Alternative 3 – Surface Removal with LUCs: \$31,625,287
- Alternative 4 – Removal of MEC to 1 foot with LUCs: \$53,524,109
- Alternative 5 – Removal of MEC to detection depth with LUCs: \$57,329,902

Comparative Analysis of Remedial Alternatives

Alternative	Overall Protectiveness of Human Health and the Environment	Compliance with ARARs and TBCs	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume (TMV) of Contaminants Through Treatment	Short-Term Effectiveness	Implementability	Cost	Regulatory Agency Acceptance ¹	Score	Rank
1 No Action	HH: Not protective EN: Protective 5 ²	Not compliant 5	EFF: Not effective PER: Not permanent 5	No reduction 4.5	Not effective 5	Most implementable 1	1	Not acceptable 5	31.5	5
2 LUC	HH: Minimally protective EN: Protective 4	Minimally compliant 4	EFF: Minimally effective PER: Potentially permanent 4	No reduction 4.5	Most effective 1	More implementable 2	2	Minimally acceptable 4	25.5	4
3 Surface Removal of UXO with LUCs	HH: Protective EN: Disruptive 3	Compliant 3	EFF: Effective PER: Permanent 3	Up to 80% reduction 3	More effective 2	Implementable 4	3	Acceptable 3	24	3
4 Removal of UXO to One Foot with LUCs	HH: More protective EN: More disruptive 1.5	More compliant 2	EFF: More effective PER: More permanent 2	Approximately 95% reduction 2	Effective 3	Implementable 4	4.5	More acceptable 2	21	2
5 Removal of UXO to Detection Depth with LUCs	HH: Most protective EN: Most disruptive 1.5	Most compliant 1	EFF: Most effective PER: Most permanent 1	Approximately 100% reduction 1	Minimally effective 4	Implementable 4	4.5	Most acceptable 1	18	1

HH = Human health; EN = Environment; EFF = Effectiveness; PER = Permanence.

¹Regulatory agency acceptance is usually evaluated following comment on the FS. However, regulatory agency acceptance is addressed preliminarily in this FS based on input received from PADEP and EPA throughout the project.

²Scores indicate the relative ranking of alternatives under each criteria, with 1 = best alternative for that criteria, and 2 = worst alternative for that criteria. Alternatives with the same relative ranking under a specific criterion receive a score of 1.5. The scores are then totaled, and the alternative with the lowest score receives a relative ranking of 1.