ALTERNATIVES PANELS FOR FEASIBILITY STUDIES

What they are and how to perform them

Presented by:
Julie Burdey
USACE Environmental & Munitions Center of Expertise (EM CX)

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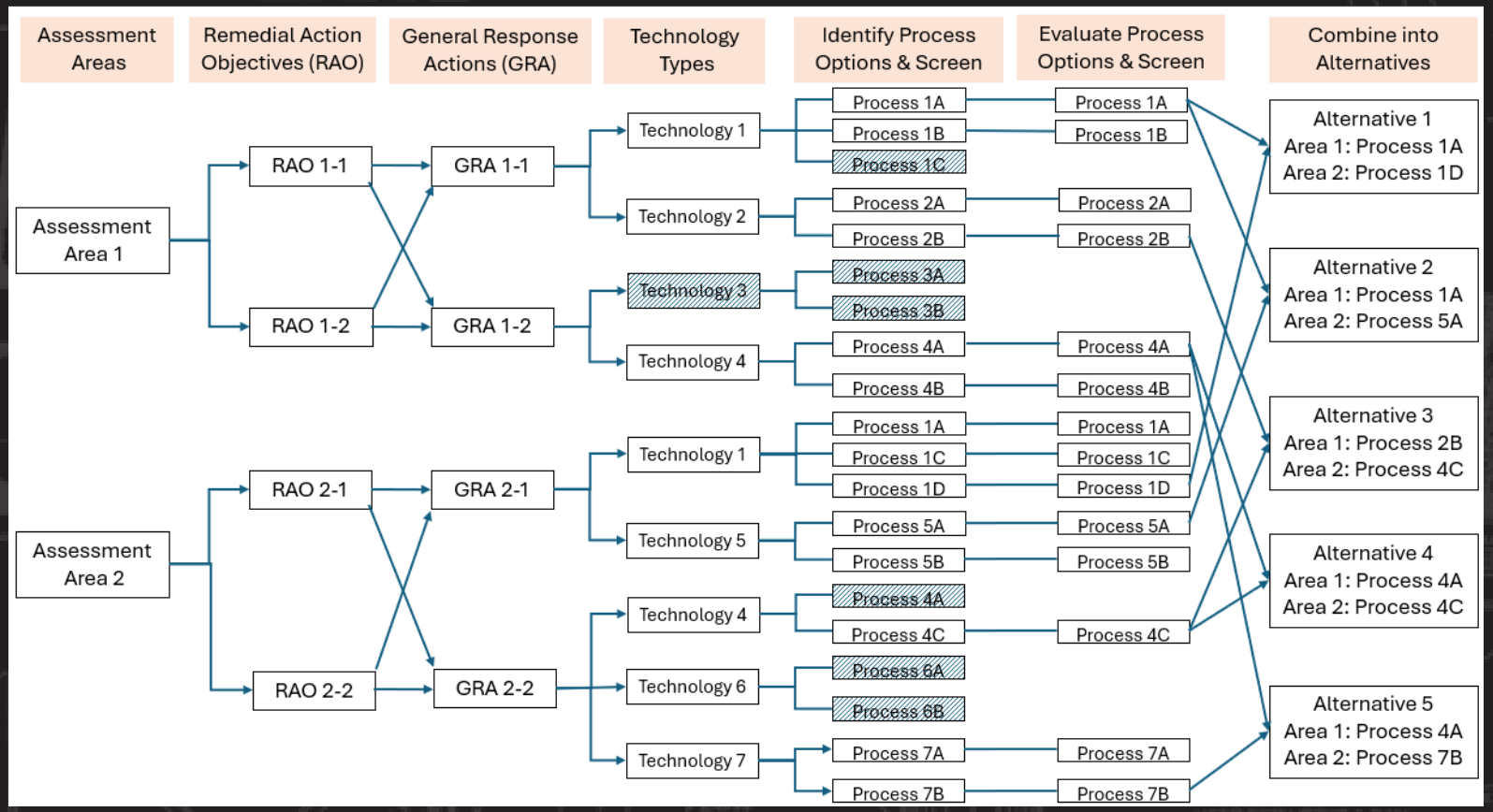

Modified from EPA/540/G-89/004, *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA*, https://semspub.epa.gov/work/06/9351177.pdf

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ALTERNATIVES DEVELOPMENT

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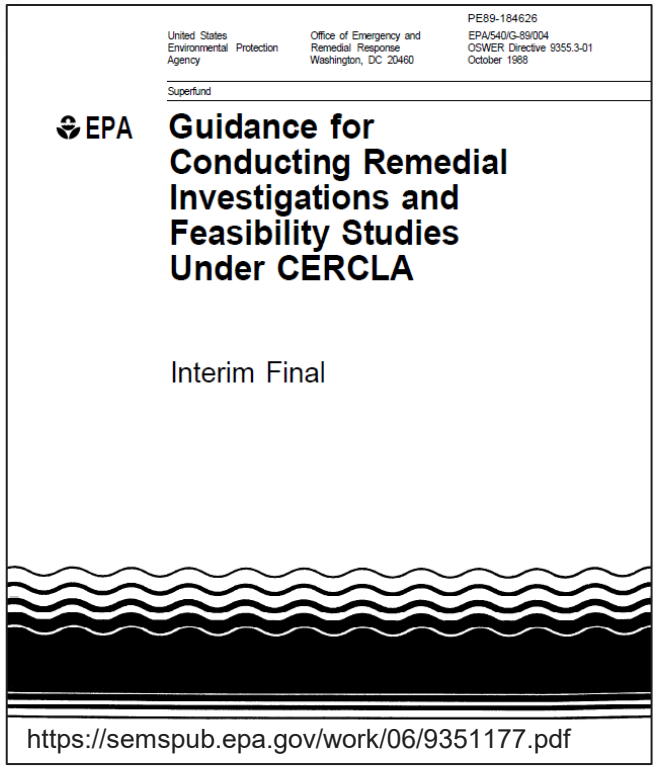
A Tried-and-True Process, dated 1988



PE89-184626

United States Environmental Protection Agency | Office of Emergency and Remedial Response Washington, DC 20460 | EPA/540/G-89/004 OSWER Directive 9355.3-01 October 1988

Superfund

EPA

Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA

Interim Final

https://semspub.epa.gov/work/06/9351177.pdf

4.5 Reporting and Communication During Alternative Development and Screening

Although no formal report preparation is required during the development and screening of alternatives (except whatever routine administrative and project management tracking methods have been designated for use by the lead agency and its contractor(s))[7], some form of written documentation of the methods, rationale, and results of alternative screening (e.g., graphical representation similar to Figures 4-5 and 4-6 or a technical memorandum) needs to be provided to the lead and support agencies. If a technical memorandum is prepared, it can serve as the basis for later development of the chapter(s) in the FS report that discusses the development and screening of alternatives.

Communication among the lead and support agencies and their contractor(s) is very important to obtain input and agreement on the technologies or processes and alternatives considered for implementation at the site. As shown in Table 4-2, communication should occur to facilitate the initial screening of technologies and process options, to agree on what additional site data may be needed, and to gain input and agreement on the choice of representative processes and combinations to be

Feasibility Study (FS) Objective:

– Develop and evaluate a range of alternatives to address contamination that is causing unacceptable risk

WEBINAR FOCUS

Conducting an “Alternatives Panel” is a way to rejuvenate our efforts to follow the tried-and-true process for Military Munitions Response Program (MMRP) sites

Agenda

- Alternatives Panel Overview
  - What, why, when, and who
- Overall process
  - Steps to performing an Alternatives Panel
- Alternatives Panel Slide Template
  - The agenda for discussion
  - Including example slides

POLL

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Question 1: How many Systematic Planning Process (SPP) meetings did you attend prior to completing your last Remedial Investigation (RI)?

1. I've never done an RI
2. No meetings
3. One meeting
4. Multiple meetings

Question 2: How many SPP meetings did you attend prior to completing your last Feasibility Study (FS)? Be honest ☺

1. I've never done an FS
2. No meetings
3. One meeting
4. Multiple meetings

Assume SPP meetings involve lead agent, regulator, contractor and other stakeholders

WHY ARE WE DISCUSSING THIS?

The Problem

- Little to no discussion during Alternatives Development
- Too many “cookie cutter” Feasibility Studies for Military Munitions Response Program sites

Results in

- A narrow range of alternatives
- Unimplementable, overly complex, or even unprotective alternatives

Which leads to

- FS rewrites and/or significant comments
- Remedial action implementation challenges
- Need for Record of Decision (ROD) changes

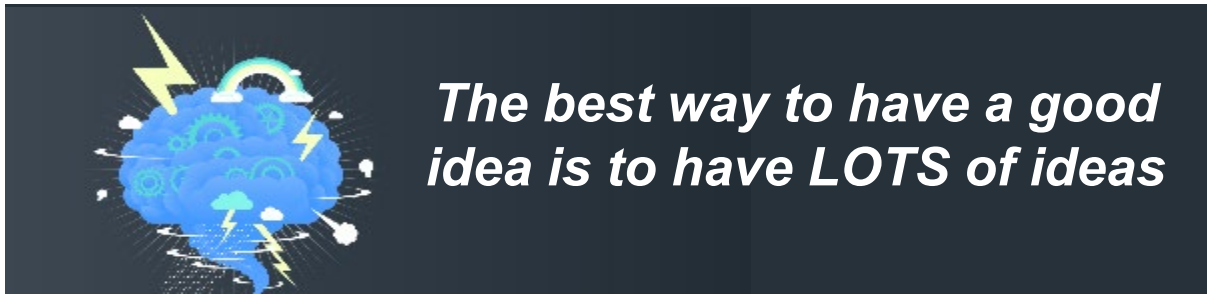
And ultimately

- Delays to mitigating unacceptable risks
- Delays to achieving Response Complete

ALTERNATIVES PANEL OVERVIEW

What is an Alternatives Panel?

- BLUF: a brainstorming process to develop the key elements of the Feasibility Study (FS)
  - Agree on revised Conceptual Site Model (CSM), following Remedial Investigation
  - Develop Remedial Action Objectives (RAOs)
  - Identify Applicable or Relevant and Appropriate Requirements (ARARs)
  - Screen remedial technologies/processes
    - Including Land Use Controls (LUCs)
  - Design site-specific remedial alternatives
  - Assign any action items



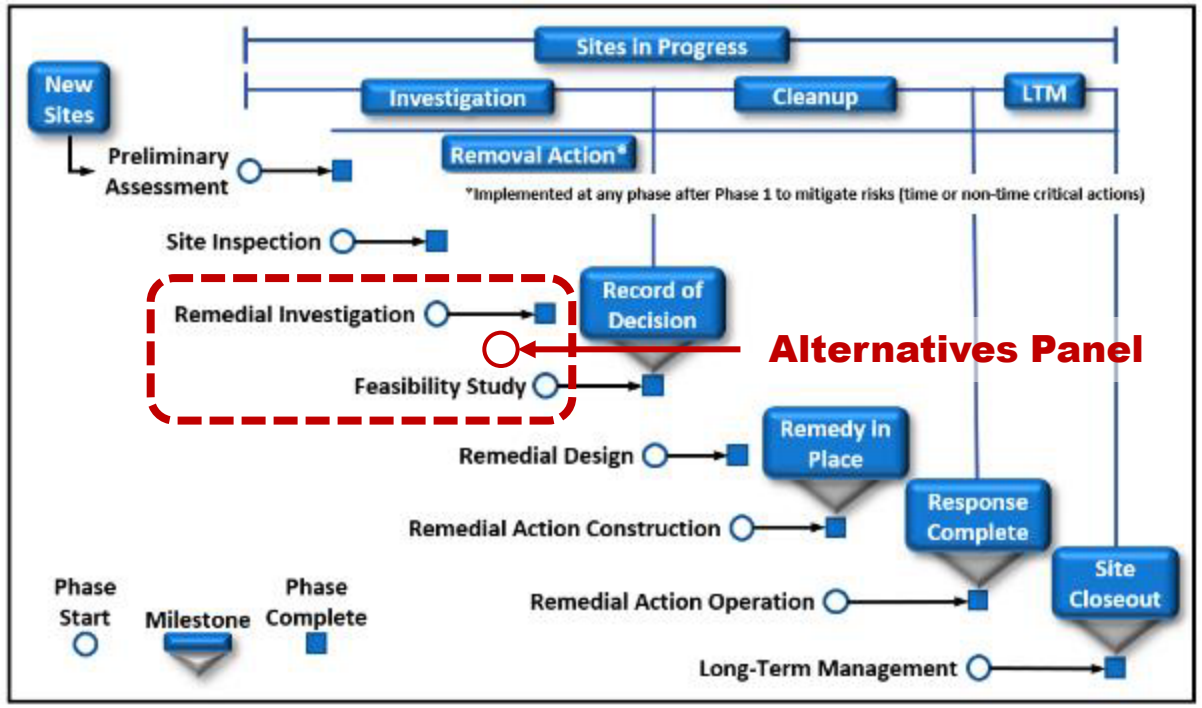
Why are they helpful?

- Facilitate consensus on draft FS
- Promotes a team approach to developing remedial alternatives
- Facilitates development of site-specific alternatives
- Avoid common issues/errors for FSs
- Sets us up for Remedial Action (RA) success
  - Site-specific alternatives should be more easily implementable
  - May even help to reduce RA costs
    - Focused remediation vs. whole Munitions Response Site (MRS)

ALTERNATIVES PANEL OVERVIEW, CONT'D.

When should we perform one?

– Should take place after the RI, but ***before*** draft FS is submitted
  - Also, ***after*** the Institutional Analysis is done



Who is typically involved?

– Project Team members
  - Project Manager (PM)
  - Technical team members including Geophysicist, Ordnance and Explosives Safety Specialist (OESS), Risk Assessor
  - Possibly Office of Counsel (for ARARs)
– Contractor
  - PM, Technical Manager, Geophysicist, SUXOS, Risk Assessor
– Regulator and other major stakeholders
  - Early involvement can reduce comments
  - May be especially helpful for high profile or complex MRSs
– This is not an exhaustive attendee list
  - Add others as needed

ALTERNATIVES PANEL SLIDE TEMPLATE

The agenda for the Alternative Panel discussion

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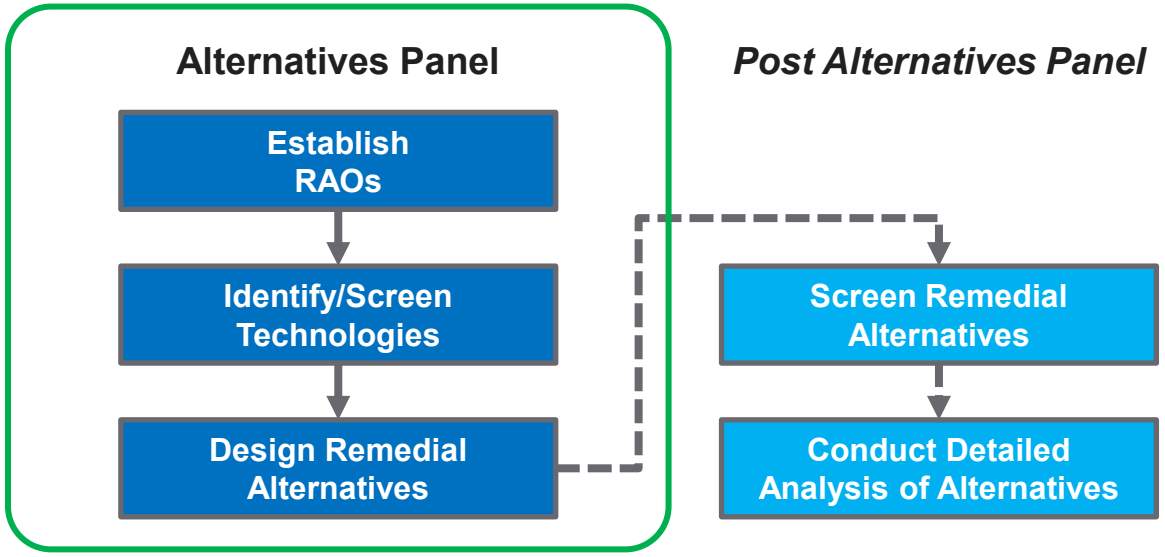
ALTERNATIVES PANEL SLIDE TEMPLATE

The EM CX has developed a slide template for MMRP Alternatives Panels

Designed to facilitate Project Team discussion of the initial FS process

- Up to development of Remedial Alternatives
- Alternatives Panel does not address screening or detailed analysis of alternatives



Slides include

- Site Overview
- Current Conceptual Site Model
  - MEC types
  - High Use Areas and Low Use Areas
  - Land Uses
  - Site-specific Issues
- Summary of Risk Management Methodology results
  - Risk scenarios and assessment areas
- Summary of Institutional Analysis
- Remedial Action Objectives
- Applicable or Relevant and Appropriate Requirements (ARARs)
- Summary of Remedial Technologies
- Summary of Remedial Alternatives
- Conclusions and Action Items

TEMPLATE: SITE OVERVIEW

Provide a BRIEF (one slide) overview of

- Property/Project
- Historical Department of Defense (DoD) operations
- Assumed DoD releases
- Overview of what has been done to date

Add a location map

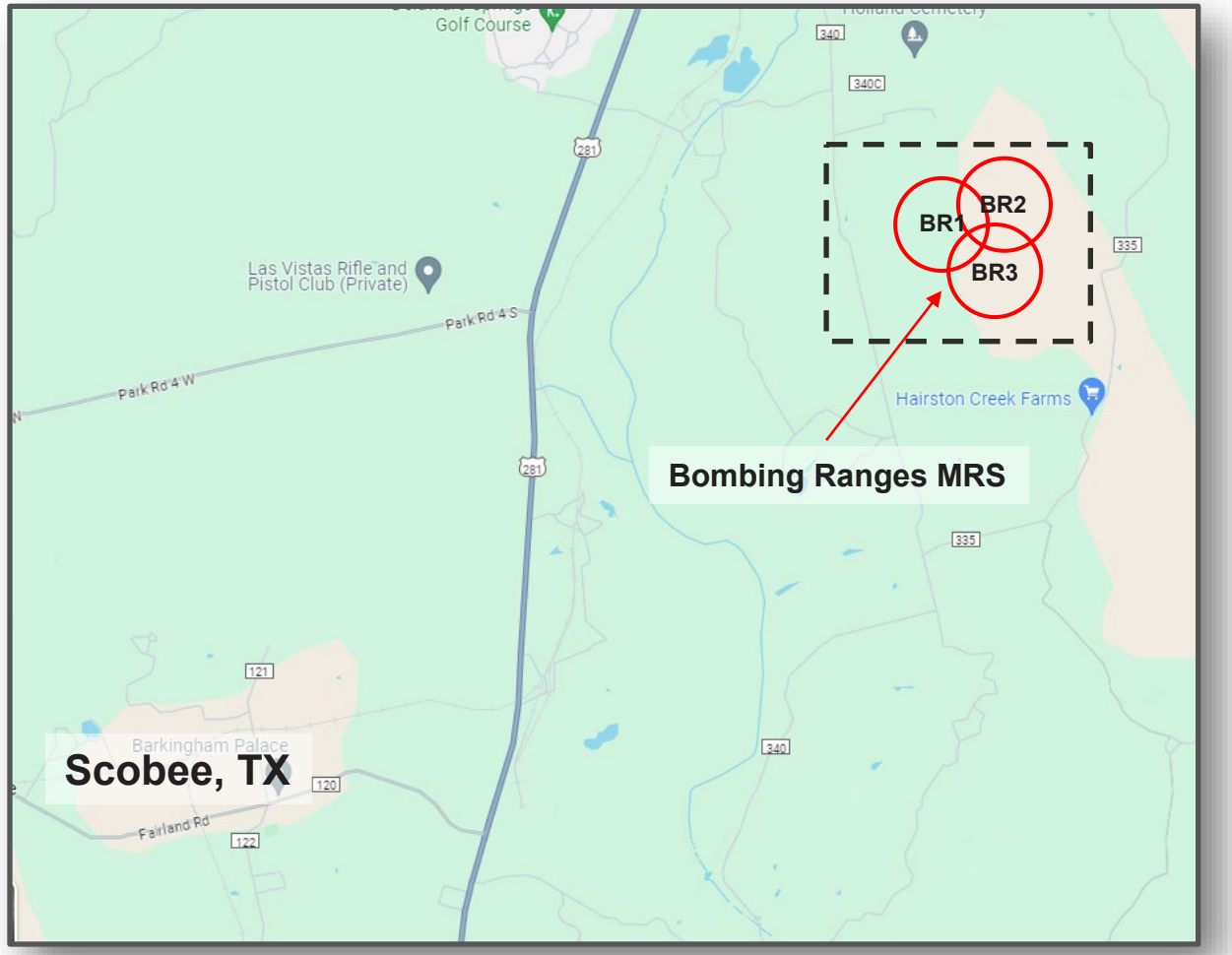
EXAMPLE: SITE OVERVIEW

Site Details

- Maydup AAF Bombing Ranges Munitions Response Site (MRS)
  - Located 7.5 miles northeast of Scobee, TX
  - Three practice bombing ranges related to aircraft training out of Maydup AAF, Texas
    - BR1 and BR3 – practice bombs only
    - BR2 – High explosive (HE) bombs used
- Training conducted using practice and HE bombs between 1941 and 1945
- Training mission ended in 1945 and land was returned to former landowners

Investigations to date

- Preliminary Assessment in 2002
- Site Inspection in 2010
  - Bomb munitions debris (MD) observed on surface
- Remedial Investigation in 2022
  - Munitions and explosives of concern (MEC) and MD found, no munitions constituents (MC), unacceptable risk due to potential MEC presence



TEMPLATE: CURRENT CONCEPTUAL SITE MODEL

MEC contamination

- Describe known and suspected MEC
- Describe high use areas (HUAs), low use areas (LUAs), and areas of no evidence of use (NEUs)
- Describe intrusive results, including vertical profile

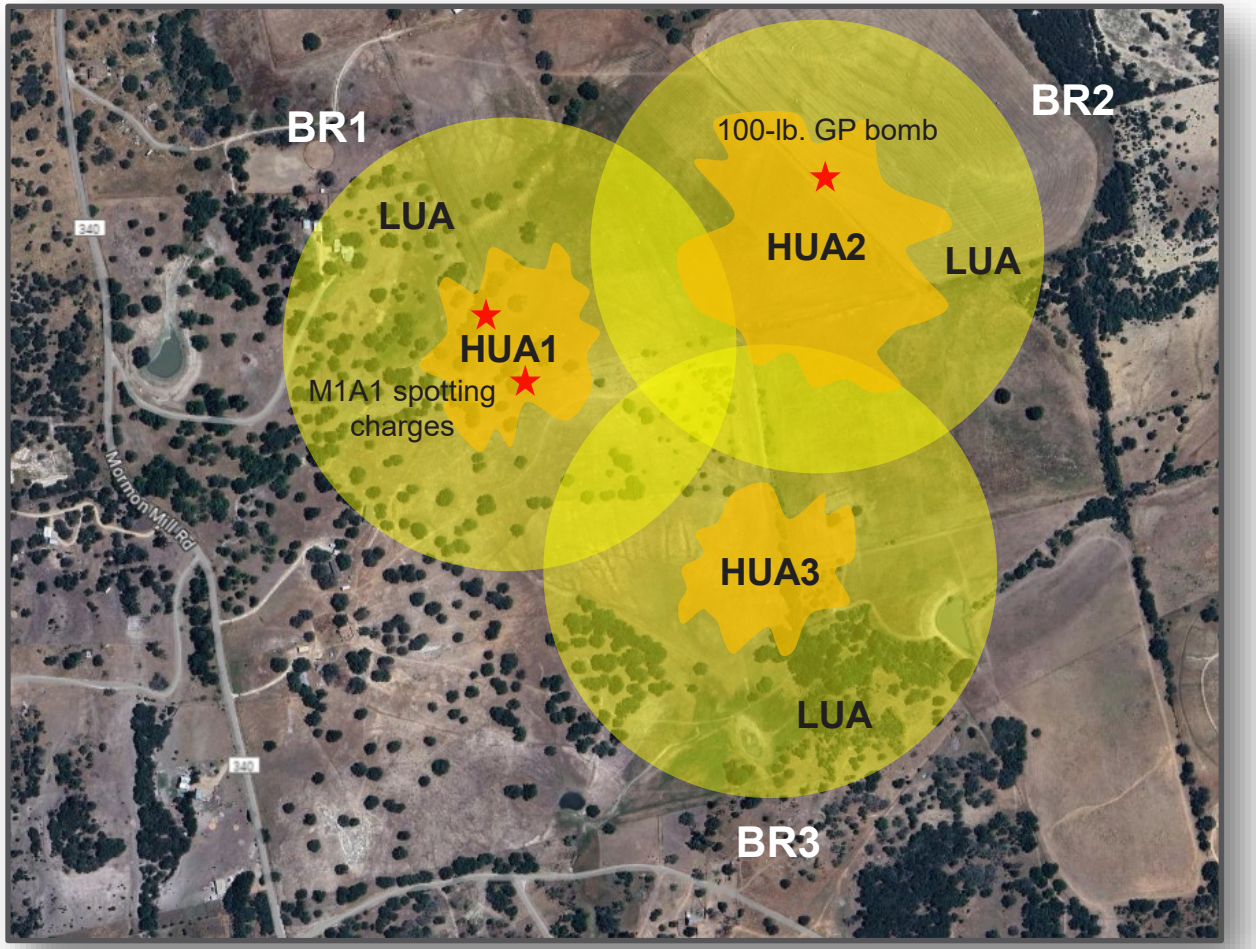
Include map(s) of HUAs, LUAs, and NEUs

- May include on separate slides if necessary

EXAMPLE: CURRENT CONCEPTUAL SITE MODEL

MEC contamination

- Known and suspected MEC
  - Bomb, 100-lb., General Purpose (GP), AN-M30
  - Bomb, 100-lb., Practice, M38A2
  - Charge, spotting, M1A1
- Characterization results
  - Three HUAs identified
  - Remaining areas are LUAs (no NEU areas)
  - Three MEC found (*shown*)
    - One 100-lb. GP bomb (at 90cm bgs)
    - Two M1A1 spotting charges
  - Multiple MD items found (*not shown*)*
    - Associated with bombs and spotting charges; included bomb fragments
  - Vertical profile
    - 100-lb. GP bombs up to 1.2m bgs est.
    - 100-lb. practice bombs up to 60cm bgs est.
    - M1A1 spotting charges up to 30cm bgs est.



* *I only did this to make it easier for this presentation. MEC characterization figures should show MEC, MD, and other pertinent data.*

TEMPLATE: CURRENT CONCEPTUAL SITE MODEL, CONT'D.

Land Uses

– Describe specific land uses including
  - Receptor activities and locations
  - Intrusive/non-intrusive
  - Estimated depth of intrusive activity
  - Estimated frequency of activity

Include map(s) of specific land uses

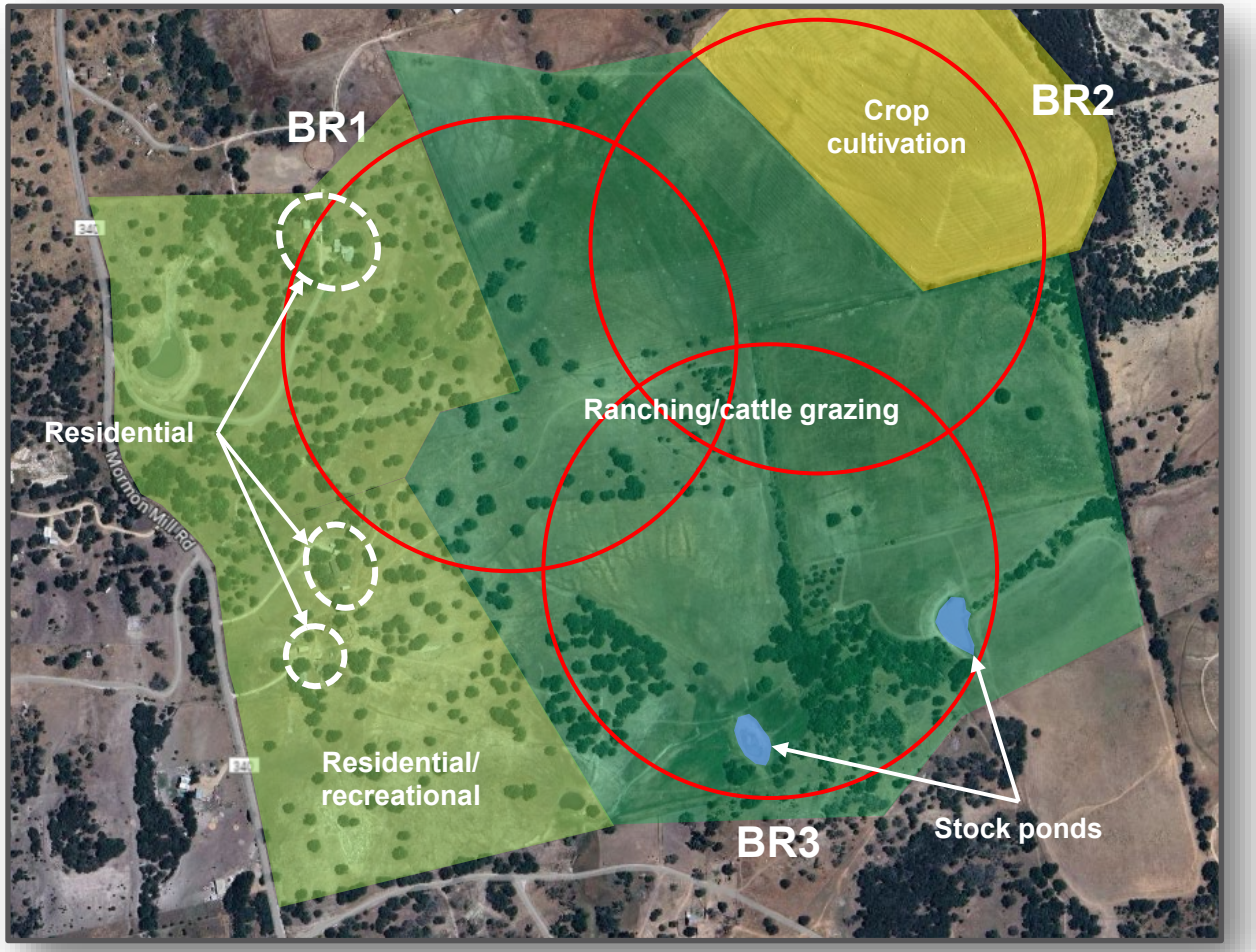
– May include on separate slides if necessary

EXAMPLE: CURRENT CONCEPTUAL SITE MODEL, CONT'D.

Land Uses

- Residential (ranch house and vicinity)
  - Outdoor recreation, gardening, landscaping
  - Some intrusive up to 30cm bgs
- Residential/recreational
  - Outdoor recreation, mowing
  - Non-intrusive
- Ranching/cattle grazing
  - Cattle handling/management, boundary fence maintenance
  - Mostly non-intrusive, some intrusive around boundary fences up to 30cm bgs
- Crop cultivation
  - Crop management: inspection, plowing, and harvesting
  - Intrusive up to 60cm bgs

- All occur frequently (daily) in respective areas



TEMPLATE: CURRENT CONCEPTUAL SITE MODEL, CONT'D.

Site-specific issues

– Summarize concerns or issues pertinent to the site, such as
  - Difficult terrain/vegetation
  - Sensitive/special concern areas
  - Right-of-entry (ROE) issues/refusals
  - Regulatory issues
  - Public concern/interest
  - etc.

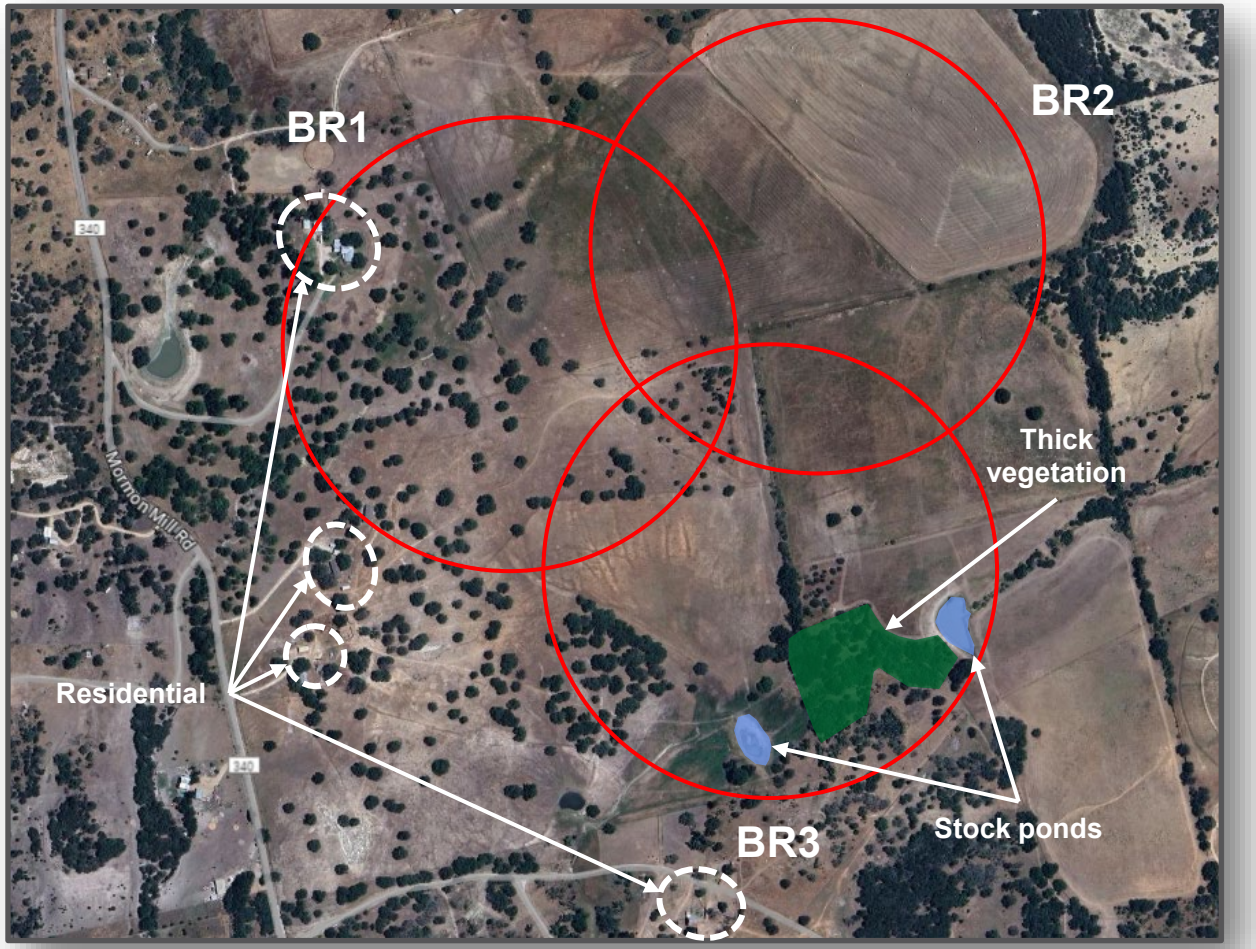
Include map(s) to support issues, if needed

– May include on separate slides if necessary

EXAMPLE: CURRENT CONCEPTUAL SITE MODEL, CONT'D.

Site-specific issues

- Residences inside and close to the MRSs
  - Evacuation likely needed for MEC removal
- Two stock ponds are within BR3
  - Created after 1945, so unlikely they contain MEC
- Stand of trees with thick underbrush between the two ponds
  - Will require vegetation reduction for MEC removal operations
- Getting ROEs required some effort
- No other public concerns
- No site-specific regulatory issues
- No sensitive environment, threatened & endangered (T&E) species, or cultural resources concerns



TEMPLATE: SUMMARY OF RMM ASSESSMENT

Provide summary of

- Assessment areas
- Risk scenarios
- Risk Management Methodology* (RMM) results

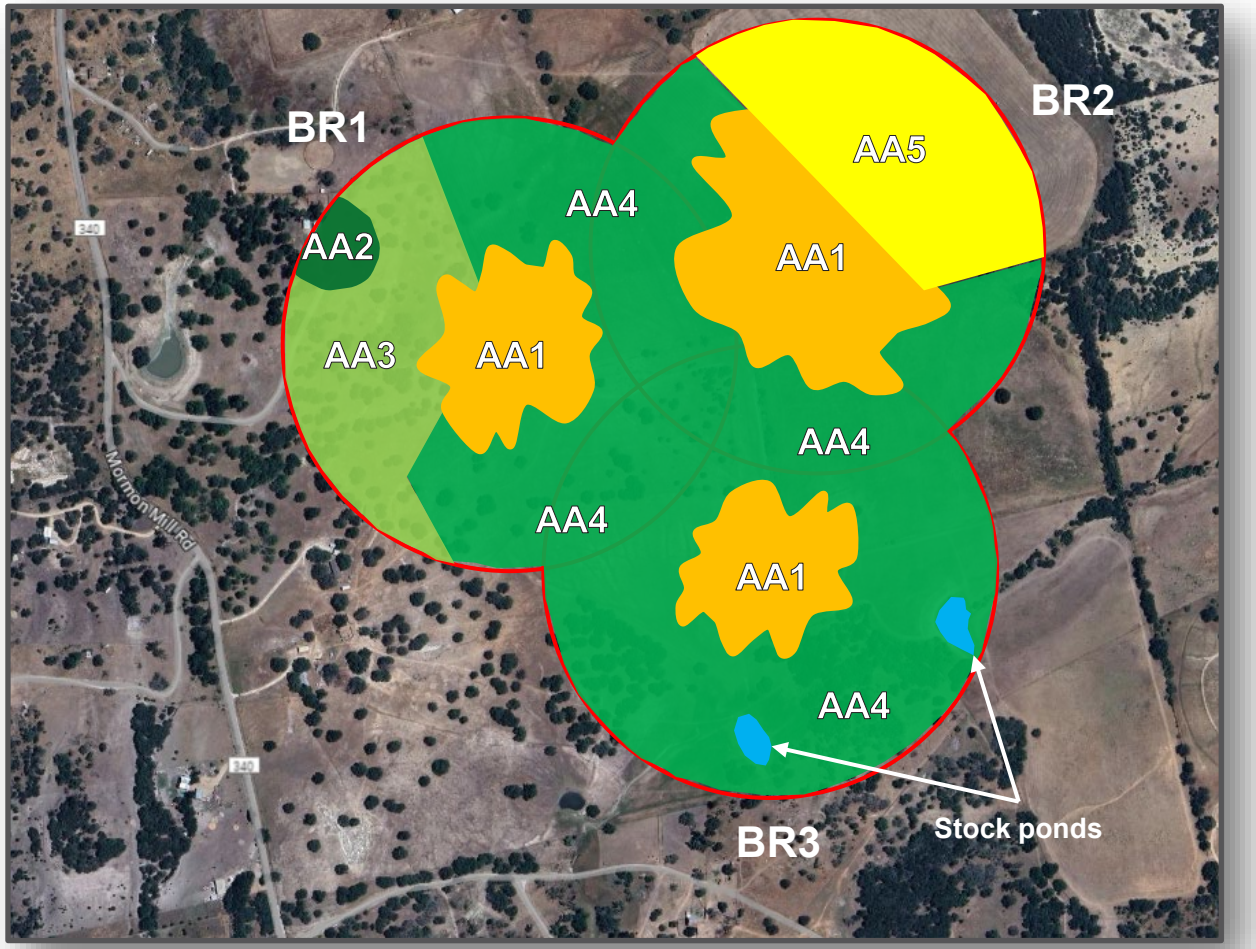
Include map of assessment areas

* Military Munitions Response Program Risk Management Methodology Memorandum, July 2023: https://www.denix.osd.mil/mmrp/denix-files/sites/46/2023/08/Military-Munitions-Response-Program-Risk-Management-Methodology_508c_v2.pdf

EXAMPLE: SUMMARY OF RMM ASSESSMENT

Five Assessment Areas for RMM

- AA1: HUAs (residential/ranching)
  - RS1a: Outdoor recreation, mowing
  - RS1b: Cattle handling/management
  - RS1c: Boundary fence maintenance
- AA2: LUA (residential)
  - RS2: Outdoor recreation, gardening, landscaping
- AA3: LUA (residential/recreational)
  - RS3: Outdoor recreation, mowing
- AA4: LUA (ranching)
  - RS4a: Cattle handling/management
  - RS4b: Boundary fence maintenance
- AA5: HUA/LUA (crop cultivation)
  - RS5a: Crop management – inspection and harvesting
  - RS5b: Crop management – plowing



- Unacceptable risk conditions assessed for all risk scenarios
  - No unacceptable risk in the stock ponds

TEMPLATE: SUMMARY OF INSTITUTIONAL ANALYSIS

Summarize Institutional Analysis

- Are there any existing LUCs?
- Who are the entities/organizations with jurisdiction over the MRS?
  - i.e., who has authority over what happens at the site?
    - e.g., landowner, DoD, EPA and state regulators, county, planning authorities
- For each entity/organization, what is their…
  - Capability to enforce/maintain LUCs?
  - Desire to participate in LUC implementation?
- What are the potential LUCs options for the MRS?

Can include summary table for entities/organizations and related information

EXAMPLE: SUMMARY OF INSTITUTIONAL ANALYSIS

Entities/organizations with jurisdiction

- USACE
  - Willing and able to implement and maintain educational and/or engineering controls
  - Cannot implement governmental or proprietary controls without support from TCEQ or County
- Texas Commission on Environmental Quality
  - Will support educational and/or engineering controls
  - Will not support governmental or proprietary controls
- Burnet County
  - Will support educational and/or engineering controls
  - Will not support governmental or proprietary controls
- Landowners
  - Will support educational controls
    - Excluding signage
  - Will not support governmental, proprietary, or engineering controls

There are no existing LUCs at the MRS

- Current fencing cannot be used as a containment measure

Potential LUCs options for the MRS

- Based on the analysis, educational controls are the only implementable LUCs for this MRS
  - Public Notices and Information Pamphlets
  - Education Seminars and Meetings
  - Websites

TEMPLATE: REMEDIAL ACTION OBJECTIVES

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Present RAOs

- For MRSs with multiple assessment areas and receptor activities, use table format as shown
- Note that RMM risk scenarios can be used to support RAO development

Consider

- Have we addressed all assessment areas?
- Have we addressed all exposure pathways?
- Have we separated our receptors adequately?
- Are there any constraints on the remedial alternatives?

REMEDIAL ACTION OBJECTIVE						
		POTENTIAL EXPOSURE PATHWAY(S) [1]				
MRS	**CONTAMINANT and MEDIA**	**Assessment Area(s)**	**Receptors and Exposure Pathways**	**Interaction Zone(s)**	**REMEDIATION GOAL**	**Constraints**
The MRS or area being addressed	*Known or suspected MEC items and medium/depth*	*MEC exposure location (i.e., assessment area)*	*Receptors and activities to be addressed*	*Receptor intrusive depth*	*Pathway no longer presents unacceptable risk conditions*	*Describe any constraints on the remedial alternatives*
MRS01	In Soil (to a depth of 14 inches bgs): • Rocket, 2.36-inch, HEAT and practice • Grenade, Hand, Practice and Training • Grenade, Hand, Smoke	Trails incl. 15m buffer - HUA and LUA	Recreational users (hiking, walking); 25,000 visitors/year	Surface only	Mitigate all exposure pathways to eliminate unacceptable risk conditions	Deed notices and dig and sift removal cannot be used Trees >15cm dia. cannot be removed
			Site workers (trail maintenance and construction); 7 workers, 20 days/year	18 inches bgs		
		Woods – HUA	Recreational users (hiking, walking); infrequent, estimated less than 5/year	Surface only		
			Site workers (new trail construction); infrequent, estimated 7 workers, 20 days/10 years	18 inches bgs		
		Woods - LUA	Recreational users (hiking, walking); infrequent, estimated less than 5/year	Surface only		
			Site workers (new trail construction); infrequent, estimated 7 workers, 20 days/10 years	18 inches bgs		

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EXAMPLE: REMEDIAL ACTION OBJECTIVES

CONTAMINANT/MEDIA	POTENTIAL EXPOSURE PATHWAY(S)			Remediation Goal
	Assessment Area(s)	Receptors and Exposure Pathways	Interaction Zone	
IN SOIL: ▪ Bomb, 100-lb., GP, AN-M30 (*up to 4 feet bgs est.*) ▪ Bomb, 100-lb., Practice, M38A2 (*up to 2 feet bgs est.*) ▪ Charge, spotting, M1A1 (*up to 1 feet bgs est.*)	HUAs (residential/ranching)	Outdoor recreation, mowing	Surface only	Mitigate all exposure pathways to eliminate unacceptable risk conditions
		Cattle handling/management	Surface only	
		Boundary fence maintenance	0-30cm bgs	
	LUA (residential)	Outdoor recreation, gardening, landscaping	0-30cm bgs	
	LUA (residential/recreational)	Outdoor recreation, mowing	Surface only	
	LUA (ranching)	Cattle handling/management	Surface only	
		Boundary fence maintenance	0-30cm bgs	
	HUA/LUA (crop cultivation)	Crop management – inspection and harvesting	Surface only	
		Crop management – plowing	0-60cm bgs	

Constraints on the remedial alternatives:

- Per the Institutional Analysis, educational controls are the only implementable LUCs for this MRS (i.e., Public Notices and Information Pamphlets, Education Seminars and Meetings, and Websites). The landowners will not allow posting of warning signs.
- The landowners will not allow the removal of mature trees (>3” dia) or dig and sift as a MEC removal technology.

TEMPLATE AND EXAMPLE: ARARs

Summarize the ARARs identified for MRS (confirm with Office of Counsel)

- What are the requirements associated with each one?
  - i.e., what will we need to do to comply with each ARAR?

Example

- RCRA Subpart X
  - Requirement to evaluate releases of contamination following MEC disposal (consolidated shots)
  - Remedial alternatives involving MEC consolidated shots will need to include post-detonation sampling for explosives, with contaminated soil being removed from site

TEMPLATE: SUMMARY OF REMEDIAL TECHNOLOGIES

Summarize technology screening

- What technologies were retained?
- What technologies were screened out and why?

Can use a table and/or text

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EXAMPLE: SUMMARY OF REMEDIAL TECHNOLOGIES

GRAS	METHODS OF ACTION	TECHNOLOGIES	Effective?	Implementable?	Excessive Cost?	RETAINED?
Treatment Actions	Surface detection	Visual detection	YES	YES	NO	YES
		Instrument-aided visual detection	YES	YES	NO	YES
	Geophysical detection/excavation	Advanced Geophysical Classification (AGC) Sensors	YES	YES	NO	YES
		Non-AGC Digital Geophysical Mapping Sensors	YES	YES	NO	YES
		Analog Sensors	YES*	YES	NO	YES
	Excavate and sift	Various	YES	NO	YES	NO
	MEC disposal	BIP or consolidated shots	YES	YES	NO	YES
		Contained detonation chamber	YES	YES	YES	NO
Containment Actions	Restrict or control access	Fencing	YES	NO	NO	NO
	Protective cover	Soil, concrete, asphalt	YES	NO	NO	NO
Institutional Actions	Governmental Control	Zoning restrictions/permits	YES	NO	NO	NO
	Proprietary Controls	Easements/restrictive covenants	YES	NO	NO	NO
	Educational Controls	Signs	YES	NO	NO	NO
		Notices/pamphlets, seminars/meetings, websites	YES	YES	NO	YES

TEMPLATE: SUMMARY OF REMEDIAL ALTERNATIVES

Summarize the remedial alternatives developed, including

- Remedial components
- Remedial footprints
- Rationale
  - How they achieve the RAO
  - How they comply with ARARs

Ideally include figures to support the description of each alternative

- Remedial footprints
  - MEC removal footprints
    - Digital Geophysical Mapping [DGM]
    - Advanced Geophysical Classification [AGC]
    - Other
  - LUCs footprints (consider different LUCs)

Some thoughts/questions to consider:

- Where are the areas with greatest risk for exposure (e.g., HUAs with high activity)?
- Is MEC removal viable across the whole MRS?
- Are there areas where MEC removal could/should be focused?
- Is a LUCs only alternative protective/viable?
- Which LUCs will be protective for which receptors?
- Is an Unlimited Use and Unrestricted Exposure (UU/UE) alternative viable?
  (We must consider one anyway)

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EXAMPLE: SUMMARY OF REMEDIAL ALTERNATIVES

No.	ALTERNATIVE NAME	MAJOR COMPONENTS	COMMENTS
1	No Action	None	Evaluation of the No-Action alternative is required
2	Subsurface Removal to Allow UU/UE	▪ Surface and subsurface MEC removal in MRS using AGC for anomaly detection and classification to 1.2m bgs ▪ Use anomaly reduction or conduct post-removal AGC surveys for saturated response areas (SRAs) ▪ Blow-in-place (BIP) or consolidated shots for MEC disposal	▪ Requires MEC removal beneath trees, so is **not implementable** ▪ However, evaluation of alternative to allow UU/UE required under DERP
3	Subsurface Removal throughout MRS	▪ Surface and subsurface MEC removal in MRS using AGC for anomaly detection and classification to 60cm bgs ▪ Use anomaly reduction or conduct post-removal AGC surveys for SRAs ▪ BIP or consolidated shots for MEC disposal	▪ No MEC removal conducted beneath buildings or trees greater then 3” dia., or in stock ponds ▪ TOI detected beyond 60cm bgs will be excavated
4	Subsurface Removal at AA1, 2, 3, and 5 with Surface Removal at AA4, and LUCs	▪ Surface and subsurface MEC removal in AA1, 2, 3, and 5 using AGC for anomaly detection and classification to 60cm bgs ▪ Use anomaly reduction or conduct post-removal AGC surveys for SRAs ▪ Surface MEC removal in AA4 using instrument-aided visual surveys ▪ BIP or consolidated shots for MEC disposal ▪ Regular mailings of informational pamphlets to landowners; maintain website	▪ No MEC removal conducted beneath buildings or trees greater then 3” dia., or in stock ponds ▪ Targets of interest (TOI) detected beyond 60cm bgs will be excavated ▪ Post-detonation sampling to comply with ARARs
5	Subsurface Removal at AA1, 2, and 5 with Surface Removal at AA3 and 4, and LUCs	▪ Surface and subsurface MEC removal in AA1, 2, 3, and 5 using AGC for anomaly detection and classification to 60cm bgs ▪ Use anomaly reduction or conduct post-removal AGC surveys for SRAs ▪ Surface MEC removal in AA4 using instrument-aided visual surveys ▪ BIP or consolidated shots for MEC disposal ▪ Regular mailings of informational pamphlets to landowners; maintain website	▪ No MEC removal conducted beneath buildings or trees greater then 3” dia., or in stock ponds ▪ TOI detected beyond 60cm bgs will be excavated ▪ Post-detonation sampling to comply with ARARs
6	Subsurface Removal at AA2, 3, and 5, and AA1 fence lines, with Surface Removal at AA1 and 4, and LUCs	▪ Surface and subsurface MEC removal in AA2, 3, and 5, and along AA1 fence lines, using AGC for anomaly detection and classification to 60cm bgs ▪ Use anomaly reduction or conduct post-removal AGC surveys for SRAs ▪ Surface MEC removal in AA1 and 4 using instrument-aided visual surveys ▪ BIP or consolidated shots for MEC disposal ▪ Regular mailings of informational pamphlets to landowners; maintain website	▪ Only surface removal in HUAs in cattle ranching areas (except for fence lines) ▪ No MEC removal conducted beneath buildings or trees greater then 3” dia., or in stock ponds ▪ TOI detected beyond 60cm bgs will be excavated ▪ Post-detonation sampling to comply with ARARs

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EXAMPLE: SUMMARY OF REMEDIAL ALTERNATIVES

No.	ALTERNATIVE NAME	MAJOR COMPONENTS	COMMENTS
1	No Action	None	Evaluation of the No Action alternative is required
2	Subsurface Removal to Allow UU/UE	▪ Surface and subsurface MEC removal in MRS using AGC for anomaly detection and classification to 1 meter bgs ▪ Use anomaly reduction or conduct post-removal AGC surveys for SRAs ▪ BIP or consolidated shots for MEC disposal	▪ Requires MEC removal beneath trees, so is **not implementable** ▪ However, evaluation of alternative to allow UU/UE required under DERP
3	Subsurface Removal throughout MRS	▪ Surface and subsurface MEC removal in MRS using AGC for anomaly detection and classification to 60cm bgs ▪ Use anomaly reduction or conduct post-removal AGC surveys for SRAs ▪ BIP or consolidated shots for MEC disposal	▪ No MEC removal conducted beneath buildings or trees greater then 3" dia., or in stock ponds ▪ TOI detected beyond 60cm bgs will be excavated
4	Subsurface Removal at AA1, 2, 3, and 5 with Surface Removal at AA4, and LUCs	▪ Surface and subsurface MEC removal in AA1, 2, 3, and 5 using AGC for anomaly detection and classification to 60cm bgs ▪ Use anomaly reduction or conduct post-removal AGC surveys for SRAs ▪ Surface MEC removal in AA4 using instrument-aided visual surveys ▪ BIP or consolidated shots for MEC disposal ▪ Regular mailings of informational pamphlets to landowners; maintain website	▪ No MEC removal conducted beneath buildings or trees greater then 3" dia., or in stock ponds ▪ TOI detected beyond 60cm bgs will be excavated ▪ Post-detonation sampling to comply with ARARs
5	Subsurface Removal at AA1, 2, and 5 with Surface Removal at AA3 and 4, and LUCs	▪ Surface and subsurface MEC removal in AA1, 2, 3, and 5 using AGC for anomaly detection and classification to 60cm bgs ▪ Use anomaly reduction or conduct post-removal AGC surveys for SRAs ▪ Surface MEC removal in AA4 using instrument-aided visual surveys ▪ BIP or consolidated shots for MEC disposal ▪ Regular mailings of informational pamphlets to landowners; maintain website	▪ No MEC removal conducted beneath buildings or trees greater then 3" dia., or in stock ponds ▪ TOI detected beyond 60cm bgs will be excavated ▪ Post-detonation sampling to comply with ARARs
6	Subsurface Removal at AA2, 3, and 5, and AA1 fence lines, with Surface Removal at AA1 and 4, and LUCs	▪ Surface and subsurface MEC removal in AA2, 3, and 5, and along AA1 fence lines, using AGC for anomaly detection and classification to 60cm bgs ▪ Use anomaly reduction or conduct post-removal AGC surveys for SRAs ▪ Surface MEC removal in AA1 and 4 using instrument-aided visual surveys ▪ BIP or consolidated shots for MEC disposal ▪ Regular mailings of informational pamphlets to landowners; maintain website	▪ Only surface removal in HUAs in cattle ranching areas (except for fence lines) ▪ No MEC removal conducted beneath buildings or trees greater then 3" dia., or in stock ponds ▪ TOI detected beyond 60cm bgs will be excavated ▪ Post-detonation sampling to comply with ARARs

To comply with DERP Manual

- **No Action alternative**
- **Alternative that allows for UU/UE**
- **Alternative(s) that use(s) LUCs**

Not protective

Not implementable

We must have BOTH

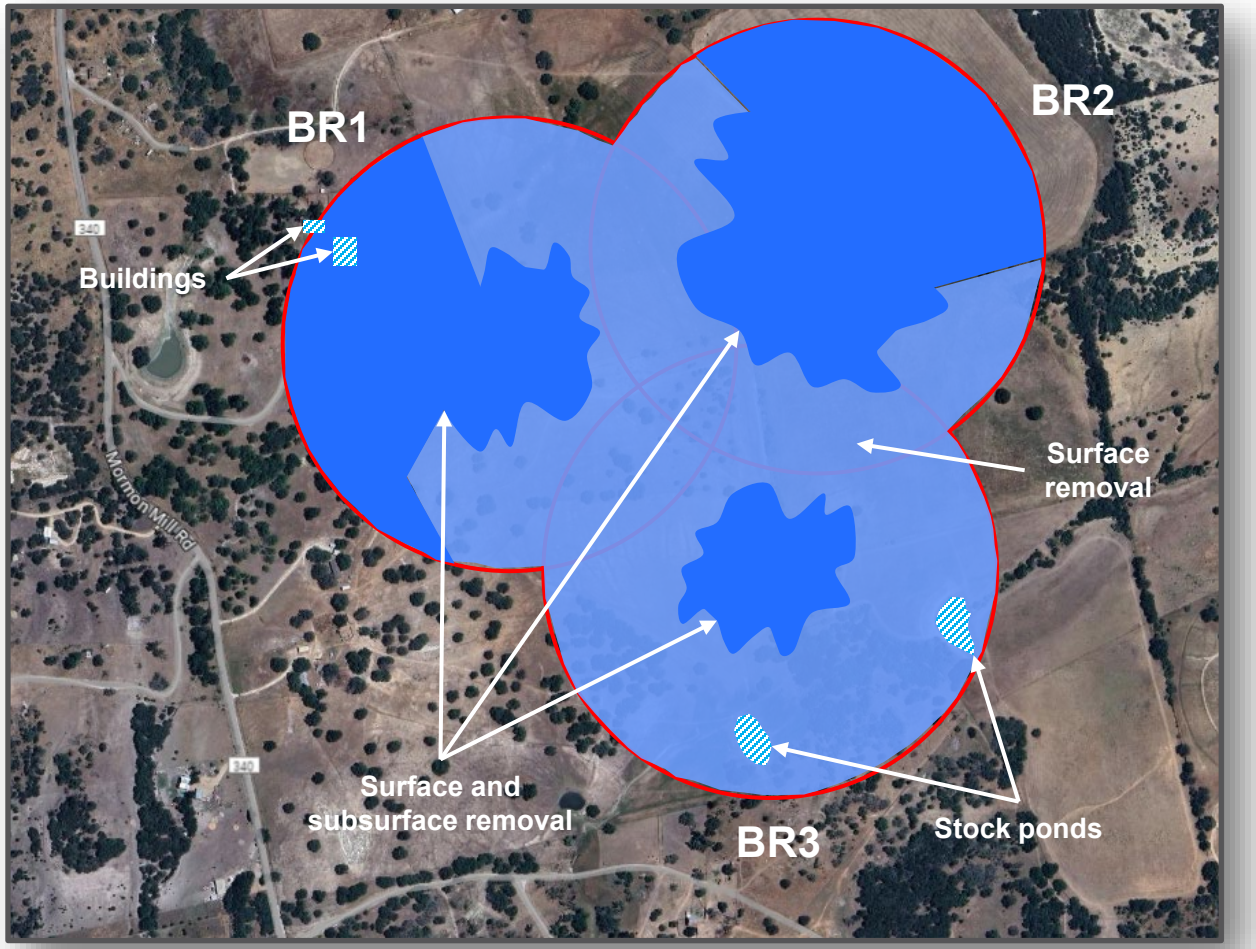
Multiple, viable site-specific alternatives

DERP Manual: https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodm/471520m.pdf

EXAMPLE: SUMMARY OF REMEDIAL ALTERNATIVES, CONT'D.

Alt 4: Subsurf. Removal at AA1, 2, 3, & 5 with Surf. Removal at AA4, & LUCs

- Surface and subsurface removal using AGC for anomaly detection and classification to 60cm bgs
  - Use anomaly reduction or conduct post-removal AGC surveys for SRAs
  - TOI detected beyond 60cm bgs will be excavated
  - **Achieves RAO** through removal of MEC to max. estimated depths throughout interaction zones in HUAs and residential/cultivated (high activity) LUAs
- Surface removal using instrument-aided visual surveys
  - **Achieves RAO** through removal of MEC on surface in cattle ranching (lower activity) areas
    - Residual risk managed through LUC implementation
- BIP or consolidated shots for MEC disposal
  - Post-detonation sampling to **comply with ARARs**
- Regular mailings of informational pamphlets to landowners; maintain website
  - **Achieves RAO** by reducing likelihood of MEC interaction in lower activity LUAs by increasing hazard awareness

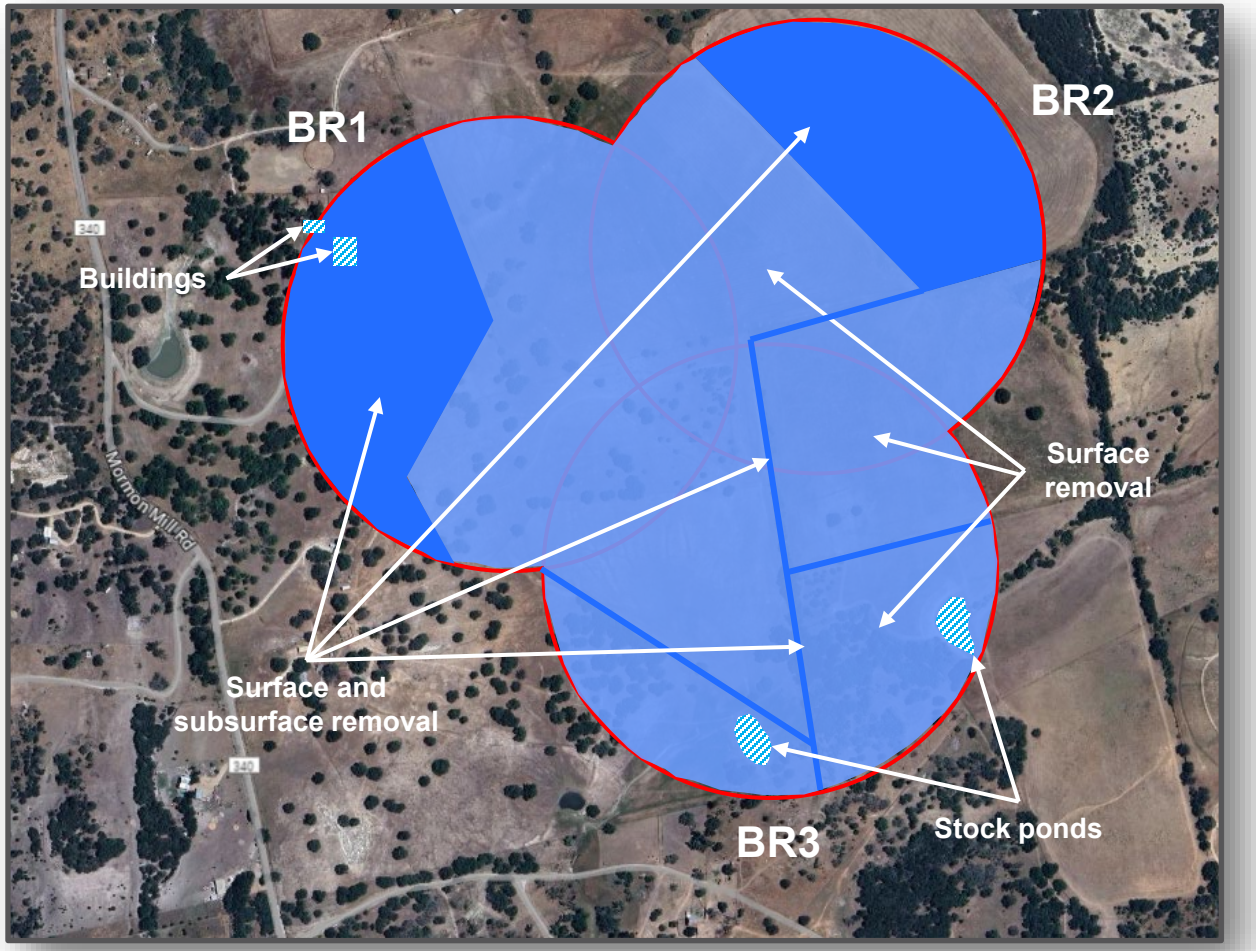


- Exception areas:
  - No MEC removal conducted beneath buildings or trees greater then 3" dia., or in stock ponds

EXAMPLE: SUMMARY OF REMEDIAL ALTERNATIVES, CONT'D.

Alt 6: Subsurf. Removal at AA2, 3, and 5, and AA1 fence lines, with Surf. Removal at AA1 and 4, and LUCs

- Surface and subsurface removal using AGC for anomaly detection and classification to 60cm bgs
  - Use anomaly reduction or conduct post-removal AGC surveys for SRAs
  - TOI detected beyond 60cm bgs will be excavated
  - **Achieves RAO** through removal of MEC to max. estimated depths throughout interaction zones along fences & in residential/cultivated (high activity) LUAs
- Surface removal using instrument-aided visual surveys
  - **Achieves RAO** through removal of MEC on surface in cattle ranching (lower activity) areas
    - Residual risk managed through LUC implementation
- BIP or consolidated shots for MEC disposal
  - Post-detonation sampling to **comply with ARARs**
- Regular mailings of informational pamphlets to landowners; maintain website
  - **Achieves RAO** by reducing likelihood of MEC interaction in lower activity LUAs by increasing hazard awareness



- Exception areas:
  - No MEC removal conducted beneath buildings or trees greater then 3" dia., or in stock ponds

TEMPLATE: CONCLUSIONS AND ACTION ITEMS

To be completed during meeting

FINAL THOUGHTS

Key Takeaways

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KEY TAKEAWAYS

Alternatives Panels are a brainstorming process to develop a range of protective and implementable alternatives

EM CX has developed a template, and our participation can help to avoid common FS issues, such as

- "Cookie cutter" alternatives
- Unprotective alternatives
- Unimplementable alternatives

Alternatives Panel Benefits

- Facilitate project team consensus on draft FS
- Should reduce significant review comments/ document rewrites for FSs
- Sets project teams up for RA success

Even if you don't conduct an Alternatives Panel, you can *still follow the process outlined here* to develop better, site-specific remedial alternatives

For general (non-project-specific) questions, contact the EM CX

- Julie Burdey
  - Julie.A.Burdey@usace.army.mil
- James Salisbury
  - James.A.Salisbury@usace.army.mil