



Open Environmental Restoration Resource (OER2) Webinar

NAVFAC Munitions Response RI/FS Guidance

Presented by:
NAVFAC Environmental Restoration Program

Segment: 2

Distribution Statement A: Approved for public release; Distribution is unlimited.

Points of Contact



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Logistics



- **Submit all questions via chat box throughout the presentation**
- **Presentation is being recorded**
- **Complete the webinar survey (main feedback mechanism)**

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OER2 Webinar Series



- **Why Attend?**
 - Obtain and hear about the latest DOD and DON's policies/guidance, tools, technologies and practices to improve the ERP's efficiency
 - Promote innovation and share lessons learned
 - **FEEDBACK** to the ERP Leadership
- **Who Should Attend?**
 - ERP Community Members: RPMs, RTMs, Contractors, and other remediation practitioners who support and execute the ERP
 - Voluntary participation
- **Schedule and Registration:**
 - Every other month, 4th Wed (can be rescheduled due to holidays)
 - Registration link for each topic (announced via ER T2 email)
- **Topics and Presenters:**
 - **ERP community members** to submit topics (non-marketing and DON ERP-relevant) to POCs (Gunarti Coghlan – gunarti.coghlan@navy.mil or Josh Fortenberry – josh.fortenberry@navy.mil)
 - Selected topic will be assigned Champion to work with presenter

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Speaker Introduction



Mr. Harre is a Senior Environmental Engineer and subject matter expert on Munitions Response at the Naval Facilities Engineering and Expeditionary Warfare Center.

His past duties have exposed him to various innovative remediation technologies including remediation of small arms ranges, alternative land-fill covers, remediation of perchlorate contaminated groundwater, and geophysical classification on munitions response sites.



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Navy/Marine Corps Munitions Response Remedial Investigation-Feasibility Study Guidance

Bryan Harre
Naval Facilities Engineering & Expeditionary Warfare Center



- Purpose is to provide guidance on the Navy/Marine Corps RI/FSs for the Munitions Response Program (MRP)
- Additional training offered by CECOS class “Advanced Munitions Response Site Management Course”
<https://www.netc.navy.mil/centers/csfe/cecos/>
- Draft MR RI/FS Guidance is available to RPMs on the NAVFAC MR Reference DVD
Contact your FEC MR Workgroup member for a copy
- Thanks to NAVFAC MR Workgroup, National Association of Ordnance Contractors, and Battelle



- DoD and EPA agreed that DoD will:
 - Conduct response actions when necessary to address explosives safety, human health, and the environment
 - DoD legal authorities include CERCLA, Defense Environmental Restoration Program (DERP), and Department of Defense Explosives Safety Board
 - A process consistent with CERCLA and these management principles will be the preferred response mechanism

DoD/EPA UXO Management Principles (2)



- **DoD munitions response actions must be consistent with the National Contingency Plan(NCP)**

- Removal action alternatives will be evaluated under the criteria set forth in the NCP, particularly NCP §300.410 and §300.415
- Approved Explosives Safety Submission(ESS) is required for removal actions (time critical and non-time critical), and remedial actions involving explosives safety hazards, particularly UXO

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DoD/EPA UXO Management Principles (3)



- **Permanent record of data gathered and a clear audit trail of pertinent data analysis and resulting decisions and actions are required**
 - To maximum extent practicable, permanent record shall include sensor data that is digitally-recorded and geo-referenced
- **Explosives safety, cost, and/or technical limitations may limit the ability to conduct a response and thereby limit the reasonably anticipated future land uses**

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Navy MR Policy in Ordnance Pamphlet 5



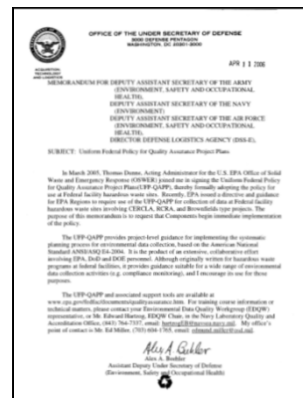
- Use most appropriate available technologies to detect and remove Munitions of Explosives Concern (MEC) consistent with future land use
- Munitions response actions for change-of-use must be compatible with explosive hazards known or suspected to be present
- Real property known or suspected to contain MEC and/or MPPEH will not normally be transferred or leased from DON control until a munitions response consistent with the future land use has been completed

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Uniform Federal Policy for Quality Assurance Project Plans (UFP-QAPP)



- Developed by EPA, DoD, DOE
- Required for use by DoD for environmental data collection, including those from an MR project
- Contains and describes in detail specific data requirements or other information that must be collected to demonstrate conformance to requirements
 - 37 required elements into 37 worksheets
 - Emphasis on systematic planning

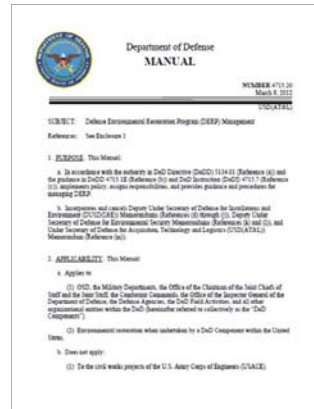


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Defense Environmental Restoration Program Management Guidance



- Issued in March 2012
- Implements policy, assigns responsibilities, and provides guidance and procedures for managing DERP
- Establishes funding eligibility
- Requires FS to evaluate unlimited use and unrestricted exposure (UU/UE)

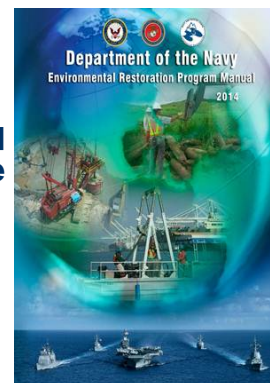


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NERP Manual



- Issued in August 2006 (currently under revision)
- Summarizes the organization and responsibilities of DoD and DON offices and provides terminology and procedures used in implementing the ER program
- Discusses funding eligibility, priority setting, reporting, and information management systems
- Comprehensive reference for the DON user to properly identify, investigate, and select protective and cost-effective remedies for ER program sites



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- Goals of RI/FS scoping are to:
 - Agree on reasonably anticipated future land use;
 - Describe the type and content of studies needed to initiate response actions and determine nature and extent of MEC/MC and associated hazard/risk;
 - Determine if there is a need for remedial/removal actions; and
 - Determine appropriate response mechanisms and authorities



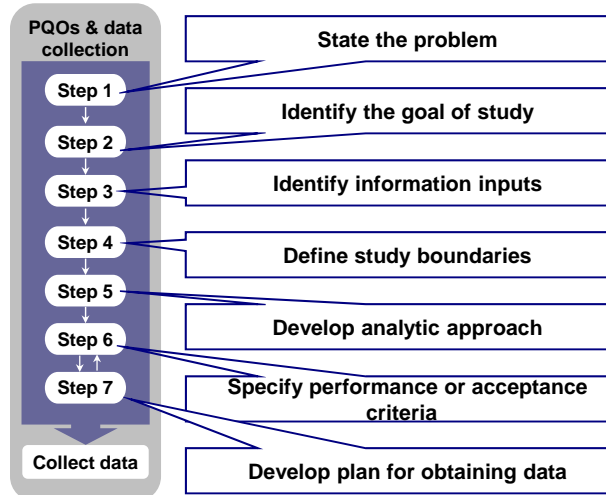
- What about project scoping?
 - The best way to ensure that a project meets its goals is to have project planning meetings with all the stakeholders (e.g., land users, data producers, decision-makers)
 - Scoping ensures that all needs are adequately defined
 - The penalty for ineffective planning often is greater conflict and extensive reworking, **which results in increased cost and lost time**

Systematic Planning Process and Project Quality Objectives (PQO's)



Systematic planning requirements come from the project team in the form of DQO's/PQO's

Every project phase identifies them, e.g., PA and SI PQO's were developed for your site



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Available Terrestrial Templates



•Six SOW templates available at NAVFAC MRP Portal:
http://www.navfac.navy.mil/navfac_worldwide/specialty_centers/exwc/products_and_services/ev/erb/mr-sites.html, each developed by MR Work Group

•SOW templates relevant to RI/FS:

- RI/FS
- UXO Quality Assessment
- Small arms RI/FS



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Conceptual Site Model Example – Waikane Valley

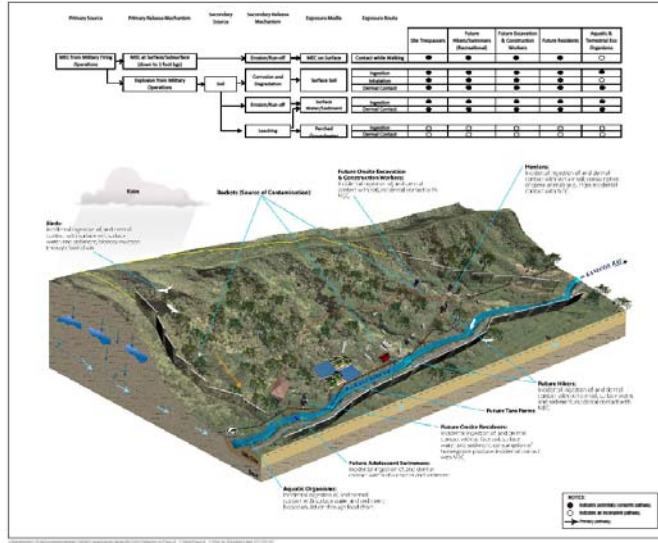


Figure not drawn to scale

**Figure 4-5
Conceptual Site Model**

Waikane Valley Impact Area
Koolapoko District, Oahu, Hawaii

LEGEND

- Contaminated Flow Direction
- Infrastructure
- Future Road/Highway
- Basal Geological Table
- Proposed Groundwater
- Site Boundary
- MDC: Migrations and Exclusions of Concern
- AMC: Appropriate Maximum Concentration Area
- Any length of line may be subject to potential unrestricted land use

Environmental, Inc. NAFAC

Drawn By: [Name] Date: [Date]

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Graphic courtesy of US Navy.

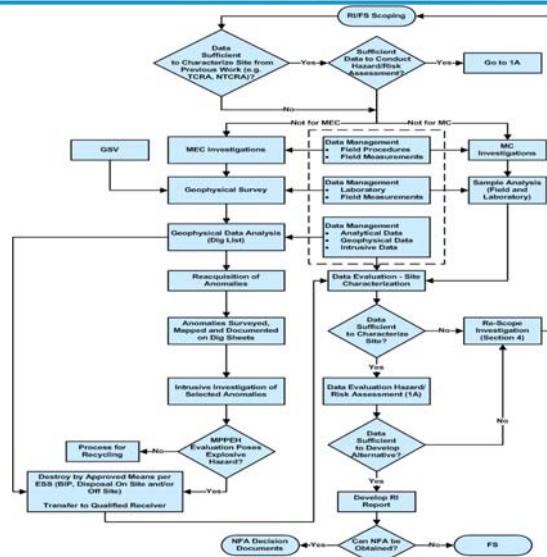
Managing Uncertainty



- **Uncertainty will always be there, both going into and coming out the RI**
 - MRS history may be unknown with many unknown factors such as munitions quantities and types, dud rates, etc.
- **Anticipate not all RI planning assumptions will be valid**
 - Even the most perfectly planned project needs to consider contingencies

The objective of the RI/FS process is not the unobtainable goal of removing all uncertainty, but rather to gather information sufficient to support an informed risk-based management decision regarding which remedy appears to be the most appropriate for a given MRS.
Source: EPA RI/FS Guidance (1988)

Terrestrial RI Road Map



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Underwater MRS Characteristics



•Before you investigate, know your site's environment

- Ocean, bay, river, lake, island
- Depth, currents, wave action, tides, water clarity, turbulence
- Local weather
- Bottoms (soft, hard, sediments)
- Habitat (sea grass beds, coral reefs, open bottom, swamps, marshes)
- Inhabiting biota (especially T&E species)



Vieques Island Live Impact Area. Photo courtesy of US Navy.



UXO laying proud on rock bottom. Photo courtesy of US Navy.

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- **Topography/terrain**
 - Instrument limitations, e.g., mountainous conditions will preclude use of wheeled carts
 - ◆ **Large flat areas best investigated with towed arrays**



Extreme terrain conditions. Photo courtesy of Montana National Guard.



Towed EMI array. Photo courtesy US Navy.



- **Geology**
 - Magnetometers are sensitive to iron-bearing geology
- **Vegetation**
 - ◆ **Density determines type of investigation instrument used**
 - ◆ **Removal not always desired or possible**

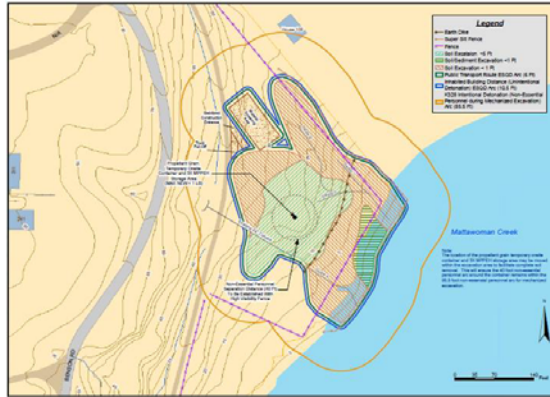


Vegetation removal crew. Photo courtesy of US Navy.

Investigation Considerations – MEC (3)



- Investigations generate Explosives Safety Quantity Distance (ESQD) arcs
- On- and off-site ESQD encumbrance requires public traffic route closures, building evacuations, etc.
 - Can be a public affairs and logistics challenge



Graphic courtesy of US Navy.

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Detectors



- **Types**
 - **Main**
 - Magnetometers and gradiometers
 - Electromagnetic induction (EMI)
 - **Other**
 - Ground penetrating radar (GPR)
 - Multi/Dual-sensor systems
 - Other, e.g., sonic systems, infrared sensors, explosive “sniffers”, neutron backscatter
- **Applications**
 - **Terrestrial (hand-held, man-portable, or towed)**
 - **Underwater**

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- **Designed for classification**

- Measure complete decay signal
- Fixed arrays for precise positioning
- Multi-axis transmit/receive coils for complete target illumination



Photo courtesy of ESTCP.



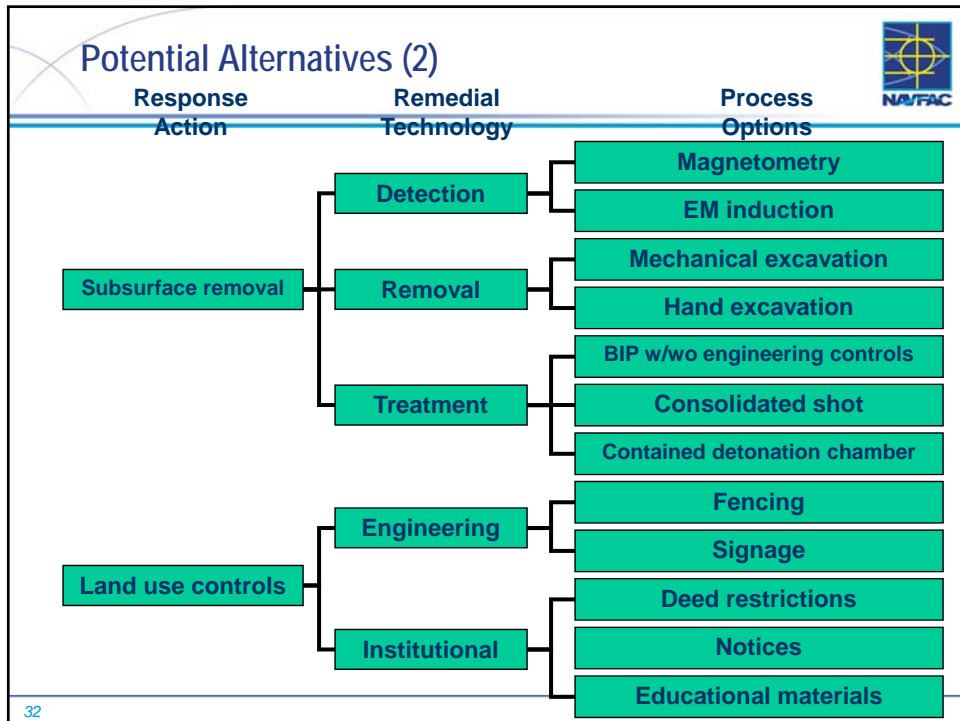
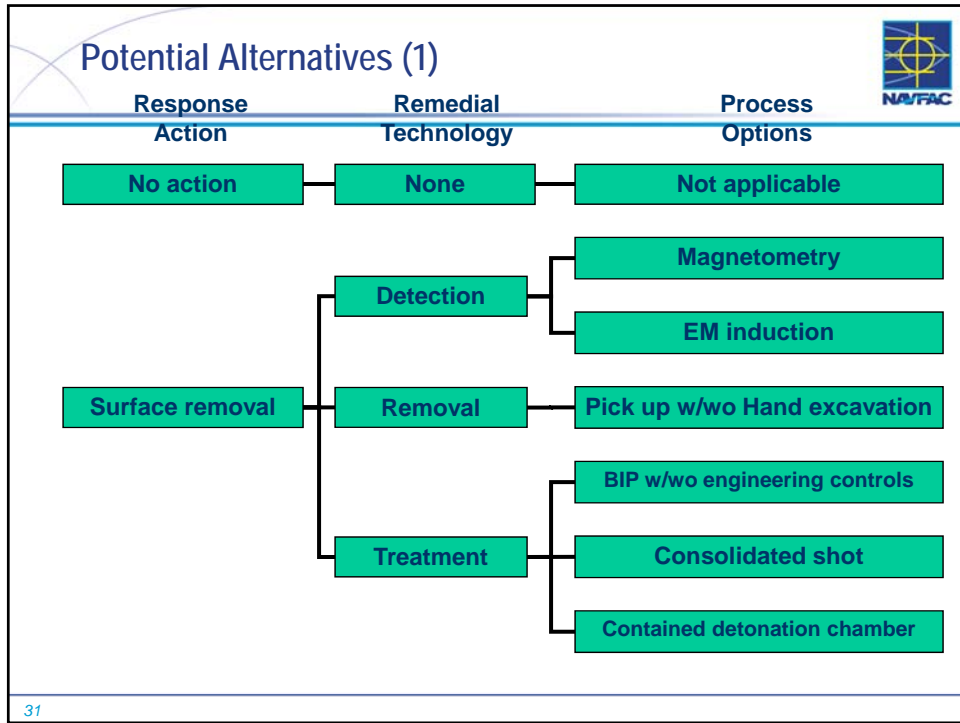
- **Grid layout**
- **Vegetation removal**
- **Surface removal**
- **Geophysical system verification**
- **Geophysical survey and data collection**
- **Data processing, analysis, and anomaly selection**
- **Anomaly reacquisition and investigation**
- **MEC/MPPEH management**
- **Magazine inspections and security**



- **Has the project team:**
 - Identified areal extent of contamination?
 - Agreed on reasonably anticipated future land use?
 - Described the type and content of studies needed to initiate response actions and determine nature and extent of MEC/MC and associated hazard/risk?
 - Determined if there is a need for remedial actions?



- **Develop and evaluate potential remedies that permanently and significantly reduce the threat to public health, welfare, and the environment;**
- **Select a cost-effective remedial action alternative that mitigates the threat(s); and**
- **Achieve consensus among DON, EPA, state, and local authorities regarding the selected response action**



Example Technology Comparison



Technology	Description	Effectiveness
Hand excavation	Digging individual anomalies using commonly available hand tools.	Medium: It can be thorough and provides good data on MEC collected.
Mechanized removal of individual anomalies	This method uses commonly available mechanical excavating equipment, such as a backhoe or excavator.	Medium: Used in conjunction with hand excavation when soil is hard. Method works well for excavation of single anomalies or larger areas of heavy ferrous metal concentration.
Mass excavation and screening	Armored excavation and transportation is earth moving equipment that has been armored to protect the operator and equipment from unintentional detonation.	High: Process works very well in areas of heavy concentration of MEC. Can separate several different sizes of material, allowing for large quantities soil to be returned with minimal screening for MEC.

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LUCs (1)



- Any type of physical, legal or administrative mechanism that restricts the use of and access to real property, preventing exposure to hazardous substances above permissible levels
 - Compatible with selected remedy and land use
- Consider life-cycle costs before implementing
- LUC database (DoD policy)
- Ensure public involvement
- In CERCLA cleanups, LUCs include engineering controls (ECs) and institutional controls (ICs)

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Many Different Signs



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Screening of Remedial Actions



- **Identifying, evaluating, and selecting appropriate remedy**
 - Identify and review remedial technology alternatives/methods that are appropriate to the site(s) and the threat it poses
 - Screen alternatives/methods using three broad criteria (effectiveness, implementability, cost)
 - Select a reasonable number of alternatives for detailed analysis

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Detailed Analysis of Remedial Actions



- Once a limited number of viable alternatives have been developed and Applicable Relevant and Appropriate Requirements (ARARs) have been identified, the alternatives are evaluated against the EPA 9 criteria



Remotely-operated subsurface MEC removal. Photo courtesy of US Navy.

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CERCLA Evaluation Criteria – 40 CFR Part 300.430(e)(9)(iii)



Threshold Criteria

Overall protection of human health and the environment

Compliance with ARARs

Primary Balancing Criteria

Long-term effectiveness & permanence

Reduction of toxicity, mobility or volume by treatment

Short-term effectiveness

Ability to implement

Cost

Modifying Criteria

State acceptance

Community acceptance

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Analysis of Alternatives – Example



Criteria		Remedial Alternative				
		No Action	LUCs	LUCs with Construction Support	Surface Clearance of Accessible Land with LUCs	Surface and Subsurface Clearance of Accessible Land with LUCs
Threshold Criteria	Overall Protection of Human Health and the Environment	Yes	Yes	Yes	Yes	Yes
	Compliance with ARARs	Yes	Yes	Yes	Yes	Yes
Balancing Criteria	Long-Term Effectiveness and Permanence	1	2	2	4	5
	Reduction of Toxicity, Mobility, or Volume	1	1	2	4	5
	Short-Term Effectiveness	4	4	3	2	1
	Implementability	5	4	4	3	1
	Comparative Cost	5	4	4	3	1
Relative Overall Rating		16	15	15	16	13
Estimated Cost of Alternative		\$0	\$1,470,000	\$1,840,000	\$2,960,000	\$5,130,000

Relative Rating System (compares alternatives relative to each other against criteria):

- | | |
|--|---|
| 5 Best - The alternative is the most favorable for this criterion | 2 Worse - The alternative is less favorable for this criterion |
| 4 Better - The alternative is more favorable for this criterion | 1 Worst - The alternative is the least favorable for this criterion |
| 3 Average - The alternative is moderately favorable for this criterion | |

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RI Report



- **Site characterization documented in a RI Report. Sample RI report included in guidance must be adapted for use with MR project**
 - **Methods used for the RI**
 - **Updated CSM resulting from the investigation**
 - **Results of the risk/hazard assessment**
 - **Determination of whether further remedial action is needed, and if so, recommended RA Objectives**

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- **Results of the FS will be documented in a report**
 - FS Report can be combined with the RI report to form a RI/FS report but the RI and FS reports also can be submitted separately
 - The RI/FS report is a significant document, as it forms the basis for the selection of the remedy and the decision documents

