

Open Environmental Restoration Resources (OER2) Webinar #24
Bridging the Gap from Remedy in Place (RIP) to Response
Complete (RC):
Part I Strategies and Requirements

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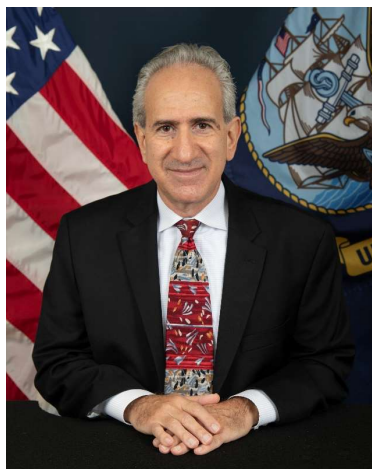
Bridging the Gap from RIP to RC



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Today's Speakers



Russell Sirabian, PE
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Michael Gonzales, PE
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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:**

- Offered quarterly
- 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 (Kim Brown – kim.brown@navy.mil or Amy Hawkins – amy.hawkins@navy.mil)
- Selected topic will be assigned Champion to work with presenter

Remedy-in-Place(RIP)/Response Complete (RC) Strategy – Overview



- In progress task - NAVFAC Optimization and Technology Innovation (OTI) workgroup
- Goal - Provide a general strategy to meet RIP and RC milestones based on:
 - Remedy complexity - Low, Moderate, High
 - Complexity based on level of technical difficulty to achieve RIP/RC milestones
 - Performance based remedy transition and progress tracking for high complexity sites
- Webinar presented in two parts
 - Part I. General topics and case study for low complexity site
 - Part II. Case studies for more complex sites

Remedy-in-Place(RIP)/Response Complete (RC) Strategy – Overview (cont'd)



- **Part I Contents**
 - **Navy Programmatic Goals**
 - ER,N program milestones
 - New ER,N Program goals for RC milestone (May 2021)
 - Potential RIP/RC schedule for remedy scenarios based on remedy complexity
 - RA-O Phase actions for high complexity sites
 - **NAVFAC Policy and Tools to Help Meet Program Goals**
 - Optimization Policy
 - Optimization Guidance Documents
 - New NORM Optimization module (Intro)
 - **Case Study for Low Complexity Site**
 - **Summary**

Milestone Definitions – RIP, RC and SC



- **RIP- Remedy In Place**

- Long term remedy - milestone achieved when remedy construction is complete and remedy is operating as planned to meet remedial action objectives in future
 - Develop an Interim Remedial Action Completion Report (I-RACR)
- Short term remedy – milestone achieved when remedy is successfully implemented and final documentation is being prepared for regulatory concurrence
 - Develop a Remedial Action Completion Report (RACR)

- **RC - Response complete**

- ER,N Program metric
- Milestone achieved when all cleanup goals/objectives specified in ROD/DD are complete
- RA-O phase complete when RC is achieved
- Regulatory concurrence is required
- RC completion documented in a RACR
- May still require LUCs depending on the cleanup goal

Milestone Definitions – RIP, RC and SC



- **SC - Site Closeout**

- Milestone achieved when active management and monitoring at a site are complete
- Remedy is protective of human health and the environment
- Unlimited use and unrestricted exposure (UU/UE) - No land use controls are needed
- No expectation of expending additional funds

Remedial Action Completion Report



- RACR documents completion of remedial action goals – Key document in DON site closeout process
- RACR is a required documents- see DON Site Closeout Guidance for details

SECTION	CONTENT
Site / OU Overview	Brief discussion of OU, contaminants, site investigation activities, RI/FS findings
Remedial Action Objectives	RA objectives, cleanup standards per ROD
Remedial Actions	Brief description
Demonstration of Completion	Provide information to show cleanup standards have been met (modify for I-RACR)
Ongoing Actions	LTMgt, five-year reviews (modify for I-RACR)
Community Relations	Summarize public outreach activities, RAB, public meetings
Certification	DON representative authorized to sign decision documents (e.g. CO, CG)

Final
**Remedial Action Completion
Report, Ford Island Landfill**
JOINT BASE PEARL HARBOR-HICKAM,
FORD ISLAND, OAHU, HAWAII

PHNC National Priorities List Site

July 2016

Department of the Navy
Naval Facilities Engineering Command, Hawaii
400 Marshall Road
JBPHH HI 96860-3139



Architect-Engineer Services
Contract Number N62742-14-D-1884, CTO 0007

Final RACR, Ford Island Landfill
JBPHH, Ford Island, Oahu, HI

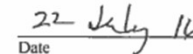
Page 10 of 12

7. Certification Statement

This RACR documents RA completion and response complete for the FI Landfill site, JBPHH, Ford Island, Oahu, Hawaii (Figure 1). The final remedy of a permeable and vegetative soil cap and LUCs at this site is operational and functional in accordance with CERCLA, which ensures long-term protection of human health and the environment.


B. Vogel

Commander, U.S. Navy
By direction of
Commander of Joint Base Pearl Harbor-Hickam


Date

New (Updated) ER,N Program Metric

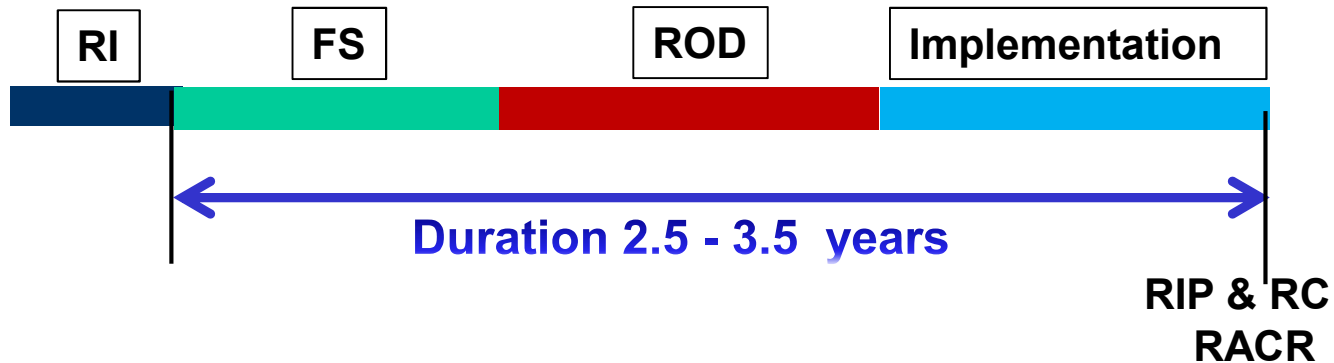


- **OSD Goal 95% RC by 2021. OSD has not yet established RC goals beyond 2021**
- **OPNAV N45 established ER,N program metrics in May 2021 in terms of RC milestone**
 - **85% RC by FY 23**
 - **87% RC by FY 26**
 - **88% RC by FY 29**
 - **90% RC by FY 31**
- **PFAS sites not included**
- **DON has achieved RC metric at 83.6% sites (mid year 21)**
- **ER,N program goal to be updated when additional OSD guidance is issued**

RIP/RC - Low Complexity Site



- No RA-O phase (e.g., dig & haul), minimal to no groundwater impacts



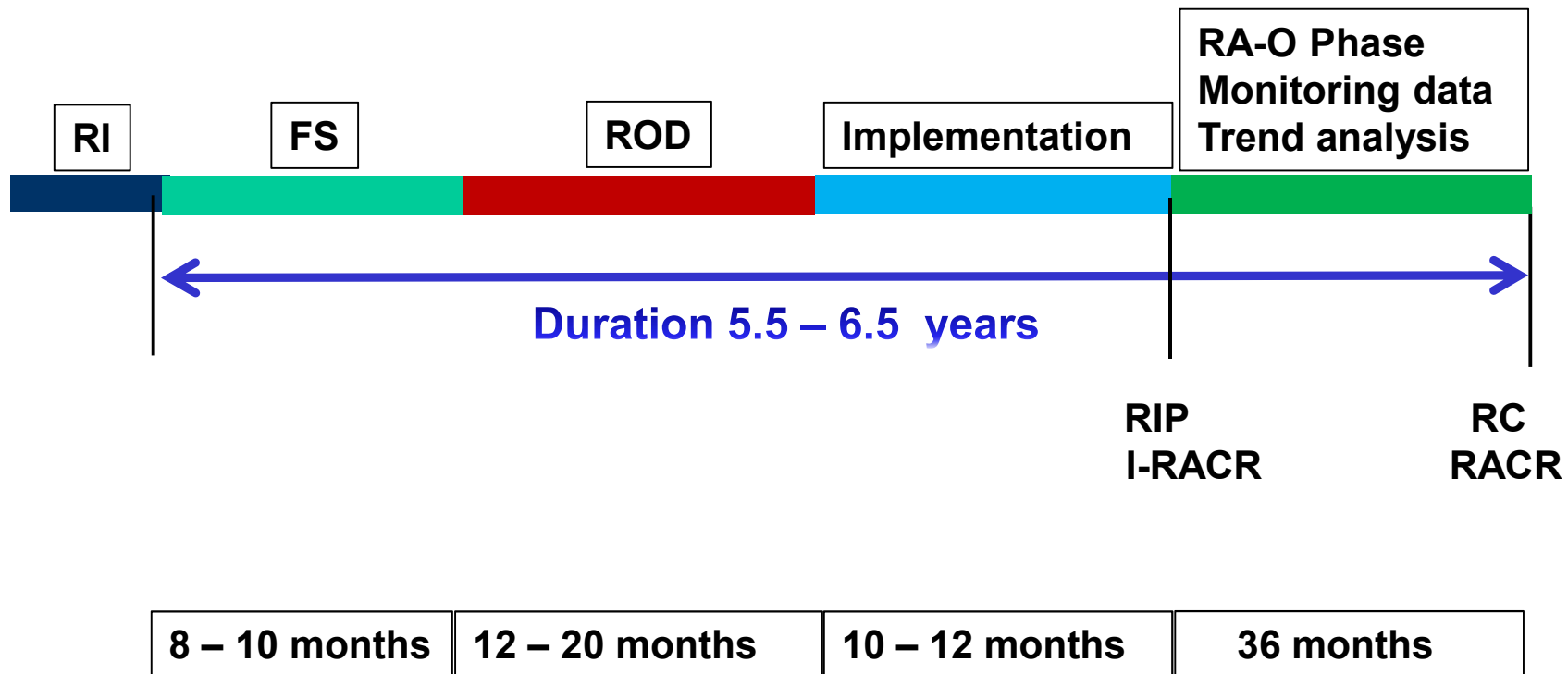
8 – 10 months	12 – 20 months	10 – 12 months
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WG member Jocelyn Tamashiro (NAVFAC PAC) led the effort for developing the remedy scenarios and schedules. Duration estimates are from WG member observations. These are not NAVFAC requirements.

RIP/RC - Low Complexity Site (cont'd)



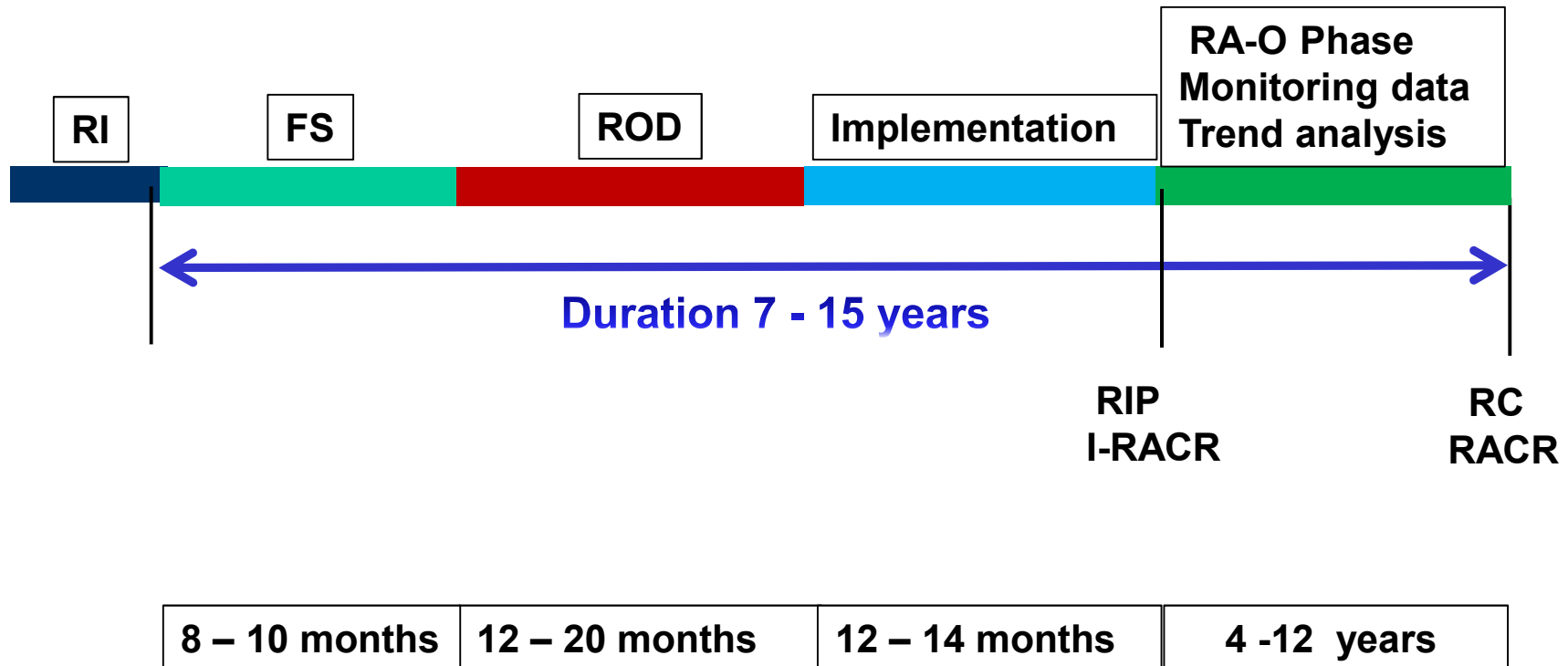
- Short RA-O Phase (e.g., simple MNA, simple SVE, Risk-Based Closure)



RIP/RC - Moderate Complexity Site



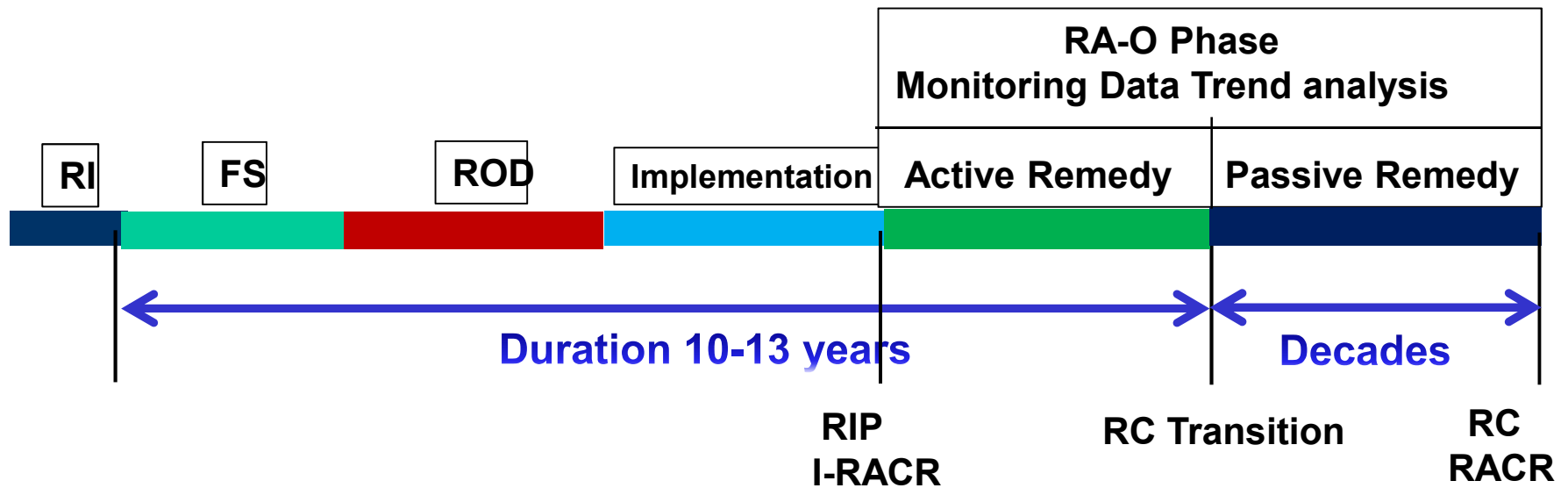
- Moderate RA-O Phase (e.g., AS/SVE, ISCO, enhanced bio)



RIP/RC - High Complexity Site



- Prolonged RA-O phase (e.g. complex groundwater plume)

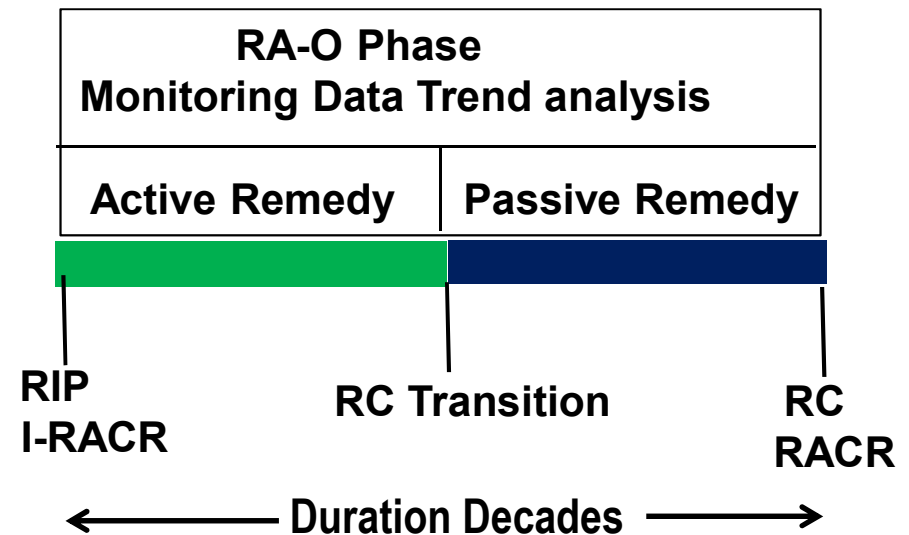


8 -10 months	12 – 20 months	16 - 24 months	5 - 8 years	Few years - Decades
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RA-O Phase Actions - High Complexity Sites



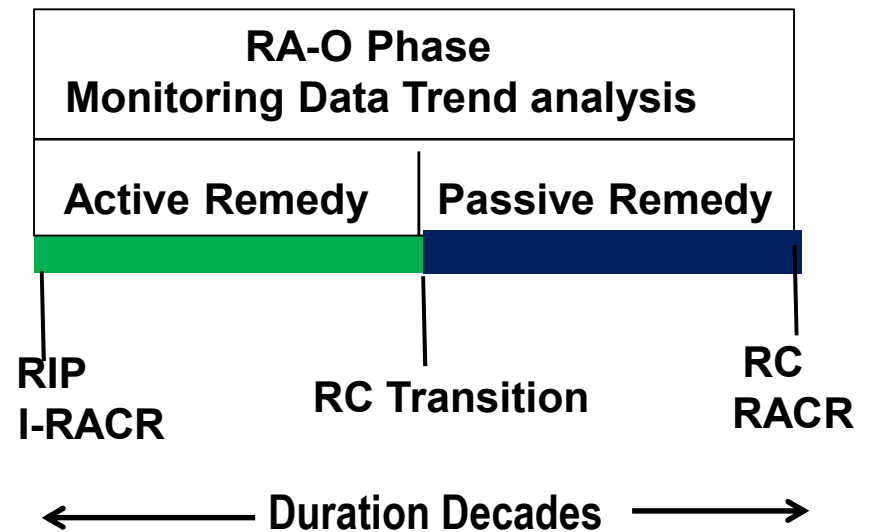
- Evaluate remedy performance and conduct routine and third party optimization over time (e.g., 5- 8 years)
- Perform data trend analysis to show contaminant removal, natural attenuation, and plume stability
- For sites with inadequate progress, demonstrate limitations of the active remedy to achieve cleanup goals within reasonable time frame and lifecycle cost
- Recommend transition to a lower O&M remedy (e.g., passive remedy). Obtain stakeholder buy in and implement this remedy



RA-O Phase Actions - High Complexity Sites (cont'd)



- Record RC Transition as an optimization effort in the new NORM optimization module for sites in Phase 6.
- Continue to monitor plume and perform any passive remedy enhancements (if necessary).
- Optimize sampling frequency, sample locations, and COCs with periodic monitoring reports and 5YR reviews until RC milestone is achieved.



Progress Criteria and Cost Summary



Progress =====>	RIP	RC-T	RC	SC
Criteria:				
• Is remedy protective?	Yes	Yes	Yes	Yes
• Have cleanup goals been met?	No	No	Yes	Yes
• Has UU/UE been achieved?	No	No	No	Yes
Cost Implications:				
• Ongoing RA-O	\$\$\$	\$\$	None	None
• Long-term management (e.g. monitoring, LUCs, 5YRs)	\$	\$	\$	None

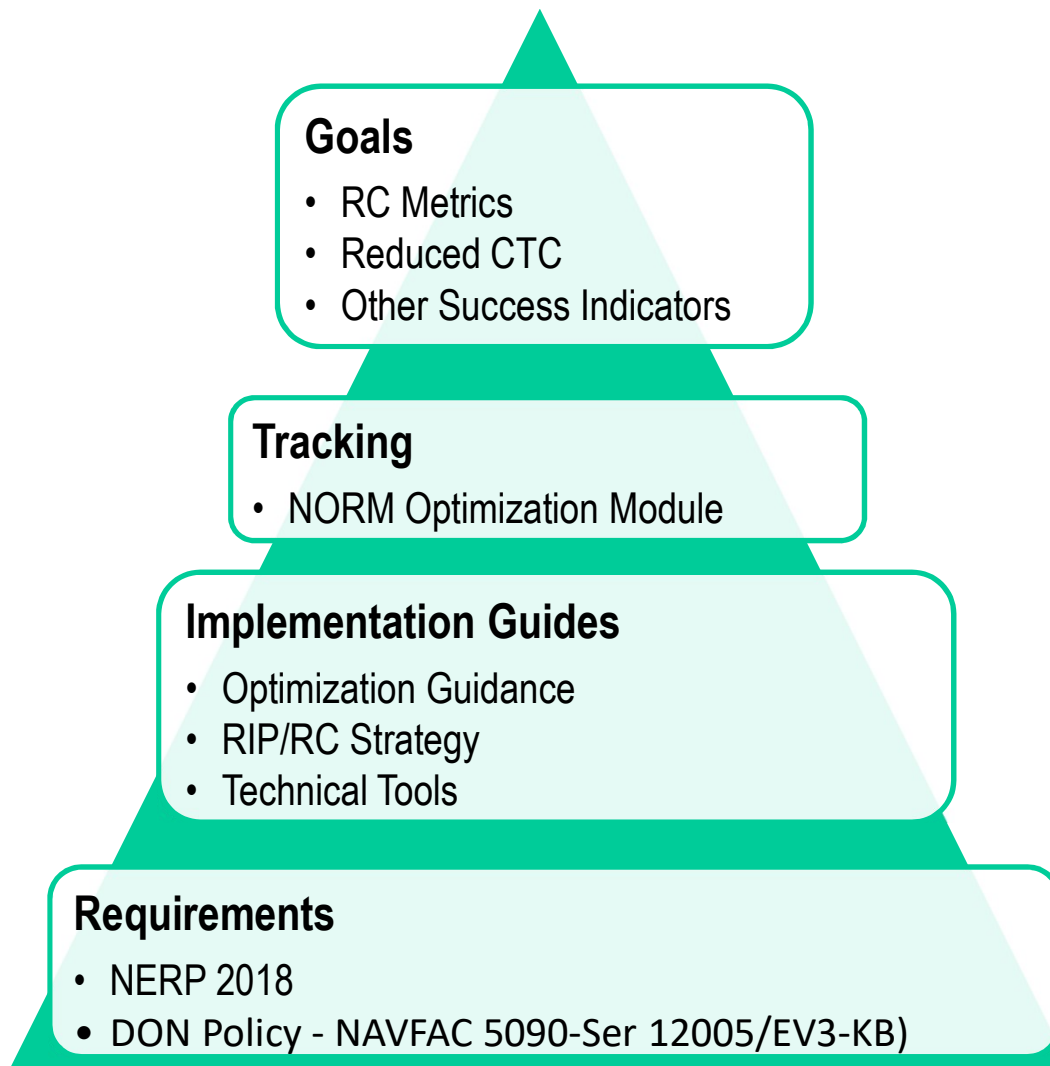
Key Point: Accelerating through the phases reduces cost to complete for the site as well as helps to meeting program goals

DON Optimization Policy (April 2012)



- **Optimization during all phases for ER,N projects**
 - Use NAVFAC optimization guidance documents (various documents referenced)
 - Third party (Navy SMEs and/or outside Navy) for conducting optimization evaluations
- **Remedial Alternatives Analysis (RAA)**
 - Performed at onset of remedy evaluation and selection phase
 - RAA guidance and template is available
- **Quality Document Review (QDR) Directive**
- **NAVFAC HQ approval of proposed pump and treat systems**
- **Green and Sustainable Remediation (GSR) analysis is part of optimization**
 - Use NAVFAC GSR Guidance and tools
- **Response Complete and other Site Closeout documentation**
 - Guidance to Documenting the Milestones throughout the Site Closeout Process. March 2006
- **NORM module to track optimization efforts**

Optimization Big Picture



Optimization Guidance Documents



- **Optimizing Remedy Evaluation, Selection, and Design (2010)**
- **Documenting Milestones Throughout the Site Closeout Process (2006)**
- **Optimizing Remedial Action Operation (2012)**
- **Green and Sustainable Remediation (2012)**
- **Planning and Optimizing Monitoring Strategies (2010)**
- **Remedial Alternatives Analysis Guidance (2020)**
- **Quality Document Review (2018)**
- **All documents available from NAVFAC ERB webpage:**
<https://www.navfac.navy.mil/go/erb>
- **Relevant CECOS Courses: NERP - May 2022, and Optimizing Remedy Selection and Operation - Sep 2022**

Additional Optimization Related NAVFAC Documents



Long-term Monitoring Optimization

- Innovative sampling methods and data analysis for reduced long-term monitoring costs (Fact Sheet). NAVFAC. Sept. 2020
- Management and Monitoring Approach (MMA) Toolkit. NAVFAC. Nov. 2015
- Transitioning from Conventional to Passive Sampling for Groundwater, TDS-NAVFAC EXWC-EV-1305. April 2013
- Monitoring Report Template, NAVFAC EV Optimization Workgroup. May 2011

Green and Sustainable Remediation (GSR)

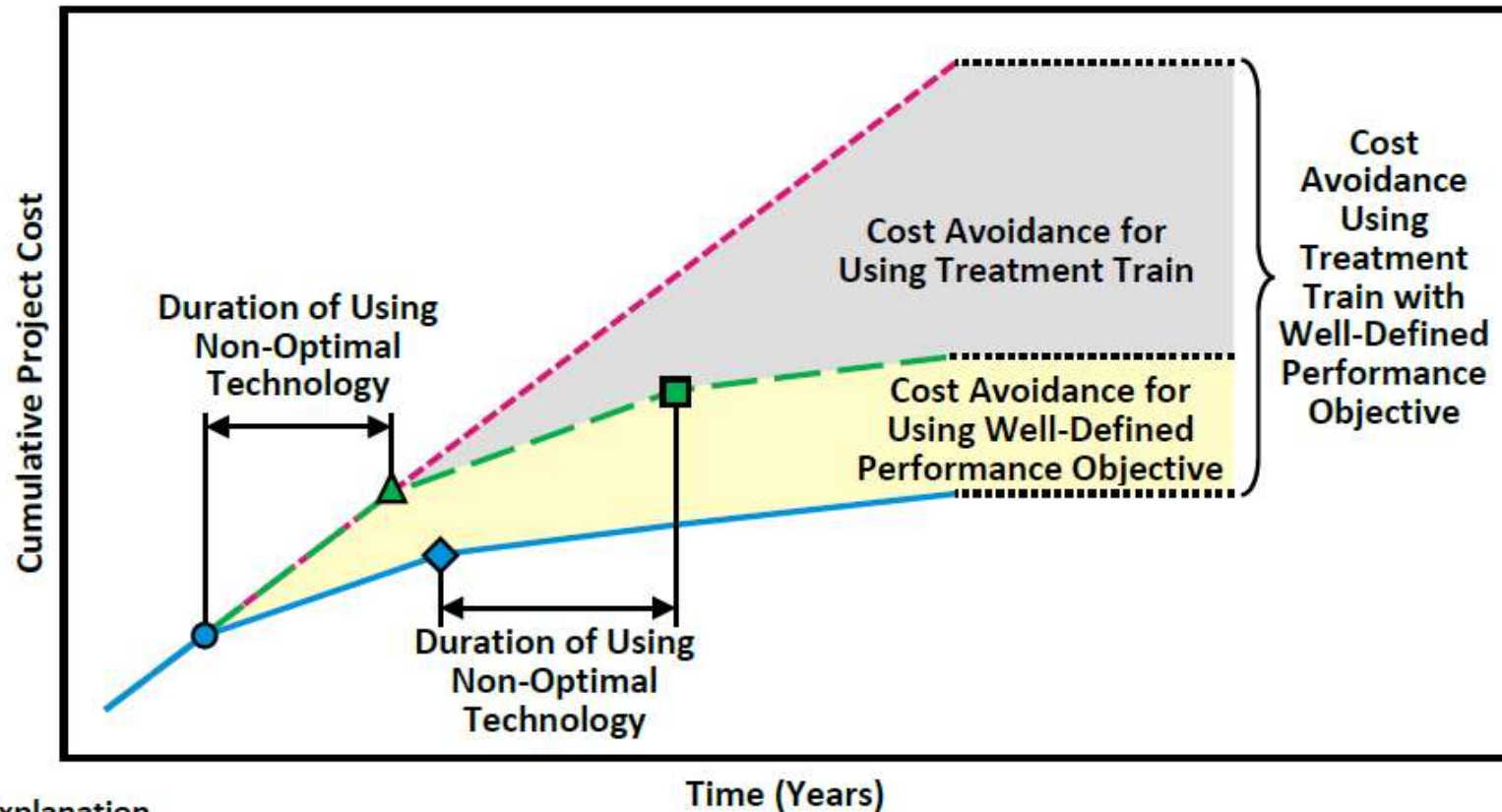
- SiteWise v3.2 Green and Sustainable Remediation Tool with User Guide (Tool available upon request)
- NAVFAC GSR Best Management Practices (BMP) Tech Memo. NAVFAC. Sept. 2016
- Sustainable Sediment Remediation White Paper, NAVFAC TR-1515 (September 2015)
- Integrating GSR Metrics within the CERCLA Process during the Feasibility Study. NAVFAC. July 2012

NAVFAC Tools to Support Acceleration to RC/RC-Transition



NAVFAC Resource	How it supports Acceleration to RC/RC-T
Case Study Review of Optimization Practices at Navy Petroleum Sites. Report. (2021)	Demonstrates innovative approaches to reach RC or RC-T for 10 petroleum sites
Transition of Petroleum Sites to Closure or Passive Remedies: Evaluating Natural Source Zone Depletion (NSZD) and other Methods. Report (2021)	Provides insights on how to apply and gain acceptance of NSDZ as a passive remedy as well as other approaches
A Review of Exit Strategies and Site Closure Challenges at Navy Cleanup Sites. Report (In Press)	Demonstrates effective exit strategies for both chlorinated and petroleum sites
Technology Specific Recommendations to Optimize Remedial Action Operation. Report (In Press)	Provides recommendations to maximize the benefits of operating systems when to transition to alternate approaches
NAVFAC Groundwater to Surface Water Interface: Summary of Tools and Techniques. Two-Part Fact Sheet (2021)	Helps evaluate natural attenuation and develop alternative endpoints.
Environmental Statistics. Fact Sheet (2019)	Provides information about the use of statistics to support decision making including evaluating MNA
Tools for Estimating Contaminant Mass-in-Place, Mass Discharge, and Remediation Timeframes. Report (2018)	These tools help support transition to MNA
Biogeochemical Transformation Handbook (2015)	Supports evaluation of MNA.
Verification of Methods for Assessing the Sustainability of Monitored Natural Attenuation. Tech Report (2013)	Presents methods for evaluation of MNA that can be used in place of active treatment
Fact Sheets on Selecting or Transitioning to Monitored Natural Attenuation (MNA). Four fact sheets (In Press)	Presents approaches to demonstrate that MNA is protective, including advanced tools to evaluate biotic and abiotic pathways

Project Cost Avoidance Considerations



Explanation

- No Treatment Train
- - - Treatment Train with Poorly-Defined Performance Objectives
- Treatment Train with Well-Defined Performance Objectives

New NORM Optimization Tracking Module



- **New optimization tracking module being developed – expected availability FY 22**
- **Module leverages the existing framework that is used for collecting and tracking costs and schedules**
- **Framework being modified to also collect optimization related costs, schedule changes, and indicators of optimization effectiveness**
- **Capture optimization goals – accelerate milestones, improve effectiveness/efficiency, Improve lifecycle cost/CTC**
- **All optimization efforts to be tracked**
- **Module expected to streamline reporting and tracking of optimization efforts**



Installation Restoration Program Site 5 Old Area 6 Shops Path to Response Complete

**Naval Base Ventura County Point Mugu
California
18 November 2021**

IRP Site 5



- Site Description
- RAOs
- Remedy Specifics
- Remedy Construction
- RACR
- RC milestones
- Significant Challenges
- Optimization
- Current Status
- NAVFAC POC



Site Description



- Point Mugu is approximately 60 miles northwest of Los Angeles along the Pacific Coast. The facility was built up out of a lagoon environment to support weapons development and testing.
- IRP Site 5 - Multi use industrial area following WWII through the mid 1970s to support the Station activities.
- IRP Site 5 is tied to the Mugu Lagoon, IRP Site 11.
- The plating waste pits located in the Mugu lagoon were the main focus of the environmental response for IRP Site 5.
- RCRA Hazardous Waste levels of metals in the sediment.
- Emergency removal action completed in 1996 and electrokinetic pilot study conducted through 2003.

RAOs



- The RAOs were developed based on human health risk assessment and ecological risk assessment.
 - Co-located sediment and tissue samples were collected to calibrate bioaccumulation models.
- Upstream sources entering Mugu Lagoon was a limitation in establishing the RAOs. Through sampling and different intensity storm events at the base boundary to confirm the contamination entering the base.
- Background metal study of non-Navy impacted areas of the facility to set RAO lower limit. Eastern and western arms of the base.

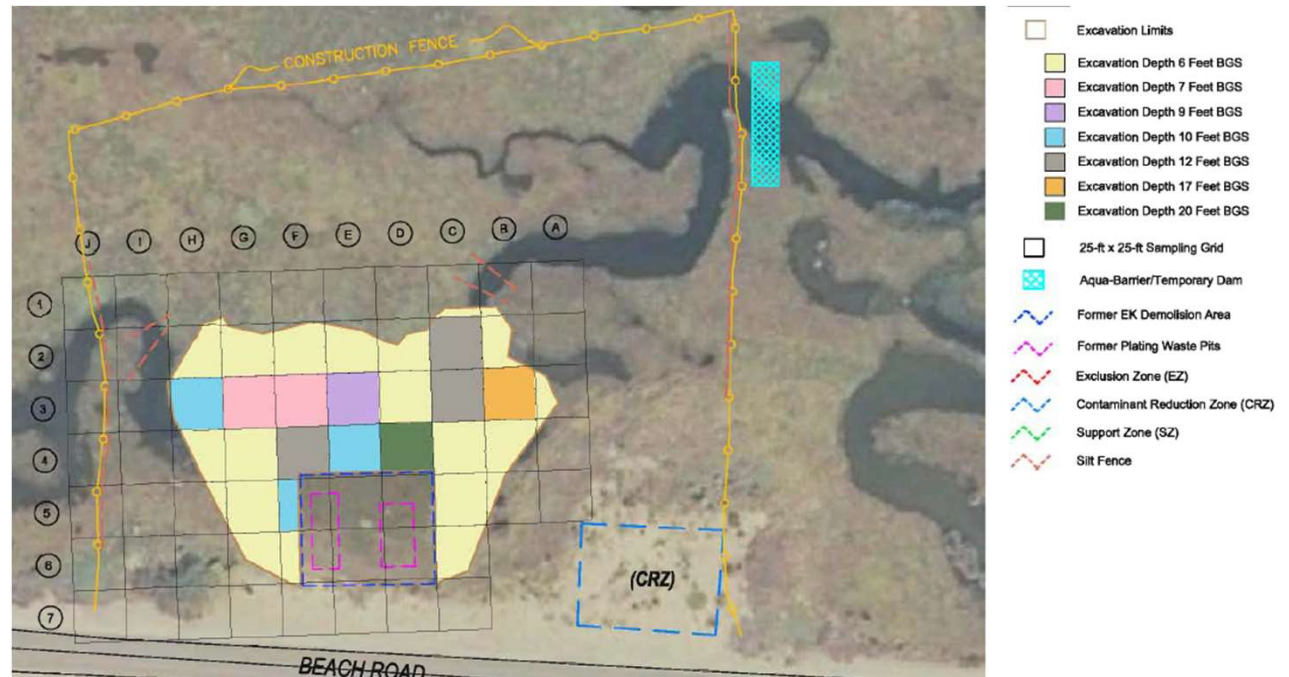
Concentration (mg/kg)	Cadmium	Chromium	Copper	Lead	Nickel	Silver
Final sediment management objectives	7.56	115	51.3	260	62.98	5.6

Remedy Specifics



- In 2011, conducted a NTCRA to address metals in sediment
- Selected Remedy: Excavation of area of ecological concern sediment to 6 feet bgs, landfill disposal, and backfill.

- Selected remedy (NTCRA) was conducted in 2011, before the final ROD was signed in 2014.
- Metals-contaminated sediment was excavated over approximately 10,500 square feet in the plating waste pits area, to depths of 6 to 20 feet.
- A silver hotspot (4x6 feet) was in the area of a former sample was excavated to 2 feet bgs.
- Approximately 18,400 square feet of intertidal wetlands were restored to approximate pre-existing topography.



Remedy Construction



- Collected seeds from existing site vegetation.
- Dammed up the intertidal creeks.
- Utilized floating planks to support excavator.
- Excavated sediment and placed on site to dewater
 - The site was very “loose” and the excavation was not precision action.
- Transported to HW landfill in California Central Valley.
- Collected Confirmation samples.
- Backfilled with clean sand to minus 2 feet finished surface
- Used donor lagoon sediments for finished backfill to supply organic matter to support revegetation.

Removal Action Completion Report



- **The NTCRA fieldwork began in 2011.**
- **The Removal Action Completion Report was finalized in 2013.**
 - Based on confirmation sediment samples, the removal action was effective in reducing contaminated sediment.
 - The remaining in place sediment no longer poses an unexpectable risk to human and ecological receptors.
 - The Navy recommended no further evaluation or cleanup actions for IRP Site 5 (UU/UE).
 - No five year reviews.
 - No planned site monitoring.

Response Complete Milestones



- **RIP** was established as the end of NTCRA fieldwork.
- **RC** – was based on the signing of the NFA ROD.
 - **NBVC** Team typically has been taking four years to cycle through the multiple versions of the RODs. Legal review has the biggest impact.
 - **RC** potentially could have been tied to the Removal Action Closure Report but not all of the site issues were being addressed.
- **SC** will be based on successful revegetation of 75% of the intertidal areas. Expected to occur in the next three years.

Significant Challenges



- **The majority of the challenges were establishing cleanup levels. This was made more difficult after regulator personnel changes.**
- **The site was within a wetland environment and made precise excavation impractical.**
 - **Excavated deeper in parts of excavation than ecological risk exposure criteria. Similar to dredging operations.**

Optimization Strategies



- Limiting the RAOs to background and offsite levels allow the removal action to limit the extent of excavation and the overall project cost.
- A NTCRA was performed vice a remedial action. The NTCRA allowed a NFA ROD to document response complete. This increased documentation costs but allowed RC to be achieved faster.
- Callegaus Watershed Working group continues to monitor the entire watershed including the Mugu Lagoon and conduct improvements to limit contaminant migration through the watershed. Navy is a member of the working group and benefits from the groups activities. The working group actions eased the state regulators acceptance of the Site 5 RAOs.

Current Status - Habitat Restoration



- **2018: Upland area reached 86% vegetative cover in 2018 (year six), exceeding target of 75%. Upland monitoring was discontinued.**
- **Ongoing: Intertidal area currently at 68% vegetative cover. We are behind schedule. The backfill soil composition consisting of low organic matter did negatively affect revegetation rates. With time rates of vegetative cover have shown consistent improvement. Non-native species are not problematic at either upland or intertidal areas. (AECOM, 2019)**
- **Achieved goal of returning area to high-quality, biologically diverse wetland habitat that functions as close as possible to pre-construction conditions**
 - Presence of native species
 - Coverage of wetland habitat
 - Hydrological function
 - Return of wildlife species known to inhabit Mugu Lagoon

NAVFAC POC



Michael Gonzales, PE

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Summary



➤ Program Goals

- Updated OPNAV N45 RC metric
- RC, RIP and SC milestones are important indicators of cleanup progress
- Project schedules to achieve RIP and RC milestones depended on remedy complexity
- Achieving RC milestone for High Complexity sites is challenging – high O&M cost and lack of progress

➤ Optimization Requirements

- Optimization efforts are necessary during the RA-O phase
- When active remedies are no longer making adequate progress, optimization evaluation could suggest remedy transition to a lower O&M passive remedy – RC Transition
- RC - Transition to be tracked in New NORM module as optimization effort
- Existing resources including optimization policy and guidance documents are readily available

➤ Example of Achieving RC at Low Complexity Site

- Demonstrates how low complexity sites with excavation remedy can still pose challenges
- Implementation of NTCRA allowed NFA ROD to document RC
- Allowed site to be returned to high-quality, biologically diverse wetland habitat

Questions and Answers



NAVFAC Points of Contact

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Wrap Up



You will be redirected to a brief survey when you leave the webinar.

Next OER2:

Bridging the Gap from RIP to RC: Part 2 Practical Examples

December 9, 2021

Thank you for participating!