

AGENDA
RESTORATION ADVISORY BOARD (RAB) MEETING
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT (NWIRP)
TOWN HALL BEDFORD, MA
WEDNESDAY, MAY 8, 2019

WELCOME/OPENING REMARKS/RAB PURPOSE

INTRODUCTIONS – NWIRP BEDFORD TEAM

SITE OVERVIEW AND ONGOING CLEANUP ACTIONS

LAND USE CONTROLS

FIVE-YEAR REVIEW

ADDITIONAL POST-ROD INVESTIGATIONS

FUTURE PLANS

QUESTIONS AND ANSWERS



Restoration Advisory Board (RAB)

May 8, 2019

**Naval Weapons Industrial Reserve Plant (NWIRP)
Bedford, Massachusetts**

Maritza Montegross – NAVFAC Mid-Atlantic



NWIRP BEDFORD TEAM

■ Maritza Montegross – Navy RPM

- Robert Davis – Tetra Tech
- John Fitzgerald – KOMAN Government Solutions
- Lisa Stone - Sovereign
- Rob McCarthy – Resolution Consultants

■ Michael Daly – USEPA Region 1

■ Randi Augustine – MassDEP

■ Don Corey – RAB Co-Chair



MEETING AGENDA

- Site Overview & Ongoing Cleanup Actions
- Land Use Controls
- Five-Year Reviews
- Additional Post-ROD Investigations
- Future Plans
- Questions and Answers



SITE OVERVIEW & ONGOING CLEANUP ACTIONS

Site 1 - Old Incinerator Ash Disposal Area

- ROD in 2000
- No Further Action



SITE OVERVIEW & ONGOING CLEANUP ACTIONS

Site 2 – Components Laboratory Fuel Tank

- ROD in 2000
- No Further Action



SITE OVERVIEW & ONGOING CLEANUP ACTIONS

Site 3 – Chlorinated Solvent Groundwater Northern Plume

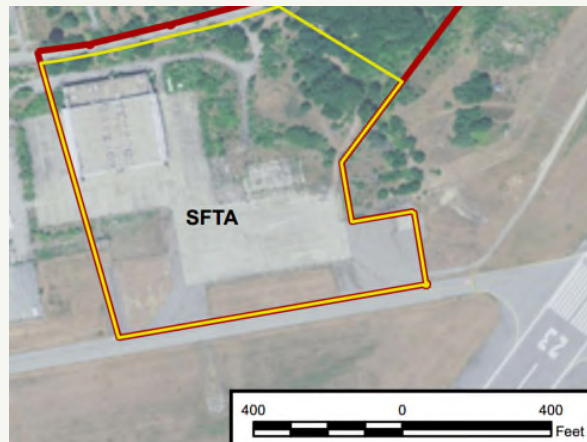
- ROD in 2010
- Groundwater Extraction & Treatment to Contain Plume
- In-situ Enhanced Bioremediation in Source Area
- Semi-Annual Monitored Natural Attenuation
- Land Use Controls
- Five-Year Reviews
- Cleanup by 2090



SITE OVERVIEW & ONGOING CLEANUP ACTIONS

Southern Flight Test Area

- ESD in 2014
- Semi-Annual Monitored Natural Attenuation
- Land Use Controls
- Five-Year Reviews
- Cleanup by 2028



SITE OVERVIEW & ONGOING CLEANUP ACTIONS

Site 4 – Benzene, Toluene, Ethylbenzene & Xylene Plume

- ROD in 2009
- Monitored Natural Attenuation
- Land Use Controls
- Five-Year Reviews
- Cleanup expected in 2018 but 10 more years added



LAND USE CONTROLS

- Applies to Sites 3, 4, and SFTA
- Easements and Deed Restrictions
 - Prevents Residential Development
 - Prevents Groundwater Use
- Maintain Monitoring Wells and Fences
- Conduct Annual Inspections



FIVE-YEAR REVIEWS

Purpose

- Review sites every five years where contaminants remain above levels for unrestricted use.
- The five-year review identifies deficiencies and recommends steps to correct them.
- Three key questions
 - Is the remedy functioning as intended?
 - Are exposure assumptions, toxicity data, cleanup levels, and remedial action objectives still valid?
 - Has any other information come to light that could call into question the protectiveness of the remedy?



FIRST FIVE-YEAR REVIEW RESULTS

- Site 4 ROD finalized in September 2009 (trigger date)
- First Five-Year Review Completed by Sept 2014
- Sites 3, 4, and SFTA were reviewed and found to be protective
- Recommended studying the 3 sites for potential Emerging Contaminants
- No emergent contaminant concerns regarding protectiveness since LUCs were in-place
- Site 3 and SFTA were recommended for study of 1,4-Dioxane due to presence of TCE and 1,1,1 TCA in the groundwater
- SFTA site would be studied for PFAS because of potential AFFF use at former hangar and old FTA at former AFB Hanscom



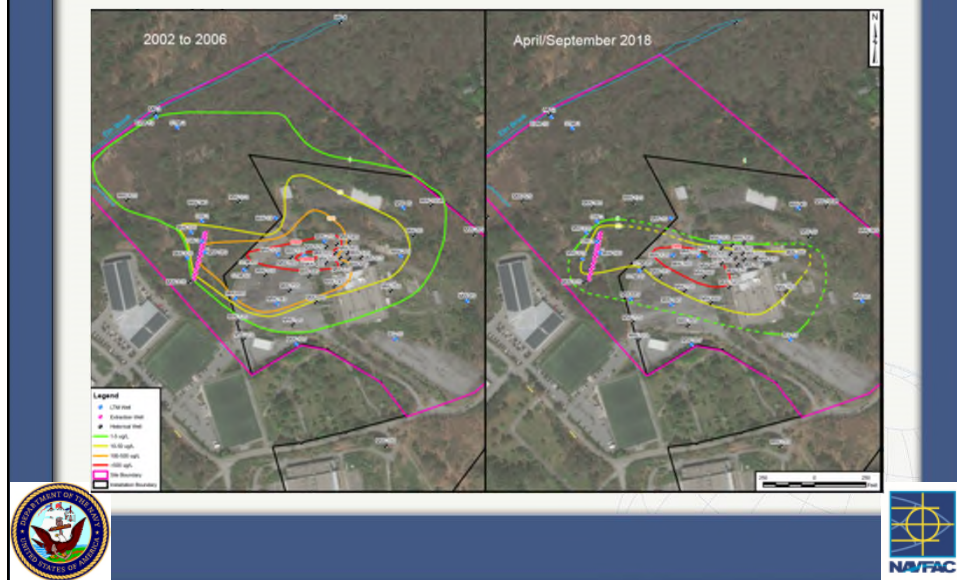
SECOND FIVE-YEAR REVIEW

- Started with Public Notice in October 2018
- Expected to be Completed in September 2019
- Review for Sites 3, 4, and SFTA
- Items Reviewed
 - Groundwater Monitoring Reports
 - 2016 Human health risk assessment for future residents exposed to soil
 - 1,4-dioxane investigation at Site 3 and SFTA
- Site visit and interviews
- Changes in risk assessment methodology and Standards (e.g., MCLs, MA Groundwater Standards)



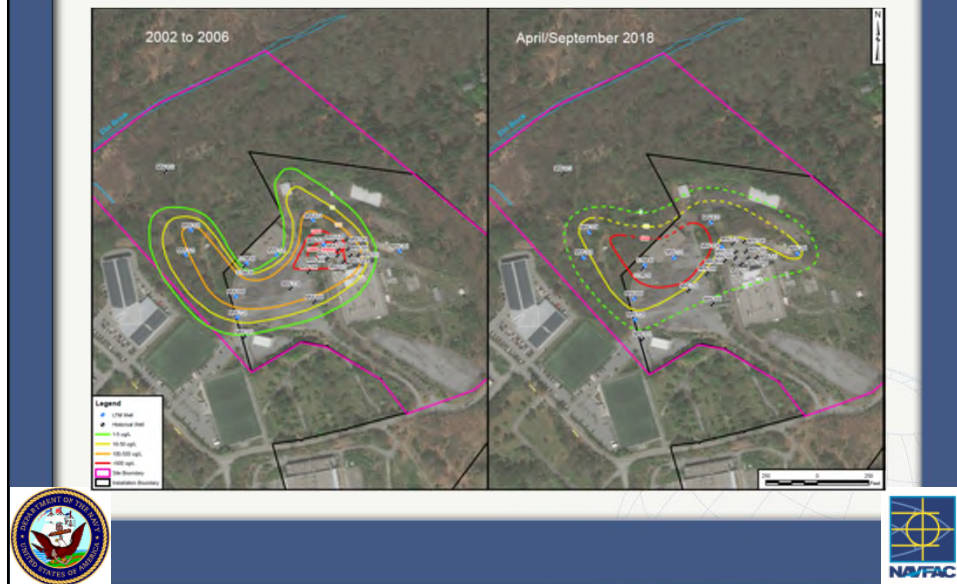
SECOND FIVE-YEAR REVIEW – SITE 3

Northern Chlorinated Solvent Groundwater Plume - Shallow



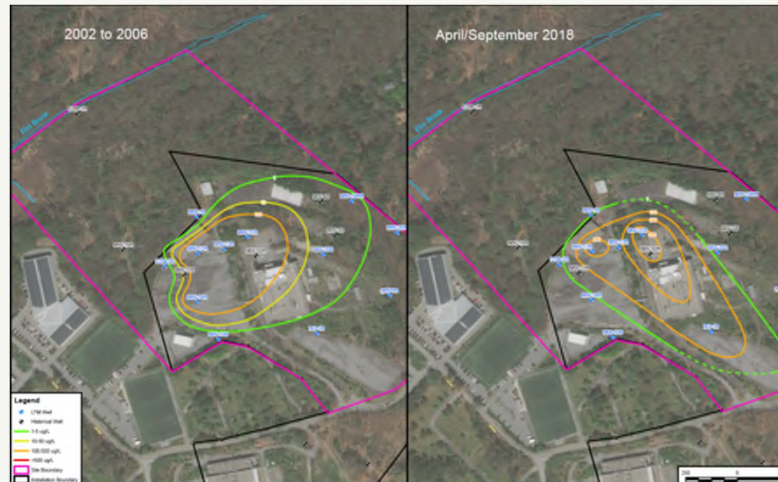
SECOND FIVE-YEAR REVIEW – SITE 3

Northern Chlorinated Solvent Groundwater Plume - Intermediate



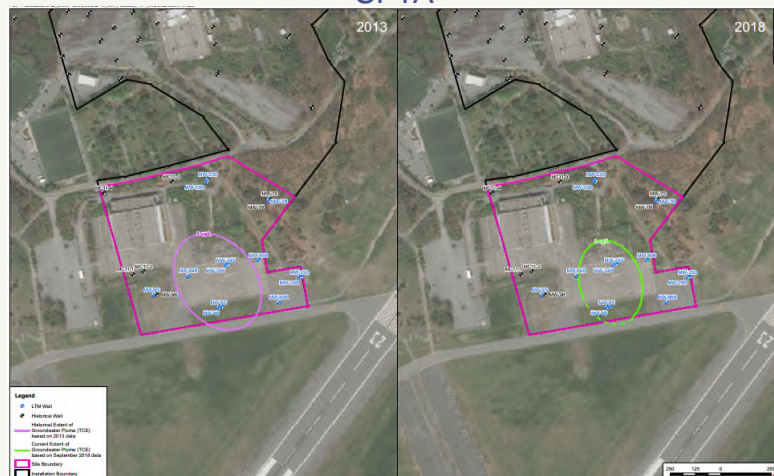
SECOND FIVE-YEAR REVIEW – SITE 3

Northern Chlorinated Solvent Groundwater Plume - Bedrock



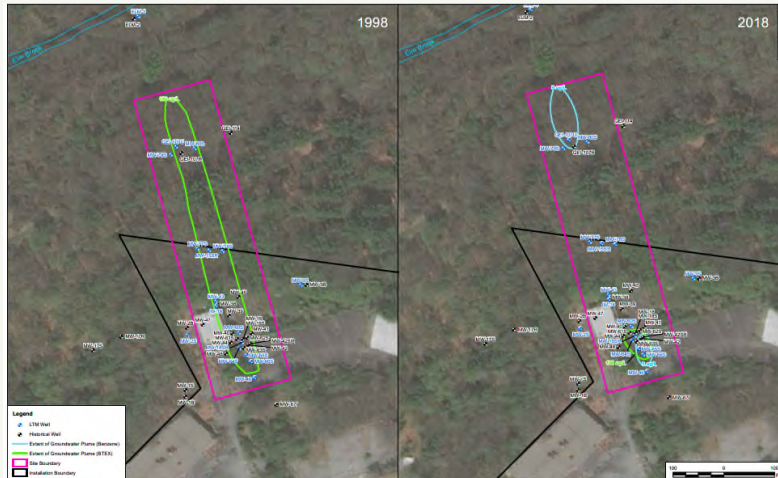
SECOND FIVE-YEAR REVIEW

SFTA



SECOND FIVE-YEAR REVIEW

Site 4 - BTEX Groundwater Plume



SECOND FIVE-YEAR REVIEW

Conclusion

The remedial actions are currently protective of human health and the environment.

Recommendations

- Optimize the LTM monitoring network for Sites 3 and 4
- Revise LUC Remedial Design to indicate no unacceptable risks associated with soil exposure

Status

The five-year review report is currently being reviewed by MassDEP and EPA.



ADDITIONAL POST-ROD INVESTIGATIONS

- Investigations for 1,4-dioxane at Site 3 and SFTA
- Investigation for PFAS at SFTA
- Emerging Contaminant Investigations Completed in 2016
 - Detected 1,4-dioxane at Site 3, but not at SFTA
 - Detected PFAS at SFTA"
- Treatability Study for 1,4-dioxane through Existing Site 3 GWETS due to be Completed in 2019
- Investigation Currently Underway to Determine Nature & Extent of 1,4-dioxane Contamination at Site 3
- Until Promulgated Standards for PFAS are Issued, Navy Conducting Sampling of PFAS at the SFTA, but not part of the LTM program



FUTURE PLANS

- Site 3 Remedy Upgrades & Expansion Design Planned for Award in Late 2019
- Site 3 Upgrades Construction Planned for Award in Late 2020
- Continue Operating Site 3 GWETS to Contain Plume
- Continue In-situ Enhanced Biodegradation Injection Every 5 Years to Augment Natural Attenuation of the Site 3 Source Area
- Prepare an Operating & Successfully/Interim Remedial Action Closeout Report (OPS/IRACR) for Site 3
- Site 4 was expected to be cleaned up by 2018, but goals still not achieved. Navy budgeted 10 more years of Monitored Natural Attenuation
- Prepare an OPS/IRACR for Site 4
- Continue to Conduct Annual Site Inspections
- Continue to Conduct Five-Year Reviews
- Continue to Sample and Monitor Groundwater Wells for Sites 3, 4, and SFTA until Cleanup Goals are Achieved



QUESTIONS AND ANSWERS

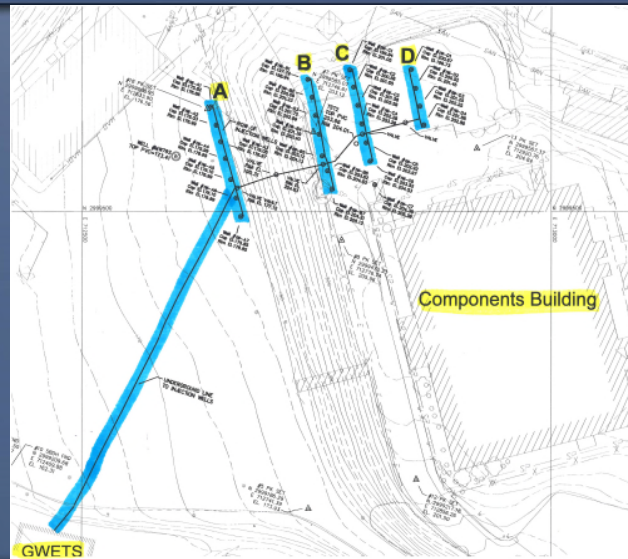
- Poster Boards and Handouts Available
- Documents Are Available
 - Bedford Public Library – Administrative Record CD Binder
 - On-line Public Administrative Record:
https://www.navfac.navy.mil/products_and_services/ev/products_and_services/env_restoration/administrative_records.html?p_instln_id=BEDFORD_NWIRP
- Contact Information
 - Maritza Montegross – maritza.montegross@navy.mil
 - Robert Davis – robert.davis@tetrattech.com

Thank you for your interest!



POSTERS

Emulsified Vegetable Oil (EVO) Injection Well Array



EVO Injection System



EVO Injection Line A (One of 4 Lines Totaling 24 Wells)



LactOil™ and Bioremediation Fundamentals



BIOREMEDIATION FUNDAMENTALS

In the simplest form, bioremediation is the breakdown of contaminants through biological means, typically some type of metabolism. The biological process of metabolism is based on a transfer of electrons from one substance to another resulting in a net gain in usable energy for the organism. This transfer of electrons requires a "donor" material that is commonly referred to as "food" and an "acceptor" material. In higher organisms, the last, or terminal electron acceptor is oxygen. In typical natural uncontaminated systems, food is limited which causes a competition among indigenous microbial populations for the available food, or electron donors. When an organic electron donor is released to the environment, the system becomes unbalanced and there the microbes compete for any available electron acceptors. Bringing the system back into balance is the basic concept behind enhanced bioremediation.

Most common organics like petroleum products readily act as electron donors and quickly degrade if an adequate supply of electron acceptors is present or introduced into the system. Other organics like chlorinated solvents are poor electron donors but degrade very quickly under anaerobic conditions as electron acceptors.

CHLORINATED SOLVENTS

The metabolism of chlorinated solvents, most notably the chloroethenes, chloroethanes, and the chlorobenzenes degrade through the process of halorespiration or reductive dechlorination with the substrate being fermented to produce hydrogen. Halorespiration can also be an important mechanism for contaminants such as chlorinated pesticides and herbicides.

Anaerobic Bioremediation:

Many chlorinated solvents degrade faster as electron acceptors. In these cases, an electron donor is added to the system to begin the process. As the substrate is metabolized under anaerobic conditions, an electron is released and is then used to replace a chlorine atom on the chlorinated solvent in a process known as reductive dechlorination or halorespiration.

Slowly Soluble Substrates

Slowly soluble substrates like LactOil® soy microemulsion and ChitoRem® chitin complex can maintain anaerobic conditions in most aquifers for over two years.

LactOil® is unique in that the microemulsion allows the diluted material to have physical properties similar to highly soluble substrates while still retaining the slow dissolution properties of a vegetable oil. This combination provides the best characteristics of both highly soluble substrates (superior dispersion characteristics) and vegetable oils (longevity).



MNA SITE 3 NORTHERN PLUME



MNA SITE 3 NORTHERN PLUME

**SITE 3 activities being performed by
Renova/Sovereign Joint Venture (RSJV):**



- Annual Land Use Control Inspection (September)
- Semi-annual groundwater monitoring (March and September)
 - March groundwater monitoring event
 - Gauge 51 monitoring wells
 - Sample 35 monitoring wells for VOC (Laboratory MNA parameters for 8 monitoring wells)
 - Sample 4 surface water locations for VOC



MNA SITE 3 NORTHERN PLUME

SITE 3 activities continued...

- **September groundwater monitoring event**
 - Gauge 55 monitoring wells
 - Sample 22 monitoring wells for VOC (Laboratory MNA parameters at 3 monitoring wells)



MNA SFTA

Legend

- Backhoe Monitoring Well
- Monitoring Well
- Fence
- 1000' Base Boundary
- SFTA Land Use Control (LUC) Boundary
- Site 3 Land Use Control (LUC) Boundary

SFTA DETAILS AND WELL LOCATIONS
Naval Weapons Industrial Reserve Plant
Bedford, Massachusetts

0 75 150 225
Feet

Source: Bart, Dighe/Mills, Smith, Bradley, Thompson, GMA/John
DHL, MDA, Ladd, Farnfield, GMA, and the US Air Community

MNA SFTA

SFTA activities performed by RSJV:

- Annual Land Use Control inspection (September)
- Semi-annual groundwater monitoring (March and September)
- March and September sampling events
 - Gauge 12 monitoring wells
 - Sample 10 monitoring wells for VOC and PFAS (Laboratory MNA parameters at 5 monitoring wells)



MNA SITE 4



MNA SITE 4

SITE 4 activities performed by RSJV:

- Annual Land Use Control inspection (September)
- Quarterly groundwater monitoring (March, June, September, December)
 - March/September sampling events
 - Gauge 9 monitoring wells
 - Sample 6 monitoring wells (VOC and SVOC)
 - Sample 2 surface water locations (March only)



MNA SITE 4

SITE 4 activities continued...

- June/December sampling events
 - Gauge 15 monitoring wells
 - Sample 13 monitoring wells for VOC and SVOC (Laboratory MNA parameters at 6 monitoring wells)



SITE 3 GROUNDWATER TREATMENT SYSTEM



SITE 3 GROUNDWATER TREATMENT SYSTEM

System operation began in April 1997

Goal is to contain groundwater VOC plume

Designed to pump average of 14 gallons per minute

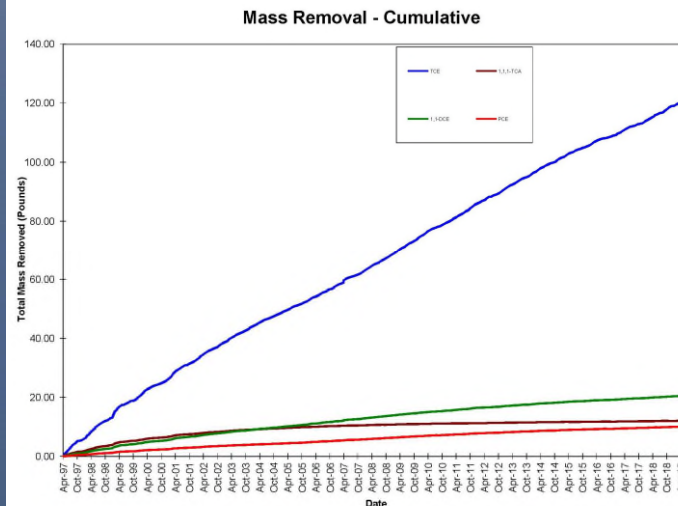
As of March 2018, approximately 162.48lbs of VOCs removed (< 1lb/month)

Operation and Maintenance (O&M) activities for GWETS:

- General equipment inspections
- Collecting measurements from all system instruments at each O&M event
- Monthly system sampling
- Carbon change outs



SITE 3 GROUNDWATER TREATMENT SYSTEM



GWETS UPGRADE – 1,4-DIOXANE

- Following the 1st Five Year Review, 1,4-Dioxane was sampled and identified at Site 3, as will be discussed in other portions of this presentation.
 - Samples were also collected from the Groundwater Treatment System Influent and Effluent and was detected at a concentration exceeding the MA Guideline of 0.3 ppb.
- 1,4-Dioxane is miscible in water, highly mobile and does not readily biodegrade in the environment.
- Therefore, it is difficult to treat because of its solubility and low volatility.



GWETS UPGRADE – 1,4-DIOXANE

- The primary treatment component in the current GWETS is granular activated carbon (GAC).
 - GAC is not an effective method to remove 1,4 dioxane primarily due to the solubility.
- The original system design included components for metals treatment. Following start-up, these components have not needed to operate, but remain present.
- The most effective methods to treat 1,4 Dioxane are Advanced Oxidation Processes, involving hydrogen peroxide, Fenton's reagent, ozone, and/or UV light.
- The unused system components included equipment to inject hydrogen peroxide into the treatment stream.



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GWETS UPGRADE – 1,4-DIOXANE



SITE 3 1,4-DIOXANE INVESTIGATION

- Purpose – to evaluate the extent of CVOCs & 1,4-dioxane in groundwater at Site 3
- Evaluate groundwater contamination in the northern and southeastern areas with the initiation of the GWET system and the area of the GWET system effluent discharge
- Investigation includes
 - Sampling and analysis of groundwater from existing monitoring wells
 - Installation and sampling of new monitoring wells



SITE 3 1,4-DIOXANE INVESTIGATION



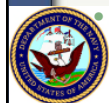
SITE 4 OPS/IRACR REPORT

■ Operating Properly and Successfully (OPS)

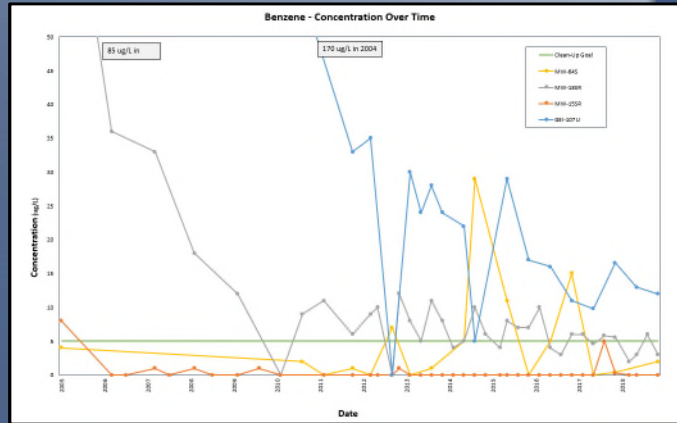
- Demonstrate that a remedial action is “OPS” as a precondition to the deed transfer of federally-owned property, as required in CERCLA.
- Property contaminated by the federal government is being environmentally restored before being conveyed.
- “Properly” – operating as designed
- “Successful” – protective of human health & the environment

■ Interim Remedial Action Completion Report (IRACR)

- Demonstrates the Remedy-in-Place (RIP) & operating successfully.
- Cleanup goals stated in the ROD have been achieved.
- Institutional Controls are in place, as appropriate.
- Protective of human health & the environment



SITE 4 OPS/IRACR



SITE 4 OPS/IRACR

■ Conclusion

- The remedial actions are
 - Operating properly and successfully
 - Protective of human health & the environment
 - Remedy is in place (RIP)
 - Land Use Controls are in place
 - Monitored natural attenuation indicates continued progress toward meeting the remedial objectives in the ROD

■ Status

- Report is being reviewed by the Navy.

