



U.S. Navy Perspective on Contaminated Sediments Management

**Presented By
Kim Markillie
NAVFAC Pacific**

- **Introduction – Navy Sediment Concerns**
- **Background – Navy Sediment Policy and Program**
- **Navy Sediment Issues and Challenges**
- **Examples of Navy Challenges – Pearl Harbor**
- **Conclusions – Navy’s Perspective**

Universal Concerns

- Risk management
- Long-term costs of monitoring natural recovery
- Getting agreement on risk-based cleanup goals
- Negotiating a timeframe for remedy
- Application of new technologies

Navy-Specific Concerns

- Active harbors
- Addressing and controlling potential on-going sources
- Dredging at sites where munitions are suspected to be or are present
- Coordinating between construction, environmental (e.g., CERCLA), and maintenance dredging and integrating the programs objectives

- **Better understanding of remedy performance in active and dynamic harbor conditions including:**

- Piers
- Quays
- Wharves
- Slopes
- Ship draft clearance
- Maintenance dredging
- Prop wash



Munitions Issues



- **Incorporate munitions logistics**
 - Support minimal interaction with and avoidance of munitions
 - Guidance for munitions handling, processing, and exposure
- **Additional Requirements**
 - ESS
 - Exclusion Zone
 - Shielded machinery
 - Time for screening for MEC
- **Cost impacts**
 - Reduced production rates
 - Modified equipment and procedures



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- **Navy Policy on Sediment Site Investigation and Response Action issued February 8, 2002**
- **The policy generally specifies:**
 - **Sources must be identified and controlled before cleanup**
 - **All investigations shall primarily be linked to a specific Navy CERCLA/RCRA site**
 - **Cleanup must be risk-based and have site-specific cleanup goals**
 - **Monitoring criteria for any long-term monitoring plan must be established before the first sample is collected**

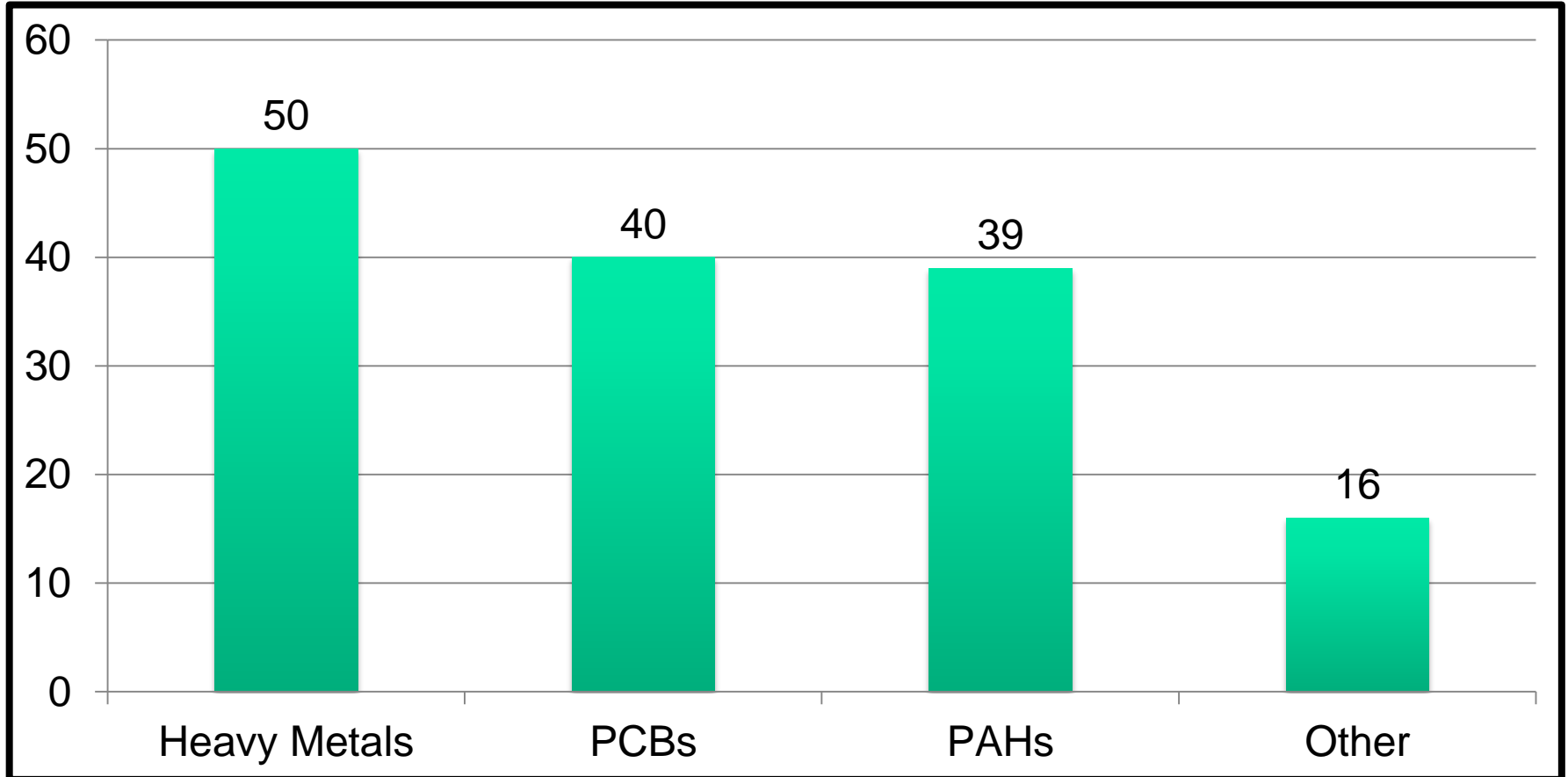
Navy Sediment Program



- The Navy has more than 90 contaminated sediment sites
- Projected remediation costs (including MRP) of more than \$1 billion
- 35% of Installation Restoration budget is related to sediment sites



What are the Chemicals of Concern in Sediment

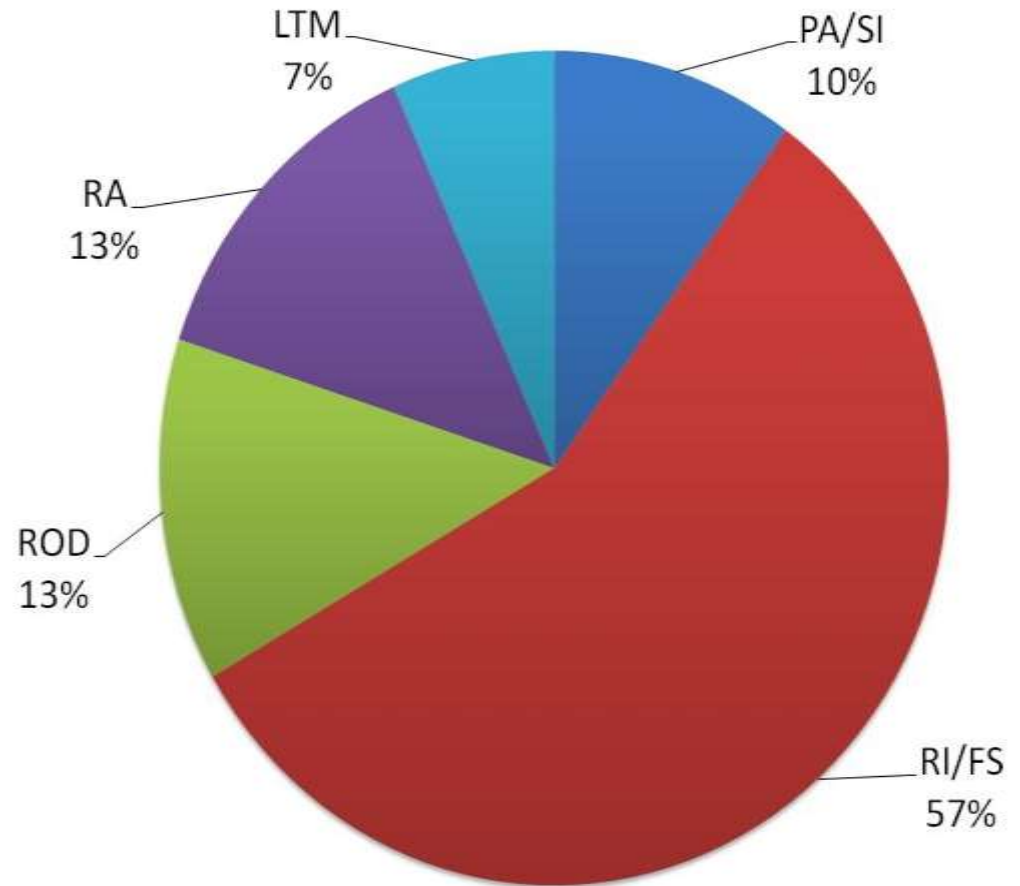


Phase of Installation Restoration Program



What phase of the IR Program is your sediment site in?

- Investigation
67%
- Remediation
33%



Presentation Outline



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Policy Issues

- **Determining background/reference locations**
- **Identifying and controlling non-Navy sources/inputs**
- **Identification and delineation of potential sites**

Technical Challenges

- **Developing site-specific cleanup goals**
- **Evaluating sediment transport**
- **In-Situ Remediation**
- **Sediment toxicity and assessing bioavailability of contaminants**
- **Performance Metrics for Monitoring Tools**

Developing Site-Specific Cleanup Goals



•Sediment

- Calculate PRGs
- Establish RAOs
- Evaluate SWACs
- Negotiate RALs

•Biota

- Fish Screening Criteria

•Porewater

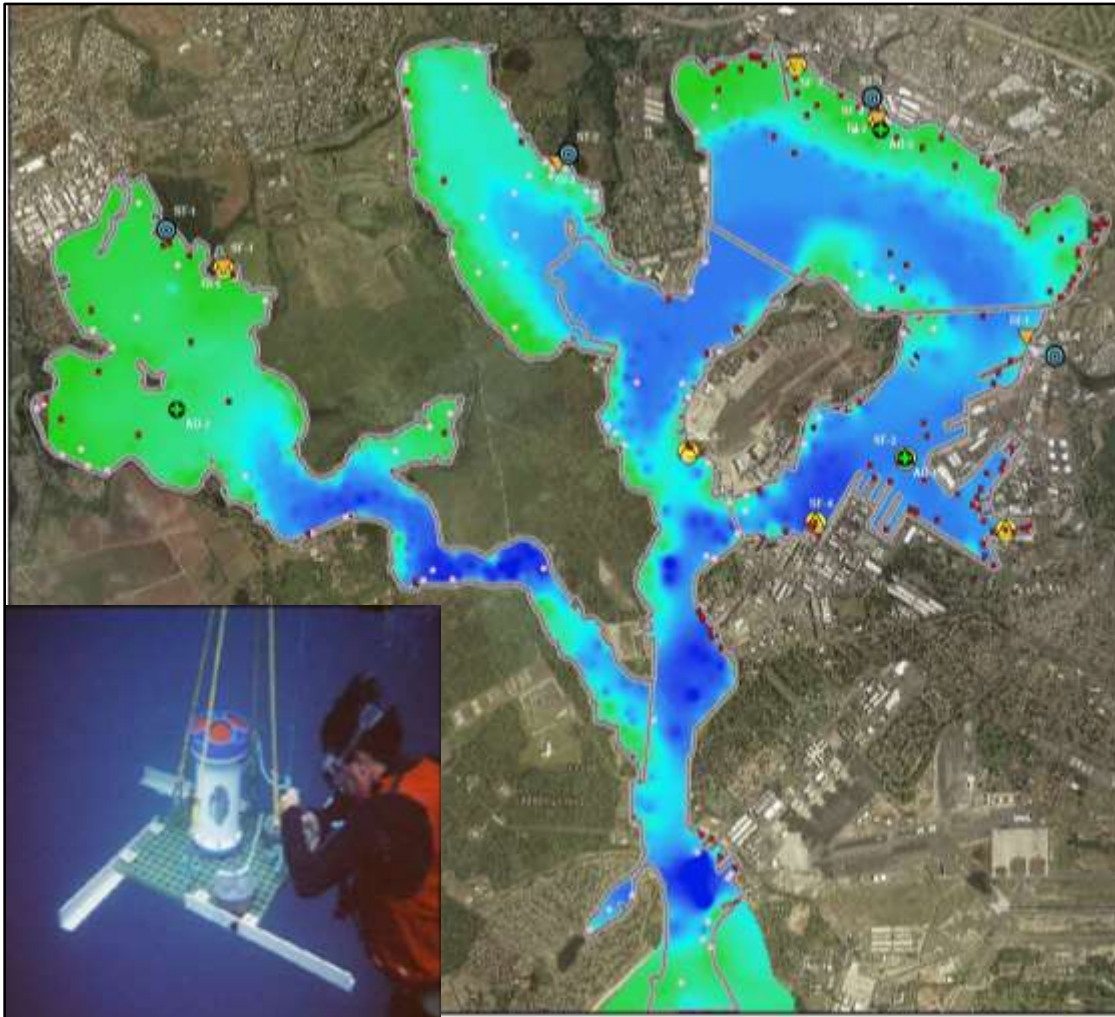
- Regulatory Standard
(Bioavailability)



Courtesy of Keoki Stender



Evaluating Sediment Transport



- Stream and Outfall input
- Harbor-wide Depositional or Erosion environment
- Prop Wash
- Sediment Loading
- On-Going Sources

In-Situ Remediation: Activated Carbon Amendment



- **Complex Environmental Conditions**
- **Lack of Experience**
- **Lack of Regulatory standards**



Regulatory Standard Challenges – Bioavailability



- **No EPA or local regulatory standards for porewater**
- **Relationship between porewater and biota is not well understood**



• Better linkage of performance metrics to monitoring tools

- Biota Tissue vs. Sediment (e.g., Biota Sediment Accumulation Factor)
- Biota Tissue vs. Porewater (e.g., food-web modeling)
- Biota Tissue/Sediment/Porewater vs. Passive sampling tools (e.g., Solid Phase Micro-extraction or Polyethylene)



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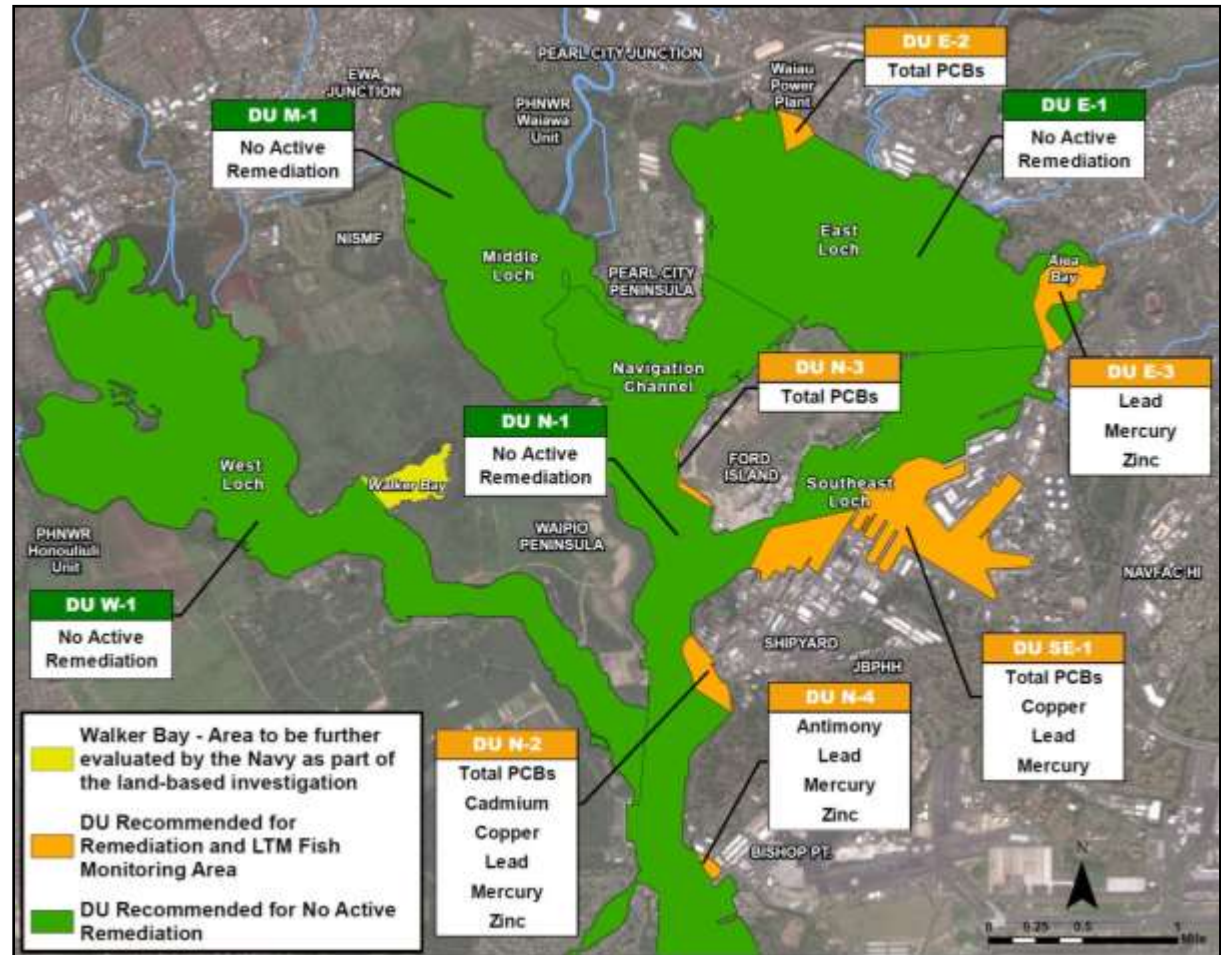


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Pearl Harbor Sediment Project



- 5000 Acres Submerged Land
- Pearl Harbor Sediment Investigation, 1996 – 2015
- Proposed Plan, February 2016
- Final Record of Decision, September 2017



Pearl Harbor Remediation Challenges



- Hybrid Remedy
- Dredging in areas with munitions
- On-going and non-point sources
- Under-pier contaminated sediment
- Navigation dredging and remediation
- Long-term monitoring for biota

Dredging in Areas with MEC



- MEC items can show up in many places during a dredging project (clamshell, screen baskets, hydraulic pipes, CDF)
- MEC have been routinely recovered from dredged material in parts of Pearl Harbor
- Ocean dumping of military munitions was a lawful disposal method for MEC until 1973
- Acts of War (i.e. Pearl Harbor and Guam)
- Requires engineering controls: armoring equipment, exclusion zones, standoff distances, ESQD arcs, barricades, comms, magnetometer scans, screen plants, conveyors, etc.
- Use properly trained UXO personnel
- DoD retains liability for munitions on or off-station forever
- Commanding Officers responsible for explosive safety
- Ensure Explosive Safety!!!

On-Going and Non-Point Sources



- **5 major streams, drainage canals/ditches, numerous Navy/Non-Navy storm drain conveyance outfalls**
- **Quantifying non-point source loading is a challenge**
- **Developing clean-up levels that take into account non-point source contributions**
- **Existing NPDES permit limits above project action levels**
- **Implementing source control on non-Navy property**



Challenges for remedial alternative application:

- **Lack of source for deposition of clean sediments**
- **Sediment removal (dredging) may not be feasible due to lack of access and the potential for undermining the integrity of the pier structures**
- **Potential recontamination source to adjacent areas**
- **Storm drain outfall under piers – potential cap disturbance**
- **In-situ cap emplacement feasible but still challenging**



Integrating Navigation Dredging with Remedy



- Majority of areas of concern is dredged periodically for navigation
- Natural recovery unlikely due to removal of overlying recent sediments
- In-situ cap requires initial dredging prior to placement
- Dredging – how to integrate navigation dredging program with environmental program when different requirements exist.



Managing Biota Only Areas of Concern



- **Fish tissue exceedance with no associated sediment exceedance identified at Walker Bay**
- **Likely to be identified in other areas moving forward**
- **Proposed long-term monitoring of fish tissue challenges:**
 - **Exit strategy – agreement on target level**
 - **Whole fish vs. fillet**
 - **Identify source and evaluate source control**
- **Porewater**



Navy's Technology Initiatives



- **Applied passive sampling technologies**
- **A diverless development system for In-situ Passive samplers**
- **Activated carbon amendment treatability study**
- **Drifter Particle Simulator study**
- **Reuse of Clean Dredge Material for Enhanced Monitor Natural Recovery**



Conclusion: Navy's Perspective



- **Risk Management Approach**
 - Establish Site Specific Cleanup Goals
- **Partnership with Regulators**
 - Team with EPA and local regulators and keep them informed and provide transparent communication
- **Applied New Technologies**
 - Sediment transport modeling, Passive sampling techniques, and Bioavailability evaluation
- **Applied in-situ remediation**
 - AC amendment and apply clean dredging material for ENR, EMNR and MNR

Contacts and Questions



Point of Contact:

NAVFAC Pacific
Kim Markillie
Kimberly.markillie@navy.mil
(808) 472-1465

Questions?

