Navy Overview
Contaminated Sediments:
Policy, Issues and Technology Needs

Presented by:
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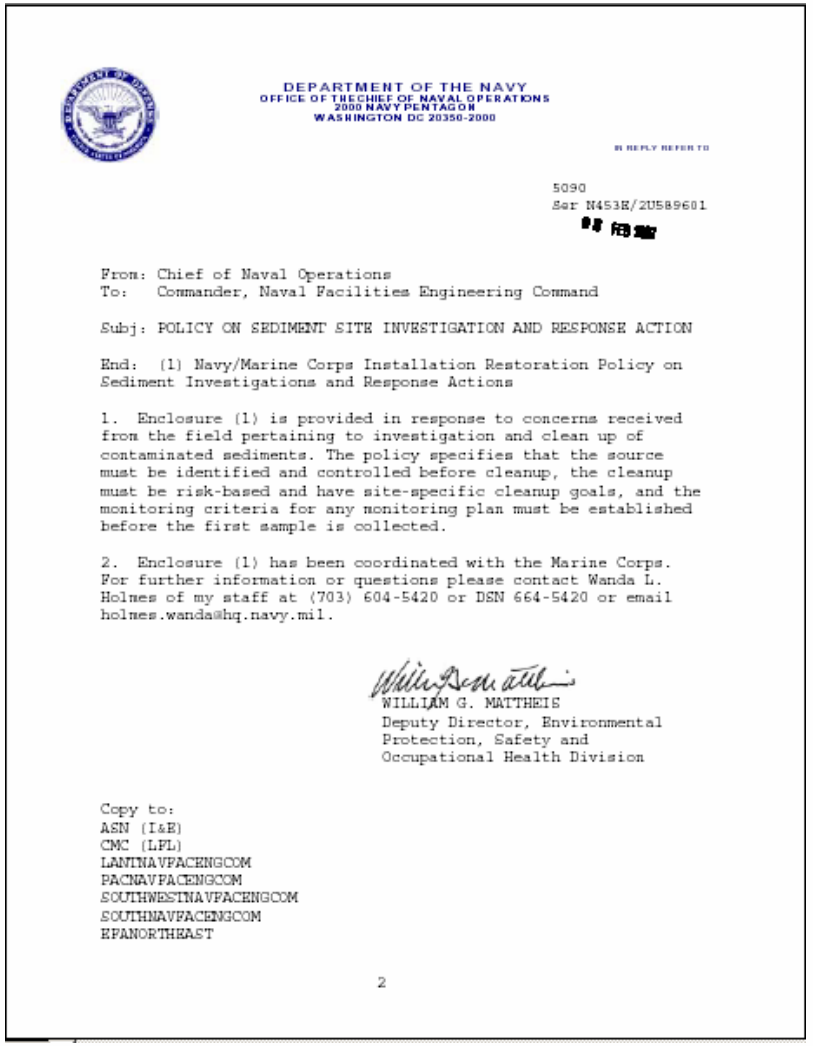
Presentation Overview

- Navy Policy - implications at contaminated sediment sites
- Navy Issues in assessing and remediating contaminated sediment sites
- Technology needs to improve assessment and management of Navy contaminated sediments (Future R&D Focus Areas)

Navy Sediment Policy

- Chief of Naval Operations issued "*Navy/Marine Corps Installation Restoration Policy on Sediment Investigations and Response Action*" in February 2002
- Addresses some similar issues as contained in EPA's "*Principals for Managing Contaminated Sediment Risks at Hazardous Waste Site*" (EPA, 2002), but expands issues from a PRP perspective



DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
2000 NAVY PENTAGON
WASHINGTON DC 20350-2000

IN REPLY REFER TO

5090
Ser N453E/2U589601

From: Chief of Naval Operations
To: Commander, Naval Facilities Engineering Command

Subj: POLICY ON SEDIMENT SITE INVESTIGATION AND RESPONSE ACTION

End: (1) Navy/Marine Corps Installation Restoration Policy on Sediment Investigations and Response Actions

1. Enclosure (1) is provided in response to concerns received from the field pertaining to investigation and clean up of contaminated sediments. The policy specifies that the source must be identified and controlled before cleanup, the cleanup must be risk-based and have site-specific cleanup goals, and the monitoring criteria for any monitoring plan must be established before the first sample is collected.

2. Enclosure (1) has been coordinated with the Marine Corps. For further information or questions please contact Wanda L. Holmes of my staff at (703) 604-5420 or DSN 664-5420 or email holmes.wanda@hq.navy.mil.

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Navy Sediment Policy Cont'd

- All sources shall be identified to determine if the Navy is solely responsible for the contamination.
  - A Watershed Contaminated Source Document (WCSD) should be developed if non-Navy sources contributed to the contamination at the site.
- All investigations shall primarily be linked to a specific Navy CERCLA/RCRA site
- All sediment investigations and response actions shall be consistent with Navy policies on risk assessment and background levels

Navy Sediment Policy Cont'd

- Sediment cleanup goals shall be developed based on site-specific risk
- The Navy shall not clean up contamination from a non-Navy source where the Navy has not contributed to the risk
- A long-term monitoring plan with exit strategies shall be developed before collecting the first monitoring sample

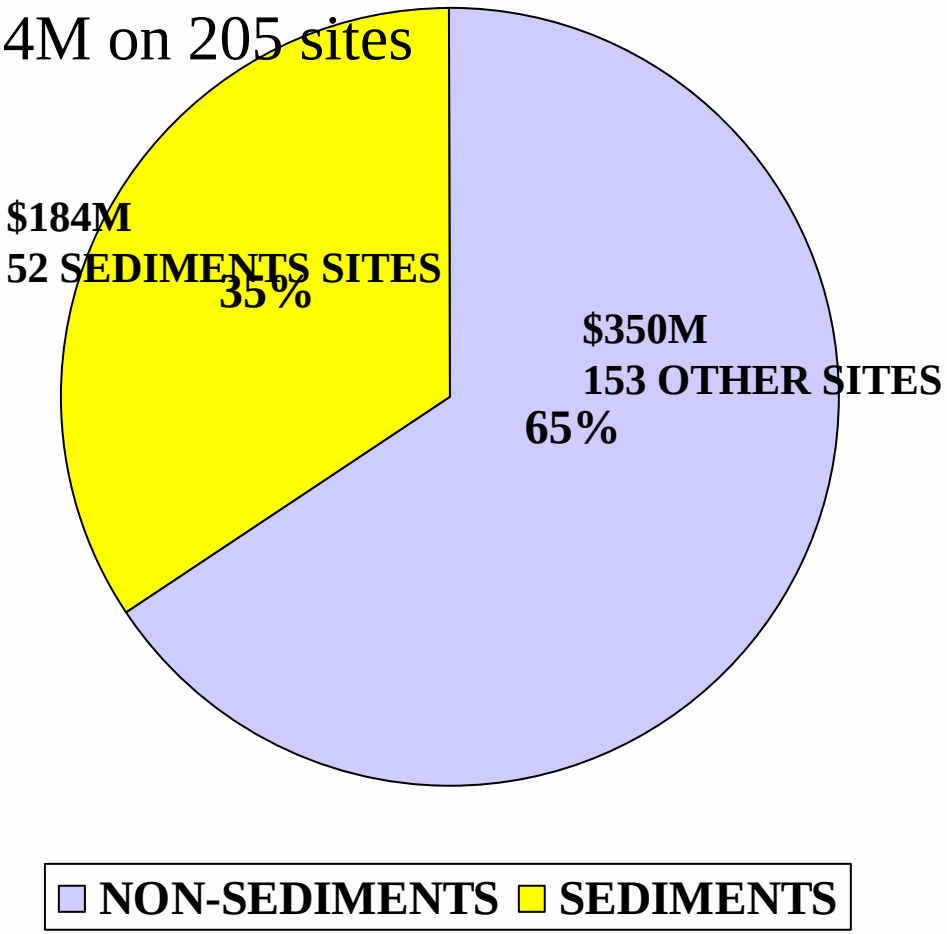
- **Sediment Remedial Alternative Evaluations**
  - Planning considerations (FS-related data, source ID/control, multiple PRPs, etc.)
  - Determining extent and volume of sediment to be remediated (remediation goals, cleanup levels)
  - Remedial option selection (*in situ* vs. removal responses)
  - Monitoring considerations (during, before and after)

Overview of the Issues

- The Navy's Installation Restoration (IR) Program covers more than 25 states and almost all of the EPA Regions
- The Navy has identified more than 200 contaminated sediment sites
- CTC approaching $1 Billion

Navy High Sites Left After EOY07 Sediment Sites Study and Cleanup Costs

Total of $534M on 205 sites



Site Settings

- Navy Sediment Sites are found in numerous water body types:
  - Marine/Estuarine bays/harbors, wetlands, and tidal rivers
  - Freshwater streams, rivers, ponds/lakes, basins, wetlands

Framing the Issues

- Multifaceted Issues:
  - Mixed Contaminants
  - Complex sites in urban water systems
  - Balancing information needed with available resources
  - Consistently understanding the information collected
  - Accepting uncertainty to reach a risk management decision
  - Regional and local differences in information needed and remedial options available
  - Balancing remedial options with Mission Requirements

Mixed Contaminants

- Sites often contain mixtures of contaminants (e.g., multiple metals, multiple organics, or mixture of metals and organics)
- Assessing and remediating mixed contaminants and linking these contaminants to upland Navy IR sites makes risk management complex

Complex Sites in Urban Water Systems

- Many of the Navy's shore-side support facilities are located adjacent to urban water systems
  - Urban water systems can include multiple sources contributing to contamination observed beyond historical releases from Navy contaminated sites
  - Selection and implementation of remedial options is complicated due to recontamination issues

Balancing Information with Resources

- The greater the complexity of a sediment site, the greater the need for increased amounts of information
- The informational needs must be balanced with the available resources to meet site goals
- With greater complexity the use of proper planning tools (e.g., DQO Process) is imperative

Consistency in Understanding

- Decision makers and technical experts are from various disciplines and have different educational backgrounds
  - Complex sediment sites often have highly technical information associated with data collected
  - Transitioning information to an understandable form for decision makers can be difficult, but is imperative
  - Transitioning information to an understandable form to the public is equally important

Accepting Uncertainty

- There is inherent uncertainty in the assessment of all sediment sites
- Understanding and accepting uncertainty by all the decision makers can be a hurdle to making risk management decisions
- Presentation and explanation of uncertainty remaining after site assessment is important to gaining clarity and confidence in making risk management decisions

Regional and Local Differences

- Navy works with multiple stakeholders
- Different stakeholders bring different opinions regarding data needs and remedial options
- Balancing these opinions can be difficult and can limit the ability for risk managers to proceed forward with decisions

Remedial Options/Mission Requirements

- Current and future use of sediment sites need to be considered and may limit the range of remedial options available
  - Examples:
    - Use of areas for current or future vessel docking and navigation
    - Use of areas for equipment testing
- Mission requirements may limit the use of *in situ* remedial options or may require them to be used in combination with intrusive options

Typical Navy Sediment Remediation Approach

- Larger and more complex sites will likely consider a combination of multiple remedial approaches:
  - Excavation of hot spot/source areas
    - Requires evaluation of *ex situ* disposal alternatives
  - Consideration of *in-situ* treatment, in situ containment, and/or monitored natural recovery of lower concentrations areas
  - Long-term monitoring

Future R&D Focus Areas

- Source Identification and Characterization Technology Tools
- Understanding of Sediment Stability/Transport
- *Ex Situ* Treatment of Excavated Contaminated Sediment
- *In-situ* Treatment and Containment
- Long-term Monitoring
- TMDL Development

Source Identification and Characterization

- Current analytical chemistry techniques being used for source identification
  - Rapid Sediment Characterization Tools
  - Advanced Chemical Fingerprinting
  - Navy has developed a users guide for applying analytical techniques

- Need: Source identification and characterization can be further enhanced by using combinations of existing or new technologies for understanding fate and transport of sediment and contaminants

Sediment Stability/Dynamics

- Monitored Natural Recovery and *In Situ* Capping has regulatory acceptance, in principle
- Need to evaluate sediment stability/dynamics to support these alternatives
- Navy has developed a users guide for assessing sediment transport

Sediment Stability/Dynamics

- Need: Future research and demonstration
  - Demonstration of existing innovative technologies in different aquatic environments with varying hydrodynamic conditions to evaluate sediment stability and system dynamics
  - Development and demonstration of models to use in different aquatic environments
  - Research into new and innovative technologies to evaluate sediment stability/dynamics effectively

Ex Situ Treatment

- In water disposal (e.g., CAD, CDF) of most highly contaminated sediment can be difficult to gain acceptance
- Upland disposal (e.g., in landfills) requires significant handling/ management, has potential legacy liability, and can be very costly
- Regulatory community has expressed interest in *ex situ* treatment alternatives

Ex Situ Treatment

- Need: Approaches for beneficial reuse of contaminated sediment material warrant future research
  - Research focused on innovative technologies that extract, stabilize (reduce mobility), or solidify contaminated sediments could reduce remediation costs

In-situ Treatment

- The feasibility of *in situ* treatment technologies are limited by lack of proven delivery systems
  - Need: Future research should look at the development of better delivery systems for application in different environments

In Situ Capping

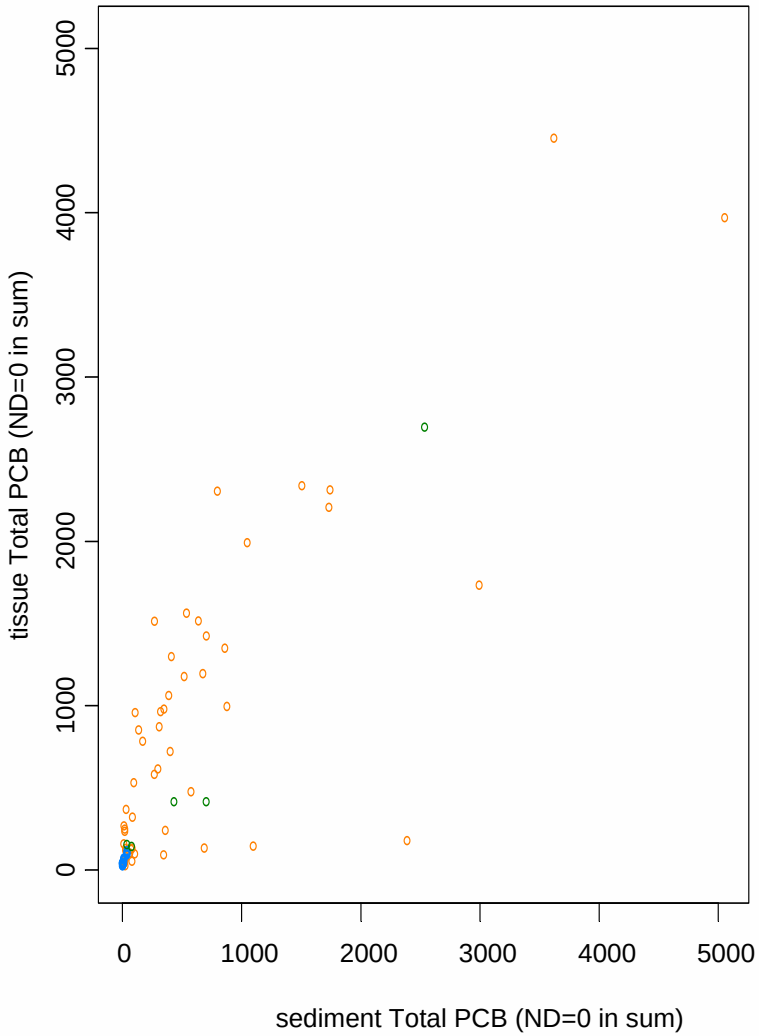
- *In Situ* Capping is a proven remedial alternative that is gaining regulatory acceptance
- Cap thickness and pore water diffusion through typical materials (e.g., sand) are site-specific
- Need: Active/Layered caps using alternative materials (e,g., coke, apatite, bauxite) are being demonstrated, but warrant further research and demonstration to gain regulatory visibility and acceptance.

Long-term Monitoring

- Often Remedial Action Objectives can be developed for the protection of piscivorous bird population, protection of the benthic community, or the reduction of body burdens of fish to allow for human consumption
- Need: Long-term and cost-effective monitoring tools and strategies to demonstrate effectiveness of remedy need to be researched and demonstrated to gain regulatory acceptance

TMDL Development

- Regulatory agencies developing TMDLs
- The relationship between sediment and tissue at low concentrations not well understood
- Acceptable risk values for some organic contaminants is very low (2 ug/kg for PCBs in San Francisco Bay)
- Regulatory agencies assuming a one-to-one correlation



TMDL Development

- Need: Better understanding of correlation between low sediment concentration of highly toxic contaminants and the body burden of fish. The assumption of a one-to-one correlation leads to unrealistic TMDLs.

Conclusions

- The Navy will address contaminated sediment sites in a manner consist with its policy
- The Navy has some unique issues while many are similar to those encountered by the regulatory community and other PRPs
- Many areas in assessing and remediating contaminated sediments warrant further research and demonstration
  - Prioritizing these areas to address the most relevant data gaps, in the most cost efficient way, is necessary

Conclusions

- Needs identified by field are immediate, intermediate, or long-term
- Due to the time required to complete a R&D project, the focus should be on intermediate to long-term needs identified
- Tech transfer to and involvement of the field needs improvement
- Navy is coordinating with DOD R&D agencies (ESTCP/SERDP)

Questions?