

Implementation Guide for Assessing and Managing Contaminated Sediment at Navy Facilities

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ABSTRACT: Sediments at many Navy facilities have some level of impact from anthropogenic compounds due to past industrial activities, hazardous waste disposal practices, ship activity, and point and non-point source (NPS) inputs. Naval Facilities Engineering Command (NAVFAC) is responsible for assessing and managing sediment sites impacted by past or present Navy operations, under the Environmental Restoration (ER,N) Program. Although regulatory guidance provides procedural direction, technical issues pertinent to sediments have not been fully addressed in practical terms. Sediments are the ultimate sinks for most contaminants introduced into watersheds. Sediments support inherently complex ecosystems and differ from soils in their dynamic nature, contaminant mobility, and potential for multiple pathways to the food chain. Additionally, sediment remediation has potentially large cost ramifications due to expensive removal and disposal or treatment options. Because of this, there are numerous technical considerations, in addition to regulatory and procedural issues, involved in assessing and managing sediments and potential remediation. Therefore, NAVFAC initiated a guide to provide sediment-specific concepts and methods that reflect the Navy's desire for timely, focused, cost-effective use of resources while complying with regulations and protecting the environment and human health. This guide, being developed by SSC San Diego, presents a sound, risk-based approach to streamlining sediment assessment and remediation. It centers on developing the critical questions and hypotheses needed for a good Problem Formulation and Conceptual Site Model (CSM), obtaining high quality data, implementing documented decision points, and ultimately achieving focused risk characterization for informed management decisions and remedy selection, if required.

This document is being developed as a procedural guidance for Remedial Program Managers (RPMs) and their in-house and/or contractor technical support. It offers insight into common issues encountered when addressing potentially contaminated sediment sites at Navy facilities. It includes practical technical and project management methods to follow in conducting sediment site assessment and cleanups within the Navy's Environmental Restoration (ER,N) program, including Installation Restoration (IR) and Base Realignment and Closure (BRAC). It provides suggestions to focus studies on the critical steps supporting site closure while avoiding costs and time delays. It complements existing Chief of Naval Operations (CNO) policy for conducting ecological risk assessments (April, 1999), the use of background chemical levels (Sep, 2000) and

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other applicable sediment and human health policies, as well as provides supplemental technical details to existing regulatory and Department of Defense (DoD) guidance.

The scope of the sediment guide includes site identification through assessment, remedial option evaluation, monitoring considerations, and site closeout, along with management decisions in the various phases. It is not intended to include comprehensive detail but to highlight the most pertinent issues and methods involved in assessing and managing sediment sites from start to finish, and to provide applicable references and links for the reader to obtain more in-depth understanding. The focus is on successful implementation of the Navy and regulatory policy/guidance relative to sediment-specific issues. It will address the substantive technical elements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, also known as Superfund) process, with the assumption that RPMs are familiar with the procedures from the respective guidance. The document is structured according to the Navy's tiered process, with step-by-step information provided to correspond with applicable USEPA Risk Assessment Guidance for Superfund (both human health and ecological) as well as pertinent guidance for conducting feasibility studies and site closure. Other potentially applicable laws and Applicable or Relevant and Appropriate Requirements (ARARs) are also presented. Critical sediment issues are discussed in this guide including:

- ♦ development of the Problem Formulation and Conceptual Site Model (CSM) for sediment sites
- ♦ appropriate selection of measurement and assessment endpoints
- ♦ addressing multiple sources (Navy and non-Navy),
- ♦ geochemistry and sediment dynamics,
- ♦ contaminant fate and transport
- ♦ use of background and reference stations,
- ♦ lines-of-evidence and the utility of the weight-of-evidence approach and other decision-making tools,
- ♦ bioavailability evaluations,
- ♦ toxicity tests and avoiding confounding factors,
- ♦ issues involved in evaluating fish tissue for ecological assessments and fish consumption for human health,
- ♦ developing site-specific cleanup goals,
- ♦ evaluating alternative sediment remedial options and the risk and liabilities associated with each including remedial dredging and disposal options, and
- ♦ consideration of data requirements for conducting the remedial investigation, feasibility study and other ancillary purposes.

The document is organized to provide the reader with easy access to pertinent information on specific phases of assessing and managing sediment sites. Section 1.0 describes general background and introductory information. Section 2.0 discusses preliminary planning considerations and ecological and human health risk assessment requirements of the remedial investigation (RI). Section 3.0 is devoted to aspects important to the feasibility study and site closure phases of the CERCLA, including a broad discussion of *in situ* and *ex situ* remedial alternatives and mention of potential overlap with maintenance dredging or harbor-deepening projects. Section 4.0 is reserved for those topics that do not lend themselves to other sections,

but need to be addressed for completeness. In the interest of brevity, whenever possible the document provides hotlinks to applicable information, however, a complete list of references, resources and websites are found in Section 6.0.

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