



Designation: E3164 – 23

Standard Guide for Contaminated Sediment Site Risk-Based Corrective Action – Baseline, Remedy Implementation and Post-Remedy Monitoring Programs¹

This standard is issued under the fixed designation E3164; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This guide pertains to corrective action monitoring before (baseline monitoring), during (remedy implementation monitoring) and after (post-remedy monitoring) sediment remedial activities. It does not address monitoring performed during remedial investigations, pre-remedial risk assessments, and pre-design investigations.

1.2 Sediment monitoring programs (baseline, remedy implementation and post-remedy) are typically used in contaminated sediment corrective actions performed under various regulatory programs, including the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Although many of the references cited in this guide are CERCLA-oriented, the guide is applicable to corrective actions performed under local, state, tribal, federal, and international corrective action programs. However, this guide does not provide a detailed description of the monitoring program requirements or existing guidance for each jurisdiction. This guide is intended to inform, complement, and support but not supersede the guidelines established by local, state, tribal, federal, or international agencies.

1.3 This guide provides a framework, which includes widely accepted considerations and best practices for monitoring sediment remedy efficacy.

1.4 This guide is related to several other guides. Guide E3240 provides an overview of the sediment risk-based corrective action (RBCA) process, including the role of risk assessment and representative background. Guide E3163 discusses appropriate laboratory methodologies to use for the chemical analysis of potential contaminants of concern (PCOCs) in various media (such as, sediment, porewater, surface water and biota tissue) taken during sediment monitoring programs; it also discusses biological testing and community assessment. Guide E3382 describes the overall framework

to determine representative background concentrations (including Conceptual Site Model [CSM] considerations) for a contaminated sediment site; Guides E3344 (methodologies for selecting representative background reference areas) and E3242 (statistical and chemical methodologies used in developing representative background concentrations for a sediment site) complement Guide E3382.

1.5 *Units*—The values stated in SI or CGS units are to be regarded as the standard. No other units of measurement are included in this standard.

1.6 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.7 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

- D75 Practice for Sampling Aggregates
- D4823 Guide for Core Sampling Submerged, Unconsolidated Sediments
- D7363 Test Method for Determination of Parent and Alkyl Polycyclic Aromatics in Sediment Pore Water Using Solid-Phase Microextraction and Gas Chromatography/Mass Spectrometry in Selected Ion Monitoring Mode
- E1391 Guide for Collection, Storage, Characterization, and Manipulation of Sediments for Toxicological Testing and for Selection of Samplers Used to Collect Benthic Invertebrates

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

E3163 Guide for Selection and Application of Analytical Methods and Procedures Used during Sediment Corrective Action

E3240 Guide for Risk-Based Corrective Action for Contaminated Sediment Sites

E3242 Guide for Determination of Representative Sediment Background Concentrations

E3344 Guide for Selection of Background Reference Areas for Determination of Representative Sediment Background Concentrations

E3382 Guide for Developing Representative Background Concentrations at Sediment Sites — Framework Overview, Including Conceptual Site Model Considerations

3. Terminology

3.1 Definitions:

3.1.1 *adaptive management*, *n*—a structured, iterative process of robust decision making in the face of uncertainty, with the goal of ensuring effectiveness during remedial action.

E3240

3.1.2 *anthropogenic background*, *n*—human-made substances present in the environment due to human activities, not specifically related to current or historical site-related releases or activities.

E3344

3.1.3 *background* (aka “reference”), *n*—substances, conditions, or locations that are not influenced by releases from a sediment site; these are usually a combination of naturally occurring (consistently present in the environment but not influenced by human activity) and anthropogenic (influenced by human activity but not related to specific current or historical activities or releases at the sediment site) components.

E3382

3.1.4 *bioavailability*, *n*—the degree to which a contaminant is free to be taken up by an organism.

E3240

3.1.5 *cleanup level*, *n*—the prescribed average or point sediment concentration of a chemical that shall not be exceeded at the remediated site.

E3242

3.1.6 *conceptual site model*, *n*—the integrated representation of the physical and environmental context, the complete and potentially complete exposure pathways, and the potential fate and transport of potential contaminants of concern at a site.

E3242

3.1.6.1 *Discussion*—The CSM should include both the current understanding of the site and an understanding of the potential future conditions and uses for the site. It provides a method to conduct the exposure pathway evaluation; inventory the exposure pathways evaluated; and determine the status of the exposure pathways as incomplete, potentially complete, or complete.

3.1.7 *contaminant of concern (COC)*, *n*—substances identified as posing a risk based on a tiered risk assessment and that warrant corrective action.

E3382

3.1.7.1 *Discussion*—Typically, all PCOCs identified for a sediment site are evaluated in the risk assessment process. PCOCs that have sediment concentrations greater than risk-based thresholds identified in the risk assessment process are

defined as COCs. Thus, the COCs identified for a sediment site are a subset of the PCOCs identified for that site.

3.1.8 *corrective action*, *n*—the sequence of actions that may include site assessment and investigation, risk assessment, evaluations of potential remedial action alternatives, interim remedial action, remedial action, operation and maintenance of the remedy, monitoring of progress, making “No Further Action” determinations, and completion of the remedial action.

E3240

3.1.9 *data quality objectives (DQOs)*, *n*—the systematic process to develop performance and acceptability criteria by defining study objectives and the type, quality, and quantity of data needed for site decisions.

E3240

3.1.10 *natural background*, *n*—naturally occurring substances present in the environment in forms (and at concentrations) that have not been influenced by human activity.

E3344

3.1.11 *potential contaminant of concern (PCOC)*, *n*—a contaminant whose sediment concentrations at the site may exceed applicable screening levels; this includes chemicals of potential environmental concern (COPECs) and chemicals of potential concern (COPCs).

E3242

3.1.12 *remedial action*, *n*—activities conducted to reduce or eliminate current or potential future exposures to receptors or relevant ecological receptors and habitats.

E3240

3.1.12.1 *Discussion*—These activities include monitoring, implementing activity and use limitations and designing and operating cleanup equipment. Remedial action includes activities that are conducted to reduce sources of exposure to meet RAOs, or sever exposure pathways to meet RAOs.

3.1.13 *remedial action objectives (RAO)*, *n*—stated objectives that describe what the remedial action for a site is expected to accomplish, based on the CSM and the exposure pathways that may pose an unacceptable risk as determined in a risk assessment; RAOs are specific and achievable goals for reducing risk to human health and the environment.

E3240

3.1.14 *representative background concentrations*, *n*—chemical concentrations that are inclusive of naturally occurring sources and anthropogenic sources similar to those present at a sediment site but not related to current or historical site releases or activities.

E3382

3.1.15 *sediment(s)*, *n*—a matrix of porewater and particles including gravel, sand, silt, clay, and other natural and anthropogenic substances that have settled at the bottom of a tidal or nontidal body of water.

E3163

3.1.16 *sediment site*, *n*—the area(s) defined by the likely physical distribution of COC(s) from a source area and the adjacent areas required to implement the corrective action. A site could be an entire water body or a defined portion of a water body.

E3240

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *backfill*, *n*—clean materials placed directly on the post-dredge surface to provide cover or bring the post-dredging surface to a targeted elevation, or both (also see, *cover material*).

3.2.2 *baseline monitoring*, *n*—monitoring to establish physical characteristics of the sediment site (such as, sediment