



Standard Guide for Developing and Implementing Short-Term Measures or Early Actions for Site Remediation¹

This standard is issued under the fixed designation D5745; 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 The purpose of this guide is to assist practitioners in the development, selection, design, and implementation of partial, short-term, or early action remedies undertaken at sites of waste contamination for the purpose of managing, controlling, or reducing risk posed by environmental site contamination. Early action remedies and strategies are applicable to the management of other regulatory processes (for example, state UST programs are equally applicable) in addition to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)/NCP process. This guide identifies and describes a standard process, technical requirements, information needs, benefits, and strategy for early actions.

1.2 This guide is applicable to both nonhazardous and hazardous sites of contamination as defined by CERCLA as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and the Resource Conservation and Recovery Act (RCRA) as amended by the Hazardous and Solid Waste Amendments (HSWA) of 1986.

1.3 To the extent that this guide may be used for hazardous materials operations, it does not address the applicability of regulatory limitations and local requirements.

1.4 *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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

¹ This guide is under the jurisdiction of ASTM Committee D34 on Waste Management and is the direct responsibility of Subcommittee D34.05 on Site Remediation.

Current edition approved Sept. 1, 2009. Published October 2009. Originally approved in 1995. Last previous approved in 2005 as D5745-95(2005) DOI: 10.1520/D5745-09.

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.

E1528 Practice for Limited Environmental Due Diligence: Transaction Screen Process

2.2 Code of Federal Regulations:³

Corrective Action or Solid Waste Management Units at Hazardous Waste Management Facilities, Proposed Rule, 27 July 1990, 40 CFR Parts 264, 265, 270, and 271 (55 FR 30797)

Corrective Action Management Units and Temporary Units; Corrective Action Provisions; Final Rule, 16 February 1993, 58 FR 8658

National Oil and Hazardous Substances Pollution Contingency Plan, Final Rule, 8 March 1990, 40 CFR Part 300

2.3 EPA Documents³

CERCLA, Compliance with Other Laws Manual, Part I (Interim Final), August 1988, EPA/9234.1-01

CERCLA, Compliance with Other Laws Manual, Part II: Clean Air Act and Other Environmental Statutes and State Requirements, August 1989, EPA/9234.1-02

Guidance for Performing Preliminary Assessments under CERCLA, September 1991, EPA/9345.0-01A

Guidance for Performing Site Inspections under CERCLA, September 1992, EPA/9345.1-05

Data Quality Objectives for Remedial Response Activities: Development Process, EPA/540/G-87/003

Guidance for Conducting Remedial Investigations and Feasibility Studies (RI/FS) under CERCLA, October 1988, EPA/9355.3-01

RCRA Corrective Action Interim Measures Guidance, Interim Final, June 1988, EPA/9902.4

3. Terminology

3.1 Definitions:

3.1.1 *applicable or relevant and appropriate requirements (ARAR)*—those requirements, cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that show either a direct correspondence or address

³ Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

problems or situations sufficiently similar at a site to show that they are well suited for application.

3.1.2 *conceptual site model, n*—a mental or physical representation of the physical system and the iterative characterization of the physical and chemical processes and conditions that affect the transport of contaminants from sources through environmental media to receptors or potential receptors.

3.1.3 *contaminant, n*—any substance potentially hazardous to human health or the environment and present in the environment above background concentration.

3.1.4 *early action, n*—any remedial plan initiated in advance of a complete or final characterization of a contaminated site.

3.1.5 *final remedy, n*—site restoration.

3.1.6 *interim remedial measure, n*—a remedial action that implements a partial solution prior to the selection of a final complete remedy. Interim remedial measures may be early actions, but they are often not.

3.1.7 *migration, n*—the movement of contaminant(s) away from a source through permeable subsurface media (such as the movement of a groundwater plume of contamination) or the movement of contaminant(s) by a combination of surficial and subsurface processes.

3.1.8 *partial remedy, n*—an interim or incomplete solution intended to be consistent with the expected permanent remedy for treatment, control, elimination, or management of risk associated with the release of a contaminant to the environment.

3.1.9 *potential migration pathway, n*—the route that may be taken by contaminants in the environment as they move or are transported from the source(s), usually in a downgradient direction.

3.1.10 *preliminary assessment (PA), n*—a review of existing information and an off-site reconnaissance, if appropriate, to determine whether a release may require additional investigation or action. A preliminary assessment may include an on-site reconnaissance, if appropriate. See ASTM Guidance for Transaction Screen Questionnaire (Practice [E1528](#)).

3.1.11 *receptor, n*—humans or other species potentially at risk from exposure to contaminant(s) at the point(s) of exposure.

3.1.12 *release, n*—any spilling, leaking, pumping, emitting, emptying, discharging, injecting, escaping, leaching, dumping, and disposing into the environment (including the abandonment or discarding of barrels, containers, and other closed receptacles) of any hazardous chemical, extremely hazardous substance, or CERCLA hazardous substance.

3.1.13 *removal, n*—the cleanup or removal of released hazardous substances from the environment; such actions as may be necessary to take in the event of the threat of release of hazardous substances into the environment; such actions as may be necessary to monitor, assess, and evaluate the release or threat of release of hazardous substances; the disposal of removed material; or the taking of such other actions as may be necessary to prevent, minimize, or mitigate damage to the public health or welfare or to the environment, which may otherwise result from a release or threat of release.

3.1.14 *short-term measure, n*—an early action designed to have an authorized duration of less than one year for the effective control or management of a contaminant released to the environment.

3.1.15 *size characterization, n*—the process by which information relating to the nature, extent, potential migration pathways, and receptors of environmental contaminants is gathered, interpreted, and documented. Site characterization efforts to provide a basis for the following: (1) the development of a conceptual site model (CSM), (2) the selection and design of a site remediation plan, or (3) the measuring point against which the effectiveness of a remedy can be evaluated, or some combination thereof.

3.1.16 *site inspection (SI), n*—an on-site investigation to determine whether a release or potential release exists and the nature of the associated threats. The purpose is to augment the data collected in the preliminary assessment and to generate, if necessary, sampling and other field data to determine whether further action or investigation is appropriate.

3.1.17 *site remediation, n*—those actions taken in the event of a release or threatened release of a hazardous substance in to the environment, to prevent or minimize the impact of the release, or to mitigate a substantial hazard to present or future environmental conditions. This early action may or may not lead to ultimate restoration of the site.

3.1.18 *source, n*—the location at which contamination has entered the natural environment.

3.2 Description of Terms Specific to This Standard:

3.2.1 *significantly above background, adj*—the mean concentration of a site contaminant can be shown (by statistical analysis of other methods) to be greater than nearby background samples from the same pathway.

4. Summary of Guide

4.1 The basic activities associated with implementing an early action are as follows: (1) construction of a CSM and estimation of risk(s); (2) identification of exposure control pathways amenable to engineered control; (3) development of interim or partial solutions, estimation of engineered risk, and identification and negotiation of required action levels; (4) selection of the desired solution(s); (5) attainment of legal authority for implementation of the planned solution(s); (6) design and execution of the selected solution(s); and (7) post-implementation monitoring of the conceptual site model.

4.2 Five common objectives for an early action are to achieve the following: (1) minimize the human or environmental risk exposure, or both; (2) minimize the time required to implement a final remedy; (3) protect resources (for example, financial, mineral, and ecological); (4) minimize the complexity of a final remedy; or (5) provide a solution-oriented project focus, or combination thereof.

4.3 There are three basic types of partial, short-term or early action remedies: (1) source control remedies, (2) pathway control remedies, and (3) receptor control remedies. Early actions are commonly categorized as source or receptor control since pathway controls usually require a sophisticated understanding of the conceptual site model dynamics.

4.4 The development of a final remedy is often an iterative process that evolves frequently with the compilation of new

data in the CSM. Prompt development and implementation of early actions increases attainment of a project's remediation objectives.

4.5 Early actions, short-term remedies, or interim remedial measures are effective risk management tools when designed and executed properly. Some common benefits derived from early actions include: (1) human, ecological, and financial resources are protected; (2) the time required to remediate an unacceptable environmental condition is minimized or reduced; (3) decreased geometric magnitude or scale of an unacceptable environmental condition; (4) minimized complexity and scope of a final remedial solution; and (5) environmental projects become "solution" oriented.

4.6 A successful strategy for the application of early actions has been developed. The strategy consists of phases or steps that include:

4.6.1 Development of a potential proactive early action remedies list.

4.6.2 Identification of early action candidate sites.

4.6.3 Selection of site-specific and easily definable CSM components(s).

4.6.3.1 Establishment and prioritization of early action objectives for each CSM component.

4.6.3.2 Identification of early action alternatives to address each objective, anticipated or expected results and their impact on final regulations and remedy.

4.6.3.3 Selection of regulatory and public comment, as appropriate.

4.6.4 Establishment of funding for early actions.

4.6.5 Prioritization of early action solutions consistent with the objectives, public response, expected results, and funding availability.

4.6.6 Selection and integration of early action solutions.

4.6.6.1 Determination of appropriate criteria for management of early action progress and results.

4.6.6.2 Establishment of documentation and record procedures for early action and effective final remedy implementation.

4.6.6.3 Analysis of the validation approach prior to the implementation of early action.

4.6.7 Preparation and finalization of the early action remedial plan.

4.6.8 Implementation and documentation of early action activities.

4.6.8.1 Frequent and periodic validation of early action results in comparison to the early action plan and the final remedial action frequently and periodically.

4.6.8.2 Frequent and periodic review of early action activities.

5. Significance and Use

5.1 This guide is intended to provide a systematic approach for the application and execution of early actions for purposes of remediating both hazardous and non-hazardous contamination. Iterative development of a CSM is fundamental to the use of this guide.

5.2 Anticipated users of this guide are owners or operators at sites of environmental contamination; technical professionals involved in the field of environmental site characterization

and remediation; environmental regulators, property owners, employees, and residents adjacent to sites of environmental contamination; and lenders, sureties, and persons of general interest within an affected community.

5.3 This guide is not intended to replace legal requirements for remediating sites of environmental contamination. This guide should be used to supplement existing regulatory guidance and to focus remedial efforts toward final remedy solutions.

6. Procedure

6.1 *Assembling Required Information*—Assemble all available information, including the following: historical records, interviews, previous studies, environmental analytical data, permits, regulatory guidance and requirements, maps, geologic cross sections, engineering infrastructure as-built plans, and drawings. At least one site visit by technical personnel tasked with the responsibility of designing and implementing an early action is required prior to the development of a remedial plan.

6.2 *Development of the Conceptual Site Model*—An initial concept of the site(s) conceptual site model should be developed using all assembled information. The quality and accuracy of all information should be assessed both quantitatively and qualitatively, and the use of the information should be focused on the following:

6.2.1 *Identification of Contaminants*—Identify the environmental contaminants for all pathways of a conceptual site model. Particular emphasis should be placed on identifying the contaminants for any suspected exposure pathways of concern.

6.2.2 *Characterization of Background Conditions*—The natural and secondary (modified) background concentration of contaminants in all conceptual site model pathways must be characterized or estimated in order to design a useful early action. This information is necessary in order to develop appropriate action levels, identify possible synergism, estimate environmental risk, and identify and design remedial solutions.

6.2.3 *Contaminant Source Characterization*—An understanding of contaminant source characteristics is essential in developing a successful early action remedy. At a minimum, the following source characteristics should be measured or estimated for a site:

6.2.3.1 Source location, boundaries, volume, and mass;

6.2.3.2 Hazardous constituents and their concentration at a source;

6.2.3.3 Time, duration, rate of contaminant release (both volume and mass) from a source; and

6.2.3.4 Suspected areas (three dimensional) of contaminant migration within a pathway from a point or source release.

6.2.4 *Migration Pathway Characterization*—Potential contaminant migration pathways through the soil, surface water, air, and ground water must be identified and characterized primarily for each source of contamination at a site. The minimum information or characterization requirements for developing an early action for each migration pathway type is as follows: (1) an evaluation and estimate of the contaminant mass released and its release mechanism to a pathway, (2) identification of the transport mechanism and an estimate of contaminant transport rate or dispersion within a pathway, or both; and (3) identification of the human and ecological