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Standard Guide for Moving Sites to Closure (MStC) for Petroleum Underground Storage Tank (UST) Releases[1]

This standard is issued under the fixed designation E3488; 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 is a framework to facilitate moving petroleum underground storage tank (UST) release sites to closure in a manner protective of human and ecological receptors. Alternative ways to assess and address the potential for exposure to human and ecological receptors resulting from petroleum UST releases to support closure decisions are presented. Guidance is provided on navigating the closure decision-making process to achieve closure, continue the existing corrective action program, or rethink and rescope the corrective action. Alternative closure criteria are presented for contamination that is present as light nonaqueous phase liquid (LNAPL), groundwater, soil, and soil gas that can be used to document current and reasonably anticipated future threats to receptors and, ultimately, facilitate site closure. Decisions on site closure should factor in these technical criteria along with legal/regulatory concerns and other requirements, such as institutional controls. In addition, best practices for overcoming nontechnical barriers, such as nonresponsive owners and funding limitations are presented.

1.2 This guide provides best practices based on the latest scientific understanding and builds upon risk-based and sustainability principles.

1.3 This framework includes rationale for closing sites under conditions presenting a low threat to current and reasonably anticipated future receptors from releases. This approach provides for closure when the remaining portion of the release is stable or decreasing and allows for current and reasonably anticipated future uses.

1.4 In this guide, the time frame for the complete degradation of petroleum releases by natural degradation is not addressed. Accurate prediction of LNAPL depletion is not possible with today's science. While we are unable to predict the time period to full depletion, in some cases, it may be possible to predict the degradation of individual components of interest, but in this guide, this type of prediction is not addressed.

NOTE 1—When developing their low threat closure policy, the state of California assumed a time period of 50 to 100 years for the natural degradation of compounds that are the health risk drivers (benzene, ethylbenzene, naphthalene). Some petroleum UST releases contain polycyclic aromatic hydrocarbons (PAHs), which can drive risk and degrade more slowly than benzene, ethylbenzene, naphthalene, but these situations are generally at used oil UST releases and are remediated by excavation or pose limited mobility and exposures.

1.5 This guide is applicable to petroleum products expected at petroleum UST sites and may not be fully applicable to other hydrocarbons such as heavy crude oils or LNAPL derived from coal tar.

1.6 In this guide, methods for estimating the volume or mass of contaminants in the ground are not provided. Such estimates are difficult to make accurately, although high-resolution site characterization methods can improve estimates of the quantity of contaminants. Such estimates could help frame remediation times and possible outcomes of different remediation technologies, although they have little bearing on the methods of determining the potential for exposure or threat from a release described in this guide. Some of the models and tools referenced in this guide include methods for estimating the volume or mass of contaminants; however, LNAPL and contaminant volume estimation methods should be used with caution because of geologic and LNAPL complexity and field conditions that do not align with model assumptions.

1.7 The framework presented in this guide is not exhaustive and may not provide a closure approach suitable for every petroleum release site. Conversely, not all the tools outlined in this framework need be applied to obtain closure at the site [for example, it may be possible to obtain closure at a site without the use of institutional controls (ICs)].

1.8 The framework presented in this guide is applicable to chemical(s) of concern (COCs)commonly associated with current and historical UST petroleum releases, including gasoline and diesel fuel constituents and fuel additives (such as oxygenates and halogenated lead scavengers in leaded motor fuel). The information provided in this framework may also be

[1] This guide is under the jurisdiction of ASTM Committee E50 on Environmental Assessment, Risk Management and Corrective Action and is the direct responsibility of Subcommittee E50.04 on Corrective Action.

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applicable to petroleum releases regulated under other regulatory programs, but they are not specifically addressed in this guide.

1.9 This guide is intended to complement (but not supersede) local, state, tribal, federal, and international regulations and guidance. At certain sites, local, state, tribal, federal, or international, regulatory agency approval may also be required to implement the approaches outlined in this guide.

1.10 The framework presented in this guide is intended to complement petroleum corrective action processes including risk-based corrective action (RBCA), such as outlined in Guide . If a petroleum UST release was previously evaluated using the RBCA framework and the corrective action has not reached closure, in this guide alternative approaches to evaluate the threat posed by the petroleum release are provided.

1.11 This guide does not require the user to implement a risk-based corrective action or analysis before implementing the moving sites to closure (MStC) approach nor does it supersede or replace existing RBCA or other corrective action. The framework presented in this guide is applicable to petroleum UST releases regardless of the cleanup goals or the corrective action process used to develop them.

1.12 A variety of standards and guidelines exist that help the user develop a cleanup level for each COC and select remedial options for application in a corrective action program. In addition, most regulatory programs publish target cleanup levels.

1.13 The alternative regulatory closure criteria described in this guide include both qualitative criteria (such as, certain indicators of plume stability) and quantitative criteria (such as numerical concentrations for specific COCs).

1.14 *Units*—The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.14.1 Other units of measurement are included in this guide where they are the customary units of North American practitioners (such as, the units for LNAPL transmissivity).

1.15 In this guide, continued ongoing releases, worsening environmental conditions, and imminently hazardous or emergency conditions are not addressed.

1.16 *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.*

1.17 *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]

D653 Terminology Relating to Soil, Rock, and Contained Fluids

D5792 Practice for Generation of Environmental Data Related to Waste Management Activities: Development of Data Quality Objectives

E1528 Practice for Limited Environmental Due Diligence: Transaction Screen Process

E1689 Guide for Developing Conceptual Site Models for Contaminated Sites

E1731 Test Method for Gravimetric Determination of Nonvolatile Residue from Cleanroom Gloves

E1943 Guide for Remediation of Ground Water by Natural Attenuation at Petroleum Release Sites

E2081 Guide for Risk-Based Corrective Action

E2091 Guide for Use of Activity and Use Limitations, Including Institutional and Engineering Controls

E2531 Guide for Development of Conceptual Site Models and Remediation Strategies for Light Nonaqueous-Phase Liquids Released to the Subsurface

E2600 Guide for Vapor Encroachment Screening on Property Involved in Real Estate Transactions

E2856 Guide for Estimation of LNAPL Transmissivity

E2993 Guide for Evaluating Potential Hazard in Buildings as a Result of Methane in the Vadose Zone

E3164 Guide for Contaminated Sediment Site Risk-Based Corrective Action – Baseline, Remedy Implementation and Post-Remedy Monitoring Programs

E3248 Guide for NAPL Mobility and Migration in Sediment – Conceptual Models for Emplacement and Advection

E3356 Guide for Stakeholder Engagement on Environmental Risk Management and Climate

E3361 Guide for Estimating Natural Attenuation Rates for Non-Aqueous Phase Liquids in the Subsurface

2.2 *ISO Standard:*[3]

ISO 18504 Soil quality—Soil remediation

2.3 *Federal Standard:*[4]

40 CFR 280.64 Free Product Removal

3. Terminology

3.1 *Definitions:*

3.1.1 *chemical(s) of concern (COCs), n*—specific compounds and their breakdown products that are identified for evaluation by the governing regulatory agency or in the risk-based corrective action (RBCA) process. **(E2081)**

3.1.1.1 *Discussion*—Identification can be based on their historical and current use at a site, detected concentrations in

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

[3] Available from International Organization for Standardization (ISO), ISO Central Secretariat, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland, https://www.iso.org.

[4] Available from U.S. Government Publishing Office (GPO), 732 N. Capitol St., NW, Washington, DC 20401, http://www.gpo.gov.