



Designation: D6597 – 00 (Reapproved 2006)

## Standard Practice for Assessment of Attaining Clean Up Level for Site Closure<sup>1</sup>

This standard is issued under the fixed designation D6597; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This practice covers the steps necessary to determine if a site is ready for closure with emphasis on general sampling techniques and how to determine if the agreed upon level of remediation has been achieved.

1.2 A minimum of statistical procedures is used in this practice.

1.3 The standard practice does not address radioactive waste sites nor does it cover every situation that can occur in the field. It does cover the following general sampling techniques: soil sampling, swipe sampling of buildings and equipment, surface impoundments, waste piles, and layered tanks. It does not cover drum sampling, general water sampling and monitoring wells and their construction.

1.4 *This standard does not purport to address all 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 to determine the applicability of regulatory limitations prior to use.*

### 2. Referenced Documents

#### 2.1 ASTM Standards:<sup>2</sup>

- D1452 Practice for Soil Exploration and Sampling by Auger Borings
- D1586 Test Method for Penetration Test (SPT) and Split-Barrel Sampling of Soils
- D1587 Practice for Thin-Walled Tube Sampling of Soils for Geotechnical Purposes
- D3550 Practice for Thick Wall, Ring-Lined, Split Barrel, Drive Sampling of Soils
- D4547 Guide for Sampling Waste and Soils for Volatile Organic Compounds
- D4687 Guide for General Planning of Waste Sampling
- D5088 Practice for Decontamination of Field Equipment Used at Waste Sites

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee D34 on Waste Management and is the direct responsibility of Subcommittee D34.01.01 on Planning for Sampling.

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<sup>2</sup> 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.

D5283 Practice for Generation of Environmental Data Related to Waste Management Activities: Quality Assurance and Quality Control Planning and Implementation

D5434 Guide for Field Logging of Subsurface Explorations of Soil and Rock

D5451 Practice for Sampling Using a Trier Sampler

D5730 Guide for Site Characterization for Environmental Purposes With Emphasis on Soil, Rock, the Vadose Zone and Ground Water

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

D6009 Guide for Sampling Waste Piles

D6051 Guide for Composite Sampling and Field Subsampling for Environmental Waste Management Activities

D6232 Guide for Selection of Sampling Equipment for Waste and Contaminated Media Data Collection Activities

D6250 Practice for Derivation of Decision Point and Confidence Limit for Statistical Testing of Mean Concentration in Waste Management Decisions

D6311 Guide for Generation of Environmental Data Related to Waste Management Activities: Selection and Optimization of Sampling Design

E1728 Practice for Collection of Settled Dust Samples Using Wipe Sampling Methods for Subsequent Lead Determination

#### 2.2 API Standard:

API Standard 2015 Cleaning Petroleum Storage Tanks<sup>3</sup>

#### 2.3 Federal Standards:

Title 40, Code of Federal Regulation (CFR), Part 245,<sup>4</sup>

Title 40, Code of Federal Regulation (CFR), Part 265, Guidance on Demonstrating Equivalence<sup>4</sup>

### 3. Terminology

#### 3.1 Definitions of Terms Specific to This Standard:

3.1.1 *clean up level, n*—a concentration of a compound or element, in a defined volume of material, that is allowed to remain on a site.

3.1.1.1 *Discussion*—The numerical level usually is determined during the DQO process using a mean, median, or

<sup>3</sup> Available from American Petroleum Institute, 1801 K Street NW, Washington, DC 20026.

<sup>4</sup> Available from Superintendent of Documents, US Government Printing Office, Washington, DC 20402.

percentage value based upon health risk, fate and transport consideration, site location and intended use.

3.1.2 *closure, n*—all waste and manufactured residue are remediated to an acceptable clean up level.

#### 4. Summary of Practice

4.1 The site is determined to be remediated and ready to be closed when site contaminant concentrations meet the agreed upon cleanup level for the site for each media of concern and sampling and analysis procedures meet data quality objectives (DQOs).

4.2 Optimization of sampling design is discussed in brief or by reference.

4.3 The site closure document assumes that the site has been characterized, the characterization was found to be adequate, and DQOs were met.

4.4 A copy of the table of contents of a closure plan submitted to a government agency is included to give an overall view of some items that should be considered. This example should be used only for guidance (see Appendix X1.2).

4.5 This site closure practice contains lists of equipment and sampling methods used in sampling of soils and buildings to confirm the cleanup level(s) has/have been reached.

#### 5. Significance and Use

5.1 This practice contains a mechanism to determine that the hazardous constituents have been remediated to an acceptable level.

5.2 This practice assists both the regulator and the owner/operator in establishing cost-effective steps and procedures necessary to determine if the site has achieved its objective for site closure.

5.3 This practice can be applied to hazardous and nonhazardous spills or leaks, surface impoundments, waste piles, buildings, and tanks. The general nature of this practice allows its use in a large variety of situations.

#### 6. Planning Using the DQO Process

6.1 The Practice D5792 is a companion to this practice. A thorough study of this practice will prevent many costly mistakes later in the remediation program. The Code of Federal Regulations document 40 CFR 245 covers the DQO process).

6.2 The DQO process should be completed and agreed to by the stakeholders.

6.2.1 The DQO process must specify some numerical value or values that the stakeholders agree beforehand that the decision for site closure shall depend on (see Note 1). For example, the decision rule may state that if the lower 95 % confidence limit is less than the regulatory limit, then the site is safe to close (see Practice D6250). In that case, no additional sampling is needed and the site may be closed. The conditions for site closure must be stated clearly.

NOTE 1—At some sites, the cleanup goal may be to eliminate an exposure pathway, as is done for installation of slurry walls or caps around or on a site. In these cases no numerical cleanup level is specified.

6.3 After the site has been remediated, the question becomes whether the effort has met the clean up level. The verification

process is established during the DQO process. The process may require additional sampling or simply a visual confirmation.

6.3.1 The number of samples and where they will be taken will depend upon the values and acceptable risk established during the DQO process.

NOTE 2—The number of samples may change if the sampling results indicate additional remediation is required.

#### 7. General Sampling Considerations

7.1 A written sampling plan should be prepared before the sampling begins. There are several ASTM documents the stakeholders may want to review during the planning process, and they include: Guides D4687, D5434, and D6051 and Practice D5283.

7.2 Complete records of all sampling activities must be maintained.

7.3 Before the final sampling commences, the project manager or other responsible party should confirm that the site is ready for the final sampling in preparation for closure. Any differences between planned and actual remediation activities should be documented.

#### 8. Sample Design

8.1 The sampling design is established and optimized during the DQO process.

8.1.1 The sampling design may change if the data from the samples do not confirm clean closure has been achieved. The sampling design should be reevaluated because the site conditions have changed due to the remediation effort. Fewer samples may be required for the second confirmation try.

8.1.2 After further remediation has occurred, the site again is sampled for confirmation that the site meets the clean closure requirements and the DQOs. If the cleanup level(s) has/have been reached and the DQOs have been met, the site is ready for closure.

#### 9. Determination of Attainment of Clean Closure

9.1 The decision rule for closure attainment typically is specified in Step 5 of a DQO process (see Practice D5792).

9.2 Clean closure value or values usually are developed and agreed to by the stakeholders during the DQO process. The values often are mandated by regulations.

9.3 Examples of closure attainment in the decision rule can include the following:

9.3.1 When the upper 95 % confidence limit of the mean is less than the regulatory limit,

9.3.2 When the lower 95 % confidence limit of the mean is less than the regulatory limit,

9.3.3 When the sample mean is less than the regulatory limit, and

9.3.4 When there is a 90 % confidence that no more than 5 % of the samples are expected to exceed the regulatory limit (in statistical terms, when the upper 95 % tolerance limit is less than the regulatory limit with 90 % confidence).

9.4 The first three examples (9.3.1, 9.3.2 and 9.3.3) have to do with closure decisions based on the mean concentration of a site. Details of how these decision rules can be formulated statistically are given in Practice D6250.