~~Designation:E 1892–97 (Reapproved 2003)~~ Designation: E 1892 – 09

Standard Guide for Preparing Characterization Plans for Decommissioning Nuclear Facilities[1]

This standard is issued under the fixed designation E 1892; 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 standard guide applies to developing nuclear facility characterization plans to define the type, magnitude, location, and extent of radiological and chemical contamination within the facility to allow decommissioning planning. This guide amplifies guidance regarding facility characterization indicated in ASTM Standard E 1281 on Nuclear Facility Decommissioning Plans. This guide does not address the methodology necessary to release a facility or site for unconditional use. This guide specifically addresses:

1.1.1 the data quality objective for characterization as an initial step in decommissioning planning.

1.1.2 sampling methods,

1.1.3 the logic involved (statistical design) to ensure adequate characterization for decommissioning purposes; and

1.1.4 essential documentation of the characterization information.

1.2 *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:*

~~E 1167Standard Guide for Radiation Protection Program for Decommissioning Operations~~

~~E 1278Standard Guide for Radioactive Pathway Methodology for Release of Sites Following Decommissioning[2]~~ [2]

E 1167 Guide for Radiation Protection Program for Decommissioning Operations

E 1281 ~~Standard~~ Guide for Nuclear Facility Decommissioning Plans

3. Terminology

3.1 *Definitions:*

3.1.1 *Characterization*, *n*—A systematic identification of the types, quantities, forms, and locations of contamination within a facility.

3.1.2 *Decommission*, *vt*—To remove safely from service and to reduce residual contamination to a level that permits termination of any applicable licenses and release of the property for unrestricted use.

3.1.3 *Decontamination*, *n*—Activities employed to reduce the levels of (radioactive or hazardous chemical) contamination in or on structures, equipment, materials and personnel.

3.1.4 *Facility*, *n*—As applied to a decommissioning project includes the structure and the soil around and under the structure to an agreed upon distance.

4. Requirements

4.1 *General*:

4.1.1 As an initial part of facility decommissioning planning, a characterization plan is developed to define the nature, extent and location of contaminants, determine sampling locations and protocols, determine quality assurance objectives for characterization, and define documentation requirements. The characterization plan considers the historic use of the facility to identify the likely contaminants due to the radiological process involved, the chemicals introduced during the processing, and any

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[1] This guide is under the jurisdiction of ASTM Committee E10 on Nuclear Technology and Applications and is the direct responsibility of Subcommittee E10.03 on Radiological Protection for Decontamination and Decommissioning of Nuclear Facilities and Components.

~~Current edition approved June 10, 1997. Published October 1997.~~

Current edition approved June 1, 2009. Published June 2009. Originally approved in 1997. Last previous edition approved in 2003 as E 1892-97(2003).

[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* ~~, Vol 12.02.~~volume information, refer to the standard's Document Summary page on the ASTM website.

resulting contaminants that may be formed during the processing. Records or recounting of any process upsets or spills that may have occurred during the operating life of the facility should be considered to help determine the likely location of contaminants. In addition to examining process records, interviews should be conducted with personnel knowledgeable in the past operation of the facility to identify conditions that may not have been recorded. During this pre-characterization data collection phase, an approach for the characterization plan is developed.

4.2 *Methodology*:

4.2.1 The actual characterization of a facility is an iterative process that involves initial sampling according to the characterization plan, field management (such as labeling, packaging, storing, and transport) of the samples, laboratory analysis, conformance to the data quality objectives (DQOs), and then identifying any additional sampling required, refining the DQOs, and modifying the characterization plan accordingly. The final product of the facility characterization is a document that describes the type, amount, and location of contaminants that will require consideration and removal during the decommissioning operations sufficient to prepare a decommissioning plan. Sufficient information must be provided to:

~~1) estimate volumes for various waste types~~

~~2) plan work to keep radiation exposure as low as reasonably achievable (ALARA)~~

~~3) plan work to keep exposures to hazardous materials ALARA~~

1) estimate volumes for various waste types,

2) plan work to keep radiation exposure as low as reasonably achievable (ALARA),

3) plan work to keep exposures to hazardous materials ALARA, and

4) support development of a decommissioning radiation protection program based on guidance from E 1167.

5. Significance and Use

5.1 Knowledge of the nature and extent of contamination in a nuclear facility to be decommissioned is crucial to choosing the optimum methods for decontamination and decommissioning, and estimating the resulting waste volumes and personnel exposures. Implementing a characterization plan, developed in accordance with this standard, will result in obtaining or deriving the above information.

5.2 Information on the proposed decommissioning methods, waste volumes, and estimated personnel radiation exposures can be used to define the overall work scope, costs, schedules, and manpower needs for the decommissioning project. This information may be included in the Decommissioning Plan. The extent of over- or under-estimating these project parameters will be a function of the sampling plan and statistical designs, described in Sections 6.1.4 and 6.1.5.

6. Elements of Characterization Plan

6.1 Radiological and hazardous constituent characterization of a facility shall be conducted in accordance with a written plan. The plan must provide direction for the performance of effective sampling and inform concerned individuals as to the intent and methods used in the characterization process. Guidance on possible content and structure of such a written plan follows:

6.1.1 *Characterization Objectives* —The overall objective of the characterization task is to obtain information on the location, type, and amount of contaminants. This information will assist in the planning and performance of decommissioning operations; and, the data collected during the characterization activity is valuable for source term evaluations to support risk assessments. Specific objectives must be clearly stated in the characterization plan to ensure obtaining information that is relevant to the decommissioning process.

6.1.2 *Data Quality Objectives*—Data quality objectives (DQO) are quantitative and qualitative statements developed by data users to specify the quality of data needed from a particular data collection activity. The development of DQOs is an iterative process involving both the data users and the technical staff. Establishment of the characterization objective leads to defining DQOs in the characterization plan. These DQOs are typically specified in terms of six characteristics: precision, accuracy, representativeness, completeness, comparability, and detection limit. For decommissioning planning the DQOs ensure that sufficient information is obtained to prepare required National Environmental Policy Act (NEPA) documentation and to support the detailed engineering.

6.1.3 *Background Information*:

6.1.3.1 *Site Location*— The location and a description of the facility relative to other facilities on the site and surrounding communities or environment should be described.

6.1.3.2 *Site Characteristics*—~~A description of the entire nuclear facility to be decommissioned should be provided including results of surveys performed prior to initiation of other decommissioning activities. As described in the U. S. Department of Energy document, *A Guide for Radiological Characterization and Measurement for Decommissioning of U. S. Department of Energy Surplus Facilities*, site characteristics that should be addressed include topography, soils and geology, hydrology, seismology, demography, and meteorology.~~—A description of the entire nuclear facility to be decommissioned should be provided including results of surveys performed prior to initiation of other decommissioning activities. The multi-agency document MARSSIM describes site characteristics that should be addressed including topography, soils and geology, hydrology, seismology,