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Standard Guide for Post-Deactivation Surveillance and Maintenance of Radiologically Contaminated Facilities¹

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1. Scope

1.1 This guide outlines a method for developing a Surveillance and Maintenance (S&M) plan for inactive nuclear facilities. It describes the steps and activities necessary to prevent loss or release of radioactive or hazardous materials, and to minimize physical risks between the deactivation phase and the start of facility decontamination and decommissioning (D&D).

1.2 The primary concerns for S&M are related to (1) animal intrusion, (2) structural integrity degradation, (3) water leakage, (4) contamination migration, (5) unauthorized personnel entry, and (6) theft/intrusion. This document is intended to serve as a guide only, and is not intended to modify existing regulations.

2. Referenced Documents

2.1 ASTM Standards:²

[E1167 Guide for Radiation Protection Program for Decommissioning Operations](#)

[E1819 Guide for Environmental Monitoring Plans for Decommissioning of Nuclear Facilities](#)

[E1892 Guide for Preparing Characterization Plans for Decommissioning Nuclear Facilities](#)

[E1893 Guide for Selection and Use of Portable Radiological Survey Instruments for Performing In Situ Radiological Assessments to Support Unrestricted Release from Further Regulatory Controls](#)

2.2 Nuclear Regulatory Commission Documents:³

[NUREG-1576 Multi-Agency Radiological Laboratory Analytical Protocols \(MARLAP\)](#)

[NUREG-1575 Multi-Agency Radiation Survey and Site Investigation Manual \(MARSSIM\), Revision 1, August 2000](#)

[NUREG-1575-Supplement 1 Multi-Agency Radiation Survey and Assessment of Materials and Equipment Manual \(MARSAME\)](#)

3. Terminology

3.1 Definitions:

3.1.1 *deactivation*—to remove a facility from service. Deactivation means the facility is placed in a safe and stable condition.

3.1.2 *decommission*—to remove a nuclear facility safely from service and reduce residual radioactivity and other hazardous materials to levels that permit release of the property or facility for unrestricted use and termination of any applicable license(s).

3.1.3 *decontamination*—those activities employed to reduce the levels of radioactive and hazardous contamination in or on structures, equipment, and materials.

3.1.4 *nuclear facility*—a facility whose operations involve (or involved) radioactive materials in such form or quantity that radiological controls are (or were) required to protect employees, the environment, or the general public.

3.1.4.1 *Discussion*—Included are facilities that are (or were) used to produce, process, use, or store radioactive materials. Some examples are nuclear reactors (power, test, or research), fuel fabrication plants, fuel reprocessing plants, uranium/thorium mills, Uranium Hexafluoride (UF-6) production and enrichment plants, research laboratories using radioactive materials, chemical processing facilities, and radioactive waste disposal sites.

3.1.5 *standby*—a condition in which a nuclear facility has been deactivated, but in such a way that it could be restarted for its original purpose.

3.1.5.1 *Discussion*—Critical systems are maintained in working order with regularly scheduled maintenance activities performed. Surveillance and Maintenance (S&M) requirements for facilities placed in standby are much more demanding than for those which are deactivated for planned decommissioning. Operations procedures are usually maintained for facilities placed in standby.

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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.

³ Available from U. S. Nuclear Regulatory Commission (NRC), One White Flint North, 11555 Rockville Pk., Rockville, MD 20852-2738, <http://www.nrc.gov>.

3.1.6 *S&M*—the act of performing periodic inspections, and related maintenance activities on facilities which have been deactivated and are awaiting the start of decommissioning.

4. Significance and Use

4.1 The purpose of this guide is to provide the user information and guidance for preparation of a plan for the surveillance and maintenance of nuclear facilities that have been deactivated and are awaiting D&D.

4.1.1 This document provides guidance for performing S&M in a way that will ensure worker and public safety, while also addressing stakeholder requirements.

4.1.2 Use of this guide helps standardize the basic requirements for S&M of nuclear facilities.

4.2 Use of this guide helps ensure that the S&M plan addresses the significant activities and actions necessary to maintain these facilities in a safe and stable condition until they can be decommissioned.

5. Key Elements in S&M Planning

5.1 One of the key elements of post-deactivation S&M planning is determining the end point condition of the facility so that S&M activities can be established to support those conditions. While performing end point planning, a review of all possible endpoints for the facility should be made. Decisions made at the initial determination of the deactivated facility may, at a much later date, be changed. Thus a review and analysis of various re-determinations of the facility end point, and the accompanying actions and data needs could prove very useful at some time in the future of the facility. The S&M plan specifies the surveillance, inspection, and maintenance of the facility in the deactivated state and should specify the locations, frequency, and manner in which they will be conducted.

5.2 Part of S&M planning is deciding which spaces must remain accessible and which equipment must be maintained operable during post deactivation and D&D activities. This may be necessary to meet commitments to stakeholders and should be agreed upon by the organization that will perform S&M activities. The post-deactivation condition of the facility will determine S&M requirements.

5.3 To avoid incompatibilities between end-point requirements and S&M costs, it is important that the S&M plan be written early in deactivation planning of the facility.

5.4 Another important reason for early preparation of the S&M plan is that people who have operated and maintained the facility have considerable knowledge in the past facility history and can assist in recommending activities to ready the facility for S&M. Thus, developing the plan should be a cooperative effort between the deactivation organization and the owner, or organization responsible for the facility.

5.5 An attempt should be made to include all identified stakeholders in the decision-making process for the facility. This should include not only S&M actions while the facility is shut down, but end point decisions with respect to the long term status and final state of the facility.

6. Prerequisites

6.1 The S&M plan covers that portion of the life of a facility between deactivation and decommissioning. Prerequisites are those activities which must be performed during deactivation.

6.2 Prior to preparing the S&M plan, the facility must be deactivated and a detailed characterization performed to identify the actual physical, radiological, chemical, and hazardous material hazards. Guidance for planning and executing characterization operations are provided in Guide E1892 for developing the plan and Guide E1893 and the NRC NUREGS for the MARSSIM, MARLAP, and MARSAME documents for measurement protocols.

6.3 All radiation safety and Occupational Safety and Health Administration (OSHA) requirements applicable to performing S&M work in the facility must be identified and hazards mitigated as necessary.

6.4 Prior to implementation of the S&M plan, any facility modifications necessary to support the plan must be completed. This may include initial decontamination for hazard mitigation.

6.5 Identify all applicable regulations and regulatory authorities associated with the facilities. Discussions with appropriate regulators should be conducted early in the development of the plan.

6.6 Performance criteria associated with S&M activities should be identified and established prior to preparing the plan. Examples of performance criteria include: length of the S&M period, estimated contaminant stability, intrusion areas, etc. The condition of the facility during the S&M phase should be specified and described.

7. Typical S&M Plan Contents

NOTE 1—The contents of an S&M plan will vary in scope and content from project to project. It should be tailored to fit the requirements of the individual project or facility and be commensurate with the hazards present. The following are brief descriptions of the contents or sections of a typical S&M plan.

7.1 *Introduction*—Describe the deactivated condition of the facility and list the buildings that are the subject of the S&M plan. Provide a sketch or photograph to indicate the scope of the facility. Indicate any unusual situations, such as portions of a building that may remain operational. State the overall objectives of the intended S&M. Indicate proximity to neighboring businesses, structures, transportation (trains, roadways, airports) and waterways.

7.2 *Purpose*—State the specific objectives of the facility surveillance and maintenance phase. Objectives can relate to contamination control, physical security, hazard isolation, preservation of economic assets, and others. The planned level of effort to conduct S&M should also be stated.

7.3 *Background*—A background section is appropriate if this information might affect the S&M plan, that is, the safety classification of the facility. It is acceptable to reference other documents to provide background information.

7.4 *Regulatory Compliance*—Describe how regulations applicable to the specific facility configuration and conditions as well as any special agreements with the State or other