OVERVIEW OF THE NRC'S CONSOLIDATED NMSS DECOMMISSIONING GUIDANCE

D. W. Schmidt, K. L. Banovac, T. L. Fredrichs, J. C. Shepherd, T. B. Smith
U.S. Nuclear Regulatory Commission
Washington, DC 20555, U.S.A.

ABSTRACT

In response to the U.S. Nuclear Regulatory Commission (NRC) Strategic Plan performance goals to (a) make NRC activities and decisions more effective, efficient, and realistic and (b) reduce unnecessary regulatory burden on stakeholders, the Office of Nuclear Material Safety and Safeguards (NMSS) consolidated and updated the policies and guidance of its decommissioning program. The product is a three-volume report (NUREG-1757) covering the functional categories of (Vol. 1) Decommissioning Process for Materials Licensees; (Vol. 2) Characterization, Survey, and Determination of Radiological Criteria; and (Vol. 3) Financial Assurance, Recordkeeping, and Timeliness.

The NRC staff reviewed existing guidance related to decommissioning and compliance with the License Termination Rule (LTR), 10 CFR 20, Subpart E. Parts of these documents have been incorporated into NUREG-1757 and some documents have been superseded. The approaches to decommissioning described in this NUREG report help to identify the information (subject matter and level of detail) needed to terminate a license. This report also incorporates the risk-informed and performance-based flexibility of NRC's LTR. This NUREG describes approaches acceptable to NRC staff. With most of the guidance for terminating materials licenses consolidated in this three-volume report, it should be easier for licensees and NRC staff to access and utilize the updated guidance. This should result in more complete and consistent submittals from licensees and more consistent and efficient reviews by NRC staff.

Volume 1 of NUREG-1757 provides guidance for developing those parts of a decommissioning plan addressing general site description and current radiological conditions; decommissioning activities, management, and quality assurance; and modifications to decommissioning programs and procedures. Volume 1 also provides guidance to NRC staff on processing decommissioning plans and related license amendment requests. Volume 1 is applicable to materials licensees (not reactors) that must terminate licenses under the LTR.

Volume 2 of the NUREG provides guidance on demonstrating compliance with the radiological criteria for license termination. Specifically, Volume 2 provides guidance on facility radiation surveys, especially final status surveys; dose assessments; and ALARA. Volume 2 is applicable to all licensees (materials and reactor facilities) that must terminate licenses under the LTR.

Volume 3 provides guidance on the technical aspects of compliance with "Timeliness in Decommissioning of Materials Facilities" (the Timeliness Rule); financial assurance requirements for decommissioning costs; and the recordkeeping requirements of the technical and financial criteria for decommissioning licensed nuclear facilities. Volume 3 is applicable to materials licensees (not reactors) that must terminate licenses under the LTR.
The paper discusses highlights of the guidance of these three volumes, including new guidance, modified guidance, and other important aspects of the guidance to be emphasized.

INTRODUCTION/BACKGROUND

As part of its redesign of the materials license program, NMSS has consolidated and updated numerous decommissioning guidance documents into a three-volume NUREG report, NUREG-1757, *Consolidated NMSS Decommissioning Guidance* [1, 2, 3]. NUREG-1757 provides guidance for planning and implementing license termination under the License Termination Rule (10 CFR Part 20, Subpart E) (LTR). The NUREG report addresses compliance with the radiological criteria for license termination of the LTR, and it incorporates the risk-informed and performance-based alternatives of the rule. The NUREG also provides guidance for compliance with the requirements for financial assurance and recordkeeping for decommissioning, and timeliness in decommissioning of materials facilities.

The objectives of the consolidation effort were to consolidate existing guidance into a single (three-volume) document, to update the guidance as needed, and to make the guidance more risk-informed and performance-based. More than 80 documents were evaluated in developing the consolidated guidance. Each volume of NUREG-1757 was published as a draft for public comment; comments were addressed in developing the final volumes. The final volumes were published in September 2003, and are available on the NRC web page, at URL: http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1757/. The NRC staff intends to update the consolidated guidance periodically.

NUREG-1757 updates and builds upon the risk-informed approach used in the NMSS Decommissioning Handbook (NUREG/BR-0241, *NMSS Handbook for Decommissioning Fuel Cycle and Materials Facilities*, March 1997) [4] and the *NMSS Decommissioning Standard Review Plan*, NUREG-1727, September 2000 (the Decommissioning SRP) [5]. NUREG-1757 describes and makes available to the public: (1) methods acceptable to the NRC staff in implementing specific parts of the Commission's regulations; (2) techniques and criteria used by the staff in evaluating decommissioning actions; and (3) guidance to licensees responsible for decommissioning NRC-licensed sites. The three volumes of NUREG-1757 supersede NUREG/BR-0241 and NUREG-1727 in their entirety and should be used as the primary guidance for decommissioning.

While NUREG-1757 is intended for use by applicants, licensees, and NRC license reviewers, it also is available to Agreement State staff, the public, and other stakeholders. NRC staff will use the policies and procedures discussed in NUREG-1757 to evaluate a licensee's decommissioning actions, financial assurance and recordkeeping for decommissioning, and timeliness in decommissioning. NUREG-1757 is not a substitute for regulations, and compliance with it is not required. Methods and solutions different from those in NUREG-1757 will be acceptable, if they provide an adequate basis for concluding that the decommissioning actions are in compliance with the Commission's regulations.

SUMMARY OF CONSOLIDATED DECOMMISSIONING GUIDANCE

Table I summarizes by volume of NUREG-1757: (1) the guidance provided; (2) the licensees to which the guidance applies; and (3) the licensee submittals to which the guidance applies.

Table I Contents and applicability of NUREG-1757

Volume	Subject	Licensees to which the guidan applies:	Licensee submittals to which the guidan applies:
1	Decommissioning Proce for Materials Licensees	fuel cycle, fuel storage, a materials licensees	decommissioning license amendme requests, decommissioning plans, a related compliance documents
2	Characterization, Surve and Determination Radiological Criteria	all licensees that must termina licenses under the LTR (fu cycle, fuel storage, materia and reactor licensees)	decommissioning license amendme requests, decommissioning plans, licen termination plans, and related complian documents
3	Financial Assuranc Recordkeeping, a Timeliness	fuel cycle, fuel storage, a materials licensees	Decommissioning funding plans a financial instruments, recordkeeping plar decommissioning license amendme requests, decommissioning plans, a related compliance documents

Volume 1, Revision 1

In September 2002, NRC announced the availability of final NUREG-1757, Volume 1. In order to ensure consistency between all three volumes of NUREG-1757 and to provide the most recent regulatory guidance available, the NRC staff decided that republication of Volume 1, as Revision 1 [1], was appropriate. Revision 1 was developed concurrently with the finalization of Volumes 2 and 3 of NUREG-1757.

Volume 1, Revision 1 provides guidance to materials licensees for developing those parts of a decommissioning plan addressing: general site description and current radiological conditions; decommissioning activities, management, and quality assurance; and modifications to decommissioning programs and procedures.

Volume 2

Volume 2 of NUREG-1757 [2] (hereinafter, Volume 2), provides guidance to materials and reactor licensees for demonstrating compliance with the LTR, on issues related to facility radiation surveys, especially final status surveys; dose assessments; and demonstrations that residual radioactivity levels are as low as is reasonably achievable (ALARA).

Volume 3

Volume 3 of NUREG-1757 [3] (hereinafter referred to as Volume 3), provides guidance to materials licensees for demonstrating compliance with the financial assurance, recordkeeping, and timeliness requirements for decommissioning materials facilities.

Superseded Documents

In the process of consolidating and updating previous guidance to develop NUREG-1757, the NRC staff identified documents that were obsolete, or that are fully consolidated into NUREG-1757. These documents, listed in Table II, are considered superseded and should no longer be used by licensees and NRC staff for new submittals and reviews.

Table II Documents superseded by NUREG-1757

Document Identification	Title	Date
RG 3.65	Standard Format and Content, Decommissioning Plans for License Under 10 CFR Parts 30, 40, and 70	06/1989
RG 3.66	Standard Format and Content of Financial Assurance Mechanisr Required for Decommissioning Under 10 CFR Parts 30, 40, 70, and 7	06/1990
P&GD FC 90-2	Standard Review Plan for Evaluating Compliance wi Decommissioning Requirements for Source, Byproduct, and Speci Nuclear Material License Applications	04/1991
P&GD FC 91-2	Standard Review Plan: Evaluating Decommissioning Plans f Licensees Under 10 CFR Parts 30, 40, and 70	08/1991
P&GD FC 83-3	Standard Review Plan for Termination of Special Nuclear Materi Licenses of Fuel Cycle Facilities	03/1983
NRC Memorandum	Draft Staff Guidance for Dose Modeling of Proposed Partial Si Releases	09/28/2001
BTP	Draft Branch Technical Position on Site Characterization f Decommissioning	11/1994
NUREG–1500	Working Draft Regulatory Guide on Release Criteria f Decommissioning: NRC Staff's Draft for Comment	08/1994
NUREG/CR–5849	Manual for Conducting Radiological Surveys in Support of Licen Termination	06/1992
NUREG/BR–0241	NMSS Handbook for Decommissioning Fuel Cycle and Materia Facilities	03/1997
NUREG–1727	NMSS Decommissioning Standard Review Plan	09/2000

Notes: RG = Regulatory Guide, P&GD = Policy and Guidance Directive, BTP = Branch Technical Position, a NUREG = NRC staff and contractor reports.

HIGHLIGHTS OF CONSOLIDATED DECOMMISSIONING GUIDANCE

The primary, previously existing guidance for decommissioning was the Decommissioning Handbook [4] and the Decommissioning SRP [5]. Much of that guidance, especially from the SRP, has been consolidated into NUREG-1757

relatively unchanged. However, there are several key changes and additions to the previously existing guidance, that are provided in NUREG-1757. Table III summarizes the more significant changes and additions to decommissioning guidance. The following sections of this paper then describe these changes in more detail.

Table III Key changes and additions to decommissioning guidance

Addition or Revision to Guidance (Type of Change)	**Location NUREG-1757**
Decommissioning process described for seven decommissioning groups (revised)	Vol. 1, Ch. 1.3, and Ch. 7–14
EPA/NRC Memorandum of Understanding (new)	Vol. 1, App. H
Disposition of solid materials (new)	Vol. 1, Ch. 15.11
NRC staff actions to comply with National Environmental Policy Act (revisions)	Vol. 1, Ch. 15.7
Flexibility in compliance with license termination criteria (emphasis added)	Vol. 2, Ch. 2
Dose assessment methodology for buried material (new)	Vol. 2, App. J
Dose modeling for partial site releases (new)	Vol. 2, App. K and L
Evaluating alternative exposure scenarios (new)	Vol. 2, App. M
Simplified final status surveys (new)	Vol. 2, App. B
Double sampling for final status surveys (new)	Vol. 2, App. C
Reviews of final status survey reports, for NRC staff (expanded)	Vol. 2, Ch. 4.5.3
Insignificant radionuclides and pathways (revised)	Vol. 2, Ch. 3.3
Characterization of ground and surface waters (updated and revised)	Vol. 2, App. F
Decommissioning lessons learned and questions and answers (new)	Vol. 2, App. O
Certification of financial assurance (clarified)	Vol. 3, App. A.2
Procedures for drawing on financial assurance instruments and for approvi disbursements from decommissioning funds (new)	Vol. 3, Ch. 6 and 7
Applicability of decommissioning timeliness requirements to onsite disposals (clarifie emphasized)	Vol. 3, Ch. 2.4
Recordkeeping (compiled)	Vol. 3, Ch. 3
Other clarifications (revisions)	All volumes

Decommissioning Process Described for Seven Decommissioning Groups

Volume 1, Revision 1 includes a description of the decommissioning process for seven groups of facilities (see Chapter 7 of Volume 1). In the past, NRC staff classified facilities undergoing decommissioning by either the activities performed during the operation of the facilities or the types of licensed material possessed by the licensee. In NUREG-1757, the staff classified decommissioning facilities into seven groups, based on amount of residual radioactivity, location of that material, complexity of the remediation activities needed to decommission the site, and methods the licensee will use to demonstrate compliance with the LTR (e.g., screening criteria or site-specific modeling; unrestricted or restricted release). The decommissioning groups are primarily intended for use by NRC staff, to ensure the appropriate actions are performed to complete decommissioning and license termination. Detailed descriptions of the groups and associated licensing actions are provided in Chapters 8–14 of Volume 1.

EPA/NRC Memorandum of Understanding

The NRC and the U.S. Environmental Protection Agency (EPA) entered into a Memorandum of Understanding (MOU) on "Consultation and Finality on Decommissioning and Decontamination of Contaminated Sites," on October 9, 2002. It is intended that the MOU will result in consistent communications between the Federal agencies, reduce dual regulation, and help ensure decommissioning is completed efficiently. Under the MOU, EPA agreed to continue its Comprehensive Environmental Response, Compensation, and Liability Act deferral policy of not listing sites on the National Priorities List that are subject to NRC's licensing authority. The MOU provides that, unless an NRC-licensed site exceeds any of three trigger criteria contained in the MOU, EPA agrees to a policy of deferral to NRC decision-making on decommissioning without the need for consultation. The three criteria provided in the MOU are: (1) radioactive ground-water contamination above EPA's Maximum Contaminant Levels; (2) radioactive soil concentrations exceeding the values provided in Table I of the MOU; and (3) license termination under either the

restricted release or alternate criteria provisions of 10 CFR Part 20, Subpart E. For NRC sites that meet any of the above criteria, NRC will consult with EPA. As of November 2003, NRC is working to implement the MOU and initiate this consultation process. Volume 1 includes the MOU (Appendix H) and advises the staff that if the site meets one of the criteria of the MOU, consultation with EPA is needed for the site. The MOU does not impose any requirements on licensees; the requirements are only on NRC staff to consult with EPA. Note that NRC termination of licenses that are in compliance with criteria in Part 20 Subpart E is fully protective of public health and safety. NRC will *not* require licensees to remediate beyond NRC-approved levels in order to achieve the MOU trigger values.

Disposition of Solid Materials

Since existing NRC regulations do not contain generally applicable standards for the disposition of solid materials with relatively small amounts of radioactivity in, or on, materials and equipment, the disposition of solid materials continues to be evaluated on a case-by-case basis using existing guidance. Section 15.11 of Volume 1 consolidates the current guidance, which was provided to the staff through several staff memoranda, regarding case-specific licensing decisions on controlled release of solid materials from licensed facilities. The guidance addresses (1) retrospective and prospective cases involving soil disposition and (2) case-specific licensing decisions on disposition of concrete.

The NRC staff currently is working on rulemaking to address the disposition of solid materials. In the interim, the NRC staff will continue its current policy of evaluating new (i.e., not previously approved) proposed dispositions of solid materials on a case-by-case basis, and licensees are encouraged to discuss such proposals with their NRC project manager. Previously approved methods and criteria for disposition of solid materials are not affected.

National Environmental Policy Act Compliance

To comply with the National Environmental Policy Act (NEPA), NRC staff actions for decommissioning include preparation of an Environmental Assessment (EA) or Environmental Impact Statements (EIS), as appropriate. In some cases, a categorical exclusion may apply and no EA or EIS is required. The NRC staff recently published, in NUREG-1748 [6], final guidance for environmental reviews for licensing actions for materials licensees, including for decommissioning actions. Based on NUREG-1748, Section 15.7 of Volume 1 of NUREG-1757 summarizes the latest guidance for NRC staff compliance with NEPA requirements.

Flexibility in Demonstrating Compliance with License Termination Criteria

The radiological license termination criteria (dose criteria) of 10 CFR Part 20, Subpart E, are performance criteria. A benefit of the performance criteria is the flexibility in approaches available to demonstrate compliance with the criteria. In Volume 2 of NUREG-1757, the NRC staff has taken a risk-informed, performance-based approach to demonstrations of compliance with the license termination criteria. As part of this risk-informed, performance-based approach, Chapter 2 of Volume 2 emphasizes the flexibility that is available to licensees in demonstrating compliance with the license termination criteria. Some of the compliance flexibility includes: (1) allowance for licensees to provide decommissioning plans (or license termination plans) that commit to a methodology to develop certain details later; (2) potential use of characterization data for the final status surveys; (3) choice of the null hypothesis for the final status survey, to demonstrate that either the concentrations are below an acceptable level or that radioactivity is indistinguishable from background; (4) demonstration of compliance with radiological criteria by dose assessment methods, or by development of derived concentration guidelines and final status surveys; (5) compliance based on screening assessments or on site-specific assessments; and (6) use of a sum of fractions approach or a more precise dose assessment approach for addressing mixtures of radionuclides.

Dose Assessment Methodology for Buried Material

The NRC staff developed a methodology for assessing potential doses from buried materials, including from previously authorized burials. The methodology provides a relatively simple approach that can be considered for many situations of buried material. This approach considers a scenario where, at some time in the future, an "intruder" constructs a house above the material, involving excavation of some of the buried material (to build a basement) and spreading of that material around the new house. If under this scenario the facility meets the license termination criteria, removal of

the buried material may not be needed. Appendix J of Volume 2 describes in detail this methodology for assessing buried material.

Partial Site Releases

Partial site release is a situation where a licensee releases a portion of its site for unrestricted use prior to terminating the entire license. The licensee should demonstrate that the residual radioactivity at the time of unrestricted release of the specific (partial site) area meets the dose criteria. In addition, at the time of final license termination, the residual radioactivity of the specific, previously released area should be taken into account to demonstrate that the entire site meets the appropriate release criteria. Appendices K and L of Volume 2 provide guidance for identifying and accounting for potential dose contributions from partial site releases.

Evaluating Alternative Exposure Scenarios for Contaminated Lands

For sites with residual radioactivity in land and water, a residential farmer scenario is used as a default screening exposure scenario for dose assessment for compliance with the license termination criteria. However, there are many cases for which use of this default (residential farmer) scenario is unrealistic and could result in potentially unnecessary remediation. In these cases, licensees may develop more realistic exposure scenarios. Appendix M of Volume 2 describes a process for eliminating pathways from the residential farmer scenario to develop a more realistic scenario, and describes the associated information needed to justify such changes.

Simplified Final Status Surveys

There are a large number of licensees with relatively simple decommissioning, for which complex final status survey methods may not be necessary. Some of these licensees may use a simplified method to demonstrate regulatory compliance for decommissioning. Appendix B of Volume 2 describes two simplified approaches that may be used for some licensees in Decommissioning Groups 1–3, as well as the conditions under which the methods may be used. These simplified methods are more prescriptive than the flexible methods of the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) [7], but will generally require less effort in survey design.

Double Sampling for Final Status Surveys

There are some situations in final status surveys when it may be desirable for a licensee to sample a survey unit a second time to determine compliance. The term double sampling refers to the case when the survey design is a one-stage design, but allowance is made for a second set of samples to be taken if the retrospective power of the test using the first set of samples does not meet the design objectives. Such allowance should be mentioned specifically in preparing the Data Quality Objectives for the final status survey and should be approved in advance of any sampling and analysis. Appendix C of Volume 2 provides a discussion of technical issues related to double sampling, and provides guidance for use of double sampling methods.

NRC Staff Reviews of Final Status Survey Reports

The Decommissioning SRP included limited guidance for NRC staff to use in reviewing final status survey reports (FSSRs) submitted by licensees. This guidance has been expanded in NUREG-1757. The guidance now addresses: (1) information that should be submitted by licensees in the FSSR; (2) minimal technical reviews that should be performed by NRC staff for all survey units in FSSRs; and (3) considerations for performing detailed reviews for survey units with more risk significance. The guidance is provided in Section 4.5.3 of Volume 2.

Insignificant Radionuclides and Pathways

The Decommissioning SRP provided guidance on conditions under which radionuclides could be considered insignificant and eliminated from further consideration. This guidance has been clarified and expanded in NUREG-1757, to address insignificant radionuclides and exposure pathways. Insignificant means that the radionuclide

or pathway contributes less than 10 percent of the applicable dose criteria (e.g., 10 percent of the 25 mrem/y criterion). Licensees may eliminate insignificant radionuclides and exposure pathways from further detailed consideration. However, the dose from the insignificant radionuclides and pathways must be accounted for in demonstrating compliance with the applicable dose criteria. The revised guidance is found in Section 3.3 of Volume 2.

Characterization of Ground Water and Surface Water

If contaminated surface water or ground water is identified at a facility, the screening derived concentration guideline levels for soil are inappropriate for use, since they are based on initially uncontaminated surface water and ground water. Thus, characterization of surface water and ground water can be an essential component of the dose modeling used to demonstrate compliance with the license termination criteria. The NRC's guidance on characterization of ground water and surface water has been consolidated, and revised and updated. The guidance is given in Appendix F of Volume 2.

Decommissioning Lessons Learned and Questions and Answers

The NUREG-1757 consolidates information developed in related efforts to clarify existing guidance associated with the LTR. Specifically, Appendix O of Volume 2 provides (a) questions and answers that were developed by a joint task force of NRC and Nuclear Energy Institute staff; (b) lessons learned by NRC staff during the review of recently submitted decommissioning plans and license termination plans; and (c) lessons learned from decommissioning final status survey inspections and confirmatory surveys.

Certification of Financial Assurance

NUREG-1757 has been clarified to state that all licensees required to provide financial assurance under 10 CFR Parts 30, 40, and 70 must submit a Certification of Financial Assurance. In addition, the term "prescribed amount" has been used instead of the previous term, "certification amount." The guidance on certification of financial amounts is provided in Appendix A of Volume 3.

Procedures for Drawing on Financial Assurance Instruments and for Approving Disbursements from Decommissioning Funds

Guidance to NRC staff on drawing money from financial assurance instruments was consolidated into NUREG-1757 (Chapter 6 of Volume 3) from other NRC guidance. New guidance on approving disbursements from decommissioning funds has been added to NUREG-1757 (Chapter 7). These topics are intended primarily for NRC staff.

Applicability of Decommissioning Timeliness Requirements to Onsite Disposals

"Timeliness in Decommissioning of Material Facilities" (known hereafter as the Timeliness Rule) established criteria for timely decommissioning upon termination of operations, by amending 10 CFR Parts 2, 30, 40, 70, and 72. The Timeliness Rule establishes requirements for notifying NRC of pending decommissioning actions and cessations in licensee operations, establishes requirements for when decommissioning plans (DPs) need to be submitted, and establishes requirements for completing decommissioning activities.

The Timeliness Rule includes requirements pertaining to outdoor areas that have been unused for a period of 24 months at facilities licensed under 10 CFR Parts 30, 40, and 70. Guidance in NUREG-1757 reiterates previous guidance that outdoor areas include areas where disposals were made pursuant to former 10 CFR 20.304 and 20.302, and current 10 CFR 20.2002. Licensee may be required to assess the dose consequences of onsite burials in order to determine whether the area is suitable for release in accordance with 10 CFR Part 20, Subpart E. This assessment would determine if further provisions of the Timeliness Rule would be applicable. Note that outdoor areas where radioactive materials were used that currently meet NRC's criteria for unrestricted use are not subject to the notification requirements of the Timeliness Rule. Applicability of Timeliness Rule requirements to onsite diposal areas is discussed in Section 2.4 of Volume 3.

Recordkeeping Guidance

The decommissioning SRP did not include guidance on recordkeeping responsibilities. NUREG-1757 provides consolidated guidance on (1) recordkeeping requirements during licensed operations, (2) recordkeeping information for decommissioning plans, (3) records disposition requirements at license termination or transfer, and (4) requirements for NRC staff for records retention. This guidance is provided in Chaper 3 of Volume 3.

NEXT STEPS FOR NRC DECOMMISSIONING GUIDANCE

The NRC staff recently analyzed issues associated with implementing the License Termination Rule. As a result, the NRC staff will pursue changes to decommissioning guidance to (1) support future rulemaking for measures to prevent future legacy sites (changes to financial assurance and licensee operations); (2) clarify issues of license termination under restricted use criteria; (3) clarify issues related to onsite burials; and (4) further address realistic exposure scenarios. These guidance development efforts are scheduled to occur in fiscal years 2005–2007.

CONCLUSION

Highlights of the recently consolidated decommissioning guidance of NUREG-1757 have been described, including areas of new or revised guidance, and other areas deserving emphasis. Licensees should use the guidance in preparing decommissioning plans, license termination plans, final status surveys, and other technical decommissioning reports for submittal to NRC. NRC staff will use the guidance in reviewing these documents and related license amendment requests. With most of the guidance for terminating materials licenses consolidated in this three-volume report, it should be easier for licensees and NRC staff to access and utilize decommissioning guidance. This should result in more complete and consistent submittals from licensees and more consistent and efficient reviews by NRC staff.

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5 *NMSS Decommissioning Standard Review Plan*, NUREG-1727, U.S. Nuclear Regulatory Commission (2000).

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