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STATUS OF THE NRC'S DECOMMISSIONING PROGRAM

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ABSTRACT

On July 21, 1997, the U.S. Nuclear Regulatory Commission published the final rule on Radiological Criteria for License Termination (the License Termination Rule) as Subpart E to 10 CFR Part 20. NRC regulations require that materials licensees submit Decommissioning Plans to support the decommissioning of its facility if it is required by license condition, or if the procedures and activities necessary to carry out the decommissioning have not been approved by NRC and these procedures could increase the potential health and safety impacts to the workers or the public. NRC regulations also require that reactor licensees submit Post-shutdown Decommissioning Activities Reports and License Termination Plans to support the decommissioning of nuclear power facilities. This paper provides an update on the status of the NRC's decommissioning program. It discusses the status of permanently shut-down commercial power reactors, complex decommissioning sites, and sites listed in the Site Decommissioning Management Plan. The paper provides the status of various tools and guidance the NRC is developing to assist licensees during decommissioning, including a Standard Review Plan for evaluating plans and information submitted by licensees to support the decommissioning of nuclear facilities and the DandD Screen software for determining the potential doses from residual radioactivity. Finally, it discusses the status of the staff's current efforts to streamline the decommissioning process.

INTRODUCTION

U.S. Nuclear Regulatory Commission (NRC) regulations at 10 CFR Parts 30, 40, 70, and 72 require that a Decommissioning Plan (DP) be submitted by a materials licensee to support the decommissioning of its facility when it is required by license condition, or if the procedures and activities necessary to carry out the decommissioning have not been approved by NRC and these procedures could increase the potential health and safety impacts to the workers or the public. The objective of the decommissioning plan is to describe the activities and procedures that the licensee intends to undertake to remove residual radioactive material at the facility to levels that meet NRC criteria for release of the site and termination of the radioactive materials license.

NRC regulations at 10 CFR Part 50 require that, prior to, or within 2 years following permanent cessation of operations, reactor licensees provide NRC with a post-shutdown decommissioning activities report (PSDAR). The purpose of the PSDAR is to provide NRC and the public with a

general overview of the proposed decommissioning activities. 10 CFR Part 50 also requires that nuclear power reactor licensees submit a License Termination Plan (LTP) at least 2 years before termination of the license. The purpose of the LTP is to describe the radiological condition of the site, provide a dose assessment for the site, identify the remaining decommissioning activities, and provide the final survey plan for the site. NRC regulations at 10 CFR Part 20, Subpart E(1) describe the criteria for the release of sites for unrestricted and restricted use and is applicable to all NRC licensees.

BACKGROUND

"Decommission" is defined in NRC's regulations at 10 CFR 20.1003 as "to remove a facility or site safely from service and reduce residual radioactivity to a level that permits 1) release of the property for unrestricted use and termination of the license; or, 2) release of the property under restricted conditions and the termination of the license (2).

NRC's decommissioning program encompasses the decommissioning of all NRC licensed facilities, ranging from routine license terminations for sealed source users, to the oversight of complex sites and those on the Site Decommissioning Management Plan (SDMP), as well as power and non-power reactors. Approximately 300 materials licenses are terminated each year. Most of these license terminations are routine and the sites require little, if any, remediation to meet the NRC's unrestricted release criteria. However, a number of SDMP sites are expected to request license termination under the restricted-use provisions of 10 CFR 20.1403 (3), while others present complex technical and policy challenges which will require large expenditures of staff resources. For example, for many sites, site-specific dose assessments, including complex groundwater modeling, will be required, while at others requesting release with restrictions on future site use, "durable institutional controls," as specified in 10 CFR 20.1403(e), will need to be provided to ensure protection of the public health and safety.

Decommissioning program activities include: (1) developing regulations and guidance to assist staff and the regulated community; (2) conducting research to develop data, techniques, and models used to assess public exposure from the release of radioactive material resulting from site decommissioning; (3) reviewing and approving decommissioning plans and license termination plans; (4) reviewing and approving license amendment requests; (5) inspecting licensed and non-licensed facilities undergoing decommissioning; (6) developing environmental assessments (EAs) and environmental impact statements (EISs) to support the NRC's reviews of DPs and LTPs; (7) reviewing and approving final site survey reports; and (8) conducting confirmatory surveys.

The NRC's decommissioning program is administered through NRC's Offices of Nuclear Material Safety and Safeguards (NMSS), Nuclear Reactor Regulation (NRR), and Nuclear Regulatory Research (RES), as well each of the NRC's Regional offices. Because of the cross-Agency nature of the decommissioning program, the staff has instituted several initiatives to ensure that decommissioning activities are integrated and coordinated within the Agency, including tracking decommissioning

activities in the Agency Operating Plan and providing management oversight and coordination of decommissioning activities, policies and efforts through the Decommissioning Management Board.

POWER REACTOR DECOMMISSIONING

NMSS and NRR signed a Memorandum of Understanding (MOU) on March 10, 1995, which delineates the transfer of responsibilities for power reactor decommissioning from NRR to NMSS. In accordance with the MOU, NRR will be responsible for regulatory project management, oversight, and inspection support for a reactor undergoing decommissioning until all spent fuel is permanently transferred from the spent fuel pool. After the spent fuel is permanently transferred from the spent fuel pool, NMSS assumes responsibility for project management and oversight. The MOU gives NMSS responsibility for LTPs, and preparing related safety evaluation reports, environmental assessments and license termination orders or amendments. NMSS is also responsible for confirmatory surveys and license termination activities, including assurance that appropriate site release criteria have been met.

Two power reactors (Shoreham and Ft. Saint Vrain) have been decommissioned and their licenses have been terminated. Currently, NRR has regulatory project management responsibility for 17 power reactors. The licensees have submitted PSDARs for these power reactors. Regulatory project management responsibility for two power reactors (Fermi 1 and Peach Bottom Unit 1) has been transferred from NRR to NMSS. NMSS staff is currently reviewing the LTPs for the Trojan, Saxton, Maine Yankee, and Connecticut Yankee facilities.

SDMP AND COMPLEX SITES

NRC created the SDMP in March 1990 in an effort to develop a comprehensive strategy for achieving closure of decommissioning issues in a timely manner, and to develop a list of contaminated sites in order of cleanup priority. The major objectives of the SDMP are to identify and manage specific problem sites through the decommissioning process and to resolve decommissioning policy issues. The original criteria used by the staff for placing sites on the SDMP were: (1) problems with the financial viability of responsible parties or organizations; (2) the presence of large volumes of contaminated soil, sludge, or slag, or onsite burials; (3) long-term presence of contamination in unused facility buildings; (4) previously terminated license that exceeded the existing unrestricted release criteria; and (5) contamination or potential contamination of groundwater from on-site waste.

10 CFR Part 20, Subpart E authorizes two different sets of cleanup criteria for SDMP sites, namely the SDMP Action Plan criteria, and dose-based criteria. Under the provisions of 10 CFR 20.1401(b) (4), any licensee that submitted its DP before August 20, 1998, and received NRC approval of that DP before August 20, 1999, could use the SDMP Action Plan criteria for site remediation. In July 1999(5), the Commission granted an extension of the DP approval deadline to August 20, 2000. All other sites must use the dose-based criteria in 10 CFR 20, Subpart E.

There are currently 27 SDMP and complex decommissioning site undergoing decommissioning. Twenty-two sites have been removed from the SDMP after successful remediation. In addition, 11 sites have been removed from the SDMP by transfer to an Agreement State or the U.S. Environmental Protection Agency. NRC is currently committed to removing one site from the SDMP in fiscal years 2001 and 2002. However, it is possible that as many as 11 current SDMP sites may be transferred to Agreement States (Minnesota-1, Pennsylvania-10) in or before 2002.

In the context of a comprehensive decommissioning program, the SDMP has become a management tool to track site-specific progress at complex decommissioning sites. In the future, adding a new site to the SDMP will not necessarily indicate that the site is a "problem" site. Current criteria for listing a site on the SDMP are: (1) all restricted-use sites; and (2) complex unrestricted-use sites that require: (a) detailed site-specific dose modeling; (b) sites subject to heightened public, State, or Congressional interest; and/or (c) sites with questionable financial viability.

In addition to regulating the cleanup of SDMP and complex decommissioning sites, the decommissioning program is responsible for overseeing the cleanup of contaminated sites identified under the Oak Ridge National Laboratory (ORNL) Terminated License Review Project. As a result of the ORNL review, and subsequent follow-up by the Regions, a total of 38 formerly licensed sites were found to have residual contamination levels exceeding NRC's criteria for unrestricted release. Seventeen of these sites have been re-released after successful remediation, and 11 have been closed by transfer to Agreement States or a Federal entity. Ten sites remain open (6 pending remediation and 4 under Regional review). Two of the formerly licensed sites were added to the SDMP because these sites will require non-routine decommissioning activities. The remaining sites are considered to be non-complex and, therefore, do not warrant placement on the SDMP at this time. However, it is possible that these sites may be added to the SDMP if site conditions change. The staff continues to work toward completing the review of all remaining ORNL identified sites and expects to complete this effort in 2001.

GUIDANCE DEVELOPMENT

In July 1998, the Commission directed the staff to prepare various guidance documents in support of the "Final Rule on Radiological Criteria for License Termination."(6) As a result, the staff has developed, and is in the process of developing, several guidance documents that will help licensees prepare decommissioning documents, and provide the staff with uniform criteria for reviewing licensee submittals. This guidance is summarized below.

Standard Review Plan

The NRC staff published NUREG-1727 "NMSS Decommissioning Standard Review Plan"(7) in September 2000 for use by NRC in reviewing and evaluating plans and information submitted by licensees to support the decommissioning of nuclear facilities. The SRP allows NRC staff to evaluate

information submitted by licensees in a timely, efficient and consistent manner, to determine if the decommissioning can be conducted such that the public health and safety are protected and the facility can be released in accordance with NRC's requirements. It provides NRC staff with a description of the contents of specific decommissioning plan modules, as well as evaluation and acceptance criteria for use in reviewing decommissioning plans and other information submitted by licensees to demonstrate that their facility is suitable for release in accordance with NRC requirements. The SRP supersedes and consolidates numerous Regulatory Guides, Policy and Guidance Directive and interim guidance, such as:

- Regulatory Guide 3.65, "Standard Format and Content of Decommissioning Plans for Licensees under 10 CFR Parts 30, 40, and 70"(8);

- Policy Regulatory Guide 3.66 "Standard Format and Content of Financial Assurance Mechanisms Required for Decommissioning under 10 CFR Parts 30, 40, 70, and 72" (9);

- Policy and Guidance Directive FC 91-2, "Standard Review Plan: Evaluating Decommissioning Plans for Licensees under Parts 30, 40, and 70"(10); and,

- Draft Regulatory Guide DG-4006, "Demonstrating Compliance with the Radiological Criteria for License Termination (11)."

Note that a comprehensive list of guidance that is superceded by the SRP in included in the "Introduction" section of the SRP.

LTP and PSDAR Guidance

The staff has also developed several guidance documents to provide the staff and licensees with criteria for staff reviews of decommissioning documents for reactor facilities. Regulatory Guide 1.184 "Decommissioning of Nuclear Power Reactors"(12) was published in July 2000. This guidance provides an overview of the decommissioning process for nuclear power reactors and describes methods and procedures that are acceptable to the NRC staff for implementing the NRC's requirements that relate to the initial activities and major phases of the decommissioning process.

Regulatory Guide 1.185 "Standard Format and Content for Post-Shutdown Decommissioning Activities Report"(13) was published in July 2000. It identifies the type of information that should be included in the PSDAR and establishes the format that is acceptable to the NRC staff.

NUREG-1700 "Standard Review Plan for Evaluating Nuclear Power Reactor License Termination Plans was published in April 2000(14). The goal of the Standard Review Plan (SRP) is to ensure

quality and uniformity in NRC staff reviews of LTPs. Interested parties can use the SRP for conducting their own reviews or in developing their LTP.

DandD Screening Code

The DandD Screen software provides a user-friendly, generally automated interface to NRC's dose assessment and screening methodology for site assessment against the Radiological Criteria for License Termination Rule in 10 CFR Part 20 Subpart E. DandD Screen assists NRC licensees who have requested termination of their license and who, in some cases, must decontaminate lands and structures as part of the decommissioning process by allowing licensees to translate residual radioactive contamination levels at their site into total effective dose equivalent (TEDE) by analyzing and modeling the set of NRC-prescribed scenarios of future land-use. DandD contains models of the transport and exposure pathways associated with each of the scenarios, requiring only information on source concentration from the user. Using DandD, and within the context of the decision methodology described in draft NUREG-1549 (15), the user may supply site-specific parameter values if available and defensible, may modify or eliminate pathways, and may propose alternative critical groups and/or scenarios. Version 1 of the code has been available for use by the regulated community since 1999. Version 2 of the DandD Screen which will allow a Monte Carlo analysis of potential doses. Staff is also developing probabalistic distributions for the parameters in the RESRAD dose modeling code. Version 2 of the code and the probabalistic distributions should be available in late 2000.

Staff has also developed, using the DandD Screen code, modified to reduce the inherent conservatism in a few of the default parameters in the code, concentrations of radionuclides on surfaces and in surface soil that may be used by licensees that do not wish to develop these values using the DandD Screen code. These values were published in the in the Federal Register on November 18, 1998 (63 FR 64132)(16) and December 7, 1999 (64 FR 68395)(17), respectively.

RULEMAKING ACTIVITIES

In June 1999, the Commission recommended that the risk posed by spent fuel pools at decommissioning reactors be assessed and the results of the risk assessments be used as a technical basis for developing an integrated approach to decommissioning reactor rulemaking in the areas of emergency planning, insurance, safeguards, operator staffing and backfit (SECY-99-168)(18). In December 1999 the Commission approved the staff's development of an integrated rulemaking plan for decommissioning regulations (SRM on SECY 99-168)(19). A draft technical study on spent fuel pool risks at decommissioning reactors was issued for public comment on February 15, 2000(20). A rulemaking plan for the integrated rulemaking topics was submitted to the Commission on June 28, 2000, SECY-00-145; Integrated Rulemaking Plan for Nuclear Power Plant Decommissioning. Comments on the draft technical study were submitted by industry and public representatives and by the NRC Advisory Committee on Reactor Safeguards. Significant changes were made to the report to address these comments. Due to the evolving nature of the risk study, the Commission returned the

Integrated Rulemaking Plan to the staff for re-submittal after the risk study was finalized. This final study is expected to be issued by October 31, 2000. The staff intends to submit its decommissioning rulemaking plans to the Commission about three months after the risk study is finalized.

On April 26, 2000, the Commission approved a rulemaking plan (SECY-00-0023)(21) to standardize the process for allowing a licensee to release part of its reactor facility or site for unrestricted use before receiving NRC approval of its LTP. A generic communication is being issued to inform licensees of the rulemaking, and to provide the staff's plans for handling requests for partial site releases on a case-by-case basis until the rulemaking is completed.

REBASELINING THE DECOMMISSIONING PROGRAM

Because the remaining SDMP and complex sites are expected to require larger staff resources than previously removed sites, in September 1999 the staff undertook an initiative to add more efficiency and effectiveness to the decommissioning process. The staff intends to use this "rebaselining" to establish and manage priorities and schedules for each of the remaining SDMP and complex sites.

The rebaselining initiative began with several key activities including: (1) updating and assessing the current status of each SDMP and complex decommissioning site; (2) developing comprehensive integrated plans for addressing major milestones for each SDMP, power reactor LTP, and complex decommissioning site; and (3) developing and implementing realistic schedules for each SDMP, power reactor, and complex decommissioning site to either successfully bring the sites to closure, or to establish priorities for effective and efficient use of staff resources.

In addition, as part of the rebaselining process, the staff sought to improve efficiency by participation in the overall Agency effort to streamline licensing procedures and continued implementation of the Integrated Licensing and Inspection Program (ILIP). The streamlined licensing process is intended to facilitate staff reviews and licensing decisions in accordance with defined and agreed-upon schedules. In addition, the SRPs and other guidance discussed above should significantly increase staff efficiency in reviewing and approving decommissioning documents, as well as the improving the quality of documents submitted by licensees to support decommissioning activities.

The staff developed the ILIP in 1997. The ILIP assures that resources for decommissioning activities are prioritized and that licensing and inspections activities are properly coordinated. The staff believes that staff resources required for decommissioning of SDMP sites and power reactors can be significantly reduced through the streamlining process and ILIP.

In addition to the staff's rebaslining initiatives, the staff is developing an integrated Communication Plan to ensure that all decommissioning stakeholders are aware of the staff's activities and are afforded the opportunity to participate in the decommissioning process. The plan will include specific strategies to increase public participation in the regulatory process, communicate more clearly with stakeholders,

enhance NRC's accountability and credibility and foster an environment where safety issues can be identified without fear of retribution. Development and implementation of this plan is one of the mechanisms the NRC staff is using to achieve the NRC's goal of increasing public confidence in the manner in which NRC regulates the use of source, special nuclear and byproduct material.

To provide a forum for industry and non-industry stakeholders to discuss the NRC's processes and procedures for managing the decommissioning of nuclear facilities, as well as current issues facing the staff and licensees as they implement the NRC's decommissioning requirements with NRC staff, the staff sponsored a workshop on November 8 and 9, 2000. The theme of the workshop was "Inform, Listen, Learn." To promote this theme, the staff first made presentations on the NRC's decommissioning requirements and process for both materials and reactors facilities and NRC staff expectations for license termination and decommissioning plans. Presentations were followed by a series of facilitated, roundtable discussions on the decommissioning process, and current issues in decommissioning, such as releasing portions of sites prior to license termination and requirements for institutional controls for sites contemplating license termination with restrictions on future site use.

In order to insure that both industry and non-industry stakeholders were represented at the workshop, staff invited representatives from the nuclear industry, various public interest groups, and other Federal and State agencies with responsibilities for regulating the use of radioactive material to participate in the roundtable discussions. Approximately 130 individuals representing the nuclear industry, citizen's organizations and the public, Federal and State regulatory agencies and the media attended the workshop.

Based on the discussions at the workshop, it appears that, while the NRC staff has made progress in developing and implementing the decommissioning program, some members of the public expressed concerns about the timing of the submission of the LTP for power reactors undergoing decommissioning; the appropriateness of a general license for a dry cask storage area; and, the closure of NRC's local Public Document Rooms.

CONCLUSION

The NRC's decommissioning program includes oversight and management of a wide variety of simple and complex facilities and includes the development of guidance and rules to facilitate the safe and timely decommissioning of these facilities. Recent improvements in the program, the publication of several guidance documents for NRC staff and licensees managing decommissioning projects as well as several rulemaking initiatives currently underway should result in a program that allows licensed facilities to be decommissioned safely while reducing the regulatory burden on licensees.

Future challenges for the decommissioning program include: implementing and identfying improvements for the processes and guidance in the decommissioning SRP; the consolidation of all decommissioning guidance into a single NUREG document; development of procedures for releasing portions of sites

prior to license termination; developing approaches for long-term institutional controls for sites that may not be able to adequately provide for the controls; improving our communications with the public and other stakeholders; and, ensuring that all NRC requirements and guidance are based on the principal of providing an appropriate level of safety, while not imposing undue burdens on the regulated community.

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