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## STATUS OF THE NRC DECOMMISSIONING PROGRAM

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### ABSTRACT

On July 21, 1997, the U.S. Nuclear Regulatory Commission (NRC) published the final rule on Radiological Criteria for License Termination (the License Termination Rule or LTR) 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 staff's current efforts to streamline the decommissioning process, current issues being faced in the decommissioning program, such as partial site release and restricted release of sites, as well as the status of the decommissioning of complex sites and those listed in the Site Decommissioning Management Plan. The paper discusses the status of permanently shut-down commercial power reactors and the transfer of complex decommissioning sites and sites listed on the SDMP to Agreement States. Finally the paper provides an update of the status of various tools and guidance the NRC is developing to assist licensees during decommissioning, including an effort to consolidate and risk-inform decommissioning guidance.

### INTRODUCTION

"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.

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) [1], 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 and other complex sites are expected to request license termination under the restricted-use provisions of 10 CFR 20.1403, 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.

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, the License Termination Rule (LTR) [2], describe the criteria for the release of sites for unrestricted and restricted use and is applicable to all NRC licensees.

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 as 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 which convenes monthly.

## **POWER REACTOR DECOMMISSIONING**

In SECY-02-0198, dated November 8, 2002, the staff implemented a change in staff regulatory oversight of decommissioning commercial nuclear reactor plants, whereby the responsibility for project management will be transferred from NRR to NMSS earlier in the decommissioning process, to take advantage of NMSS's regulatory expertise in overseeing decommissioning and waste storage facilities. Power reactor sites will be transferred after the successful completion of regulatory

and safety milestones that ensure that the plant more closely represents a materials facility temporarily storing and processing radioactive waste than a commercial power reactor. This should result in a more efficient and effective approach that maintains safety while increasing public confidence and reducing unnecessary regulatory burden on reactor licensees.

NMSS currently has regulatory project management responsibility for 15 decommissioning power reactors. To date, 2 power reactors (Shoreham and Ft. Saint Vrain) have been decommissioned and their licenses have been terminated, 4 LTPs have been approved, the LTP for Big Rock Point was submitted in April 2003, and the LTP for Yankee Rowe is expected in November 2003. Currently, 12 research and test reactors have decommissioning orders or amendments.

## **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.

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.

The LTR authorized two different sets of cleanup criteria--the SDMP Action Plan criteria, and dose-based criteria. Under the provisions of 10 CFR 20.1401(b), 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. All other sites must use the dose-based criteria of the LTR. In addition, Agreement States were expected to adopt equivalent dose criteria by August 20, 2000. As of December 2002, 27 States had adopted the LTR, or other legally binding requirements, and 4 States had not.

There are currently 22 SDMP sites and five additional complex sites undergoing decommissioning. Twenty-four sites have been removed from the SDMP after successful remediation, 11 sites have been removed from the SDMP by transfer to an Agreement State or the U.S.

Environmental Protection Agency (EPA). NRC is currently committed to removing one site from the SDMP in fiscal year 2003 and fiscal year 2004.

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 [3]. Forty formerly licensed sites were found to have residual contamination levels exceeding NRC's criteria for unrestricted release. After successful remediation, nineteen sites have been closed, and 11 have been closed by transfer to Agreement States or a Federal entity. Ten sites remain open pending remediation. Two of the formerly licensed sites were added to the SDMP because these sites 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.

NRC provides licensing oversight and decommissioning project management to fuel cycle facilities including conversion plants, enrichment plants, and fuel manufacturing plants. Most of these facilities have been in operation for 20 or more years. Pursuant to NRC's regulations at 10 CFR 70.38 (the "Timeliness Rule"), any licensee with a building or outdoor area with residual contamination that has not been in use for two years must begin decommissioning, and submit a DP, or request an extension to the time period for submitting a DP. The NRC staff continues to work closely with the States and EPA to regulate remediation of unused portions of fuel cycle facilities.

NRC also provides project management and technical review for decommissioning and reclamation of conventional uranium mills and other facilities that process ore primarily for its source material content, such as uranium in-situ leach, heap leach, and ion-exchange facilities. The NRC authority over Atomic Energy Act 11e(2) byproduct material at licensed uranium (or thorium) mill sites was established in Title II of the Uranium Mill Tailings Radiation Control Act of 1978. NRC and the Agreement States that are authorized for 11e(2) byproduct material (Colorado, Illinois, Texas, and Washington) oversee decommissioning at licensed sites. Under Title I of that Act, DOE was authorized to remediate the 24 designated abandoned uranium mill sites, with State and NRC concurrence on remedial plans, activities, and completion reports. NRC was also authorized to concur in the long-term surveillance plan for each site and place it under general license to DOE, when remediation was complete. The surface decommissioning at all Title I sites is complete. Currently, there are 12 Title II NRC-licensed sites in decommissioning. Additionally, Six Title I sites are completing ground water restoration (three active and three natural flushing), and restoration plans for eight other sites are currently under staff review.

## REGULATIONS AND GUIDANCE

In July 20, 2000, and September 5, 2000, the Commission directed the staff to develop a Rulemaking Plan to address the entombment option for power reactors. On June 1, 2001, the staff forwarded SECY-01-099, "Rulemaking Plan and Advanced Notice of Proposed Rulemaking [ANPR]: Entombment for Power Reactors," which contained three options for proceeding. The ANPR was published for public comment in October 2001. Comments were received from nineteen parties during the comment period, which ended on December 31, 2001. In October 2002, staff informed the Commission that it plans to defer the rulemaking until research is completed to support the rule.

In September 2001, the staff published a proposed rule adding a new section 10 CFR 50.83, to standardize the process for allowing a licensee to release part of its reactor facility or site for unrestricted use (partial site release) before receiving NRC approval of its LTP. The staff issued the final rule in April 2003. One site has been granted a partial site release, the Maine Yankee reactor site.

Increasingly, the NRC has focused attention on sites experiencing difficulties in funding site cleanup. Recently, the staff recommended a new aggressive regulatory posture, for selected sites, that will afford NRC the best opportunity to bring financially suspect sites to closure without Federal funding. The staff is currently examining other approaches to ensure adequate funding is available for decommissioning. In addition, on October 7, 2002, NRC proposed to amend its regulations to require certain licensees using substantial quantities of nuclear materials to increase funding for decommissioning costs after their facility shuts down permanently. The changes would bring the amount of money that would be available more in line with current decommissioning costs and provide adequate assurance that timely decommissioning can be carried out following shutdown of a licensed facility. The changes would affect materials licensees, but not nuclear power plants, which are covered by separate regulations. The amount of financial assurance that nuclear materials licensees must provide can be based on either a facility-specific decommissioning cost estimate provided by the licensee in a decommissioning funding plan or on dollar amounts specified in the regulations.

In response to the NMSS performance goals in the Strategic Plan, NMSS implemented a project to consolidate and update the policies and guidance of its decommissioning program. The project involves review and consolidation of all existing NMSS decommissioning guidance documents, decommissioning technical assistance requests, decommissioning licensing conditions, and all decommissioning generic communications issued over the past several years. The goal is to produce consolidated NMSS decommissioning guidance that allows the NRC staff to evaluate

information submitted by licensees in a timely, efficient, and consistent manner that protects public health and safety. The end result will be a streamlined three-volume NUREG series, 1757, grouped into decommissioning functional categories. Volume - 1 decommissioning process; Volume 2 - characterization, survey, and determination of radiological criteria; and Volume 3 - financial assurance, recordkeeping, and timeliness. Further ease of use will be realized by making this a web-based document. The updated, consolidated guidance will be provided to all users, both NRC and licensee in hard-copy and/or electronic media. Since each group will have access to the same guidance, the expected results are more complete license documents that will expedite the approval process for both applicants and reviewers. As a result, it is expected that this project will serve to improve the overall decommissioning process. The final product will be completed in fiscal year 2003.

The staff has also undertaken an effort to update the 1988 "Generic Environmental Impact Statement (EIS) on Decommissioning" (NUREG-0586) for power reactors. The staff worked closely with EPA, industry, and interested members of the public in defining the scope of the draft EIS. In October 2001, the staff published Draft Supplement 1 for comment. After soliciting public input, the staff issued the Final Supplement in November 2002 [4].

In 2002, the staff completed an effort with the Nuclear Energy Institute (NEI) to develop a shared view of acceptable generic approaches for dealing with several license termination issues while ensuring that the requirements of the LTR will be met. This shared view should provide opportunities for standardized approaches of developing, reviewing, approving, and implementing license termination plans. In an effort to clarify existing guidance associated with the LTR, NRC and NEI adopted an approach whereby the NEI License Termination Task Force generated questions and answers (Q&As), and submitted them to NRC for review. NEI submitted the first 10 Q&As on July 16, 2001. NRC staff and NEI further developed the Q&As so that they adequately reflect NRC regulations and guidance and include a sound technical basis. As a result of this cooperation, eight Q&As have been found acceptable by NRC staff. The final Q&As will be included in the text of the final document of Volume 2 of NUREG-1757, the guidance consolidation effort.

In October 2002 the NRC signed and MOU with EPA [5] on the radiological decommissioning and decontamination of NRC-licensed sites. The MOU provides that EPA will defer exercise of authority under the Comprehensive Environmental Response, Compensation and Liability Act (Superfund) for the majority of facilities decommissioned under NRC authority. The MOU includes provisions for NRC and EPA consultation for certain sites when, at the time of license termination, (1) groundwater contamination exceeds EPA-permitted levels; (2) NRC contemplates restricted

release or alternate criteria for release of the site; and/or (3) residual radioactive soil concentrations exceed levels defined in the MOU.

In addition to working with the EPA on the MOU, staff has continued to interact with other local, State, and Federal regulatory authorities to ensure that sites are remediated in a safe and effective manner. For example, NRC is a member of the Interagency Steering Committee on Radiation Standards. Additionally, at the West Valley Demonstration Project (WVDP) the NRC is working with EPA, the Department of Energy, the New York State Energy Research Authority, the New York State Department of Health, the New York State Department of Labor to implement a Regulator's Communication Plan for the WVDP. Staff also routinely interacts with State and local regulators at NRC licensed sites undergoing decommissioning.

In 2001 NRC initiated an evaluation of the NRC's decommissioning process. This program evaluation will consist of a number of evaluations. First, the overall effectiveness of NMSS's Decommissioning Program will be evaluated, including materials decommissioning and the portion of reactor decommissioning for which NMSS is responsible. In addition, evaluations will be conducted of the effectiveness of 15 specific changes to the decommissioning program. The results of these evaluations will be used to recommend further changes to the program as well as the existing goals, strategies, and measures/metrics for the decommissioning program. The program will be evaluated over a 2 year period, from fiscal years 2001 to 2003. The staff completed a "Work Plan" in fiscal year 2001, "Procedures and Criteria" in fiscal year 2002 and will complete the evaluation by the end of fiscal year 2003.

In addition, in 2002 the staff initiated a comprehensive evaluation of issues associated with the implementation of the License Termination Rule. Staff provided the Commission with their initial analysis of how to make the restricted release/alternative criteria provisions of the LTR more available for licensee use in SECY-02-0117, dated October 1, 2002. Staff is continuing to evaluate this issue and several other issues associated with improving the implementation of the LTR including: determining the appropriate relationship between the LTR and the unimportant quantity limits at 10 CFR 40.13(a); the relationship between the LTR and on-site disposal pursuant to 10 CFR 20.2002; the appropriateness of developing an alternative unrestricted release standard for uranium and thorium sites; determining the relationship between the LTR and the control of solid materials (clearance); development of realistic exposure scenarios; intentional mixing; and measures to prevent future legacy sites, including financial assurance provisions and operational event provisions.

## REBASELINING THE DECOMMISSIONING PROGRAM

The staff has continued implementation of the rebaselining initiative that began in September 1999. The objective of rebaselining was to develop and implement a comprehensive integrated plan for successfully bringing SDMP and complex decommissioning sites to closure. Site status summaries are maintained, and updated monthly, for each SDMP and complex decommissioning site. These summaries describe the status of each site and identify the technical and regulatory issues impacting removal of the site from the SDMP or completion of decommissioning. The staff also developed and maintains Gantt charts for each site, which are updated quarterly, to guide the management of decommissioning activities. The Gantt charts identify all major decommissioning activities and schedules for completion.

As part of the rebaselining process, the staff is also implementing streamlining objectives such as: (a) assuming a more pro-active role in interacting with licensees undergoing decommissioning; (b) expanding the acceptance review process, to include a limited technical review, to reduce the need for additional rounds of questions; (c) ensuring that institutional controls and financial assurance requirements are adequate before a technical review of the DP; (d) implementing other procedures to reduce the number of requests for additional information; (e) conducting in-process/side-by-side confirmatory surveys; and (f) relying more heavily on licensees' quality assurance programs, rather than conducting large-scale confirmatory surveys. Furthermore, the staff is incorporating strategies to achieve the performance goals identified as part of the Agency's strategic planning process and Strategic Plan for fiscal years 2000 - 2005. Examples of strategies being incorporated include: focusing on resolving key issues such as institutional control for restricted release; partial site release; conducting stakeholder workshops to seek licensee, industry, and public input; updating, consolidating and risk informing/performance orienting decommissioning guidance; and working with industry to identify and resolve technical and policy issue associated with decommissioning; and developing a stakeholder database and website.

In addition to the staff's rebaselining initiatives, in March 2001 the staff developed 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 includes 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. The staff implemented the site-specific communications plans for SDMP sites in June 2002. The staff will implement site-specific communication plans for reactor sites in 2003.

## 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 identifying improvements for the processes and guidance in the decommissioning SRP; finalizing 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.

## ACRONYMS

ANPR	Advance Notice of Proposed Rulemaking
CFR	Code of Federal Regulations
DOE	Department of Energy
DP	Decommissioning Plan
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
LTP	License Termination Plan
LTR	License Termination Rule
MOU	Memorandum of Understanding
NEI	Nuclear Energy Institute
NMSS	Office of Nuclear Materials Safety and Safeguards
NRC	Nuclear Regulatory Commission
NRR	Office of Nuclear Reactor Regulation
ORNL	Oak Ridge National Laboratory
PSDAR	Post Shutdown Decommissioning Activities Report
RES	Office of Nuclear Regulatory Research
Q&As	Questions and Answers
SDMP	Site Decommissioning Management Plan
SRP	Standard Review Plan
WVDP	West Valley Demonstration Project

## REFERENCES

1. SDMP Action Plan Criteria, 57 FR13389, April 16, 1992
2. License Termination Rule, 62 FR 39058, July 21, 1997
3. Memorandum to L.W. Camper from J.T. Buckley, "Final Report on Results of Terminated License Reviews," September 26, 2001 (ML 012710526)
4. "Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities," NUREG-0586, Supplement 1, U.S. Nuclear Regulatory Commission (2002)
5. Whitman, T.W. and Meserve, R.A., "Consultation and Finality on Decommissioning and Decontamination of Contaminated Sites," Memorandum of Understanding Between the Environmental Protection Agency and the Nuclear Regulatory Commission, October 9, 2002.