The U.S. Nuclear Regulatory Commission's Decommissioning Process

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Abstract. The term "Decommission" is defined in the U.S. Nuclear Regulatory Commission's (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), as well as power and non-power reactors. This paper describes the NRC's decommissioning process for materials and reactor facilities and presents an overview of NRC's decommissioning program activities

1. Introduction

The major activity undertaken in the decommissioning program is to regulate the decontamination and decommissioning of power reactors, non-power reactors, fuel cycle facilities, Site Decommissioning Management Plan (SDMP) locations and other complex material licensees. The primary objectives of NRC's decommissioning program are: (1) clear criteria and guidance; (2) timeliness; (3) adequate financial assurance; (4) efficiency; and (5) finality. Decommissioning program activities include: (1) development of regulations and guidance; (2) conduct of research to develop data, techniques, and models used to assess public exposure from the release of radioactive material resulting from site decommissioning; (3) review and approval of decommissioning plans (DPs) and license termination plans (LTPs); (4) review and approval of license amendment requests; (5) inspections of licensed activities; (6) development of environmental assessments (EAs) and environmental impact statements (EISs); (7) review and approval of final site survey reports; and (8) conduct of confirmatory surveys.

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. The decommissioning program is responsible for establishing policies, procedures and criteria, for routine terminations and for the termination of licenses that are not routine because the sites require more complex decommissioning activities. Currently, there are 19 nuclear power plants, 12 research reactors, and 33 materials facilities undergoing non-routine decommissioning under NRC jurisdiction. On July 21, 1997, the NRC published the final rule on "Radiological Criteria for License Termination" (LTR) as Subpart E to 10 CFR Part 20 (62 FR 39058). Subpart E contains criteria for the release of sites for unrestricted use, if the residual radioactivity that is distinguishable from background results in a total effective dose equivalent to an average member of a critical group that does not exceed 0.25 millisievert per year (mSv/a) (25 mRem/a) and the residual activity has been reduced to levels that are as low as reasonably achievable (ALARA). Subpart E also contains criteria for license termination with restrictions on future land use, as long as specific conditions are met, and criteria for license termination in unusual situations where the site may exceed the 0.25 mSv/a (25 mRem/a) limit,

but would not be permitted to exceed 1 mSv/a (100 mRem/a) or 5 mSv/a (500 mRem/a), under certain conditions. All existing sites undergoing decommissioning are subject to this dose based standard with the exception of a few SDMP sites which have been "grandfathered" to utilize previous concentration-based criteria. Several steps have been taken by the USNRC staff to ensure that appropriate levels of integration of major decommissioning activities within the Agency take place including tracking decommissioning activities in the Agency Operating Plan, using a Decommissioning Management Board to review decommissioning activities.

Licensees and other individuals decommissioning licensed facilities are required to demonstrate to the NRC that the methods proposed by the licensee or responsible party will ensure that the decommissioning can be conducted safely and that the facility, at the completion of decommissioning activities, will comply with NRC's requirements for license termination. NRC regulations require that licensees submit a plan for decommissioning that is based on the level of complexity of the site and the NRC's confidence that adequate on-site expertise will be available to ensure that the decommissioning can be conducted safely. In acknowledgment that nuclear power reactors posed different risks than materials licenses during decommissioning, the NRC published specific requirements for the decommissioning of power reactors in 1996.

2. The NRC Power Reactor Decommissioning Process

NRC Headquarters offices have the decommissioning program responsibilities for decommissioning power reactors and the NRC Regional offices implement the policy decisions and perform inspections at the direction of headquarters. Decommissioning activities for power reactors may be divided into three phases: 1) initial activities; 2) major decommissioning and storage activities, and 3) license termination activities. The first phase of decommissioning includes initial activities, starting on the effective date of permanent cessation of operations and encompassing the activities before the licensee either places the power reactor in a storage mode or begins major decommissioning activities. The second phase encompasses activities during the storage period or during major decommissioning activities (i.e., decontamination and dismantlement), or some combination of the two. The third phase consists of the rest of the activities the licensee undertakes to terminate the license. Transfer of the spent fuel typically involves a dry cask storage system. NRC is responsible for licensing the storage of spent nuclear fuel at an independent spent fuel storage facility (ISFSI). Requirements for the licensing of independent storage of spent nuclear fuel at a facility (10 CFR Part 72) are separate from site decommissioning activities (10 CFR Part 20 and Part 50).

The licensee who has determined to permanently cease operations is required to submit written certification to the NRC within 30 days of the decision or requirement to permanently cease operations. Part 50 states that prior to or within two years following permanent cessation of operations, the licensee is required to submit a post-shutdown decommissioning activities report (PSDAR). The PSDAR will include a description of the planned decommissioning activities, with a schedule for the accomplishment of significant milestones and an estimate of expected costs, and an evaluation of the environmental impacts associated with the site-specific decommissioning activities. No major decommissioning activities may be performed until 90 days after the NRC receives the PSDAR. The 90-day period allows sufficient time for the NRC staff to determine if the PSDAR contains the information required by the regulations, publish notification of the receipt of the PSDAR, hold a public meeting in the vicinity of the facility to discuss the licensee's plans for decommissioning, and conduct any necessary safety inspections prior to the initiation of major decommissioning activities. The application for

termination of a license must include an LTP. The LTP must be a supplement to the Final Safety Analysis Report (FSAR) or equivalent, and must be submitted at least 2 years prior to the expected termination of the license as scheduled in the PSDAR. Unless the licensee receives permission to the contrary, the site must be decommissioned within 60 years.

Two power reactors (Shoreham and Ft. Saint Vrain) have been decommissioned and their licenses have been terminated however, these sites were decommissioned prior to the existence of the LTR. Currently, NRC has regulatory project management responsibility for 19 power reactors in various stages of decommissioning. These licensees have submitted PSDARs for their power reactors. NRC staff completed its review of the LTP for the Trojan reactor and is currently reviewing the LTPs for Saxton, Maine Yankee and Connecticut Yankee (Haddam Neck) power reactors.

3. The NRC Materials Decommissioning Process

Decommissioning is accomplished according to the requirements of 10 CFR Part 20 and the applicable section of the licensing Part (for example, 10 CFR Part 30 is for byproduct materials; Part 40 is for source materials; and Part 70, for special nuclear materials). In the event a licensee wishes to terminate operations or if no principal activities have been conducted in any separate building or outdoor area for 24 months, the licensee shall notify NRC within 60 days. Within one year of that notification, the licensee shall either remediate the area for release for unrestricted use, or submit a decommissioning plan if one is required by the license or regulation. The decommissioning plan includes; a description of the conditions of the site; the planned decommissioning activities; a description of the methods used to ensure protection of workers and the environment against radiation hazards during decommissioning; a description of the planned final radiation survey; an updated cost estimate; a comparison of the cost estimate with funds set aside for decommissioning; and a plan for assuring the availability of adequate funds for the completion of decommissioning. 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 license.

During the technical review of the decommissioning plan, when the NRC staff meets with the licensee on decommissioning plan issues or other license issues, the meetings are publicly noticed. The decommissioning plan will be approved by the license amendment process. Notice of receipt of the plan and the license amendment approving the plan with its associated environmental document will be published. The license amendment action provides an opportunity for hearing by any affected party. After remediation activities are complete, the licensee will conduct a final status survey to demonstrate compliance with the specified criteria of 10 CFR Part 20 Subpart E. Should staff review of the results, possibly including independent sampling, conclude that the criteria have been met; the NRC will issue a letter to the licensee terminating the license. If the licensee proposes a restricted use release, public involvement is mandated by 10 CFR 20.1403. This participation includes input to the licensee on the decommissioning plan, adequacy of financial assurance for post-termination activities, if required, and institutional controls. In addition, NRC will solicit comments from State and Local governments, Indian Nations, the U.S. Environmental Protection Agency, and other affected parties as specified in 10 CFR 20.1405.

In 1988-1989, NRC staff identified over 30 sites involving unique and difficult decommissioning issues that required special attention to ensure timely decommissioning. While none of the sites

represented an immediate threat to public health and safety, they all had contamination exceeding existing NRC criteria for unrestricted release. All of the sites required some degree of remediation, and several involved regulatory issues to be addressed by the Commission prior to release for unrestricted use and license termination. These problematic sites had buildings, former waste disposal areas, large piles of tailings, ground water, and soil contaminated with low levels of uranium or thorium (source material), or other radionuclides. Consequently, they presented varying degrees of radiological hazard, remediation complexity, and cost. Some of the sites were still under the control of active NRC licensees, whereas licenses for other sites had already been terminated or had never been issued. At some of the sites, licensees were financially and technically capable of completing decommissioning in a reasonable timeframe, whereas at other sites, the licensee or responsible party was unwilling or unable to perform decommissioning. In addition, the sites were in various stages of decommissioning. At some sites, licensees had initiated decommissioning, whereas at other sites, decommissioning had not yet been planned or initiated. As a result, the staff created the SDMP at the direction of the Commission. In directives to the staff, in August 1989, and January 1990, the Commission directed the staff to develop a comprehensive strategy for achieving closure of decommissioning issues. The major objectives of the SDMP, when initiated were: (1) to identify and manage specific problem sites through the decommissioning process, and (2) to resolve decommissioning policy issues.

In the context of a comprehensive decommissioning program, the SDMP is primarily a management tool to track site-specific progress at complex decommissioning sites and inform the Commission when the site is suitable for removal from the SDMP. Adding a new site to the SDMP will not necessarily indicate that the site is a “problem” site but rather that it warrants management attention to ensure successful decommissioning and license termination. Current SDMP listing criteria are as follows: (1) all restricted-use sites; and (2) complex unrestricted-use sites requiring (a) detailed site-specific dose modeling; (b) sites subject to heightened public, State, or Congressional interest; and (c) sites with questionable financial viability.

Sites released from the SDMP to date have been released using the criteria contained in the “Action Plan to Ensure Timely Cleanup of Site Decommissioning Management Plan Sites” SDMP Action Plan 57FR 13389. However, in July 1997 the Commission published the LTR. The LTR initially authorized two different sets of cleanup criteria for SDMP sites: (1) SDMP Action Plan criteria (removable contamination levels); and (2) the dose-based criteria contained in 10 CFR Part 20, Subpart E. Currently, SDMP sites are decommissioned utilizing both of these criteria.

Since its inception, 57 sites have been managed under the SDMP program. To date, 24 sites have been removed after being remediated and 11 have been transferred to States. Staff currently expects to remove at least 1 site from the SDMP each year. In addition to the SDMP sites, the NRC oversees 5 complex non-SDMP sites and 6 additional sites that were released from regulatory control in the past.

4. Conclusion

During the past fifteen years, the NRC has increasingly placed an emphasis on nuclear sites undergoing decommissioning. NRC’s decommissioning program is a large and important component of the agency’s regulatory program, involving several Offices and substantial interest by the Commission. Sites undergoing decommissioning also generate a great deal of local and political interest, thus elevating the decommissioning process to a high level of attention and ongoing staff effort. The decommissioning process also places a significant emphasis on public awareness and stakeholder involvement, resulting in substantial dialog with those organizations

or individuals having a vested interest in the outcome of the process. The NRC decommissioning program faces a number of complex challenges. Licensees undergoing decommissioning must deal with several different regulatory jurisdictions, at both the Federal and State levels, while ensuring that their sites are successfully decommissioned. The extent to which the various regulatory agencies can work together will have a very large impact on public confidence with the process.

REFERENCES

[1] Federal Register Notice 69 FR 39058, "Radiological Criteria for License Termination," July 21, 1997.

[2] Federal Register Notice 61 FR 39278, "Decommissioning of Nuclear Power Reactors," July 29, 1996.

[3] Title 10 Code of Federal Regulations, Part 72, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste," January 1, 2000.

[4] Title 10 Code of Federal Regulations, Part 20, "Standards for Protection Against Radiation," January 1, 2000.

[5] Title 10 Code of Federal Regulations, Part 50, "Domestic Licensing of Production and Utilization Facilities," January 1, 2000.

[6] Title 10 Code of Federal Regulations, Part 30, "Rules of General Applicability to Domestic Licensing of Byproduct Material," January 1, 2000.

[7] Title 10 Code of Federal Regulations, Part 40, "Domestic Licensing of Source Material," January 1, 2000.

[8] Title 10 Code of Federal Regulations, Part 70, "Domestic Licensing of Special Nuclear Material," January 1, 2000.

[9] NRC Commission Paper SECY-88-0308, "Contaminated Material Licensee Facilities," October 31, 1988.

[10] NRC Commission Paper SECY-89-0369, "Strategy for Decommissioning of Material Licensee Sites," December 8, 1989.