



OFFICE OF THE INSPECTOR GENERAL

U.S. NUCLEAR REGULATORY COMMISSION
DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Audit of NRC's Transition Process for Decommissioning Power Reactors

OIG-19-A-16
August 23, 2019



All publicly available OIG reports (including this report) are accessible through NRC's Web site at <http://www.nrc.gov/reading-rm/doc-collections/insp-gen>



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

**OFFICE OF THE
INSPECTOR GENERAL**

August 23, 2019

MEMORANDUM TO: Margaret M. Doane
Executive Director for Operations

FROM: Dr. Brett M. Baker */RA/*
Assistant Inspector General for Audits

SUBJECT: AUDIT OF NRC'S TRANSITION PROCESS FOR
DECOMMISSIONING POWER REACTORS
(OIG-19-A-16)

Attached is the Office of the Inspector General's (OIG) audit report titled *Audit of NRC's Transition Process for Decommissioning Power Reactors*.

The report presents the results of the subject audit. Following the August 13, 2019, exit conference, agency staff indicated that they had no formal comments for inclusion in this report.

Please provide information on actions taken or planned on each of the recommendation(s) within 30 days of the date of this memorandum. Actions taken or planned are subject to OIG follow-up as stated in Management Directive 6.1.

We appreciate the cooperation extended to us by members of your staff during the audit. If you have any questions or comments about our report, please contact me at (301) 415-5915 or Jacki Storch, Team Leader, at (301) 415-2877.

Attachment: As stated



Office of the Inspector General

U.S. Nuclear Regulatory Commission
Defense Nuclear Facilities Safety Board

OIG-19-A-16
August 23, 2019

Results in Brief

Why We Did This Review

Decommissioning is the process used to safely remove a nuclear power plant from service and reduce residual radioactivity to a level that permits release of the property and termination of its NRC operating license.

The Office of Nuclear Reactor Regulation (NRR) maintains oversight of all operating nuclear power plants. The Office of Nuclear Material Safety and Safeguards (NMSS) maintains oversight of all decommissioning activities. Once a licensee announces its intention to shut down its reactor, NRR and NMSS closely coordinate during this “operating to decommissioning” transition process.

The audit objective was to determine whether NRC’s transfer of oversight responsibilities, used when operating power reactors undergo decommissioning, is efficient and effective.

Audit of NRC’s Transition Process for Decommissioning Power Reactors

What We Found

OIG found that NRC’s transfer of oversight responsibilities is effective; however, the efficiency could be improved. Specifically, NRC should update decommissioning guidance and implement a formal project manager knowledge transfer process.

Agency guidance states NRC should run its programs effectively and efficiently; however, NRC has not implemented certain knowledge management principles into the reactor decommissioning process. Consequently, there may be unnecessary delays in the processing and management of reactor decommissioning projects which may incur additional costs to licensees, NRC, and taxpayers.

What We Recommend

This report makes two recommendations to improve the effectiveness and efficiency of the transition from operating to decommissioning power reactors.

Agency Management stated their general agreement with the finding and recommendations of this report.

TABLE OF CONTENTS

<u>ABBREVIATIONS AND ACRONYMS</u>	i
I. <u>BACKGROUND</u>	1
II. <u>OBJECTIVE</u>	5
III. <u>FINDING</u>	5
<u>Efficiency of NRC Decommissioning Practices Could be Improved</u>	5
<u>Recommendations</u>	15
IV. <u>AGENCY COMMENTS</u>	17
APPENDIXES	
A. <u>OBJECTIVE, SCOPE, AND METHODOLOGY</u>	18
B. <u>Total Hours for Decommissioning Activities Charged Since Shutdown Fiscal Year 2012 – Fiscal Year 2018</u>	20
C. <u>Nuclear Power Plants with Announced Planned Shutdowns from 2019 to 2025</u>	21
<u>TO REPORT FRAUD, WASTE, OR ABUSE</u>	22
<u>COMMENTS AND SUGGESTIONS</u>	22

ABBREVIATIONS AND ACRONYMS

NRC	Nuclear Regulatory Commission
PSDAR	Post-Shutdown Decommissioning Activities Report
NRR	Office of Nuclear Reactor Regulation
NMSS	Office of Nuclear Material Safety and Safeguards
PM	Project Manager

I. BACKGROUND

The U.S. Nuclear Regulatory Commission (NRC) regulates the decommissioning of commercial nuclear power plants. Decommissioning is the process used to safely remove a nuclear power plant from service and reduce residual radioactivity to a level that permits release of the property and termination of its NRC operating license. NRC has rules governing commercial nuclear power plant decommissioning involving the cleanup of radioactively contaminated plant systems and structures and removal of the radioactive fuel. These rules protect workers and the public during the entire decommissioning process and protect the public after the license is terminated.

As of June 2019, there are 20 nuclear power reactors undergoing decommissioning regulated by NRC (see Figure 1). Licensees in the U.S. have utilized two¹ primary methods of decommissioning: “DECON” and “SAFSTOR.” Under the “DECON” method, soon after the plant closes, equipment, structures, and portions of the plant are immediately removed or decontaminated. Under the “SAFSTOR” method, a nuclear power plant is maintained and monitored to allow radioactivity to decay; afterward, the plant is dismantled and the property is decontaminated. The entire decommissioning process may take up to 60 years. For a map of sites that have completed decommissioning or are undergoing decommissioning, see Figure 1.

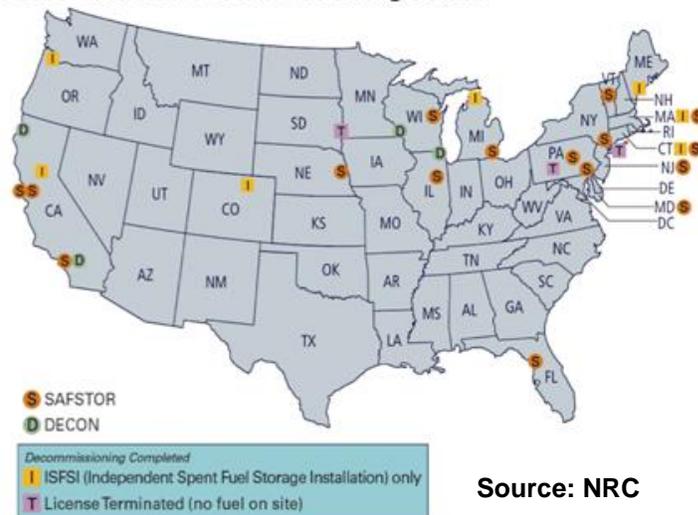
¹ A third method of decommissioning available to licensees called “entomb” involves the permanent encasement of radioactive contaminants in structurally sound material such as concrete. To date, no NRC-licensed facilities have implemented this option.

Figure 1: Decommissioned Plants & Plants Undergoing Decommissioning as of June 2019.²

Decommissioning Process

When a nuclear power plant licensee has determined to shut down a plant permanently, it must submit a written certification of this decision to NRC within 30 days. When all nuclear fuel is permanently removed from the reactor vessel, the licensee must also submit a written certification of permanent fuel removal to NRC. Upon NRC's receipt of both certifications, the licensee is no longer authorized to operate the reactor or load fuel into the reactor vessel. Prior to or within 2 years after the licensee permanently ceases operations, the licensee must submit a post-shutdown decommissioning activities report (PSDAR) to NRC. This report provides a description of the planned decommissioning activities, a schedule for accomplishing them, and an estimate of the expected costs.

Power Reactor Decommissioning Status



Source: NRC

NRC's goal is to make the report available for public review and comment and hold a public meeting near the reactor within 90 days of receiving the PSDAR. The licensee may begin major decommissioning activities 90 days after it has submitted the PSDAR and both required certifications. Major decommissioning activities can include permanent removal of major components like the reactor vessel, steam generators, and large piping systems, pumps, and valves. At least 2 years before the expected license termination, the licensee is required to submit a license termination plan for NRC's approval. This plan addresses site characterization and site remediation, final radiation surveys, and site release, among others.

² There are 10 decommissioned reactors as indicated by the "Independent Spent Fuel Storage Installation" and "License Terminated" sites. The map displays an additional 20 reactors currently undergoing the decommissioning process. San Onofre Nuclear Generating Station, Units 2 and 3, and Zion Nuclear Power Station, Units 1 and 2, are currently in active decommissioning.

Handoff of Oversight Responsibilities

The Office of Nuclear Reactor Regulation (NRR) maintains oversight of all operating nuclear power plants. The Office of Nuclear Material Safety and Safeguards (NMSS) maintains oversight of all decommissioning activities. Once a licensee announces its intention to shut down its reactor, NRR and NMSS closely coordinate during this “operating to decommissioning” transition process.³ This process begins when the licensee announces its plans to permanently shut down the plant. This transition process includes the two certifications licensees must submit to NRC, as well as the PSDAR submission, and any license amendments and exemptions that must be approved by NRR and/or NMSS staff. Once these items have been completed and the updated defueled technical specifications⁴ are approved by NRR, the official handoff to NMSS occurs. This completes the NRC’s transition of its oversight of the plant from an operating reactor to a decommissioning facility, and NMSS now has full responsibility of the power reactor and oversees the remainder of the decommissioning.

License Amendments & Exemptions

One of NRC’s primary responsibilities during the operating to decommissioning transition process is the review of licensee amendment and exemption requests. Currently, most of NRC’s regulations do not specifically address reactor decommissioning. Specifically, many of NRC’s regulations and some conditions of the license hold decommissioning reactors to the same standard, and the same requirements, as operating reactors. This includes employing the same number of emergency response staff, or maintaining the same physical security requirements, even after the site has shut down and there is no longer fuel in the reactor core. Consequently, after licensees announce their intent to decommission, they will submit several requests for NRC’s

³ NRR still has primary oversight responsibilities during this point in the transition process.

⁴ Technical specifications are part of an NRC license authorizing the operation of a power plant. They establish requirements for items such as safety limits, surveillance requirements, design features, and administrative controls. When a licensee begins the decommissioning process, its standard technical specifications are updated to defueled technical specifications to reflect the decommissioning status of the power reactor.

review to exempt them from regulations that primarily apply to operating reactors and amend their licenses to align with planned decommissioning activities rather than reactor operations. NRC has approved such requests based on the much lower risk with decommissioning reactors, as compared to operating reactors, due to the nuclear fuel being removed. Nevertheless, the process for preparing and reviewing these exemption and amendment requests requires a commitment of resources by both the licensee and NRC staff.

Pictured: Connecticut Yankee during the decommissioning process.



Decommissioning Reactor Rulemaking

Beginning in the late 1990s, it became apparent to NRC that it should consider rulemaking to improve the efficiency and effectiveness of the power reactor decommissioning process. A decommissioning rulemaking effort was initiated to address the transition issues, but it was subsequently suspended because of a shift in agency priorities following the terrorist attacks on September 11, 2001. However, in 2014, the Commission directed NRC staff to proceed with rulemaking on reactor decommissioning. Major provisions of the proposed rule include changes in areas such as emergency preparedness, physical security, cyber security, drug and alcohol testing, certified fuel handler training, and foreign ownership, among others. If the proposed rule's current iteration is approved, it would streamline the decommissioning process and eliminate approximately 13 licensing actions (e.g., exemptions and amendments) per decommissioning that NRC staff must process. NRC staff submitted the draft proposed rule to the Commission for review in May 2018.

Source: NRC

II. OBJECTIVE

To determine whether NRC's transfer of oversight responsibilities, used when operating power reactors undergo decommissioning, is efficient and effective. Appendix A contains information on the audit scope and methodology.

III. FINDING

NRC's transfer of oversight responsibilities is effective; however, the efficiency could be improved. Specifically, NRC should

- Update decommissioning guidance, and
- Implement a formal project manager knowledge transfer process.

A. Efficiency of NRC Decommissioning Practices Could be Improved

Though effective, NRC's decommissioning process could be more efficient. Agency guidance states NRC should run its programs effectively and efficiently; however, NRC has not implemented certain knowledge management principles into the reactor decommissioning process. Consequently, there may be unnecessary delays in the processing and management of reactor decommissioning projects which may incur additional costs to licensees, NRC, and taxpayers.

What Is Required

Agency guidance states NRC should run its programs effectively and efficiently.

Project Aim seeks to enhance the culture of NRC to increase efficiency, effectiveness, agility, and flexibility of NRC work processes. NRC's goal is to improve agency processes by streamlining, standardizing, and clarifying roles and responsibilities so that resources are used more wisely.

What We Found

Though effective, NRC's decommissioning process could be more efficient.

Currently, there is no standard method to decommission power reactors as the process is dynamic and there are many variables involved. NRC is still adjusting to the changes occurring in reactor decommissioning space, and this is further exacerbated by the lack of updated agency guidance and the absence of a reactor decommissioning knowledge transfer process for NRC staff.

Recent History

Starting in early 2013 and through the end of 2014, five power reactors permanently ceased operations. These were the first reactors to transition to decommissioning since 1998. Out of the five power reactor shutdowns, four were unexpected and involved little pre-planning by licensees and NRC. Because it had been 15 years since any reactor had entered decommissioning, licensees and NRC staff initially had limited experience in processing decommissioning licensing actions. Furthermore, NRC's regulations were generally not written to address reactor decommissioning.

From 2013 through 2015, NRC had to process over 70 decommissioning-related licensing actions and other regulatory activities for the five decommissioning reactors. Since the last round of decommissionings, process changes occurred including the need to review and process multiple concurrent licensing action applications (from multiple licensees). From a knowledge management perspective, licensees and NRC staff were both working on steep learning curves.

NRC formed a decommissioning working group to study and document these recent decommissionings, as well as to develop a lessons learned report⁵ to assist in future power reactor decommissionings.

New Business Model

In October 2018, NRC staff issued an order approving the permanent license transfer of the Vermont Yankee operating license from the original owner (Entergy) to a new decommissioning company (NorthStar). The idea behind this new business model is decommissioning companies possess the required expertise and can complete the decommissioning process more quickly and efficiently than the company that operated the reactor. These transactions typically include switching the licensee's decommissioning plan from SAFSTOR to DECON, thereby potentially reducing the decommissioning timeline from 60 years down to possibly 10 years. According to NRC staff, this business model appears to be the "wave of the future" and NRC is currently reviewing several other license transfer requests of this kind. Because this new business model presents a compressed decommissioning time frame, and each power reactor is different and presents its own unique challenges, NRC is still learning how to work with these types of license transfer requests.

NRC Billing Practices During the Transition Period

The audit team analyzed NRC's billing practices; specifically, to identify if there may have been incorrect licensee billing during the transition period when both NRR and NMSS were involved in the reactor decommissioning

⁵ *Power Reactor Transition from Operations to Decommissioning, Lessons Learned Report, October 2016.* Henceforth, this report shall be referred to as the *Lessons Learned Report*.

process. The audit team reviewed raw cost activity code data provided by the Office of the Chief Financial Officer to evaluate whether there may have been overlap in licensee fee billing during the transition period between NRR and NMSS. The audit team also reviewed the agency's forecasted number of full-time equivalents to be used for decommissioning activities and compared it with the number expended to identify any possible large discrepancies. The data analysis did not indicate any evidence of unjustified billing charges or unreasonable fluctuations in full-time equivalents during reactor decommissioning. In fact, the data analysis displayed strong coordination between the two program offices, and this was further supported by interviews with licensees. See Appendix B for NRR and NMSS billing hours data analyses.

Why This Occurred

NRC has not incorporated certain knowledge management principles for reactor decommissioning.

Two basic knowledge management⁶ principles, guidance and knowledge transfer, have not been effectively implemented into NRC's power reactor decommissioning processes.

Guidance

Both NRR and NMSS' office guidance documents related to power reactor decommissioning are outdated. NRR's guidance document, Office Instruction-COM 101, was last updated in 2002. NMSS' guidance document, Policy & Procedure 5-1, was last updated in 2016. However, this update simply addressed an office name change due to an internal reorganization, and this document has seen little substantive revision since it was originally written in 2007.⁷ Additionally, Regulatory Guide

⁶ Knowledge management is a practical, process-orientated approach to how agencies and departments capture institutional knowledge and learn from it. Knowledge management ensures that all necessary elements (accountabilities, processes, technologies, and governance) are in place and interconnected. This ensures that there are no gaps in the system, and that knowledge flows freely through the organization.

⁷ Policy & Procedure 5-1 was revised in 2010, but the revision clarified NRC's financial assurance review responsibilities which is outside the scope of this audit.

1.184, which provides guidance to licensees on the actions required to decommission power reactors, was last updated in 2013.

Despite the evolution of the decommissioning process, these primary guidance documents remained largely unchanged since their initial inception. Not surprisingly, some staff stated that the guidance documents are unclear or lacking in detail. For example, one staff member said the guidance does not meet reality as there is no orderly flow of licensing actions as depicted in guidance. Rather, licensing actions can occur in an ad hoc manner. A staff member from one of NRC's regional offices opined that NRC's guidance documents do not clearly state how the handoff from NRR to NMSS is to occur. This person said the guidance should capture examples, people's experiences, etc., because regional staff do not have that knowledge.

Some other examples where the guidance is unclear include

- NMSS involvement – How and when should NMSS staff be involved with the power reactor decommissioning process? It is clear to most that NMSS has oversight responsibility after NRR has approved the defueled technical specifications, but some NMSS staff opined that they were not involved early enough in the process prior to the approval of the new technical specifications. This leads them to be less informed when their responsibilities eventually increase. This could differ for each reactor and depends on the project managers (PMs) involved, but it likely occurs because there is no set standard for NMSS involvement provided in guidance. For example, staff raised questions as to when the operating to decommissioning transition process technically begins since there is no precise order of decommissioning activities; what incomplete reviews NRR can pass on to NMSS; and which office has the lead in stakeholder activities.

Pictured: NRC public meeting.



Source: NRC

- PSDAR public meetings – Who should run these meetings? Since NMSS staff are the decommissioning experts, they are expected to run the public PSDAR meetings. However, at times this meeting occurs prior to the handoff of decommissioning responsibilities from NRR to NMSS. Furthermore, funding for these meetings comes from NRR's budget. Consequently, there have been instances of confusion over which office oversees this meeting. There have also been occasions when NRR and NMSS did not always agree on certain aspects of how and when NRC should run the meeting.
- New business model (decommissioning license transfers) – How should NRC address these requests? Since decommissioning license transfers are new (2018), NRC's guidance does not address them. For example, staff mentioned a recent license transfer request has posed some logistical problems. A licensee recently submitted its PSDAR simultaneously with a license transfer request, the PSDAR of the proposed decommissioning company, and related exemptions for both entities. The licensee also asked for it to be completed on an expedited basis. This strained NRC resources since staff had to review everything at once, to include the review of the PSDAR and exemption requests from an entity that was not yet the licensee.

This poses a challenge as staff is reviewing the PSDAR of a proposed decommissioning company prior to NRC's approval of the license transfer; thus, NRC could potentially be expending resources on a license transfer that may not be approved. On the other hand, licensees and decommissioning companies may prefer to submit both PSDARs upfront because PSDARs contain company financial information necessary to approve any license transfers. Nevertheless, PSDARs from current licensees and from decommissioning companies are usually much different, with licensees typically choosing SAFSTOR and decommissioning

companies choosing DECON. Currently, NRC regulations permit licensees and decommissioning companies to submit their requests concurrently.

Lessons Learned Report

Both NRC staff and licensees state the *Lessons Learned Report* is an excellent resource and has the most up-to-date information on power reactor decommissioning. The report provides lessons learned on several decommissioning experiences and provides several recommendations. For example, the report encourages licensees to submit planned, early decommissioning transition licensing actions to increase the efficiency of the operating to decommissioning transition process. It noted that decommissioning guidance is outdated, especially in areas of document processing and office structure. It also stated the experience gained in recent decommissioning transitions should be used to improve Regulatory Guide 1.184. The report recommended NRC staff proceduralize numerous different activities, including planning discussions with licensees related to the sequencing of PSDAR submittals and encouraging licensees to submit a decommissioning physical security plan amendment 1 year prior to shutting down the plant. To date, none of the report's recommendations have been incorporated into NRC-issued guidance.⁸

Knowledge Transfer

In addition to guidance, another important basic knowledge management principle centers around knowledge transfer. Presently, NRR and NMSS do not have a formal knowledge transfer process for decommissioning power reactors.

One NRR staff member said there is one experienced PM in NRR and the lack of a knowledge transfer process is a weak area. An NRR PM opined there should be a system for new PMs to shadow the experienced PM, but this does not typically occur. An NMSS PM said knowledge transfer could be a major issue moving forward, given several senior staff involved with decommissionings are close to retirement. Another NMSS PM stated

⁸ NRC staff has made proposed changes to several guidance documents to address the proposed rule changes and lessons learned.

NMSS' training focuses on the "end of the decommissioning" process and not on power reactor licensing or operations in general, thereby leaving out the operating to decommissioning transition process.

The audit team reviewed the turnover of primary PMs for the six power reactor sites currently undergoing decommissioning activities. Of these six sites that began their operating to decommissioning activities in 2012 or later, there have been at least 29 different PMs assigned to those sites.

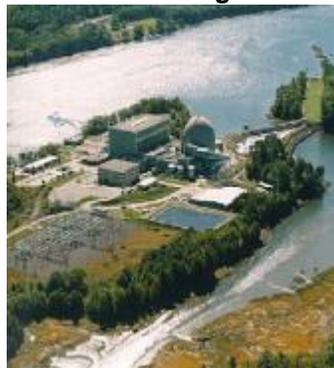
Though NRC does not have a formal knowledge transfer process, NRR has recognized a need for increased training and is in the process of adding a "transition to decommissioning" qualification card to its qualification program for NRR PMs. NMSS has facility decommissioning training as well as a qualification program for its PMs.

Why This Is Important

There may be unnecessary delays in the processing and management of reactor decommissioning projects.

The lack of certain knowledge management principles could create unnecessary delays in decommissioning power reactors. One example of an issue with employee turnover and the lack of proper knowledge transfer was provided by a licensee. The licensee stated that in October of 2018, NRC had said it would consult with another Federal agency regarding a requirement that the licensee felt should no longer apply. This consultation was supposed to be completed by June 2019. When the licensee contacted NRC in March 2019 for an update, NRC told the licensee that the original PM was no longer with NRC, and the new PM was unaware of the

Pictured: Maine Yankee before and after decommissioning.



Source: NRC

situation. The new PM began working on the issue, but the work on this item has now been delayed 6 months.

As noted in the *Lessons Learned Report*, the decommissioning working group asserted that the current exemption and amendment processes for transitioning plants are sufficient to ensure adequate protection of public health and safety and of the environment and are consistent with the common defense and security. However, the process is inefficient and additional delays could incur more costs to licensees, NRC, and taxpayers, and could further delay releasing reactor sites to the public for unrestricted use.⁹

Rulemaking

As noted earlier, a draft decommissioning rule is under review by the Commission, which would streamline the power reactor decommissioning process and potentially save millions of dollars by removing approximately 13 of the typical exemption requests and licensing actions. NRC estimates the new rule would save licensees, NRC, and taxpayers approximately \$19 million per decommissioning power reactor. An industry representative stated that there is a real cost to decommissioning delays, to the tune of approximately \$1 million per month per every 100 staff employed.

The audit team conducted a data review of the exemptions and licensing actions from 2017 to 2019 that would be eliminated by the new decommissioning rule. The audit team found that there was a total of 14 licensing actions over the past 2 years that averaged just over 7 months each to complete, and a total of approximately 2,125 hours expended by NRC staff for the 14 licensing actions. Furthermore, NRC estimates a savings of approximately 1.25 full-time equivalents per power reactor under the new rulemaking.

The vast majority of NRC staff, as well as industry representatives, interviewed by the audit team agreed that the new rule would make the

⁹ In addition to releasing former nuclear power plants for the general public's use, licensees may also release the site for other purposes such as industrial uses (e.g., leaving buildings and installing a gas-, coal-, or oil-powered generating plant).

reactor decommissioning process much more efficient. Moreover, in a 2017 congressional hearing,¹⁰ the Commission asserted that a new rule would promote more transparency and accountability than NRC's current system of granting exemptions to licensees. An industry representative stated that the decommissioning process is very inefficient right now, noting it is hard to believe just how many exemptions and license change requests licensees must submit. An NRC senior staff member opined that a majority of the work NRR must do is to exempt licensees from provisions that "are unnecessary." This person noted that NRR spends a lot of time doing extraneous work on regulatory requirements not necessary for safety, but just to meet "the letter of the law." The employee stated if the rulemaking goes through, NRR could focus on things that are more significant.

NRC has developed guidance and established agencywide principles that appear to support the new rulemaking. In its *Lessons Learned Report*, the decommissioning working group stated that "most of the licensee exemption and amendment requests do not involve safety issues and are based instead on efficiencies gained and the associated reduction of licensee resources required for a plant that is no longer operating." It continued, "NRC staff recognizes that the continued need for exemptions by licensees transitioning to decommissioning reflects a gap in the regulatory structure." It also noted, "Use of regulatory exemptions has several drawbacks when compared to having explicit regulations applicable to decommissioning plants, such as not being as efficient or predictable and not providing for public comment." Furthermore, *NRC's Principles of Good Regulation* state that regulatory activities which minimize the use of resources should be adopted, and regulatory decisions should be made without undue delay.

The draft rule has been with the Commission for over a year, and there is no indication as to when the Commission may vote on it. One commissioner publicly expressed concerns with the proposed rule in May 2019, while another implied to the audit team that the rulemaking was not a top priority.

¹⁰ *Oversight of the Nuclear Regulatory Commission, Hearing before the Committee on Environment and Public Works*; December 13, 2017.

Conclusion

Seven reactor facilities have recently begun the decommissioning process,¹¹ and nine more have announced plans to start decommissioning from 2019 to 2025. See Appendix C for nuclear power plants with announced planned shutdowns from 2019 to 2025. The number of power reactors planning to decommission is sharply increasing, while the length of time to complete the decommissionings is sharply decreasing due to the current trend of the new license transfer business model.

Since more decommissionings are imminent, NRC must be properly equipped to handle these activities. This includes ensuring guidance is clear and updated, as well as establishing a formal staff knowledge transfer process. According to an NRC Office Director, there is a “talent crisis” within NRC as much of the agency’s staff is ready to retire.¹² NRC must be prepared for impending staff retirements and turnover to effectively handle the influx of expected reactor decommissionings.

The audit team has found that NRC has done an effective job in working with licensees during the decommissioning process. While efficiencies could certainly be gained through improved guidance and a focus on knowledge transfer, perhaps the most significant improvement to the effectiveness and efficiency of the reactor decommissioning process would be the implementation of the proposed decommissioning rule.

Recommendations

OIG recommends that the Executive Director for Operations

1. Update NRR and NMSS decommissioning guidance to include the license transfer business model, the applicable

¹¹ These facilities are Crystal River, Kewaunee, Oyster Creek, Vermont Yankee, Fort Calhoun, and San Onofre, Units 2 and 3.

¹² At a Commission briefing on June 18, 2019, NRC’s Chief Human Capital Officer said the rate of retirement eligibility is increasing, with 26 per cent of NRC’s population eligible to retire by the end of fiscal year 2019. Moreover, approximately 40 per cent of the agency’s workforce will be eligible to retire by 2022.

items/recommendations of the *Lessons Learned Report*, and to further clarify the operating to decommissioning transition process.

2. Create and implement a formal project manager knowledge transfer process on decommissioning power reactors.

IV. AGENCY COMMENTS

An exit conference was held with the agency on August 13, 2019. Prior to this meeting, after reviewing a discussion draft, agency management provided comments that have been incorporated into this report, as appropriate. As a result, agency management stated their general agreement with the finding and recommendations in this report and opted not to provide formal comments for inclusion in this report.

OBJECTIVE, SCOPE, AND METHODOLOGY

Objective

To determine whether NRC's transfer of oversight responsibilities, used when operating power reactors undergo decommissioning, is efficient and effective.

Scope

This audit focused on NRC's transition process for decommissioning power reactors. The Office of the Inspector General (OIG) conducted this performance audit from January 2019 to July 2019 at the NRC headquarters (Rockville, MD). Internal controls related to the audit objective were reviewed and analyzed.

Methodology

To accomplish the audit objective, OIG reviewed relevant Federal laws, regulations, and guidance including

- Office Instruction (OI) No.: COM-101, "NRR Interfaces with NMSS."
- NMSS Policy and Procedures 5-1, Revision 3, "Reactor Decommissioning Program Procedures for Interfacing with the Office of Nuclear Reactor Regulation."
- Inspection Manual Chapter 2561, "Decommissioning Power Reactor Inspection Program."
- Title 10, Code of Federal Regulations, Section 50.82, "Termination of license."

- Title 10, Code of Federal Regulations, Section 1.42, "Office of Nuclear Material Safety and Safeguards."
- Title 10, Code of Federal Regulations, Section 1.43, "Office of Nuclear Reactor Regulation."
- Lessons Learned Report, *Power Reactor Transition from Operations to Decommissioning*.

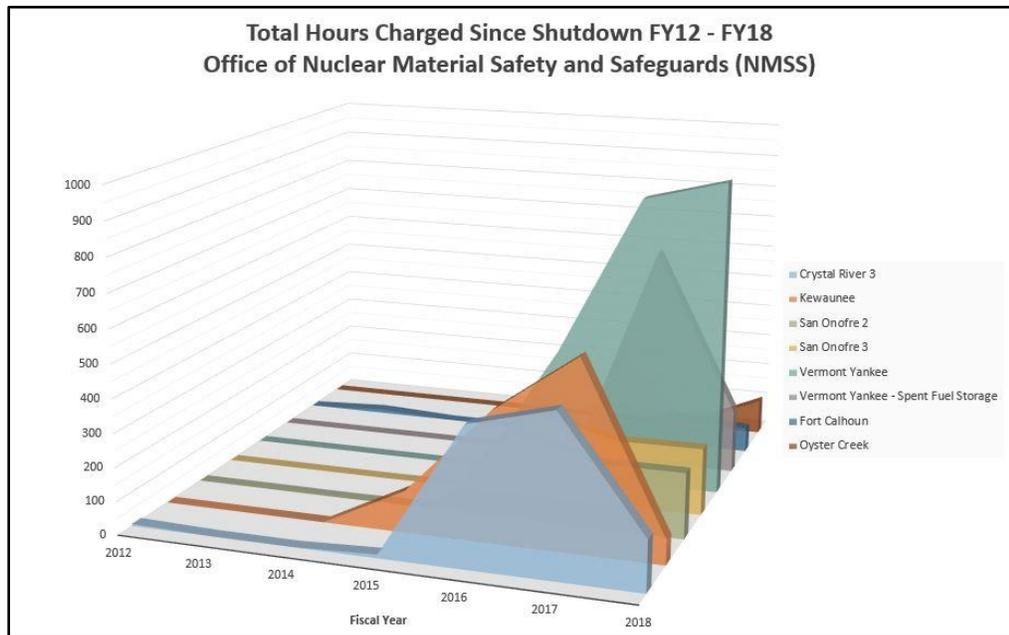
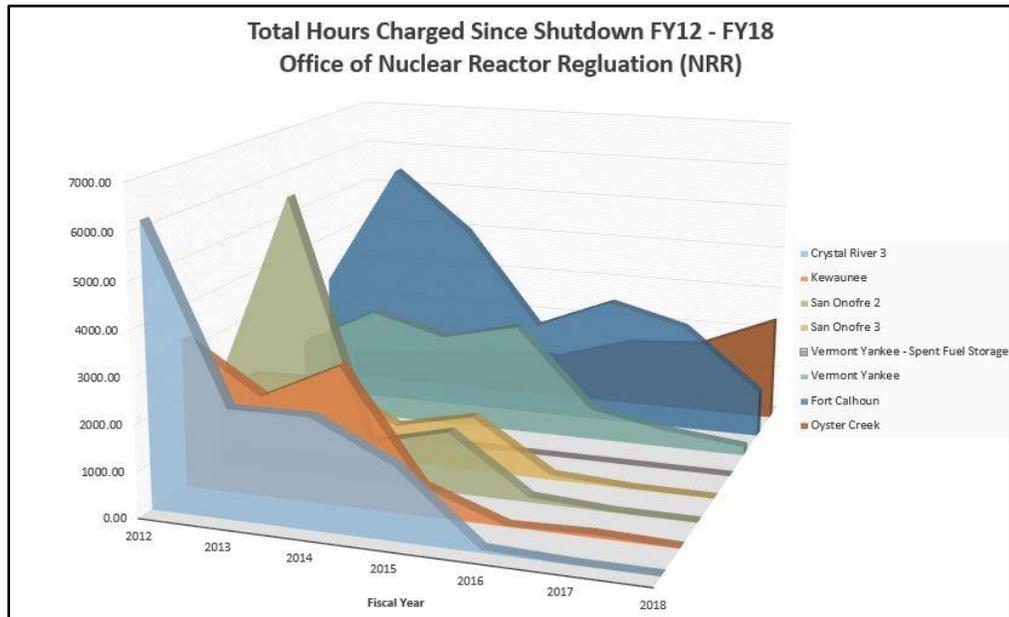
OIG conducted approximately 40 interviews of NRC staff and management to gain an understanding of the roles and responsibilities related to licensees undergoing the decommissioning process and the coordination among offices that have the responsibility of leading the regulatory review and oversight aspects of the decommissioning efforts. Auditors interviewed staff from the Office of Nuclear Reactor Regulation, the Office of Nuclear Material Safety and Safeguards, and the Office of Nuclear Security and Incident Response, as well as the regional offices. OIG also conducted approximately 10 interviews of industry representatives to get their perspectives on the decommissioning process as it relates to the handoff from NRR to NMSS.

We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our finding and conclusions based on our audit objectives.

Throughout the audit, auditors considered the possibility of fraud, waste, and abuse in the program.

The audit was conducted by Jacki Storch, Team Leader; Mike Blair, Audit Manager; Roxana Hartsock, Senior Auditor; Janelle Wiggs, Senior Auditor, and Connor McCune, Management Analyst.

Total Hours for Decommissioning Activities Charged Since Shutdown Fiscal Year 2012 – Fiscal Year 2018



Source: OIG generated using agency provided raw data

Appendix C

Nuclear Power Plants with Announced Planned Shutdowns from 2019 to 2025

Plant Name	Planned Shutdown
Three Mile Island Unit 1	September 30, 2019
Indian Point Unit 2	April 30, 2020
Duane Arnold	End of 2020
Indian Point Unit 3	April 30, 2021
Beaver Valley Unit 1	May 31, 2021
Beaver Valley Unit 2	October 31, 2021
Palisades	Spring 2022
Diablo Canyon Unit 1	November 2, 2024
Diablo Canyon Unit 2	August 26, 2025

Source: NRC

TO REPORT FRAUD, WASTE, OR ABUSE

Please Contact:

Email: [Online Form](#)

Telephone: 1-800-233-3497

TTY/TDD: 7-1-1, or 1-800-201-7165

Address: U.S. Nuclear Regulatory Commission
Office of the Inspector General
Hotline Program
Mail Stop O5-E13
11555 Rockville Pike
Rockville, MD 20852

COMMENTS AND SUGGESTIONS

If you wish to provide comments on this report, please email OIG using this [link](#).

In addition, if you have suggestions for future OIG audits, please provide them using this [link](#).