OFFICE OF THE INSPECTOR GENERAL

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

Audit of NRC's Decommissioning Funds Program

OIG-16-A-16
June 8, 2016

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

June 8, 2016

OFFICE OF THE
INSPECTOR GENERAL

MEMORANDUM TO: Victor M. McCree
Executive Director for Operations

FROM: Stephen D. Dingbaum
Assistant Inspector General for Audits

SUBJECT: AUDIT OF NRC'S DECOMMISSIONING FUNDS PROGRAM (OIG-16-A-16)

Attached is the Office of the Inspector General's (OIG) audit report titled *Audit of NRC's Decommissioning Funds Program.*

The report presents the results of the subject audit. Following the April 19, 2016, 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 recommendations within 30 days of the date of this memorandum. Actions taken or planned are subject to OIG followup 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 Eric Rivera, Team Leader, at (301) 415-7032.

Attachment: As stated

Office of the Inspector General

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

OIG-16-A-16

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Results in Brief

Why We Did This Review

The U.S. Nuclear Regulatory Commission regulates the decommissioning of nuclear power plants, material sites, fuel cycle facilities, research and test reactors, and uranium recovery facilities, with the ultimate goal of license termination. NRC maintains strict rules governing nuclear power plant and material site decommissioning. These requirements were developed to protect workers and the public during the entire decommissioning process and after the license is terminated.

Federal law and NRC regulations require power reactor and material licensees to establish or obtain a financial mechanism such as a decommissioning trust fund or a guarantee to ensure there will be sufficient money to pay for the facility's decommissioning.

The audit objectives were to identify opportunities for program improvement, and determine the adequacy of NRC's processes for coordinating with licensees to address possible shortfalls.

Audit of NRC's Decommissioning Funds Program

What We Found

The agency has adequate processes in place for coordinating with licensees to address possible decommissioning fund shortfalls. However, the Office of the Inspector General (OIG) identified multiple opportunities for improvement in the agency's decommissioning funds review process.

Specifically, NRC needs to (1) develop guidance on processing power reactor exemptions to reactor licensees, (2) re-evaluate the minimum decommissioning funding estimate formula, (3) strengthen user controls and guidance on conducting decommissioning financial assurance reviews, and (4) consistently document decommissioning financial assurance reviews for material licensees and inventory reviews of financial instruments.

What We Recommend

The report makes recommendations to improve internal controls related to decommissioning funds reviews. When implemented, these recommendations will strengthen the agency's decommissioning funds review process.

Agency management stated their general agreement with the findings and recommendations in this report.

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ABBREVIATIONS AND ACRONYMS

BWR	Boiling Water Reactor
CFR	Code of Federal Regulations
GAO	U.S. Government Accountability Office
MWt	Thermal Megawatt (Power)
NEI	Nuclear Energy Institute
NMSS	Office of Nuclear Material Safety and Safeguards
NRC	U.S. Nuclear Regulatory Commission
NRR	Office of Nuclear Reactor Regulation
OIG	Office of the Inspector General
PNNL	Pacific Northwest National Laboratory
PWR	Pressurized Water Reactor
RIS	Regulatory Issue Summary

I. BACKGROUND

The U.S. Nuclear Regulatory Commission (NRC) regulates the decommissioning of nuclear power plants,[1] material sites, fuel cycle facilities, research and test reactors, and uranium recovery facilities, with the ultimate goal of license termination. NRC maintains strict rules governing nuclear power plant and material site decommissioning. These requirements were developed to protect workers and the public during the entire decommissioning process and after the license is terminated.

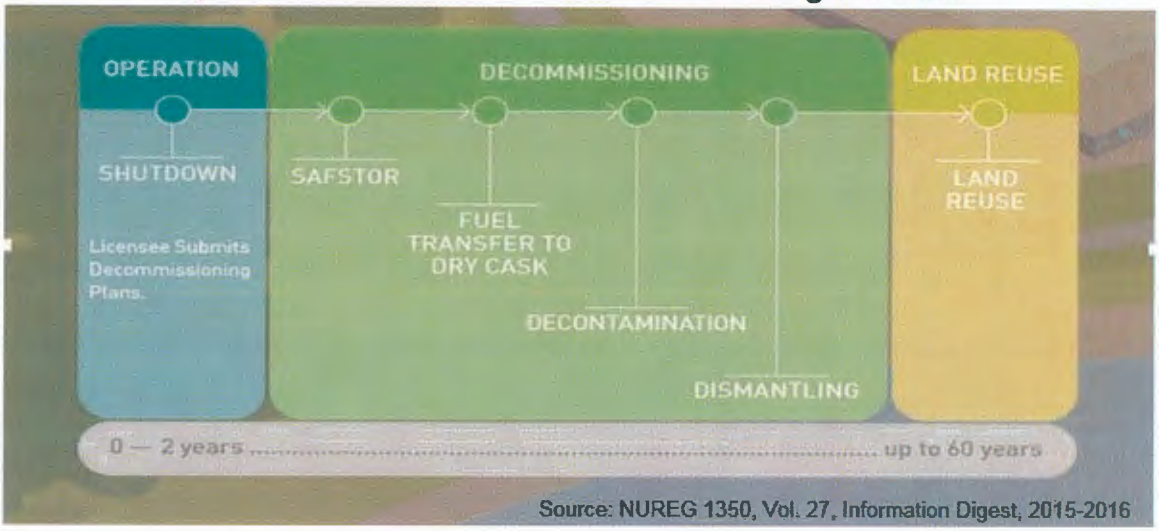
Before a nuclear power plant begins operations, the licensee is required to establish or obtain a financial mechanism such as a decommissioning trust fund or a guarantee from its parent company to ensure there will be sufficient money to pay for the decommissioning of the facility.[2] Power reactor decommissioning must be completed within 60 years (See Figure 1) of the plant ceasing operations. A time beyond that would be considered by NRC only when necessary to protect public health and safety in accordance with NRC regulations. Although there are many factors that can affect nuclear reactor decommissioning costs, generally these costs range from $300-$400 million.[3]

[1] Decommission means to remove a facility or site safely from service and reduce residual radioactivity to a level that permits: (a) release of the property for unrestricted use and termination of the license; or (b) release of the property under restricted conditions and termination of the license. (Title 10 Code of Federal Regulations (CFR), Section (§) 50.2, Definitions.)

[2] 10 CFR 50.75.

[3] NRC's Office of Public Affairs Backgrounder document titled "Decommissioning Nuclear Power Plants," dated May 14, 2015.

Figure 1: Power Reactor Decommissioning Timeline



Some material sites are also required to establish or obtain a financial instrument to ensure there will be sufficient money to pay for decommissioning the facility. An original signed financial instrument[4] must be submitted to NRC before an applicant can receive a license. An NRC Management Directive instructs NRC staff to perform internal and external inventory evaluations[5] of the financial instruments to ensure proper accounting and safeguarding. The cost to decommission these facilities ranges broadly, from a few thousand dollars up to hundreds of million dollar range.

As of July 2015, there were 19 nuclear reactors, 15 complex material sites, 5 research and test reactors, 2 fuel cycle facilities, and 11 uranium recovery facilities in decommissioning as shown in Figure 2.

[4] Under NRC regulations, a number of different types of financial instruments may be used to demonstrate financial assurance, including trusts, letters of credit, surety bonds, and parent company or self-guarantees.

[5]Internal inventory evaluations are conducted by the Office of Nuclear Material Safety and Safeguards on an annual basis. External inventory evaluations are conducted by the Office of Nuclear Reactor Regulation on a biennial basis.

Figure 2: Facilities Undergoing Decommissioning Under NRC Jurisdiction

Source: NUREG-1350, Volume 27, Information Digest 2015-2016

Federal Requirements

Reporting and Recordkeeping for Decommissioning Planning for Power Reactors

NRC regulation[6] requires power reactor licensees or applicants to provide NRC reasonable assurance that funds will be available for the decommissioning process. Each licensee or applicant is required to submit a decommissioning funding status report to NRC every 2 years. The report must contain a certification that financial assurance for decommissioning will be provided in an amount which may be more, but not less, than the amount stated in the table of minimum amounts (NRC Minimum Decommissioning Formula).[7] Reactor licensees also have the option to submit a site-specific cost estimate,[8] provided that amount is greater than the amount calculated using the minimum decommissioning formula.[9]

[6] 10 CFR 50.75.

[7] See Appendix B for a detailed description of the table of minimum amounts.

[8] A site-specific cost estimate is used to calculate the cost required to complete license termination (radiological), spent fuel management, and site restoration.

[9] The amount listed as the prescribed amount (formula) does not represent the actual cost of decommissioning for specific reactors but rather is a reference level established to assure that licensees demonstrate adequate financial responsibility that the bulk of the funds necessary for a safe decommissioning are being considered and planned for early in facility life, thus providing adequate assurance at that time that the facility would not become a risk to public health and safety when it is decommissioned. (53FR24018, 24030, June 27, 1988)

Financial Assurance for Decommissioning Material Sites

NRC regulation[10] requires that licensees provide financial assurance of funds needed for decommissioning material sites with a specific license authorizing the possession and use of byproduct material. Additionally, this regulation provides a table of amounts of financial assurance for decommissioning based on quantity of material possessed. Material licensees having possession limits exceeding the upper bounds of the table must base their financial assurance on a decommissioning funding plan.

Specific Exemptions for Reactor Licensees

The NRC Commission may, upon application by any interested person or upon its own initiative, grant exemptions from the requirements of the regulations that (1) are authorized by law, (2) will not present an undue risk to the public health and safety, and (3) are consistent with the common defense and security. The NRC Commission will not consider granting an exemption unless special circumstances[11] are present.

Agency Decommissioning Funds Process

Financial Assurance Reviews

NRC established technical and financial regulations for decommissioning licensed facilities to ensure that (1) all licensed facilities will be decommissioned in a safe and timely manner, and (2) licensees will provide adequate funds to cover decommissioning costs.

Reactor Decommissioning Funds Review

The Office of Nuclear Reactor Regulation (NRR) provides oversight of a licensee's decommissioning funding plan and mechanisms to ensure sufficient funds will be available to safely decommission nuclear reactors.

[10] 10 CFR 30.35.

[11] Examples of special circumstances in 10 CFR 50.12 include (1) application of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule, or (2) compliance would result in undue hardship or other costs that are significantly in excess of those contemplated when the regulation was adopted, or that are significantly in excess of those incurred by others similarly situated.

This oversight is based on NRR's[12] review of the biennial decommissioning funding status reports submitted by operating reactor licensees.

The most current biennial reports were submitted by licensees on or before March 31, 2015, with decommissioning fund information reflected as of December 31, 2014. NRR reviewed 104 licensee reports represented collectively by approximately $53 billion in decommissioning trust fund balances. One licensee self-reported three plants with shortfalls; the NRC staff independently calculated shortfalls ranging from approximately $6 million to $84 million. However, the licensee requested from NRC, and was granted, 20-year license extensions, which allows additional time to grow the decommissioning trust fund to make up the shortfalls.

Material Sites Decommissioning Fund Review

The Office of Nuclear Material Safety and Safeguards (NMSS) provides project management for uranium recovery facilities, and material sites undergoing decommissioning. In addition, NMSS[13] reviews and approves decommissioning financial assurance documents to ensure there are sufficient funds to safely decommission material sites. These reviews are conducted at intervals not to exceed 3 years.

NMSS' financial instrument control list disclosed 45 financial instruments and approximately $2.2 billion[14] in decommissioning funds. The decommissioning financial assurance program for material sites requires licensees to have sufficient funds available for decommissioning activities at the time of license issuance and that licensees maintain funding throughout the duration of site operations.

II. OBJECTIVES

The audit objectives were to identify opportunities for program improvement, and determine the adequacy of NRC's processes for coordinating with

[12] Five NRR staff supported the 2015 decommissioning financial assurance reviews.

[13] NMSS maintains 2.5 staff for decommissioning activities.

[14] See *Limitations on the Scope of Our Work* in Appendix A of this report.

licensees to address possible shortfalls. Appendix A of this report provides information on the audit scope and methodology.

III. FINDINGS

The agency has adequate processes in place for coordinating with licensees to address possible decommissioning fund shortfalls. However, OIG identified multiple opportunities for improvement in the agency's decommissioning funds review process. Specifically,

A. NRC guidance for processing power reactor decommissioning trust fund exemptions is subject to various interpretations.
B. The current minimum decommissioning formula needs re-evaluating.
C. Lack of user controls over Excel master data sheet.
D. Operating reactor guidance is used for decommissioning plant financial assurance reviews.
E. Inconsistent documentation of NMSS financial assurance reviews.

Findings A through D relate to power reactor decommissioning and finding E relates to material decommissioning.

A. Vague Guidance for Processing Power Reactor Exemptions

An NRC Advance Notice of Proposed Rulemaking provides scenarios for when a power reactor licensee does not need to seek an exemption from decommissioning funding requirements. However, guidance for granting exemptions is subject to various interpretations by NRC staff and licensees. This is happening because there are no objective criteria for determining the definition of legitimate decommissioning activities and guidance issued to clearly identify commingled[15] funds is not followed. As a result, the availability of funds for radiological decommissioning may be reduced. Further, establishing clear criteria for the use of decommissioning trust funds would enable licensees to request, and NRC to process exemptions more efficiently.

[15] Commingling funds means combining funds to address radiological decommissioning, spent fuel management, and site restoration in a single trust fund account.

What Is Required

An NRC Advance Notice of Proposed Rulemaking, published November 19, 2015, *Regulatory Improvements for Decommissioning Power Reactors,* discusses scenarios where a licensee would not need to request an exemption from NRC to use decommissioning trust funds for non-radiological[16] expenses. Specifically, exemptions need not be requested when the following conditions are met:

- If the licensee reports to NRC that it is commingling funds in a single trust fund account and can separately identify and account for these funds.
- If the licensee can show that its decommissioning trust includes State-required funds and the amount of radiological decommissioning funds exceed the amount of radiological decommissioning funds estimated to be needed in the licensees site-specific decommissioning cost estimate.

What We Found

NRC Guidance for Processing Power Reactor Exemptions Is Subject to Various Interpretations

NRC is processing exemptions from requirements for use of decommissioning funds based on vague guidance that is subject to various interpretations. Five nuclear power reactor sites that recently transitioned into decommissioning requested, and were granted, exemptions to use their decommissioning trust funds for non-radiological expenses. At least one of those licensees requested an exemption that did not appear to be necessary. OIG reviewed this request and NRC's reply. This licensee

[16] Decommissioning costs and expenses associated with license termination and the definition of "decommission" as per 10 CFR 50.2, are considered radiological decommissioning expenses. The three categories of decommissioning expenses are (1) radiological (i.e., license termination), (2) spent fuel management (non-radiological), and (3) site restoration (non-radiological). Cost of removal and disposal of spent fuel or non-radioactive structures and materials beyond that necessary to terminate the license is not included in the minimum amounts required by 10 CFR 50.75(c). See note 1 to 10 CFR 50.75(c).

informed NRC that they were commingling funds and their trust fund included State-required funds. Although not required, NRC made a conservative decision to have the licensee request, and NRC process, the exemption. The request for exemption was granted.

Why This Occurred

Criteria is Not Clear

There are no objective criteria[17] for determining the proper use of power reactor decommissioning trust funds. NRC regulations state, "Decommissioning trust funds may be used by licensees if the withdrawals are for expenses for legitimate decommissioning activities consistent with the definition of decommissioning in §50.2…" However, no centralized guidance document exists that lists what is or is not considered a "legitimate decommissioning activity."

Further, the agency issued guidance[18] to clarify the need for licensees who maintain commingled funds to distinguish between the radiological decommissioning fund balance and amounts accumulated for other purposes. However, licensees continue to report funds they have accumulated for other purposes as part of the amount for radiological decommissioning.

Why This Is Important

If the agency continues using vague guidance to process decommissioning trust fund exemptions, it may reduce the availability of funds needed for radiological decommissioning. In addition, clarifying decommissioning trust fund regulations reduces the likelihood of licensees requesting and NRC processing unnecessary exemption requests. This will result in a more efficient streamlined process.

[17] Agency staff stated that NUREG-1713, "Standard Review Plan for Decommissioning Cost Estimates for Nuclear Power Reactors," and other guidance documents provide some examples of allowable decommissioning expenditures.

[18] Regulatory Issue Summary (RIS) 2001-07, Revision 1, "10 CFR 50.75 Reporting and Recordkeeping for Decommissioning Planning," January 8, 2009.

Recommendations

OIG recommends that the Executive Director for Operations

1. Clarify guidance to further define "legitimate decommissioning activities" by developing objective criteria for this term.

2. Develop and issue clarifying guidance to NRC staff and licensees specifying the instances when an exemption is not needed.

B. Minimum Decommissioning Funding Estimate Formula Needs Re-evaluating

NRC's Principles of Good Regulation state that regulations should be based on use of best available knowledge from research and operational experience. However, NRC's current minimum decommissioning funding estimate formula (the formula) is based on studies conducted in 1978 - 1980. In addition, NRC generally does not identify shortfalls during the biennial review process. Although there have been multiple recommendations by separate entities for management to update the formula, it remains unchanged. Furthermore, the agency's secondary review process for the reviews of biennial submissions are not adequate. If not re-evaluated, the current formula may not provide a realistic estimate of minimum funds needed to decommission which could lead to a loss of public confidence in NRC's process.

What Is Required

Use of Best Available Knowledge

NRC Principles of Good Regulation state that regulations should be based on use of best available knowledge from research and operational experience. These principles further state, once established, regulation should be perceived to be reliable and not unjustifiably in a state of transition. Regulatory actions should always be fully consistent with written regulations and should be promptly, fairly, and decisively administered so as to lend stability to the nuclear operational and planning processes.

What We Found

The Current Minimum Decommissioning Formula Needs Re-evaluating

The formula used by staff and licensees to calculate the minimum decommissioning cost estimate was implemented in 1988 and based on studies conducted in 1978 - 1980.[19] Specifically,

- Most power reactor licensees rely on site-specific cost estimates.
- NRC staff normally do not identify shortfalls.
- Agency staff used some outdated values to calculate the formula.

Licensees Rely on Site-Specific Cost Estimates

Most power reactor licensees rely on site-specific cost estimates for decommissioning planning purposes, not on the formula established by regulations. An industry representative stated that approximately 95 percent of reactor licensees have a site-specific cost estimate even though they do not necessarily provide it to NRC with the biennial financial assurance submission. In addition, a licensee stated that the NRC minimum formula estimated $600 million; however, the site-specific decommissioning cost estimate was $2.2 billion for radiological decommissioning of the site.[20] This licensee also stated that the formula serves as a guide for radiological decommissioning, but it does not cover the funds needed for all decommissioning costs so licensees do not rely on it.

NRC Staff Normally Do Not Identify Shortfalls

Through its review, NRC staff normally do not identify shortfalls during biennial financial assurance reviews. To determine if there is a potential funding shortfall, staff compare the current balance of the licensee's decommissioning trust fund, plus any other funds that will be accumulated by

[19] The agency stated in multiple meetings with OIG that SECY-13-0066, written in response to the ***Draft*** Pacific Northwest National Laboratory (PNNL) study dated November 2011, validates the 1978-1980 studies.

[20] Agency staff stated that the NRC minimum formula estimate is for a single-reactor site. The site specific cost estimate total is for a multi-reactor site and also includes costs associated with State requirements for processing decommissioning waste. OIG information was obtained from the licensee at a site visit and no evidence was provided by agency staff to support their statement.

the expiration of the operating license, to the amount calculated by staff using the NRC minimum decommissioning formula. If the licensee funds are less than the NRC calculated formula amount, it is considered a shortfall. Shortfalls can either be identified by the financial analyst or self-identified and reported by licensees. When identified, shortfalls are reported to the Commission. Licensees have until the next reporting cycle to rectify the potential shortfall. Also the licensee may correct the shortfall by selecting an option such as a license extension to allow more time for the funds to accumulate. NRC staff stated that the regulatory system has been successful in the past, since no reactor has failed to perform its decommissioning obligation due to lack of funds.

NRC Staff Used Some Outdated Values to Calculate the Formula

Agency staff used some outdated values in the formula to calculate the minimum decommissioning cost estimates. Staff completed 104 operating plant biennial status reviews for the period ended December 31, 2014. Of these 104 reviews, OIG sampled 26 to verify the accuracy and consistency of the agency's application of the formula. OIG found that

- Of the 26 sampled, 6 (23 percent) were inaccurate because NRC staff included outdated values for the Thermal Megawatt (MWt) Power used to calculate the minimum decommissioning cost estimates using the agency's formula (see Appendix B for the NRC formula).
- Of the six inaccuracies[21] noted above, four incorrectly calculated the estimated 1986 dollars component of the formula, based on the outdated MWt value.

OIG informed staff of these inaccuracies. NRC staff stated that incorrect values were used due to an oversight in capturing the power uprate change for the nuclear power plants. The staff has since independently verified that the formula errors were corrected and has recalculated the NRC minimum needed for decommissioning for the identified six plants. No shortfalls were identified within the six inaccuracies.

[21] Two of the six plants had MWt values greater than 3,400 resulting in the use of default 1986 dollar (1986$) values in accordance with 10 CFR 50.75 (c)(1)(i) and (ii).

Why This Occurred

NRC management has not updated or changed the formula despite multiple recommendations to do so. In SECY-13-0066 dated June 20, 2013, staff provided its justification for not updating the formula after the November 2011 Draft Pacific Northwest National Laboratory (PNNL) Study and also addressed prior OIG and U.S. Government Accountability Office (GAO) comments. No staff requirements memorandum has been issued by the Commission to address SECY-13-0066.

The agency is currently in the initial stages of proposed rulemaking to implement regulatory improvements for decommissioning power reactors. In light of this, the agency should take appropriate steps to evaluate the formula.

There is also a lack of an adequate review process of manual data input to calculate the minimum decommissioning cost estimates using the agency's formula.

Multiple Recommendations to Revise Formula

There were three studies conducted by PNNL and audit reports conducted by NRC OIG and GAO that made recommendations related to revising the minimum decommissioning formula, but NRC elected to not revise it.

In addition, OIG suggests that, to determine power reactor minimum decommissioning funds, NRC considers developing a range of costs based on MWt values similar to the table found in 10 CFR 30.35(d).

PNNL Studies

NRC contracted with PNNL three times to evaluate the NRC formula and provide recommendations for updating it. These studies are described below.

- Late 1970s – The current formula is based on these studies,[22] which were part of an effort to understand the requirements for decommissioning sites and were based on decommissioning technology and experience from that time period.

- Mid 1990s – Studies reflected changes in decommissioning technology and decommissioning experience gained. PNNL updated the decommissioning cost estimates to 1993 dollars, but no change to the formula was made by NRC.

- Mid 2000s – PNNL evaluated the adequacy of the minimum decommissioning fund requirement by reviewing additional nuclear power plant decommissioning experience and changes in decommissioning technology and practices. As a result, PNNL provided a draft report that proposed a revised formula, including new weighting of the adjustment factors and a new base year (2010), yet no change to the formula was made by NRC.

Audit Reports

- NRC OIG found that licensee site-specific cost estimates were generally higher than the estimates calculated using the agency's formula.[23] OIG recommended that staff "update NRC's decommissioning formula considering the relationship between formula based and site-specific estimates," yet no change to the formula was made by NRC.

- GAO also issued a report that suggested revising decommissioning regulations.[24] NRC Regulatory Guide 1.159, *Assuring the Availability of Funds for Decommissioning Nuclear Reactors Regulatory Guide,*

[22] NUREG/CR-0130, June 1978, "Technology, Safety and Costs of Decommissioning a Reference Pressurized Water Reactor (PWR) Power Station." This study developed a detailed decommissioning cost estimate for a reference PWR, the Trojan nuclear power plant, which has since been decommissioned.

NUREG/CR-0672, June 1980, "Technology, Safety and Costs of Decommissioning a Reference Boiling Water Reactor (BWR) Power Station." This study developed a detailed decommissioning cost estimate for a reference BWR, the Columbia (formerly WNP-2) nuclear power plant.

[23] OIG-06-A-07, *Follow-up Audit of NRC's Decommissioning Fund Program.*

[24] GAO-12-258, *Nuclear Regulation - NRC's Oversight of Nuclear Power Reactors' Decommissioning Funds Could Be Further Strengthened.*

Revision 2, October 2011, states that the formula does not represent the actual cost of decommissioning, but the "bulk" of funds needed. GAO recommended NRC define the term "bulk" of funds. NRC has not defined "bulk" of funds.

Despite the fact that numerous studies and audits were conducted, NRC has not updated the formula for over 30 years.

Lack of Adequate Review Process

NRC's staff secondary review process of the work conducted on the 2015 biennial submissions is not adequate. Since 2011, the biennial review process has been automated to streamline the staff's analysis. A lead financial analyst is designated each year to spearhead the biennial reviews. This individual is responsible for updating information for each nuclear reactor site in the Minimum Decommissioning Funding Assurance Data Sheet,[25] also referred to as the Excel master data sheet, as of December 31 of the previous year. In addition, this person is responsible for the setup of individual operating reactor templates where information is auto-populated from the Excel master data sheet. These templates are used by financial analysts to manually input data from licensee biennial reports such as the dollar amount in the decommissioning trust fund, and to compute the minimum amount of financial assurance needed using the agency's formula, to determine if the licensee has adequate financial assurance. Once this initial review is complete, a second financial analyst verifies the accuracy of the information that was manually input. A quality assurance reviewer then selects a random sample to validate the accuracy and completeness of the independent financial assurance reviews of the biennial reports. All six calculation inaccuracies identified by OIG received an initial and secondary review. None of the secondary reviews performed by the agency noted the outdated MWt values.

[25] Contains information to perform the calculation of the minimum decommissioning amount using the agency's formula. It includes items such as reactor type (PWR/BWR); thermal power level (Megawatt; MWt); termination date of operations; adjustment factors for labor, energy, and waste burial costs; and 1986$ base amount.

Why This Is Important

As a result of management's decision to not update the formula, vulnerabilities remain for decommissioning funding shortfalls and potential adverse impacts on the reliability of NRR's assessment of licensee financial assurance and the minimum estimate of funds needed for decommissioning. An outdated formula can potentially lead to a loss of public confidence in the agency's efforts to ensure that licensees have sufficient money to cover decommissioning costs.

Recommendations

OIG recommends that the Executive Director for Operations

3. Prepare and document an analysis to evaluate:
    a. If requiring a site-specific cost estimate is more efficient and effective than using the formula.
    b. If using a range of costs based on MWt is more efficient and effective than using the formula.
    c. If the formula needs updating.

4. Update LIC-205 to assure that the staff's independent verification of licensees' decommissioning funding assurance includes steps to verify data is accurate and current.

C. Weak User Controls over Excel Master Data Sheet

NRC does not appropriately address user controls over the Excel master data sheet used by NRR staff for decommissioning financial assurance reviews. According to Federal guidance, good business practice includes internal control techniques to appropriately control user accounts. NRR allows multiple users to access the Excel master data sheet because controls have not been established to limit user controls to protect data integrity. As a result, there is an increased potential for faulty decision making related to financial assurance.

What Is Required

User Controls Should Be Properly Addressed

Good business practice[26] includes internal control techniques to appropriately control user accounts to preserve data integrity. The control techniques include limiting access to individuals with a valid business purpose and at the least privilege[27] necessary to perform their duties.

What We Found

Lack of User Controls over Excel Master Data Sheet

Excel master data sheet user controls are not in place. The agency financial analysts use the Excel master data sheet as a repository for information such as thermal power level and reactor type in calculating the minimum decommissioning cost estimates using the NRC formula. This information is then automatically populated into the individual operating reactor templates used by financial analysts to conduct financial assurance reviews. Specifically, user access is not limited to the least privilege needed to complete responsibilities, allowing multiple users access to the Excel master data sheet.

Why This Occurred

User Controls Have Not Been Established

NRR does not appropriately address user controls over the Excel master data sheet because management has not established controls to protect data

[26] These practices are consistent with control techniques outlined in the Federal Information System Controls Audit Manual which is based on the National Institute of Standards and Technology Special Publication 800-53, Revision 4, *Security and Privacy Controls for Federal Information Systems and Organizations.*

[27] Principle requiring that each subject be granted the most restrictive set of privileges needed for the performance of authorized tasks. Application of this principle limits the damage that can result from accident, error, or unauthorized use of an information system.

integrity. NRR staff acknowledged that the Excel master data sheet used to be locked but was uncertain why it is no longer secured. Staff agreed with the need to secure the Excel master data sheet to maintain the integrity of the information it contains.

Why This Is Important

Increased Potential for Faulty Decision Making

Due to the lack of user controls over NRR staff's Excel master data sheet, there is potential for unauthorized access, data manipulation, or alterations to the formula components. This could lead to decommissioning fund decisions based on inaccurate information.

Recommendation

OIG recommends that the Executive Director for Operations

5. Develop and implement controls to protect data integrity in the Excel master data sheet.

D. Guidance Can Be Improved

NRR Office Instruction LIC-205 provides procedures for NRC's independent analysis of financial assurance for operating power reactors; however, the agency also uses this guidance to conduct financial assurance reviews for plants in decommissioning status. Additionally, NRC staff are not fully following the LIC-205 training procedures for decommissioning financial assurance reviews. This is due to NRC's lack of guidance in LIC-205 specific to performing decommissioning plant financial assurance reviews and inadequate documentation of training provided to management. Enhancing guidance and training increases NRC's ability to properly identify misused radiological decommissioning funds.

What Is Required

Federal and Agency Guidance

Standards for Internal Control in the Federal Government[28] state that policies and procedures enforce management's directives to achieve the entity's objectives and address related risks. Additionally, these standards state management needs to identify appropriate knowledge and skills for various jobs and provide necessary training.

NRR Office Instruction LIC-205, *Procedures for NRC's Independent Analysis of Decommissioning Funding Assurance for Operating Nuclear Power Reactors*, includes a detailed description of the 11-step biennial financial assurance review process for operating reactors. The first step is training for the biennial review process. It refers the reader to Appendix B, where specific training procedures for the positions of lead financial analyst, financial analysts, quality assurance reviewer, and branch chief are described.

What We Found

Operating Reactor Guidance is used for Decommissioning Plant Financial Assurance Reviews

NRC uses NRR Office Instruction LIC-205, which was developed for operating reactor financial assurance reviews, to conduct decommissioning reactor financial assurance reviews.

Information contained in reports for operating and decommissioning plants are different. Accordingly, separate guidance for operating and decommissioning plants is essential.

Operating plants must follow the regulatory requirements which include submitting a biennial decommissioning trust fund financial assurance report to NRC. This operating plant report must contain

[28] GAO-14-704G, dated September 2014.

- The amount of decommissioning funds estimated to be required.
- The amount of decommissioning funds accumulated to the end of the calendar year preceding the date of the report.
- A schedule of the annual amounts remaining to be collected.
- The assumptions used regarding rates of escalation in decommissioning costs, rates of earnings on decommissioning funds, and rates of other factors used in funding projections.
- Any contracts upon which the licensee is relying.
- Any modifications occurring to a licensee's current method of providing financial assurance since the last submitted report.
- Any material changes to trust agreements.

Any licensee for a plant that is within 5 years of the projected end of its operation, or where conditions have changed such that it will close within 5 years (before the end of its licensed life), or that has already closed (before the end of its licensed life), or that is involved in a merger or an acquisition shall submit this report annually.

Decommissioning plants are required to submit an annual report to NRC that includes

- The amount spent on decommissioning, both cumulative and over the previous calendar year, the remaining balance of any decommissioning funds, and the amount provided by other financial assurance methods being relied upon.
- An estimate of the costs to complete decommissioning, reflecting any difference between actual and estimated costs for work performed during the year, and the decommissioning criteria upon which the estimate is based.
- Any modifications occurring to a licensee's current method of providing financial assurance since the last submitted report.
- Any material changes to trust agreements or financial assurance contracts.

If the sum of the remaining decommissioning funds and other financial assurance methods relied on does not cover estimated decommissioning completion costs, the financial assurance report must include additional financial assurances to cover the estimated cost of completion.

NRR Is Not Fully Following LIC-205 Procedures

NRR is not fully following LIC-205 procedures related to training. According to LIC-205, the Financial Analysis and International Projects Branch staff associated with performing the financial analysis of the decommissioning funding status reports are required to participate in training sessions to learn the financial assurance review process. The lead financial analyst reportedly conducted a kick-off meeting and one-on-one training sessions with the financial analysts, but no documentation of the training sessions could be provided.

Additionally, LIC-205 requires each staff member to complete the "Learn One, Watch One, Complete One" training unless there is an exemption from the instructor. There was one NRR staff member who stated they did not receive training and did not obtain an exemption.

Why This Occurred

Lack of Guidance

The agency has not developed guidance specific to conducting decommissioning plant financial assurance reviews. NRC staff confirmed there were no written procedures for decommissioning plant financial assurance reviews, but the steps were similar to operating plant decommissioning financial assurance reviews, so they used LIC-205. NRR staff stated they intend to revise LIC-205 to include steps for performing financial assurance reviews for plants in decommissioning.

Inadequate Management Monitoring

Due to inadequate management monitoring, NRR is not maintaining appropriate records consistent with LIC-205 to demonstrate biennial decommissioning financial assurance review training completion. NRC staff stated that they were provided one-on-one training by the lead financial analyst, but there was no documentation to confirm training was conducted.

NRC management stated that staff follows the training requirements stated in ADM-504, Qualification Program, Revision 3, dated February 16, 2015. NRC management acknowledged that ADM-504 is not mentioned in LIC-205.

Why This Is Important

Enhancing guidance for performing reviews of decommissioning plant financial assurance increases NRC's ability to identify misused funds. Further, with proper guidance, decommissioning financial assurance reviews can be conducted consistently and there will be documentation for a new employee to follow.

If staff is not documenting completed training there is a potential risk for decreased knowledge management. Without sufficient knowledge the staff may not be able to optimally perform their work.

Recommendations

OIG recommends that the Executive Director for Operations

6. Revise NRR Office Instruction LIC-205 to include

    a. Guidance on conducting annual decommissioning financial assurance reviews for plants in decommissioning.

    b. Reference to training qualifications/certifications described in ADM-504, *Qualification Program*, Revision 3.

    c. Recordkeeping requirements to document employee completed training.

E. Lack of Documentation for Material Licensees

The agency does not consistently document decommissioning financial assurance reviews for material licensees or inventory reviews on financial instruments. This is because there are no procedures for maintaining documentation of decommissioning financial assurance reviews, no tracking mechanism for NMSS decommissioning financial assurance reviews, and management has not made it a priority to conduct and document internal/external inventory reviews. As a result, there is increased risk for misplaced or lost records and potential release of unauthorized proprietary information. Further, by improving recordkeeping practices, knowledge management can be enhanced.

What Is Required

Federal standards state that creation and maintenance of records provide evidence of execution of internal controls. NRC guidance establishes requirements to protect and account for financial assurance inventory.

Federal Standards

According to the Standards for Internal Control in the Federal Government,[29] internal control and all transactions and significant events need to be clearly documented, and documentation should be readily available for examination.

NRC Guidance

Management Directive 8.12, *Decommissioning Financial Assurance Instrument Security Program,* establishes requirements for the agency to perform an annual internal inventory and a biennial external inventory of the financial instruments contained in the NMSS safe to ensure proper protection and accounting of these instruments.

Annual Internal Inventory

Financial assurance instrument custodians are required to perform an annual verification of the decommissioning financial assurance inventory to ensure proper accounting of all instruments. The custodians use their financial assurance inventory-controlled list to verify whether the instruments provided on the list are in fact, in the safe and whether information related to the instruments is correct, current, and complete. After verification, custodians are required to prepare a report for management providing the results, identifying discrepancies, and recommending actions to correct discrepancies.

Biennial External Inventory

NRR is required to perform an external verification of 25 percent of the financial assurance instruments in the NMSS safe every 2 years. If any major concerns are identified, NRR is required to evaluate an additional 25 percent

[29] GAO-14-704G, dated September 2014.

of the instruments, at its discretion. Results of this review are required to be submitted via a report to NMSS management.

What We Found

Inconsistent Documentation of NMSS Financial Assurance Reviews

The agency does not consistently document financial assurance reviews. OIG asked staff to provide a consolidated list of all the NMSS financial assurance reviews conducted during the 2014-2015 time frame. Staff provided a consolidated list but stated that they could not attest it was all-inclusive. A sample of the reviews was selected by OIG for further analysis and NMSS staff stated the sample was a mix of both NRR and NMSS reviews. For the selected NMSS reviews, copies of the completed reviews including any markings, notes, or comments that indicated NMSS' review were requested. The agency provided copies of licensee submittals with no written comments/markings indicating that a financial assurance review was, in fact, performed. NMSS staff stated they generally do not keep copies of their completed reviews unless they identify a problem.

Internal and external inventory reviews are also inconsistently documented and are not conducted in a timely manner. OIG requested documentation for the previous four internal and external inventory reviews. Agency staff stated that there was an internal inventory review conducted by NMSS in 2015, however, there was no documentation for this or any previous years. Additionally, staff provided documentation of external inventory reviews performed by NRR for 2010 and 2013. According to agency guidance, if there was a review performed in 2010, the next review should have been in 2012. However, NRC did not perform an external review in 2012. NMSS staff were unable to provide documentation for external reviews prior to 2010.

Why This Occurred

There are no procedures on documenting financial assurance reviews and no tracking mechanism to confirm that financial assurance reviews are completed. Additionally, the agency has not made it a management priority to conduct and document internal and external inventory reviews of the financial instruments in the NMSS safe.

Lack of NMSS Documentation Procedures

There are no specific procedures on how to document financial assurance reviews. Staff use NUREG 1757, Volume 3, Revision 1, *Consolidated Decommissioning Guidance, Financial Assurance, Recordkeeping, and Timeliness, Final Report*, to guide their financial assurance reviews. While this guidance identifies what the licensee is required to submit, this guidance does not describe how NMSS maintains documentation of financial assurance reviews.

No Tracking Mechanism

NMSS does not keep a list of decommissioning financial assurance reviews performed. Staff stated that the site project managers in NMSS are responsible for tracking the status of tasks. When the site project manager identifies a need for a financial assurance review, they submit a technical assistance request via email to the Performance Assessment Branch Chief. The Branch Chief then assigns a financial analyst to the review. The Performance Assessment Branch does not track the technical assistance requests, the completed review, or any due dates.

Not a Management Priority

The agency has not made it a management priority to conduct and document internal and external inventory reviews in accordance with Management Directive 8.12. NRC management acknowledged that internal and external inventory reviews of the financial instruments in the NMSS safe have not been performed in a timely manner or documented properly.

Why This Is Important

Without documentation of financial assurance or internal/external inventory reviews, there is increased risk for misplaced or lost records and potential release of unauthorized proprietary information. Further, by enhancing recordkeeping, the agency will have records available for training and knowledge management purposes.

Recommendations

OIG recommends that the Executive Director for Operations

7. Develop procedures for maintaining documentation of decommissioning financial assurance reviews performed by NMSS.

8. Develop and implement a mechanism to track NMSS decommissioning financial assurance reviews.

9. Comply with Management Directive 8.12 provisions related to conducting internal and external inventory, including recordkeeping requirements.

IV. CONSOLIDATED LIST OF RECOMMENDATIONS

OIG recommends that the Executive Director for Operations

1. Clarify guidance to further define "legitimate decommissioning activities" by developing objective criteria for this term.

2. Develop and issue clarifying guidance to NRC staff and licensees specifying the instances when an exemption is not needed.

3. Prepare and document an analysis to evaluate:
   a. If requiring a site-specific cost estimate is more efficient and effective than using the formula.
   b. If using a range of costs based on MWt is more efficient and effective than using the formula.
   c. If the formula needs updating.

4. Update LIC-205 to assure that the staff's independent verification of licensees' decommissioning funding assurance includes steps to verify data is accurate and current.

5. Develop and implement controls to protect data integrity in the Excel master data sheet.

6. Revise NRR Office Instruction LIC-205 to include
   a. Guidance on conducting annual decommissioning financial assurance reviews for plants in decommissioning.
   b. Reference to training qualifications/certifications described in ADM-504, *Qualification Program*, Revision 3.
   c. Recordkeeping requirements to document employee completed training.

7. Develop procedures for maintaining documentation of decommissioning financial assurance reviews performed by NMSS.

8. Develop and implement a mechanism to track NMSS decommissioning financial assurance reviews.

9. Comply with Management Directive 8.12 provisions related to conducting internal and external inventory, including recordkeeping requirements.

V. AGENCY COMMENTS

An exit conference was held with the agency on April 19, 2016. Prior and subsequent to this meeting, agency management reviewed a discussion draft and provided comments that have been incorporated into this report as appropriate. As a result, agency management opted not to provide formal comments for inclusion in this report.

Appendix A

OBJECTIVES, SCOPE, AND METHODOLOGY

Objectives

The audit objectives were to identify opportunities for program improvement, and determine the adequacy of NRC's processes for coordinating with licensees to address possible shortfalls.

Scope

This audit focused on assessing the adequacy of NRC's processes for coordinating with reactor licensees to address possible shortfalls. During this audit, OIG sampled the Decommissioning Funding Status Reports as of December 31, 2014, and recalculated the agency's calculation of the minimum decommissioning cost estimates using the NRC formula.

We conducted this performance audit at NRC headquarters in Rockville, Maryland, from August 2015 through February 2016. OIG also reviewed and analyzed internal controls related to the audit objectives. Throughout the audit, auditors were aware of the possibility of fraud, waste, and abuse in the program.

Limitations on the Scope of Our Work

There were limitations on the scope of our audit work; namely, OIG was not able to verify the accuracy of the controlled list of original financial instruments maintained by NMSS. The financial instruments are maintained in a safe which was broken and inaccessible. NMSS was not able to get the safe repaired and opened until after the completion of OIG's verification phase of this audit. These scope limitations result in our inability to perform an independent inventory to accurately verify information related to the financial instruments in NMSS' safe.

Methodology

OIG reviewed relevant laws, regulations, and guidance, including Management Directive 8.12, *Decommissioning Financial Assurance Instrument Security Program,* and the *Status of the Decommissioning Program 2014 and 2015 Annual Reports.* OIG also reviewed relevant CFR cites, NRC NUREGS and Regulatory Guides, including

Title 10

CFR Part	Title
30.35	Financial assurance and recordkeeping for decommissioning
50.2	Definitions
50.12	Specific exemptions
50.75	Reporting and recordkeeping for decommissioning planning
50.82	Termination of license

NUREGS	Title
1307 Rev 15	Report on Waste Burial Charges Changes in Decommissioning Waste Disposal at Low-Level Waste Burial Facilities
1350	NRC Information Digest 2015 - 2016
1757 Vol 3 Rev 1	Consolidated Decommissioning Guidance Financial Assurance, Recordkeeping, and Timeliness

NRC Regulatory

Guide	Title
1.159 Rev 2	Assuring the Availability of Funds for Decommissioning Nuclear Reactors Regulatory Guide
1.185 Rev 1	Standard Format and Content For Post-Shutdown Decommissioning Activities
1.202	Standard Format and Content of Decommissioning Cost Estimates For Nuclear Power Reactors

In addition, OIG reviewed Nuclear Energy Institute (NEI) documents, Fact Sheets, and interviewed NEI officials to gain their perspective on Draft Guidance NEI 15-06, *Use of Nuclear Decommissioning Trust*

Fund, and NRC's Decommissioning Trust Fund Program. OIG also attended a public meeting on January 7, 2016, regarding Draft Guidance NEI 15-06.

OIG also reviewed NRR Office Instruction LIC-205, Revision 5, *Procedures for NRC's Independent Analysis of Decommissioning Funding Assurance for Operating Nuclear Power Reactors*, and relevant SECY and NRC RIS documents.

During this audit OIG reviewed and analyzed prior GAO and OIG audit reports related to the following topics: NRC's (1) decommissioning fund program, (2) assurances of decommissioning funding, and (3) accumulation of funds to decommission nuclear power plants.

OIG also reviewed and analyzed various studies and contractor efforts related to decommissioning such as:

- Draft PNNL Study, Assessment of the Adequacy of the 10 CFR 50.75(c) Minimum Decommissioning Fund Formula (2012)

- Callan 2014 Nuclear Decommissioning Funding Study (December 31, 2013)

OIG interviewed staff from NRR, NMSS, the Office of the General Counsel, and NEI. In anticipation of conducting this audit, two members of the audit team participated in decommissioning training sponsored by Argonne National Laboratory. In addition, NMSS and NRR provided OIG staff with an overview of the decommissioning funding program. In order to receive a first-hand look at decommissioning and other NRC processes, audit team members participated in site visits at the following locations:

- Zion Nuclear Power Plant, Illinois.
- Humboldt Bay Nuclear Power Plant, California.
- Diablo Canyon Nuclear Power Plant, California.
- San Onofre Nuclear Generating Station, California.

We conducted this performance audit in accordance with generally accepted government auditing standards (except as noted earlier with regard to access to the original financial instruments maintained by NMSS). 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. Except for the scope limitation regarding access to the financial instruments maintained by NMSS, we believe the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

This audit was conducted by Eric Rivera, Team Leader; Terri Cooper, Audit Manager; Gail Butler, Senior Auditor; Michael Steinberg, Senior Auditor; Jimmy Wong, Management Analyst; and Chanel Stridiron, Auditor.

Appendix B

THE NUCLEAR REGULATORY COMMISSION'S MINIMUM DECOMMISSIONING FUNDING ESTIMATE FORMULA

The complete two-tiered NRC minimum decommissioning funding estimate formula provided in 10 CFR 50.75(c) is shown below:

(c) Table of minimum amounts (January 1986 dollars) required to demonstrate reasonable assurance of funds for decommissioning by reactor type and power level, P (in MWt); adjustment factor.[1]

		Millions
(1)(i) For a PWR:	greater than or equal to 3400 MWt	$105
	between 1200 Mwt and 3400 Mwt (For a PWR of less than 1200 Mwt, use P=1200 Mwt)	$(75+0.0088P)
(ii) For a BWR:	greater than or equal to 3400 MWt	$135
	between 1200 Mwt and 3400 Mwt (For a BWR of less than 1200 Mwt, use P=1200 MWt)	$(104+0.009P)

(2) An adjustment factor at least equal to 0.65 L + 0.13 E + 0.22 B is to be used where L and E are escalation factors for labor and energy, respectively, and are to be taken from regional data of U.S. Department of Labor Bureau of Labor Statistics and B is an escalation factor for waste burial and is to be taken from NRC report NUREG-1307, "Report on Waste Burial Charges."

[1] Amounts are based on activities related to the definition of "Decommission" in § 50.2 of this part and do not include the cost of removal and disposal of spent fuel or of nonradioactive structures and materials beyond that necessary to terminate the license.

The first tier of the formula computes the minimum decommissioning amount, in 1986 dollars, that will be needed at the time of permanent cessation of operations. The first tier is based on the reactor type and power level of the reactors.

The second tier of the formula adjusts the amount computed in the first tier, from 1986 dollars to current year dollars, based on escalation factors of labor, energy, and burial. The factors for labor and energy are found in regional data of U.S. Department of Labor, Bureau of Labor Statistics, and the factor for burial is found in NRC's NUREG-1307, "Report on Waste Burial Charges," which is updated approximately every two years.

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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.