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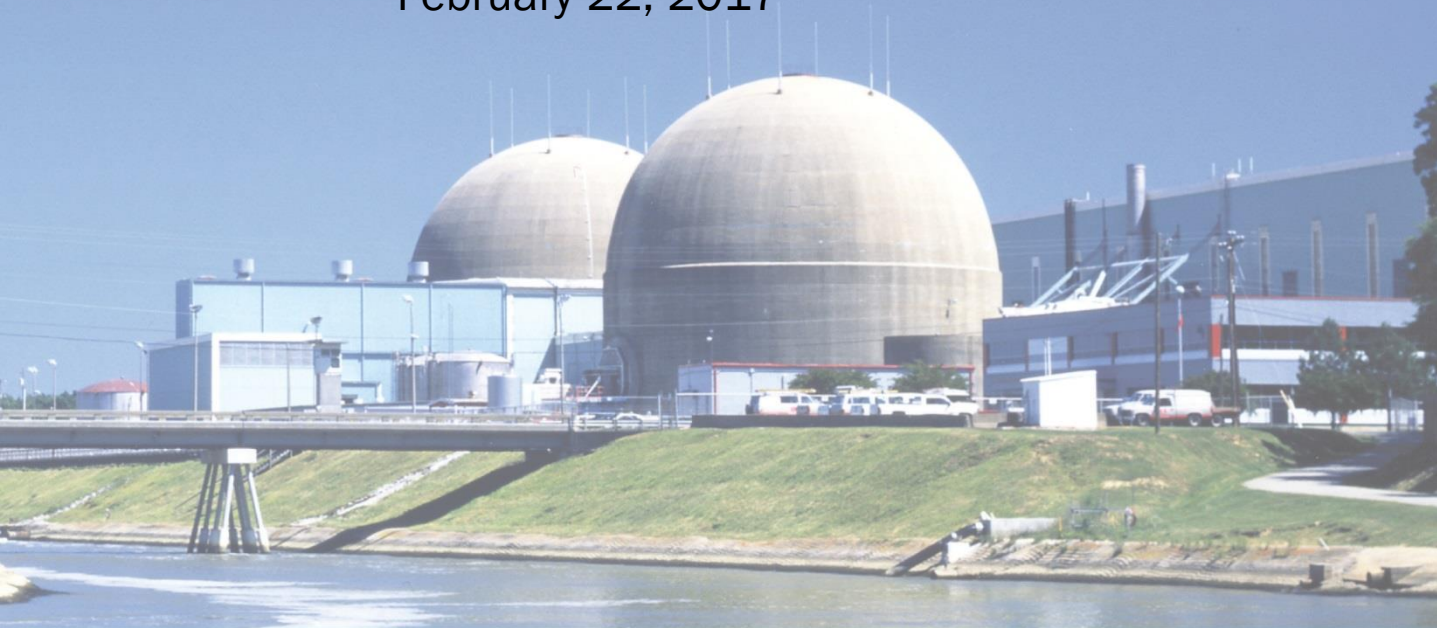
U.S. NUCLEAR REGULATORY COMMISSION

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Audit of NRC's Oversight of Security at Decommissioning Reactors

OIG-17-A-09

February 22, 2017



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

**OFFICE OF THE
INSPECTOR GENERAL**

February 22, 2017

MEMORANDUM TO: Victor M. McCree
Executive Director for Operations

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

SUBJECT: AUDIT OF NRC'S OVERSIGHT OF SECURITY AT
DECOMMISSIONING REACTORS (OIG-17-A-09)

Attached is the Office of the Inspector General's (OIG) audit report titled *Audit of NRC's Oversight of Security at Decommissioning Reactors*.

The report presents the results of the subject audit. Following the February 9, 2017, 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 Beth Serepca, Team Leader, at (301) 415-5911.

Attachment: As stated



Office of the Inspector General

U.S. Nuclear Regulatory Commission

Defense Nuclear Facilities Safety Board

Results in Brief

OIG-17-A-09

February 22, 2017

Why We Did This Review

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 license.

NRC has rules governing power plant decommissioning that protects workers and the public during the decommissioning process. For example, NRC regulations require power plant licensees to establish, maintain, and implement an insider mitigation program.

In addition, NRC has regulations for the management of worker fatigue. These regulations are designed to ensure licensees effectively manage worker fatigue and provide reasonable assurance that workers are able to safely and competently perform their duties.

The audit objective was to determine whether NRC's oversight of security at decommissioning reactors provides for adequate protection of radioactive structures, systems, and components.

Audit of NRC's Oversight of Security at Decommissioning Reactors

What We Found

NRC's oversight of security at decommissioning reactors provides for adequate protection of radioactive structures, systems, and components. However, OIG identified opportunities for program improvement. Specifically, OIG found that

1. NRC regulations lack clarity on which elements of fitness-for-duty decommissioning licensees must implement.
2. NRC lacks regulatory requirements for a fatigue management program for decommissioning licensees.

However, NRC is currently taking steps to address the issues. Presently, there are ongoing rulemaking efforts in the area of decommissioning. Additionally, NRC recently finalized a report to document lessons learned associated with permanent power reactor shutdowns that occurred from 2013 – 2016.

What We Recommend

This report makes recommendations to clarify which fitness-for-duty elements decommissioning licensees must implement to meet the requirements of the insider mitigation program; and to establish requirements for a fatigue management program. Management stated their agreement with the findings and recommendations in this report.

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ABBREVIATIONS AND ACRONYMS

CFR	<i>Code of Federal Regulations</i>
NRC	U.S. Nuclear Regulatory Commission
OIG	Office of the Inspector General

I. BACKGROUND

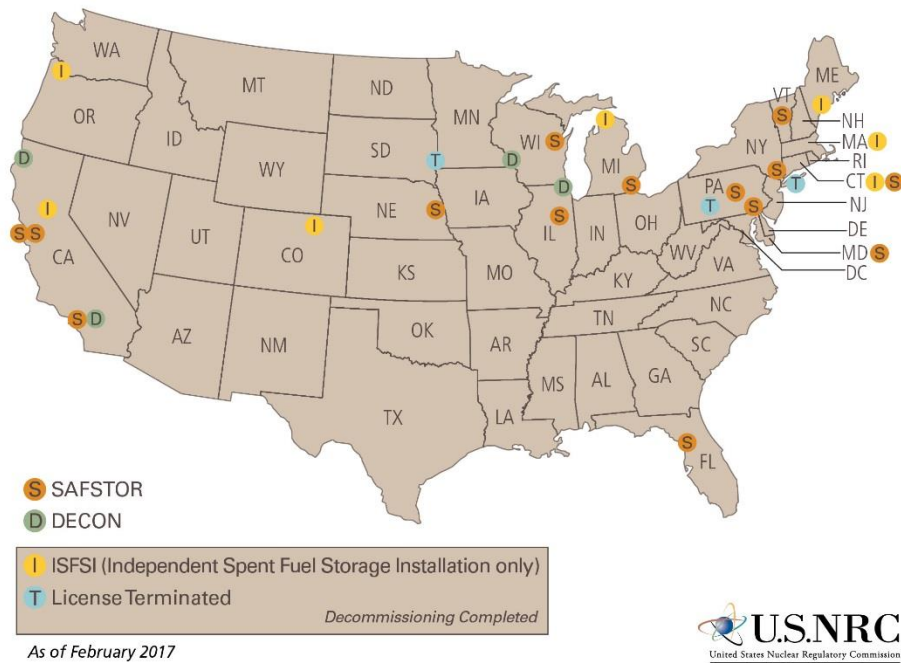
Decommissioning Nuclear Power Plants

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 license (see 10 CFR 50.2). NRC has rules governing commercial nuclear power plant decommissioning that protect workers and the public during the decommissioning process.

Once a nuclear power plant licensee decides to cease commercial operations, they are required to notify NRC (§ 50.82). Thereafter, the licensee will begin to remove all fuel from the reactor vessel. Once all the fuel is removed from the reactor vessel, the plant must again notify NRC. After this, the security-risk profile of the plant has decreased compared to when it was operating.

Figure 1: Decommissioned Plants & Plants Undergoing Decommissioning as of February 2017.¹

Power Reactors Decommissioning Status



As of February 13, 2017, there are 20 nuclear reactors undergoing decommissioning regulated by NRC (see Figure 1). There are three methods of decommissioning: “DECON,” “SAFSTOR,” and “ENTOMB.” Under the “DECON” method, soon after the plant closes, equipment, structures, and portions of the plant are removed or decontaminated.² 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.³

¹ The sites labeled as “T” (License Terminated) and “I” (ISFSI) are not within the scope of this audit. The map displays 18 reactors undergoing decommissioning. San Onofre Nuclear Generating Station, Units 2 and 3, and Zion Nuclear Power Station, Units 1 and 2 are combined in their respective symbols.

² Decontamination is a process used to reduce, remove, or neutralize radiological, chemical, or biological contamination to reduce risk of exposure.

³ Under ENTOMB, radioactive contaminants are permanently encased on site in structurally sound material such as concrete. The facility is maintained and monitored until the radioactivity decays to a level permitting restricted release of the property. To date, no NRC-licensed facilities have requested this option.

In addition to the 20 plants undergoing decommissioning, Pilgrim, Oyster Creek, and Palisades have advised NRC of their intent to cease commercial operations by 2019.

Physical Protection of Nuclear Power Plants

Physical protection (also called physical security) consists of a variety of measures to protect nuclear facilities and material against sabotage, theft, diversion, and other malicious attacks. NRC establishes the regulatory requirements and assesses compliance, while licensees are responsible for providing protection in accordance with NRC regulations. The regulations in Title 10 of the Code of Federal Regulations (10 CFR) Part 73 (Part 73) contain physical protection regulations for power reactors and materials. To comply with Part 73, power plant licensees must develop a physical security plan, which must be approved by NRC. A physical security plan is the approach licensees use to ensure compliance with NRC rules and requirements. Another required element of the physical protection program is an insider mitigation program.

Insider Mitigation Program

Part 73 also requires power plant licensees to establish, maintain, and implement an insider mitigation program (10 CFR 73.55(b)(9)) and describe their program in the physical security plan. The insider mitigation program must contain elements from the fitness-for-duty program described in 10 CFR Part 26 (Part 26). An individual with protected or vital area access, or access to digital computer and communication systems and networks outside the protected area, can pose a significant threat to the security of a nuclear power plant. A protected area means an area encompassed by physical barriers and to which access is controlled. A vital area contains equipment, systems, devices, or material, the failure, destruction, or release of which could directly or indirectly endanger the public health and safety by exposure to radiation (see § 73.2).

Fitness-For-Duty

Part 26 contains NRC's regulations for the fitness-for-duty program. The fitness-for-duty program provides, in part, reasonable assurance that nuclear facility personnel are trustworthy, will perform their tasks in a reliable manner, are not under the influence of any substance, and are not mentally or physically impaired from any cause that can adversely affect their ability to safely and competently perform their duties.

Fatigue Management

Part 26, Subpart I, contains NRC's regulations for the management of worker fatigue. NRC recognizes the potential for excessive worker fatigue can result from a number of factors including extensive work hours, stressful working conditions, and disruptions of the circadian rhythm associated with shift work. The fatigue management rule is designed to ensure NRC licensees effectively manage worker fatigue and provide reasonable assurance that workers are able to safely and competently perform their duties.

II. OBJECTIVE

The audit objective was to determine whether NRC's oversight of security at decommissioning reactors provides for adequate protection of radioactive structures, systems, and components.

III. FINDINGS

NRC's oversight of security at decommissioning reactors provides for adequate protection of radioactive structures, systems, and components. However, NRC can improve its oversight by clarifying regulatory requirements related to the insider mitigation program and fatigue management. NRC is currently taking steps to address both issues. Presently, there are ongoing rulemaking efforts in the area of decommissioning. Additionally, NRC recently finalized a report to document lessons learned associated with permanent power reactor shutdowns that occurred from 2013 – 2016.

A. NRC Regulations Lack Clarity on Which Elements of Fitness-for-Duty Decommissioning Licensees Must Implement

NRC's *Principles of Good Regulation* require regulations to be logical, coherent, and practical. However, NRC regulations for fitness-for-duty lack clarity on which elements must be implemented for decommissioning reactor licensees. This is happening because Part 50 decommissioning reactor licensees subject to Part 73.55 do not fall under the scope of Part 26 (10 CFR 26.3(a)) and because applicable guidance does not incorporate current insights. In addition, it does not provide guidance for Part 50 licensees following a licensee's 10 CFR 50.82 certifications.⁴ As a

⁴ In accordance with 10 CFR 50.82(a)(1-2), when a nuclear power plant licensee shuts down the plant permanently, it must submit a written certification of permanent cessation of operations to NRC within 30 days. When radioactive nuclear fuel is permanently removed from the reactor vessel, the owner must submit another written notification to NRC, surrendering its authority to operate the reactor or load fuel into the reactor.

result, there is a greater risk that an individual could pose a threat to the security of a decommissioning nuclear power plant.

What Is Required

NRC's Principles of Good Regulation

NRC promotes five *Principles of Good Regulation* in carrying out the agency's mission. The principles address independence, openness, efficiency, clarity, and reliability. The principles focus on ensuring safety and security while appropriately balancing the interests of NRC's stakeholders, including the public and licensees. The principle of clarity states that regulations should be coherent, logical, and practical. For reliability, regulations should be based on the best available knowledge from research and operational experiences. Furthermore, regulatory actions should always be fully consistent with written regulations and should be promptly, fairly, and decisively administered so as to lend stability to nuclear operational and planning processes.

What We Found

NRC Regulations Lack Clarity To Identify Which Fitness-For-Duty Elements Must Be Implemented

NRC regulations lack clarity in identifying which fitness-for-duty program elements must be implemented in order to satisfy the requirements of the insider mitigation program.

Insider Mitigation Program

10 CFR Part 73.55(b)(9) requires licensees to establish, maintain, and implement an insider mitigation program and describe the program in their physical security plan. The program must be maintained as long as spent fuel remains in the reactor core or in the spent fuel pool and until the licensee comes under security requirements established for interim spent fuel storage. The program must contain elements from the fitness-for-duty program in Part 26.

Part 26 – Fitness-For-Duty Program

Part 26 lists the required elements for a fitness-for-duty program. Table 1 shows the program elements.

Table 1: 10 CFR Part 26, Subpart B, Fitness-For-Duty Program Elements

Section No.	Program Elements
26.23	Performance Objective
26.27	Written Policies & Procedures
26.29	Training
26.31	Drug & Alcohol Testing
26.33	Behavioral Observation
26.35	Employee Assistance Programs
26.37	Protection of Information
26.39	Review process for Fitness-for-Duty Policy Violations
26.41	Audits and Corrective Actions

Source: NRC Regulations, Part 26.

Part 73 does not describe which fitness-for-duty elements are to be implemented for the insider mitigation program for Part 50 licensees, including decommissioning licensees. Current regulatory guidance does not describe appropriate program elements during decommissioning to provide assurance that an effective program will be maintained. NRC staff and licensees agree there are elements from Part 26 that should be implemented as part of the insider mitigation program. The drug and alcohol testing, employee assistance program, and behavioral observation are all cited by interviewees as especially important for licensees to implement.

Why This Occurred

Part 26 Scope Statement and Applicable Guidance Do Not Apply to Decommissioning Licensees

NRC regulations and guidance are unclear on which elements of the fitness-for-duty program must be implemented for decommissioning Part 50 licensees because Part 26 does not apply following a licensee's 10 CFR 50.82 certifications. In addition, Regulatory Guide 5.77 does not incorporate current insights gained from industry and NRC staff lessons learned, inspections, and operating experience.

Part 26 Scope

The scope of Part 26 excludes decommissioning power reactors. Currently, it says "Licensees who are authorized to operate a nuclear power reactor under 10 CFR 50.57, and holders of a combined license under 10 CFR Part 52 shall comply with requirements of this [Part 26] part." However, this scope does not apply to decommissioning reactors because these sites are no longer authorized to operate. Thus, Part 26 is not applicable to those nuclear power plant licensees that are no longer authorized to operate because they have provided certifications of a terminated license under 10 CFR 50.82, or have been ordered by the Commission to cease operation.

Incomplete Guidance – Regulatory Guide 5.77, Revision 0

Decommissioning sites were not specifically considered in Regulatory Guide 5.77, Revision 0. The guide describes an approach that NRC staff considers acceptable for an insider mitigation program at nuclear power plants. However, Regulatory Guide 5.77 does not incorporate the latest insights gained from industry and NRC staff lessons learned, inspections, and operating experience. In addition, it does not provide guidance for the situation following a licensee's 10 CFR 50.82 certifications. However, NRC staff are working to update Regulatory Guide 5.77 to identify which elements of the fitness-for-duty program should be implemented to satisfy the insider mitigation program requirements.

Why This Is Important

Greater Risk An Individual Can Pose a Threat

The insider mitigation program is designed to help identify an individual who may represent an insider threat by addressing a broad context of trustworthiness and reliability issues. For example, an individual with protected or vital area access, or access to digital computer and communications systems and networks from outside the protected area, can pose a significant threat to the security of a nuclear power plant. Without regulatory clarity and established guidance, future decommissioning licensees, including those that may unexpectedly cease operations, may choose not to implement all parts of the fitness-for-duty program. And, given that Oyster Creek, Pilgrim, and Palisades have indicated their intent to cease operations by the end of 2019, it is crucial for NRC to clarify regulatory requirements.

Recommendations

OIG recommends that the Executive Director for Operations

1. Clarify the fitness-for-duty elements that are necessary to comply with 10 CFR 73.55(b)(9)(i), insider mitigation program.
2. Develop rule language in 10 CFR Part 26 that describes the necessary fitness-for-duty requirements for decommissioning licensees.

B. NRC Lacks Regulatory Requirements for a Fatigue Management Program for Decommissioning Licensees

The *Atomic Energy Act of 1954*, as amended, gives NRC the responsibility for ensuring nuclear energy production makes the maximum contribution to the common defense and security. However, NRC lacks a fatigue management rule for decommissioning licensees, because these licensees were not considered when the fatigue management rule was established in 2008. As a result, there is potential for security personnel at decommissioning nuclear power plants to be subject to fatigue.

What Is Required

The Atomic Energy Act of 1954, as amended

The *Atomic Energy Act of 1954*, as amended, gives NRC the responsibility for ensuring that peaceful uses of nuclear energy makes the maximum contribution to the common defense and security and the national welfare. Physical protection consists of a variety of measures to protect nuclear facilities and material against sabotage, theft, diversion and other malicious acts. NRC establishes regulatory requirements and assesses compliance, and licensees are responsible for providing protection.

What We Found

NRC Lacks Clear Requirements for Decommissioning Licensees to Implement a Fatigue Management Rule

The fatigue management rule establishes requirements for operating nuclear power plant licensees and for the management of fatigue. The rule provides reasonable assurance that the effects of fatigue and degraded alertness on an individual's ability to safely and competently perform their duties are managed commensurate with maintaining public health and safety. The fatigue management provisions also reduce the potential for worker fatigue (e.g. for security officers, maintenance personnel, control room operators, and emergency response personnel) that may adversely affect the common defense and security.

However, Part 26, Subpart I does not apply to decommissioning Part 50 licensees. Therefore, NRC lacks regulatory requirements for these licensees to implement a fatigue management program.

Why This Occurred

Decommissioning Licensees Were Not Considered

Power reactor licensees that had permanently shut down and defueled were not considered within the scope of the fatigue management rule. On March 31, 2008, NRC published a final rule in the *Federal Register* adding Subpart I to 10 CFR Part 26. Subpart I provides reasonable assurance that the effects of fatigue and degraded alertness on an individual's ability to perform their duties are managed commensurate with maintaining public health and safety.

However, power reactor licensees that had permanently shut down and defueled were not considered within the scope of that rulemaking effort. The Commission stated that the staff could consider decommissioned facilities separately at a later date.

Why This Is Important

Fatigue Management Ensures Security Personnel Are Able To Maintain Common Defense and Security

Without a required fatigue management program, licensees may opt not to establish one. As such, there is no reasonable assurance that the effects of fatigue are appropriately managed.

In order to ensure that security personnel are able to meet their responsibilities for maintaining the common defense and security, they must not be subject to fatigue, which could reduce their alertness and ability to perform the critical job duties of identifying and promptly responding to plant security threats.

Given that Oyster Creek, Pilgrim, and Palisades have indicated their intent to cease operations by the end of 2019, it is crucial for NRC to develop regulatory requirements.

Recommendations

OIG recommends that the Executive Director for Operations

3. Develop requirements for decommissioning power reactor licensees to implement a fatigue management program commensurate with the security significance of the activities being performed.

IV. CONSOLIDATED LIST OF RECOMMENDATIONS

OIG recommends that the Executive Director for Operations

1. Clarify the fitness-for-duty elements that are necessary to comply with 10 CFR 73.55(b)(9)(i), insider mitigation program.
2. Develop rule language in 10 CFR Part 26 that describes the necessary fitness-for-duty requirements for decommissioning licensees.
3. Develop requirements for decommissioning power reactor licensees to implement a fatigue management program commensurate with the security significance of the activities being performed.

V. AGENCY COMMENTS

An exit conference was held with the agency on February 9, 2017. 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 findings and recommendations and opted not to provide formal comments for inclusion in this report.

OBJECTIVE, SCOPE, AND METHODOLOGY

Objective

The audit objective was to determine whether NRC's oversight of security at decommissioning reactors provides for adequate protection of radioactive structures, systems, and components.

Scope

This audit focused on NRC's oversight of security at decommissioning nuclear reactors. OIG conducted this performance audit from August 2016 to December 2016 at NRC headquarters (Rockville, MD). Internal controls related to the audit objectives were reviewed and analyzed. Throughout the audit, auditors were aware of the possibility of fraud, waste, and abuse in the program.

Methodology

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

- NUREG-0980, Volume 1, No. 11, Nuclear Regulation Legislation 113th, Congress, 2nd Session."
- NUREG-0800, 13.6.1, "Physical Security – Combined License and Operating Reactors Review Responsibilities."
- NUREG-1757, Volume 1, Revision 2, Consolidated Decommissioning Guidance, "Decommissioning Process for Materials Licensees."
- Title 10 Code of Federal Regulations, Part 26, "Fitness-For-Duty Programs."
- Title 10 Code of Federal Regulations, Part 73.55, "Requirements for Physical Protection of Licensed Activities in Nuclear Power Reactors Against Radiological Sabotage."

- NRC Regulatory Guides:
 - 5.77, “Insider Mitigation Program.”
 - 5.73, “Fatigue Management for Nuclear Power Plant Personnel.”

OIG also reviewed NRC’s *Principles of Good Regulation*, Inspection Procedures for Decommissioning Nuclear Power Reactors, the “*Power Reactor Transition from Operations to Decommissioning Lessons Learned Report*,” and the “*Regulatory Improvements for Decommissioning Power Reactors Advanced Notice of Proposed Rulemaking*.”

OIG conducted approximately 30 interviews of NRC staff and management to gain an understanding of the roles and responsibilities related to licensees undergoing the decommissioning process and coordination among offices that have a role in securing decommissioning nuclear power reactors. Auditors interviewed staff from the Office of Nuclear Security and Incident Response, the Office of Nuclear Reactor Regulation, the Office of Nuclear Material Safety and Safeguards, the Office of the General Counsel, and the regional offices.

OIG auditors also accompanied two inspectors from Region IV on their inspections of San Onofre Nuclear Generating Station in October 2016 and spoke with licensees about their experiences during the decommissioning process.

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 findings and conclusions based on our audit objectives.

The audit was conducted by Beth Serepca, Team Leader; Kristen Lipuma, Audit Manager; Chanel Stridiron, Auditor; Janelle Wiggs, Auditor; and Connor McCune, Management Analyst.

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COMMENTS AND SUGGESTIONS

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