Inspector General's Assessment of the Most Serious Management and Performance Challenges Facing the Nuclear Regulatory Commission in Fiscal Year 2022

At a glance

WHY WE DID THIS REPORT

The Reports Consolidation Act of 2000 (Public Law 106-531) requires us to annually update our assessment of the Nuclear Regulatory Commission's (NRC's) most serious management and performance challenges facing the agency and the agency's progress in addressing those challenges.

WHAT WE FOUND

The Nuclear Regulatory Commission (NRC) licenses and regulates the nation's civilian use of radioactive materials to provide reasonable assurance of adequate protection of public health and safety, to promote the common defense and security, and to protect the environment. In this capacity, the NRC has earned a commendable reputation among the world's nuclear regulatory agencies. The NRC's proposed Fiscal Year (FY) 2022 budget is $887.7 million, including 2,879 full-time equivalents (FTE). Most NRC employees work in six primary locations in the United States. As it executes its important mission as a federal agency, the NRC must continue to be a responsible steward of taxpayer dollars and properly expend its budgeted funds.

With input from NRC leadership, we have assessed, developed, and described each of the NRC's challenges for FY 2022 in a single-page format that notes each challenge, actions already completed by the agency, and the NRC's continuing work on the challenge. We have independently identified the following nine clear, specific, and actionable challenges that require the NRC's continued attention:

1. Ensuring safety while transforming into a modern, risk-informed regulator;
2. Regulatory oversight of the decommissioning process and the management of decommissioning trust funds (DTF);
3. Using the COVID-19 lessons learned to strengthen NRC readiness to respond to future mission-affecting disruptions;
4. Readiness to license and regulate new technologies in reactor design, fuels, and plant controls, and maintaining the integrity of the associated intellectual property;
5. Ensuring the safe and effective acquisition, management, and protection of information technology and data;
6. Strategic workforce planning during transformation and industry change;
7. Oversight of materials, waste, and the National Materials Program;
8. Management and transparency of financial and acquisitions operations; and,
9. NRC readiness to address cyber threats to critical national infrastructure sectors impacting the NRC's public health and safety mission and/or NRC licensees.

By addressing these challenges, the NRC will strengthen the execution of its mission, achieve its strategic goals, and maintain the highest level of accountability over taxpayer dollars.

AGENCY RESPONSE TO MANAGEMENT CHALLENGES FOR FY 2021

The NRC has constructively engaged with the Office of the Inspector General (OIG) and sought to address OIG audit report recommendations throughout the year. The NRC continues its focus on multiple transformation initiatives as it seeks to achieve its objective to become a more modern, risk-informed regulator.

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Introduction

FROM THE INSPECTOR GENERAL

I am pleased to present our assessment of the most significant management and performance challenges facing the NRC in FY 2022.

The Reports Consolidation Act of 2000 requires us to annually update our assessment of the NRC's "most serious management and performance challenges facing the agency…and the agency's progress in addressing those challenges." In this report, we summarize what we consider to be the most critical management and performance challenges for the NRC, and we assess the agency's progress in addressing those challenges.

The NRC continues to accomplish its mission commendably, demonstrating through its work that it is an agency dedicated to effective regulation of nuclear materials while ensuring public health and safety and protection of the environment. Beyond its nuclear safety and security mission, as a federal agency, the NRC must be a responsible steward of taxpayer dollars and expend its budgeted funds properly.

ABOUT THE INSPECTOR GENERAL

In accordance with the 1988 amendment to the Inspector General Act of 1978, the NRC's OIG was established on April 15, 1989, as an independent and objective unit to conduct and supervise audits and conduct investigations relating to the NRC's programs and operations. The purpose of the OIG's audits and investigations is to prevent and detect fraud, waste, abuse, and mismanagement, and promote economy, efficiency, and effectiveness in NRC programs and operations. In addition, the OIG reviews existing and proposed regulations, legislation, and directives, and comments on any significant concerns. The Inspector General serves under the general supervision of the NRC Chairman but operates with personnel, contracting, and budget authority independent of the NRC. The Inspector General informs the Chairman and Congress about problems, recommends corrective actions, and monitors the NRC's progress in implementing such actions.

Robert J. Feitel,
NRC and DNFSB
Inspector General

ABOUT THE NRC

The NRC's mission is to license and regulate the nation's civilian use of radioactive materials to protect public health and safety, promote the common defense and security, and protect the environment. The NRC's vision is to carry out this mission as a trusted, independent, transparent, and effective nuclear regulator, consistent with the NRC Principles of Good Regulation.

The NRC is led by a group of five Commissioners appointed by the President and confirmed by the Senate for 5-year terms. One of them is designated by the President as Chairman and official spokesperson of the Commission. President Biden appointed Christopher T. Hanson as Chairman of the Commission effective January 20, 2021. Mr. Hanson is joined by Commissioners Jeff Baran and David A. Wright. Two of the five Commissioner positions are currently vacant following the departures of Commissioners Kristine Svinicki and Annie Caputo during 2021. The Commission formulates policies and

regulations governing nuclear reactor and materials safety, issues orders to licensees, and adjudicates legal matters brought before it. The Executive Director for Operations (EDO) carries out the policies and decisions of the Commission and directs the activities of the program offices. The offices reporting to the EDO strive to ensure the safe commercial use of nuclear materials in the United States. As part of the regulatory process, the four regional offices conduct inspection, enforcement, and emergency response programs for licensees within their regions.

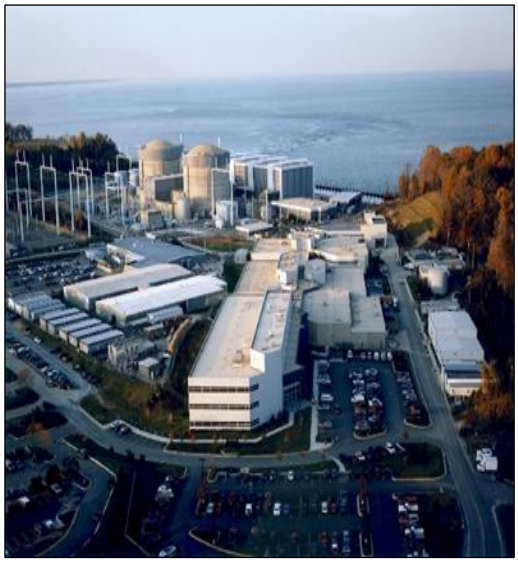
The NRC's FY 2018–2022 Strategic Plan describes the agency's mission, vision, and principles of good regulation, along with strategic goals, objectives, and strategies. The safety and security strategic goals ensure the safe and secure use of radioactive materials. The NRC carries out its safety and security activities through two major programs: Nuclear Reactor Safety, consisting of the Operating Reactors and New Reactors business lines, and Nuclear Materials and Waste Safety, consisting of the Fuel Facilities, Nuclear Materials Users, Decommissioning and Low-Level Waste, Spent Fuel Storage and Transportation, and High-Level Waste business lines. The agency accomplishes its mission to provide reasonable assurance of adequate protection for public health and safety through such regulatory activities as licensing, oversight, and rulemaking. In addition, the NRC's incident response activities prepare for and respond to emergencies involving radioactive materials.

The NRC's FY 2022 budget request is $887.7 million, including 2,879 FTEs. Compared to the NRC's FY 2021 Enacted Budget including authorized carryover, the FY 2022 budget request increased by approximately 3 percent, or $24.4 million, primarily to support salaries and awards adjustments.

During FY 2021 the NRC has made progress in achieving its safety and security goals through continued oversight of the safe and secure operation of nuclear power plants and fuel cycle facilities, as well as the possession and use of radioactive materials. As of the end of August 2021, the NRC had satisfactorily closed 26 OIG Audit recommendations during FY 2021. The NRC has also advanced toward its objective of becoming a modern, risk-informed regulator. The following examples are representative of agency accomplishments and issues addressed in FY 2021.

Operating Reactors

The agency's most recent performance assessments indicate that all operating power reactor plants continue to operate safely. NRC staff conducts assessment reviews, communicates changes in licensee performance quarterly, and issues end-of-cycle assessment letters. The NRC issued annual assessment letters to licensees in March 2021.



Calvert Cliffs Nuclear Power Plant, Lusby, MD

In the area of subsequent license renewal (SLR) application reviews, the NRC issued a renewed license to operate the Surry Power Station Units 1 and 2 for an additional 20 years on May 4, 2021. The SLR applications undergoing review are from Point Beach Units 1 and 2, North Anna Units 1 and 2, the Oconee Nuclear Station (Units 1, 2, and 3), and the St. Lucie Plant Units 1 and 2.

On June 22, 2021, NRC staff recommended the agency discontinue the activity to consider regulatory and other changes to enable license renewal for 40 years. This activity had included evaluation of the technical issues relevant to plant operation up to 100 years. This staff decision came as a result, in part, from significant public comment, as well as NRC management's understanding that industry interest in 40-year license renewal had waned.

NRC staff continued interactions with industry in calendar years (CY) 2020 and 2021 on the potential usefulness of Fukushima-response-inspired FLEX equipment and strategies for mitigating beyond-design-basis events in other applications at nuclear power plants. NRC staff is nearing the end of its verification of industry's implementation of the regulatory actions undertaken after the accident at Fukushima Daiichi. Because of the ongoing Coronavirus Disease (COVID-19) pandemic, the final three Hardened Containment Vent Systems inspections were postponed from CY 2020. In late September 2021, NRC staff reported that two of these inspections are now complete, with the final inspection planned for completion by the end of CY 2021.

NRC staff completed the Fukushima-related evaluations on the impacts of seismic hazards and issued close-out memorandum GI-199, "Closure of Generic Issue 199 (GI-199), Implications of Updated Probabilistic Seismic Hazard Estimates in Central and Eastern United States on Existing Plants," on December 15, 2020. NRC staff has continued to evaluate potential generic issues, examining the risk and zones of influence for aluminum in components undergoing high energy arc faults.

NRC staff initiated a project to modernize NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition." The staff held a public meeting on March 31, 2021, to obtain feedback on this effort and to inform interested stakeholders.

New and Advanced Reactors

The NRC continued the technical reviews of large, light-water reactor (LLWR) applications and its regulatory oversight of construction activities of the Vogtle Units 3 and 4 AP-1000 Reactor plants. The NRC reported to Congress in March 2021, that all Vogtle 3 and 4 construction findings in the prior 6 months were of very low safety significance and were addressed by the licensee. On June 21, however, the NRC sent a special inspection team to investigate identified construction quality problems at Vogtle associated with inadequate routing and separation of safety-related power and instrument cables.

The NRC staff continued its licensing reviews of small modular reactor applications and pursued actions to be ready for advanced reactor applications by prioritizing a rulemaking to establish a technology-inclusive, risk-informed, and performance-based regulatory framework and associated guidance for advanced reactors. This rulemaking would create a new part within Title 10 of the Code of Federal Regulations (C.F.R.), Part 53, "Licensing and Regulation of Advanced Nuclear Reactors," in keeping with the NRC's vision and strategy report and the requirements in the Nuclear Energy Innovation and Modernization Act Section103(a)(4).

The NRC continued to develop the draft generic environmental impact statement (GEIS) for advanced nuclear reactors. NRC staff issued a scoping report that summarizes the comments received during the public scoping period and the staff's responses for the GEIS for advanced reactor designs.

Artist rendition -- NuScale nuclear power plant (Image credit: NuScale Power)

The NRC staff continues to review designs and engage with potential applicants regarding new reactor technologies:

- NRC staff issued the final safety evaluation report for the NuScale small modular reactor design, completing the final phase of this review in August 2020. The NRC published a proposed rule in July 2021 for design certification, requesting public comment. The public comment period will end October 14, 2021 after an extension granted by NRC base on requests by members of the public. The NRC expects the final rule to be published by August 17, 2022.

- During reviews of the Oklo Aurora reactor design and combined construction and operating license application, NRC staff expressed concerns for the technical sufficiency of the applicant's submittals to allow the staff to define the scope of the full technical review. The NRC has had to extend completion dates as well as adjust the staff's approach to the review of this unique, non-light water reactor design.

- NRC staff continues to engage with developers of non-LWR reactor designs. These designs include X-energy, LLC, on its pebble bed, high-temperature, gas-cooled reactor; Kairos Power on its pebble-fueled, molten-fluoride-cooled, reactor and its Hermes test reactor; Terrestrial Energy on its molten salt, molten fuel reactor; and TerraPower on its sodium-cooled fast reactor. The Advisory Committee on Reactor Safeguards (ACRS) issued a letter on September 21, 2021, to EDO Margie Doane on its review of NRC staff's draft safety evaluation (SE) report on Kairos Topical Report, KP-TR-010, Revision 3, "KP-FHR Fuel Performance Methodology". The letter noted the staged approach to the review and provided recommendations for NRC staff on the level of information the applicant should provide as well as specific aspects of fuel performance of interest to the ACRS.

- NRC staff issued Regulatory Guide (RG) 1.237, "Guidance for Changes During Construction for New Nuclear Power Plants Being Constructed Under a Combined License Referencing a Certified Design Under 10 C.F.R. Part 52," in February 2021.

Materials, Fuel, and Waste

In the area of byproduct materials oversight, the NRC issued a major revision to Inspection Manual Chapter 2800, "Materials Inspection Program." This revision enhances coordination and communication among the NRC Agreement States, revises the documentation of materials inspections, allows flexibility for in-office reviews, and incorporates reciprocity inspection information.

The NRC developed a feature in Web-based Licensing, part of the Integrated Source Management Portfolio, for generating materials inspection reports and inspection trip planning. It also developed a revised system to update the contact information for tribal leaders and tribal historic preservation officers. This system promises to improve communication with Native American tribes for environmental reviews and other outreach activities.

OIG staff toured a power plant interim spent fuel storage installation in July 2021.

In a letter dated June 11, 2021, the Governor of Indiana notified the NRC that Indiana intends to become an Agreement State, with a goal of final agreement by January 1, 2026. Chairman Hanson responded to this letter of intent on July 7, 2021, welcoming this initiative and indicating the readiness of NRC staff to provide guidance. Connecticut is currently pursuing an agreement with the NRC.In December 2020, the Oglala Sioux Tribe and a stakeholder group, Aligning for Responsible Mining, petitioned the United States Court of Appeals for the District of Columbia Circuit, for review of the NRC's January 2014 Final Environmental Impact Statement for the Dewey-Burdock In-Situ (Uranium) Recovery Project in Custer and Fall River Counties, South Dakota, and a related list of commission orders and memoranda.

In the area of high-level waste regulation, the NRC has been reviewing applications to license consolidated interim waste storage facilities (CISF) in Lea County, New Mexico, and in Andrews County, Texas. The topic has been contentious and has involved the Commission's review of the

denial by an Atomic Safety and Licensing Board of numerous requests to intervene from various parties.

Many stakeholders, including politicians in New Mexico and Texas, have weighed in on both sides of the issue. New Mexico has sued the NRC in a complaint filed March 29, 2021, challenging the legality of the agency's proceedings. Petroleum and gas industry stakeholders in the Permian Basin also filed suit against the CISF proceedings in federal court during 2021. On July 2, 2021, the NRC extended the schedule to complete the environmental and safety reviews of Holtec International's 2017 application to build and operate a CISF in New Mexico until January 2022. While an earlier date extension had been noted by the NRC due to delays caused by the COVID-19 pandemic, the latest extension is related to time required by the applicant to respond to requests for additional information.

In late July 2021, the NRC issued the final Environmental Impact Statement for the Interim Storage Partner application to construct and operate a consolidated interim storage facility in Andrews Texas for spent nuclear fuel (SNF) and greater-than-Class-C waste, along with a small quantity of spent mixed oxide fuel. The NRC subsequently issued a license, as well as a record of decision and a final safety evaluation report on September 13, 2021, to Interim Storage Partners LLC to build and operate a spent fuel consolidated interim storage facility in Andrews, Texas. The license was issued to ISP to construct and operate a CISF at the proposed location to temporarily store up to 5,000 metric tons of uranium (MTU) [5,500 short tons] of SNF for a licensing period of 40 years (Phase 1). Subsequent expansions of the facility via license amendment over 20 years could bring the total capacity to as much as 44,000 MTUs.

The NRC has reported to Congress on its readiness to review applications for licensing accident tolerant fuel (ATF). Several U.S. power reactor licensees have inserted lead test assemblies with ATF technologies beginning in the Spring of 2018.

The NRC staff examined its regulatory framework and found the existing regulations and guidance are suitable for review of the ATF concepts (i.e., coated cladding and doped pellets) expected to be submitted in the near term. The NRC stated it considers the existing regulatory framework to be generally acceptable for licensing fuel with an up to 10 percent uranium-235 increase by weight. Higher enrichments between 5 and 10 percent uranium-235 by weight will require license amendments to existing fuel fabrication and enrichment facility licenses and transportation package certificates of compliance, and could involve regulatory exemptions. NRC staff noted in its ATF project plan version 1.1 issued in October 2019, that staff has "…extensively engaged with its stakeholders in the development and finalization of this project plan, consistent with the NRC's principles of good regulation and statutory requirements." The NRC solicited comments on the plan on July 8, 2021, and held a public meeting on the plan on July 22, 2021.

The industry media in August 2021 identified recent NRC developments and industry perspectives on the ATF project plan. In particular, on July 9, 2021, the NRC released a draft revision of its ATF project plan, noting 36 regulations and guidance documents that had been analyzed by staff for applicability to the licensing of ATF and high enrichment, high burnup nuclear fuels. The NRC planned to release the final revision at the end of FY 2021. An August 5, 2021 letter from the Nuclear Energy Institute (NEI) to the NRC commented that the plan fails to address risk-informed licensing strategies and options identified in a June 2020 technical report from the Electric Power Research Institute that examined fuel fragmentation, relocation and dispersal during loss of coolant accident sequences for pressurized water reactor plant high burnup fuel. The NEI expressed its view that earlier stakeholder interactions are necessary before finalizing revisions like this that affect the industry.

NRC staff continued preapplication interactions with X-energy, LLC, for a fuel fabrication facility planned to produce TRISO (tri-structural isotropic particle) fuel, and a review of the Centrus license amendment request to demonstrate the production of high assay, low enriched uranium at its Piketon, Ohio, facility.

In an August 6, 2021 Federal Register notice, the NRC issued a draft environmental impact statement (EIS) for public comment on the Westinghouse fuel fabrication facility in Columbia, South Carolina. The final EIS is planned for issuance in February 2022.

COVID-19 Response and Lessons Learned

The NRC responded effectively to the challenges posed by the COVID-19 pandemic. In response to the pandemic, the agency implemented precautionary measures to ensure the health and safety of its workforce, licensee staff, and stakeholders in accordance with guidance provided by the federal government, including the Centers for Disease Control and Prevention and the Office of Personnel Management, as well as state and local authorities.

NRC staff conducted multiple virtual public meetings to engage stakeholders and discuss options for regulatory flexibility due to the pandemic. NRC staff issued documents explaining when the agency would provide expedited reviews for certain pandemic-related exemptions and relief requests in separate topical areas affecting both operating reactor and materials licensees. The staff may continue to use some of these process options as pandemic conditions warrant.

The NRC reported that the staff effectively conducted inspection and oversight activities, and the impacts to NRC licensing activities and regulatory duties were minimal. The Reactor Oversight Process (ROP) had the flexibility to allow the NRC to adjust the operating reactor baseline inspections, as needed, to focus on safety significant issues. The Office of Nuclear Reactor Regulation and the Office of Nuclear Material Safety and Safeguards issued guidance for the regional offices to continue inspections as COVID-19 restrictions continued to change in CY 2021. The OIG's Audit of COVID-19's Impact on Nuclear Materials and Waste Oversight (OIG-21-A-15) found that the NRC's nuclear materials and waste oversight processes during the COVID-19 pandemic have generally been effective in helping the NRC accomplish its mission; however, opportunities exist for strengthening the process during prolonged work disruptions.

The NRC issued a lessons-learned report, "Initial Report on Challenges, Lessons Learned and Best Practices from the 2020 COVID-19 Public Health Emergency – Focus on Regulatory Oversight of Operating Nuclear Reactors," on January 11, 2021. The NRC has discussed this report's recommendations with industry representatives during ROP public meetings. The NRC is also conducting a comprehensive assessment of the implementation of materials oversight programs during the public health emergency.

Transformation: Becoming a Modern Risk-Informed Regulator

NRC leaders have continued to focus on innovation and transformation initiatives to adapt to the evolving nuclear industry and the future regulatory environment, including the increased use of the concept of risk informing its decisions.

The NRC's transformation initiative currently encompasses a broad set of activities that seek to help the agency move toward its vision of being a more modern, risk-informed regulator. Four focus areas were identified: (1) recruiting, developing, and retaining a strong workforce; (2) improving decision-making through the acceptance of an appropriate level of risk without compromising the NRC's mission; (3) establishing a culture that embraces innovation; and (4) adopting new and existing information technology resources.

The NRC reported that its staff continues to work with industry to support risk-informed and performance-based initiatives. For example, the industry has communicated plans to continue to submit applications for adoption of 10 C.F.R. Part 50.69, "Risk-informed Categorization and Treatment of Structures, Systems and Components for Nuclear Power Reactors." Additionally, the industry has submitted applications to adopt the Risk-Informed Technical Specifications (RITS) Initiative. As of Sept. 14, 2021, the industry has submitted 25 applications to adopt RITS Initiative 4b (Risk-Informed

Completion Times). NRC staff has approved 17 applications, is currently reviewing the remaining 8 applications, and anticipates receiving an additional 13 applications by the end of FY 2022.

The NRC expects the guidance document on "Integrated Risk-Informed Decision-Making for Licensing Reviews," that was issued to NRC staff in June 2020, will result in greater consistency and transparency in the use of risk insights as inputs to regulatory decisions and safety conclusions. The NRC also completed revisions to regulatory guidance in probabilistic risk assessment (PRA)-related areas, such as fire protection, and developed approaches for determining whether a base PRA is sufficient to provide confidence in the results of PRA calculations used in regulatory decision making. Additionally, the NRC implemented a new training course in May 2021 called "Be riskSMART: A Tool for Everyone." Be riskSMART "Guidance for Integrating Risk Insights into NRC Decisions" is a framework described in NUREG/KM-0016. This course is intended to help NRC staff consider the Be riskSMART approach to evaluating problems in every part of the NRC's organization.

In November 2020, the NRC staff issued draft Revision 2 of RG 1.205, "Risk-Informed, Performance-Based Fire Protection for Existing Light-Water Nuclear Power Plants," for public comment. This revision includes updated information and guidance on fire-induced circuit failures, as well as NRC endorsements of NEI guidance documents on how to implement fire protection programs under 10 C.F.R. Part 50.48(c), and on post fire safe shutdown circuit analysis.

NRC MANAGEMENT AND PERFORMANCE CHALLENGES FOR FY 2022

We have assessed, developed, and described each of the NRC's challenges* for FY 2022 in a single-page format that notes each challenge, actions already completed by the agency, and the NRC's continuing work on the challenge.

NRC leadership noted its own assessment of the key challenges facing the agency in its input to the OIG for management challenges. We have considered this input and independently identified the following nine clear, specific, and actionable challenges that require the NRC's continued attention:

1. Ensuring safety while transforming into a modern, risk-informed regulator;
2. Regulatory oversight of the decommissioning process and the management of decommissioning trust funds (DTF);
3. Using the COVID-19 lessons learned to strengthen NRC readiness to respond to future mission-affecting disruptions;
4. Readiness to license and regulate new technologies in reactor design, fuels, and plant controls, and maintaining the integrity of the associated intellectual property;
5. Ensuring the safe and effective acquisition, management, and protection of information technology and data;
6. Strategic workforce planning during transformation and industry change;
7. Oversight of materials, waste, and the National Materials Program;
8. Management and transparency of financial and acquisitions operations; and,
9. NRC readiness to address cyber threats to critical national infrastructure sectors impacting the NRC's public health and safety mission and/or NRC licensees.

By addressing these challenges, the NRC will strengthen the execution of its mission, achieve its strategic goals, and maintain the highest level of accountability over taxpayer dollars.

*Note, challenges do not necessarily equate to problems; rather, they should be considered areas of continuing important focus for NRC management and staff.

Challenge 1: Ensuring Safety while Transforming into a Modern, Risk-Informed Regulator

Why is this a serious management and performance challenge?

The NRC's increasing emphasis on risk-informed regulation necessitates guidance changes, as well as efforts to raise staff awareness of these changes and ensure regulatory consistency. The NRC must also engage external stakeholders to ensure transparency of resulting changes to its licensing and oversight processes.

Challenge synopsis

It has been NRC policy since 1995 to inform regulatory activities with risk insights, thereby balancing deterministic engineering judgment with quantitative analysis based on operating experience. The agency has emphasized this policy in recent years as risk analysis models have become more sophisticated and nuclear power licensees have increasingly used probabilistic safety risk assessment to support changes to their license conditions. Nevertheless, the NRC and the nuclear industry have methodological differences in their respective approaches to probabilistic risk assessment, and agency staff sometimes disagree on the use of risk analysis in regulatory actions such as license amendments and inspection findings. Additionally, advanced reactor designs present unique challenges given the lack of operating experience data to inform risk modeling.

Ongoing Actions

The NRC is assessing the risk of aluminum enhanced high energy arc faults at nuclear power plants, mitigation strategies, and possible regulatory action based on assessment results.

The NRC is engaging nuclear power licensees regarding potential expansion of FLEX strategies for mitigating effects of natural disasters on plant safety.

The NRC is performing nuclear power licensing actions using risk information and developing risk-informed, regulatory guidance for licensees in areas such as fire protection, physical security, and digital instrumentation and controls.

Completed Actions

The NRC issued staff guidance for integrating risk insights in regulatory decision making across multiple mission areas, such as reactor and material safety, security, and emergency preparedness (NUREG/KM-0016).

The NRC issued staff guidance known as the Risk-Informed Process for Evaluations (RIPE) for evaluating nuclear power plant licensing issues of very low safety significance.

The NRC issued a draft white paper on the use of probabilistic risk assessment to support advanced non-light water reactor licensing.

Looking ahead: The OIG will continue to monitor developments in this area throughout the year to inform its audit planning work.

Challenge 2: Regulatory Oversight of the Decommissioning Process and Management of Decommissioning Trust Funds

Why is this a serious management and performance challenge?

NRC staff members perform independent analyses of licensee decommissioning funding status reports for power reactors to determine whether licensees have provided reasonable assurance of sufficient funding availability for radiological decommissioning of the reactor and site until license termination.

Challenge Synopsis

The NRC must obtain reasonable assurances from nuclear reactor licensees that funds will be available for the decommissioning process. To oversee licensees' decommissioning funding assurance (DFA), the NRC requires licensees to provide a decommissioning financial status (DFS) report biennially. Five years prior to permanent cessation of operations, licensees must provide the DFA status reports annually. Prior to, or within 2 years after permanent cessation of operations, licensees are required to submit a Post Shut-Down Decommissioning Activities Report that includes a description and schedule for the planned decommissioning activities and a site-specific cost estimate. There are 21 power reactors currently undergoing decommissioning with a total combined decommissioning trust fund (DTF) balance of approximately $13 billion as of December 30, 2020.

In addition, for permanently shut down reactors, NRC inspection procedures require inspectors to assess licensee cost management information and determine whether licensee-docketed decommissioning cost estimates and projections reasonably correlate to actual costs, and whether funds from DFA requirements described in 10 C.F.R. Part 50.75 are being used for decommissioning activities. Moreover, inspectors are required to verify whether licensee decommissioning costs are within the schedular and expenditure requirements of 10 C.F.R. Part 50.82. The OIG conducted an audit of the NRC's oversight of the adequacy of decommissioning trust funds during FY 2021, and identified recommendations for the agency to improve its oversight of the decommissioning program.

Key decommissioning trust fund challenges include:

- Ensuring that agency processes adequately address new reactor decommissioning business models, including accelerated decommissioning activities;
- Managing oversight of DTF shortfalls in both operating and decommissioning reactors;
- Maintaining reasonable assurance that operating reactors will have sufficient funds to decommission safely;
- Overseeing licensee use of DTFs in accordance with 10 C.F.R. Part 50.82; and,
- Improving decommissioning guidance.

Ongoing Actions

The NRC is conducting power reactor decommissioning rulemaking to clarify regulations.

Completed Actions

NRC staff completed the 2020 annual review of decommissioning funding status reports for plants in decommissioning.

Looking ahead: The OIG is continuing efforts to analyze the agency's decommissioning program. Further, an audit of the NRC's engagement with the public related to reactor decommissioning actions is planned for FY 2022.

Challenge 3: Using the COVID-19 Lessons Learned to Strengthen NRC Readiness to Respond to Future Mission-Affecting Disruptions

Why is this a serious management and performance challenge?

The NRC has adapted its policies, procedures, and internal business practices to protect its workforce against COVID-19 while ensuring mission-essential regulatory, licensing, and inspection work is performed. The NRC's response to COVID-19 could provide valuable lessons to help the agency prepare for future events that cause social and economic disruption affecting NRC's ability to conduct its mission.

Challenge Synopsis

On March 13, 2020, the President of the United States declared a national emergency associated with the COVID-19 outbreak. Soon thereafter, the Office of Management and Budget directed federal agencies to "adjust operations and services to minimize face-to-face interactions" and to postpone or significantly curtail "non-mission critical functions that cannot be performed remotely or that require in-person interactions." The NRC then directed most employees to work from home with recently-issued agency laptops, minimizing safety-based leave claims or other disruptions to agency business. Nevertheless, NRC offices remained open to support work that could not be performed remotely, such as intelligence analysis and processing of classified and safeguards information. The NRC held public teleconference meetings with external stakeholders to discuss regulatory actions. NRC inspectors continued oversight work at nuclear power plants and materials licensee facilities, while using information technology to minimize face-to-face interaction with licensee personnel as appropriate. Notably, the NRC calibrated its posture in accordance with local epidemiological trends and modified remote work and social distancing requirements as public health conditions improved in various locations across the country. While trends have improved in 2021, COVID-19 variants present additional risk and could impact operations.

Ongoing Actions

An NRC headquarters and regional working group is assessing baseline reactor inspection procedures to determine which portions could be performed remotely, as well as potential compensatory measures for conditions precluding onsite inspection work.

The NRC is planning a more comprehensive lessons learned evaluation of its COVID-19 practices with internal and external stakeholders to identify long-term ROP improvements for public health emergencies and other conditions.

Another NRC working group is assessing COVID-19 impacts on nuclear materials and waste oversight programs and will develop program recommendations to prepare for future public health emergencies.

Completed Actions

The NRC approved temporary regulatory exemptions and deferrals for licensees based on guidance issued shortly after the COVID-19 outbreak.

The NRC developed alternative force-on-force inspection procedures for power reactor sites where normal full-scope exercises were precluded.

The NRC conducted a preliminary lessons-learned review of COVID-19 reactor inspection program adaptations, with recommendations to improve data access inspection programs and procedures.

The NRC analyzed COVID-19 impacts on reactor inspections as part of its annual ROP self-assessment for calendar year 2020, and conducted lessons learned in the materials and waste program.

Looking ahead: The OIG will continue to monitor developments in this area throughout the year to inform its audit planning work.

Challenge 4: Readiness to License and Regulate New Technologies in Reactor Design, Fuels, and Plant Controls, and Maintaining the Integrity of the Associated Intellectual Property

Why is this a serious management and performance challenge?

Industry's development of new technologies to extend the life of existing reactors, combined with congressional support for developing new reactor and fuel technologies, will require the NRC not only to adapt existing licensing processes and capabilities and create new ones, but also to protect proprietary information against industrial espionage or other efforts by adversaries to compromise this information.

Challenge Synopsis

Unfavorable electric power market conditions have slowed construction of new commercial nuclear power plants in the United States and led to plant closures in recent years. Nevertheless, some domestic utilities have expressed interest in alternative reactor designs, which could produce electricity at lower cost with greater scalability than current operating reactors. Domestic utilities are developing technologies that can extend the operating lifetimes of existing reactors. Congress has passed legislation designed to facilitate research, development, and licensing of new reactor technologies. The technical complexity of these initiatives, combined with their experimental nature, has challenged the NRC to adapt its regulatory processes to accommodate new technologies in an efficient and effective manner. As new reactor and fuel technologies are reviewed and licensed, it is critical that the NRC, as well as its federal partners, vendors, and applicants, protect the proprietary information entrusted to them.

Ongoing Actions

The NRC continues to engage external stakeholders, such as the U.S. Department of Energy, industry, the public, and other entities as it develops the proposed Part 53 rule for advanced reactors, with a goal of completion by fall 2024.

The NRC continues to assess its own regulations and work with the U.S. Department of Commerce and other federal agencies to establish adequate export controls for advanced non-light water reactors and small modular reactors.

The NRC will conduct additional research and solicit external stakeholder input on safety issues associated with ATF, higher burnup fuels, and fuels with uranium enrichment levels above five percent.

The NRC continues to hold pre-application meetings with nuclear power plant licensees for digital modernization projects.

Completed Actions

The NRC published preliminary Part 53 rule language and sought public comments as part of the agency's rulemaking process for advanced reactors.

The NRC partnered with federal research institutions, such as Oak Ridge National Laboratory, to develop staff guidance on advanced reactor technical matters.

The NRC issued technical reports on safety issues associated with ATF and issued a license amendment to allow limited testing of ATF at the Calvert Cliffs Nuclear Power Plant.

The NRC updated staff guidance on common cause failure in digital instrumentation and control systems. The NRC most recently demonstrated implementation of this guidance through its review and issuance of a safety evaluation report approving a digital upgrade at the Waterford Steam Electric Station.

Looking ahead: The OIG will continue to monitor developments in this area throughout the year to inform its audit planning work.

Challenge 5: Ensuring the Safe and Effective Acquisition, Management, and Protection of Information Technology and Data

Why is this a serious management and performance challenge?

Technology continues to advance rapidly. The challenge is supporting a future-ready workforce equipped with the modern tools, technologies, skills, and knowledge necessary to meet current and future mission needs.

Challenge Synopsis

The NRC must continue to meet the regulatory and statutory federal mandates for Information Technology and Information Management (IT/IM). The responsibility of the NRC's IT/IM program is to maintain and enhance services and infrastructure to enable the agency's mission. The NRC must continue to use robust, proactive measures to protect its buildings, personnel, and data from internal and external threats. The NRC faces evolving cyber threats and challenges with oversight of the protection of operating and decommissioning facilities, use of nuclear materials, sharing of sensitive information, emergency preparedness, and incident response.

The NRC requested supplemental appropriations under the Coronavirus Aid, Relief, and Economic Security (CARES) Act to support remote access, expanded teleworking, and operational and security activities related to COVID-19 prevention, preparation, and response. The agency requested licensing funds to support increases in mobile and collaborative licensing and telecommunications services, commodity IT funds to optimize staff productivity (e.g., audio headsets), and availability of replacement parts. The NRC's request included contractor support funds to support increased operational and security activities (e.g., patch management). In addition, re-engineering systems and work processes funds requests will support optimized electronic process solutions.

Key internal security oversight challenges for the NRC include:

- Managing patches in the face of increasing demand for bandwidth;
- Increasing numbers, types, and sophistication of cyber threats highlight the need to reinforce IT security;
- Directing agencywide information resource planning to help the agency select and manage IT/IM and IT security resources to provide maximum value;
- Executing the insider threat prevention and detection program to protect classified and safeguards information;
- Managing risk-based security strategies to protect against sophisticated cyber-attacks; and,
- Executing the Federal Information Security Modernization Act of 2014, to strengthen information technology security.

Ongoing Actions

The NRC is leveraging IT mobile devices for material inspection use in the field.

The NRC is continuing to broaden use of web-based licensing.

The NRC is expanding virtual private network availability.

Completed Actions

The NRC transitioned to a Microsoft cloud-based solution so agency-managed IT end points can directly download applications, patches, and updates.

The NRC developed an automated process and online web form to streamline the submission and processing of COVID-19-related exemption requests.

Looking ahead: The OIG will continue to monitor the NRC's actions to ensure technology is proactively upgraded in the remote work environment and effectively procured for timely installation of needed technology that functions properly.

Challenge 6: Strategic Workforce Planning During Transformation and Industry Change

WHY IS THIS A SERIOUS MANAGEMENT AND PERFORMANCE CHALLENGE?

Strategic workforce planning is critical to help the NRC maintain its focus on longer-term workforce development and accomplishing organizational goals during periods of agency transformation and industry change.

CHALLENGE SYNOPSIS

The NRC's enhanced Strategic Workforce Planning (SWP) is a structured, data-driven process. The SWP process develops short- and long-term strategies and action plans that enable the NRC to recruit, retain, and develop a skilled and diverse workforce with the competencies and agility to address emerging needs and workload fluctuations. In addition, the NRC is transforming to realize its vision of becoming a modern, risk-informed regulator and be in the best position to continue meeting its important safety and security mission well into the future. Transformation will help the NRC keep pace with the highly dynamic, interconnected environment in which the agency operates, and be prepared to regulate an industry that is innovative and has new technologies. The SWP process takes place annually to develop strategies for workforce needs in the budget 5 years in the future.

The NRC's proposed FY 2022 budget is $887.7 million, an increase of $24.4 million over its enacted budget for FY 2021. This includes 2,879 FTE, a slight increase compared to the FY 2021 enacted budget.

The NRC faces the challenges of fulfilling the agency mission with mandates on limiting corporate costs and further reductions in staff. These challenges make it clear that effective future workforce planning is even more important in an innovative industry.

ONGOING ACTIONS

The NRC completed a three-office pilot of an enhanced SWP process and now forecasts its workload 5 years ahead.

The NRC used Futures Assessment insights and the related multi-day online conference to identify four focus areas for achieving its transformation vision of being a modern, risk-informed regulator: Our People, Be RiskSMART, Using Technology, and Innovation. Each focus area was supported by transformation initiatives that were updated for NRC Commissioners in meetings on September 17, 2020, and June 22, 2021.

COMPLETED ACTIONS

The NRC has completed three recommendations from GAO-17-233, which addressed its strategic human capital management and workforce plans.

The NRC's 2019 Futures Assessment effort helps to ensure that the NRC continues to effectively meet its mission using a scenario planning approach to understand the various ways the future of the NRC's external environment could change, how the NRC could be affected, and steps the NRC could take to be prepared.

Looking ahead: The OIG will audit the NRC's Knowledge Management Program in FY 2022.

Challenge 7: Oversight of Materials, Waste, and the National Materials Program

Why is this a serious management and performance challenge?

This challenge involves sustained, high-level coordination between the NRC and 39 Agreement States to ensure a consistent understanding and implementation of regulations associated with the oversight of radioactive materials, in addition to the NRC's ability to effectively oversee the continued increase in high-level radioactive waste.

Challenge Synopsis

The NRC is responsible for maintaining an established regulatory framework for the safe and secure use of nuclear materials; medical, industrial, and academic applications; uranium recovery activities; and high-level radioactive waste.

The NRC's regulatory framework includes Agreement States, which are U.S. states that have entered into an agreement with the NRC to regulate certain radioactive materials and limited quantities of special nuclear material. Agreement States must demonstrate that their regulatory programs are adequate to protect public health, safety, and the environment, and are compatible with the NRC's program. There are currently 39 Agreement States; however, within the past 12 months, 2 states—Connecticut and Indiana—have submitted letters of intent to also become Agreement States.

The broad collective effort of the NRC and Agreement States to carry out their respective regulatory programs for radioactive material is called the National Materials Program (NMP). The mission of the NMP is to have a partnership between the NRC and Agreement States that ensures protection of public health, safety, security, and the environment from the hazards associated with radioactive material.

In addition to the NMP, the NRC has sole responsibility for overseeing high-level radioactive waste (HLW), the highly radioactive byproduct of the reactions that occur inside nuclear reactors. Spent (used) reactor fuel is one form of HLW, and significant amounts of HLW result from the Department of Energy's (DOE's) defense reprocessing programs. The NRC does not regulate DOE HLW, but this waste must be included in any HLW disposal plans. An alternative to storing spent fuel is reprocessing; however, commercial spent fuel is not currently reprocessed in the United States.

Ongoing Actions

The NRC is in the process of updating guidance to document strategies and tools to be used for risk-informing requests for additional information in licensing processes for spent nuclear fuel.

Staff will continue to expand its use of Nuclepedia as a knowledge management tool to capture important technical positions and recurrent requests for information issues.

Completed Actions

The NRC posted the revised State Agreements Procedure (SA-100) on the state communication portal website. The revised SA-100 included aspects of the implementation plan that align with the NRC consolidated Integrated Materials Performance Evaluation Program plan.

NRC staff sought input from stakeholders and used a risk-informed approach to evaluate and document the benefits of strengthening current internal control processes to ensure temporary radiation safety officer appointments were established and terminated in accordance with NRC policy.

Looking ahead: The OIG will continue to monitor developments in this area throughout the year to inform its audit planning work.

Challenge 8: Management and Transparency of Financial and Acquisitions Operations

Why is this a serious management and performance challenge?

Sound financial management is vital for federal agencies to effectively and efficiently accomplish their missions. A strong acquisition management process increases the likelihood that the agency awards contracts to the right contractors and monitors contracting actions in accordance with regulations.

Challenge synopsis

The Nuclear Energy Innovation and Modernization Act (NEIMA) requires the NRC to recover, to the maximum extent practicable, approximately 100 percent of its annual budget less certain amounts excluded from this fee-recovery requirement. It also requires the NRC to establish a schedule of charges that fairly and equitably assesses the fees to license holders and license applicants. To improve efficiency and accuracy, the NRC is piloting new IT applications to improve its fee calculation process.

The NRC requested supplemental funds under the CARES Act and to maintain transparency, so it must continue to implement solid internal controls over financial management and reporting. Sound acquisitions practices are also an important aspect of NRC operations. The agency has continued to promote sound acquisition award practices, improvements in the management of contracts, and timely closeout of contracting actions. In addition, the agency must continue to administer its grants program in accordance with the prescribed federal regulations. The OIG conducted an audit of the NRC's grants pre-award and award processes during FY 2021 and identified recommendations for the agency to improve internal controls related to the pre-award and award process. Key financial and acquisition challenges include the following:

- Developing and implementing the agency's budget in accordance with federal laws, regulations, and guidance;
- Maintaining an automated fee structure in accordance with laws and regulations that is fair to agency licensees and includes all types of reactors;
- Improving controls over license fee billing; and,
- Exploring ways to improve the award, management, and timely closeout of acquisition actions.

Ongoing Actions

The NRC is part of a governmentwide initiative to remove the Data Universal Number System organizational identifier and replace it with a unique entity identifier.

The NRC is continuing to pursue various internal control efforts in accordance with federal internal control guidelines that involve agency management and promote sound financial management.

Completed Actions

The agency implemented an eBilling process so the NRC can bill, and licensees can pay, fees online.

The NRC implemented a new fee billing validation process.

The NRC completed corrective actions related to previous OIG audits affecting the agency's grants program.

Looking ahead: The OIG is continuing efforts to analyze the agency's financial and budgeting information, as well as the agency's contract administration and grants award actions.

Challenge 9: NRC Readiness to Address Cyber Threats to Critical National Infrastructure Sectors Impacting the NRC's Public Health and Safety Mission and/or NRC Licensees

WHY IS THIS A SERIOUS MANAGEMENT AND PERFORMANCE CHALLENGE?

The increasing complexity of information technology and industrial control systems throughout the nation's critical infrastructure makes it imperative to strengthen preparedness to counter any emerging cyber threats in the NRC's areas of responsibility.

CHALLENGE SYNOPSIS

Federal government policy organizes critical infrastructure into 16 sectors with assets, systems, and networks considered vital to the security, economy, and/or public health and safety of the United States. Nuclear reactors, materials, and waste comprise one of these sectors, which the NRC oversees in accordance with its statutory mission to ensure adequate protection of public health and safety, promote the common defense and security, and protect the environment.

Cybersecurity presents unique challenges to critical infrastructure protection because information technology and industrial control systems are highly complex and dynamic, technologically diverse, and often geographically dispersed. This complexity increases the difficulty in identifying, managing, and protecting the numerous operating systems, applications, and devices involved. The NRC issued a cybersecurity rule (10 C.F.R. Part 73.54) for nuclear power plants in 2009 and performs routine inspections at plants to assess licensee compliance with it. In 2017, the NRC staff sent the Commission a proposed cybersecurity rule for nuclear fuel cycle facilities, but the Commission has not yet acted on the proposed rule, so the NRC does not presently conduct cybersecurity inspections at nuclear fuel cycle facilities.

ONGOING ACTIONS

The NRC is developing a revised cybersecurity inspection procedure and plans to restart power reactor cyber security inspections as part of the next biennial ROP cycle.

The NRC continues its monitoring of cybersecurity threats directed toward nuclear power plants and Category I fuel cycle facilities to communicate time-sensitive information and assess the need for any changes to the design basis threat applicable to these facilities.

COMPLETED ACTIONS

NRC inspectors completed the final round full-scope cybersecurity inspections at nuclear power plants, which began in 2017.

All operating plants have now undergone full scope inspections to verify licensees' implementation of the 2009 cybersecurity rule.

In September 2021, the NRC issued a baseline inspection procedure for biennial oversight of licensee cyber security programs starting in January 2022.

Looking ahead: The OIG will continue to monitor developments in this area throughout the year to inform its audit planning work.

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COMMENTS AND SUGGESTIONS

If you wish to provide comments on this report, please email the OIG using this link.

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