

**OVERSIGHT OF
THE NUCLEAR REGULATORY COMMISSION**

HEARING
BEFORE THE
**COMMITTEE ON
ENVIRONMENT AND PUBLIC WORKS**
UNITED STATES SENATE

ONE HUNDRED SEVENTEENTH CONGRESS

FIRST SESSION

DECEMBER 1, 2021

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COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

ONE HUNDRED SEVENTEENTH CONGRESS

FIRST SESSION

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OVERSIGHT OF THE NUCLEAR REGULATORY COMMISSION

WEDNESDAY, DECEMBER 1, 2021

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
Washington, DC.

The Committee, met, pursuant to notice, at 10:09 a.m. in room 406, Dirksen Senate Office Building, Hon. Thomas R. Carper (Chairman of the Committee) presiding.

Present: Senators Carper, Capito, Cardin, Whitehouse, Markey, Stabenow, Padilla, Lummis, and Sullivan.

OPENING STATEMENT OF HON. THOMAS R. CARPER, U.S. SENATOR FROM THE STATE OF DELAWARE

Senator CARPER. I would like to invite the Chairman and the Commissioners to please come to the witness table.

Colleagues and witnesses, guests, I think we have everybody in their respective seats. Nice to see you all; thanks for joining us.

Today we are going to hear from three members currently serving on the Nuclear Regulatory Commission. I want to start by welcoming each of them back to this Committee.

Chairman Hanson, Commissioner Baran, and Commissioner Wright, we want to thank you all first of all for being here. I want to thank you for your service. It is great to see each of you.

This hearing is an opportunity for our Committee to examine the work of the NRC, important work of the NRC, understand what is working and to learn what we can do together to address any challenges that this important agency is facing. We appreciate the Commissioners' joining us today, because it is important for us to hear directly from you.

We want to ensure that the NRC has the resources it needs to maintain the safety of existing nuclear facilities and also to prepare for the future. This includes the work required to develop and deploy the next generation of reactors as well as new, advanced nuclear technology and materials.

As many of you know, I believe that safe nuclear power plays an important role in our efforts to address the greatest challenge that we face on Earth at this time, and that is the climate crisis. America's nuclear reactors provide, if I am not mistaken, one-fifth of our Nation's electricity and just about half of all emission free energy in this country of ours. Think about that. Just about half.

Nuclear energy is key to reaching net zero emissions economy-wide. And the NRC is critical to ensuring that our nuclear energy is safe and that it is reliable.

In August, I had the opportunity to visit the Salem Hope Creek Nuclear Power Plant, just across the Delaware River in our neighboring State of New Jersey, along with Chairman Hanson.

Thank you for being there with us.

I describe that as my favorite part of Delaware, but it is really in New Jersey. Actually part of the high water mark on the Delaware River on the New Jersey side actually does belong to Delaware. We never got control of the nuclear plants.

Anyway, I was quite impressed with what we saw during our visit. I suspect the Chairman was as well. Those two plants employ more than 1,600 people, a bunch of them from New Jersey, but a surprising number from Delaware, too, and some from Pennsylvania. They keep electricity rates affordable and help make the electric grid more reliable. More importantly, they do all these things safely. Let me say that again. More importantly, they do all these things safely.

The NRC remains the gold model for nuclear safety agencies. And the Commission's work to maintain safe and secure nuclear power is an essential tool in our efforts to reduce greenhouse gas emissions.

Unfortunately, our existing aging and inefficient nuclear fleet is struggling to keep up with our growing needs for safe, climate friendly power. Several nuclear plants have closed prematurely in recent years. Several more are expected to close this decade.

From this adversity comes opportunity. Now, American innovators can rise to the challenges and work to develop the next generation of reactors and technologies. Doing so will place our Nation at the forefront of the revolution to clean energy, all while creating jobs and economic opportunity for the American people. That is something we all should be proud of and we should all support.

As we work to meet this moment, we open the door to another critical opportunity, that is the chance to right the wrongs of the past and address the historic impact of pollution on disadvantaged and underserved communities across our country. As a founder and co-chair along with the Senator from Illinois, I and also Senator Cory Booker, I think it is essential for the NRC to bring that focus on equity to their work as we pave the way for a new era of non-polluting and safe nuclear power.

So I am pleased that the NRC is currently undergoing a review of its environmental justice policies and programs. I hope and expect that these efforts will empower those communities historically left behind by our energy policies and will give them a seat at the table in the NRC's decisionmaking processes, and hopefully within the nuclear industry more broadly.

These are good efforts underway at the Commission. So in closing, I would just add that I look forward to hearing from each of you about how this Committee can better support your efforts. Together, I think we can. Actually, I think we must ensure that a revitalized nuclear industry is a significant part of our national strategy to combat climate change by providing safe, secure, clean, and affordable energy to all Americans.

Before we hear from our witnesses, I would like for us to hear from Senator Capito for any comments that she wants to make.

Senator Capito, welcome, and thank you.

**OPENING STATEMENT OF HON. SHELLEY MOORE CAPITO,
U.S. SENATOR FROM THE STATE OF WEST VIRGINIA**

Senator CAPITO. Thank you, Chairman Carper, and thank the witnesses for coming before us today and for your service.

This comes at a very critical time. Energy prices continue to rise, as the weather is turning colder and families need to heat their homes. My constituents are paying more at the pump to take their kids to school or to go to their jobs. Higher energy prices are driving inflation, and make no mistake, this is a hidden tax on our working families.

Despite this, the game plan is to continue to push policies, I think, that will make the situation worse. Unaccountable White House staff, led by climate czar Gina McCarthy, are developing and implementing an extreme environmental agenda. President Biden's administration is taking drastic steps that will hurt energy affordability and electric reliability. The EPA is pushing regulations to limit production of American energy. EPA Administrator Michaela Regan has stated that he is going to push the envelope in exercising the agency's regulatory authority.

It seems this reckless tax and spending spree would increase energy costs on all American families and businesses and will harm our competitiveness, will reduce the reliability of our energy systems; it is just a bad deal. It would raise energy prices through a natural gas tax. These policies will raise energy costs and undermine baseload electric generation, threatening families and businesses with more frequent and wholly preventable blackouts.

Instead of pursuing policies that will accelerate inflation and undermine our grid, we should advance the solutions we are going to hear about today that reduce costs and increase reliability, all while improving the environment. This means pursuing all clean energy sources, including carbon capture, natural gas, and nuclear.

The NRC enables the safe use of nuclear energy in the United States. It is instrumental to ensure our public confidence. The public confidence is strengthened when the Commission operates as it was intended.

The Congress established the Commission as a five member body. It functions most effectively with a full slate of members. The Commission is currently operating with just three members, who we have here with us today.

In March, Chairman Carper and I wrote to President Biden asking that he promptly put forth a bipartisan pairing of qualified nominees, one Democrat and one Republican. But the President has yet to do so. A full slate of Commissioners should be in place to make critical decisions for how new nuclear technologies are licensed, regulated, and operated.

In 2018, Congress passed the Nuclear Energy Innovation and Modernization Act, which I cosponsored, with overwhelming bipartisan support. That law, which was a product of this Committee, requires that the NRC develop safety rules for the next generation of advanced nuclear technologies. This past May I wrote to the NRC Chairman Hanson to applaud the Commission and its staff for their diligent work so far on those rules. Our innovators need safety rules that are both predictable and flexible. Nuclear engineers and entrepreneurs who are investing time and money to de-

velop new reactor designs need to use the rules, and they need to know the rules of the road.

I look forward to receiving an update on the rulemaking as well as other related advanced nuclear initiatives.

The Commission is looking to update existing policies for new and emerging technologies to guide review of applications submitted before the rulemaking is complete. In addition to setting the stage for new nuclear technologies, the Commission should modernize its policies to allow for today's reactors to focus on the most important safety issues.

In 2019, the NRC staff proposed recommendations to the Commission for common sense changes to what is known as the reactor oversight process, the regulations that guide the oversight and inspection rules for operating nuclear power plants. I joined seven of my colleagues in asking the Commission to support these proposals, which were based on thorough analysis and review of historical data. I am disappointed that the Commission did not act. The staff is now, to my understanding, reworking its proposals.

While the Commission reviews its policies to ensure the safe operation of nuclear power plants, Congress can build on previous bipartisan efforts like the Nuclear Energy Innovation and Modernization Act to secure the future of our country's nuclear energy sector.

In July, I introduced the American Nuclear Infrastructure Act to preserve and expand our use of nuclear energy. Joining me on the bipartisan legislation are six cosponsors, including Senator Whitehouse and Senator Graham on this Committee. Last year the EPW Committee, this Committee, passed that bill by 16 to 5. Chairman Carper and Senator Cardin voted in favor of that bill.

I look forward to working with Chairman Carper to advance this legislation again this Congress to ensure Americans have access to clean, reliable, affordable energy.

With that, I yield back.

Senator CARDIN [presiding]. Let me thank the Ranking Member.

We will now hear from the Commissioners of the Nuclear Regulatory Commission, starting with its Chair, Hon. Christopher Hanson.

**STATEMENT OF HON. CHRISTOPHER T. HANSON,
CHAIRMAN, NUCLEAR REGULATORY COMMISSION**

Mr. HANSON. Thank you, Senator Cardin.

Chairman Carper, Ranking Member Capito, and distinguished members of the Committee, my colleagues and I appreciate the opportunity to update you on the U.S. Nuclear Regulatory Commission's licensing and oversight activities this morning.

The NRC is an independent Federal agency established to protect the public health and safety through the regulation of commercial nuclear plants, research tests and training reactors, nuclear fuel cycle facilities, and civilian use of nuclear materials. Additionally, the agency regulates transportation, storage, disposal, export and import of nuclear materials and waste, the export and import of nuclear reactors and production facilities, and the export of nuclear facility components.

The Commission last appeared before this Committee in March 2020. Since that time, the NRC has had to respond to the chal-

allenges of the COVID-19 pandemic while protecting the safety of our work force and continuing to perform our important safety and security mission. To ensure that the agency could maintain its regulatory oversight role during the pandemic, the NRC implemented a number of interim procedures. These procedures enabled the NRC to continue inspections and other key oversight activities during the pandemic. It also allowed the agency to stay engaged with the public despite limitations on in person meetings.

The NRC's incredible work force has remained committed to the agency's mission despite all the challenges and uncertainty associated with the pandemic. The NRC began its transition to a hybrid work environment on November 7th, just last month. We have taken care to ensure our buildings are safe for employees, contractors, and visitors.

In this regard, we have been fully implementing the Administration's executive orders requiring COVID-19 vaccination for Federal employees as well as Federal contractors and subcontractors.

The NRC has made significant progress in implementing the provisions of the Nuclear Energy Innovation and Modernization Act since its enactment in January 2019. The NRC submitted 12 reports to Congress and has made progress implementing other provisions, including the requirement to complete a rulemaking for a technology inclusive regulatory framework for advanced nuclear reactors, also known as Part 53. The NRC remains on a schedule that would allow for publication of the final rule significantly ahead of the NEIMA deadline of December 2027.

The NRC continues to provide licensing and oversight for 93 operating commercial nuclear power plants and 31 research and test reactors around the country. Currently, 92 of 93 reactors are in NRC's highest performance category and have fully met our safety and security performance objectives. Only one reactor is in the second performance category, needing to resolve items of low safety significance.

Since December 2019, the NRC has approved subsequent license renewals for six reactors, extending each reactor's period of operation from 60 to 80 years. The NRC is currently reviewing several other applications for subsequent license renewal.

The NRC is also actively preparing for the completion of construction and anticipated transition to operation of the Vogtle Reactor units in Georgia. NRC inspections are proceeding in accordance with the licensee's continued work at the site.

Regarding small modular reactors, or SMRs, the NRC has completed its technical review of NuScale's application for certification of its SMR design. The NRC is also engaged in pre-application discussions with vendors for three other SMR designs as well as a possible combined license application that might reference one of these designs.

In the nuclear materials and safety program, the NRC completed its safety and environmental reviews for a consolidated interim storage facility in Andrews, Texas. And the agency issued a license to Interim Storage Partners in September 2021.

In addition, the NRC approved a license amendment in June that authorizes a 16 centrifuge cascade for uranium enrichment at the American Centrifuge Plant in Piketon, Ohio, to demonstrate

the production of high assay low enriched uranium for the Department of Energy.

Twenty-six NRC licensed reactors are currently in decommissioning. Three additional power reactors publicly indicated or submitted formal notifications to the NRC that they will be permanently shut down before the end of 2025.

The Commission recently approved a proposed rule to address decommissioning reactors. Decommissioning reactors are currently subject to the same requirements as operating reactors, despite significant differences. This rulemaking removes inapplicable requirements but does not reduce safety. It will provide for a safe and more efficient decommissioning process ending with unrestricted release of the reactor sites. It should reduce the need for license amendment requests and requests for regulatory exemptions.

In closing, the NRC and its dedicated employees are hard at work and remain deeply committed to the agency's safety mission.

Chairman Carper, Senator Cardin, Ranking Member Capito, and distinguished members of the Committee, this concludes my formal testimony. On behalf of the Commission, I thank you for the opportunity to appear before you this morning and for your support for the vital mission of the NRC. We would be pleased to respond to any questions.

[The prepared statement of Mr. Hanson follows:]

WRITTEN STATEMENT
BY CHRISTOPHER T. HANSON, CHAIRMAN
UNITED STATES NUCLEAR REGULATORY COMMISSION
TO THE
SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
DECEMBER 1, 2021

Chairman Carper, Ranking Member Capito, and distinguished members of the Committee. My colleagues and I appreciate the opportunity to update you on the U.S. Nuclear Regulatory Commission's (NRC) licensing and oversight activities.

The NRC is an independent Federal agency established to regulate commercial nuclear power plants; research, test, and training reactors; nuclear fuel cycle facilities; and civilian use of nuclear materials. Additionally, the agency regulates the transportation, storage, disposal, export and import of nuclear materials and waste; the export and import of nuclear reactors and production facilities; and the export of nuclear facility components. The NRC also works with agencies around the world to enhance nuclear safety and security.

The Commission last appeared before this Committee in March 2020, to discuss the agency's activities in the year ahead. Today, I will focus my testimony on the NRC's response to the COVID-19 pandemic and provide the Committee with an update on the agency's current regulatory activities, including NRC activities associated with the Nuclear Energy Innovation and Modernization Act (NEIMA), progress on NRC activities relating to advanced and small modular reactors, decommissioning activities, safety and security performance of the operating fleet of nuclear power reactors, and several other programs that are important to the Commission.

NRC'S RESPONSE TO THE COVID-19 PUBLIC HEALTH EMERGENCY

In response to the Department of Health and Human Services' declaration of the COVID-19 public health emergency in January 2020, the NRC took numerous actions to protect the safety of our workforce while continuing to perform our important safety and security mission. Our buildings have remained open, although most staff have performed their duties from home while remaining fully engaged. We stood up a COVID-19 Task Force and Working Group—a dedicated team of senior leaders and staff focused on identifying, tracking, and responding to COVID-19 issues pertinent to the NRC and its workforce.

During the 20 months before the NRC's re-entry on November 7, 2021, NRC employees successfully teleworked nearly full-time, with a peak of 98 percent employees teleworking at the height of the pandemic. This success of this transition was due in part to actions the agency had taken earlier to provide laptops and train staff on technology for working effectively in a virtual environment. The agency also expanded its bandwidth to accommodate the increase in virtual connections, which was made possible by a supplemental appropriation under the CARES Act.

Special attention was given to our inspection staff to protect both their health and that of licensee employees while our staff continued to carry out their important duties. Resident inspectors at nuclear power plants and fuel cycle facilities employed a risk-informed strategy to provide oversight through a routine, onsite presence supplemented by telework flexibilities, as appropriate. Licensees worked with us to provide new mobile technology, which enabled NRC inspectors to remotely monitor plant data systems, attend meetings, and access other information during the pandemic.

In keeping with our commitment to be transparent, the NRC communicated regularly with Congress, the public, industry, and licensees on conditions at sites and plant activities, including plans with respect to licensee staffing and work outages. In response to the pandemic, the NRC instituted an expedited exemption process to enable licensees to request relief from certain NRC regulations, such as work-hour limits, subject to thorough NRC review to ensure that reasonable assurance of public health and safety was maintained. The NRC also issued guidance to inspection staff in exercising enforcement discretion for specific cases of noncompliance that may have occurred as a result of the pandemic.

Although force-on-force inspection activities were briefly put on hold, in July 2020, the staff implemented a new inspection procedure for limited-scope tactical drills in a manner that mitigated the risk of COVID-19 transmission. In 2021, the staff developed another option that was broader in scope than the 2020 tactical drills. Depending on licensee site conditions due to COVID-19, the NRC staff has successfully performed either tactical drills or the modified force-on-force exercises throughout 2021.

Re-entry Preparations and Implementation

The NRC's re-entry date was November 7, 2021, which was based on the previous vaccine attestation guidance and the associated requirement for agencies to develop COVID-19 testing programs, which has since been replaced by the COVID-19 vaccine mandate. We are continuously consulting with other agencies, as well as monitoring public health conditions and updating our Workplace Safety Implementation Plan, in accordance with the latest guidance issued by the Centers for Disease Control and Prevention and the Safer Federal Workforce Task Force.

Currently, we are implementing the requirements in the recently issued Executive Orders requiring COVID-19 vaccination for Federal employees, as well as Federal contractors and subcontractors. As of November 23, 2021, 93% percent of NRC employees have provided documentation that they are fully vaccinated. We required that all NRC employees provide documentation by November 22, 2021, showing that they have been fully vaccinated or have sought an exception allowed by law. We are also taking steps to ensure that NRC contracts include appropriate provisions requiring contractors to comply with Safer Federal Workforce Task Force guidance, which specifies that contractor employees are to be vaccinated by January 4, 2022.

NRC'S CURRENT REGULATORY ACTIVITIES

I would like to take this opportunity to update the Committee on the NRC activities required by NEIMA and the NRC's other licensing and regulatory activities.

Nuclear Energy Innovation and Modernization Act (NEIMA)

The NRC has made significant progress in implementing the provisions in NEIMA since its enactment in January 2019. The NRC has submitted 12 reports to Congress and has undertaken significant efforts to implement other provisions, including the requirement to complete a rulemaking for a technology-inclusive regulatory framework for advanced nuclear reactors.

Most recently, the NRC provided the report, "Nuclear Energy Innovation and Modernization Act (NEIMA) – Implementation, Impacts, and Recommendations for Improvement of the U.S. Nuclear Regulatory Commission's Annual Budget Justification; Fees and Charges; Performance and Reporting; and Accurate Invoicing," to the Committee, as well as other congressional

committees. As detailed in the report, the NRC identified and implemented improvements to invoicing, the fee recovery framework, and performance reporting to reflect changes required by NEIMA, and complied with the specified corporate support percentage to the maximum extent practicable. However, the NRC has experienced difficulties meeting the corporate support cap and anticipates significant challenges in future years in meeting this cap, and the cap on the annual fees charged to operating reactors. As required by Section 102(e) of NEIMA, the NRC provided recommendations for improvement that could be made to address the impacts and challenges identified with implementing NEIMA Section 102. I would welcome the opportunity to work with the Committee to further discuss these implementation challenges.

Nuclear Reactor Safety

Operating Reactors

The NRC continues to provide licensing and oversight for 93 operating commercial nuclear power reactors and 31 research and test reactors. Since December 2019, the NRC has renewed licenses for six reactors to extend each reactor's period of operation from 60 to 80 years: Turkey Point Nuclear Generating Station, Units 3 and 4 in Florida; Peach Bottom Atomic Power Station, Units 2 and 3 in Pennsylvania; and most recently, Surry Power Station, Units 1 and 2 in Virginia. The NRC is currently reviewing applications for subsequent license renewal for Point Beach Nuclear Plant, Units 1 and 2 in Wisconsin; North Anna Power Station, Units 1 and 2 in Virginia; Oconee Nuclear Station, Units 1, 2, and 3 in South Carolina; and St. Lucie Plant, Units 1 and 2 in Florida.

The NRC expects to receive additional initial license renewal applications for plants seeking to extend operations from 40 to 60 years and a significant number of subsequent license renewal applications in the coming years as 79 units have licenses that will expire at 60 years of operation.

New Reactors

The staff is actively preparing for the completion of construction and anticipated transition to operation of the Vogtle reactor units in Georgia, and inspections are proceeding in accordance with the licensee's continued work at the site.

Interest in small modular reactors (SMRs) and advanced, non-light-water reactors has continued to grow. Regarding SMRs, the NRC has completed its technical review of the NuScale SMR application, and the application is currently in the design certification rulemaking process. Additionally, the NRC is engaged in pre-application discussions with vendors for three other new SMR designs, as well as a possible combined license application that might reference one of these designs.

The NRC is also committed to developing a regulatory infrastructure to review new reactor technologies. A rulemaking under a new Part 53 of Title 10 of the Code of Federal Regulations will define technology-inclusive, performance-based requirements for advanced nuclear reactors. This regulatory framework would provide an optional path for applicants seeking licenses for new commercial advanced nuclear reactor licenses.

The performance-based requirements of Part 53 will support a risk-informed approach that will acknowledge features designed to prevent or mitigate adverse consequences. The staff has

been working to develop the rule in a way that is creative, open, and responsive. The staff has received considerable input from a diverse set of stakeholders and will respond to that input in developing the rule.

Over the past year, the staff has had more than 30 external engagements, as well as briefings to the Advisory Committee on Reactor Safeguards (ACRS), on preliminary proposed rule language and associated draft guidance. To date, we have received more than 140 individual public comments, and over the past several months the staff has worked to address the feedback from external stakeholders and the ACRS. The staff has also been actively revising its preliminary proposed rule language, embracing new ideas and reflecting comments from these stakeholders.

The staff remains on a schedule that would allow for publication of the final rule significantly ahead of the NEIMA deadline of December 2027.

Nuclear Materials and Waste Safety

Major Licensing Activities

In the Nuclear Materials and Waste Safety program, the staff has recently completed two major licensing actions. The staff completed the safety and environmental reviews for Interim Storage Partner's application for a consolidated interim storage facility in Texas, and the staff issued the license in September 2021. The proposed facility is authorized to receive, possess, store, and transfer up to 5,000 metric tons of spent fuel and 231.3 metric tons of Greater-than-Class C radioactive waste.

In addition, the staff approved a license amendment in June that authorizes Centrus Energy to operate a 16-centrifuge cascade at the American Centrifuge Plant in Ohio to demonstrate the production of high assay low-enriched uranium for the Department of Energy.

Decommissioning Reactors

Twenty-six reactors are currently in decommissioning. Three additional power reactors have publicly indicated or submitted formal notifications to the NRC stating that they will permanently shut down before the end of 2025. The reactors at the Vallecitos Nuclear Center in California will be moving to active decommissioning by 2023, after the Commission denied GE Hitachi's request for an extension of the decommissioning schedule. Conversely, there have been some recent changes in plans for power reactors that had previously announced plans to decommission; specifically, Exelon Generation announced that it has decided to continue operations at Byron Station and Dresden Nuclear Power Station in Illinois as a result of the recent passage of Illinois energy legislation.

In November, the Commission approved a proposed rule to address decommissioning reactors. The goal of this rulemaking is to provide for a safe, effective, and efficient decommissioning process; to reduce the need for license amendment requests and exemptions from existing regulations; and to address other decommissioning issues. The rulemaking proposes to incorporate lessons learned from licensees that have completed or are currently in the decommissioning process. The rulemaking also will align regulatory requirements with the reduction in risk that occurs as the decommissioning process progresses, while continuing to maintain safety and security.

The proposed rule will be published in the Federal Register [in December], and the public will have an opportunity to provide comments on the proposed rule and draft regulatory guidance documents for a 75-day public comment period. The staff will conduct a public meeting during that time.

Nuclear Power Plant Safety Performance

As of September 1, 2021, 89 of 93 reactors were in the NRC's highest performance category and fully met our safety and security performance objectives. Three reactors were in the second performance category, needing to resolve items of low safety significance. For these three reactors, the NRC's regulatory oversight includes additional inspection and follow-up of corrective actions. One reactor was in the third performance category with a degraded, but still acceptably safe, level of performance. For this reactor, regulatory oversight includes increased NRC inspections, increased attention by NRC senior management, and oversight focused on the causes of the degraded performance. There were no reactors in the fourth (lowest) performance category.

Environmental Justice

The NRC is committed to engaging with a broad range of stakeholders on environmental justice. In April 2021, the Commission directed the NRC staff to review how environmental justice is addressed in the NRC's programs, policies, and activities, and as part of that review, consider the adequacy of the 2004 Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions. The NRC staff continues to reach out directly to environmental justice communities to inform them about this effort and to solicit comments. In addition, the NRC staff has held several public meetings in support of this effort, including a listening session to hear perspectives from environmental justice community leaders and

practitioners on how the NRC has addressed, and might enhance, environmental justice in its programs and activities. The NRC staff also held a panel discussion on the agency's 2004 policy statement and how the agency might consider environmental justice beyond its reviews under the National Environmental Policy Act. The staff sent letters to Federally recognized tribes to provide notice of the NRC staff's effort and solicit comments and to offer consultation on environmental justice issues. Further, the staff is leveraging knowledge, ideas, and experience from across the agency by conducting interviews with staff experts. The NRC held an internal town hall-style meeting in October 2021 to receive comments and suggestions from the NRC staff.

International Activities

As activities associated with SMRs and advanced reactors continue to increase, the NRC is maintaining an open dialogue with all interested stakeholders, including reactor designers, operators, financiers, and our international regulatory counterparts. NRC participates in a wide range of bilateral and multilateral activities that enhance the safety and security of nuclear activities worldwide. The agency has bilateral agreements with over 45 regulatory counterparts, including almost every country with a power reactor program. These agreements facilitate technical exchanges, regulatory information sharing, personnel exchanges, and regulatory assistance. The NRC's regulatory approach has long been considered a model for countries operating or considering a nuclear program, and both new and established regulators routinely seek the NRC's assistance and cooperation.

Transformation and Innovation

The NRC has continued its efforts to be a modern, risk-informed regulator by leveraging available technologies, increasing opportunities for current staff to gain new skills, attracting and retaining talented staff, and fostering a culture of safety and innovation that continues to account for differing viewpoints and well-managed risks in our decision-making. To enhance our use of technology, improve our decision-making, and better inform the public of the bases for our regulatory decisions, the agency recently launched the Operating Reactor Analytics public website. This website provides an overview of different aspects of the Reactor Oversight Process and allows users to filter and sort results on plant performance and findings by site, Region, or licensee. The NRC staff will use this tool to assess plant performance trends, compare results across different “cornerstones” of plant operation, and link to more details on findings from inspection reports.

NRC Workforce

The agency recognizes the importance of having a highly skilled staff and the need to maintain our unique expertise. Strategic workforce planning is vital to helping the NRC identify the knowledge, skills, and abilities necessary to perform our mission now and into the future. We have looked at skill adequacy and gaps through a modern, enhanced Strategic Workforce Planning process with a 5-year planning horizon. We are instituting increased entry-level hiring to ensure a pipeline of talent and have created the Nuclear Regulator Apprenticeship Network (NRAN) program, a full-time, 2-year training program designed to develop well-rounded regulators by focusing on skill development in multiple program areas across the agency.

Diversity and Inclusion

Shortly after becoming Chairman, I issued an agencywide announcement emphasizing that all NRC employees must consider diversity and inclusion in agency operations and maintain a work environment free from discrimination, harassment, and intimidation. I have since emphasized this message in meetings with employees at all levels of our agency, explaining that the NRC is most effective when we maintain an open, inclusive, and collaborative work environment that supports all employees. The agency's "Inclusive Diversity Strategic Plan for Fiscal Years 2021–2026" serves as our blueprint for efforts in this area.

Differing Views and Whistleblower Protection

In addition, the NRC strives to maintain a workplace where employees are comfortable raising concerns without fear of retaliation. The NRC has a strong open-door policy that allows employees to raise concerns informally, along with well-established programs that allow employees to register their formal disagreement with proposed or finalized actions. The NRC also regularly reminds employees of federal whistleblower-protection laws, promptly informs employees of changes in the law, and requires our supervisors to receive training in this area. We also offer whistleblower training to all employees, including a September 2021 seminar where an attorney from the Office of Special Counsel provided NRC employees with valuable information on prohibited personnel practices and whistleblower protections.

CONCLUSION

In closing, the NRC remains deeply committed to its safety mission. As part of this commitment, our dedicated employees work daily to help ensure the safety and security of nuclear power facilities and nuclear materials. We are closely monitoring changes in our external environment that affect our work, tackling new challenges, and taking new approaches to address the issues that confront us.

Chairman Carper, Ranking Member Capito, and distinguished members of the Committee, this concludes my formal testimony. On behalf of the Commission, I thank you for the opportunity to appear before you and for your support of the vital mission of the NRC. We would be pleased to respond to your questions.

**Senate Committee on Environment and Public Works
Hearing Entitled, "*Oversight of the Nuclear Regulatory Commission*"
December 1, 2021**

Questions for the Record for Chairman Christopher T. Hanson

Senator Kelly:

1. In recent months, we've seen a number of utilities and energy companies fall victim to sophisticated cyber threats – and it goes without saying that the risk of any breach at a nuclear generation or storage facility would be of serious concern. How has NRC responded in recent months and years to ensure that regulated facilities don't fall victim to increasingly sophisticated cyber threats?

RESPONSE:

For nuclear power plants, the NRC cyber security regulation requires the protection of digital computer and communication systems and networks associated with safety, security, and emergency preparedness functions. In 2021, the NRC oversaw and inspected the successful completion of the full implementation of cyber security programs at nuclear power plants and will perform routine inspections to verify continued cyber security protection of those functions.

The Department of Homeland Security Cybersecurity and Infrastructure Agency (DHS/CISA), as the Nuclear Sector Risk Management Agency, communicates threat information directly to a broad set of industry stakeholders. In addition, the NRC issued three Security Advisories in 2021, to alert licensees to vulnerabilities identified by DHS and other government agencies: SA 2021-13, "Situational Awareness—Apache LOG4J Vulnerability," dated December 23, 2021 (ADAMS Accession No. ML21356B494); SA 2021-10, "Situational Awareness—Blackberry QNX Vulnerability," dated August 17, 2021 (ADAMS Accession No. ML21217A177); and SA 2021-05, "Situational Awareness—Microsoft Exchange Server Vulnerabilities," dated March 10, 2021

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(ADAMS Accession No. ML21064A380). These advisories provided licensees with timely information regarding new threats and allowed them to assess the need for actions to protect their digital assets to ensure continued compliance with the NRC cyber security regulation.

For several years, the NRC has continued to routinely interact with other federal and state agencies and monitor intelligence information to maintain awareness of the cyber threat landscape of the nation and to determine the need for any changes to the cyber security posture for NRC licensees. Through these information sharing channels, the NRC stays abreast of new and evolving cyber threats and takes part in assessing potential impacts of cyber attacks, such as the 2021 Colonial Pipeline attack, on the U.S. critical infrastructure. These partnerships also allow the NRC to participate in the development of integrated strategies for information sharing and a whole-of-government response to cyber threats.

- a. How would the additional funding you requested for FY22 for the Nuclear Reactor Safety Program support ongoing efforts to respond to cyber threats?

RESPONSE:

The additional funding requested for Fiscal Year (FY) 2022 for the Nuclear Reactor Safety Program was not for responding to cyber threats. The NRC has the necessary resources in place in FY 2022 to provide reasonable assurance of adequate protection against cyber threats at NRC-licensed facilities.

Ranking Member Capito

1. In February 2020, NRC staff established an effort to improve the efficiency of NRC's review and disposition of low safety inspection issues, which is known as the "Very Low

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Safety Significance Issue Resolution" (VLSSIR) process. My understanding is VLSSIR has since been successfully used in a targeted way with NRC licensees.

- a. Please provide a list of when VLSSIR has been used, including a brief description of the issue, the outcome of the process, and the NRC region in which the event occurred.

RESPONSE:

Very Low Safety Significance Issue Resolution (VLSSIR) is a process used to discontinue inspection, screening, and evaluation of an issue expected to be of very low safety significance involving a licensing basis question that cannot be resolved without a significant level of effort and resources. When the VLSSIR process is used, issue screening is discontinued and the VLSSIR is documented in the inspection report when certain criteria are met. The table below lists the issues that have ultimately been dispositioned via this process, but other issues have also been screened for potential VLSSIR applicability.

Plant and Region	Issue Summary	Inspection Report Issue Date and ADAMS Accession No.
Arkansas Nuclear One Region IV	Technical Specifications for Maximum Temperature of Service Water System When Aligned to Lake Dardanelle	May 1, 2020 (ML20120A599; Pages 20-22)
Donald C. Cook Region III	Lateral Support Bumper Gaps	May 13, 2020 (ML20134J115; Pages 8-9)
Fermi Region III	Application of Technical Specification Limiting Condition for Operation 3.0.9, Barriers, to the Mechanical Draft Cooling Tower Fan Brake System	May 14, 2020 (ML20135H234; Pages 9-12)
Virgil C. Summer Region II	Closure of violation 05000395/2017004-02, "Failure to Implement Corrective Actions to Restore Compliance for Previous NRC-identified Green NCV [non-cited violation] 05000395/2005007-01"	May 14, 2020 (ML20135H247; Pages 4-7)

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Plant and Region	Issue Summary	Inspection Report Issue Date and ADAMS Accession No.
Wolf Creek Region IV	Atmospheric Relief Valve and Main Steam Safety Valve Tornado Missile Vulnerabilities Result in Unanalyzed Condition	August 12, 2020 (ML20224A354; Pages 21-23)
H.B. Robinson Region II	Potential Passive Single Failure Design Control Issue	December 21, 2020 (ML20356A076; Pages 4-8)
Joseph M. Farley Region II	Capability of Emergency Diesel Building Ventilation System to Withstand the Effects of a Tornado	January 14, 2021 (ML21015A000; Pages 4-7)
McGuire Region II	Capability of Diesel Building Ventilation System to Withstand the Effects of a Tornado	March 17, 2021 (ML21076A113; Pages 5-7)
Edwin I. Hatch Region II	Capability of Diesel Building Ventilation System to Withstand the Effects of a Tornado	June 25, 2021 (ML21176A042; Pages 5-7)
Palo Verde Region IV	Change to Emergency Plan in 1994 Relative to Emergency Response Organization Augmentation Timelines	August 9, 2021 (ML21217A331; Pages 13-17)

b. How is the NRC sharing best practices on VLSSIR application across regions?

The agency has a number of routine mechanisms for sharing best practices on the Reactor Oversight Process (ROP), including VLSSIR. These include semi-annual Inspector Counterpart Meetings, quarterly Inspector Newsletters, monthly Knowledge Management sessions, and periodic program effectiveness reviews in accordance with Inspection Manual Chapter 0307, "Reactor Oversight Process Self-Assessment Program." The VLSSIR process, while a relatively new addition to the agency's suite of options for dispositioning inspection issues of concern, was the subject of an effectiveness review in spring 2021 (ADAMS Accession No. ML21070A334), which identified several improvements in program implementation based on experiences to date.

c. Will the NRC consider expanding the use of the VLSSIR model to other regulatory activities?

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The VLSSIR process was initially developed by the Office of Nuclear Reactor Regulation (NRR) to address a subset of operating reactor inspection issues in which the NRC staff determined that a risk-informed application of resources could be better applied, namely, those issues for which the licensing basis was not clear and may take substantial effort to determine. During development of the process, the working group determined that issues that fall clearly within or outside of the licensing basis would be subject to existing risk-informed processes. With respect to operating power reactors, the agency is open to feedback on other potential applications of VLSSIR, but given its origin and purpose, significant expansion of VLSSIR applicability is not anticipated at this time. Current application of VLSSIR includes a screening of inspection issues through the ROP significance determination process to confirm the issues are low risk. However, the NRC staff has plans to evaluate the possible expansion of the VLSSIR screening tools to also include consideration of low safety significance issues that could lead to traditional enforcement.

The Office of Nuclear Material Safety and Safeguards (NMSS) is aware of the VLSSIR effort underway in NRR and formed a working group to develop a comparable process for the nuclear materials area. Similar in intent to the NRR VLSSIR process, while recognizing many NMSS areas do not have the quantitative probabilistic risk assessment models relied upon by NRR, the NMSS working group developed an approach for addressing issues (e.g., facility or activity licensing basis questions) commensurate with their importance/significance. Guidance for use of the VLSSIR process has been established in NMSS inspection guidance documents with additional guidance updates underway. Throughout the NMSS VLSSIR initiative, the working group has stayed in contact with members of the parallel NRR activity to share insights, approaches, and lessons learned.

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2. NRC's Office of Nuclear Regulatory Research oversees research activities that are generally requested by NRC's regulatory programs. This research is most effective when serving as confirmatory research, or to affirm or validate known gaps in NRC's regulatory structure, rather than exploratory research. How does NRC evaluate its research activities to ensure that your limited funding is used for high-priority, confirmatory research?

RESPONSE:

The NRC takes several steps to ensure research activities are properly planned, prioritized, and funded. Foremost is the use of program review meetings among the Office of Nuclear Regulatory Research (RES) and the NRC regulatory offices to focus research activities. These meetings highlight planned activities in future years, the planned results and benefits, and estimated resources for the projects. These communications focus and align on the top challenges that require research to support the continued success of the NRC's regulatory programs.

The NRC uses a planning tool to prioritize research projects during the budget development process to focus on activities that provide the greatest benefit to the mission with consideration of enterprise risk. The research prioritization tool is used to screen and assess future research plans by considering factors, including safety/risk benefits, uncertainties in the state of knowledge, programmatic needs, the degree to which the research activity can be leveraged, and the level of applicability of the research work to the entire classes of licensees. The tool provides insights into the relative importance of individual projects and is used throughout the agency budgeting process.

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Another tool that the agency uses to identify programmatic gaps and trends is the agency environmental scan, which provides a holistic view across NRC offices of emerging challenges and opportunities five years ahead. These insights allow the NRC research program to plan for and stay ahead of regulatory needs and support the NRC's mission.

Furthermore, the Advisory Committee on Reactor Safeguards (ACRS) conducts biennial reviews of the NRC research program with the findings reported to the Commission. For individual research projects, the staff frequently gives public briefings on research activities to the ACRS, which helps to enhance individual research activities. These activities also support the ACRS and provide public visibility into research activities.

Together, through the conduct of program reviews, prioritizing research activities, and using the agency budgeting process, the research budget results in regulatory research outcomes that deliver the right research, at the right time, using the right level of resources. A report of NRC research activities can be found at <https://www.nrc.gov/about-nrc/regulatory/research/activities.html>. This publication allows coordination with stakeholders to ensure the agency appropriately leverages funds and avoids duplication of efforts while conducting regulatory research.

3. The American Society of Mechanical Engineers (ASME) recently revised its recommendations regarding the frequency to inspect and test certain nuclear power plant structures, systems, and components. NRC's technical staff independently proposed to initiate a rulemaking to align the Commission's requirements with ASME. On November 8, 2021, the Commission approved the staff's recommendation.

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- a. Please provide a sample of other instances in which the NRC generally aligns its regulatory requirements with recommendations from ASME or other professional organizations.

RESPONSE:

The NRC participates with many voluntary consensus bodies in the development of consensus standards, consistent with the National Technology Transfer and Advancement Act of 1995 and Office of Management and Budget (OMB) Circular No. A-119. The NRC staff routinely participates in consensus standard development through engagement with organizations such as the American Society of Mechanical Engineers (ASME), the Institute of Electrical and Electronics Engineers (IEEE), the American Nuclear Society (ANS), and the American Society for Testing and Materials. The NRC also coordinates with international standards organizations, such as the International Electrotechnical Commission (IEC), where joint logo standards are increasingly developed by IEC and IEEE. Consensus codes and standards developed through these processes may be either incorporated by the NRC by reference in regulatory requirements (such as 10 CFR 50.55a, "Codes and standards") or endorsed by the NRC in agency regulatory guidance.

As an example of this process, ASME publishes new editions of the Boiler and Pressure Vessel (BPV) and Operation and Maintenance (OM) Codes on a biennial basis, which typically include either new ASME requirements or modifications to existing ASME requirements. ASME publishes Code Cases, which are alternatives to ASME Code requirements, on a quarterly basis. Since the 1970s, the NRC has participated in the ASME Code development process and has engaged in decision-making to decide whether to endorse or incorporate ASME Codes. Because ASME BPV and OM Codes are regularly updated, the NRC staff conducts routine rulemaking efforts to consider incorporating newer editions of certain ASME Codes and Code

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Cases into 10 CFR 50.55a to authorize their use with conditions to modify ASME requirements when needed. Currently, the NRC conducts these independent reviews and rulemakings about every 2 years. This process is consistent with the NRC's role as an independent regulator and its obligations under the National Technology Transfer and Advancement Act of 1995 to use consensus standards where possible. In a similar way, other standards development organizations reach out to the NRC for potential endorsement of standards and revisions to their standards.

As another example of this process, the NRC routinely participates in the development of IEEE consensus standards through membership on various IEEE working groups. IEEE working groups are designated for individual IEEE standards, and working group membership is comprised of numerous entities within the industry, such as nuclear power plant licensees and vendors, as well as the NRC staff. Certain IEEE standards have become part of the NRC's regulatory infrastructure through incorporation by reference into 10 CFR 50.55a or endorsement in agency regulatory guidance. The NRC staff's involvement in the development of new standards or updates to existing standards allows the staff to share the technical and regulatory perspective of the NRC during the development process. Consistent with its role as an independent regulator, the NRC conducts independent reviews of new or updated standards to determine whether they meet the technical and regulatory needs of the agency's mission and are suitable for endorsement or incorporation by reference.

The NRC Standards Forum, usually held once a year, is an NRC-led cooperative effort between standards development organizations, government, industry, and academia. The purpose of this forum is to facilitate discussions on codes and standards needs and coordination to accelerate the development of codes and standards and the NRC's review for potential endorsement of them in its regulations and regulatory guides. Within this forum, participants

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have been able to engage in meaningful discussions on codes and standards' needs, process improvements for how topics are identified and prioritized, and development and updates of standards. Further, more than 180 NRC staff participate with domestic and international standards development organizations, including IEEE, IEC, ASME, ANS, International Organization for Standardization, as well as the International Society of Automation.

- b. Please briefly describe the technical basis for the NRC staff's proposal to align inspection frequency with ASME recommendations.

RESPONSE:

On November 8, 2021, the Commission approved the staff's recommendation to initiate a rulemaking to update 10 CFR 50.55a to modify the frequency with which licensees are required to update their ASME Code of record to the most recently endorsed ASME Code edition. This update frequency is not an ASME Code requirement and is only a requirement of 10 CFR 50.55a. However, the current requirement is aligned with the ASME inservice inspection interval, which is part of the ASME Code incorporated by reference in 10 CFR 50.55a. The inservice inspection interval is currently a ten-year, repeating cycle used to schedule inservice inspections. At the beginning of each interval, licensees evaluate their inservice inspection programs in preparation for the new interval. Aligning the timing for licensees to update the ASME Code editions they use with that repeating cycle allows increased efficiencies and improved effectiveness. Currently, these updates and inspection intervals are aligned so that licensees must update their Code edition at the beginning of every inspection interval. This rulemaking would allow licensees that have updated to the latest ASME Code edition incorporated into NRC regulations to update their code edition on every other inspection interval. This would change the NRC's code adoption requirement to provide licensees 20 years to update their licensing basis code to the most recent code.

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The staff determined that due to the maturity of the ASME Code, the length of time necessary to incorporate safety changes into the ASME Code, and the improvements in mitigating material degradation mechanisms over the years, the proposed change in the update frequency for the Code of record would not be likely to have an adverse impact on plant safety. If a new safety issue is discovered between ASME Code of record updates, such as a new degradation mechanism, ASME would first publish standards to address the issue in a Code Case. The NRC staff would then review the new or revised Code Case and decide whether to incorporate the Code Case into the regulations, with conditions if necessary, following the standard process. If provisions to address the new safety issue are first issued in an ASME Code edition, the staff would use the same process to determine whether mandating early adoption of the new provisions is necessary. There are also regulatory tools outside of ASME codes and standards that the NRC staff can leverage to address an emerging safety concern.

In addition, ASME is considering extending the inservice inspection interval from 10 years to 12 years. The Commission has approved the NRC staff's recommendation to conduct a future rulemaking to change the code adoption requirement to provide licensees 24 years to update to the most recent code if ASME moves to a 12-year inspection interval and the NRC determines that the 12-year interval is acceptable.

4. The Department of Energy (DOE) recently entered into a cost-sharing agreement to help upgrade the Limerick Nuclear Power Plant's systems to use new digital technologies. This project is a commitment of taxpayer funding and highlights the importance to modernize nuclear power plant systems.

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- a. Please list some potential benefits associated with utilizing new, digital systems at nuclear power plants.

RESPONSE:

Implementation of digital instrumentation and control technologies can provide dependability and safety benefits. Digital technologies can provide continuous diagnostic information to plant operators on the integrity of some internal plant systems operation and system availability. Digital technologies can provide fault tolerance, self-testing, signal validation, and system diagnostics. Digital technologies can be an effective means of addressing obsolescence of and lack of available parts for analog instrumentation and control systems.

- b. What is the NRC doing to efficiently review and approve the use of modern digital systems?

RESPONSE:

Over the past several years, the NRC has significantly modernized its regulatory infrastructure involving digital instrumentation and control technologies. Now that significant improvements to the regulatory infrastructure are in place, the NRC is beginning to use it to support the consistent regulation of digital technologies. In 2021, the NRC approved the first license amendment request using a modernized licensing process for a digital upgrade for the Waterford Steam Electric Station in Louisiana. The NRC expects license amendment requests for major digital upgrades in 2022 for Turkey Point Nuclear Generating Station in Florida and Limerick Generating Station in Pennsylvania. For digital instrumentation and control technologies requiring NRC approval, the modernized licensing process provides for early NRC review of the licensee's design process, which, in turn, may allow applicants to have more regulatory certainty before capital expenditures to complete system development. To achieve

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this, the staff reviews the system design as well as the licensee's development process to support a determination as to whether the design meets regulatory requirements, and the development process is of sufficiently high quality to produce systems and software suitable for use. Also in 2021, the NRC updated the staff review guidance concerning common-cause failure that could occur due to latent design defects in digital safety systems to better focus the NRC staff's review on items of safety significance. The NRC has also provided additional guidance for licensees to implement digital upgrades that do not require NRC approval under the 10 CFR 50.59 process.

- c. Are there additional actions the Commission can approve to improve the stability of the regulatory framework to enable deployment of modern digital instrumentation and control technologies?

RESPONSE:

The NRC continues to engage with external stakeholders and pursue additional modernization opportunities to the NRC's regulatory infrastructure. For example, currently, the NRC staff is developing a new regulatory guide intended to provide additional approaches for licensees to use commercial-grade digital equipment at NRC-regulated facilities. The new regulatory guide is anticipated to be completed by the end of 2022.

- 5. The Nuclear Energy Innovation and Modernization Act (NEIMA) requires the NRC to establish a technology-inclusive, performance-based regulatory framework for advanced nuclear technologies. This effort, known as Part 53, is underway. Congress directed NRC to establish this framework because the existing regulations are tailored to existing large light-water reactor (LWR) designs that are currently in use. NEIMA does not preclude LWRs from potentially using this framework. Since existing regulations are

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known and established for LWRs, it is unlikely a LWR would rely on Part 53. Part 53 will provide additional optionality to receive a license for a nuclear power reactor. This issue has been raised at several NRC public meetings on Part 53. Does the Commission agree that NEIMA's intent is to establish Part 53 for advanced reactors, but does not preclude LWR from seeking a license under those regulations?

RESPONSE:

The Commission has not yet had an opportunity to vote on a proposed rule. However, the NRC staff agrees that NEIMA requires the NRC to establish a technology-inclusive regulatory framework for optional use by license applicants for commercial advanced reactors and does not preclude LWRs from seeking a license under the regulations being developed in the Part 53 rulemaking if the safety criteria that is ultimately established in Part 53 can be met by a particular design. In recent iterations of the NRC staff's preliminary proposed rule language for Part 53, the NRC staff has begun using the term "commercial nuclear reactor," rather than "advanced reactor," to describe the scope of reactors that could be licensed under Part 53. This reflects the NRC staff's assessment of the broad definition of "advanced nuclear reactor" in NEIMA and determination that there was no need to exclude any specific reactor technology from using Part 53 if it can meet the safety criteria. The requirements in Part 53 would encourage designers to include attributes like those identified in NEIMA's definition of "advanced nuclear reactor" and in the Commission's Advanced Reactor Policy Statement (e.g., additional inherent safety features) because it is those designs that will be in the best position to meet the criteria established in Part 53.

6. Nuclear fuel developers, with support from DOE, are working to develop what is known as "Accident Tolerant Fuel" or ATF. This fuel would both improve safety and economics for operating reactors.

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- a. Please provide a brief update on the status of the Commission's activity to review and approve ATF.

RESPONSE:

While the NRC is ready to review and license ATF, higher burnup, and increased enrichment submittals under the current regulatory framework, the NRC continues to take steps to make agency processes responsive to potential designs that could be received by the agency. The NRC staff's actions are guided by its ATF project plan, which was revised in September 2021 (ADAMS Accession No. ML21243A298), following continued engagement with stakeholders, to include an increased focus on higher burnup and increased enrichment fuels. The NRC is currently reviewing five ATF-related fuel vendor topical reports: two relate to the use of doped fuel pellet technologies, two support the move to higher burnup levels, and one would be used to support the use of fuel with an increased enrichment level. The NRC staff expects to receive several additional vendor topical reports in 2022 related to the transition to higher burnup and increased enrichment fuel types. In addition to the five topical reports currently being reviewed, as of December 2021, the NRC has approved two topical reports regarding doped uranium fuel pellets and one revision to the General Electric Standard Application for Reactor Fuel (GESTAR II) topical report to permit the use of high burnup lead-use fuel assemblies.

In addition, the NRC staff continues to participate in technical conferences and international research programs to maintain awareness and understanding of the most current data on ATF performance during reactor operation, fuel storage and transportation, and both normal and accident conditions. The NRC staff also completed, in 2021, a Phenomena Identification Ranking Table exercise related to ATF behavior during severe reactor accidents. This exercise is captured in two reports published in April 2021: NUREG/CR-7282 (ADAMS Accession No.

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ML21210A321) and NUREG/CR-7283 (ADAMS Accession No. ML21210A331). This exercise provides information that may be used to improve the NRC's severe accident code MELCOR. Also, in December 2021, the NRC issued a Research Information Letter, RIL 2021-13, "Interpretation of Research on Fuel Fragmentation, Relocation, and Dispersal (FFRD) at High Burnup," which discusses current research pertaining to phenomena observed during experiments on high burnup fuel. The information in this letter can be used to support NRC safety evaluation of fuel designs and methodologies related to fuel burnup extension and associated licensing reviews.

On the matters of fuel fabrication and transportation, the NRC staff is currently reviewing three requests to amend certificates of compliance for transportation packages to support the transportation of fuel assemblies with enrichments above 5 weight percent uranium-235. This is in addition to the four previously approved transportation packages for ATF lead test assemblies. The NRC is expecting several license amendment requests in 2022 from enrichment facilities and fuel fabricators to directly support increased enrichment above 5 weight percent uranium-235.

In addition to these activities, the NRC staff is continuing to actively engage stakeholders. The NRC staff routinely meets with DOE and industry representatives to keep abreast of the status of activities and issues related to ATF concepts, higher burnup, and increased enrichment fuels. Finally, the NRC staff has sought opportunities to engage all stakeholders, including the public, on this topic, such as hosting its second public workshop related to higher burnup fuel types in June 2021.

- b. How is the NRC utilizing risk insights in this area to enable NRC licensees to use ATF?

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RESPONSE:

The NRC has historically included risk insights in its licensing activities, and the agency's existing risk-informed framework can be used to support the ATF reviews. Specifically, for fuel reviews, the NRC staff has used risk insights to focus resources on issues that are more likely to occur or issues with high associated uncertainties. For example, the research described in RIL 2021-13 was completed to close knowledge gaps associated with high burnup fuel performance under accident conditions. The NRC staff is aware that the industry may pursue additional risk-informed approaches to licensing ATF concepts, higher burnup, and increased enrichment. The NRC staff is continuing to engage closely with potential applicants to gain an understanding of their proposed approaches and to communicate any information needs or issues related to the NRC staff's review of those approaches. In addition, the NRC staff is evaluating whether there are potential policy issues that may arise from an increased consideration of risk in the licensing of these fuel types based on its current understanding of the industry's proposed approach. Finally, consistent with the strategy contained in the ATF project plan, the NRC staff has been encouraging vendors and licensees that are considering a risk-informed approach to engage with the NRC staff early in the process to identify and address any relevant technical and policy issues.

7. Over the last five years, the Commission and NRC staff have embarked on what is known as the "Transformation Initiative." This initiative is intended to make the NRC become a more modern, risk-informed regulator. This will help the agency keep pace with technology changes, process innovations, and allow NRC to streamline its processes and procedures – all while fulfilling its core mission to protect public health and safety.

- a. What are the next steps for the Transformation Initiative?

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RESPONSE:

Transformation is occurring across the entire agency to fulfill the vision of becoming a more modern, risk-informed regulator. The transformation initiative is focused on advancing the NRC's decision-making, modernizing its processes, and using innovative approaches to continue to meet the agency's safety and security mission. As a continuous learning organization, the NRC is leveraging the strong foundation that it has built during the agency's transformation journey. As a more modern, risk-informed regulator, the NRC will continue to achieve mission excellence in a diverse, inclusive, and innovative environment with a highly skilled, adaptable, and engaged workforce. The Agency Desired Culture Initiative will continue to play a key role to help ensure that mindsets and behaviors are aligned with being a modern, risk-informed regulator.

To sustain progress and meet the agency's transformation goals, the NRC will use a variety of tools to make sure that it remains on track. The NRC will continue to use "objectives and key results," which are also aligned with the goals and objectives included in the draft Fiscal Year 2022–2026 Strategic Plan. These objectives and key results relate to the NRC's four transformation focus areas (i.e., Be riskSMART, Our people, Using Technology, and Innovation) and include the following concepts:

- Institutionalizing the use of risk insights and data analytics to improve agency decision-making;
- Empowering and encouraging staff to enhance agency approaches and processes to realize added efficiencies through innovative thinking and collaboration across the agency;
- Continuing to foster a productive work environment, which includes an ideal agency culture, as well as staff recruitment, development, and knowledge management; and

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- Using technology assets and resources to make the agency more effective and efficient while operating in a hybrid work environment.
- b. What are the highest priority issues for the organization that can be used to show how the initiative is being applied?

RESPONSE:

The agency has continued its initiatives over the past several years, and the work the NRC has accomplished supported the agency's effective performance of its mission during the COVID-19 pandemic. The agency has completed all but one of its agencywide Futures Initiatives as well as many office-level initiatives and has built the tools and infrastructure necessary to be a more modern, risk-informed regulator. Specific examples in each of the four Transformation focus areas are as follows:

- **Using Technology:** The NRC increased the development and use of dashboards and other tools that have assisted in its decision-making and helped external stakeholders easily find information. For example, over 160 data analytic dashboards are in use at the NRC, and the agency has digitized millions of documents from microfiche to digital formats. In addition, during the COVID-19 pandemic, the NRC staff has effectively used technology to continue to perform the NRC's important safety and security mission, as well as to ensure robust stakeholder engagement through the use of virtual collaboration tools to conduct public meetings and the development of online portals to standardize and streamline the submission of COVID-19-related licensee requests to the NRC.
- **Our People:** The NRC has made strides in developing the workforce that will meet the needs of the future. The NRC launched the Nuclear Regulator Apprenticeship

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Network (NRAN), which currently includes a 23-member cohort of diverse and talented staff from different colleges and universities. These individuals have completed the first year of the program using innovative training methods, new competency models, virtual connections, and on-the-job training. The NRC has also provided new career enhancement and planning tools, geared to help mid-career staff develop in new ways.

- **Be riskSMART:** The NRC continues to implement the Be riskSMART framework, which is a plain language framework that gives the staff confidence to apply and communicate risk insights in NRC decision-making, whether in the technical, corporate, or legal arena. The framework ensures the staff's basic understanding of how risk information is applied across different program areas and allows the staff to effectively communicate how the staff uses risk information to inform the agency's regulatory decisions. Using this framework has been key in activities such as developing a regulatory infrastructure for advanced reactors and updating procedures to help the agency focus on issues of greater safety significance. The agency has also used the framework as a tool to examine various exemption and amendment requests as a result of the COVID-19 pandemic.
- **Innovation:** The NRC is fostering a culture of innovation that will help the agency adapt to changes and challenges. The 2020 Federal Employee Viewpoint Survey results showed an 8-percent increase in NRC staff feeling encouraged to come up with new and better ways of doing things, which is exemplified by the over 500 success stories that the NRC staff have provided in the NRC's agencywide innovation platform, IdeaScale.

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8. In January, NRC staff provided some recommendations to improve how the NRC conducts its environmental review process of nuclear reactors. The staff proposals consider new methods to create a more efficient environmental review process for advanced nuclear reactors. The staff proposals reflect modern construction and manufacturing techniques, as well as different fuels and coolants that make new technologies safer and smaller.

RESPONSE:

On December 31, 2020, the staff provided to the Commission SECY-21-0001, "Rulemaking Plan – Transforming the NRC's Environmental Review Process" (ADAMS Accession No. ML20212L389). The recommended rulemaking is intended to streamline the staff's environmental review process; assist in focusing decision-making on the relevant environmental issues; maintain openness with the public; and reduce the burden on applicants, licensees, and the NRC. The rulemaking plan is currently under consideration by the Commission.

- a. Are there certain environmental considerations for advanced reactor technologies may require a different environmental review process or assessment compared to those for today's reactor designs?

RESPONSE:

The NRC staff provided to the Commission on November 30, 2021, both a draft "Generic Environmental Impact Statement for Advanced Reactors" (NUREG-2249; ANR GEIS) (ADAMS Accession No. ML21222A044) and a proposed rule that would codify the generic findings of the ANR GEIS (SECY-21-0098). The ANR GEIS provided by the staff for Commission consideration uses a technology-neutral regulatory framework and performance-based values and assumptions to determine those environmental impacts that could result in the same

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(generic) impact for different advanced nuclear reactor designs that fit within the parameters set forth in the ANR GEIS and those environmental impacts that would require a project-specific analysis. The NRC staff expects that the ANR GEIS will improve the efficiency and effectiveness of advanced reactor environmental reviews.

In addition, the staff is evaluating several issues associated with the NRC's National Environmental Policy Act (NEPA) implementing regulations contained in 10 CFR Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions." The staff is developing an alternative approach to developing environmental impact statements for new applications and has recommended that the Commission pursue rulemaking to consider whether preparation of an environmental assessment (EA) may be sufficient to evaluate and disclose the environmental impacts for some categories of nuclear power reactor applications. These categories would include some advanced reactors and non-power production or utilization facility applications that presently fall within the scope of 10 CFR 51.20(b) but may have limited environmental impacts, such as those involving the deployment and operation of lower power micro-reactors. This change is among those recommended by the NRC staff in SECY-21-0001.

Additionally, some regulations in 10 CFR Part 51, such as 10 CFR 51.51 (Table S-3, "Table of Uranium Fuel Cycle Environmental Data") and 10 CFR 51.52 (Table S-4, "Environmental effects of transportation of fuel and waste"), are premised upon large light-water power reactors using a conventional uranium fuel cycle. The staff has recommended considering amendments to make these regulations technology-neutral to support advanced reactor environmental reviews. This change, if implemented, would also inform the staff's determination on a case-specific basis whether an EA is appropriate for certain advanced reactor applications.

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- b. Are there issues the Commission could address to account for smaller, safer, and more efficient reactor designs in the environmental review process?

RESPONSE:

The NRC has activities underway in the environmental review area that account for advanced reactor designs. The NRC staff provided to the Commission on November 29, 2021, both a draft “Generic Environmental Impact Statement for Advanced Reactors” (NUREG-2249; ANR GEIS) (ML21222A044) and a proposed rule that would codify the generic findings of the ANR GEIS (SECY-21-0098). The ANR GEIS provided by the staff for Commission consideration uses an approach to generically resolve approximately eighty percent of more than 120 identified technical areas, assuming that certain site and plant parameter envelope values are met. The parameter envelope approach is intended to provide for effective and efficient consideration of environmental issues during the review of individual advanced reactor applications.

- c. What is the status of the staff’s proposals to modernize NRC’s environmental review process?

RESPONSE:

The Commission is currently considering the staff’s proposals presented in SECY-21-0001.

- 9. As part of the agency’s response to the COVID-19 public health emergency, the NRC staff has shown it can effectively adjust its processes and procedures in an agile manner.

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- a. What is the NRC doing to build on the increased flexibility experienced since the beginning of the COVID-19 public health emergency – particularly in scheduling and utilizing inspection resources – to become a more modern regulator?

RESPONSE:

For the NRC's Reactor Oversight Process (ROP) and its materials and waste safety programs, the NRC staff continues to conduct lessons learned reviews of the implementation of the inspection programs during the COVID-19 pandemic. These efforts thus far reveal that the NRC effectively adjusted processes and procedures to COVID conditions around sites, particularly in areas such as scheduling and utilizing inspection resources, and protecting the health and safety of the NRC staff and site personnel .

Specific to the ROP, the staff established a working group to review COVID-19 lessons learned, best practices, and challenges as a follow-on to the staff's initial lessons learned efforts documented in a January 2021 report (ADAMS Accession No. ML20308A389). The working group's review will include, but not be limited to, evaluating three key areas: 1) information technology capability and reliability; 2) remote inspection practices; and 3) inspection guidance enhancements. The working group is soliciting both internal and external stakeholder feedback to ensure that broad and diverse lessons learned are considered. Insights from this follow-on effort could be applied during future events that limit or prevent access to nuclear power plant sites and be used to assess potential longer-term improvements. In addition, the NRC staff issued a memorandum to the Regions and Office of Nuclear Security and Incident Response providing supplemental guidance to aid in the performance of ROP inspection activities as COVID-19 conditions and restrictions change across the country (ADAMS Accession No. ML21295A302).

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Specific to the materials and waste safety programs, the staff also established a working group to assess agencywide practices, processes, and flexibilities implemented during the COVID-19 pandemic. The working group's most recent assessment, dated November 24, 2021 (ADAMS Accession No. ML21294A368), concluded that the programs remained effective and that the NRC staff continued to demonstrate creativity, innovation, flexibility, and resiliency in accomplishing the mission objectives in the face of COVID. The working group also provided eight recommendations to enhance the materials and waste safety programs' implementation during the ongoing COVID-19 pandemic, any future pandemic or public health emergency, and aspects of the current framework for the oversight programs. NRC staff management plans to evaluate the recommendations and direct appropriate action.

- b. Please provide a few examples of how the NRC has improved its operations and interactions with its licensees since the beginning of the COVID public health emergency.

RESPONSE:

The NRC improved its operations and provided for continued stakeholder interactions since the beginning of the COVID-19 public health emergency. The NRC made these changes in a deliberate manner to preserve openness, transparency, and stakeholder engagement in the agency's decision-making process without compromising its mission. To ensure robust stakeholder engagement, the NRC enhanced its use of virtual collaboration tools to conduct public meetings, including town halls, and extended public comment periods, as appropriate. Virtual public meetings provided the nuclear industry and other stakeholders a venue to discuss regulatory challenges and needs, and ask questions of the NRC staff. In addition, the NRC developed a COVID-19 updates webpage and provided periodic social media posts to keep the public informed of how the NRC has adapted, and continues to adapt, its regulatory approach.

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In licensing operations, the NRC took necessary steps to protect public health and safety, including early identification of regulatory requirements that could pose challenges to the health of the NRC staff and site personnel during the COVID-19 pandemic, and the areas where temporary flexibilities, such as exemptions, could be approved without compromising the ability of licensees to maintain the safe and secure operation of NRC-licensed facilities. Based on stakeholder engagement, the NRC issued a series of letters and staff guidance describing specific criteria and conditions under which it would expedite the review of COVID-19-related licensee requests. These letters and guidance are available on the NRC public Web Page at <https://www.nrc.gov/about-nrc/covid-19/index.html>.

The staff also developed online portals to standardize and streamline the submission of COVID-19-related licensee requests to the NRC. Based on successes and lessons learned, the NRC staff expanded this concept to other licensing activities, including a pilot online portal for operating reactor licensees to submit relief requests for alternatives to American Society of Mechanical Engineers (ASME) code requirements. This first-of-its-kind Web Based Relief Request (WRR) portal provides licensees the ability to log-in to a personalized Web page to document and submit proposed ASME code alternatives (whether related to COVID-19 or not) and monitor transaction status. The WRR is in active use by some licensees with increased adoption anticipated, and the NRC continues to engage with users to obtain feedback to enhance the WRR portal. These external online portals establish the foundation and framework for future process enhancements that are likely to result in efficiencies, such as enabling streamlined document transmission, electronic tracking of review status, and standardized formatting and automation of administrative aspects of the review.

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In oversight operations, the NRC executed a risk-informed oversight approach that maintained reasonable assurance of adequate protection of public health and safety and promoted the common defense and security, while protecting the health and safety of inspectors, site personnel, and the community, in accordance with Federal, State, and local guidelines. The scope, objectives, and requirements of the NRC's inspection procedures did not change; however, the NRC developed a flexible approach enabling Regional Administrators to balance local health conditions and risk profiles to determine the appropriate onsite presence of inspectors. While not onsite as much as before the pandemic, NRC inspectors were able to independently monitor some licensee activities and review documentation remotely using technology to access facility information necessary to perform the agency's independent oversight role. These efforts, coupled with increased NRC and licensee communications, allowed the NRC to successfully continue its independent oversight of NRC-licensed facilities.

10. On November 19, 2021, NRC staff published a "Charter for the Follow-On Review of the Lessons-Learned, Best Practices, and Challenges During the COVID-19 Public Health Emergency." The Charter establishes an internal team to identify lessons learned and make recommendations primarily focused on NRC's Reactor Oversight Process and inspection procedures. The charter establishes a schedule for the working group to complete its work by August 2022.

- a. How is the Commission considering this narrow lessons learned approach within a broader effort to identify best practices and permanently integrate lessons learned and best practices into the Commission's processes and procedures?

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RESPONSE:

Consistent with the NRC's Principles of Good Regulation, the NRC staff continues to identify and incorporate lessons learned from its response to the COVID-19 pandemic. One example includes establishing streamlined processes for evaluating licensee requests in a manner that demonstrates the NRC's ability to execute its regulatory mission efficiently and effectively. The staff is also considering lessons learned that apply to the NRC's licensing and oversight programs as well as broader programmatic insights gained from agency experience during the COVID-19 pandemic, such as best practices for conducting public meetings, ensuring an effective hybrid work environment, and expanding the use of agile teams.

The Office of Nuclear Reactor Regulation (NRR) and Office of Nuclear Material Safety and Safeguards (NMSS) have developed an approach for capturing the lessons learned from their respective and collective response to the pandemic. This approach is designed to establish a framework that leverages an existing and innovative agency platform, Nuclepedia, which will, in addition to documenting and sharing lessons learned from the COVID-19 pandemic identified by NRR, NMSS, and the Office of the Chief Information Officer, provide a consistent framework for other NRC offices to share their lessons learned. An inherent benefit of using Nuclepedia is that it will create a real-time, detailed repository of information that can be used by staff to share insights across all the NRC's program areas and that it will serve as a valuable resource.

The NRC staff has and will continue to facilitate interactions with both internal and external stakeholders during its response to the COVID-19 pandemic and the development of respective lessons learned products. The staff will use internal stakeholder engagement to confirm and augment the list of lessons learned and good practices. Additionally, further outreach will be undertaken when determining which practices might be appropriate for incorporation into daily operations.

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- b. How are other offices, such as the Office of Nuclear Material Safeguards and Security, approaching a lessons learned review from the COVID-19 public health emergency?

RESPONSE:

For the NRC's Reactor Oversight Process, and its materials and waste safety programs, the NRC staff continues to conduct lessons learned reviews of the implementation of the inspection programs during the COVID-19 pandemic. These efforts evaluate agency practices, processes, and flexibilities implemented during the COVID-19 pandemic across the agency to determine if there are any changes that are appropriate to make to the inspection programs based on the experience gained implementing these programs during the pandemic. The most recent assessment completed by the materials and waste safety programs is publicly available in ADAMS under Accession No. ML21294A368.

The Office of Nuclear Security and Incident Response (NSIR) used initial lessons learned from the COVID-19 pandemic response to inform its 2021 updates to the NRC's Continuity of Operations Program and Pandemic Plan and procedures.

In July 2020, NSIR staff implemented a new force-on-force inspection procedure to provide for limited-scope tactical drills in a manner that mitigated the risk of COVID-19 transmission. In 2021, the staff developed another option that was broader in scope than the limited 2020 tactical drills. Depending on licensee site conditions due to COVID-19, the NRC staff has successfully performed either tactical drills or the modified force-on-force exercises throughout 2021.

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NSIR staff also conducted a lessons learned review of the NRC's implementation of the force-on-force inspection program in 2021. As part of the NRC's Reactor Oversight Process working group, NSIR will consider these lessons in developing updates to the NRC's baseline inspection program. These updates may include efficiencies identified while conducting inspections in the COVID-19 environment and improvements to the oversight process for force-on-force exercises.

11. In 2019, the Nuclear Regulatory Commission entered into a Memorandum of Cooperation with the Canadian Nuclear Safety Commission (CNSC). The memorandum is intended to facilitate closer cooperation on establishing a shared understanding to license and regulate advanced nuclear technologies.

a. Please provide an update on the status of your work with the CNSC.

RESPONSE:

The NRC and the CNSC issued the first joint reports under the Memorandum of Cooperation on Advanced Reactor and Small Modular Reactor Technologies in June and August 2021. These two reports discussed the NRC's and the CNSC's positions on a white paper submitted by X Energy, LLC, on choosing a construction code for the reactor pressure vessel and provided a comparison of the U.S. Licensing Modernization Project with Canada's approach. Two projects are currently active under the Memorandum of Cooperation, and the NRC and the CNSC expect to issue additional joint reports in 2022 on (1) the review of Terrestrial Energy's process for identifying postulated initiating events and (2) the review of a topical report submitted by General Electric-Hitachi on its containment evaluation methodology. A new project under the Memorandum of Cooperation was recently started to establish a common regulatory position on Tristructural Isotropic (TRISO) particle fuel qualification and to identify any potential analytical or testing gaps related to TRISO use in advanced reactor licensing applications. The NRC and the

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CNSC plan to initiate additional projects on designs that are likely to be submitted for review in the United States and Canada by vendors who have expressed interest in a cooperative review of specific technical topics.

- b. What do you consider successful outcomes between partnerships between NRC and CNSC?

RESPONSE:

The NRC views successful outcomes from its partnership with the CNSC to be activities and documents that will enhance the efficiency, clarity, and predictability of our licensing process for new and advanced reactors. To date, the NRC and the CNSC have issued two reports documenting the results of joint reviews. The findings of the joint reviews can be used to achieve enhanced efficiency, clarity, and predictability in the NRC staff's review of future license applications that reference these reports. Applicants and vendors may also gain efficiencies in pre-licensing and licensing activities when common documents are reviewed by the NRC and the CNSC, by holding joint technical discussions on specific topics, and possibly responding to one set of questions from both regulators rather than responding separately. So far, applicants and vendors have acknowledged the benefits gained by knowing where both countries have common positions and where the countries' positions on an issue may differ. As one of the next steps, the NRC and the CNSC successfully initiated a staff exchange that is expected to improve the timeliness and quality of work under the Memorandum of Cooperation, as well as gather lessons learned on improvements in communication and work efficiency.

- c. What else is the NRC doing to work with international partners on advanced reactor regulations?

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RESPONSE:

The NRC is engaged in numerous international engagements on advanced reactors, for example:

- The NRC chairs the Nuclear Energy Agency (NEA) Working Group on the Safety of Advanced Reactors, in which regulators from around the world exchange information on technical topics related to the safety and regulation of non-LWRs. As part of this working group, the NRC staff is leading a task group to study common regulatory practices to ensure appropriate qualification and through-life performance of materials in advanced reactors. In 2021, the working group completed a report on regulatory approaches to fuel qualification, which formed the foundation of the NRC's draft guidance in this area, and regulatory perspectives on analytical codes and methods for advanced reactors
- The NRC also chairs the International Atomic Energy Agency (IAEA) Small Modular Reactor Regulators' Forum, in which regulators identify and address key regulatory challenges to small modular reactor (SMR) issues (water cooled and advanced concepts). The forum has completed projects on emergency planning zones; the principles of graded approaches and defense-in-depth; and manufacturing, commissioning, and operations. Current projects include topics such as the framework for international collaboration and joint assessments; the integration of security, safeguards, and safety by design principles; and regulatory considerations in pre-licensing engagement for long lead requests and items.
- The NRC staff is participating in several experimental programs under the NEA Committee on the Safety of Nuclear Installations (CSNI). These programs give the NRC access to valuable and unique nuclear safety research. For example, the NRC chairs

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the NEA/CSNI Loss of Forced Coolant Joint Project, which gives the NRC access to high temperature gas-cooled reactor data from the Japanese High-Temperature Engineering Test Reactor and to natural circulation data from integral test facilities, which could improve the NRC's confirmatory analysis capability.

- Through bilateral agreements with foreign regulators, the NRC staff has access to unique research and testing activities. Over the last 3 years, the NRC has continued to build on strong partnerships on materials research, which have led to significant information exchange and increased the agency's knowledge, data, and international experience. Notable examples of these partnerships include the technical exchanges with the United Kingdom on the use of graphitic components; with Japan on high temperature materials and surveillance programs; and with the Czech Republic on molten salt purity, best practices, and materials compatibility.

- The NRC staff is participating in the IAEA's initiative to review the applicability of the IAEA Safety Standards to different power reactors, including advanced reactors. This effort has consisted of multiple meetings throughout 2021 and participation by more than 150 experts representing 30 countries and 40 organizations, including more than 30 staff members from the NRC. The outcomes of this work have been captured in a draft report that identifies (1) areas of the Safety Standards that are technology-neutral and applicable to all types of reactors, and (2) areas of the Safety Standards that may be considered as gaps or need additional consideration. The draft report was sent to member states in October 2021; the NRC reviewed and provided comments. The IAEA expects to respond to comments in early 2022 and publish the report later in the year. The IAEA Secretariat is in the process of developing recommendations on this topic, which may include updating IAEA Safety Standards, developing new technical

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documents or Safety Standards, hosting webinars, and establishing knowledge sharing platforms, among others.

12. Recently, Romania announced its intent to work with NuScale to license and construct a small modular reactor (SMR). After a prolonged and thorough review, NRC approved NuScale's SMR design in 2020. How is NRC working with other countries, like Romania, to share information and lead on licensing and regulating SMRs, based on its experience with technologies that NRC has already reviewed and approved?

RESPONSE:

As part of the NRC's International Strategy (ADAMS Accession No. ML21236A120), the NRC assists countries that are seeking to establish, enhance, or expand nuclear power regulatory programs. The NRC's International Assistance Program focuses on providing information, knowledge, and training to other countries to assist them in developing and enhancing their national regulatory infrastructure, consistent with U.S. Government foreign policy and national security priorities.

The NRC continues to complement broader U.S. Government nuclear energy outreach through the provision of targeted regulatory assistance to regulatory counterparts in countries interested in deploying technology that has already been approved by the NRC (e.g., Romania, Poland, and Ukraine). Under bilateral arrangements with these international counterparts, the NRC has the appropriate mechanisms to facilitate information sharing and technical capacity building, as requested. Because the NRC can positively influence countries in the development of a sound, independent, and technically competent regulatory infrastructure that mirrors key principles of our own infrastructure, the NRC supports other regulators irrespective of the country's chosen

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technology. These exchanges are critical tools for establishing multilateral coalitions, enhancing global nuclear safety, and strengthening regulatory programs for nuclear power plants.

13. Following the NRC's approval of NuScale's small modular reactor design, NuScale submitted a lessons learned report to the NRC documenting changes to the NRC's processes that could be useful for future regulatory interactions between the NRC and advanced reactor companies.

- a. What is NRC's process for learning from past reviews, not only from external parties like NuScale, but also internally?

RESPONSE:

Consistent with the NRC's Principles of Good Regulation, the NRC staff continuously conducts self-assessments and works to implement the resulting recommendations and insights. The NRC staff conducted and completed several self-assessments following its review of new reactor applications, including applications for a combined license (COL). These assessments focused on the new reactor licensing process; the Construction Reactor Oversight Process (cROP); the NRC's requirements, policies, procedures, and practices during the first year of post-COL implementation of 10 CFR Part 52; and opportunities for greater efficiencies in the application review process.

More recently, the NRC staff conducted a comment-gathering public meeting on its plans to modernize the NRC's Standard Review Plan, a key guidance document that is used by the NRC to review light-water reactor applications submitted under 10 CFR Parts 50 and 52 (NUREG-0800). The Standard Review Plan was developed from many years of NRC experience in establishing safety requirements and staff experience in applying those requirements to

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evaluate the safety of various designs for nuclear facilities. This modernization effort seeks to focus the guidance on what is important to safety; to provide clear, concise guidance for completing reviews; to improve the quality of NRC review products; and to improve consistency on the use of risk-insights and engineering judgment. This modernization effort is a result of experience in using the NRC review guidance during the NuScale review.

As a general practice, the NRC staff strives to incorporate lessons learned from review activities into future regulatory activities. Lessons learned from formal agency reviews, innovation initiatives such as EMBARK Venture Studio¹ and IdeaScale² challenge campaigns (which can identify lessons learned and innovative improvements related to agency reviews), and external feedback are used to update internal procedures and practices to enhance the efficiency and effectiveness of NRC activities.

With regard to NuScale, even though there were last-minute design changes by the applicant, the NRC staff completed its review of the NuScale design certification application in August 2020, ahead of schedule. In October 2020, senior management from the NRC's Office of Nuclear Reactor Regulation established an independent lessons learned team composed of NRC subject matter experts and experienced project managers. The team has been tasked with gathering lessons learned from the review of the NuScale design certification application, including assessing the effectiveness and efficiency of the staff's review of the application,

¹ EMBARK Venture Studio is the Office of Nuclear Reactor Regulation's dedicated resource for promoting and implementing innovation projects that will benefit the Nuclear Reactor Safety Program, as well as other NRC Business Lines. The primary goal of EMBARK Venture Studio is to remove barriers to innovation and launch initiatives that improve the way the NRC staff works to make safe use of nuclear technology possible and encourage staff to make innovative changes.

² IdeaScale is an integrated, collaborative innovation platform that provides a virtual, real-time way to collaborate and brainstorm across the agency. Two main features of IdeaScale are the Success Gallery and Challenge Campaigns.

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identifying successes as well as areas for improvement, and recommending actions to enhance the efficiency of the staff's future application reviews. The staff received and reviewed industry lessons learned and recommendations to enhance future reviews and is considering these as part of the development of a lessons learned report. The team's report is currently under development and is expected to be issued publicly in early 2022.

- b. What specific changes has NRC implemented as a result of lessons learned from NuScale's design certification review process?

RESPONSE:

The NRC staff is currently gathering all the lessons learned from the NuScale review and plans to issue a lessons learned report on the NuScale design certification review in early 2022. The report will take into consideration the October 2, 2020, letter from the Advisory Committee on Reactor Safeguards that provided observations following the NuScale review, which could be relevant to future advanced reactor reviews (ADAMS Accession No. ML20267A655). The NRC staff plans to share and discuss its findings and recommendations with stakeholders and prospective applicants in upcoming public meetings. Upon issuance of the NRC staff's lessons learned report, NRC staff management plans to evaluate the report and task the staff with developing an action plan in response to the report.

In addition, the NRC staff recently completed an assessment of its rulemaking process based on experience that included the development and issuance of the NuScale proposed design certification rule. Based on this assessment, the NRC staff completed the update of rulemaking package templates and developed a quality assurance checklist for design certification rules.

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14. NEIMA directed the NRC develop a technology-inclusive regulatory framework that uses “methods of evaluation that are flexible and practicable for application to a variety of reactor technologies, including, where appropriate, the use of risk-informed and performance-based techniques and other tools and methods.” Over the past year, the NRC has expended extensive resources and held numerous public meetings to share draft language with stakeholders and receive early feedback. Please elaborate on what “other tools and methods” are being incorporated into this regulatory framework, to ensure a framework that is not solely reliant on one individual evaluation technique.

RESPONSE:

The NRC staff has pursued developing Part 53 consistent with the rulemaking plan approved by the Commission in the Staff Requirements Memorandum for SECY-20-0032, “Rulemaking Plan on ‘Risk-Informed, Technology-Inclusive Regulatory Framework for Advanced Reactors (RIN-3150-AK31; NRC-2019-0062).’” This includes leveraging the risk-informed approaches to designing and licensing advanced reactors developed through past projects that have involved coordination between the NRC, Department of Energy, and industry such as the Next Generation Nuclear Plant Project and the Licensing Modernization Project. The licensing approach described in the initial Part 53 preliminary proposed rule language relies on the enhanced use of a PRA in the development of the licensing basis supporting the reactor design and builds on the Licensing Modernization Project.

During interactions with stakeholders, the NRC staff received numerous comments requesting that an alternative to the enhanced PRA approach in the Part 53 rule language be developed as part of this rulemaking activity. For example, in September 2021, the Nuclear Energy Institute (NEI) sent a letter to the agency on this topic (ADAMS Accession No. ML21274A070). This letter requested an NRC licensing path for future advanced reactors that generally aligns with

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international standards such as International Atomic Energy Agency (IAEA) Specific Safety Requirements SSR-2/1, "Safety of Nuclear Power Plants: Design." The framework in IAEA SSR-2/1 is similar to the existing NRC regulations in 10 CFR Parts 50 and 52. The NRC staff evaluated stakeholder comments concerning the role of the PRA in Part 53 and possible harmonization with international standards. After considering these comments, the NRC staff decided to develop preliminary proposed rule language to support establishing a more traditional, deterministic approach for designing and licensing advanced nuclear reactors in addition to the Part 53 enhanced PRA approach. The NRC staff is also exploring the viability of a dose-based deterministic approach, which uses bounding estimates, instead of PRA, to demonstrate adequate protection, in response to stakeholder comments to consider options that would not require development of a PRA.

15. Many companies are looking to leverage new technologies that are common in other industries, but not commonly utilized in the nuclear industry. The NRC should proactively prepare to license designs that utilize technologies such as additive manufacturing, advanced construction, or artificial intelligence. Being prepared will ensure that NRC is not a barrier for companies seeking to use these technologies and also ensure the technologies will meet NRC's safety requirements. What activities has the NRC undertaken to prepare to review and approve the use of new technologies that companies may employ in their designs?

RESPONSE:

The NRC stands ready to review initial license applications utilizing new technologies under the existing regulatory framework. As needed, the NRC may use orders, exemptions, or license conditions to address unique considerations associated with first-of-a-kind designs. The NRC has been proactively preparing for the use of additive manufacturing, advanced construction

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techniques, and artificial intelligence. The following activities provide some examples of the NRC staff's efforts in these areas:

- The NRC staff hosted the 2021 NRC Standards Forum to facilitate the identification of needed consensus codes and standards and to explore coordination to accelerate their development. This year's forum focused on recent developments in codes and standards for advanced reactors and the regulatory approach for advanced manufacturing technologies (ADAMS Accession No. ML21229A263).
- The NRC staff developed an Advanced Manufacturing Technologies Action Plan (ADAMS Accession No. ML19333B980) to assess the need for guidance updates and ensure NRC staff preparedness to review applications that include advanced manufacturing technologies. The comprehensive action plan included activities to address technical preparedness, regulatory preparedness, stakeholder engagement, and knowledge management. The NRC staff has made significant progress with the issuance of several reports on assessment of near-term technologies, generic technical information, and technology-specific guidelines to be addressed in applications and workshops.
- The NRC staff issued a Technical Letter Report TLR-RES/DE/CIB-CMB/2021- 05, "Status of Advanced Non-Light Water Reactor Research Activities: Materials, Chemistry, and Component Integrity" (ADAMS Accession No. ML21088A013), which describes ongoing research and planned activities focusing on topics including advanced manufacturing and qualification of high temperature alloys, data analytics, advanced sensors, and online surveillance monitoring. These efforts leverage domestic

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and international partnerships to identify challenges and gaps related to advanced reactor regulation.

- The NRC staff is developing a framework document for an advanced reactor construction oversight program, which will consider a broad range of advanced reactor designs and technologies. This document will also consider the full spectrum of construction, fabrication, and manufacturing environments, from completely factory-built reactors with minimal site preparation to larger reactors involving site preparation and onsite construction activities resembling current practice. It will incorporate insights from advanced manufacturing techniques and remote inspection and monitoring methods introduced recently in the nuclear industry, as well as those used in other industries with similar risk profiles.
- The NRC staff participates in workshops to stay informed regarding technological advancements and potential applications in advanced nuclear reactor designs. For example, the staff recently participated in a workshop on advanced materials and manufacturing technologies hosted by the Department of Energy's (DOE's) Gateway for Acceleration in Nuclear program, the Electric Power Research Institute (EPRI), and the Nuclear Energy Institute.
- The NRC staff has undertaken a digital twin project to investigate potential applications, challenges, and gaps associated with use of digital twin technology for nuclear reactors. As part of the effort, the staff will assess the use of enabling technologies associated with digital twins, such as artificial intelligence, machine learning, data analytics, advanced multi physics models, and advanced sensors. The NRC staff's efforts leverage experience and knowledge from the non-nuclear sector. The NRC staff is

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engaging with external stakeholders, including DOE, EPRI, and the nuclear industry.

The NRC staff has also completed two workshops and issued a report on the state of technology for digital twin applications in the nuclear industry (ADAMS Accession No. ML21160A074).

- In November 2021, the NRC staff issued a document to support ongoing public discussions (ADAMS Accession No. ML21291A024) that provides a systematic evaluation of the remote operations concept based on the information available and lays the groundwork to address the future regulatory needs of developing and establishing a regulatory position on remote operation of nuclear power plants.
- The NRC staff hosted a series of three Data Science and Artificial Intelligence workshops in June, August, and November 2021 to provide a forum for the NRC, nuclear industry, and stakeholders to discuss the state of knowledge and research activities related to data science and artificial intelligence and their application in the industry. Insights from these workshops will be used to develop the NRC's Data Science and Artificial Intelligence Strategic Plan in preparing the agency for regulatory decision-making regarding the safe and secure use of artificial intelligence technologies in the nuclear industry.

Additionally, the NRC's Office of Nuclear Regulatory Research supports the agency's preparedness with respect to advanced and new reactors and new technologies. For instance, the NRC continues to complete efforts regarding its Integrated Action Plan Strategy 2 (Analytical Tools), Strategy 3 (Regulatory Framework), and Strategy 4 (Industry Codes and Standards) and coordinates on these activities with DOE. In addition, the NRC continues to enhance tools and

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models to perform risk and confirmatory evaluations to support its licensing and oversight responsibilities.

16. The Commission is currently reviewing one Combined License application for the Oklo Aurora microreactor. A number of other companies are designing microreactors, which are significantly smaller than the current operating fleet and similar to the research and test reactors at colleges and universities. Applying the same requirements to both microreactors and 1000+ MW plants may not be appropriate considering the scale of potential consequences of an accident. In addition, as identified by the NRC staff, there may be multiple Commission policy issues related to microreactors, like staffing and remote operation, that will require timely Commission action to resolve.

- a. Based on the Commission's preparation to review and approve microreactor designs, please identify efficiencies in the licensing review process that have been instituted for Oklo's application.

RESPONSE:

The NRC staff adopted a core team approach for the review of the Oklo Aurora combined license application. This approach empowers a small team of experts to focus the review on the most significant safety aspects of the design to enable timely, efficient, and effective reviews. Under this approach, the core team is supported by subject matter experts from around the agency, as needed, to ensure a comprehensive review of the application. In addition, the NRC staff created several tools to communicate review status in an effort to increase transparency of NRC staff review activities. The NRC's flexible process for an efficient, safety-focused review of the Oklo application included addressing key issues up front, conducting audits, issuing requests for additional information (RAIs) to address information gaps, agreeing to review

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exemption requests piecemeal, and agreeing to address deficiencies in the application and RAI responses through alternative approaches, such as topical reports. The staff actively engaged with Oklo to address the identified gaps in information needed to establish a review schedule and reach safety, security, and environmental findings required for licensing this new technology. For significant portions of the past year, at Oklo's request, the NRC staff paused its efforts on the review while Oklo assessed its path forward and developed topical reports on the key issues. It was essential that Oklo fully explain its novel approaches and the NRC staff evaluate their reasonableness prior to expending significant resources on other portions of the review. Although Oklo had several opportunities to provide necessary technical information, the NRC staff determined that it failed to do so.

On January 6, 2022, the agency ended its review of the application. The NRC staff denied the application, without prejudice, based on Oklo's failure on a number of occasions to provide necessary technical information to support developing a review schedule or reaching findings on the safety of the facility that the NRC must make before issuing a license.

- b. How is the Commission ensuring that these reviews are done as efficiently and effectively as possible, while still ensuring safety?

RESPONSE:

The NRC has been preparing for advanced reactor applications by updating its tools, developing guidance, resolving generic issues, and offering pre-application engagement to identify issues early and develop pathways for resolving them. The use of the core review team approach has increased the efficiency of the reviews during both the application review and pre-application activities. In addition, the NRC staff encourages advanced reactor vendors to engage in robust pre-application activities. Pre-application engagement includes an appropriate

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mix of technical reports for NRC staff information, white papers for NRC staff feedback, and topical reports for regulatory assessment. This engagement also helps to establish a common understanding of the safety case for the design, identify first-of-a-kind issues that need to be resolved, and identify gaps in information and data necessary to establish the safety of the design early in the process. These pre-application activities support more efficient and effective licensing reviews.

The NRC staff has also been in discussions with the Air Force on its plans to request proposals for a stationary microreactor to supply power for the Eielson Air Force base under a power purchase agreement. It is anticipated that the owner and operator of the facility would be a commercial entity and would seek a license from the NRC. The NRC is prepared to engage in pre-application activities with a future commercial applicant and the Air Force and to review a license application if submitted.

17. High-Assay Low-Enriched Uranium (HALEU) is required to fuel many of the advanced nuclear reactors. No domestic commercial HALEU production currently exists. DOE took initial steps to provide a short-term supply until a commercial fuel supply is established. For example, DOE supported Centrus to pilot the production of HALEU and the NRC recently approved Centrus' license to produce HALEU.

- a. What lessons learned from the Centrus HALEU license review will be applied to other enrichment companies that are also looking to enter the market?

RESPONSE:

Generally, the NRC staff's review of a first-of-a-kind application informs future applicants about the review process and identifies enhancements and efficiencies for future NRC staff reviews.

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In terms of specific lessons learned, this review confirmed the importance of pre-application interactions and robust communication with the applicant and the public on major licensing reviews.

The NRC staff's review and approval of the license amendment authorizing Centrus to operate a 16-centrifuge cascade at the American Centrifuge Plant to demonstrate the production of HALEU was done through the NRC's current regulatory framework to consider applications or amendments for higher enrichment. No significant regulatory obstacles were identified for licensing processes involving HALEU. In December 2021, the Commission submitted a report to Congress (ADAMS Accession No. ML21327A388), concluding that the NRC's existing regulatory framework is sufficiently flexible to license and regulate HALEU fuel. The report details how the NRC is addressing the licensing of various HALEU fuel types and the staff's expectations and planned licensing review practices for HALEU fuel applications.

- b. While enrichment of HALEU is essential, it then needs to be fabricated into specific fuel forms to be useful for different advanced reactor companies. How is the NRC preparing to license different types of fuel forms – such as TRISO or metallic fuel?

RESPONSE:

The NRC has experience with licensing fuel fabrication facilities and certifying transportation packages of higher uranium enrichments and advanced fuels. To date, the NRC has not identified any needed changes to its regulatory framework for fuel cycle facilities, storage, and transportation, which includes 10 CFR Parts 70, 71, and 72, to support the near-term advanced reactor concepts (e.g., certain advanced reactor designs with solid fuel). The NRC continues to assess its regulatory infrastructure to identify any challenges or data needs for longer-term

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advanced reactor fuel concepts (e.g., nonsolid fuel forms) so that the agency will be ready to efficiently conduct the necessary licensing reviews.

18. On October 28, 2021, the Nuclear Energy Institute wrote the NRC staff expressing concern about staff beginning to develop requirements that would apply if a licensee were to be actively moving used nuclear fuel in a dry cask storage system during a tornado. The likelihood of this scenario is extremely low and NRC already has a robust safety program for the dry cask storage systems and establishes processes guiding when such casks would be moved. I am particularly concerned this staff action would violate the Commission's backfitting requirements. Will this activity be reviewed to determine if it would constitute a generic backfit and, if it is determined to violate the generic backfit requirements, be terminated?

RESPONSE:

The NRC is not developing any new requirements regarding fuel movements supporting the loading of a dry cask storage system during a tornado. During NRC inspections of dry cask storage loading campaigns, the NRC has assessed whether licensees meet the existing requirements for protecting dry cask storage systems from extreme weather events. During recent inspections, NRC inspectors identified potential findings related to compliance with the licensing basis by the cask vendors, the reactor licensees, or both. The NRC staff is currently evaluating the identified issues against the current regulatory framework and license authorizations for each site, and as part of this evaluation is considering whether there are backfitting implications. The staff will continue to engage NEI and individual licensees as the staff continues its assessment.

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19. On December 22, 2015, NuScale Power submitted a topical report titled "Methodology for Establishing the Technical Basis for Plume Exposure Emergency Planning Zones at NuScale Small Modular Reactor Plant Sites." Following that submittal, NuScale revised its topical report and then withdrew and submitted a new report based on the methodology the Commission approved for use as part of Tennessee Valley Authority's Early Site Permit at the Clinch River Site. Separately, the Commission has proceeded with a rulemaking to establish an EPZ for SMRs and other new technologies. NRC approval of NuScale's topical report is important for the company's engagement on other international projects. What is the current status of NRC's review of the NuScale topical report?

RESPONSE:

The topical report proposes a risk-informed methodology to determine the emergency planning zone (EPZ). NuScale submitted Revision 2 of this topical report for NRC staff review on August 4, 2020 (ADAMS Accession No. ML20217L422). Revision 2 expanded the scope and content of the topical report. The staff provided a revised schedule and a new estimated level of effort for the staff to complete its detailed technical review in a letter to NuScale dated April 2, 2021 (ADAMS Accession No. ML21084A123).

Currently, completion of the NRC staff's review is pending the resolution on an open item related to a request for additional information (RAI) that the NRC staff issued on April 22, 2021 (ADAMS Accession No. ML21116A110). NuScale indicated that it would provide draft revised RAI responses, including proposed changes to the topical report, by the end of February 2022 and would submit the revised topical report by the end of March 2022. At that time, the staff will be able to assess its review schedule.

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Senator Inhofe:

1. Chairman Hanson, in 2016, as chairman of the Committee on Environment and Public Works, I was concerned that while the Nuclear Regulatory Commission's (NRC) workload was decreasing, its budget request kept growing. I worked with my colleagues on legislation that later became law, known as the Nuclear Energy Innovation and Modernization Act (NEIMA), which reformed NRC's fee recovery to bring its spending in line with its workload. While the NRC has made progress on implementation, the NRC's workload continues to decline – forty percent since 2016 – while its budget request is once again increasing. The core of NRC's mission is conducting inspections and license reviews yet it only accounts for twenty-one percent of its budget and accounts for only 438 "full-time equivalent" personnel out of the NRC's nearly 2,900 total personnel. In comparison, the corporate support budget is thirty percent of the budget. Why is NRC's administrative support budget more than its inspection and licensee review budget?

RESPONSE:

To carry out the NRC's safety and security mission, the NRC performs a range of essential activities in addition to licensing and inspection—including, event response, rulemaking, research, and international activities. In the Fiscal Year (FY) 2022 budget request, licensing and inspection activities across all six programmatic business lines (Operating Reactors, New Reactors, Nuclear Materials Users, Fuel Facilities, Spent Fuel Storage and Transportation, and Decommissioning and Low-Level Waste) account for 36 percent of the total budget requested for the NRC. In the FY 2022 budget request, corporate support is 30 percent of the total budget requested for the NRC. The corporate support budget supports all activities of the agency.

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- a. Why does the NRC need over 6 FTE to support every FTE conducting inspections and license reviews? Considering this excessive ratio, why is the NRC requesting additional FTE?

RESPONSE:

Inspections and license reviews are two of the many activities that support the NRC's mission. In the FY 2022 budget request, corporate support FTE (580) support all the activities performed by the remaining 2,299 FTE. The FY 2022 budget request includes a net increase of 11 FTE compared to the FY 2021 enacted budget and authorized carryover. The primary driver for the additional FTE requested is to support new and advanced reactor activities. Corporate support FTE in the FY 2022 budget request (580) represents a decrease of 8 FTE compared to the FY 2021 enacted budget and authorized carryover.

- b. What actions is NRC taking to improve its overall efficiency as part of its transformation into a "modern, risk-informed" regulator?

RESPONSE:

The transformation initiative is focused on advancing the NRC's decision-making, modernizing its processes, and using innovative approaches to continue to meet the agency's safety and security mission. The NRC's accomplishments in this area include:

- The staff developed the "Be riskSMART" framework to support consistent communication and application of risk in NRC decision-making. The staff is consistently applying the framework in many contexts; in the reactor arena, for example, the staff has implemented the "Risk-Informed Process for Exemptions" (RIPE) for operating reactor licensing actions.

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- To support a culture of innovation, the staff launched IdeaScale, an agencywide innovation platform that facilitates cross-organizational development and collaboration. Over 2,000 staff have used the platform, and the NRC has implemented over 450 innovative ideas arising from crowdsourced challenges.
- As an example of process improvement, the staff put into place the e-concurrence system, an agencywide technology tool that creates an efficient workflow process to process documents more efficiently and effectively. Approximately 2,250 e-concurrences have since been completed.

Senator Graham

1. With Subsequent License Renewals (SLR) critical to our nation's efforts to fight climate change, what specifically is the Commission doing to insure an NRC culture of risk-informed decision?

RESPONSE:

The NRC is fostering a culture of risk-informed decision-making through several avenues. The NRC's Agency Desired Culture Initiative includes a continued focus on using risk information in decision-making. The agency is implementing this culture improvement through the Be riskSMART framework, which is described in NUREG/KM-0016, "Be RiskSmart: Guidance for Integrating Risk Insights into Agency Decisions." Be riskSMART is a plain language framework to apply and communicate risk insights in NRC decision-making, whether in the technical, corporate, or legal arena. Using a common framework promotes the advancement of consistent guidance and practices that give the NRC staff confidence in accepting well-managed risks in its decision-making without compromising the NRC's mission. It includes guidance and steps for identifying and managing risk information for issues where there is no pre-determined answer in

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a law, policy, or standard; performance metrics for how well the NRC staff is considering risk information; and training to ensure a common understanding of how risk information is applied across NRC program areas. Over 55 percent of the NRC staff has completed initial training on this framework, and more advanced training is available.

For nuclear reactor licensing actions, NRR Office Instruction LIC-206, "Integrated Risk-Informed Decision-Making for Licensing Reviews," provides guidance on a graded approach for using risk insights in licensing and to better integrate complementary insights from traditional engineering and risk assessment approaches to foster a broadened understanding of the benefits that risk-informed decision-making can bring to the overall regulatory approach. A key feature of this approach is a formal, integrated review team that consists of project managers, technical reviewers, and probabilistic risk assessment subject matter experts.

For subsequent license renewal, the agency has made changes to the review process using risk-informed decision-making. For example, a smaller, dedicated team performs the initial intake review. The agency is also considering additional ways to incorporate risk-informed decision-making into the review of subsequent license renewal applications. For example, recently the agency began an initiative to transform the use of risk information by materials engineers for regulation of passive, long-lived components. The goal is to provide actionable, reliable, and clear guidance to both internal and external stakeholders for risk-informed materials engineering reviews.

Senator CARDIN. Chairman Hanson, as you first pointed out, Senator Carper is in another committee where his time is up for questioning. He will be back shortly. Senator Capito had a similar commitment. Don't take it personally.

[Laughter.]

Mr. HANSON. Not at all.

Senator CARDIN. You are left with Senator Whitehouse and myself.

We will now hear from Commissioner Jeff Baran.

**STATEMENT OF HON. JEFF BARAN,
COMMISSIONER, NUCLEAR REGULATORY COMMISSION**

Mr. BARAN. Thank you for the opportunity to testify today. It is great to be back with my colleagues to discuss NRC's important work.

I want to briefly focus on three pressing challenges affecting NRC: The fight against climate change, the response to the COVID-19 pandemic, and the pursuit of environmental justice.

I see NRC's nexus to climate change in two main areas: The operating fleet and new reactors.

For the long term operation of existing nuclear power plants, NRC's role is to provide strong safety and security standards and rigorous independent oversight. The Reactor Oversight Process has generally been an effective safety framework. If we are going to make a particular change, there should be a solid safety case for it. Of course, NRC needs to be open to and ready for new technologies that could improve safety, such as digital instrumentation and accident tolerant fuels.

The other main climate related role for NRC is the licensing and oversight of new reactors. New reactor designs have the potential to be safer than existing designs. The challenge is striking a reasonable balance between the value of new safety attributes and maintaining a prudent degree of defense in depth.

Responding to the COVID-19 pandemic has been another major priority for the agency. Resident inspectors are now back onsite, and the regions have returned to in person safety and security inspections. In fact, the staff has set a goal of getting back to normal levels of oversight this year.

During the pandemic, some inspections were performed remotely out of necessity. I see that as a temporary measure that made sense during an extremely unusual and challenging public health emergency.

Going forward, there is broad agreement on the value of and need for in person safety and security inspections. There is just no substitute for having independent NRC inspectors onsite.

NRC must also pursue environmental justice. The staff is performing a systematic review of the agency's programs, policies, and activities. They are consulting with a broad range of stakeholders and developing options for improving how the agency pursues environmental justice.

In my view, we must meet the moment and not settle for doing things the way they have always been done.

Thank you, and I look forward to your questions.

[The response of Mr. Baran to a question for the record follows:]

**Senate Committee on Environment and Public Works
Hearing Entitled, "Oversight of the Nuclear Regulatory Commission"
December 1, 2021
Questions for the Record for Commissioner Jeff Baran**

Senator Kelly:

1. What can you share about the status of the Church Rock licensing decision?

RESPONSE:

The NRC staff is currently considering a license amendment application submitted by the United Nuclear Corporation (UNC) to dispose of mine waste in a lined engineered cell to be constructed on the existing mill tailings impoundment at the Church Rock mill site. NRC is currently on track to make a licensing decision by June 2022. The staff expects to issue its Final Environmental Impact Statement (FEIS) in Spring 2022 and its Final Safety Evaluation Report in June 2022.

Under its Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process, EPA led a coordinated effort to design the disposal option for the mine waste. NRC, DOE, Navajo Nation EPA, and the New Mexico Environment Department were part of the design review team. EPA approved the completed repository design for submission to NRC in 2018.

NRC continues to work cooperatively with EPA and DOE and has actively engaged the Navajo Nation as the staff reviews this license amendment request. This includes regular meetings with and outreach to the Navajo Nation.

- a. What lessons has NRC learned through the process of making the Church Rock mine decision?

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RESPONSE:

Although the review of the license amendment application is ongoing, the NRC staff already has take-aways from the process. The review has reinforced the importance of providing ample opportunities for all interested stakeholders to participate in NRC regulatory processes and ensuring open channels of communication with other federal agencies, states, Tribal Nations, and local communities. The NRC staff tried to enhance community outreach during the agency's review process through broadcasts on Navajo radio in English and Diné, and an extension of the EIS comment period to provide a more time for interested stakeholders to comment.

- b. And are there ways that this committee could help support NRC, and the interagency process of uranium mine cleanup, in the months and years to come?

RESPONSE:

I have been involved in the efforts to clean up the uranium contamination in and around the Navajo Nation since 2007, when the House Committee on Oversight and Government Reform held a hearing to listen to the personal stories of Navajo citizens affected by the contamination and bring together the federal agencies that would need to play a role in addressing the daunting problem. I think that active Congressional oversight has played and can continue to play a critical role in making progress on the clean-up. The first 5-year plan was developed by federal agencies in direct response to a request by the Oversight Committee. I believe that the status meetings with the Navajo Nation, Hopi Tribe, and federal agencies convened by House Members and staff in the years that followed the hearing helped keep a

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strong focus on making concrete progress, improved coordination among the federal agencies involved, and provided an opportunity for the Tribes and agencies to build trust.

Senator CARDIN. Thank you very much, Commissioner.
We will now hear from Commissioner David Wright.

**STATEMENT OF HON. DAVID A. WRIGHT,
COMMISSIONER, NUCLEAR REGULATORY COMMISSION**

Mr. WRIGHT. Thank you, Senator Cardin.

Good morning to Chairman Carper, Ranking Member Capito, and the other members of the Committee as well. I appreciate the opportunity to appear.

First, I would like to thank my colleagues for their insights into the matters that are before the Commission and to the Chairman for his leadership during these challenging times. I hope that the next time we appear before you, we will be a full complement, because we work best with five Commissioners.

Thanks to the efforts of our COVID task force, we did begin re-entry on November 7th. This gives us the opportunity to collaborate in person again, as well as meet employees who onboarded while we were on full time telework. That in person interaction helps us meet our mission in the most effective way possible.

There are many exciting things happening at the NRC, including advanced reactor applications under review, the Part 53 rulemaking efforts, subsequent license renewal applications, digital I&C, accident tolerant fuel application reviews, and the decommissioning rulemaking. In these and in all matters, my focus and the staff's focus is safety.

There have been recent media statements and social media posts regarding NRC decisions and rulemakings suggesting that the staff's recommendations are not safe or simply reflect the industry viewpoint, including on the proposed decommissioning rule. For the record, I do not agree with those statements. Our staff members are committed professionals dedicated to meeting the NRC's safety mission.

As you know, our safety mission is apolitical, as are the NRC's Principles of Good Regulation. The staff's findings in the matters before the NRC are based on data, expertise, and experience, and are informed by input from external stakeholders.

At times, the staff is not unanimous in its recommendations, but processes are in place to ensure that all staff perspectives, including differing views, are considered before making recommendations to the Commission. While there may be different policy views on those recommendations, each recommendation staff provides the Commission meets the NRC's safety mission. I make sure I understand each of these points of view, as well as my colleagues' perspectives, before reaching a decision.

I would like to thank the staff for its unwavering focus and dedication to the shared goal of the Commission, the staff, and our licensees, which is the safe and secure civilian use of radioactive materials.

Thank you, and I look forward to your questions.

Senator CARDIN. Again, I thank all three of you for your service and for your testimony here today.

You obviously have tremendous challenges. I think we all hope that we can get a full complement of Commissioners nominated and approved as quickly as possible.

I want to start this round of questioning dealing with the work force issues, if I might. You have tremendous responsibility. We are very proud of the work force, I am very proud of your location in Rockville, Maryland, where your headquarters are located. I have been there many times and talked to many of your work force about the challenges that you face. You clearly have to deal with the safety of our current reactor inventory as well as dealing with decommissioning and dealing with the new reactors that are being put online, and new technologies legislation passed by Congress that you have to implement. We recognize all that.

In addition, you have Project AIM 2020, which dealt with downsizing the Nuclear Regulatory Commission. Put on top of that COVID-19, which changed your methods of dealing with challenges to a remote work environment. As I look at the demographics of your work force, I see an aging work force. I see a concern as to whether we are attracting the type of talent that is needed at NRC moving forward.

So I would like you to share with us your strategies for making sure that we have the work force we need to carry out this incredibly important responsibility.

Chairman Carper and Ranking Member Capito pointed out the importance of nuclear energy. I strongly agree with that. Half of our carbon free energy production is through nuclear. So it is a critical part of our current energy portfolio, and an important source moving forward with dealing with both energy and climate.

What are we doing to make sure that we have the talented work force that we need, most of which are technical individuals, as we move forward under this environment?

Mr. HANSON. Senator Cardin, thank you for that. This issue of what we call strategic work force planning is a very high priority for me. I know my colleagues have spoken on it in public and in other venues as well, in making sure that we have the work force of the future.

Let me highlight a couple of things. We have aggressively implemented a number of computer based tools and other tools to identify the skill sets that we are going to need going into the future. So that may be materials engineers for advanced reactors, or health physicists or other kinds of skill sets. We are actively recruiting for those people. We need experienced and mid-career people to step into senior technical roles and leadership positions within the agency, certainly.

One of the other big areas that we really need to focus on is attracting younger talent as well. In my visits to nuclear plants this summer, I was always asking, what is the percentage of the work force at a plant under the age of 30. On average, plants were coming in in the 10 percent to 15 percent range. At the NRC, it is actually 3 percent. So this is a big area.

We reinstituted our apprenticeship program, what we are calling the Nuclear Regulator Apprenticeship Network, to take people that are right out of school and bring them in and cycle them through the various offices within the agency over a 2 year period, so that when they come out, they have seen a lot of the agency, and they are ready to hit the ground running, having experience in a number of areas.

We had our first class of that 2 years ago, with 22 folks. We are about to recruit another class. With additional resources in our human capital organization, we are hoping to be able to make that an annual program as well, to get more talent in the agency, so that we can have that culture and knowledge transfer from the folks that are going to be retiring out over time.

Senator CARDIN. I would add that your budget is primarily financed through the industry itself. We recognize that nationwide, we have a real challenge in regard to work force issues. This is not unique to one agency. We have a national shortage, particularly of trained individuals. If you need some additional help from us, please let us know. Because I will tell you, we are deeply concerned by that percentage of those under 30 being 3 percent. We want you to have the brightest minds coming out of our universities that are going to help us deal with the new technologies in nuclear power, as well as dealing with the challenges of how we deal with waste and material, in addition to your current responsibility of safety.

So you have a pretty heavy portfolio. We would welcome any thought you might have as to how we can help you in order to retain the best possible work force.

Let me ask one additional question as our leadership is settling into their seats here. That is the economic issue of nuclear power. Nuclear power has not enjoyed the same type of tax incentives as other energy sources, particularly those that are friendly toward our environment on carbon emissions. I have introduced legislation dealing with the production tax credit. It is bipartisan; it is included in the Build Back Better budget on the House side. We have had many members of this Committee that have been interested in this on both sides of the aisle, same thing on the Senate Finance Committee, where Senator Carper and I both serve as well.

Could you talk for a moment as to the need, moving forward with maintaining our nuclear reactors safely, as well as going to the next generation of nuclear reactors, to have a level playing field in regard to the tax code to make it economically feasible for the investments to be made to make sure we have nuclear power moving forward?

Mr. HANSON. Senator, thank you for that. As you know, our focus is really going to be on the safety and maintaining the safety of each of these plants. As many people in the industry have acknowledged to me, there is no future for nuclear power without the safe operation of the current fleet. So that is just the opening stakes, if you will, into the larger energy conversation.

There is a nexus, of course, with the economics. Because of the economic pressures on some of these plants, there tends to be a focus to streamline and highly optimize the operations in a way that is not currently impacting safety. We don't want to impact safety into the future. So we are cognizant of the economics. But our focus is really on making sure that all of our licensees, whether long existing or new or prospective, understand our standards.

Senator CARDIN. I appreciate that answer. The reality is, if it is not economically feasible because of the competitive disadvantage that it does put additional challenges on operating safely. So it does affect your mission. And I think the economics of energy is an important part of our overall policies here. I would welcome your

thoughts as to making sure that we stay competitive so that safety is not compromised. I think your point is very well taken; we cannot compromise safety. But we also need to make sure that it is a level playing field for nuclear power.

With that, I will turn the gavel back over to Senator Carper, and ask if I got any additional staff as a result of taking over.

Senator CARPER [presiding]. I am just glad you didn't annex part of Delaware on the DelMarVa Peninsula and take it into Maryland while I was away.

Senator Capito, please.

Senator CAPITO. Thank you, Chairman.

Thank you, I am sorry we had to slip out. As you can tell, there is a lot going on right now with simultaneous committee meetings.

As you all know, Congress created the DOE's Advanced Reactor Demonstration program to establish public-private partnerships. Then the BIF put in \$2.5 billion in funding to support these programs. That is a major investment and much welcomed in a bipartisan effort.

To successfully build and operate these reactors, the NRC must efficiently review and approve these designs.

Chairman Hanson, my understanding is that there are already two applications that were accepted last year and that will be going into this program. How is the Commission preparing to review those in light of the new funding opportunities?

Mr. HANSON. Senator Capito, thank you for that. One of the key ways that we are preparing is by reviewing what we call topical reports from both X-Energy and TerraPower, the two ARDP award-ees. What those really are, they are technical reports that they submit to us for early review.

What that does is it allows us to resolve any technical questions that we might have about their design. It also gets them into the regulatory process early before there is a formal application. So we can have a very interactive process with them. We can learn about their design. They have an opportunity to go back and refine their design as needed. We can do that.

So that when, for instance, TerraPower is supposed to come in with their application in 2023, we are fully prepared to review that efficiently and effectively.

Senator CAPITO. So I guess the basic question there is, the protocols are already firmly established; the rules of the road are already established in this particular case for these two projects. In other words, they know what they are going to be, they know how to formulate their applications. The rules of the road are explicit for them right now to be able to—as you are moving toward the process.

Mr. HANSON. Yes, that is right. Because our advanced reactor rulemaking is still ongoing, they are going to, I think, choose alternative pathways for licensing for their reactors in the near term.

Senator CAPITO. OK, thank you.

Commissioner Wright, in 2018 the NRC stood up what is called the Vogtle Readiness Group, which was tasked specifically to oversee activities associated with the completion of the only two new nuclear reactors currently under development, and that is Southern Company's Vogtle site in Georgia. This organizational approach

may be useful to replicate for the Commission's review of the ARDP reactors.

Is there a structure that NRC would consider for these first reactors that mirrors these principles that are embodied in the Vogtle Readiness Group?

Mr. WRIGHT. Thank you for the question. Yes, ma'am, I think that the NRC is going to take lessons learned from everything that we are doing right now. And the Vogtle Readiness Group is one of those things that has performed very well.

Because the different technologies that are coming before us, be it the TerraPower thing, be it NuScale, be it Oklo, or be it Kairos, or whatever, they have different needs, requirements. So we look at tiger teams, we will loosely call it that, to try to, once we get a team working on something, they stay with that, so they are not bouncing back and forth to different people. I think that will add some consistency to it. What we learn from one we can apply to others as well.

Senator CAPITO. So would you anticipate creating some sort of group that is exclusively focused on reviewing these two demonstration projects? Is that what you are saying?

Mr. WRIGHT. I would think that we are going to do something very similar. It may not be exactly.

Senator CAPITO. Mr. Chairman, did you want to weigh in on that?

Mr. HANSON. That is right, Senator. We are looking at kind of what we are calling a core team approach where we have a dedicated group of people that will follow that application all the way through, and then can kind of bring in extra expertise as we go along. We think that has been kind of a proven method for improving the efficiency of these reviews and decreasing the need to kind of educate multiple groups of staff within the agency.

Senator CAPITO. I alluded in my opening comments to the fact that the Commission did not act on the reactor oversight process that was formulated. What are the next steps for the staff and for the Commission to improve and modernize that?

Mr. HANSON. Senator, as you noted, they withdrew the paper, I think.

Senator CAPITO. Right.

Mr. HANSON. Because they had updated information. They are looking at that, those papers again, and incorporating that updated information. I expect that we will see that paper again. That was certainly the basis of my approval of the withdrawal, was that we would see these issues again in some revised form. I am looking forward to that.

I don't have an update on the specifics. I would be happy to follow up.

Senator CAPITO. Let me just ask a real generalized question here. From the view of the American public, who I believe believes in an all of the above energy plan for the country, and you heard from my opening statement some frustrations that I have felt with the direction that we are going. Nuclear is the least talked about, but in some ways could be the most powerful dual tool in terms of generating the power, but also in an environmental way that doesn't add the emission challenges that things like coal and nat-

ural gas that my State produces very well for the country, I will say.

How do you tell the American public, and if I could take the time to ask all three of you, how do you, very quickly, tell the country that nuclear needs to have a future, and has a future, and any concerns from the past, how they are being allayed? If you can do that in a minute or so, I think it would be important for the American public to hear that. We will start with Mr. Baran.

Mr. BARAN. We always walk a careful line here because it is important for all of us, I think the Chairman will say this, too, we don't promote nuclear power. It is important for us to be neutral on it. We all have our individual opinions. But we as an agency don't promote it. Our focus is on safety and security.

What I want the American people to know is that is what we are focused on every day, to make sure we have the right standards in place, and rigorous, strong oversight, and we have good processes for new reactor applications. As I talk to licensees, when the conversation turns to climate and how are we going to get to net zero, the focus turns to nuclear in a lot of cases.

So that could mean we get a lot of additional applications in the future. We need to be ready for that. We need to have a framework in place. We need to be using these strategies that my colleagues talked about to make sure we have a good process for reviewing new reactor applications.

Senator CAPITO. Chairman Hanson.

Mr. HANSON. I would like the American people to know that nuclear power has a long history of safe operation in this country, overseen by a rigorous, independent regulator here at the NRC and the NRC staff. As Commission Baran said, we are well poised with our technical staff to license new nuclear technologies into the future. And we are modernizing our approaches. We are building on what we have learned over that long history of safe operation to make our oversight of the current fleet more efficient and more effective.

Senator, as you have noted, a lot of utilities, the cornerstone of their carbon free electricity plans are the continued operation of existing reactors today. NRC will continue to be an efficient and effective regulator of those sites.

Senator CAPITO. Mr. Wright.

Mr. WRIGHT. Thank you. External awareness is really part of our mission as well, to be externally aware of what is going on around us. When I go visit plants specifically, where a plant is located, that is probably the biggest support area around that plant. The farther away you get from a plant, it becomes less and less talked about, so to speak.

So the support for the plants are closest to where they are. You hear that talked about. But one thing, I agree with my colleagues, we just need to be sure that when we are engaged with the public that they know that we are going to make sure they are operated safely.

Senator CAPITO. Thank you.

Thank you for the time.

Senator CARPER. Senator Lummis, I am going to yield to you, so you can go next. Once you have asked your questions, Senator Whitehouse, you will be next.

Senator LUMMIS. Thank you, Mr. Chairman.

Chairman Hanson, in July 2020, the NRC and EPA signed a memorandum of understanding regarding the understanding of uranium in situ recovery facilities. The MOU provided clarification of the respective roles and responsibilities of the two agencies. And it was needed.

Will you commit that the NRC will uphold this MOU, particularly as the agency proceeds with its consideration of a draft proposed rule regarding uranium in situ recovery facilities?

Mr. HANSON. Senator, thank you for that. The approval of the MOU with EPA was a full Commission decision. It would take a decision by the Commission to change that MOU, and that is not a matter before us at this time. I don't foresee any changes in the immediate future.

Senator LUMMIS. So if there were to be a change, the entire Commission would have to abrogate the MOU in order to make the rulemaking conform to their new ideas?

Mr. HANSON. I believe that the proposed rule on the in situ recovery that is before us conforms to the MOU.

Senator LUMMIS. OK, perfect. Thank you.

The NRC and the States that have implemented NRC regulation requirements, the agreement States, of which my State of Wyoming is one, have a really good track record on in situ recovery. We make sure that uranium recovery is safe, that it is carried out through regulation, guidance, site specific licensing considerations, and the expertise of regulatory staff. The regime is comprehensive, and it is working very well to protect the environment.

I understand that the NRC is seeking to formalize aspects of the licensing process in the draft proposed rule. In doing so, would you agree that the NRC should reinforce existing management practices that are working well, and not duplicate or supplant them?

Mr. HANSON. As a general matter, I think if agreement States are executing the programs that they have in front of them, that there is not a need for the NRC to, as you say, duplicate that effort. We don't do that in other areas, for example.

We do inspect State programs on a triennial basis, I believe, for their effectiveness. We would do the same thing with Wyoming, I think, coming up. There are new agreement States so I think their review is some ways off.

But those reviews tend to be generally constructive. We want to help States implement their programs effectively.

Senator LUMMIS. I think that is a worthwhile give and take that occurs during those discussions. It is important that you understand what they are doing, and they understand what you expect of them. That is reassuring.

My next question is for all of you. As you know, TerraPower's Natrium Power Plant is going to be built near Kemmerer, Wyoming. We are very, very pleased with that choice. It is a timeline that will allow workers from the coal plant that is slated to be closed to transition to the Natrium plant. Both DOE and the devel-

opers have said they can meet the 7 year deadline imposed by Congress.

But this will require the NRC to review and approve applications in a streamlined and efficient manner, because it is a pretty tight timeline. Congress also passed the Nuclear Energy Innovation and Modernization Act to push the NRC to move faster on licensing advanced reactors. NRC has been working hard to meet the bill's timelines. It is clear that meeting these timelines and moving faster is a key priority for Congress.

So for all the Commissioners, does the NRC have what it needs to ensure that these reactors, funded through a public-private partnership, will achieve the 2028 goal? If not, what more do you need from Congress?

Mr. HANSON. Senator, thank you for that. At this point, I would say we do have what we need. We have gotten money outside of our regular fee structure for the development of the advanced reactor rulemaking. The Department of Energy, of course, has granted money to the ARDP awardees like TerraPower, and they are using some of that money to consult with us for early licensing engagement. So I think we are on a good track now.

To the extent that we need additional resources, if I could, I will put in a plug for some of our corporate support functions in the IT area, to make sure we have the information technology tools, and in our human capital area, so we have the people on board that we need, to hire the people that we are going to need to review these applications.

So it is kind of one step removed. I think we are doing well in the technical areas. Again, the conversation we had with Senator Cardin about the need to backfill a lot of the technical expertise that is going to retire over time, we are actively engaged in that. But at the moment, I think we are in a good situation.

Senator LUMMIS. Mr. Baran.

Mr. BARAN. I agree with the Chairman. I think we are well positioned to do this work.

Senator LUMMIS. Great.

Mr. Wright.

Mr. WRIGHT. He did a very good job. There is not much to add to it, except to say we are going to do everything we can no to be a barrier to anything there.

Mr. HANSON. Well said.

Senator LUMMIS. I thank the witnesses, and I yield back.

Thank you, Mr. Chairman.

Senator CARPER. Thanks so much for joining us today.

Senator Whitehouse.

Senator WHITEHOUSE. Thank you, Chairman.

I am going to ask questions very aligned with Senator Lummis's. I was an original author and sponsor of the Innovation and Modernization Act. So I am keenly interested in seeing you implement it effectively. Senators Barrasso, Crapo, Booker, and I wrote to you all recently to give you a well done on moving up the schedule.

But recently, you extended by 9 months the date in the Part 53 rulemaking for receipt of the proposed rule package. I am wondering what that portends by way of timeline.

Mr. HANSON. Senator, thank you. The Commission did just approve an extension of the timeline, and we didn't do it lightly. Because we do feel the urgency in getting this rulemaking out.

Senator WHITEHOUSE. But as I understand it, you have moved ahead of the anticipated schedule to begin with. So this is slowing down an accelerated schedule.

Mr. HANSON. That is right. The original schedule was December 2027. The Commission had given direction to the staff to move that up to I think some time in 2024. We have now pushed that back a little bit so that we could really focus on how best to use our risk information in some of the designs that we are going to get and how to credit design maturity appropriately in the application process.

Senator WHITEHOUSE. So does the 9 month extension likely flow through and tack onto the anticipated end date?

Mr. HANSON. I am hoping it is not a day for day slip, to tell you the truth. I am hoping that the extra time that we are taking up at this stage in the process that we can recover at least some of that in the final rule stage, because we will have a more fully developed product.

Senator WHITEHOUSE. OK. We wish you well. This is a strong bipartisan area in a Congress in which strong bipartisan areas can be scarce.

One of the reasons that I have been supportive of this innovation is the constant news that we are hearing out of the innovative community that these technologies will put them in a position to take the spent nuclear fuel, nuclear waste, for which America currently has no plan, and which is sitting onsite near nuclear facilities, because we don't even like to have it travel, and piling up. And it seems to me that the ability to take that resource and use it to power carbon free generation is a pretty positive thing. We have no better plan for the nuclear waste right now.

I am concerned that the economics are going to be a problem. If we were United States of America, Incorporated, we would have a balance sheet; we would have accountants; there would be a report each year on the financial picture of the company. And in that financial picture would be the liability of cleaning up the nuclear waste mess. Whatever that number was, that number less \$1 would be the incentive to get that problem solved, because it would be identified as an economic burden on the enterprise.

The United States of America as a country doesn't operate that way. My worry is that a small savings from using new fuel as opposed to trying to address the spent fuel problem will push the spent fuel technologies to the side, simply because the importance of dealing with the spent fuel won't be recognized in the equation in any way.

First, are you aware of that problem, and is there any way in which the NRC is focused on trying to make sure that spent fuel innovation, spent fuel based innovations don't become orphaned by your process?

Mr. HANSON. Thank you for that, Senator. I think we are focused to make sure that there aren't any parts of the fuel cycle that are orphaned. In our advanced reactor preparations, I have personally tried to emphasize with the staff the need to look at all parts of

the fuel cycle and ensure that we have what I would call a regulatory line of sight for all of these parts of the fuel cycle. If all we are doing is focusing on regulating reactors, for instance, Senator, but we are forgetting fuel enrichment on the front end or fuel fabrication, or spent fuel management handling, reprocessing, I think as you are suggesting on the back end, then we are potentially hampering the entire enterprise.

So that has been a focus for me, and certainly the spent fuel management piece of that, whether it is storage or transportation or disposal or as you say, reprocessing.

Senator WHITEHOUSE. So you think you are going to be to provide a level playing field for reprocessing innovation, as well as new fuels innovation?

Mr. HANSON. I believe we can.

Senator WHITEHOUSE. OK.

Thanks, Chairman.

Senator CARPER. Thank you for your continued interest and leadership on these issues, Sheldon. Thank you very much.

Senator Markey has joined us.

Senator, welcome.

Senator MARKEY. Thank you, Mr. Chairman, very much.

The Nuclear Regulatory Commission is responsible for ensuring a safe, effective, and efficient decommissioning process for nuclear power plants whose life expectancy has now been completed. That includes the Pilgrim Nuclear Power Station in Plymouth, Massachusetts.

However, with its recent approval of the proposed decommissioning rule, I fear the NRC now stands for Not Recognizing Concerns. The NRC has decided that the best way to shield itself from criticism around the decommissioning process is to take itself out of the process. In the latest version of the proposed decommissioning rule, the Nuclear Regulatory Commission would have no ability to approve, no ability to change, no ability to deny plants decommissioning proposals. Known as post-shutdown decommissioning activity reports; its only job would be to acknowledge receipt of the report.

Our independent nuclear safety regulator would serve as a glorified filing cabinet, ceding the job of regulator to the nuclear industry itself. It is not a win for safety, for communities, or for the energy sector.

Chairman Hanson, if the Nuclear Regulatory Commission doesn't need to formally approve nuclear plants' decommissioning plans, will anyone, the NRC or stakeholders, be able to meaningfully assess or address any issues in the accuracy, timeline, cost estimates, environmental impacts, or overall legitimacy of the plants' decommissioning proposals?

Mr. HANSON. Senator, thank you. Our decommissioning processes are oriented around one primary goal, and that is the ultimate greenfield release of the site. And the post-shutdown decommissioning activities report that you mentioned is supposed to outline the activities that our licensees are going to undertake to reach that goal over time.

We establish in regulation what is required in that report. If that report comes to us and is lacking in any way, we can direct our

licensees to address those deficiencies and prohibit undertaking any decommissioning activities until those deficiencies are addressed.

We also publish that report for review by the communities. We hold two public meetings and solicit public comments, so that not only can we rely on our own review with regard to whether or not that report meets our regulations, but we can solicit input from the community about whether or not they think it meets our regulations.

Senator MARKEY. So you are saying that you can, and are authorized to require NRC approval of decommissioning plans? You are saying that is in your jurisdiction, you will have to approve the decommissioning plan? Is that what you are saying you are going to do?

Mr. HANSON. It is not a formal approval, as you note. It is a review for consistency with our regulations.

Senator MARKEY. Well, then, from my perspective, check the box exercises aren't enough. This needs to be a process that takes into account the accuracy of those plans, not just the completion of those plans. And the Nuclear Regulatory Commission has to sign off on it as part of the process. Otherwise, we wind up closing the barn door after the horse is out, gone, and died of old age. We don't have the NRC playing a meaningful role in this process.

Do you believe that anything in this proposed rule does anything to strengthen stakeholder involvement in the decommissioning process?

Mr. HANSON. Senator, one of the areas that we added to this rule was, we are making licensees conduct an analysis to ensure that their activities are going to be bounded by previous environmental assessments. If they are proposing any activities that are not bounded, they have to—the NRC is going to provide a meaningful opportunity for public participation to review those activities and their relationship to these prior environmental analyses.

Senator MARKEY. Is there a requirement to consider and respond to public comments? Is there a requirement to have public hearings on this decommissioning process?

Mr. HANSON. We do have public meetings on the post-shutdown decommissioning activities report, and we solicit public comments on that report.

Senator MARKEY. This would be after the utility, the industry, had completed this process, so that there would be public input as to the adequacy of the work which was completed?

Mr. HANSON. Well, the activities report happens at the beginning of the process. They are required to submit that to us 2 years prior to shutdown. The license termination plan would be, there is an environmental assessment conducted at that, and that is within 2 years of completion of all the activities. Then the NRC oversees the activities in the interim.

Senator MARKEY. The problem is the comments that don't have to be responded to are considered not meaningful if they are not going to be actually considered. It is like shouting into the wind, if you are a community that is concerned about what is taking place with this nuclear power plant and its decommissioning process.

So I am very concerned about this process, as it is unfolding. I would just absolutely urge you to ensure that there is full NRC and public participation. Because the industry historically, I am not telling you anything you don't know, has been known to cut corners, and ultimately we cannot allow the public safety to be put in jeopardy at all.

Thank you.

Senator CAPITO [presiding]. Senator Stabenow.

Senator STABENOW. Thank you very much.

Good morning, thank you to all of you for your testimony and your work.

Chairman Hanson, as a Michigan native yourself, I know you understand the importance of the Great Lakes to all of us. It is not only about our economy, it is really our way of life in Michigan. Protecting the Great Lakes is really in our DNA, as you know. So it is vital that we do everything that we can to protect 95 percent of the country's fresh water, which surrounds us in Michigan.

That is why for years I have led bipartisan efforts to oppose Canadian proposals to very low level nuclear waste just off the shore of Lake Huron. Thankfully, they decided not to do that, and I appreciate the fact that they have not done that.

But they are still considering a proposal to store highly radioactive waste at a site within the Great Lakes Basin that is only 30 miles from Lake Huron. So Michiganders are extremely, extremely concerned. I am extremely concerned about this. Stopping the storage proposal is the right thing to do for the people of Michigan; it is the right thing to do for the people of Canada, because the risk is just too great. They have a lot of other possibilities of where they could create this storage facility.

Chairman Hanson, will you commit to work alongside our other Federal partners, including the State Department, to engage with our Canadian allies with the shared goal of protecting the Great Lakes from the risk of a nuclear accident?

Mr. HANSON. Senator, thank you. As you said, as a native Michigander, I am keenly interested and concerned with the long term health and viability of the Great Lakes. The NRC would be happy to support the State Department and other inter-agency partners in that.

We also have a very strong relationship with our Canadian nuclear regulators. We believe they have a very mature and technically competent staff. We haven't interacted with them much on this issue, but if they wanted our consultation, we would be happy to provide it.

Senator STABENOW. I think it is really important that you do have that dialogue. I have very much appreciated having multiple conversations with our Canadian friends. There is no question that there is competency and sophistication and a lot of land in Canada. It does not have to be right next to the Great Lakes. I think that is the point for all of us.

Also, we have about 10,000 tons of spent nuclear fuel from 15 current or former U.S. power plants stored along the shores of the Great Lakes. And as the Biden administration has made clear, it is going to be hard to meet our near term carbon reduction goals

without nuclear power. But we have to make sure that these smaller nuclear storage facilities are sound.

So it is critical that we work together on the most effective means of dealing with the waste, again, alongside our precious Great Lakes. I would appreciate your comments, and can we count on you to work with us on this?

Mr. HANSON. Yes, Senator. I think you can count on the NRC to make sure that the existing operating reactors continue to operate safely and that the spent fuel stored on the Great Lakes is also stored safely. I was at D.C. Cook this last summer and had an opportunity to see the storage pad as they were preparing to move some of their spent fuel out of the pool and onto the pad this fall. I think Attorney General Nessel may have been there for that spent fuel loading campaign and was very interested to kind of learn about the stability and how they manage those facilities and came away very reassured.

Senator STABENOW. Good. I appreciate it very much. Again, we have a really, what we view as a sacred trust in Michigan in protecting the Great Lakes, not only for us but for the entire country. It is very important that we look at these issues through the eyes of protecting those waters. Thank you.

Mr. HANSON. Thank you. I appreciated your comment about sacred trust. I think my colleagues and I feel that acutely every day in the mission that we set out to achieve.

Senator STABENOW. Thank you.

Mr. HANSON. Thank you.

Senator CAPITO. Thank you.

While we are waiting for the Chairman to return, he had to go over to Finance, I am going to exercise my discretion and ask another question.

I have been in these hearings now with NRC probably for my entire 6 years as a Senator. The management issues seem to always be the same. In response to Senator Lummis's question about what do you need, it was more resources for IT. Yet at the same time, if you look at some of the financial management practices, for instance, the NRC pays the GSA rent for space that is currently occupied by FDA. Apparently a decade ago, I understand this is before any of you all were there, the NRC signed a long term lease for space that has never been fully utilized by the agency. And I missed your opening part when you talked about the blended work force and flexible times.

Chairman Hanson, how much does the agency pay GSA in rent for office space that the agency does not use? If you are looking for more resources, in my view this would be a place that if you took that out of your overhead calculations you might be able to pick up some of the additional IT requirements that you think you are going to need in the future.

Nobody wants to take that.

Mr. HANSON. Oh, I do, except I think Commission Wright has actually spoken, within the agency, has spoken very eloquently on this issue. I wanted to give him an opportunity to respond.

Senator CAPITO. All right, good.

Mr. Wright.

Mr. WRIGHT. Senator, thank you so much. I couldn't agree with you more. The fact that that counts against us, we get no benefit from it at all. And in the end, our licensees end up paying part of this stuff, too. So that is something we don't get any benefit for.

I do think that if we can adjust that, and I think it totals \$6 million and change that we are talking about, which is about 1 percent, when you are looking at that.

Senator CAPITO. Right. So how do we solve this problem? Can you get out from under the lease? Does the lease have to expire? What are your options here? How aggressively have you pursued this?

Mr. WRIGHT. Again, I think, and I would just go back in my confirmation hearing, the last time I did tell Senator Inhofe that if there was anything that we had issues or concerns about where the budget was concerned, we were going to come to you to ask for help. We are searching for answers as well. I think we are reaching out to you and to the others, and our CFO and everybody would be more than willing to discuss the best way.

As I sit here right now, I can't tell you exactly.

Do you know?

Mr. HANSON. Senator, that subsidy to FDA as you call it I think was put in place by the House Transportation and Infrastructure Committee. So we are looking at it, and we want to engage your staff on specific ways that we might be able to address that going forward. It could be just as simple as a recategorization or maybe some other method.

Senator CAPITO. It would seem to me, I am on the Appropriations Committee as well. The truth in budgeting, it is not there. Certain agencies, and I wouldn't necessarily categorically put you in this category, but certain agencies and commissions ask for money in certain areas knowing full well that they want to come back in and reprogram this money into other areas that may be less politically viable, or for other reasons. I don't know that this is necessarily in this case, but I would say—now that I see Senator Padilla is here, I will yield to him and get off my soapbox.

But I will say as we look at these blended work forces, as we look at more of our Federal work force that is not coming in full time, there is no reason that you all and others throughout the entire Federal Government should not be able to skinny down your physical space, your requirements for physical space. And if it is just as easy as a recategorization, it should be done.

So we will be supportive of that. I think the taxpayers would be supportive of that, and it is smart.

Senator Padilla, I will open it up to you for questions.

Senator PADILLA. Thank you, Madam Chair.

Good morning to all of you. I have a couple of questions specifically for Chairman Hanson. But let me set the stage. As I know you are familiar, California has one nuclear facility still in operation, but three that are in various stages of decommissioning. Those would be San Onofre, Rancho Seco, and Humboldt Bay, with the most recent action being the NRC's announcement that it has terminated a license for Humboldt Bay's Unit 3, and released the unit site for unrestricted use on November 18th.

A transparent decommissioning process I think we can all agree, and a clear understanding of its timeline, is critical to not just operators and stakeholders, but to community members at large, and local governments around these sites. Concerns about environmental health impacts, future use of these sites, et cetera.

So with that as a lead in, the first question is this, Mr. Chairman. Given that the NRC's historic role has been in regulating the operations of nuclear power plants, rather than overseeing their decommissioning, how do you see the NRC meeting this expanded role of oversight regarding decommissioning activities, and what is being done internally to ensure that the NRC is ready to conduct a transparent and timely process?

Mr. HANSON. Thank you, Senator, for that. We really have had the opportunity, because as you have said, we have had an increasing number of decommissionings or plants entering decommissioning over the last several years. Because all 26 didn't hit all at once, we have been able to shift staff gradually to focus on decommissioning.

I call it kind of the three challenges that the agency currently has. Historically, we focus mostly on the safe operation of the current fleet. With regard to reactors, we had kind of that single mission.

Well, now we are doing three things. We are getting ready for new technology, of course we are focused on the existing fleet, like Diablo Canyon, while it is still operating. And we are shifting our focus as well, we are pivoting, if you will, to decommissioning. I think overall, the agency has been quite successful in that regard, in being able to review those shifts by our licensees to that new status.

Senator PADILLA. Thank you. Just two comments before my next question. One, looking at not just shifting personnel to getting ready for new technology, as you said, current operations and decommissioning, sort of a new growing priority, but if there is capacity concerns, need for additional staffing and other resources to accommodate this shift, please let this Committee know how we can be supportive of that.

Second, just in thinking ahead on the decommissioning, my start was in local government, before moving to State government, before coming to the U.S. Senate. So I know my colleagues in local government are anxious in many ways, even if it is thinking 10, 20, 30 years ahead, what future use of these sites can and should be. Residential, maybe not quite the case. But for example, clean energy technologies, renewable energy sources, et cetera, to take advantage of existing tie ins to transmission and distribution infrastructure, which is key for wind, when appropriate, to solar, when appropriate, depending on the natural resource that is site specific. So I want to plan that seed.

The second question is this. Specifically on the issue of community interest and engagement, the NRC states that it "considers public involvement and information about the NRC's activities to be a cornerstone of strong, fair regulation of the nuclear industry." So the question is, how do you see the NRC's role in facilitating local community stakeholders with the decommissioning process,

specifically from the beginning, but not just the beginning, through until the end?

Mr. HANSON. Thank you, Senator. As part of the implementation of the Nuclear Energy Innovation and Modernization Act, we completed a study, if you will, or a report, on best practices for community advisory boards. We would be happy to provide your office with that.

As part of the proposed decommissioning rule, my understanding is that we will be putting those best practices for community engagement into guidance for our licensees.

We also participate regularly in community advisory board meetings, so that people have an understanding of what it is the agency is doing, how we are overseeing our licensees. I know the performance of spent fuel storage system at San Onofre is of significant concern to the community. We have participated a great deal in the community advisory board there to talk about how our oversight, how we are overseeing the licensee and the licensee's monitoring program, how we are ground truthing the data that we are getting from the licensee about the performance of those systems.

That is one example. I don't know if, Commissioner Baran, you want to jump in.

Mr. BARAN. Sure. The only thing I would add there is, one of the things we have been interested in doing is making sure we provide flexibility for how all that is structured. So at some sites in the country, the company has set up an advisory panel and involved the local community. In other places, it is the State, the State legislature passed legislation establishing, I think that is what they did in Massachusetts and Vermont.

So one of the things we have been careful to do is allow that flexibility, different communities, different States are going to want to do it different ways. We don't want to push them to do it any one particular way.

Senator PADILLA. Just in closing, I would imagine it is done collaboratively with, in California, the legislature or the Public Utilities Commission and its counterparts in other States, their regulatory and oversight bodies, not just to arrive at the stakeholder process, but formalize any commitments that are made as a result.

Thank you, Mr. Chair. Welcome back.

Senator CARPER [presiding]. Thanks, Senator Padilla. Thanks for joining us.

Senator Sullivan, good morning.

Senator SULLIVAN. Thank you, Mr. Chairman.

Good morning, and thank you to the Commissioners.

I have a question I want to begin with about the U.S. Air Force's announcement in October that it picked Eielson Air Force Base in interior Alaska to host a first of its kind small nuclear reactor. The design known as a microreactor would reliably generate enough electricity to support round the clock operations at this remote but very strategic military base. It is going to be hosting over two and a half squadrons of F-35s here in a couple of months.

I would like to get, Mr. Chairman, your views on this first. A, on safety, everybody wants to know about safety. But B, in remote communities, in my State and other States that rely currently on fuel delivery, diesel generation, a lot of us see that this kind of

microreactor has potential to provide clean, reliable energy for decades to come.

So what is the thinking on these microreactors? Not just the Eielson one, which I am sure you are involved with, but the potential, and again, safety, but also energy costs. We are all experiencing very high energy costs right now in our country. A lot of it is self-inflicted wounds by the Administration. Some of their senior advisors are telling the American people, hey, we are driving up energy costs on your back to "accelerate the transition to renewables." This is Gina McCarthy, not very smart, in my view, really hurting American working families.

But can you talk about the Eielson microreactor, and the potential for remote communities to benefit? One idea that we have thought about in Alaska is you would have the microreactor at Eielson, is there a possibility to actually have that not just power the base but the surrounding communities? Fairbanks, for example, is nearby. And I would love to hear from all the Commissioners.

The safety issue is a big one, obviously. People have concerns about that.

Mr. HANSON. Yes. Thank you, Senator. I will speak to the Air Force part if I could first, then I will talk more generally, we can all talk more generally about microreactors.

I wanted to point out, we have a longstanding relationship with the Office of Naval Reactors actually to review some of their designs and their fuel formulations and so forth.

Senator SULLIVAN. By the way, that is an incredible office and legacy that we have in America. Not a lot of people know about it, starting with Admiral Rickover. Just really remarkable.

Mr. HANSON. And now led by Admiral Caldwell of course. So the NRC has been very pleased to provide peer review and technical support and so forth.

We haven't heard from the Air Force, to my knowledge. But we would be happy to do the same for them, and we'll make the appropriate staff available.

Senator SULLIVAN. Do you think they should be giving you a call about the Eielson?

Mr. HANSON. We will leave that up to them.

Senator SULLIVAN. We can help with that.

Mr. HANSON. We will answer the call if the phone rings, certainly.

Senator SULLIVAN. OK.

Mr. HANSON. Microreactors themselves are very intriguing, because of their small size and in many cases, their passive safety features. We have one application in from Oklo for a microreactor, and we are actively engaged with them in reviewing that. Understanding the safety features that they have with those, in many cases kind of passive safety features, it doesn't have as many moving parts so there aren't as many things to break or pay attention to.

I think the other thing that is interesting across the advanced reactor spectrum is this focus on fuels. Part of what makes microreactors so interesting and viable for remote communities, not that remote, obviously, Fairbanks, is the long term core. So every day,

the reactors in Senator Carper's, across the bay there in New Jersey, they will refuel every 18 months to 2 years, say. Some of these microreactors don't have to be refueled for 10 or even 20 years, depending on the fuel formulation.

So that has the potential, as you point out, to bring down the delivered cost of energy, which of course I know is of great concern to Alaskans.

Senator SULLIVAN. And safety. Just safety in general on these microreactors. What is your assessment?

Mr. HANSON. We still have a number of these concepts under review. So I don't know that we are ready to make a formal declaration. But I think the passive safety features are intriguing and I think hold a lot of promise.

Senator SULLIVAN. Any other Commissioners want to comment?

Mr. BARAN. Yes, the only thing I would add there, and maybe Commissioner Wright has a point, too, this is a big area as we establish the framework for advanced reactors. This is one of the tricky pieces that we need to get right. The existing fleet, these are really large reactors. They are 1,000 megawatt reactors. Now we are talking about designs that are maybe a megawatt. You are not going to have the same requirements for a 1 megawatt reactor that is advanced as you would for a 1,000 megawatt light water reactor.

Having a rule that can cover the big ones but also something as small as a microreactor is what the staff is really focused on. It is tricky, because we want to make sure it is open to all the different technologies and the different sizes. It is different than we have in the existing fleet.

Senator SULLIVAN. Great.

Commissioner Wright, do you have any thoughts on this?

Mr. WRIGHT. Personally, I am a real fan of this, the idea. Intuitively you would think they are safer. The jury is still out; we are still, as the Chairman said. There are national security implications with this for sure, and benefits for us as well as if we own it, and we send it out from us, then we control that.

So there is grid security potential advantages to it, there is reliability, stability, and resilience that you can work to or independence, just like they are trying to do in some of these areas. I am looking forward to getting one of these things through the process and letting it get to market. I really can't wait for it.

Senator SULLIVAN. Good. Thank you.

Thank you, Mr. Chairman.

Senator CARPER. You are quite welcome, thank you. Thanks for joining us.

Senator Duckworth I think may be joining us on Webex.

Senator Duckworth, are you there?

Senator DUCKWORTH. I am, Mr. Chairman. Thank you. I am sorry I couldn't come back to the hearing. I am back and forth between hearings.

Senator CARPER. I know that feeling. Welcome.

Senator DUCKWORTH. Thank you. And thank you to the Commissioners for being here today.

There may be few other States that better understand the NRC's critical importance to nuclear safety than Illinois. After all, Illinois possesses more nuclear generating capacity than any other State.

Last year, nuclear power plants accounted for 58 percent of my State's in State electricity generation.

On the positive side, nuclear power has played an important role in expanding production of zero emission, clean energy sources. However, the inability to implement a permanent storage solution for our Nation's nuclear waste hinders our ability to effectively decommission nuclear power reactors, and worse, harms local communities located near such stranded sites that no longer generate power or revenue but still store nuclear waste.

Shortly after joining the Senate in 2017, I traveled to the city of Zion, Illinois, and witnessed the adverse financial and social impacts resulting from Zion's proximity to a stranded site. Congress should better serve communities that suffer a devastating one-two punch at first, losing a significant economic driving force, and then being forced to service a de facto interim storage site.

That is why I wrote the Sensible Timing Relief for America's Nuclear Districts Economic Development Act of 2021, which is also known as the STRANDED Act. My bipartisan bill would provide the city of Zion and other similarly situated communities across the country with financial assistance to offset the harmful impacts of a stranded nuclear waste site.

Chairman Hanson, given the NRC's extensive expertise and experience with the decommissioning process, can you share your view on why the public would benefit from the programs and funding contained in the bipartisan STRANDED Act?

Mr. HANSON. Senator, thank you. I also appreciate the hybrid nature of our interactions here. We are striving for this at the NRC, too, with the re-entry of the staff. So it is nice to see you virtually.

As you recognize, Senator, the NRC's focus is really on protecting people and the environment. It is really focused on public health and safety and security. So we are not going to have necessarily a direct role in some of the issues you raise.

But I think one of the most important things that the NRC can do is actually oversee and ensure the safe and timely and secure cleanup of these decommissioning sites, so that ultimately I think as I mentioned to Senator Markey, that they become available for unrestricted use into the future, so they can be used for any number of purposes.

Senator DUCKWORTH. Thank you. Helping these communities, these stranded communities, there is an urgent environmental justice priority. It is why, beyond just passing my bill, I also focus on what immediate relief the NRC could provide, or what specific authorities Congress could empower the NRC with to deliver such help.

My understanding is that despite the NRC maintaining legal oversight, that you have mentioned, over a stranded nuclear waste site, the Commission is significantly limited in its statutory authority to assist my constituents in Zion and others throughout the country that are struggling with the preparations leading up to and the aftermath of a decommissioned facility.

Chairman Hanson, what would be the most effective additional authorities to empower the NRC to achieve environmental justice

goals and better support communities that are essentially forced to serve as dumpsters for nuclear waste?

Mr. HANSON. Senator, thank you for that. I want to give you an answer, then I want to give Commissioner Baran an opportunity, because he has spoken a lot about environmental justice.

We have a review ongoing within the agency with regard to environmental justice, a comprehensive review of our policies and programs, with a view toward environmental justice. That would certainly include decommissioning.

We are expecting the conclusions of that review to come to the Commission in January or February 2022. We would be happy to follow up with you about that.

It may be a little premature for me to say what I think our additional legislative authorities are, but we would be happy to follow up with you and your staff going forward.

Senator DUCKWORTH. Thank you.

Mr. BARAN. I think the Chairman gave a very good overview of it. I think all of us are approaching it with an open mind. We have asked the staff to take several months to talk to a large number of stakeholders and gather ideas. What are other Federal agencies doing? We know a lot of Federal agencies right now are focused on environmental justice. Some of those ideas may make sense for NRC; some of them may not.

But the staff is pulling together, they have gotten hundreds and hundreds and hundreds of comments, and talked to a lot of stakeholders, Tribes, they have held panels to gather information. Talked to some of the folks that maybe haven't interacted as much with NRC in the past and see what they think about what NRC should be doing on environmental justice.

I appreciate your flagging this issue. I am not sure how much focus there has been on that in this environmental justice conversation. I think it is an important aspect.

We are looking for, I think all of us, to see what has the staff come up with, what are the options, are there any that require new legal authorities or changes in the way the agency has operated. That is coming, and I think we are all very open minded and focused on doing something there. I think we want to improve what the agency has done on environmental justice. I for one think we need to ask those tough questions and be bold.

Thank you for flagging another area for us to look at there.

Senator DUCKWORTH. Thank you. I look forward to following up with you both.

I yield back, Mr. Chairman.

Senator CARPER. Senator Duckworth, thanks very much for your involvement on this issue. It is an important issue, and your leadership.

I have a couple of questions for our Chairman and our Commissioners. One of those deals with NRC funding. I think we have had some conversations about that already. I have been in and out, so I missed some of the questions.

The NRC's work to help maintain the safety and the security of our Nation's nuclear power facilities and materials ensures that nuclear power can continue to provide safe, zero emission power for our Nation. For the NRC to do its job, the agency must be able to

hire the best and brightest, be equipped to keep up with the industry's innovation and new technologies, which we are witnessing.

At the same time, the NRC must be nimble and adapt to COVID and other work force challenges. And in NEIMA, you will recall, Congress put spending limits on how much the NRC could spend on human capital, on IT and building costs, commonly known as corporate support.

In your testimony, again, this is for Chairman Hanson, in your testimony I believe you mentioned that the NRC is having difficulty meeting these limits. Would you talk a little bit more with us about those difficulties and what it may mean in terms of the NRC meeting its mission? And to follow up with that, how the COVID work force challenges and the prospect of new advanced nuclear reactors changed your view on the importance of corporate support. Please.

Mr. HANSON. Senator, thank you. First, I want to say that collectively, as a Commission, we take the corporate support caps very seriously. We have strived to meet them. So it is not something that we undertake lightly to say that we are having difficulty in meeting those.

We have reduced corporate support spending over the last 6 or 7 years by over \$100 million, and by well over 100 staff. So we have taken reductions, and I think what where are getting to is, we are reaching the limit of those reductions.

A couple of key areas I may have mentioned to Senator Lummis and Senator Capito that I would like to highlight, and that would be in our IT function. IT costs, as you know, particularly you, Senator Capito, from the Appropriations Committee, are rising across the Government. Yet the need to invest in modernization and new technology continues apace.

Most agencies across the Government invest probably 7 percent to 8 percent of their IT spending in modernization. That is in new tools and new capabilities. The NRC is around the 2 percent to 3 percent mark. We could do that for the last couple of years, but that is starting to catch up with us, particularly as we have a hybrid work force, and as we train up to want to take on the challenges of licensing advanced reactors and wanting some of those advanced computing tools and other tools available to us.

The other area is really in our H.R., which also falls under the corporate support. I have learned recently that—we talked about the under 30 cohort. I spoke about this with Senator Cardin earlier in the hearing, about how we are about 3 percent under 30 right now within the agency, and that we really need to work on that to have the work force of the future.

We have an apprenticeship program in the agency that we started a couple of years ago. We would be able to expand that if we had additional resources in our H.R. function, for example, and could more aggressively tackle that problem. One of the things we want to accomplish in our work force is to have some overlap between the new people and the more experienced folks with the institutional knowledge, so that they can transmit that knowledge and culture as they head off into retirement.

So these are some of the challenges. I don't know if Commissioner Wright or Commissioner Baran want to speak about this a

little bit as well. It has been a subject of a lot of conversation among the three of us.

Mr. BARAN. Yes, I think there is broad agreement between the three of us on it. I agree with everything the Chairman said.

I would just flag a couple of things. With the agency, we talked about this earlier, kind of an aging work force, we have probably 6, 7, 8 percent of the agency turn over every year. So just to kind of keep our staff at the current level, that is a couple hundred people we have to hire. Right now, we struggle actually with H.R. to actually hire that many in terms of having the resources there to do it. That is just to kind of stay flat and be ready for everything that is coming down.

The other area I would flag, just where I think basically the corporate support cap has had an unintended consequence in terms of our inability to make an investment that could save money down the road is actually something we were talking about earlier with Senator Capito, which is space planning. One of the things we want to be able to do, for example, is say let's have the up front costs to renovate a floor of our building. If we do that, we can take up less space, free up other space, we get rent savings.

We found that there are times with the budget we just actually don't have the corporate dollars to do that renovation that would make sense as an efficiency and just improving the quality of the experience of the staff, too. But we can't capture those savings down the road, because we can't make the up front investment and still meet the corporate cap.

So I really appreciate that you all are focused on this. I know it you all, on a bipartisan basis, want us to focus on corporate support. We have done that. And now we are at the point where it is starting to create some challenges.

Senator CARPER. Senator Capito has another question or comment that she would like to add. I have one or two more questions. I want to follow up on the apprenticeship program that you mentioned.

Senator Capito, please proceed.

Senator CAPITO. Thank you, Mr. Chairman.

I want to thank the three of you for being here today. I learned a lot, and I think we have a lot of things we can work on together. I look forward to that. I am hoping that President Biden heeds our call to have two more Commissioners nominated, so we can have a full boat in front of us.

I would like to make a brief note, prior to leaving the meeting. The NRC's career staff provides invaluable scientific and technical advice. They do not make policy decisions. Policy decisions are made by the Commission. NRC staff do propose recommendations for the Commission to approve or disapprove, proposals that are grounded in the NRC statutory authority.

The staff should be able to make recommendations in an unbiased manner without fear that a member of the Commission will take to social media, suggest that staff recommendations are designed to weaken or roll back nuclear safety. Commissioners should not use social media to call into question the motives behind the staff's recommendations.

I am concerned that a Commissioner's recent and persistent social media comments will have an adverse impact on NRC career staff's unbiased work. I hope that all members of the Commission will consider how their social media activity may influence and threaten the objectivity of professional NRC staff's work.

I appreciate that, and I would like to ask for unanimous consent to enter into the record my March 26th letter with you, Chairman Carper, to President Biden, requesting those nominations of two members, and a November 22nd letter from the American Nuclear Society and Nuclear Industry Council regarding the importance of the full Commission.

Senator CARPER. Without objection, so ordered.

[The referenced information follows:]

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United States Senate
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
WASHINGTON, DC 20510-6175

March 26, 2021

President Joseph R. Biden, Jr.
The White House
1600 Pennsylvania Ave., NW
Washington, DC 20500

Dear Mr. President:

We write to request that you promptly nominate an objective and qualified candidate to serve as a member of the Nuclear Regulatory Commission (NRC) and re-nominate Commissioner Annie Caputo for another term. Doing so will allow the Senate to consider and act on a bipartisan pairing of the two nominees prior to the expiration of Commissioner Caputo's current term on June 30, 2021.

As the independent nuclear safety regulator, the NRC is responsible for the licensing, oversight, and regulation of civilian use of nuclear materials. The NRC occupies a central role in determining the future of nuclear energy in the United States. Nuclear power currently generates over half of the United States' carbon-free energy. Preserving and expanding our use of nuclear energy is critical to reducing greenhouse gas emissions.

Congress established the Atomic Energy Commission (AEC). NRC's predecessor, as a five-member body. When Congress abolished the AEC and transferred its regulatory responsibilities to the NRC in 1974, this five-member Commission structure was retained. The agency functions most effectively with a full Commission, where members provide diverse viewpoints and expertise to reach consensus in a collegial manner.

On May 24, 2018, the Senate confirmed Commissioner Caputo to serve as a member of the NRC by unanimous consent, along with confirming her colleagues NRC Commissioners David Wright and Jeff Baran. Former NRC Chairman Kristine Svinicki resigned from the Commission on January 20, 2021, prior to the conclusion of her term on June 30, 2022. That seat is currently vacant.

We look forward to working with you to preserve and expand nuclear energy. Thank you for your consideration of our request.

Best Personal Regards,



Tom Carper
United States Senator
Chairman
Committee on Environment & Public Works



Shelley Moore Caputo
United States Senator
Ranking Member
Committee on Environment & Public Works



November 22, 2021

Dear President Biden:

On the behalf of the organizations we represent, we are writing to urge you to proceed with nominations for the two open seats on the U.S. Nuclear Regulatory Commission (NRC).

As you know, the NRC is comprised of five presidentially appointed, U.S. Senate-confirmed commissioners, who are commonly referred to as "the Commission," and approximately 3,000 federal employees referred to as the staff. The Commission oversees the NRC staff, and together they license and regulate the nation's civilian use of radioactive materials to provide reasonable assurance of adequate protection of public health and safety.

The NRC carries out a vital national mission, which includes the regulation and oversight of the nation's 93 operating nuclear power plants. Those plants produce a majority of the nation's clean, carbon-free electricity and are an essential component of a reliable U.S. electric grid. The NRC is also responsible for licensing new nuclear plants and the agency is developing a modernized licensing framework for the small modular reactors and advanced reactors that are essential for deep decarbonization of our economy.

The NRC operates best with a full complement of five qualified Commissioners who have diverse and complementary backgrounds, and a strong technical grounding in nuclear science and technology. Unfortunately, the Commission was last at full strength in January 2021, nearly a year ago, and two of the five seats have been open since June. Restoring the Commission to a full complement of Commissioners will help the regulatory agency carry out its responsibilities in the most effective and efficient manner. A well-functioning NRC will support your administration's policy of sustaining and expanding nuclear power to help achieve your goal of 100 percent carbon pollution-free electricity generation by 2035.

Historically, the Commission has acted as an essential executive function of government, outside the purview of day-to-day political considerations. There are many qualified nuclear professionals eligible for service on the Commission. The Atomic Energy Act, as amended, requires you to nominate persons to fill open seats, subject to confirmation by the U.S. Senate. We urge you to discharge that responsibility with all due haste.

The American Nuclear Society is the professional society for the men and women working in the field of nuclear technology. The United States Nuclear Industry Council is the leading U.S. business advocate for advanced nuclear energy and promotion of the American supply chain globally.

Sincerely,

Steven P. Nesbit
President
American Nuclear Society

Bud Albright
President & CEO
U.S. Nuclear Industry Council (USNIC)

cc: Senator Chuck Schumer
Senator Mitch McConnell
Senator Tom Carper
Senator Shelley Moore Capito

Senator CAPITO. Thank you.

Senator CARPER. Thanks so much. This is an important hearing, and I am glad we could have it.

I want to come back—I think, Mr. Chairman, you mentioned an apprenticeship program. We have mentorships; probably every Senator on this Committee has interns in our offices back home and here as well. I am a big fan of apprenticeships. Tell us a little bit about your apprenticeship program. How long have you had it, and how is it working?

Mr. HANSON. We revived it here just 2 years ago. We took a cohort of 22 recent engineering graduates, and it is a 2 year program where each of those graduates cycles around in 3 to 6 month assignments around the agency. So they are touching a lot of different areas that the agency works in, everything from medical technologies to reactor operations and so forth. So that when they are done, and they find a home in the organization, they have a broader sense and a lot of experience with the overall NRC mission. We are just coming to the end, and we are starting a new cohort now on that.

You mentioned internships, Senator. We also have an intern program, a summer intern program for students.

Senator CARPER. I presume it is a paid internship.

Mr. HANSON. Yes, paid internship, absolutely. We also have co-op for engineering students where they can take a semester off, come work for us and then go back and finish their studies as well. So we are really fully utilizing all those mechanisms to bring people into the agency.

Senator CARPER. Could you comment on the—I am going to stay on apprenticeships. So just hold your horse just for a second.

One of the things we try to be mindful of as we are recruiting interns is diversity. Any thoughts anybody can make on that front, please.

Mr. WRIGHT. If you don't mind, I will pick up.

First off, this is a very diverse group. They are very active as well. They are not shy. In fact, we learned a lot from them when we started the program back a couple of years ago. We had a group of four of them who actually came up to my office and talked about where the NRC was missing out. Because when they were recruiting some of the people, when they were applying for internships or for the NRAN program or whatever, we weren't getting back to them soon enough, and other agencies were coming in and taking the cream of the crop. They were saying, the NRC is missing that opportunity.

So it actually helped us kind of refocus on how we went about this. I think it has been very successful. I am really excited; there are a couple of them right now that I am following their career as they go.

Senator CARPER. All right, thank you. Anything else on this point?

Mr. HANSON. With regard to diversity, Senator, we take the diversity, the need to have a diverse apprenticeship class and internship class very seriously. I think this recent group of apprentices was culturally and ethnically diverse. But we could have done better on the gender balance. So I have asked our H.R. people to take

a closer look at that and how we are approaching women graduates of some of the engineering and other programs around the country to make sure that those folks know that the NRC is a good place to work with an important mission.

Senator CARPER. That is great. Good, thank you.

A question if I could for Commissioner Baran and Commissioner Wright. We have learned a lot about the nature of work throughout the course of the Coronavirus pandemic. And we know that the NRC needs to be able to adapt and remain flexible in order to maintain the safety as well as the security of its operations, and its ability to carry on the agency's regulatory responsibilities.

While some aspects of the NRC's work can adapt to remote operations, some do not adapt. For example, safety and security inspections at nuclear facilities cannot be conducted over Zoom. With new variants of COVID-19 still emerging we would be sharing the lessons learned from the NRC's responses to the Coronavirus pandemic, both from an operation and a regulatory perspective. Any challenges you are expecting as we move forward? Would anyone like to lead that off?

Mr. BARAN. Sure, I am happy to. One of the things that I think we as an agency learned from the pandemic period is just how valuable the technology was. We were fortunate that our IT folks had really been forward thinking. We were in a position where everyone, for example, every employee had a laptop ready to go. You could transfer it, have your workstation at home. That is something, if it had all happened a few years earlier, we wouldn't have been ready for.

So I think overall as an agency, we functioned very well, even at the 100 percent remote. We took advantage of new technologies at the plants, so we had many licensees would give our resident inspectors laptops with data that they could use on plant performance that really helped, if you weren't there all the time.

One of the things I think we learned where we want to get back to where we were is on the inspections, as you mentioned. There is this, I think there was this growing appreciation from the inspectors, the managers, throughout the agency, that there is no substitute for having people on the ground at the plants with an NRC hard hat walking around. Remote inspections, they were good enough for the period where we needed it, but not as good as when we have people there in person. The ability to walk down the equipment, to just look and say, that doesn't look quite right, and then pursue it. Talk to the folks working there and hear if they have any concerns.

So I think that has been one of the lessons. There is a lot we can do with technology, and then there are some really kind of core principles I think we have learned are super-important in terms of having people there, eyes on equipment and available to talk to folks.

Mr. WRIGHT. Thank you. So, if you want to look at examples of successes where being a risk informed regulator, you look no further than just what happened during COVID and how the agency responded. Personally, I will remind you of this. My confirmation hearing was, when Chris and I were here; it was the next day that the world shut down.

Senator CARPER. Was that cause and effect, do you think?

[Laughter.]

Mr. WRIGHT. Yes, and we do apologize for that.

[Laughter.]

Mr. WRIGHT. There are many things that we have done that hopefully we can learn how to carry some of that forward. I agree with Commission Baran that nothing beats boots on the ground. The real live person being there helps.

But because of COVID, our inspectors were given real time access via computer to the plant. So there are some things, if there was an event or something that they did not need to respond to right away, they had access to it via computer, and they could come in hours later, next morning, or something like that. We were able to do hybrid inspections, virtual inspections, or real time inspections in person.

So we have learned how to do things, and we have learned how to be adept and nimble, as you mentioned earlier, sir. There are some things we can learn, and I know that we have empowered a group to go do that and try to figure it out. Hopefully, we will have some updates for you.

Senator CARPER. All right, good. Thanks for that.

Last question is just, I want to know if you have any additional thoughts, maybe a question you were not asked that you wish you had been. Let us know what that question is and how would you answer it.

We will start with you, Mr. Chairman, and then Commissioner Baran, and finally wrap up with Commissioner Wright.

Mr. Chairman.

Mr. HANSON. Thank you, Senator, Mr. Chairman. People who hear me talk around the agency kind of know that I like to start and finish all my speeches with thank you. So I think I will do that today.

I wanted to thank you for having us and the opportunity to appear before you. I think this was a really productive discussion this morning, so thank you.

I wanted to thank my colleagues for their friendship and their professionalism, and their insights. As several people have noted this morning, we function—we are designed for five, and we benefit always from the additional perspectives. Although I think I have to say, among the three of us, we are accomplishing the mission, and we are getting things done.

Finally, I want to thank the NRC staff. As Commission Wright noted, we shut down right in March 2020 and the staff pivoted to work remotely almost immediately. Not least of all because of some very fortunate and forward thinking IT investments that we made that allowed everybody to take their laptops home and work from home and accomplish the mission and figure out new ways of doing things. They have been equally professional and flexible in moving to this new hybrid work environment that we have undertaken in the last month or so as well.

So I couldn't be prouder, really, to come to work every day and serve alongside my fellow Commissioners and to lead this agency. And I appreciate the opportunity.

Senator CARPER. You bet. Thanks for those words.

Commission Baran.

Mr. BARAN. I agree with everything the Chairman said. In terms of the complement of the Commission, it is always great to be at five. I have been on the Commission long enough; I have been around for three, I have been around for four; I have been around for five. As long as you have quorum, it is good, and there is no issue there.

But I would just echo what the Chairman said, that the three of us all have terrific working relationships. I think we are doing a lot of good work.

Senator CARPER. Some of us remember a time when it wasn't quite that way. This is refreshing.

Mr. BARAN. And those days are well behind us. It is just a really great, collegial environment. I think everyone is focused on the mission, and we have a terrific staff at the agency, as the Chairman said. We are working very well together and getting a lot of work done.

So we appreciate your support, and we appreciate your interest.

Senator CARPER. You bet. Thank you, sir.

Commissioner Wright.

Mr. WRIGHT. Thank you, Senator. Everything that my colleagues have spoken is true. But again, I want to reiterate two things. One, for them, to their staffs, I appreciate my staff. They are awesome. They make me look good; they keep me educated and up to speed. They have not missed a beat during this whole telework program, as have my fellow Commissioners' staffs. Our staffs work very well together.

As you know, we can only get together one on one, but they can throw down three on three right now. Hopefully, it will be five on five at some point.

The staff of the NRC, from the EDO shop all the way down to the person who cleans the floors and runs the security guard gates, they are incredible people. They are dedicated, they are passionate. From where I sit, they are very appreciated. I thank you for the opportunity to recognize them publicly.

Senator CARPER. You bet. I am reminded by your comments of a story. I don't know if it was a NASA story in Florida, or maybe in Houston. But we were preparing to, as a country, put a man on the moon. And someone was visiting this NASA operation, had an evening meeting. They got there, and they couldn't find the right place for the meeting, and they were kind of looking around, this guy was looking around. He came across someone from the custodial staff. He said to the custodian, what do you do here, sir? And the custodian said, I am helping to put a man on the Moon. Isn't that great? Helping put a man on the Moon.

So folks, all the folks, including right here, the people who help make sure that this place, the building, the Capitol itself, is presentable and just an attractive place to live and work and visit. We appreciate everybody at the NRC and the folks that you lead.

We try to emulate your collegiality here on this Committee. We reported out last year unanimously bipartisan infrastructure legislation on roads, highways, bridges, climate, on water, drinking water, wastewater, floodwater, unanimously. Most people in this country wouldn't believe that we do that, but we do. That is seldom

in the papers. But we admire the way that you have evolved as a Commission over the last decade, and we seek to emulate what you are doing.

I want to thank each of you for helping us to better understand the NRC's important work, and what we can do to better support this important agency. As you said earlier, a well functioning nuclear industry is critical to the future of our economy. It is critical to the future of our planet.

We look forward to continuing our work together in order to ensure that this future, our future, our children's, grandchildren's future, is realized.

Before we adjourn, there is some housekeeping work. I would like to ask unanimous consent to submit for the record a variety of materials that include letters from stakeholders and other materials that relate to today's nomination hearing. And one other unanimous consent request.

I hear no objection to that first request.

[The referenced information was not received at time of print.]

Senator CARPER. Since there is no other Senator here, unless I object to my own request, it will be affirmed.

But one other unanimous consent request for this meeting. At this morning's business meeting, the Committee favorably reported the nomination of Jennifer Clyburn Reed of South Carolina to be Federal Co-Chair of the Southeast Crescent Regional Commission, and Amanda Howe of Virginia to be Assistant Administrator for Mission Support of the Environmental Protection Agency. I would ask unanimous consent that the record actually reflect the number of the presidential nomination there, they are Presidential Nomination 957 for Ms. Reed, and Presidential Nomination 633 for Ms. Howe.

Hearing no objection, so ordered.

And getting back to this hearing, before we close, Senators, members will be allowed to submit questions for the record through the close of business on Wednesday, December 15th. We will compile those questions; we will send them to our witnesses, to you, and ask you to reply by Wednesday, December 29th.

Anything else that you all would like to add, take away?

Hearing none, this hearing is adjourned. Thank you all very much.

[Whereupon, at 11:59 a.m., the hearing was adjourned.]

