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ONE YEAR OF PROGRESS: AN UPDATE ON IMPLEMENTATION OF THE NUCLEAR ENERGY INNOVATION AND MODERNIZATION ACT

HEARING

BEFORE THE

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

UNITED STATES SENATE

ONE HUNDRED SIXTEENTH CONGRESS

SECOND SESSION

JANUARY 15, 2020

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C O N T E N T S

ONE YEAR OF PROGRESS: AN UPDATE ON IMPLEMENTATION OF THE NUCLEAR ENERGY INNOVATION AND MODERNIZATION ACT

WEDNESDAY, JANUARY 15, 2020

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

The Committee met, pursuant to notice, at 10:03 a.m. in room 406, Dirksen Senate Office Building, Hon. John Barrasso (Chairman of the Committee) presiding.

Present: Senators Barrasso, Carper, Braun, Rounds, Sullivan, Ernst, Cardin, Whitehouse, and Van Hollen.

OPENING STATEMENT OF HON. JOHN BARRASSO, U.S. SENATOR FROM THE STATE OF WYOMING

Senator BARRASSO. Good morning. I call this hearing to order.

Nuclear power is a reliable, clean source of energy. Nuclear power plants generate electricity 24 hours a day, 7 days a week, 365 days a year.

Nuclear energy is also resilient. It produces power through cold snaps, through heat waves, and through snowstorms, and it does so without emitting carbon dioxide. Preserving and expanding our use of nuclear energy is necessary to address climate change.

Our Nation's nuclear power plants are operating at historically high levels of safety and performance. Despite this, challenging electricity markets have led to a shrinking nuclear energy. It is time to reverse this trend.

To do so, the Committee led efforts to pass the Nuclear Energy Innovation and Modernization Act, or NEIMA. Congress overwhelmingly supported this bipartisan legislation. One year ago, President Trump signed the bill into law.

This morning, we will review the Nuclear Regulatory Commission's implementation of that law. The law provides certainty to assist today's nuclear power plants. The law revises how the Nuclear Regulatory Commission manages its finances.

This is important for a number of reasons. One is to provide predictable regulatory costs for nuclear utilities. The law prioritizes agency spending on activities that directly support its regulatory mission. It establishes performance metrics and milestone schedules to increase accountability and certainty for major licensing actions.

The law also requires the commission to take both short term and long term actions to develop and deploy advanced nuclear tech-

nologies. Advanced reactors will be designed differently than current nuclear reactor designs. Smaller, safer nuclear technologies should not be subject to the rigid costly requirements imposed on yesterday's designs.

The law requires a modernization of nuclear safety rules. The commission has taken important initial steps to implement the bill. In December, the commission approved a proposed rule for emergency planning for advanced nuclear reactors.

The commission also approved a first of its kind permit for the Tennessee Valley Authority to site a small modular reactor. I applaud the commission for the efforts so far. Still a lot of work to do.

The new financial management requirements take effect in the upcoming fiscal year. The commission's forthcoming budget must be in line with the law's intent. American ratepayers and nuclear licensees fund the organization. As a result, budgetary resources must be responsibly managed.

As nuclear power plants shut down, the agency must make real reductions of staff and resources proportionate with the reduced workload. Within the next year, the commission must establish a strategy to license advanced technologies using the existing regulatory framework. This short term approach complements the long term development of a new regulatory framework.

The commission must be smart about developing new safety regulations. America's nuclear innovators and entrepreneurs need confidence that the licensing process is predictable and affordable. The rules should appropriately reflect the increased performance and lower risk of new reactor designs.

As the commission continues to implement the law, other key nuclear energy issues must be addressed. The significant benefits of clean nuclear energy will be limited until Washington keeps its promise to permanently dispose of nuclear waste.

Advanced nuclear technologies can generate less nuclear waste. Some may even produce electricity from previously used nuclear fuel. Advanced nuclear technologies cannot eliminate the need for a permanent nuclear waste program. Legislation that I have introduced will help get our Nation's nuclear waste program back on track.

Another critical issue is the source of our nuclear fuel. America's uranium miners are struggling to stay in business due to Russia's manipulation of the uranium market. Many of those hard working miners live in my home State of Wyoming.

Six months ago, President Trump recognized the national security implications of relying on foreign countries for uranium. He established a nuclear fuel working group to recommend actions to revive our nuclear fuel cycle. We are still waiting for those recommendations from the working group.

American uranium producers need immediate assistance and certainty. It is time for action. The 1 year anniversary of the Nuclear Energy Innovation and Modernization Act becoming law gives us a great opportunity to discuss these important issues facing America's nuclear energy industry. Nuclear power is clean, reliable, and carbon-free. We must continue to support this important energy technology.

I will now turn to Ranking Member Carper for his opening remarks.

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

Senator CARPER. Thanks, Mr. Chairman. Thanks so much for bringing us together, for your leadership on this, and that of others on our Committee.

Ms. Doane, it is great to see you. Thank you for coming.

Mr. Ficks, I have a son named Ben. It is always nice to see that name. We welcome both of you today.

I have a statement here. I am going to go ahead and read it, and then I am just going to talk a little bit off the cuff, and then we will get started.

Mr. Chairman, thanks again for bringing us together to discuss the implementation of the Nuclear Energy Innovation and Modernization Act, known as NEIMA.

Thank you to each of our witnesses, for your service at the Nuclear Regulatory Commission, and for joining us. It is not every day that we have folks like you, who do a lot of the real work. We are thrilled that you were able to come.

From the very start of our Nation, our country has faced daunting challenges that at first seemed impossible to overcome, but with support from Federal, State, and local governments, Americans have always found a way to innovate and find solutions to overcome these challenges.

Not all of those solutions come from Washington. They come from all over—every corner of this land and around the world—and we welcome that.

Today we face the greatest environmental crisis I think we are likely ever to face, certainly in my lifetime, probably in our lifetime; that is climate change, extreme weather. If we are going to meet the challenges of climate change, we must do more to spur zero emitting technologies here at home and around the world.

Nuclear power is a prime example of how we can combat climate change and provide economic opportunities for Americans. Done responsibly, nuclear power helps our Nation reduce both our reliance on dirtier fuels and air pollution that damages our lungs and our climate.

At the same time, we know that when the United States leads on nuclear energy, it opens up good paying manufacturing, construction, and operating job opportunities for Americans nationwide.

Nuclear energy provides about 20 percent of our Nation's energy. However, our existing reactors cannot run forever. I said 20 percent of our Nation's energy, about 50 percent of our carbon-free energy. That is an important point.

If we are smart about it, we will replace our aging nuclear reactors with new advanced technology developed here at home. Domestic technology that is safer produces less spent fuel, and it is cheaper to build and to operate.

The Chairman, myself, and many other cosponsors of this bill hope that this legislation will be the catalyst needed for advanced nuclear technology to become a reality for this country. We look

forward to our conversations today with our friends from NRC to discuss its implementation and whether or not our hopes have yet been realized.

I believe that NEIMA was an important step to address climate change, but it is only a drop in the bucket when it comes to climate solutions. If we are going to stem the tide of climate change, so much more needs to be done, and we need to do it fast.

The Federal Government needs to be galvanized to address the climate crisis and move our country to reach net zero greenhouse gas emissions, sooner rather than later. What that takes is leadership from our President, and we are just not seeing that today.

Instead, we have seen an Administration that promotes policies that undermine climate science and increase our dependence on dirty energy policies that are, quite frankly, sending the wrong message to those who are interested in investing in advanced nuclear and other zero emitting technologies. These actions send the wrong message that threatens Americans competitiveness in the global clean energy economy and the health of every American.

To put this in context, the country of Australia is on fire. We have been seeing it on television, hearing it on the media for days; 15.3 million acres have been destroyed. That is larger than Senator Capito's and my native State of West Virginia. Imagine that. We are told that a billion animals and birds have been killed. A lot of species that were endangered are going to be extinct, are extinct now.

This is right in front of us. Right in front of us. If that doesn't get somebody's attention and say we need to do something to address this crazy weather and climate change, climate crisis, then we are in the wrong business.

There a lot of different ways to do that. Senator Whitehouse, Senator Sullivan, and I were, earlier this morning, at an industry led gathering that is focusing on recycling of packaging, and finding ways to do that more sustainably, smartly, wisely. There is a role for us. There is a role for the private sector. There is a role for Government, too.

I had lunch earlier this week in Salisbury, Maryland—your State—with a fellow who is the CEO of Purdue, the folks who raise a lot of chickens. They have just done a business merger with a company that is involved in using European, German technology to be able to take poultry waste—chicken waste—which we have a lot of on the Delmarva Peninsula—and turn it into clean fuel that can create a lot of electricity for folks who need electricity in their homes and their businesses and do so in a way that is sustainable and good for the environment. Very exciting stuff.

Then we have all kinds of ways we can reduce the climate threat. Nuclear is good. Done badly, done unwisely, not good. There are ways to do this smart, and if we are really smart, we will find ways to do this in a way that protects our safety, find ways to actually recycle or reuse spent fuel rods to derive additional energy from them.

There is a lot of opportunity here. In adversity lies opportunity, and this is one of the opportunities.

I am delighted to be able to be with you.

All the years I served in the Navy, for 27 years, including my time as a midshipman, has been on ships, on aircraft carriers, nuclear submarines. We are about to launch the U.S.S. Delaware, fast attack nuclear submarine commissioned Delaware on April 4th deploying to Wilmington.

I have known people who served in the nuclear Navy forever. I don't think there has ever been a life that has been lost in the nuclear Navy in 50 years. In 50 years, all the sailors that have been on the ships, submarines, aircraft carriers, not one life lost because of nuclear initiative.

On this day, in this country, we are going to see probably dozens of people die because of air pollution, because of breathing air that is, frankly—electricity that is not produced by carbon-free sources like nuclear. So this is kind of a life and death matter for all of us.

I am thrilled that we are here; thank you.

Senator BARRASSO. Thank you very much, Senator Carper.

We will now hear from our two witness. Margie Doane is here, who is the Executive Director of Operations of the U.S. Nuclear Regulatory Commission, and Ben Ficks, who is the Deputy Chief Financial Officer of the U.S. Nuclear Regulatory Commission.

I would like to remind both of you that your full written testimony will be made part of the official record, so please try to keep your statements to 5 minutes so that we may have time for questions. We look forward to the testimony.

Ms. Doane, would you please begin?

STATEMENT OF MARGARET DOANE, EXECUTIVE DIRECTOR OF OPERATIONS, U.S. NUCLEAR REGULATORY COMMISSION

Ms. DOANE. Good morning, Chairman Barrasso, Ranking Member Carper, and distinguished members of the Committee.

I appreciate the opportunity to appear this morning with the Deputy Chief Financial Officer, Mr. Ben Ficks, to testify on the U.S. Nuclear Regulatory Commission's progress in implementing the requirements of the Nuclear Energy Innovation and Modernization Act, or NEIMA.

Over the past year, the NRC staff has successfully implemented NEIMA's requirements and met all of NEIMA related deadlines. I attribute the NRC's success to the unparalleled focus, commitment, and hard work of the NRC staff. It is their expertise, knowledge, and collaborative efforts that allow the NRC to meet all deadlines, including timely submitting nine NEIMA related reports since April 2019 on topics ranging from emergency preparedness, to accident-tolerant fuel, to advanced reactor licensing.

Speaking of advanced reactors, the NRC has been preparing for the licensing of advanced reactors for several years, and is ready to review potential near term applications, the first of which is anticipated this month. Notably, this past May, the staff issued a draft regulatory guide for a technology inclusive, risk informed, and performance based licensing approach for advanced reactor licensing.

This effort was informed by the NRC's staff interactions with the Licensing Modernization Project, a DOE cost shared initiative being led by Southern Company and coordinated by the Nuclear

Energy Institute. The staff's regulatory guide will serve as a foundation for the rulemaking to establish a technology inclusive regulatory framework for advanced reactors.

The staff has also made significant progress in implementing risk informed and performance based techniques and guidance for the resolution of numerous policy issues regarding new reactors. For instance, the commission recently approved the use of more realistic approaches for estimating the potential radiological consequences of new reactor technologies.

These approaches recognize that nuclear reactor designs of the future may look very different compared to the operating reactors of today. For example, they may be much smaller and have enhanced safety features.

NRC remains committed to regulating in a transparent manner to provide reasonable assurance of adequate protection of public health and safety in its review of new reactor technologies.

Other highlights of the staff's activities under NEIMA include our development of staff training on various advanced reactor technologies and the agreements we reached with the Department of Energy to share technical expertise and knowledge.

In addition, we conducted 11 public meetings—more than NEIMA requires—at various locations throughout the country on best practices for community advisory boards regarding reactor decommissioning.

As a complement to the staff's work under NEIMA, the NRC continues to conduct activities in support of transformation into a modern, risk informed regulator. For example, in 2019, the NRC completed its merger of the Office of Nuclear Reactor Regulation and the Office of New Reactors. They are now one office under the office of Nuclear Reactor Regulation.

This organizational change is reflective of the broader changes within the nuclear industry, and most importantly, helps ensure the agency is better suited for meeting its safety and security mission in an evolving future.

I thank the Committee for its continued interest and support as we implement this important piece of legislation.

Chairman Barrasso, Ranking Member Carper, and distinguished members of the Committee, this concludes my oral testimony. On behalf of the NRC staff, thank you for this opportunity to appear before you and for your support of our vital mission.

[The prepared statement of Ms. Doane follows:]

BIOGRAPHY

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Margaret Doane

Margaret "Margie" Doane became the Executive Director for Operations in July 2018. This is the highest-ranking career position in the agency, with responsibilities for overseeing the agency's operational and administrative functions, and serving as the chief operating officer.

Doane previously served as the agency's General Counsel from November 2012 to June 2018. In that position, she oversaw the Office of General Counsel and directed matters of law and legal policy; provided legal opinions, advice, and assistance to the agency; monitored adjudicatory proceedings; provided legal interpretations; and represented and protected the interests of the NRC in legal matters, among other responsibilities.

Prior to that position, Doane served for five years as the Director of the NRC's Office of International Programs. She was the principal liaison between the international regulatory community and the members of the Commission as well as civilian nuclear policy-making bodies within the federal government involved in international activities. She also served for three years as the office's Deputy Director.

Doane began her career at the NRC in 1991 as a Special Assistant (Legal) in the Office of the Secretary. She later served for seven years as an attorney in the Office of Commission Appellate Adjudication before joining the office of Commissioner Jeffrey S. Merrifield, where she held progressively responsible positions before ultimately serving as his Chief of Staff. She is a 2004 graduate of the NRC's SES Candidate Development Program.

Doane received the NRC Meritorious Service Award in 2005, the Presidential Meritorious Service Award in 2018, and was a Finalist in 2013.

Prior to joining the NRC, Doane was an attorney advisor for the Department of Veterans Affairs, Board of Veterans Appeals. Doane received a bachelor's degree in Economics from Loyola College in Baltimore. She holds a law degree from the University of Maryland School of Law.

September 2019

WRITTEN STATEMENT
BY MARGARET DOANE, EXECUTIVE DIRECTOR FOR OPERATIONS
UNITED STATES NUCLEAR REGULATORY COMMISSION
TO THE
SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
JANUARY 15, 2020

Good morning Chairman Barrasso, Ranking Member Carper, and distinguished members of the Committee. I appreciate the opportunity to appear this morning with Deputy Chief Financial Officer Ben Ficks to testify on the U.S. Nuclear Regulatory Commission's (NRC) activities and progress implementing the Nuclear Energy Innovation and Modernization Act, or NEIMA.

My testimony will describe how the NRC is ensuring timely implementation of the Act's requirements as well as provide to you an update on the agency's progress towards implementing various sections of NEIMA. Mr. Ficks will cover the budget-related sections of NEIMA.

The NRC has made significant progress in implementing the provisions in NEIMA.
To date, the NRC has submitted 9 of the reports required by NEIMA to Congress since April 2019, in addition to completing other actions pursuant to NEIMA provisions. We have also undertaken significant efforts to implement the advanced-reactor-related provisions in NEIMA, including the requirement to develop a rulemaking for a "technology-inclusive regulatory framework."

Section 103: Advanced Nuclear Reactor Program

NEIMA directs the NRC to establish performance metrics and milestone schedules and to accelerate planned activities in the areas of advanced reactors and research and test reactors licensing, while soliciting input from the Department of Energy (DOE), reactor developers, and other stakeholders. The NRC has been preparing for the licensing of advanced reactors for several years and is ready to review potential near-term applications, the first of which is anticipated to be submitted this month. As part of our preparation, the NRC staff has been holding periodic public meetings with the advanced reactor community since 2016. The NRC has also issued its vision and strategy for preparing to license non-light-water reactor designs. These activities built upon the progress the agency has made for light-water small modular reactors, Generation III+ designs such as the AP1000 reactors, and previous advanced reactor activities, including our cooperation with DOE on the Next Generation Nuclear Plant Project. In addition, the NRC has completed several "staged licensing" procedural activities, including the issuance in December 2017 of the guidance document, "A Regulatory Review Roadmap for Non-Light Water Reactors," which provides details of the options available to developers of new reactors to navigate the regulatory review process.

NEIMA also requires the NRC to develop and implement strategies to increase the use of risk-informed licensing within the existing regulatory framework and to complete a rulemaking to establish a technology-inclusive regulatory framework for advanced reactors. The NRC staff's interaction with the Licensing Modernization Project, a DOE cost-shared initiative led by Southern Company and coordinated by the Nuclear Energy Institute, resulted in the NRC's issuance of a draft regulatory guide proposing to endorse industry guidance for advanced reactor licensing. The agency is also interacting with the industry on another DOE-supported project to ensure that potential future applications for advanced reactors would focus on the

most risk-significant aspects of advanced reactor designs. These activities provide a foundation for the rulemaking to establish a technology-inclusive regulatory framework for advanced reactors.

The NRC is using risk-informed, performance-based techniques and guidance for the resolution of numerous policy issues regarding new reactors, including those specifically mentioned in NEIMA. Examples include the Commission's approval of the use of more realistic approaches to estimate potential radiological consequences for new reactor technologies, a methodology to define containment performance criteria, and, for the Early Site Permit for the Tennessee Valley Authority's Clinch River site, a dose-based, consequence-oriented methodology for determining the appropriate size of the emergency planning zone at the site.

Regarding research and test reactors, the NRC is able to license these reactors under existing regulations, including prototype or demonstration plants. As required by NEIMA, the necessary guidance to implement the licensing process for new research and test reactors will be in place by January 2021.

The NRC is addressing the issue of staff training and expertise identified in NEIMA through an action plan for staff development and knowledge management. The NRC has completed many activities under this plan, including staff training on various advanced reactor technologies, and continues to assess the need for additional training and hiring. The NRC has also established agreements with DOE to share technical expertise and knowledge. The NRC is interacting with both DOE and the U.S. Department of Defense on matters related to the development and possible deployment of micro-reactors.

Section 104: Baffle-Former Bolt Guidance

Last April, the NRC submitted a report to Congress concluding that further revision to the industry Baffle-Former Bolt (BFB) Guidance is not necessary. The staff has verified that licensees are properly implementing the industry guidance and that corrective actions appear to be effective. Since the submission of the April 2019 report, subsequent baffle-former bolt examinations have been completed at most of the high-susceptibility plants. The observed baffle-former bolt cracking raised no immediate safety concern. Baffle-former assemblies are constructed with a significant amount of structural margin and can maintain structural integrity despite the failure of a large number of bolts. The follow-up examinations found a large number of degraded original bolts in only one of the seven high-susceptibility plants, Salem Unit 1 in New Jersey. In light of this new operating experience, the NRC staff continues to monitor the issue and licensee corrective actions through its inspection program and through its continued engagement with the industry. The NRC will continue to evaluate the need for further revisions to industry guidance for BFB examinations.

Section 105: Evacuation Report

On July 12, 2019, the NRC submitted a report to Congress on the actions NRC has taken to consider lessons learned regarding evacuations in densely populated areas since September 11, 2001, and during other recent natural disasters. In developing this report, NRC consulted with experts in analyzing human behavior and probable responses to a radiological incident: State emergency planning officials and the Federal Radiological Preparedness Coordinating Committee chaired by FEMA. The report concludes that the NRC's approach to evacuations as part of the NRC's emergency planning programs for currently operating power reactors remains valid, and that the NRC's understanding of evacuations can help risk-inform future power reactor emergency planning programs.

Section 106: Encouraging Private Investment in Research and Test Reactors

NEIMA amended the Atomic Energy Act (AEA) to include criteria for whether a utilization facility is licensed as a noncommercial research and development facility or as a commercial facility. According to the new criteria, the NRC is authorized to license a utilization facility as a research and development facility subject to the condition that the licensee shall recover not more than 75 percent of the annual cost of owning and operating the facility from commercial activities, of which not more than 50 percent can be from sales of energy such as electricity or process heat. The new criteria became effective January 14, 2019, and the NRC staff is applying the new criteria to issuance of NRC licenses after that date. The NRC staff is also assessing the impacts of the new criteria on existing research and test reactor licensees. To further understand the potential impacts of the new criteria on existing licensees, on September 26, 2019, NRC staff conducted a public meeting with these stakeholders. The NRC staff is considering the stakeholder feedback it has received and is developing a rulemaking plan to update NRC regulations to reflect the new criteria in the AEA and clarify the applicability of the new criteria to existing licensees.

Section 107: Commission Report on Accident-Tolerant Fuel

NEIMA directs the NRC to submit a report to Congress on the status of preparations to license accident-tolerant fuel technologies. The NRC has a project plan to align agency regulatory readiness with industry and fuel vendor plans for regulatory submittals related to fuel technologies. The U.S. nuclear industry, with DOE's assistance, is planning to deploy batch loads of accident-tolerant fuel in the operating fleet by the mid-2020s. The industry expects that these new fuel technologies will offer power plant owners more flexibility in how they operate their plants and will provide more robust performance during normal operations, as well as

under potential accident conditions. In FY 2020, the NRC staff will continue to engage with vendors, licensees, DOE, international counterparts, and other stakeholders to ensure all sides are prepared for licensing and oversight of accident tolerant fuel.

Section 108: Best Practices for Establishment and Operation of Local Community Advisory Boards

The Act requires the NRC to conduct a series of public meetings and then develop a report to Congress on best practices for community advisory boards associated with decommissioning nuclear plants. The NRC conducted two public webinars and held 11 public meetings throughout the United States. The NRC was able to accommodate all meeting requests submitted by April 2019 and held meetings near the following sites that are planning or undergoing decommissioning: Palisades in Michigan; Humboldt Bay, Diablo Canyon, and San Onofre in California; Vermont Yankee in Vermont; Pilgrim in Massachusetts; Kewaunee in Wisconsin; Zion in Illinois; Indian Point in New York; Oyster Creek in New Jersey; and Crystal River in Florida. The results of these meetings, along with the data collected, will be summarized in the report to be submitted to Congress by July 14, 2020.

Section 109: Report on Study Recommendations

NEIMA directed the NRC to submit a status report detailing the efforts to address and implement the recommendations contained in the memorandum of the Executive Director for Operations entitled, "Tasking in Response to the Assessment of the Considerations Identified in a 'Study of Reprisal and Chilling Effect for Raising Mission-Related Concerns and Differing Views at the Nuclear Regulatory Commission.'" The NRC submitted the report on April 9,2019.

Section 201: Uranium Recovery Report

NEIMA directed the NRC to submit a report describing the duration of uranium recovery license issuance and amendment reviews, and recommendations to improve the efficiency and transparency of these reviews. The NRC completed its review and submitted this report on April 10, 2019.

Transformation

In addition to carrying out the requirements under NEIMA, the NRC continues to conduct activities in support of its transformation. These transformation initiatives will help us achieve our vision of being a more modern, risk-informed regulator, while building upon and complementing the important work currently occurring throughout the agency to fulfil our nuclear safety and security mission.

The NRC also made some significant organizational changes in 2019. In October, the NRC completed the merger of the Office of Nuclear Reactor Regulation and the Office of New Reactors and reorganized the Office of Nuclear Materials Safety and Safeguards. The resulting program structure provides greater flexibility to respond to a dynamic environment, supports earlier alignment on technical and regulatory issues, and allows the NRC to incorporate best practices from different parts of the organization more efficiently.

CLOSING

We appreciate the Committee's interest and support as we implement this important legislation. Chairman Barrasso, Ranking Member Carper, and distinguished members of the Committee, this concludes my written testimony. On behalf of the staff of the NRC, thank you for the opportunity to appear before you and for your support of the vital mission of the NRC. We are pleased to respond to your questions. Thank you.

Senate Committee on Environment and Public Works
Hearing entitled, *"One Year of Progress: An Update on Implementation of the Nuclear Energy Innovation and Modernization Act"*
January 15, 2020
Questions for the Record for Ms. Doane

Chairman Barrasso:

QUESTION 1. Your testimony highlights the importance of a predictable licensing process. Predictability is just one component of a successful regulatory framework. It must also be efficient, timely, and affordable. How is the NRC ensuring its licensing and regulatory processes are predictably efficient, timely, and affordable?

ANSWER:

The NRC ensures its licensing and regulatory processes are efficient by conducting business process improvement initiatives. The NRC also reviews past activities and applies lessons learned to improve ongoing and future efforts. For example, during licensing reviews of similar applications or requests, the NRC forms teams with the same staff, to the extent practicable, to gain efficiencies during these reviews.

The NRC ensures its processes are timely by establishing and subsequently monitoring schedules, which are developed commensurate with the risk and safety significance of the action. The schedules consider applicants' and licensees' needs to ensure activities are completed in a timely manner. In the Fiscal Year (FY) 2020 Congressional Budget Justification, the NRC has established timeliness indicators for activities such as issuance of operating reactor license amendments; final significance determinations for inspection findings; non-light-water reactor application reviews; and spent fuel storage and transportation container design

reviews, license renewals, and major licensing actions. The agency also has other lower-level metrics that it monitors on a routine basis.

When initiating review activities, the NRC develop cost estimates based on data from precedent, similar actions. These estimates are further adjusted as the NRC factors in lessons from past activities and takes steps to make the activity more efficient. For licensing activities, these cost estimates are shared with applicants or licensees and monitored by assigned project managers. Significant changes are communicated to applicants or licensees to ensure mutual understanding of the reasons for the changes.

In addition to timeliness metrics discussed above, the NRC also establishes metrics for tracking task completion within forecasted hours. The agency's senior executives monitor and oversee project costs and schedules, including review of metrics and measures , to ensure costs and schedules are justified and appropriate. Monitoring also allows the NRC to adjust its priorities as needed to complete actions in an efficient and timely manner.

The NRC has also undertaken new transformation initiatives related to technology adoption and process simplification, which should further improve efficiency.

QUESTION 2. **What are the key lessons learned from NRC's previous experience when the agency prepared to review anticipated new nuclear reactor designs and applications that did not materialize?**

ANSWER:

The NRC has gained valuable experience from its completed licensing reviews for new reactor designs and applications as well as its review of those applications that did not materialize or were suspended by applicants. Following the completion of the licensing reviews under Title 10 of the *Code of Federal Regulations* Part 52 (10 CFR Part 52), "Licenses, Certifications, and Approvals for Nuclear Power Plants," the NRC staff conducted lessons-learned assessments of its experience implementing Part 52 The following reports document those assessments:

- "New Reactor Licensing Process Lessons Learned Review: 10 CFR Part 52," issued April 2013;
- "Staff Report: 10 CFR Part 52 Application Reviews - Efficiency Opportunities and Review Timelines," issued March 2016.

These reports identified the importance of high-quality applications, timely development and maintenance of regulatory guidance, early identification and timely resolution of complex technical issues, and enhancing the request for additional information process, among other themes.

Additionally, the NRC recognized the nuclear industry's shift of focus from large light-water reactors to small modular and advanced reactor designs and started to identify and implement innovative approaches for reviewing these new technologies, guided by the insights from its previous experience. In October 2019, the NRC merged its Offices of Nuclear Reactor

Regulation and New Reactors and renewed its focus on preparing for the efficient licensing of new and advanced reactors. The NRC has positioned itself to provide flexibility in reviewing new technologies through approaches such as establishing dedicated and focused "Core Review Teams" with the necessary resources to complete timely safety and environmental reviews. The NRC is also ensuring appropriate discipline in its budgeting process to request and allocate resources more efficiently for these reviews. The NRC staff is currently nearing completion of a first-of-a-kind small modular reactor design certification review and has already identified lessons learned that are being factored into preparations for future licensing reviews.

QUESTION 3. **The NRC technical staff recently identified modest revisions to the inspection procedures for dry cask storage of spent nuclear fuel, known as "Independent Spent Fuel Storage Installations" (ISFSIs).**

a. What analysis did NRC staff conduct to identify potential changes?

b. Critics suggest that any revisions to the number of hours required for certain inspections will automatically correlate to a reduced level of nuclear safety. Does NRC have any data that shows a direct correlation between inspection hours and nuclear safety?

c. How does NRC's assessment of its inspection programs align with a risk-informed, performance-based regulatory framework, as supported by enactment of the Nuclear Energy Innovation and Modernization Act?

ANSWER:

a. An NRC staff working group was established to develop risk-informed enhancements to the Independent Spent Fuel Storage Installation (ISFSI) inspection program. The working group completed an objective analysis using probabilistic risk analyses, byproduct material radiation

exposure studies, subject matter expertise, operating experience, and lessons learned from the last 30 years of ISFSI inspections. This analysis informed the recommended enhancements to the program. In addition, the working group developed a risk prioritization tool to help inspectors identify the most important items to be inspected in each of the five safety-focused areas within the inspection program. During a public meeting held December 2, 2019, the NRC staff discussed the working group's recommendations and requested public comments by December 20, 2019. The staff's recommendations and public comments will be evaluated before any final decision is made.

b. While the NRC does not have data that show a direct correlation between inspection hours and nuclear safety, the NRC considers inspections an important element of NRC's oversight of its licensees. Because inspections play a vital role in NRC's oversight, the inspection programs should be as effective as possible. The changes considered by the working group are aimed at focusing the program on the most safety significant inspection items.

c. The staff is considering enhancements that provide for a more risk-informed, performance-based ISFSI inspection program that focuses on those areas most important to safety and contributing the most to reasonable assurance of adequate protection.

QUESTION 4. **What has the NRC staff learned from the review of NuScale's application for a design certification of its small modular reactor design that can be applied to future NRC reviews?**

ANSWER:

The staff has gained insights from the NuScale review that are being factored into preparations for future small modular and advanced reactor reviews.

The NRC plans to conduct a formal lessons-learned review following completion of its safety assessment of the application later this year. The following are a few examples of the lessons learned thus far:

- The NRC and applicant should focus pre-application and acceptance review activities on identifying the key risk and safety aspects of the design and then ensure that schedules and resources are focused on early resolution of those issues.

- The applicant should ensure that the level of documentation in the application is commensurate with the identified safety and risk significance of all design attributes, and the staff should ensure that the level of review in the staff's safety evaluation is commensurate with the identified risk and safety significance of those design attributes.

- The NRC and applicant must maintain an integrated and holistic perspective on the safety of the design that recognizes the importance of reasonable assurance of adequate protection of public health and safety and the environment. This includes recognizing that adapting traditional defense-in-depth approaches employed for large light-water reactor reviews to the review of new technologies may require innovative approaches .

QUESTION 5. **Advanced nuclear technologies may be utilized for non-power generation applications. The technologies could produce both electricity and heat for non-electric applications, or solely industrial purposes. What challenges and special considerations must be addressed with respect to licensing nuclear reactor designs for non-electric applications?**

ANSWER:

The NRC and Department of Energy specifically considered the use of advanced reactors for purposes other than generating electric power within the licensing strategy jointly developed for the Next Generation Nuclear Plant (NGNP) Program. A major focus of the NGNP Program was the use of a high-temperature gas-cooled reactor to produce hydrogen or to support other process heat applications. The special considerations for using a nuclear plant for process heat or non-electric applications fit within the general approach used by the NRC, which consists of assessing (1) the potential for a nuclear plant to affect its environment and (2) the potential for its environment, including nearby industrial facilities, to affect the nuclear plant. For example, the NRC would consider the unique aspects raised by a nuclear plant supplying process heat to a hydrogen production facility by reviewing the design features and programmatic controls developed by an applicant to protect against potential hydrogen gas releases and explosions from a nearby facility that could adversely affect the nuclear plant. Similarly, the NRC review would also evaluate whether an accident at the nuclear plant could lead to an offsite release of radioactive materials that could affect a nearby facility. If there is a potential for offsite release of radioactive materials from the nuclear plant, then the NRC would evaluate preventive or mitigative measures that could be put in place.

Senator Van Hollen:

QUESTION 6. **In its efforts to reform the licensing process for advanced reactors, is the Nuclear Regulatory Commission (NRC) taking into account "Safeguards by Design" criteria to ensure the consideration of International Atomic Energy (IAEA) safeguards throughout all phases of a nuclear facility project, from the initial conceptual design to facility construction and into operations, including design modifications and decommissioning?**

ANSWER:

Yes. The NRC considers and supports the principles of "Safeguards by Design" for nuclear facilities. The U.S. remains a strong proponent of the principles of nonproliferation and the role of the IAEA in this area. "Safeguards by Design" is a set of principles promoted by the IAEA to facilitate the implementation of nuclear safeguards in facilities as appropriate. While the use of the "Safeguards by Design" principles are not required for NRC applicants or licensees, the agency has communicated the importance of providing early design information for implementation of IAEA safeguards to advanced reactor designers, builders, and operators throughout the continuing development process.

In its final policy statement for advanced reactors, the NRC recognized international safeguards among several aspects to be considered in the design of advanced reactors. Any new facility that applies for a license from the NRC will be placed on the Eligible Facilities List and made available for selection by the IAEA for implementation of safeguards. If selected by the IAEA, the facility would be required to provide a completed Design Information Questionnaire (DIQ) to the NRC for submittal by the U.S. Government to the IAEA within 45 days of selection. However, a facility may proactively decide to provide the NRC with a completed DIQ voluntarily

to help identify challenges in the interface of safeguards measures with security and safety design features.

This policy statement is a complement to the NRC requirements for international safeguards that are given in Title 10 of the Code of Federal Regulations (10 CFR) Part 75, "Safeguards on Nuclear Material—Implementation of Safeguards Agreements Between the United States and the International Atomic Energy Agency." This regulation places requirements on NRC licensees and others in the U.S. commercial nuclear sector so that the U.S. government can fulfill the nation's commitments under the U.S.-IAEA Safeguards Agreement for the Application of Safeguards in the U.S. and the Initial Protocol and its Additional Protocol. The requirements in this regulation are in addition to any other requirements of other Parts of 10 CFR. These requirements primarily address implementation of IAEA safeguards at selected facilities, locations, and sites licensed by the NRC and include facilitating IAEA inspections; complementary access; design information verification; and reporting of physical inventories, transactions, and facility information on certain types of material, equipment, components, and other activities in the U.S. commercial sector. Under the terms of the Nuclear Nonproliferation Treaty (NPT), the U.S.-IAEA Safeguards Agreement does not require the same level of IAEA safeguards in the U.S. as in other, non-nuclear-weapons, states.

QUESTION 7. **Has the NRC consulted with the Department of Energy, U.S. nuclear industry stakeholders and the IAEA about the potential nonproliferation and international safeguards challenges associated with advanced reactors and fuels and how to mitigate them?**

ANSWER:

Yes. The NRC is actively engaging with the Department of Energy (DOE), U.S. nuclear industry stakeholders, and the International Atomic Energy Agency (IAEA) on nonproliferation and safeguards for advanced reactors and an advanced reactor fuel cycle.

The NRC staff maintains an ongoing dialog on safeguards with cognizant staff at the IAEA, DOE, and stakeholders within the U.S. nuclear industry. These discussions include U.S. commitments under the U.S.-IAEA Safeguards Agreement for the Application of Safeguards in the U.S., including the Additional Protocol, in areas such as inspections, complementary access, recordkeeping, reporting, and facility information, as well as future topics such as possible selection for IAEA safeguards.

The NRC engages on implementation of IAEA safeguards with other Federal agencies, including DOE, through several interagency groups, including the Subgroup on IAEA Safeguards in the U.S. (SISUS). The NRC staff has also worked with U.S. experts to co-author a 2014 report titled, "International Safeguards, Security and Regulatory Aspects of U.S. Light Water Small Modular Reactors," for the National Nuclear Security Administration (NNSA) Office of Nonproliferation and International Security. The report on light-water small modular reactors (SMRs) focuses on international safeguards and security implications when deployed to non-nuclear weapons states.

In addition, the NRC staff continues to engage with the nuclear industry in these areas both through direct conversations with licensees and potential applicants and through professional organizations and industry consortia. The NRC staff has met with the Nuclear Energy Institute Advanced Reactor Working Group to discuss domestic and international safeguards requirements and has led sessions at the annual NRC Regulatory Information Conference that included safeguards for advanced reactors and an advanced reactor fuel cycle. The NRC staff also actively participates in meetings of the Institute for Nuclear Material Management, whose 2019 national meeting included several sessions dedicated to advanced reactor technology and safeguards.

For advanced nuclear technologies, the DOE/NNSA has also recently organized an Innovative Safeguards Working Group that includes staff from the NRC and the State Department, as well as staff from DOE national laboratories.

QUESTION 8. **Parallel to the regulatory changes the Nuclear Energy Innovation and Modernization Act calls for, is the NRC undertaking efforts to update its export licensing framework for advanced nuclear technologies? Has the NRC been involved in any discussions at the Nuclear Suppliers Group (NSG) on updating the NSG's control lists for advanced nuclear technologies?**

ANSWER:

Yes. As a participating member of the U.S. Government's NSG delegation, the NRC has been involved in discussions on updating the control lists for advanced nuclear technologies. The NRC is also currently reviewing 10 CFR Part 110 export regulations to consider what, if any, changes may be necessary to accommodate future exports of advanced reactor equipment and

associated materials. This review is being conducted by an Advanced Reactors Working Group that includes technical and legal experts from the NRC as well as the Department of Energy and has considered 14 different advanced reactor designs from a wide range of U.S. vendors. The NRC's Office of International Programs will provide preliminary findings during a technical session at the upcoming Regulatory Information Conference, hosted by the NRC from March 10-12, 2020. The final results and findings from this regulatory review will be used to inform future Commission decisionmaking and U.S. Government views within the context of the NSG.

QUESTION 9. **Has the NRC participated in any discussions at the International Nuclear Regulators Association (INRA) on developing international regulatory standards for advanced nuclear technologies?**

ANSWER:

INRA has not had discussions specific to the development of international regulatory standards for advanced nuclear technologies. The NRC, however, has been substantially involved in shaping multilateral discussions on the regulation of small modular (SMR) and advanced reactors at both the International Atomic Energy Agency (IAEA) and the OECD/Nuclear Energy Agency (NEA).

At the IAEA, the NRC proposed and funded the creation of the SMR Regulators Forum (Forum), which covers both light-water and non-light water technology. The NRC had a cost-free expert at the IAEA for a 3-year period focused on establishing the Forum and advancing its work, and an NRC subject matter expert has chaired the Forum since its inception. Member countries include the United States, Canada, the United Kingdom, France, the Republic of Korea, the Russian Federation, China, Saudi Arabia, and Finland. The NEA serves as an observer.

Topics under consideration have included emergency preparedness, manufacturing, construction, commissioning, and operations.

Similarly, the NRC proposed the creation of the Working Group on the Safety of Advanced Reactors (WGSAR) at the NEA. This group covers non-light-water reactors of all sizes and varieties and serves as a regulatory interface to the Generation 4 International Forum (GIF). Like the SMR Forum, the NRC has chaired the WGSAR since its inception. Member countries include the United States, Canada, the United Kingdom, France, the Republic of Korea, the Russian Federation, China, Germany, Italy, and Japan. The IAEA, European Commission, and the GIF serve as observers. Topics covered have included non-light-water reactor fuel qualification, analytical tools, high temperature materials, and risk-informed licensing approaches.

The NRC also engages in a variety of bilateral cooperation activities related to SMRs and advanced reactors. For example, the NRC signed a Memorandum of Cooperation (MOC) with the Canadian Nuclear Safety Commission (CNSC) to enhance its cooperation in areas such as the development of shared advanced reactor and SMR technical review approaches; collaboration on pre-application activities; and collaboration on research, training, and development of regulatory approaches to address unique technical considerations. The next meeting between the NRC and CNSC under this MOC will take place in March 2020.

Senator Whitehouse:

QUESTION 10. **One of the key elements of NEIMA is new $15 million annual authorization for NRC to continue developing an advanced reactor licensing regulatory framework suitable for new reactor designs. Since 2017, we have worked to get the Commission $40 million in funding for advanced reactor licensing readiness.**

a. **What has NRC done with the funding it has received from Congress for advanced reactor licensing? What does it plan to do with the $15 million it received this year?**
b. **How does NRC plan to implement the new licensing framework required under NEIMA?**
c. **What steps has the NRC taken to prepare for this new regulatory framework?**
d. **What advanced reactors concepts are currently being considered at NRC?**

ANSWERS:

a. The agency issued a report "NRC Vision and Strategy: Safely Achieving Effective and Efficient Non-Light Water Mission Readiness," that describes the objectives, strategies, and contributing activities for the tasks funded by recent Congressional appropriations for the NRC's advanced reactor program. The NRC has used the funding received to date to support activities such as:

- Increasing NRC staffing levels dedicated to advanced reactor activities;

- Contracting with national laboratories to develop and deliver training on different advanced reactor technologies, including molten-salt reactors and sodium-cooled fast reactors;

- Coordinating with the Department of Energy (DOE) on developing or adapting computer codes and analytical tools for evaluating advanced reactor designs;

- Developing technology-inclusive guidance for advanced reactor licensing, including guidance for developing principal design criteria and identifying and analyzing licensing basis events;

- Participating in the development of consensus codes and standards, including an American Society of Mechanical Engineers standard, important for advanced reactors operating at high temperatures and developing probabilistic risk assessments for non-light-water reactors;

- Identifying and resolving policy issues such as defining performance criteria for functional containment concepts, developing proposed performance-based emergency preparedness requirements, and proposing revised guidance related to population-related siting considerations; and

- Coordinating NRC activities with international counterparts such as the Canadian Nuclear Safety Commission and organizations such as the Nuclear Energy Agency

For the upcoming year, the NRC is continuing to increase staffing levels for advanced reactor activities to prepare for advanced reactor applications. The NRC staff, with assistance from national laboratories, is also continuing to: develop analytical tools; prepare additional licensing-related guidance; develop and endorse consensus codes and standards; and prepare for possible license applications. Recent appropriations are also being used to expand contracts with national laboratories to help identify policy and key technical issues for advanced reactors and for specific technologies. The NRC is increasing resources to address evolving areas such as cooperating with and learning from DOE's Versatile Test Reactor Project and efforts at DOE and the Department of Defense to develop and possibly deploy micro reactor concepts.

b. & c. Regarding the licensing framework required under NEIMA, the NRC staff has interacted with stakeholders and engaged with the industry-led, DOE-supported Licensing Modernization Project (LMP), to develop a technology-inclusive licensing approach for advanced reactors. The NRC staff has issued draft regulatory guidance that would make use of the LMP's licensing methodology. As part of this initiative, the NRC has received results from a number of table-top exercises performed by the industry to test the methodology with various advanced reactor developers. The NRC is also observing the use of the methodology to support the design and DOE review of the Versatile Test Reactor. The draft regulatory guidance is currently before the Commission for consideration as an approved methodology for use by applicants and licensees. The NRC staff is currently interacting with a follow-on industry-led, DOE cost-shared project to provide additional technology-inclusive guidance on the content of applications and is also interacting with several advanced reactor developers preparing applications. The NRC staff is interacting with DOE and other stakeholders to assess fusion technologies and discuss possible options for fusion reactors.

These activities are expected to provide the foundation for the rulemaking required by NEIMA, for which the NRC staff is currently preparing a rulemaking plan for Commission consideration. The NRC staff has discussed possible approaches with stakeholders at several public meetings and plans to engage stakeholders on the development of the rule in mid-2020.

d. The NRC has held discussions with advanced reactor developers working on a variety of advanced reactor designs. Reactor developers have submitted reports for NRC review or informed the NRC that they are planning to submit licensing-related applications for the following advanced reactor technologies:

- Light-water small modular reactors,
- Sodium-cooled fast reactors,
- High-temperature gas-cooled reactors,
- Gas-cooled fast reactors,
- Fluoride salt-cooled high-temperature reactors,
- Molten-salt reactors, and
- Micro reactors using various technologies.

QUESTION 11. **Our bill also requires that NRC make changes to its existing licensing frameworks to be more suitable for advanced reactors outside of adopting new regulations. What changes has NRC made to make its existing licensing framework more suitable for advanced reactors?**

ANSWER:

To make its existing licensing framework more suitable for advanced reactors, the NRC has completed readiness activities necessary to establish a staged licensing process for commercial advanced nuclear reactors. The NRC staff interacted extensively with developers, industry organizations, and other stakeholders on developing guidance for preparing regulatory engagement plans and has received several of these plans from reactor developers. In addition, the NRC's Regulatory Review Roadmap, issued in December 2017, is intended to help designers prepare design-specific licensing project plans by providing guidance for a flexible regulatory review process within the bounds of existing regulations, including the use of conceptual design reviews and staged-review processes.

To address issues related to differences in technology, the NRC has implemented changes for light-water, small modular reactors (SMRs) currently under review. The Commission-directed changes are reflected in documents such as the NRC's Standard Review Plan (NUREG-0800), design-specific review strategies, and several Commission papers highlighting risk-informed and performance-based approaches to address issues for designs currently under review. At the Commission's direction, the NRC staff is changing regulations and guidance documents to address issues related to emergency preparedness and physical security at future light-water SMR and non-light-water (non-LWR) facilities.

Regarding non-LWRs, the Commission approved an approach that resolves a long-standing advanced reactor issue related to designs using protective features other than a dedicated containment structure to limit the release of radioactive materials. Following extensive interactions with stakeholders, the NRC issued Regulatory Guide 1.232, "Guidance for Developing Principal Design Criteria for Non-Light Water Reactors," and Draft Regulatory Guide 1353, "Guidance for a Technology-Inclusive, Risk-Informed, and Performance-Based Methodology to Inform the Licensing Basis and Content of Applications for Licenses, Certifications, and Approvals for Non-Light-Water Reactors." These documents change the existing licensing frameworks to be more suitable for applications supporting advanced reactor designs. The NRC staff is assessing the use of these guidance documents in tabletop exercises by various advanced reactor developers and in actual submittals of topical reports and white papers. The NRC staff meets frequently with advanced reactor developers, the Department of Energy industry organizations, and other stakeholders to identify any additional potential issues and opportunities to improve guidance and licensing approaches such that the NRC can ensure the safety of future nuclear reactors while not creating unnecessary obstacles to their development and possible deployment.

QUESTION 12. **We just passed a spending bill that includes significant funding for advanced nuclear. Several notable inclusions include:**

- **A new advanced reactor demonstration program, providing $230 million to build multiple advanced reactor projects.**
- **$20 million for Nuclear Reactor Innovation Center (NRIC). NRIC aims to bring together technical expertise of the National Labs and DOE to enable the construction of experimental reactors.**

- **$65 million to support material testing for advanced reactors using the Versatile Advanced Test Reactor.**
- **$15 million in funding for the NRC to continue develop a suitable regulatory framework for advanced reactors, consistent with the authorization in NEIMA.**

With this funding in mind.

a. **How do you see this new funding and program development at DOE better interfacing with your work at NRC?**
b. **What do you expect to see from the advanced reactor community in the next five years?**

ANSWERS:

a. The NRC signed cooperative agreements with the Department of Energy (DOE) related to the Gateway for Accelerated Innovation in Nuclear (GAIN) program, computer code development, and for sharing information and expertise to support the Versatile Test Reactor (VTR). The NRC, DOE, and researchers at national laboratories routinely communicate on research activities related to these projects. An example of the NRC seeking to obtain valuable insights from interacting with DOE is with the use of the methodology developed under the NRC-reviewed Licensing Modernization Project to support the design and safety review process for the VTR. The NRC also interfaces with individual reactor developers receiving support from DOE through GAIN vouchers or cost-share projects. The possible availability of funds from DOE to support multiple advanced reactor projects along with the funding to the NRC for developing a regulatory framework has further focused both the NRC and the advanced reactor community on addressing issues and preparing for licensing applications to be submitted for

review. The NRC, within the bounds of its statutory authority, is interacting with DOE and the Department of Defense (DOD) on the development and possible manufacture and deployment of micro reactors for both defense and commercial applications.

b. The advanced reactor community is diverse in both technologies and possible markets for the energy produced for electrical generation or process heat applications. The NRC expects to receive several applications for a license, certification, or approval of advanced reactor designs within the next five years and also anticipates the number of preapplication interactions will continue to increase. The NRC will maintain its interactions with DOE and DOD on the programs related to the VTR, reactor demonstration program, nuclear reactor innovation center, and micro reactors.

Senator BARRASSO. Thank you, Ms. Doane.
Mr. Ficks.

STATEMENT OF BEN FICKS, JR., DEPUTY CHIEF FINANCIAL OFFICER, U.S. NUCLEAR REGULATORY COMMISSION

Mr. FICKS. Good morning, Chairman Barrasso, Ranking Member Carper, and distinguished members of the Committee.

I appreciate the opportunity to appear this morning to testify on the U.S. Nuclear Regulatory Commission's activities and progress implementing Sections 101, 102, and 202 of NEIMA, for which the Office of the Chief Financial Officer has the lead.

The NRC is developing the fiscal year 2020 draft fee rule consistent with NEIMA such that the development of the regulatory infrastructure for advanced nuclear reactor technologies, including activities required under Section 103 of NEIMA, is not recovered through fees.

Section 102 caps the operating reactor licensee annual fee, caps the NRC corporate costs at 30 percent of the annual budget request for fiscal year 2021, and requires anticipated expenditures for requested activities of the commission to be identified in the annual budget justification.

The budget formulation process and associated systems have been modified to implement these changes, and the fiscal year 2021 congressional budget justification and the fiscal year 2021 fee rule will reflect the changes. Once the President's budget is released on February the 10th, 2020, the NRC will be able to provide more specific information regarding the implementation of these provisions.

In partnership with our internal and external stakeholders, we have taken several steps to improve invoice accuracy and transparency consistent with Section 102. We completed a new, monthly, standardized fee validation process starting in July 2019. This new process improves accountability and oversight within the NRC to ensure that fee billing data are correct before appearing on a licensee's quarterly invoice.

Specifically, we added new data elements to our information technology systems to identify the individuals responsible for validating billing charges, and we also created new reports for staff and managers to improve their analysis and provided training to responsible staff so that they were prepared for this change.

In addition, the NRC implemented the new electronic billing—e-billing—system on October the 1st, 2019. This system was designed in consultation with a representative group of nine licensees that were involved throughout the development phase.

The system includes the following improvements: eliminating mailing of paper invoices, providing licensees with the capability to analyze their invoices online, providing licensees with access to Treasury's payment system to pay their invoices, improving the timeliness of invoices, providing the capability to export invoice data easily for analysis and verification of charges, and it provides licensees with an efficient method to submit inquiries regarding their invoices by having questions immediately delivered by e-mail to the agency for research or action. Forty-five licensees have been enrolled in e-billing as of December the 27th, 2019.

Section 202, Pilot Program for Uranium Recovery. As directed by NEIMA, the NRC provided a report describing the results of the pilot initiative to the Committee on January the 10th, 2020. As discussed in the report, the NRC staff determined that while it could fairly and equitably establish flat fees for financial reviews and routine inspections for the single remaining uranium recovery NRC licensee in this fee class, the NRC ultimately decided to maintain its current fee billing structure as the current licensee appreciates the level of transparency provided by the current process.

NRC will continue its communication with the remaining licensee and provide estimated costs for uranium recovery activities. In addition, the NRC staff has posted cost estimates for uranium recovery activities on the NRC's public Web site to give a general sense of what can be expected.

Chairman Barrasso, Ranking Member Carper, distinguished members of the Committee, thank you again for the opportunity to appear before you, and I look forward to answering any questions you may have.

[The prepared statement of Mr. Ficks follows:]

LEE BENEDICT (BEN) FICKS, JR.

Mr. Ficks has served as the Deputy Chief Financial Officer of the U.S. Nuclear Regulatory Commission (NRC) since October 2017.

Prior to his appointment, Mr. Ficks served as the Budget Director.

Mr. Ficks joined the NRC in 2001 as an analyst in the former Office of Human Resources and has held a number of progressively responsible positions in the Office of Chief Financial Officer, Office of Nuclear Reactor Regulation, Office of Chief Information Officer, and Office of the Chief Human Capital Officer. He is a graduate of the NRC Senior Executive Service (SES) Candidate Development Program 2009 class and has held SES-level positions since 2010.

Before joining the NRC, Mr. Ficks worked as an entrepreneur for two years in the private sector and worked nine years with the U.S. Environmental Protection Agency's national water program.

Mr. Ficks earned a bachelor of science degree in Foreign Service with a concentration in science and policy from Georgetown University in 1990, and master's degree in business administration from the University of Maryland in 2000.

WRITTEN STATEMENT
BY BEN FICKS, DEPUTY CHIEF FINANCIAL OFFICER
UNITED STATES NUCLEAR REGULATORY COMMISSION
TO THE
SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
JANUARY 15, 2020

Good morning Chairman Barrasso, Ranking Member Carper, and distinguished members of the Committee. I appreciate the opportunity to appear this morning with the Executive Director for Operations Margaret Doane to testify on the U.S. Nuclear Regulatory Commission's (NRC) activities and progress implementing the Nuclear Energy Innovation and Modernization Act, or NEIMA. I will cover the progress associated with Sections 101, 102, and 202 of NEIMA, for which the Office of the Chief Financial Officer has the lead.

Section 101: NRC User Fees and Annual Charges Through FY 2020

Section 101 of NEIMA specifically excludes amounts appropriated to the NRC for activities related to the development of regulatory infrastructure for advanced nuclear reactor technologies from the amount the NRC must recover through fees. The NRC is developing the Fiscal Year (FY) 2020 draft fee rule consistent with NEIMA such that the development of regulatory infrastructure for the advanced reactor technologies, including activities required under section 103 of NEIMA, is not recovered through fees. Since FY 2017, annual appropriations acts for the NRC have similarly provided that funding for such activities is to be excluded from fee-recovery requirements.

Section 102: Nuclear Regulatory Commission User Fees and Annual Charges for FY 2021 and each year thereafter

On October 1, 2020, the NRC will revise its framework for developing the annual budget and fee recovery as directed by NEIMA. Specifically, Section 102 caps the operating reactor licensee annual fee; caps the NRC's corporate support costs at 30 percent of the annual budget request for FY 2021, stepping down to 28 percent in FY 2025 and beyond; and requires anticipated expenditures for "requested activities of the Commission" to be identified in the annual budget justification. The budget formulation process and associated systems have been modified to implement these changes, and the FY 2021 Congressional Budget Justification and FY 2021 fee rule will reflect the changes. Once the President's budget is released on February 10, 2020, the NRC will be able to provide more specific information regarding the implementation of these provisions. In addition, Section 102 requires new performance measures, which have been established and will be included in the FY 2021 Congressional Budget Justification.

Section 102 also requires the NRC to ensure accurate invoicing and make associated modifications to NRC regulations regarding fee disputes, which will be reflected in the FY 2021 Fee Rule. In partnership with our internal and external stakeholders, we have taken several steps to improve invoice accuracy and transparency consistent with Section 102(d) of NEIMA. Most importantly, we completed a new monthly standardized fees validation process starting in July 2019. This new process, the result of a collaborative effort led by the Office of the Chief Financial Officer with the NRC's major program offices and Regions, improves accountability and oversight within the NRC to ensure fee billing data are correct before appearing on a licensee's quarterly invoice. Specifically, we added new data elements to our information technology systems to identify the individuals responsible for validating billing charges, created

new reports for staff and managers to improve their analysis, and provided training to ensure responsible staff were prepared for this change.

In addition, the NRC implemented the new electronic billing (eBilling) system on October 1, 2019. This system was designed in consultation with a representative group of nine licensees that were involved throughout the development phase. The system includes the following improvements: (a) eliminating mailing of paper invoices; (b) providing licensees with the capability to analyze their invoices online; (c) providing licensees with access to Treasury's payment system to pay their invoices; (d) improving the timeliness of invoices; (e) providing the capability to export invoice data easily for analysis and verification of charges; and (f) providing licensees with an efficient method to submit inquiries regarding, or to seek review of, their invoices by having questions immediately delivered via email to the agency for research or action. A phased implementation approach and corresponding communication plan to licensees is being used to facilitate efficient and effective enrollment throughout FY 2020. Forty-five licensees were enrolled in eBilling as of December 27, 2019.

Section 202: Pilot Program for Uranium Recovery

The NRC completed a voluntary pilot initiative to determine the feasibility of establishing a flat fee structure for routine licensing matters relating to uranium recovery. As directed by NEIMA, the NRC provided a report describing the results of the pilot initiative to the Senate Committee on Environment and Public Works and the House Committee on Energy and Commerce on January 10, 2020. As discussed in the report, the NRC staff determined that while it could fairly and equitably establish flat fees for financial reviews and routine inspections for the single remaining uranium recovery NRC licensee in this fee class, the NRC ultimately decided to maintain its current fee billing structure. However, the NRC will continue its communication with

the remaining licensee and any future applicants and provide estimated costs anticipated for uranium recovery activities. In addition, the NRC staff has posted cost estimates for uranium recovery activities on the NRC's public web site to give a general sense of what can be expected.

CLOSING

Chairman Barrasso, Ranking Member Carper, and distinguished members of the Committee, thank you again for the opportunity to appear before you, and I look forward to answering any questions you may have.

Senate Committee on Environment and Public Works
Hearing entitled, *"One Year of Progress: An Update on Implementation of the Nuclear Energy Innovation and Modernization Act"*
January 15, 2020
Questions for the Record for Mr. Ficks

Chairman Barrasso:

QUESTION 1. **NRC staff determined that while it could fairly and equitably establish flat fees for financial reviews and routine inspections for uranium recovery, the current billing structure would be maintained because the current licensee appreciates the transparency of the current process. How do you expect this conclusion would change if there were multiple active uranium recovery licensees?**

ANSWER:

The NRC would revisit the issue of flat fees for routine uranium recovery actions, if there is an increase in the number of active uranium recovery licensees. To evaluate this issue, the NRC would review at least 3 years of fee billing data to ensure a representative sample size for financial assurance reviews and routine inspections. If the fleet size increases, the NRC would conduct outreach to determine whether transitioning to flat fees or maintaining the current fee billing structure would be more equitable and transparent.

QUESTION 2. **Please list the number and total value of contracts for Fiscal Year 2020 activities the NRC entered into that are funded with FY 2019 money. Please list the number of contracts and value both by NRC office and business line.**

ANSWER:

The total number and total dollar value of contracts for FY 2020 activities funded through the use of FY 2019 funding is **470** and **$178.5 million**, respectively. The tables below identify the

balance and number of contracts by NRC office and also by business line. The major drivers for the FY 2019 forward funding include unexpected delays for awarding multiple task orders and new contracts for technical assistance; advance funding of firm-fixed-price contracts; research work required to be fully funded for the length of agreement; timing of the funding availability and contract awarding; strategically forward funding critical contracts (including large IT contracts) to avoid disruption in service; and delayed billing.

The NRC continues to strategically use forward funding to manage fluctuations in workload for unexpected project delays or accelerations, fixed price contracts, and expected future shortfalls. The NRC plans to continue evaluating forward funding levels.

Office	Balance	Number of Contracts
ACRS	$ 95,000.00	3
ADM	$ 21,867,375.36	64
NMSS	$ 13,829,713.86	33
NRO	$ 3,092,764.10	24
NRR	$ 5,504,240.46	33
NSIR	$ 6,912,358.16	34
OCFO	$ 12,426,072.53	15
OCHCO	$ 6,430,078.42	52
OCIO	$ 70,308,718.74	84
OCM	$ 3,500.00	1
OE	$ 141,376.12	3
OEDO	$ 117,000.00	1
OGC	$ 340,158.44	6
OI	$ 49,087.16	3
OIP	$ 2,091,542.00	8
OPA	$ 132,112.38	2
RES	$ 31,754,120.59	82
RI	$ 788,267.91	34
RII	$ 872,350.80	20
RIII	$ 431,725.20	30
RIV	$ 863,095.05	30
SBCR	$ 454,789.78	7
SECY	$ 5,000.00	1
Total	**$ 178,510,447.06**	***470**

Business Line	Balance	Number of Contracts
Operating Reactors	$ 52,187,277.95	213
New Reactors	$ 12,654,991.02	83
Spent Fuel Storage and Transportation	$ 4,910,342.74	23
Nuclear Materials Users	$ 10,951,071.20	30
Decommissioning and Low-Level Waste	$ 2,503,233.94	29
Fuel Facilities	$ 2,884,521.85	20
Corporate Support	$ 92,419,008.36	214
Total	**$ 178,510,447.06**	***470**

*The sums of the individual lines are larger than 470 because some contracts are repeated in the tables due to enterprise wide agreements shared by multiple offices and business lines that contribute to the funding of the contracts.

QUESTION 3. **Please identify the amount of Fiscal Year 2019 carryover funding budgeted for Fiscal Year 2020 both by NRC office and business line.**

ANSWER:

The table below identifies the distribution of authorized carryover funding by business line and office.

Business Line	Office	Authorized Carryover ($K)
Operating Reactors	NRR	2,065
	NSIR	2,756
	OCIO	5,666
	RES	10,000
New Reactors	NMSS	434
Spent Fuel Storage and Transportation	NMSS	1,040
	OCIO	426
Nuclear Materials Users	NMSS	2,049
	OCIO	869
Decommissioning and Low-Level Waste	NMSS	1,070
Fuel Facilities	OCIO	440
Corporate Support	ADM	6,430
	OCIO	6,755
Total		**$40,000**

QUESTION 4. **How is NRC's Office of Chief Financial Officer using data analytics and other modern, innovative analysis tools to improve the fidelity of NRC's budget development and execution process?**

ANSWER:

The Office of the Chief Financial Officer (OCFO) uses two primary systems, both of which share the same budget structure, to formulate and execute funds appropriated to the NRC.

These systems include modules that the NRC staff uses to improve the fidelity of budget development and execution. Specifically, there are modules that help the NRC develop and evaluate commitments, obligations, and expenditures with the purpose of analyzing budget execution data and improving the accuracy of NRC budget requests. The NRC also has a module to support more precise projections of agency salaries and benefits, as well as full-time equivalent (FTE) utilization, so the NRC can more accurately predict salary rates over time.

Finally, OCFO has recently adopted the use of Tableau – a next generation data visualization reporting tool – to enhance its ability to analyze financial system data to gain deeper insight into the agency's current and future funding needs.

The OCFO is committed to identifying and using innovative analysis tools, now and in the future, to report on and understand the agency's changing needs in the areas of budget development and execution.

QUESTION 5. **How is the Office of the Chief Financial Officer incorporating NRC's Transformation Initiative into its budget development, management, and execution processes?**

ANSWER:

In response to the Transformation Initiative and in the spirit of continuous improvement, the OCFO initiated many innovative and transformative activities to help improve the overall financial management framework Some of the activities undertaken by OCFO include implementation of the Commitment Planning Module, creation of a new analytical group, adoption of new analytical tools such as Tableau and a Salaries & Benefits Projection Tool, automating carryover tracking, and a new methodology to calculate forward funding. OCFO continues to improve the alignment between budget formulation and budget execution through the use of the latest analytical tools. These tools will help agency budget analysts generate intuitive, actionable, and real time budget execution data and data visualization, including Tableau-developed dashboards, to support a more efficient, risk-informed budget formulation process. These proactive strategies help guide OCFO's stewardship of the agency's resources and improve customer service.

Additionally, we have identified future initiatives to continue to drive transformation in budget development, management, and execution processes:

1. Greater risk tolerance in prior period adjustments and the fee validation processes while ensuring reasonable assurance for fee billing requirements (e.g., re-examine policy informed by contractor's study and be open to potential efficiency enhancements)

2. Continue collaboration between the Office of the Chief Human Capital Officer, OCFO, and Office of the Executive Director of Operations using Strategic Workforce Planning to ensure we have the right people with the right skills to achieve the mission within budget, including a strong pipeline of entry-level staff for OCFO

3. Greater acceptance of risk in budget formulation (e.g., automation and analytics to improve workload estimating, trend analysis, forward funding analysis, and benchmarking other agencies)

Senator Whitehouse:

QUESTION 6. **One of the key elements of NEIMA is new $15 million annual authorization for NRC to continue developing an advanced reactor licensing regulatory framework suitable for new reactor designs. Since 2017, we have worked to get the Commission $40 million in funding for advanced reactor licensing readiness.**

a. **What has NRC done with the funding it has received from Congress for advanced reactor licensing? What does it plan to do with the $15 million it received this year?**
b. **How does NRC plan to implement the new licensing framework required under NEIMA?**
c. **What steps has the NRC taken to prepare for this new regulatory framework?**
d. **What advanced reactors concepts are currently being considered at NRC?**

ANSWERS:

a. The agency issued a report, "NRC Vision and Strategy: Safely Achieving Effective and Efficient Non-Light Water Mission Readiness" that describes the objectives, strategies, and contributing activities for the tasks funded by recent Congressional appropriations for the NRC's advanced reactor program. The NRC has used the funding received to date to support activities such as:

- Increasing NRC staffing levels dedicated to advanced reactor activities;

- Contracting with national laboratories to develop and deliver training on different advanced reactor technologies, including molten-salt reactors and sodium-cooled fast reactors;

- Coordinating with the Department of Energy (DOE) on developing or adapting computer codes and analytical tools for evaluating advanced reactor designs;

- Developing technology-inclusive guidance for advanced reactor licensing, including guidance for developing principal design criteria and identifying and analyzing licensing basis events;

- Participating in the development of consensus codes and standards, including an American Society of Mechanical Engineers standard, important for advanced reactors operating at high temperatures and developing probabilistic risk assessments for non-light-water reactors;

- Identifying and resolving policy issues such as defining performance criteria for functional containment concepts, developing proposed performance-based emergency preparedness requirements, and proposing revised guidance related to population-related siting considerations; and

- Coordinating NRC activities with international counterparts such as the Canadian Nuclear Safety Commission and organizations such as the Nuclear Energy Agency.

For the upcoming year, the NRC is continuing to increase staffing levels for advanced reactor activities to prepare for advanced reactor applications. The NRC staff, with assistance from national laboratories, is also continuing to: develop analytical tools; prepare additional licensing-related guidance; develop and endorse consensus codes and standards; and prepare for possible license applications. Recent appropriations are also being used to expand contracts with national laboratories to help identify policy and key technical issues for advanced reactors and for specific technologies. The NRC is increasing resources to address evolving areas such as cooperating with and learning from DOE's Versatile Test Reactor Project and efforts at DOE and the Department of Defense to develop and possibly deploy micro reactor concepts.

b. & c. Regarding the licensing framework required under NEIMA, the NRC staff has interacted with stakeholders and engaged with the industry-led, DOE-supported Licensing Modernization Project (LMP), to develop a technology-inclusive licensing approach for advanced reactors. The NRC staff has issued draft regulatory guidance that would make use of the LMP's licensing methodology. As part of this initiative, the NRC has received results from a number of table-top exercises performed by the industry to test the methodology with various advanced reactor developers. The NRC is also observing the use of the methodology to support the design and DOE review of the Versatile Test Reactor. The draft regulatory guidance is currently before the

Commission for consideration as an approved methodology for use by applicants and licensees. The NRC staff is currently interacting with a follow-on industry-led, DOE cost-shared project to provide additional technology-inclusive guidance on the content of applications and is also interacting with several advanced reactor developers preparing applications. The NRC staff is interacting with DOE and other stakeholders to assess fusion technologies and discuss possible options for fusion reactors.

These activities are expected to provide the foundation for the rulemaking required by NEIMA, for which the NRC staff is currently preparing a rulemaking plan for Commission consideration. The NRC staff has discussed possible approaches with stakeholders at several public meetings and plans to engage stakeholders on the development of the rule in mid-2020.

d. The NRC has held discussions with advanced reactor developers working on a variety of advanced reactor designs. Reactor developers have submitted reports for NRC review or informed the NRC that they are planning to submit licensing-related applications for the following advanced reactor technologies:

- Light-water small modular reactors,
- Sodium-cooled fast reactors,
- High-temperature gas-cooled reactors,
- Gas-cooled fast reactors,
- Fluoride salt-cooled high-temperature reactors,
- Molten-salt reactors, and
- Micro reactors using various technologies.

QUESTION 7. **Our bill also requires that NRC make changes to its existing licensing frameworks to be more suitable for advanced reactors outside of adopting new regulations. What changes has NRC made to make its existing licensing framework more suitable for advanced reactors?**

ANSWER:

To make its existing licensing framework more suitable for advanced reactors, the NRC has completed readiness activities necessary to establish a staged licensing process for commercial advanced nuclear reactors. The NRC staff interacted extensively with developers, industry organizations, and other stakeholders on developing guidance for preparing regulatory engagement plans and has received several of these plans from reactor developers. In addition, the NRC's Regulatory Review Roadmap, issued in December 2017, is intended to help designers prepare design-specific licensing project plans by providing guidance for a flexible regulatory review process within the bounds of existing regulations, including the use of conceptual design reviews and staged-review processes.

To address issues related to differences in technology, the NRC has implemented changes for light-water, small modular reactors (SMRs) currently under review. The Commission-directed changes are reflected in documents such as the NRC's Standard Review Plan (NUREG-0800), design-specific review strategies, and several Commission papers highlighting risk-informed and performance-based approaches to address issues for designs currently under review. At the Commission's direction, the NRC staff is changing regulations and guidance documents to address issues related to emergency preparedness and physical security at future light-water SMR and non-light-water (non-LWR) facilities.

Regarding non-LWRs, the Commission approved an approach that resolves a long-standing advanced reactor issue related to designs using protective features other than a dedicated containment structure to limit the release of radioactive materials. Following extensive interactions with stakeholders, the NRC issued Regulatory Guide 1.232, "Guidance for Developing Principal Design Criteria for Non-Light Water Reactors," and Draft Regulatory Guide 1353, "Guidance for a Technology-Inclusive, Risk-Informed, and Performance-Based Methodology to Inform the Licensing Basis and Content of Applications for Licenses, Certifications, and Approvals for Non-Light-Water Reactors." These documents change the existing licensing frameworks to be more suitable for applications supporting advanced reactor designs. The NRC staff is assessing the use of these guidance documents in tabletop exercises by various advanced reactor developers and in actual submittals of topical reports and white papers. The NRC staff meets frequently with advanced reactor developers, the Department of Energy industry organizations, and other stakeholders to identify any additional potential issues and opportunities to improve guidance and licensing approaches such that the NRC can ensure the safety of future nuclear reactors while not creating unnecessary obstacles to their development and possible deployment.

QUESTION 8. **We just passed a spending bill that includes significant funding for advanced nuclear. Several notable inclusions include:**

- **A new advanced reactor demonstration program, providing $230 million to build multiple advanced reactor projects.**
- **$20 million for Nuclear Reactor Innovation Center (NRIC). NRIC aims to bring together technical expertise of the National Labs and DOE to enable the construction of experimental reactors.**

- **$65 million to support material testing for advanced reactors using the Versatile Advanced Test Reactor.**
- **$15 million in funding for the NRC to continue develop a suitable regulatory framework for advanced reactors, consistent with the authorization in NEIMA.**

With this funding in mind.

a. **How do you see this new funding and program development at DOE better interfacing with your work at NRC?**
b. **What do you expect to see from the advanced reactor community in the next five years?**

ANSWERS:

a. The NRC signed cooperative agreements with the Department of Energy (DOE) related to the Gateway for Accelerated Innovation in Nuclear (GAIN) program, computer code development, and for sharing information and expertise to support the Versatile Test Reactor (VTR). The NRC, DOE, and researchers at national laboratories routinely communicate on research activities related to these projects. An example of the NRC seeking to obtain valuable insights from interacting with DOE is with the use of the methodology developed under the NRC-reviewed Licensing Modernization Project to support the design and safety review process for the VTR. The NRC also interfaces with individual reactor developers receiving support from DOE through GAIN vouchers or cost-share projects. Furthermore, the possible availability of funds from DOE to support multiple advanced reactor projects along with the funding to the NRC for developing a regulatory framework has further focused both the NRC and the advanced reactor community on addressing issues and preparing for licensing applications to

be submitted for review. The NRC, within the bounds of its statutory authority, is interacting with DOE and the Department of Defense (DOD) on the development and possible manufacture and deployment of micro reactors for both defense and commercial applications.

b. The advanced reactor community is diverse in both technologies and possible markets for the energy produced for electrical generation or process heat applications. The NRC expects to receive several applications for a license, certification, or approval of advanced reactor designs within the next 5 years and also anticipates the number of preapplication interactions will continue to increase. The NRC will maintain its interactions with DOE and DOD on the programs related to the VTR, reactor demonstration program, nuclear reactor innovation center, and micro reactors.

Senator BARRASSO. Thank you very much to both of you for your important testimony. We look forward to some questions.

I will start, and we will have 5 minute rounds of questions.

Ms. Doane, in 2018, the EPA withdrew what was an Obama administration midnight rule. This midnight rule would have added unnecessary red tape to the principal method of uranium production. The NRC raised substantial jurisdictional concerns to the EPA regarding the proposed rule.

In 2017, I asked the EPA to sign a memorandum of understanding—an MOU—with the NRC to resolve the issue. For over a year, NRC and EPA have worked on this memorandum of understanding. The process, I believe, needs to be completed.

Could you provide an update on the status of the Nuclear Regulatory Commission's engagement on this memorandum?

Ms. DOANE. Thank you for that question, Senator.

Yes, the memorandum of understanding is in its final stages. The staff of both agencies have agreed in principle on a document, which I think, in my experience, is sometimes the hardest part of an endeavor like this.

The next step is for us to finalize the documentation. It is formal documentation, because this is an enduring document. We are finalizing the documentation; it will then come to me, and then be moved on to the Chairman, because it is for her signature. So it is in the final stages, and I do not expect it to be very long.

Senator BARRASSO. Thank you. Another question. In December, the commission approved a staff proposal to establish emergency planning requirements for advanced nuclear technologies. The proposal accounts for the reduced risk of smaller and safer reactor designs.

The Nuclear Energy Innovation and Modernization Act requires this approach, which we signed last year, but will you summarize the NRC's proposal and the historical basis for your recommendations?

Ms. DOANE. The proposal that we made to the staff for this draft proposed rule is based on a scaling, recognizing that larger reactors, the consequences could be very different for larger reactors than smaller reactors. As an example, existing reactors include over 1,000 megawatts, up to 1,400 megawatts, where the reactor I referred to earlier could be 1 megawatt.

In summary, the approach is a scaling approach that would recognize for these consequences, the communities would be very well protected, even with a smaller emergency planning zone.

Senator BARRASSO. Mr. Ficks, the law limits how much funding the commission can request for overhead activities or corporate support costs. These include funding for human resources, for information technology.

This new requirement is going to prioritize spending on activities that directly support the agency's mission to license and to oversee the use of nuclear material. What steps are you taking now to meet the new funding limitation in the NRC's 2021 budget proposal?

Mr. FICKS. NRC has taken a lot of steps to reduce its budget. Since fiscal year 2014, we have actually decreased our budget from fiscal year 2014 to fiscal year 2020 by approximately 19 percent. In that same period, corporate support reduction resources have de-

creased as well by 19 percent. We have decreased our space, our footprint.

We have also re-baselined our activities. We have done careful FTE analysis to ensure that we do not overbudget, and we continuously look at our budget models. We look forward to discussing this more in detail once the budget is released in February the 10th.

Senator BARRASSO. Thank you on that. Because the law limits the amount that the commission can charge operating nuclear power plants, starting in this upcoming fiscal year; this is going to ensure that the remaining nuclear plants don't pay more to fund the agency to make up for lost revenue because other plants have shut down.

I am concerned the commission may shift funding to circumvent the requirement, but what are you doing to reduce the portion of the agency's budget that the nuclear reactors fund?

Mr. FICKS. Again, we have used analytics to look at our model for when a plant goes from operating to decommissioning, and we have adjusted the model and the budget formulation process. That has yielded very good results. You can see that in the fiscal year 2018 and fiscal year 2019 fee rule rates for operating reactor fee class, which actually are below the level specified in NEIMA, which is tied to the fiscal year 2015 fee rule, which is $4.8 million before it is adjusted for inflation.

Senator BARRASSO. Does this tie in, to say, a broader effort to reduce spending as additional reactors may shut down over time?

Mr. FICKS. Yes.

Senator BARRASSO. Thank you.

Senator Carper.

Senator CARPER. Thanks, Mr. Chairman.

One of the things I love to do back in Delaware when we are not in session, and actually around the country, when I visit, I visit businesses, large and small. I call them customer calls.

I ask three questions of those businesses. I ask, how are you doing, how are we doing, the Federal Government, our congressional delegation, the State of Delaware, and what can we do to help. I hear over and over again, one of the things we can do to help is to focus on work force. We have a tight labor market, as you know. There are like 5 million jobs going unfilled today because folks don't have the skills or education or desire to do those jobs.

One of the things I always hear when I visit businesses is a need for certainty and predictability, certainty and predictability. At a time when businesses are having to put up with these changes in tariffs, in tariff laws imposed, not imposed, they want some certainty and predictability.

Let me just ask this question of you, Ms. Doane. Do you believe the changes that we made are helping provide more certainty for the advanced nuclear licensing process? Since its implementation, have you received any more interest in stakeholders that may want to pursue an advanced nuclear license?

That is my question. I am sticking with it.

Ms. DOANE. Yes, thank you, Senator.

These changes are helping because we have looked at our processes and also our regulations to determine whether they have any

obstacles as NEIMA mandates and make sure that we are improving these documents so that the users of these documents will be able to come into our processes. There will be a meeting of the minds, and an understanding of the timetables and the resources, so all of these things are providing predictability in how to use our processes, but also in the length of time that it would take in meeting these time scales.

It is also giving us an understanding of the technology that they are going to be using so that we can get ahead. You were talking about skills, so that we can get ahead on what we need to know so that we can resolve questions earlier in the process, the sooner we know about these issues.

Senator CARPER. All right, thank you.

I am going to build on the question raised by the Chairman a few minutes ago, and ask this. When we have multiple nuclear reactors closing, and as a result, additional spent fuel going into dry cask storage, you have proposed a dramatic reduction in dry cask storage inspections.

I just wanted to ask if you, Ms. Doane, if you would explain why you think it is necessary to make this change at this time.

Ms. DOANE. Thank you, Senator, for that question.

It is not a proposal yet. It is under consideration. There is a working group, and they are considering changes to the inspections for independent spent fuel storage facilities or dry cask storage facilities.

Senator CARPER. I hope that working group will just consider the question that I just raised.

Thank you. Go ahead and finish your thought.

Ms. DOANE. Yes. I think the more interest that we have, the more views that we have, we do consider them. The changes are being made based on a long history of these processes and looking at the other inspection activities that are already going on. So they are looking at redundancy, but they are also looking at how we can do our work smarter.

In any event, the inspection process, I can assure you, will remain adequately protective of public health and safety. We take these issues very seriously.

Senator CARPER. OK, thank you.

Another question for you, if you don't mind, then we will pick on Mr. Ficks.

For 60 years, the Halden test reactor in Norway had been used by nuclear fuel developers globally to test fuels. The three leading developers of accident tolerant fuel wanted to use the Halden test reactor for some critical testing. Unfortunately, the Norwegian government recently closed the Halden test reactor for good.

My question would be, Ms. Doane, how is the NRC and industry testing the new accident tolerant fuel technologies, now that the Halden reactor is closed?

Ms. DOANE. I can take this question for the record, because I don't have all of the specifics. But at a very high level, I will tell you that we are relying on the Department of Energy and some of their testing, and they are already working with the fuel vendors, so we will rely on that testing.

To the extent that other testing is done by our vendors, we would then validate that testing.

You are right, that the Halden has closed, but we have given a lot of attention to that issue to ensure that there will be an adequate way of testing the fuel to make the safety decisions. More than that, I would want to take it for the record.

Senator CARPER. OK. Let's take it for the record, and just build on what you just gave me, OK? Thanks so much.

Thanks, Mr. Chairman.

Senator BARRASSO. Senator Braun.

Senator BRAUN. Thank you, Mr. Chairman, and thank you for your testimony.

I am on Health, Education, Labor, and Pension. We just appointed a new FDA commissioner, and looking at the comparisons between regulatory bodies and the underlying industry, there is so much room for improvement there.

You have got an industry that pushes things like patent thickets, dragging its feet to lower the cost of health care, and you have got an FDA that I think has been very stodgy in trying to help the cause as well.

Recently, I was the first Republican to join the Climate Caucus, and that is going to be, along with the cost of health care——

Senator CARPER. Hopefully not the last.

Senator BRAUN. True. I think it is going to be a discussion for a long time. I see, in the attempt to try to lower CO_2, that advanced nuclear technology is the one bird in the bush that could be close to being a bird in the hand. I know our own Purdue University recently became the first nuclear reactor in the U.S. that converted to digital instrumentation.

I think, and I would like your opinion, in a general sense, is the NRC in a position to accommodate, or is it like the FDA has been in my mind, more of an obstructor to moving in the right direction? And do you think that the timeframe will be there to where you, as the oversight body, and the industry itself is going to have enough to work with to push advanced nuclear technology to the forefront as maybe being our ace in the hole to address climate issues?

That is kind of a broad, loaded question, and I would like your opinions, generally, on that.

Ms. DOANE. So part of the activities that we have been doing, a lot of the work that we have been doing is to ensure that we are not a barrier to new technology. I know you know we are not a promoter, but we also don't want to be a barrier. We understand the importance that the Committee places on advanced technology.

We also agree that our licensing has to be predictable, so we are taking steps starting from the bottom of the agency all the way up to the top to transform in a way that we can have our processes perform in a way that are predictable, that we have looked at our regulations to ensure that they aren't a barrier. We have had to do a lot of changes with guidance and processes.

Then finally, our people. We are making sure that they are trained. This is technology, that, if it comes in, it will be technology we have never seen before, so we are working on ensuring that they are trained.

Senator BRAUN. That is good to hear. You said, if it comes in. What is your opinion of where it is currently?

Ms. DOANE. I would tell you that we—I might sound a little bit—if it comes in based on our experience in previous—about a decade ago, we built up the agency in a way and didn't materialize it as much as we thought it would. So that is probably my hesitancy, but we are told that it will come in. We are told that they are going to be filed and that later this month, or perhaps the very beginning of the next month will be the first non-light-water reactor, or microreactor.

Senator BRAUN. Mr. Ficks.

Mr. FICKS. I would just point to all the transformation efforts that we have undertaken within the office of the Chief Financial Officer to be more modern and risk informed. I think the e-billing example that I highlighted in my testimony gives you a sense of that. We also partner very closely with the program offices, including nuclear reactor regulation to ensure that there are adequate resources.

Senator BRAUN. So, in summarizing, I think it is incumbent on you to be careful, but not create undue barriers. I think that, unlike the healthcare industry, I see an energy industry that is interested in trying to move to the forefront, bringing new technology to address CO_2. It is good to hear that it sounds a lot better than my sense of what is happening in the healthcare arena.

Thank you.

Senator BARRASSO. Thank you, Senator Braun.

Senator Cardin.

Senator CARDIN. Thank you, Mr. Chairman.

I want to thank our witnesses. I first want to acknowledge the incredible work force we have at NRC. We are pretty proud of it, and very proud that it is located in the State of Maryland.

I am concerned that we seem to be losing a lot of the experienced work force at NRC. The work that you do is the best in the world, as far as nuclear safety is concerned.

Are we attracting the bright talent of the future to work at NRC, considering the circumstances of the Federal budget and the recruitment issues and the morale issues?

I just raise that because to me, as we talk about the urgency that Senator Carper mentioned on climate change and how nuclear power is friendly toward our greenhouse gas and climate change issues, we also have to recognize that part of this is having the work force at NRC to be able to properly evaluate new technology, so that we can move aggressively in that direction.

Our existing nuclear energy reactors are old, 1960s and 1970s, most of them. They need attention. As we talk about bringing on new technologies, which are very important, we also have to recognize that maintaining the existing force in a safe manner to meet the energy needs of our country without contributing more greenhouse gas emissions is also a challenge.

One of the reasons that I was very excited about the Nuclear Energy Innovation and Modernization Act is to deal with one of those issues that has made nuclear power not as competitive as it needs to be in the current marketplace in order to be able to get the type of investments to maintain our force, as well as to invest in new

technologies. The regulatory process is just too costly, and we don't want to compromise safety. But we recognize that the process is too costly.

When we are looking at having a somewhat level playing field on the sources of energy, nuclear is at a disadvantage. It is at a disadvantage because the regulatory cost is much, much higher than any other source of energy, including the fossil fuels.

Then there is a second area that we don't have the level playing field or a competitive playing field, and that is in the tax structure. All energy sources except nuclear get help from the tax code in regard to their improvements and their explorations, et cetera, but nuclear does not.

Senator Cramer and I have introduced legislation that would provide an investment tax credit in regard to the nuclear industry to try to provide some parity here.

I know today's hearing is focused on how we can implement the law we passed a year ago to deal with the regulatory costs and how we can make sure that it is easier in regard to advanced nuclear technology.

But my question is a little bit broader. Don't we have to deal with the economics of energy that is out there, and recognize that today, nuclear is really at a disadvantage, not only from the regulatory point of view, but from the tax point of view? And that if we want to attract the type of investment that we need, that we have to also take issue with the tax structures.

I say that because three of the four members that are here also serve on the Finance Committee, and I hope that we will have a chance this year to take up an energy tax package.

We were shortchanged in the omnibus bill that moved through the Congress. It was not, I think, fair toward the environmentally friendly energy sources. We are making it a priority to bring up that type of legislation in this Congress this year.

I would hope that we would get some support for looking at the economics of fairness in the nuclear industry and take a serious look at Senator Cramer and my bill that would try to provide some degree of fairness in that regard.

I have 56 seconds left; do either one of you want to comment? Fine. You want to endorse my bill? That is fine.

Perhaps just dealing with the economics of energy sources today. We know that there is a lot of natural gas that is out there, and that is affecting the price. We know that we have significant fossil fuel production here in the United States as far as being sources. So we know that it has been a challenge from an economic point of view. Don't we have to deal with that in the reality? Just say yes.

[Laughter.]

Ms. DOANE. Our hesitancy really isn't—it is just because of our role as safety regulators. We really don't play a role there.

Senator CARDIN. But you need to have investment by the private sector if this is going to work. Investment depends upon the economic model, and the economic model today is challenged.

Ms. DOANE. I understand, Senator Cardin, thank you. I will tell you for our part, what will be essential here is that our process is predictable. And as for making a very hard case on assuring ade-

quate protection of public health and safety and security and the environment, we need to do it in a way that is—NEIMA mandates us to look at that and make sure that we are focused on the most significant safety issues and not to be distracted and create much more cost increases to things that aren't safety significant.

So I think in some ways, it does feed into the points that you are making.

Senator CARDIN. Thank you, I appreciate that relevant response.

Senator BARRASSO. Senator Whitehouse.

Senator WHITEHOUSE. Thank you, Chairman.

Before I ask my questions, let me make a point reacting to what you said earlier about nuclear waste and your desire to solve the nuclear waste problem. It is my observation that if our nuclear waste stockpiles were in the hands of private corporations, then the accounting methodology, to which private corporations are subject, would take a look at that as a liability.

Whoever was doing their accounting reports or doing their shareholder reports would go, and they would say, wow, you have all this nuclear waste, that is a problem; And then they would do their level best to try to put a price on the problem, so they could be booked as a liability for shareholders and the public to know about.

The instant that you put a number on that on a company's books, let's say the number is $2 trillion, I don't know what it is; it is a big number, I expect. Then that gives that company a $2 trillion minus $1 incentive to spend money to solve the problem. It is, right now, from an accounting perspective, free to have all this nuclear waste simply sit there with no solution.

The flip side of that is that there is no market incentive, there is no financial reward, to anybody who solves the problem. That puts it on us, as Members of Congress, to force that solution. But I hope and expect that there may be a way to bring that market analysis to bear in the solution that you are trying to develop, and I look forward to working with you on that proposition.

We would not have the problem we have if somewhere on the books of the United States of America was an X-billion dollar liability for this that affected our financial reporting. Somebody would be incented to solve the problem.

So my question is to both of you. I just want to make sure that it is clear that a lot of the support for this, the bipartisan support for this, came because people care about some of the goals that we believe there is a chance for these modern nuclear technologies to achieve. There were two of them.

I would ask you to guess what you think our two priorities were in supporting this legislation. What were the two policy goals that you think most drove us?

Ms. DOANE. You really want me to guess? OK.

Senator WHITEHOUSE. I would hope you would know. It was so clear that what our point was in giving you this power. If you don't know, then that is a big signal to me that we need to make it really clear why we did this.

Ms. DOANE. Yes, sir. I think that the most important goals would be to provide an energy source that is carbon-free.

Senator WHITEHOUSE. Bingo. Well said. That is one.

Ms. DOANE. No. 1, and that in addition, it would address—so one would be carbon-free because of the climate issues that are being addressed. But the other is energy itself and the need for energy, and that this would be another source. I would say additionally, to keep involved in the national policy interest in staying involved in nuclear. So all of these things I think are rooted together.

Senator WHITEHOUSE. OK. You are getting a little bit closer with the last two, but I would not give you a passing grade on that. I would say that, you know, maybe good effort.

What I would say one of our clear purposes was was to try to make sure that these new technologies, as they came online, explored the possibility of repurposing our existing nuclear waste stockpile. Some of these technologies have been proposed as promising to turn this massive liability into actually a positive value as a fuel.

I don't know if that is going to pan out. I honestly don't. I am not a technologist. But people who are very smart about this, and who have invested millions and millions of dollars in these new technologies, tell me that that is their intention, that that is their purpose.

So as you are looking at these new technologies, I very much want—and I think I speak for a considerable number of us who have encouraged, supported, and authorized you to do this—we very much want to see that as this work gets done, it gets done in a way in which we are focused on the possibility of turning all that nuclear waste sitting around now as a health hazard and as an economic drag into something that could be positive.

If, all things being equal, you have two different technologies that you could fund, or that you could pursue, or that you could authorize, I would urge that in every way you can, you lean toward the one that has the better chance of allowing us to repurpose this enormous, poisonous stockpile for which we have no other plan.

Clear enough? Is that a yes from both of you? Because we don't have a record.

Ms. DOANE. Yes.

Mr. FICKS. Yes.

Senator WHITEHOUSE. OK, then I have said my piece. Thank you very much for what you are doing to try to implement the law that we passed.

Senator BARRASSO. Thank you, Senator Whitehouse, for your continued leadership and thoughtfulness on this issue. Thank you.

Senator Carper.

Senator CARPER. While Senator Whitehouse is still here, I spoke in my opening statement about the liability that we have on the Delmarva Peninsula that goes from an important industry for us, and the important industry is agriculture, and the important industry within agriculture is poultry. We have just huge numbers of chickens living in the Delmarva Peninsula.

Senator WHITEHOUSE. Rhode Island Reds, I hear.

[Laughter.]

Senator CARPER. There you go. Yes and no.

The liability that comes from that is this amount of chicken manure, which has the virtue of being high in phosphorus, high in nitrogen, which is coveted by farmers. But if used to a great extent,

it creates runoff, it creates real problems for our friends in Maryland and the Chesapeake Bay and areas to clean up the Chesapeake and not end up with all these dead zones.

I mentioned, I think before you got here, that I had lunch in Salisbury, Maryland, Ben's territory, with folks from Purdue, the big poultry operation and a company that uses European, German technology. They have over 200 facilities around the world where they actually take this liability, and they turn it into something that is good, sustainable energy and fertilizer.

We get a lot of it; we have the potential to get so much of this off the peninsula, the Delmarva Peninsula, where we have way too much to be able to spread it in some other parts of the country where they could use it. It is like what Einstein used to say, in adversity lies opportunity.

Laura Haynes is sitting right behind me, so my brain is on a bunch of issues, including this one. Several years ago, we were in France, and we visited some French facilities where they were trying to take spent fuel and figure out how to reuse it, repurpose it, recycle it, in order to drive some of the spent fuel, some of the energy that is right there in the spent fuel. I think there is still great potential for that. I think part of our job may be to figure out how to unleash that.

Senator WHITEHOUSE. The equation that waste plus technology can equal value, I think is the equation that we need to pursue, whether we are dealing with nuclear waste, or chicken——

Senator CARPER. Chicken litter.

Senator WHITEHOUSE. Thank you.

Senator CARPER. We call them "nutrients."

[Laughter.]

Senator CARPER. I want to go back and revisit, if I could, with our panel on an issue sort of raised by our Chairman, and I touched on it as well.

For our guests, do you believe that the NRC will have the resources needed in the long run? Do you believe the NRC will have the resources needed in the long run to do its job effectively? If the NRC does not have the needed funding, are there tools in the law to ensure that the NRC is able to inform Congress that additional funding is needed?

And that would be for both of you.

Mr. Ficks, why don't you take the first shot at that?

Mr. FICKS. We believe that Congress has given us the support we need to get the resources we need, and we continue looking forward to interacting positively to make sure that that continues.

Senator CARPER. All right, thank you.

Ms. Doane. Will you use fewer words? I thought he spoke too long.

[Laughter.]

Senator CARPER. I am kidding. I wish, Mr. Chairman, all of our witnesses are so economical in their use of words for responses. They are probably wish that we were, too.

Ms. DOANE. OK. You know, what I think he says in those few words, it is so meaningful, so it is a good economy of words.

Yes, I agree with Ben that we have had the adequate resources, and we recognize that, for example, there are caps that will come

into play in 2021, and we look forward to building our budgets to ensure that we have adequate resources. At this time, we have adequate resources in fiscal year 2020.

Senator CARPER. I guess the question is about the long term in making sure that if it turns out that you don't have the resources for the long term, do you feel that our law is adequate to ensure that the NRC is able to inform Congress that additional funding is needed?

Ms. DOANE. I do, because there are the caps in the legislation, but there is also a provision that says that, to take into consideration if these caps are practical. I think with that two part process, that it is adequate for us to get the funding that we need.

But I will add that it will be challenging in the future to continue to bring down, I don't want to leave a misimpression, to continue to bring down corporate costs, for example, because we have been bringing this, as Ben had said, we have been bringing down this cost over the years. Since 2014 we have brought these costs down dramatically.

So we have already taken advantage of the most obvious ways of reducing those costs, like space and things like that. In the future, it will get tougher and tougher to find these things. But like I said, the legislation does provide then a provision to say that these caps are applied, and then if it is practical.

Senator CARPER. All right, thanks so much.

Thanks, Mr. Chairman.

Senator BARRASSO. Senator Van Hollen.

Senator VAN HOLLEN. Thank you, Mr. Chairman, Ranking Member.

Thank you for your testimony today.

I have a few questions regarding the interaction between this effort to innovate our nuclear reactors and nuclear nonproliferation, because NEIMA was designed primarily to update the NRC's licensing framework for advanced nuclear reactors and technologies. It will help ensure that our domestic regulatory structure evolves in tandem with nuclear technology.

But I think it is also important that as nuclear technologies progress, the international nonproliferation regime evolves as well. Part of the reason that we are trying to advance these new technologies is obviously our domestic industry, but we also hope that with the proper safeguards, this will allow some of these new reactors to be located overseas.

There are some reactor designs that could pose proliferation issues. Specifically, those that would use proliferation sensitive fuels, like uranium fuel enriched to close to 20 percent HEU, while others would use a closed fuel cycle that would be capable of producing spent fuel that contains weapons grade plutonium.

Production of those fuels and the spread of reprocessing technologies may run up against longstanding U.S. policy to secure global supplies of fissile material. On top of that, the IAEA has indicated that several advanced reactor designs could pose safeguard challenges and make monitoring of nuclear facilities more difficult than it is today.

I have a couple questions related to that, and I am wondering whether in your licensing criteria and evaluation of advanced nu-

clear reactors, whether the NRC has taken into account the "safeguards by design" measures that would facilitate the implementation of international IAEA safeguards.

Ms. DOANE. Yes. Our reactor licensing process will take into consideration the implementation of the safeguards measures. As you know, our regulations provide for our agency to review the safeguard methods that are used at these reactor facilities to ensure that there is not—to reduce the threat or the up diversion and other issues that this addresses. Our licensing does, yes.

Senator VAN HOLLEN. Have you been in direct communication with the folks at the IAEA to discuss how this will work and how your work here meshes with their international safeguards?

Ms. DOANE. I personally have not. For the record, I can get back to you.

Our staff is very active in the area of safeguards and ensuring that the U.S. complies with all of its obligations, but specifically, whether our staff has been discussing this particular issue with the IAEA with safeguards by design, I would request to take that for the record.

Senator VAN HOLLEN. Got it. OK, if you could get back to us in writing. I also have some other written questions on this topic. Because I do, I think as many of my colleagues do, hope that we will be able to innovate in this area of nuclear technology for a variety of reasons.

At the same time, we need to be very careful in making sure that it doesn't undermine the nuclear nonproliferation regime that we have worked very hard to build over a period of time.

I hope that will be done in tandem going forward, in fact, not just hope. We are going to work with you to insist that that be done in order to protect against the risks of nuclear nonproliferation.

Thank you both for being here.

I will submit some additional questions for the record.

Senator BARRASSO. Thank you, we welcome those.

Senator Carper.

Senator CARPER. Thanks, Mr. Chairman.

As you may know, Senator Whitehouse and I sent a letter to Chairman Svinicki regarding the post-Fukushima rule that was finalized by the commission last January. As you may know, these changes made by the commission were against staff recommendations.

Senator Whitehouse and I expressed concerns that changes to the final rule made by the chairman missed the mark in addressing the lessons learned from the Fukushima Daiichi nuclear accident.

My question, and I guess this would be to you, Ms. Doane. Our Nation's leading scientists tell us that flooding and storm surges will continue to be the new normal in many parts of the country, many parts of the world, as we are reminded of in Australia today due to climate change. Do you still believe our Nation's nuclear reactors should be required to be able to meet the new flooding hazards that now exist due to climate change?

Ms. DOANE. Yes, I do agree that they should meet the hazards at the facilities. Yes.

Senator CARPER. All right. Did the commission miss the mark when they overturned the recommendations from you and your staff?

Ms. DOANE. As the staff, we will implement those directions in a way that ensures adequate protection of public health and safety with respect to reevaluated hazards, which is the issue that was raised.

At this time, we are receiving documentation from the licensees on how they are going to meet those reevaluated hazards, and we have the authority to take all measures necessary for adequate protection and also take measures where we can demonstrate a substantial benefit to safety that is justified by the cost of new changes.

So, yes, we have the full authority to ensure adequate protection, even for the reevaluated hazard.

Senator CARPER. Mr. Chairman, can I ask just one more short question?

Senator BARRASSO. Go right ahead.

Senator CARPER. Sometimes we ask questions of you that you are able to answer, and sometimes you ask to be able to answer for the record.

I am going to answer a different kind of question. For each of us, give us one question that you wish you had been asked. I want each of you to give us one question you wish you had been asked.

Mr. FICKS. Do you like working at NRC?

[Laughter.]

Senator CARPER. Do you like working at NRC?

Mr. FICKS. I do, I love it.

[Laughter.]

Senator CARPER. That is a good question. Do you want to ask us the same question?

Mr. FICKS. Do you like working at the Senate?

Senator CARPER. Almost every day.

[Laughter.]

Senator CARPER. One or 2 days we could probably get by without, but mostly we get a lot more done. We work a lot better together, especially in this Committee, than you read about it or hear about it in the media. They like to report bad news and conflict. We are not very good at conflict.

Ms. Doane, same question. Give us a question that you wish you had been asked. You can't use the same question.

Ms. DOANE. Darn it, because it was a really good one, and it was short, again. He has got a good economy with words.

Senator CARPER. It is his nature.

Ms. DOANE. Yes. So, the question I would want you to ask me is, the staff of the NRC is incredible. They are so well trained and I would have wanted to be asked, are we doing everything we can to both retain them and recruit staff to meet the needs of the future?

Senator CARPER. I would like to ask that question, with your permission. How would you respond?

Ms. DOANE. I would respond in that we are very focused on ensuring that we get them what they need. On these—with respect to advanced reactors, our staff is very open minded, and they are

looking forward to this. They actually look at this as a great possibility and good work to be done for the country. They are very enthusiastic.

So, yes, we are looking our program start to finish, making sure we identify gaps and using staff that is already there. When the number of issues go down, like with a reactor closing, taking staff and moving them over and getting them opportunities for transformational learning.

Also, recruiting good staff, we have put in place a new apprenticeship program. We are going to have our first class this summer, so we are very excited about that. We have gone out to universities, and really ensuring that we are going to retain, bring in new staff, but also retain those really important staff that are there doing such a great job.

Senator CARPER. Well, that was a really great question. I thought a pretty good answer, too.

Mr. Ficks, you get one more shot if you have a more serious question.

Mr. FICKS. I guess the question would be, do you really think NRC is becoming more modern.

Senator CARPER. Do you?

Mr. FICKS. Yes. I tried to put the success stories in my written testimony, just to make it very clear to you, but these things don't happen overnight. They are a lot of work, and my office, the Chief Financial Officer's office, has invested a lot in fee transformation over the past 4 years, and I think you are really seeing the yields of all that investment and hard work, like the e-billing. We see that as a capstone, and that fee validation process.

We are excited about the successes, and we want to continue those.

Senator CARPER. Great. Thank you both.

Senator BARRASSO. If there are no more question from the Senators, or questions of yourself, members may submit follow up written questions for the record, and if you have additional questions you would like to ask yourself, please include those as well for the record because the hearing record is going to stay open for 2 weeks.

[Laughter.]

Senator BARRASSO. With that, I want to thank you both for your testimony and for your cooperation and for all your help today in understanding some of the complexities that we are facing. Thank you.

With that, the hearing is adjourned.

[Whereupon, at 11:07 a.m., the hearing was adjourned.]

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