

OVERSIGHT OF THE NUCLEAR REGULATORY COMMISSION

HEARING

BEFORE THE

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

UNITED STATES SENATE

ONE HUNDRED SIXTEENTH CONGRESS

FIRST SESSION

APRIL 2, 2019

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COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

ONE HUNDRED SIXTEENTH CONGRESS
FIRST SESSION

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OVERSIGHT OF THE NUCLEAR REGULATORY COMMISSION

TUESDAY, APRIL 2, 2019

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

The Committee met, pursuant to notice, at 10:05 a.m. in room 406, Dirksen Senate Office Building, Hon. John Barrasso (Chairman of the Committee) presiding.

Present: Senators Barrasso, Carper, Capito, Cramer, Braun, Rounds, Ernst, Cardin, Whitehouse, Gillibrand, Markey, 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.

Today's oversight hearing will be looking at the Nuclear Regulatory Commission, the NRC, and I welcome all five Commissioners here today to the Committee.

Last May, the Senate confirmed Commissioners Caputo, Wright, and Baran. As a result, the Commission now has a full slate of five Commissioners for the first time since 2014.

This morning Commissioners Caputo and Wright will testify before Congress for the first time since being confirmed. I look forward to the testimony.

Today also marks the last time that Commissioner Burns will be testifying before the Committee. His term concludes this summer. Commissioner Burns has served the agency in various capacities for over 40 years. A remarkable service. We are very grateful.

You were Chairman from 2015 through 2017, so we just want to thank you on behalf of the entire Committee for all of your service to the NRC.

Last week marked 11 years of continuous service as Commissioner for Chairman Svinicki. This is unprecedented. So far, her tenure as Chairman has been very productive. Last September Chairman Svinicki and then-Wyoming Governor Mead signed an agreement in Cheyenne, Wyoming. The agreement allows the State of Wyoming to license and regulate uranium recovery facilities.

It has been a long time priority for me. Thank you for your leadership to assure the agreement was signed in a very timely manner.

Affordable, reliable electricity powers a strong economy. Nuclear energy is by far the most reliable carbon-free energy source. Nuclear energy also provides more than twice the amount of elec-

tricity as wind and solar combined. Nuclear power provides about 60 percent of our Nation's emissions-free energy. If we are serious about climate change, we must be serious about expanding our use of nuclear energy.

In 2018, nuclear energy generated a record breaking amount of electricity in the United States. Regrettably, last year's record will not be broken again unless we take dramatic action. Two nuclear power plants will close this year. An additional eight reactors are expected to close between 2020 and 2022. We need to work to reverse this trend.

Shuttering nuclear plants not only reduces the amount of dependable energy produced, it also increases a plant's regulatory costs since fewer plants are available to fund the Commission's work. In this regard, I am pleased the Commission has submitted a smaller budget that reflects the reduced workload.

I encourage the Commission to continue to find ways to make their work more efficient. For example, the Commission staff should focus their efforts on issues of greatest safety significance. This would not only reduce budgetary demands, it would also allow nuclear reactor operators to focus on the most important safety issues.

Predictable and transparent budgets should align with predictable and transparent regulations. The Commission's completion of a major rulemaking in January I believe did just that. This rulemaking requires nuclear power plants to be prepared for an unforeseen emergency. It is an accumulation of years of work in response to the 2011 nuclear crisis in Japan. I look forward to hearing more about the rulemaking.

In addition to maintaining predictable requirements for existing nuclear reactors, the Commission must also establish the rules for new nuclear technologies. That is why I was pleased that President Trump signed into law the Nuclear Energy Innovation and Modernization Act in January. A number of us cosponsored this bipartisan legislation. I cosponsored it, along with seven members of our Committee, to help American nuclear innovators develop, license, and deploy advanced nuclear technologies.

These new technologies could increase safety, could decrease costs, and could reduce nuclear waste. They are also necessary to achieve low carbon energy future for our country and the world.

America has always been the global leader in nuclear technology. We can't allow our international rivals to surpass us. The Commission plays a vital role in this global competition. The Commission should prioritize activities to advance American nuclear leadership. For example, new and upgraded fuel types, known as accident-tolerant fuel, can improve safety, make plants more cost efficient, and generate less waste. This is a win-win-win.

While we seek to reestablish American leadership for nuclear reactor operation and technology, we must not disregard the dire outlook of American uranium production. Last year, two American uranium companies petitioned the Department of Commerce to consider the national security impacts of uranium imports. I support this review.

The deadline for the Administration's response to the petition is approaching. The Administration must take meaningful steps to

maintain and grow American uranium production. Our American uranium industry must not be forced out of business due to unfair competition driven by Russia and other nations.

It is also critically important for the Federal Government to properly manage and dispose of our Nation's spent nuclear fuel and nuclear waste. I am pleased the Commission's budget requests \$39 million to resume its review of the Yucca Mountain site, as required by law. Congress should support this request.

I would now like to turn to Ranking Member Carper for his statement.

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

Senator CARPER. Thanks, Mr. Chairman. Thanks for bringing us all together.

It is good to see each of you here before us today.

Madam Chair, a pleasure.

And to our former Chairman, I just want to echo the words of our Chairman John Barrasso to thank you for a lifetime of service to this country.

He has expressed my thoughts on the need for more carbon-free electricity—not less—and nuclear has provided anywhere from 60 to 70 percent of our carbon-free electricity for some time. It is dropping now, as you know, but I think we have an opportunity and I think an obligation to try to make sure it doesn't drop much further. And if we can somehow reverse that, we ought to do so.

But we are here today to continue our oversight of the Nuclear Regulatory Commission and to hear more about the President's budget proposal for fiscal year 2020. It is my sincere hope that today's hearing is just the beginning of other hearings on our Committee's budget over the agencies for which we have jurisdiction.

Since joining this Committee, I have worked closely with our colleagues to strengthen the culture of safety, worked closely with you to strengthen the culture of safety, and within the U.S. nuclear industry itself. In part, due to our collective efforts, and thanks to the NRC leadership and the Commission's dedicated staff, the NRC continues to be the world's gold standard for nuclear regulatory agencies.

However, we are here to look forward, not look back, and we need to ensure that the NRC continues to have the tools that it needs to be successful and to be safe. We also need to ensure that the NRC's actions taken this year have safety in mind in order to ensure that America's nuclear power remains the safest in the world.

Today I am interested in—and I think we are interested in—learning whether the President's budget, which I believe falls short in a number of areas, will provide the NRC with sufficient funding to protect the public, while being responsive to the legitimate needs of the industry that is being overseen.

While most any organization needs strong leadership, as I like to say, it is always the key to success. I don't care what the organization is, leadership is always the key. A dedicated work force is certainly helpful, and the appropriate resources don't hurt, either.

I support improving the NRC's efficiency and its flexibility to respond to the changes in the nuclear industry; however, we cannot cut the agency's budget just for the sake of cutting. We must ensure that the NRC has adequate funding to continue to attract the best and brightest talents so that the agency continues to be the global standard for safety.

Beyond the budget, I am particularly interested in hearing today more about why the NRC decided to change courses regarding the post-Fukushima rule. Our nuclear reactors must be able to withstand seismic or flooding events, regardless of when the reactors were built. Requiring our nuclear reactors, most of which were built decades ago, as you know, to withstand earthquake and flooding risks beyond the capacity of their original design doesn't make much sense to me.

This issue goes well beyond being able to withstand a similar event that occurred in Fukushima. As we continue to see the worsening effects of climate change nationwide, our nuclear fleet will experience flooding, experience drought and other extreme weather more frequently. As we saw a year or two ago in Ellicott City, Maryland, not far from here, and recently in the Midwest, 1,000-year flooding events are happening every couple of years, not every 1,000 years, and we need for our nuclear fleet to be prepared for this new climate reality.

Why the NRC has decided to reverse course from its proposal and make these protections voluntary is still unclear to me, especially since, according to the NRC's own staff, no one asked for this change; not industry, not staff, no one. With that said, I look forward to learning more today from the NRC about why its members decided to take this approach.

I am also interested in hearing today how the NRC plans to implement changes in the advanced nuclear reactor licensing framework, as Congress directed in the recently passed Nuclear Energy Innovation and Modernization Act that the Chairman has alluded to. This legislation was supported by the Chairman, by me, I think many members of our Committee, and it is a good legislation.

I believe that if our country is smart—and we are—we will replace older nuclear technology with new technology developed right here at home. That includes advances that are safer, produce less spent fuel, and are cheaper to build and to operate. In doing so, we can reap the economic benefits, along with the clean air benefits of a new, advanced nuclear electricity generation.

In closing, let me again reiterate the importance of making sure that the NRC has the resources that you need to review these new technologies and to ensure that our current nuclear fleet remains safe far into the future.

I want to thank our Commission for being here today. We look forward to your testimonies. Welcome.

I am going to have to slip out for a few minutes, but I will be back, and I look forward to a robust round of questions and answers.

Thank you.

Senator BARRASSO. Thank you, Senator Carper.

We are now going to hear from our witnesses. We will start with the Chairman, Kristine Svinicki, and then move to Commissioner

Jeff Baran, Commissioner Stephen Burns, Commissioner Annie Caputo, and Commissioner David Wright.

We are going to continue with the Committee's practice of a 5-minute opening statement from Chairman Svinicki and the 2-minute statements from each of the other Commissioners.

I want to remind the witnesses that your full testimony will be part of the official hearing record.

Chairman Svinicki, please proceed.

**STATEMENT OF KRISTINE SVINICKI,
CHAIRMAN, U.S. NUCLEAR REGULATORY COMMISSION**

Ms. SVINICKI. Thank you.

Good morning, Chairman Barrasso, Ranking Member Carper, and Senators Gillibrand and Cramer, and other distinguished members of the Committee who may join us. My colleagues and I appreciate the opportunity to testify this morning on the U.S. NRC's fiscal year 2020 budget request.

The funding we are requesting provides the resources necessary to accomplish our mission to license and regulate the civilian use of radioactive materials to ensure adequate protection of public health and safety, and to promote the common defense and security.

The NRC's fiscal year 2020 budget request, including resources for the NRC's Office of the Inspector General, is \$921.1 million, which would include 3,062 full-time equivalent positions, or FTE. The fiscal year 2020 budget request represents an increase of \$10.1 million when compared to the fiscal year 2019 enacted budget. This requested increase in resources is due principally to the inclusion of \$38.5 million to support licensing activities for the proposed Yucca Mountain deep geologic repository for spent fuel and other high level radioactive waste.

The NRC proposes to recover \$759.6 million of the requested budget from fees assessed to NRC's licensees and applicants. This will result in a net appropriation of approximately \$161 million with, again, \$38.5 million of that to be derived from the Nuclear Waste Fund.

The NRC has initiated efforts to implement requirements of the Nuclear Energy Innovation and Modernization Act and is progressing in each area to ensure timely implementation of the Act's requirements. The budget also proposes \$15.5 million for the continued development of a regulatory infrastructure for advanced nuclear reactor technologies.

We are mindful of the importance of the highly skilled staff that we have and the need to maintain our expertise while our workload continues to evolve. In addition, the NRC's focus on transformation and innovation continues. The Commission has met with NRC staff and external panels that included the nuclear industry, other Federal agencies with ongoing innovation efforts, and non-governmental organizations to discuss the NRC's staff's efforts, and we have also explored broader organizational strategies and innovation perspectives from a range of external experts.

In summary, the fiscal year 2020 budget request reflects the NRC's continuing efforts to achieve efficiencies while maintaining

reasonable assurance of adequate protection of public health and safety and safeguarding the security of our Nation.

On behalf of the Commission, thank you for the opportunity to appear before you and for the Committee's consistent support and oversight of NRC's important mission.

Before I conclude, I would like to add my recognition and thanks to former Chairman Stephen Burns and Commissioner. I think of the members of the Commission, I may have known him the longest. He was Deputy General Counsel when I joined the Commission, was then General Counsel, left for a time, and came back and was both my Chairman and my colleagues. I consider him a friend. He is a pleasure to work with.

We all think about the last day we might have on the job, but I think if any of us could leave the NRC with the amount of respect and esteem that Steve commands throughout the NRC, it would be a significant accomplishment.

So thank you, and I look forward to questions.

[The prepared statement of Ms. Svinicki follows:]



Kristine L. Svinicki
Chairman
Nuclear Regulatory Commission

The Honorable Kristine Svinicki was designated Chairman of the U.S. Nuclear Regulatory Commission by President Donald J. Trump on January 23, 2017. She is currently serving her third term, ending June 30, 2022. She began her service on the Commission in 2008.

Chairman Svinicki has a distinguished career as a nuclear engineer and policy advisor, working at the state and federal levels of government, and in both the legislative and executive branches.

Before joining the NRC, Svinicki spent over a decade as a staff member in the United States Senate advancing a wide range of policies and initiatives related to national security, science and technology, and energy and the environment. She also served as a professional staff member on the Senate Armed Services Committee where she was responsible for the Committee's portfolio of defense science and technology programs and policies, and for the atomic energy defense activities of the U.S. Department of Energy, including nuclear weapons, nuclear security, and environmental programs.

Previously, Svinicki worked as a nuclear engineer in the U.S. Department of Energy's Washington, D.C. Offices of Nuclear Energy, Science and Technology, and of Civilian Radioactive Waste Management, as well as its Idaho Operations Office, in Idaho Falls, Idaho. Before that, she was an energy engineer with the State of Wisconsin at the Wisconsin Public Service Commission in Madison, Wisconsin.

Born and raised in Michigan, Svinicki earned a bachelor's degree in nuclear engineering from the University of Michigan in 1988. She is a longstanding member of the American Nuclear Society and the Society has twice honored her with its Presidential Citation in recognition of her contributions to the nuclear energy policies of the United States. Chairman Svinicki was named Woman of the Year by the Women's Council on Energy and the Environment in 2013. She was selected as a Stennis Congressional Fellow of the 108th Congress and as a Brookings Institution Legis Congressional Fellow in 1997. She has been honored by the University of Michigan, College of Engineering as its 2009 Alumni Merit Award recipient for Nuclear Engineering and Radiological Sciences and, in 2017, was awarded the College's Alumni Medal.

WRITTEN STATEMENT
BY KRISTINE L. SVINICKI, CHAIRMAN
UNITED STATES NUCLEAR REGULATORY COMMISSION
TO THE
SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
APRIL 2, 2019

Good morning Chairman Barrasso, Ranking Member Carper, and distinguished members of the Committee. My colleagues and I appreciate the opportunity to testify this morning on the U.S. Nuclear Regulatory Commission's (NRC) Fiscal Year (FY) 2020 budget request.

The NRC is an independent Federal agency established to license and regulate the civilian use of radioactive materials in the United States to ensure adequate protection of public health and safety and to promote the common defense and security. The funding that we are requesting for FY 2020 provides the resources necessary to accomplish the NRC's mission while improving the agency's efficiency and effectiveness.

This testimony will also provide an update on the NRC's ongoing regulatory activities and our continuing efforts to adopt efficiencies and streamline agency processes where possible, while continuing to uphold the agency's important safety and security mission. In addition to our inspection and oversight programs, areas of significant activity include overseeing new reactor construction, reviewing applications for small modular reactors (SMRs), preparing to review advanced non-light water reactor designs and accident tolerant fuel (ATF) designs, and conducting reviews of applications for subsequent license renewal and consolidated interim spent fuel storage facilities.

We recognize that the agency needs to enhance our use of risk-informed, innovative approaches and embrace new and diverse ideas in a changing regulatory environment. If the number of operating plants continues to decrease in the coming years, the agency's budget will reflect appropriate and commensurate decreases. The NRC will continue to improve the accuracy and realism of its cost and schedule projections for regulatory actions so that the Congress, the public, and regulated entities will be more fully informed.

FY 2020 BUDGET REQUEST

The NRC FY 2020 budget request, including resources for the NRC's Office of the Inspector General (OIG), is \$921.1 million, including 3,062 full-time equivalents (FTE). The FY 2020 budget request represents an increase of \$10.1 million, or 1.1 percent, when compared to the FY 2019 enacted budget. This requested increase in resources is due to the inclusion of \$38.5 million, including 77 FTE, to support licensing activities for the proposed Yucca Mountain deep geologic repository for spent nuclear fuel and other high-level radioactive waste.

In FY 2020, the NRC proposes to recover \$759.6 million of the requested FY 2020 budget from fees assessed to NRC licensees and applicants. This will result in a net appropriation of \$161.5 million, which is an increase of \$31.4 million when compared to the FY 2019 enacted budget, with \$38.5 million to be derived from the Nuclear Waste Fund for licensing activities related to Yucca Mountain.

FY 2019 Proposed Fee Rule

I would like to turn briefly to some key elements of the FY 2019 Proposed Fee Rule. Annually, the NRC adjusts its licensing, inspection, special project, and annual fees charged to its

applicants and licensees. These adjustments are necessary to implement the requirements of the Omnibus Budget Reconciliation Act of 1990. The Act requires the NRC to recover approximately 90 percent of its annual budget through fees. Based on the Act and the FY 2019 enacted budget, the following items are excluded from the fee-recoverable portion of the budget in the FY 2019 Proposed Fee Rule: international activities, advanced reactor technologies regulatory infrastructure activities, generic homeland security activities, Waste Incidental to Reprocessing activities, and Inspector General Services for the Defense Nuclear Facilities Safety Board.

Based on the FY 2019 enacted budget, the NRC is currently proposing to collect \$781.9 million in fees for FY 2019, a decrease from \$789.3 million in FY 2018. Proposed annual fees for FY 2019 have increased for operating reactors, some materials users, and Department of Energy (DOE) transportation activities, while the annual fees for spent fuel storage/reactor decommissioning, research and test reactors, fuel facilities, and the facilities covered by the DOE Uranium Mill Tailings Radiation Control Act Program have decreased. Proposed annual fees for non-DOE uranium recovery licensees remained unchanged.

The NRC held a public meeting on the proposed fee rule on February 13, 2019, which included presentations relating to budget formulation. The public comment period for the FY 2019 Proposed Fee Rule ended on March 4, 2019. Regulated entities continue to express concerns regarding fee increases, particularly in areas where the number of licensees is declining. The NRC is mindful of the impact on fees as the number of licensees declines within a fee category. Our goal is to ensure that fees are equitable, fair, and transparent. We monitor these dynamics and seek to mitigate the impact on the remaining licensees, where possible.

FY 2020 Budget Request

I would now like to highlight specific elements of the FY 2020 budget request.

Nuclear Reactor Safety

The NRC's Nuclear Reactor Safety Program encompasses licensing and oversight of civilian nuclear power plants, research and test reactors, and medical isotope production facilities to protect public health and safety. This program contributes to the NRC's safety and security strategic goals through the activities of the Operating Reactors and New Reactors Business Lines that regulate existing and new nuclear reactors and medical isotope production facilities to ensure their safe and secure operation.

Overall resources requested in the FY 2020 budget for Nuclear Reactor Safety are \$449.5 million, including 1,824 FTE. This represents a funding decrease of \$9.9 million when compared to the FY 2019 enacted budget. Primarily, the reduction is a result of activities associated with the planned merger of the Office of Nuclear Reactor Regulation (NRR) and the Office of New Reactors (NRO). These two program offices are on track to integrate by October of this year, earlier than previously planned. The merger of NRR and NRO will provide flexibility and improved agility to manage uncertainties associated with the workloads in both the Operating Reactors and New Reactors Business Lines. In addition, there will be efficiencies gained and elimination of redundancies in certain technical programs, administrative support, and supervisory and management oversight. The budget request also proposes \$15.5 million for the continued development of a regulatory infrastructure for advanced nuclear reactor technologies.

Operating Reactors

The Operating Reactors Business Line portion of the Nuclear Reactor Safety Program encompasses the regulation of 96 operating civilian nuclear power reactors and 31 research and test reactors. The NRC is requesting \$361.6 million for operating reactors, including 1,485 FTE, which represents a decrease of \$3.6 million from the FY 2019 enacted budget. When compared to the FY 2019 enacted budget, the resources for research activities appear to increase because \$10.4 million was funded through the application of authorized prior-year carryover in FY 2019. Overall, resources decrease when compared to the FY 2019 total budget authority.

The decrease in funding within the Operating Reactors Business Line is primarily due to the permanent closure of Oyster Creek Nuclear Generating Station and the pending closures of the Pilgrim and Three Mile Island reactors. The decrease is also a result of fewer requests from the States for replenishment of potassium iodide supplies, efficiencies in processing licensing actions, and the completion of post-Fukushima flooding and integrated assessment work. The NRC is reviewing three applications for subsequent license renewal for Turkey Point Nuclear Generating Station in Florida, Peach Bottom Atomic Power Station in Pennsylvania, and the Surry Power Station in Virginia. If approved, they would extend operations at each of these plants for an additional 20 years.

The NRC is committed to enabling the safe use of existing and new technologies, especially those that have the potential to increase safety at NRC-regulated facilities. The U.S. nuclear industry, with DOE's assistance, is planning to deploy ATF in the operating fleet by the mid-2020s. In 2018, the NRC developed a project plan to align agency regulatory readiness with industry and fuel vendor plans for regulatory submittals. In FY 2020, the NRC staff will continue

to engage with vendors, licensees, DOE and other stakeholders to ensure all sides are prepared for licensing and oversight of ATF.

New Reactors

The New Reactors Business Line portion of the Nuclear Reactor Safety Program is responsible for licensing and overseeing the design, siting, and construction of new nuclear power reactors, including SMRs and advanced reactors, in an efficient manner. The new reactors activities are designed to ensure that new civilian nuclear power reactor facilities are developed in a manner that protects the health, safety, and security of the public.

The FY 2020 budget request for new reactors is \$87.8 million, including 339 FTE, a funding decrease of \$6.3 million when compared to the FY 2019 enacted budget. The decrease in funding within the New Reactors Business Line is primarily due to delays in application submittals, projects nearing completion, and efficiencies gained in several critical areas, including the merger of NRR and NRO. During FY 2020, the NRC expects to continue reviewing the reactor design certifications for the NuScale SMR and the U.S. Advanced Pressurized-Water Reactor (a large light water reactor), as well as the renewal of General Electric-Hitachi's Advanced Boiling-Water Reactor design certification.

The NRC is accelerating its activities related to the development of regulatory infrastructure to support reviews of advanced reactor technologies. Regarding future new reactors, the NRC continues to interact with vendors about prospective SMR and advanced reactor applications. Additionally, we will continue to refine our regulatory processes as we prepare to review these potential applications.

Nuclear Materials and Waste Safety

The Nuclear Materials and Waste Safety Program is responsible for licensing, regulating, and overseeing nuclear materials in a manner that adequately protects the public health and safety. The agency's work provides assurance of the physical security of the materials and waste and protection against radiological sabotage, theft, or diversion of nuclear materials. Through this program, the NRC regulates uranium processing and fuel facilities; research and pilot facilities; and other nuclear materials licensees such as medical, industrial, research, and academic uses. Additionally, through this program, the NRC regulates: spent fuel storage; spent fuel and other nuclear material transportation and packaging; decontamination and decommissioning of facilities; and low-level and high-level radioactive waste.

The FY 2020 budget request for this program is \$165.7 million, including 564 FTE. This funding level represents an increase of \$34.7 million when compared to the FY 2019 enacted budget. This increase is due to the inclusion of \$38.5 million in the budget request for continuing licensing activities for the proposed Yucca Mountain deep geologic repository for spent nuclear fuel and high-level radioactive waste.

Spent Fuel Storage and Transportation

The Spent Fuel Storage and Transportation Business Line is responsible for licensing and overseeing the safe and secure storage of spent fuel and the safe and secure transport of radioactive materials. The FY 2020 budget request for spent fuel and transportation is \$24.2 million, including 101 FTE. When compared to the FY 2019 enacted budget, the resources for licensing activities appear to increase because \$2.4 million was funded in FY 2019 through the application of authorized prior-year carryover. However, resources decrease when compared to the FY 2019 total budget authority. In addition to licensing and overseeing independent spent

fuel storage installations, transportation packages, and storage casks, this business line has two reviews under way for consolidated interim spent fuel storage facilities – one submitted by Holtec International for a proposed facility in New Mexico and another requested by Interim Storage Partners for a facility in Texas. The NRC anticipates the completion of both reviews by mid-2020.

Nuclear Materials Users

The Nuclear Materials Users Business Line portion of the Nuclear Materials and Waste Safety Program supports the licensing and oversight necessary to ensure the safe and secure processing and handling of radioactive materials in medical, industrial, and academic applications. This business line also provides Tribal coordination and programmatic oversight of Agreement States that have assumed NRC regulatory authority under the Atomic Energy Act of 1954. The FY 2020 budget request for nuclear materials activities is \$59.1 million, including 205 FTE, a funding decrease of \$1.4 million when compared to the FY 2019 enacted budget. The recent agreement with the State of Wyoming was signed on September 25, 2018, and became effective on September 30, 2018. The State of Vermont has applied to become an Agreement State and, if approved, would bring the total number of Agreement States to 39 by FY 2020.

Decommissioning and Low-Level Waste

The Decommissioning and Low-Level Waste (LLW) Business Line portion of the Nuclear Materials and Waste Safety Program supports licensing and oversight of uranium recovery facilities, sites undergoing decommissioning, and disposition of LLW from all civilian sources. The FY 2020 budget request for decommissioning and LLW is \$22.9 million, including 93 FTE, an overall funding decrease of \$1.9 million when compared to the FY 2019 enacted budget as a result of overseeing fewer operating uranium recovery facilities, completing support to the State

of Wyoming for the Agreement State transition, and nearing the expected license terminations for the former Humboldt Bay Power Plant in California, Zion Nuclear Power Station in Illinois, and LaCrosse Boiling Water Reactor in Wisconsin. The FY 2020 budget request provides funding for a number of major activities to include oversight of the national LLW management program, monitoring of DOE's Waste Incidental to Reprocessing determinations and related disposal actions at the Savannah River Site and the Idaho National Laboratory, and decommissioning activities for four research reactors and 20 power reactors.

Fuel Facilities

The Fuel Facilities Business Line portion of the Nuclear Materials and Waste Safety Program is responsible for ensuring that commercial nuclear fuel cycle facilities are licensed and operated in a manner that adequately protects public health and safety and promotes the common defense and security. The FY 2020 budget request for fuel facilities is \$21 million, including 88 FTE, which represents a funding decrease of \$2.2 million when compared to the FY 2019 enacted budget. This decrease in funding is primarily due to an expected decline in work associated with license renewal applications, a decrease in the anticipated number of license amendments, efficiencies gained as a result of changes to the Fuel Facilities Inspection Program and workload projections, a reduction in rulemaking activities involving enhanced security for special nuclear material, and elimination of workload associated with the Mixed-Oxide Fuel Fabrication Facility.

High-Level Waste

The High-Level Waste Business Line portion of the Nuclear Materials and Waste Safety Program supports the NRC's activities for the proposed Yucca Mountain deep geologic repository for the disposal of spent nuclear fuel and other high-level radioactive waste using

appropriations from the Nuclear Waste Fund. The FY 2020 budget request for high-level waste is \$38.5 million, including 77 FTE. The FY 2020 resources would include support for the adjudicatory proceeding; infrastructure activities for facilities and information technology (IT) capabilities; rulemakings associated with the geologic repository operations area; and related support activities such as acquisitions, recruitment, staffing, and training.

The NRC continues to provide monthly updates to Congress on its activities in response to the decision issued by the U.S. Court of Appeals for the District of Columbia Circuit in *In re Aiken County*; these updates provide information on our effort to effectively spend the remaining limited unobligated carryover funds appropriated from the Nuclear Waste Fund for Yucca Mountain activities. At the beginning of FY 2019, there was approximately \$430,000 remaining.

Corporate Support

The NRC's corporate support involves centrally managed activities that are necessary for agency programs to operate and achieve goals more efficiently and effectively and includes acquisitions, administrative services, financial management, human resource management, IT and information management, training, outreach, and policy support. The FY 2020 requested budget for corporate support comprises approximately 32 percent of the agency's total budget and reflects a decrease of \$0.4 million when compared to the FY 2019 enacted budget. Within the Corporate Support Business Line, \$6.6 million was funded in FY 2019 through the application of authorized prior-year carryover. However, when compared to the FY 2019 total budget authority, the FY 2020 budget request reflects a decrease of \$7.0 million. The budget request supports continuing efforts to modernize IT, leverage common contracts and best practices to drive cost reductions and efficiencies, improve the management of major

acquisitions, focus on the highest value work, and improve the customer experience with federal services.

Office of the Inspector General

The NRC's Office of the Inspector General (OIG) is a statutory entity whose mission is to independently and objectively audit and investigate programs and operations to promote effectiveness and efficiency, and to prevent and detect fraud, waste, and abuse. The FY 2020 budget request for the NRC OIG is \$13.3 million, which includes \$11.3 million in salaries and benefits to support 63 FTE and \$2.0 million in program support. These resources will support OIG auditing and investigation functions for both the NRC (\$12.1 million) and the Defense Nuclear Facilities Safety Board (\$1.2 million).

CHANGING REGULATORY ENVIRONMENT

The NRC has initiated efforts to implement requirements of the "Nuclear Energy Innovation and Modernization Act," which was signed into law on January 14, 2019. The legislation changes the way the NRC determines how fees are assessed to licensees and applicants, including limiting the annual charge to each operating reactor licensee, and includes requirements related to our fee invoicing process. The Act also specifies a cap on the percentage of the annual budget request that the NRC can devote to corporate support costs. These fee- and budget-related requirements take effect on October 1, 2020 (FY 2021). In addition, the legislation requires the NRC to take certain actions related to the licensing process for advanced reactors and research and test reactors while soliciting input from the Department Of Energy, industry, a diverse set of technology developers, and other public stakeholders. The legislation also includes a number of other provisions related to various topics. The NRC is progressing in each area to ensure timely implementation of the Act's requirements.

In January of this year, the NRC directed the staff to publish the Mitigation of Beyond-Design-Basis Events Rule, based on lessons learned from the March 2011 accident at Japan's Fukushima Daiichi plant. This rule is the result of seven years of activities that have tangibly enhanced safety at U.S. nuclear power plants. The NRC and its nuclear power plant licensees will continue to monitor and review post-Fukushima efforts outside of the rulemaking context, including analyses of whether additional safety improvements are necessary in response to updated site-specific seismic and flooding risk assessments.

We are mindful of the importance of a highly skilled staff and the need to maintain our expertise while our workload continues to evolve. Strategic Workforce Planning is vital to helping the NRC identify the knowledge, skills, and abilities necessary to perform our mission now and into the future. In addition to our continuing efforts to find efficiencies, use resources wisely, and streamline processes, the NRC has undertaken additional initiatives to ensure that our workforce is trained, equipped, and resourced to address current and future challenges.

The NRC's focus on transformation and innovation continues. At last year's hearing, we reported that the Executive Director for Operations had established a Transformation Team whose charter was to identify potential transformational changes to our regulatory framework, culture, and infrastructure. In October of 2018, the Commission held a public meeting, entitled *Transformation at the NRC*. At this meeting, the Commission met with NRC staff and two external panels that included nuclear industry, other Federal agencies, and non-governmental organizations to discuss the NRC staff's recommendations in a paper that is now before the Commission. The Commission has scheduled a second public meeting on this topic.

Separately, the agency sought assistance from a consulting firm to evaluate how industry and the NRC's regulatory environment might look in 2025 and beyond. In January 2019, the NRC published a report on those findings. The report, entitled "*The Dynamic Futures for NRC Mission Areas*," describes four possible scenarios or hypotheses to inform the agency's near- and mid-term planning related to budget, workload, workforce issues, agency organization and structure, and opportunities to innovate. The NRC staff is currently evaluating the report and will prepare a paper seeking Commission approval by June 30, 2019. This paper will discuss how the staff will monitor conditions to determine which scenarios may be unfolding and will identify actions that would be beneficial to meet the future regulatory environment.

CLOSING

In conclusion, safety and security have always been the main focus of the NRC. The FY 2020 budget request reflects the NRC's continuing efforts to achieve additional efficiencies while maintaining reasonable assurance of adequate protection of public health and safety and the security of our Nation.

Chairman Barrasso, Ranking Member Carper, and distinguished members of the Committee, this concludes my written testimony. On behalf of the Commission, thank you for the opportunity to appear before you and also 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 "Oversight of the Nuclear Regulatory Commission"
April 2, 2019

Chairman Barrasso:

QUESTION 1. This year the Commission is spending about \$20 million in carryover funding from Fiscal Year (FY) 2018.

a) What is the current projected amount of carryover funding expected to remain at the end of FY 2019?

b) How is NRC accounting for projected carryover as it proceeds with the final fee rulemaking for FY 2019 and the FY 2020 budget management planning process?

ANSWERS.

a) As of April 30, 2019, the projected amount of fee-based unobligated carryover expected to remain at the end of FY 2019 is in the range of \$20 million to \$30 million. The agency continues to refine its projection for fee-based unobligated carryover funding as it completes its mid-year review.

b) With respect to FY 2019, the Omnibus Budget Reconciliation Act of 1990 (OBRA-90), as amended, requires the NRC to recover approximately 90 percent of its annual appropriated budget through fees, less certain amounts excluded from this fee-recovery requirement. Fees are collected on new appropriations only. The NRC does not assess fees in the current fiscal year for any carryover because carryover is appropriated in previous fiscal years and fees would have been assessed in the fiscal year in which it was appropriated. The FY 2020 budget request does not assume the use of any carryover. The NRC provides information to Congress regarding carryover balances throughout the year, such as in the monthly Congressional Status Report submitted in accordance with section 402(e) of the Energy and Water Development and Related Agencies Appropriations Act, 2019.

QUESTION 2. The shrinking number of licensees in the fuel cycle facilities fee class may place additional resource constraints on NRC's fuel cycle regulatory and oversight programs.

a) Last year, NRC staff proposed adjusting the fee calculation for fuel cycle facility licensees. Is NRC committed to providing predictable annual charges for fuel cycle facility licensees?

b) How is NRC aligning staff needs to reflect the limited number of fuel cycle licensees?

ANSWER.

a) The NRC is committed to using a fair, equitable, and transparent process for its decisionmaking, including with respect to how fees are calculated each year. The fees assessed to licensees and applicants by the NRC must conform to OBRA-90, which requires the NRC to collect approximately 90 percent of its annual appropriated budget (less certain excluded items) through both user fees and annual fees. Regarding the fuel facilities fee class, the NRC has taken steps to right-size the budget to ensure that it reflects the reduced workload in the business line. In a public meeting conducted on February 13, 2019, on the FY 2019 proposed fee rule, the NRC provided an overview of the Fuel Facilities Business Line budget, which included a discussion of major activities, the budget planning process (e.g., workload forecasting, types of work, and inspection activities), and 10 CFR part 170 user fees and 10 CFR part 171 annual fees for the fuel facilities fee class.

The NRC provides cost estimates for common licensing and inspection services on the NRC's public website. The available cost estimates are offered to enhance stakeholder awareness of the costs associated with these services and to aid licensees and applicants in the planning and budgeting of future applications. These cost estimates are developed through a sampling of historic actions, and actual costs may vary depending on the specific circumstances. The NRC

encourages licensees and applicants to engage the NRC early in the process when submitting new licensing requests. Licensees are encouraged to work with their NRC project manager to discuss details of any specific application.

b) The NRC continues to look for efficiencies within the fuel facilities program. The Fuel Facilities Business Line is focusing efforts to align the agency's program of work in the fuel facilities area to workload projections and continuing to risk-inform the regulatory framework for these activities. In the coming months, the NRC will be sharing opportunities for the public and industry to engage in these efforts with a goal of identifying and realizing additional efficiencies in the licensing and oversight of fuel facilities while maintaining adequate protection consistent with the NRC's mission.

QUESTION 3. The Office of Nuclear Regulatory Research conducts research to support other NRC program offices. The supporting offices provide funding to the research office to carry out research activities.

a) Please provide the total Office of Nuclear Regulatory Research budget for FY 2018 and projected total budget for FY 2019. Please break down the funding office and provide a description of each project.

ANSWER.

Office of Nuclear Regulatory Research Budget for FY 2018 and FY 2019

| Business Line | Funding Office | FY 2018 Resources Enacted and Carryover * | | | FY 2019 Resources Enacted and Carryover * | | |
|--|--|---|-----|-------------|---|-----|-------------|
| | | \$ K | FTE | \$ Total | \$ K | FTE | \$ Total |
| Operating Reactors | Office of Nuclear Reactor Regulation | 38,229 | 180 | 69,699 | 33,766 | 183 | 67,433 |
| New Reactors | Office of New Reactors | 7,009 | 17 | 10,056 | 6,533 | 21 | 10,468 |
| Spent Fuel Storage and Transportation | Office of Nuclear Material Safety and Safeguards | 745 | 2 | 1,106 | 630 | 2 | 1,009 |
| Nuclear Materials Users | | 0 | 1 | 175 | 0 | 1 | 184 |
| Decommissioning and Low-Level Waste | | 150 | 1 | 329 | 300 | 1 | 488 |
| Total | | 46,133 | 201 | 81,365 | 41,229 | 208 | 79,583 |
| * Resources for the Integrated University Program are not included in this table. Authorized prior-year carryover of \$7.7 million in FY 2018 and \$10.4 million in FY 2019 are included in the table. | | | | | | | |

Office of Nuclear Regulatory Research – Project Descriptions

| Technical Area | FY18/19 Project Title | Description | Business Line(s) |
|------------------------------------|---|--|----------------------------------|
| Seismic | Seismic Analysis and Evaluation | This research assesses the probability and consequences of seismic events for nuclear facilities, including Commission-directed activities following the Fukushima earthquake and tsunami. Objectives include updated seismic hazard assessments and ground motion models. | Operating Reactors, New Reactors |
| Structural and Geotechnical | Structural and Geotechnical Evaluations | This research assesses the integrity of structural elements of nuclear facilities (e.g., walls, foundations, and supports), including their ability to withstand design basis impacts and loads. A key research focus area is to evaluate aging-related degradation of concrete structures during long-term reactor operation. | Operating Reactors, New Reactors |
| Instrumentation and Controls (I&C) | Safety of I&C | This research primarily supports the implementation of Commission direction to modernize the regulatory infrastructure for digital I&C, including the assessment of issues such as common cause failure and embedded digital devices. | Operating Reactors |
| | Security of I&C | This research primarily supports the assessment of cybersecurity risks and threat mitigation for nuclear facilities, as well as evaluating the effects of electromagnetic pulses and geomagnetic disturbances on nuclear facilities. | Operating Reactors |
| Electrical | Cable and Equipment Aging | This research assesses the integrity and reliability of cables and electrical equipment in nuclear power plants. A key research focus area is to evaluate aging-related degradation of cables during long-term reactor operation. | Operating Reactors |
| | Electrical System Evaluation | This research assesses the reliability of electrical power systems at nuclear power plants, including batteries, breakers, and switchgear. | Operating Reactors |
| Materials Performance | Evaluation Techniques | This research evaluates the efficacy of non-destructive examination methodologies for nuclear power plant components, including new and emerging technologies proposed by | Operating Reactors |

| Technical Area | FY18/19 Project Title | Description | Business Line(s) |
|----------------------|--|--|---------------------------------------|
| | | industry to improve the reliability and efficiency of examinations. | |
| | Integrity Analysis Tool Development and Guidance | This research develops computational tools to independently confirm licensee analyses for the failure of piping systems using probabilistic fracture mechanics, thereby supporting safety evaluations and reviews of inspection relief requests. | Operating Reactors |
| | Steam Generator Integrity | This research provides support for evaluating steam generator tube inspection methodologies and integrity analyses. A key focus is new and emerging technologies proposed by industry to improve the reliability and efficiency of examinations. | Operating Reactors |
| | Materials Degradation, Analysis, and Mitigation Techniques | This research assesses the corrosion and irradiation-assisted degradation of reactor components. A key research focus area is to evaluate aging-related degradation of reactor vessel internals during long-term operation. | Operating Reactors |
| | Piping and Other Components Integrity | This research provides support for developing computational models to analyze the structural integrity of reactor components, thereby supporting safety evaluations and reviews of inspection relief requests. | Operating Reactors, New Reactors |
| | Vessel Integrity (reactor pressure vessel and internals) | This research assesses the structural integrity of the reactor pressure vessel, particularly irradiation-induced embrittlement. | Operating Reactors |
| | Storage (Dry Cask, Transportation) | This research assesses the potential for corrosion or aging-related degradation of spent nuclear fuel dry storage casks, as well as the efficacy of in-service non-destructive examination methodologies. | Spent Fuel Storage and Transportation |
| Operating Experience | Accident Sequence Precursor Program | This Commission-directed program maintains the NRC's tool for long-term risk-informed trending of industry-wide operating experience of all events that occur at U.S. commercial nuclear power plants. | Operating Reactors |
| | Reactor Operating Experience Program | This program provides up-to-date event frequencies and component reliabilities for use in NRC and licensee probabilistic risk assessment (PRA) | Operating Reactors |

| Technical Area | FY18/19 Project Title | Description | Business Line(s) |
|----------------------------|---|---|----------------------------------|
| | | models to support plant licensing and oversight activities. | |
| External Hazards | External Hazards Analysis | This research involves assessing external hazards in PRAs, including the Commission-directed Process for Ongoing Assessment of Natural Hazards Information (POANHI) effort. | Operating Reactors |
| | Probabilistic Flood Hazard Assessment Research | This research activity will provide improved guidance and tools for probabilistic assessment of flooding hazards and potential impacts to structures, systems and components for use in the oversight of operating facilities as well as licensing of new facilities. | Operating Reactors, New Reactors |
| Human Factors Research | Drug-and-Alcohol-Related Fitness-for-Duty and Fatigue Management Research | This research activity ensures that the NRC's regulations are consistent with up-to-date information on rapidly evolving drug and drug-test subversion technologies needed to provide effective oversight of licensees' fitness-for-duty programs. | Operating Reactors |
| | Safety Culture Inspections and Technical Assistance | This activity provides technical expertise related to human and organizational performance to support the agency's safety culture and policymaking activities. | Operating Reactors |
| Human Reliability Research | Human Reliability Analysis Data Collection | This Commission-directed research effort involves obtaining up-to-date human reliability analysis (HRA) data to support PRA analyses and improved realism. | Operating Reactors |
| | Human Reliability Analysis Methods | This research effort was initiated from Commission direction to reduce variability in the use of HRA methods contributing to the variability of PRA/HRA results. | Operating Reactors |
| Fire Research | Fire Risk Training | This program supports the agency's policy to increase the use of PRA technology by providing training for fire protection programs in fire PRA, circuit analysis, fire analysis, HRA, and advanced fire modeling. | Operating Reactors |
| | High-Energy Arc Faults Testing | This activity involves performing experiments to obtain data on the high-energy arc fault (HEAF) phenomena to develop an improved mechanistic model to account for failure modes and | Operating Reactors |

| Technical Area | FY18/19 Project Title | Description | Business Line(s) |
|---|--|---|----------------------------------|
| | | consequence portions of HEAF. This research entails characterizing and understanding HEAF hazards to reduce uncertainties and provide realism in fire PRA in the area of HEAF modeling. | |
| | Support for Fire Protection Activities | This research involves the development and implementation of tools, methods, and data to improve realism in fire PRAs to support risk-informed decisionmaking. | Operating Reactors |
| Risk Analysis Research | Risk Analysis Research | This activity includes research to maintain state-of-the-art risk assessment methods, tools, data, and technical information to support the agency's safety mission and increasing use of risk-informed regulatory decisionmaking. | Operating Reactors |
| | Development and Enhancement of NRC Risk Analysis Tools | This activity includes the development and enhancement of risk analysis tools to provide the agency with the capability to perform independent risk assessments and supports risk-informed regulatory activities. | Operating Reactors, New Reactors |
| | Level 3 PRA Project (full site, multi-unit risk assessment) | This Commission-directed activity involves research on the state-of-practice methods, tools, and data reflecting advances in the application of PRAs to gain new insights on PRA for enhancing the agency's capabilities for regulatory decisionmaking. | Operating Reactors |
| Guidance and Standards | Development of Technical Guidance for Implementation of Risk-Informed Activities | This research supports the development of consensus standards on PRA and guidance on the application of approaches and methods in support of risk-informed decisionmaking. | Operating Reactors, New Reactors |
| Accident Progression and Source Term Analysis | MELCOR Code Development and Maintenance | The MELCOR computer code is a tool used to evaluate severe accident analysis and potential source term generation for nuclear reactors and spent fuel pools under design basis accident and beyond-design-basis conditions. | Operating Reactors, New Reactors |
| | Severe Accident Verification and Validation | Severe accident experimental research provides a valuable phenomenological behavior assessment basis and validation framework to help ensure that the NRC will continue to have available | Operating Reactors, New Reactors |

| Technical Area | FY18/19 Project Title | Description | Business Line(s) |
|-------------------------------|---|---|-------------------------------------|
| | | audit tools that are sufficiently sophisticated to confirm industry calculations submitted to the NRC. | |
| | Accident Progression and Source Term Analysis | Accident progression analyses, generally using MELCOR, support independent regulatory decisionmaking through confirmatory safety reviews of power plant operator actions, license amendment requests, and design certifications. | Operating Reactors, New Reactors |
| Consequence Analysis | MACCS Code Development, Maintenance, Verification, and Validation | The MACCS computer code is a tool used to evaluate consequence analysis from potential severe accidents of nuclear reactors and spent fuel pools under beyond-design-basis conditions. | Operating Reactors, New Reactors |
| | WinMACCS, MeMACCS, and SECPOP Code Development and Maintenance | The WinMACCS and MeMACCS computer codes provide a graphical user interface, code-to-code coupling, post processing, and uncertainty analysis; and SECPOP provides estimated population and economic data to support MACCS analysis. | Operating Reactors, New Reactors |
| | Consequence Analysis | Offsite consequence analysis, generally using MACCS, helps inform the technical bases and cost-benefit analyses in support of rulemaking, environmental, and regulatory decisionmaking. | Operating Reactors, New Reactors |
| Radiation Protection Analysis | Dose Assessment Code Development and Maintenance | The dose assessment computer codes (RASCAL, RADTRAD, GALE, and HABIT) are tools used to evaluate dose consequence calculations for accidents and events involving NRC-licensed facilities to confirm protective action recommendations and protective action decisions. | Operating Reactors, New Reactors |
| | Radiation Protection Code Development and Maintenance | The radiation protection assessment computer codes (VARSKIN, PiMAL, and RadToolbox) are tools used to evaluate radiation safety and protection of workers and members of the public from releases during normal and accident conditions. | Operating Reactors, New Reactors |
| | Decommissioning Code Development and Maintenance | The decommissioning assessment computer codes (DandD, VSP, MILDOS, and RESRAD) are tools used to evaluate long-term storage | Decommissioning and Low-Level Waste |

| Technical Area | FY18/19 Project Title | Description | Business Line(s) |
|-------------------------------|--|---|---|
| | | performance and associated evaluation of decommissioning actions. | |
| | Radiation Protection Analysis | Radiation protection analysis evaluates radiation protection and event data and monitors ongoing radiation health effects research to ensure that the NRC's system of radiation protection is adequately protecting public health and safety. | Operating Reactors, New Reactors, Nuclear Materials Users |
| Fuels and Neutronics Analysis | PARCS Code Development and Maintenance | The PARCS computer code is a tool used to evaluate core neutronic phenomena during core cycle analysis and is often coupled with TRACE to support thermal-hydraulic/neutronic systems analysis. | Operating Reactors, New Reactors |
| | SCALE Code Development and Maintenance | The SCALE computer code is a tool used to evaluate criticality safety, reactor physics, radiation shielding, radioactive source term characterization, and sensitivity and uncertainty analysis. | Operating Reactors, New Reactors |
| | FAST Code Development and Maintenance | The FAST computer code is a tool used to evaluate fuel performance under operating, anticipated transient and design-basis accident scenarios, evaluation of drying and long-term spent fuel storage, and confirmation of fuel safety criteria. | Operating Reactors, New Reactors |
| | Fuels and Neutronics Analysis | Fuels and Neutronics Analysis, generally using PARCS, SCALE, and FAST, supports independent regulatory decisionmaking through confirmatory safety reviews of power plant operator actions, license amendment requests (e.g., power uprates), and design certifications. | Operating Reactors, New Reactors, Spent Fuel Storage and Transportation |
| | Accident Tolerant Fuels | This activity supports independent and collaborative efforts in evaluating the technical bases and computer code capabilities for potential accident tolerant fuel (ATF) applications. | Operating Reactors |
| | | | |
| Thermal-Hydraulics Analysis | TRACE Code Development and Maintenance | The TRACE computer code is a tool used to evaluate coupled neutronic (with PARCS) and thermal-hydraulic transient behavior of nuclear reactor and plant systems under normal, abnormal, and accident conditions. | Operating Reactors, New Reactors |

| Technical Area | FY18/19 Project Title | Description | Business Line(s) |
|----------------|---|--|---|
| | Thermal-Hydraulic Verification and Validation | Thermal hydraulic experimental research provides a valuable assessment basis and validation framework to help ensure that the NRC will continue to have available audit tools that are sufficiently sophisticated to confirm industry calculations submitted to the NRC. | Operating Reactors, New Reactors |
| | Thermal-Hydraulic Analysis | Thermal-Hydraulic Analysis, generally using TRACE in concert with the Fuels and Neutronics codes, supports independent regulatory decisionmaking through confirmatory safety reviews of power plant operator actions, license amendment requests (e.g., power uprates), and design certifications. | Operating Reactors, New Reactors |
| | CFD Analysis | Commercial computational fluid dynamics (CFD) codes are used to conduct detailed thermal-hydraulic analysis to audit and confirm industry calculations submitted to the NRC and enhance system-level code predictive capability by examining an area or phenomena more closely. | Operating Reactors, New Reactors, Spent Fuel Storage and Transportation |
| | RSICC Support | The Radiation Safety Information Computational Center (RSICC) at Oak Ridge National Laboratory maintains a database of computer codes that the NRC uses to help with code distribution and minimally maintaining legacy codes. | Operating Reactors |
| | SNAP Code Development and Maintenance | The SNAP computer code provides a graphical user interface, code-to-code coupling, post processing, and uncertainty analysis for assessment codes such as TRACE, PARCS, FAST, MELCOR, RADTRAD, and SCALE. | Operating Reactors, New Reactors |
| Generic Issues | Generic Issues Program | These resources are for management of the NRC-wide Generic Issues Program, including meeting Commission reporting requirements and maintaining the public generic issues web page. | Operating Reactors |

b) What steps will the Commission take to increase transparency into the research office's activities?

ANSWER.

The Commission is taking several steps to increase transparency of budgeting and program execution for the Office of Nuclear Regulatory Research (RES). Since FY 2017, RES has grouped distinct research projects into separate financial accounting structures referred to as Enterprise Project Identifiers (EPIDs). The EPIDs structure facilitates tracking and reporting on the use of staff time and contract funds and provides insights into trends where resources are increasing or decreasing within a research area.

The Commission continues to emphasize transparency with respect to research progress and the anticipated outcomes of research activities. The Commission currently reports monthly to Congress on the initiation of new and significant research projects. Additionally, the Commission hosted a public briefing in May 2019 on the NRC research program and obtained external perspectives from representatives of industry, research laboratories, and academia.

RES staff also regularly makes presentations on research projects to the public and peers in the technical community at conferences, at working meetings, and during public meetings. RES has begun conducting program reviews with internal and external stakeholders to inform decisions on program activities. Additionally, the staff frequently gives public briefings on research activities to the Advisory Committee on Reactor Safeguards (ACRS). Also, the ACRS conducts a biennial review of the NRC research program with the findings reported to the Commission. These reviews are posted publicly on the NRC's website.

**c) How much of the research office's activities are conducted
through contracts with non-NRC entities?**

ANSWER.

RES has a total FY 2019 budget of \$41.2 million contracting dollars and 208 full-time equivalents (FTE), which equates to a total budget of \$79.6 million. Therefore, approximately

50 percent of the RES budget is used to fund contracts with non-NRC entities, the largest number of which are Interagency Agreements with Department of Energy (DOE) National Laboratories.

d) How many active contracts for FY 2019 research are funded with FY 2018 money?

ANSWER.

As of April 2019, RES has 199 active contracts that were funded with either FY 2018 or FY 2019 appropriations. Of those, 178 (89%) were funded, at least in part, with the FY 2018 appropriation, and there are 21 (11%) new contract awards with funds appropriated in FY 2019. It is typical for RES commercial contracts or Interagency Agreements to have a period of performance extending over more than one fiscal year to undertake long-term tests or studies. The average RES contract length is approximately 40 months.

QUESTION 4. NRC proposes an increase from its FY 2019 proposed budget of \$6.2 million to \$53.3 million of the Operating Reactor budget proposal to the Research program. The bulk of work in the Office of Research originates with user need requests from the Office of Nuclear Reactor Regulation (NRR). Given the overall reduction in licensing actions in the Office of Nuclear Reactor Regulation from 2017 to present as well as the anticipated closures of existing operating reactors, what additional research is required and why is the research budget not reducing by an amount commensurate with anticipated reactor shutdowns and reduced work load?

ANSWER.

The FY 2020 budget request for research activities within the Operating Reactors Business Line represents a decrease of \$4.2 million when compared to the FY 2019 total budget authority for these activities. In FY 2019, research activities within the Operating Reactors Business Line were funded, in part, through the application of authorized prior-year carryover, which is not reflected in the FY 2019 enacted budget. Specifically, the total FY 2019 resources for these research activities included the enacted budget of \$47.1 million and the authorized carryover of \$10.4 million, resulting in a total budget authority of \$57.5 million. Appendix I, "FY 2019 Total Budget Authority Comparison," in the FY 2020 Congressional Budget Justification provides additional details.

The general direction of research needs for the Operating Reactors Business Line continues downward with the closure of existing plants and the maturity of existing technology. However, the remaining plants continue to invest in new technology, capabilities to support operational flexibilities, and extended plant lifetimes. Additionally, research is needed to support new inspection methods, confirmatory analysis to support changes in power operation, agency readiness for ATF designs, and advanced manufacturing methods. Furthermore, the agency continues to invest in advancing risk-informed tools with a goal of focusing licensing reviews on the most risk significant activities.

QUESTION 5.

Advanced nuclear reactor designs will need fuel enriched at levels above what is currently commercially available. This fuel is known as high-assay, low-enriched uranium (HA-LEU).

a) Has NRC staff identified preliminary activities necessary to license, certify, and regulate HA-LEU fuel cycle facilities and transportation canisters?

b) Does NRC expect regulations of category-2 fuel cycle facilities will need revisions as part of HA-LEU efforts?

ANSWER.

a) Yes, the NRC staff has developed a strategy to ensure that it is ready to review potential applications for non-light water reactor technologies effectively and efficiently. In support of these activities, the NRC staff has reviewed available information on industry plans to produce, possess, and transport high-assay, low-enriched uranium (HALEU) material for use in light water reactors and advanced reactors. The staff has also discussed the fuel cycle industry's HALEU plans with industry representatives and potential applicants and intends to continue actively engaging stakeholders on these activities. Although not policy challenges, there are some issues that the industry would need to address to facilitate the production of HALEU and the fabrication of fuel using HALEU. Uranium enrichers produce uranium hexafluoride and ship it to fuel fabricators to be made into reactor fuel. Transportation shipping containers for HALEU in the form of uranium hexafluoride do not currently exist in a form that would make shipping economically feasible. Similarly, new shipping packages for fresh HALEU reactor fuel would need to be developed and certified. Additionally, there is currently a lack of criticality benchmarks, which are used in the verification of criticality computer codes, for uranium enrichments at the HALEU levels. Without these benchmarks, additional safety precautions would have to be added to ensure that an inadvertent criticality does not occur. The additional safety precautions, such as requiring smaller packages or less throughput in plant systems, could impact the design of the transportation packages themselves, as well as the facilities producing and using the HALEU.

b) No, the NRC staff expects to be able to license and regulate facilities that produce, possess, or use HALEU material without revising the regulations that apply to Category II facilities. Any

necessary requirements for the existing enrichment and fuel fabrication facilities could be established through issuance of orders or through the use of license conditions.

QUESTION 6. **Please describe specific actions of NRC's Accident Tolerant Fuels (ATF) licensing project plan which have been completed since September.**

a) What are the upcoming key milestones for NRC's ATF activities?

ANSWER.

Since issuance of the ATF Project Plan in September 2018, the NRC has been actively implementing the preparation strategy outlined in the plan. The NRC staff has completed the following activities since that time:

- Issued a draft regulatory issue summary (RIS) to solicit schedule information and to promote early and frequent communication with potential ATF applicants.
- Approved three transportation package authorizations to allow for the safe shipment of ATF lead test assemblies (LTAs) to reactor sites.
- Finalized a letter to industry documenting the NRC staff's position on the regulatory paths associated with the use of LTAs and submitted the letter to the Office of Management and Budget for review under the Congressional Review Act.
- Participated in and presented at six industry and NRC workshops and conferences to keep stakeholders aware of current activities related to implementation of the ATF Project Plan.
- Continued updating code architecture and incorporating materials property data of near-term ATF concepts in the NRC's suite of computational tools (e.g., FAST, TRACE, SCALE, and MELCOR) and began assessment activities.

- Held eight meetings with the nuclear fuel vendors to discuss and provide feedback on fuel qualification plans, testing matrices, phenomena important to safety, and licensing strategies for near-term ATF concepts.
- Held an internal NRC seminar to inform NRC staff of preparatory activities related to licensing ATF and potential future impacts on its work.
- Held monthly meetings with DOE ATF leads to enhance awareness of activities and promote early understanding and resolution of issues.
- Engaged the DOE CASL team on opportunities to leverage CASL tools in ATF confirmatory calculations and licensing reviews.
- Initiated the phenomena identification and ranking table (PIRT) exercise for the chromium-coated cladding ATF concept. An initial report was issued in January 2019, and a PIRT panel discussion with externally solicited experts was held in April 2019.

a) The following table outlines key upcoming milestones, through the end of the calendar year, for continued implementation of the ATF Project Plan. Note that this schedule was devised to enable ample external stakeholder engagement.

| Upcoming Milestone | Date |
|---|----------------|
| Complete Final PIRT Report for Chromium-Coated Cladding | June 2019 |
| Issue Final Letter to Industry on Regulatory Paths for LTAs | June 2019 |
| Issue RIS Soliciting ATF Information from Fuel Vendors | July 2019 |
| Issue Draft Staff Review Guidance for Chromium-Coated Cladding for Public Comment | September 2019 |
| Complete Initial Plans for Enabling Burnup and Enrichment Extension | October 2019 |

| | |
|--|---------------|
| Issue Final Staff Review Guidance for Chromium-Coated Cladding | December 2019 |
| Receive First Chromium-Coated Cladding Topical Report for Review | December 2019 |

QUESTION 7. **Last year, the NRC established a “Transformation Initiative” to identify new and modern approaches to achieve the Commission’s mission in the 21st Century. In March, the Commission held its second meeting in six months to discuss this initiative.**

a) What are the next steps to develop and implement the initiative?

ANSWER.

The NRC transformation initiative is a broad-based effort to prepare organizational culture and processes to address a dynamic environment and become a modern, risk-informed regulator.

Key ongoing activities that will facilitate transformation, and their next steps, are as follows:

Futures Assessment — The Futures Assessment is an effort to gain insights into the NRC’s future beyond 2025 by considering a range of scenarios that will affect workload, workforce, and opportunities to innovate. Those insights will better inform decisions about how and when to adjust to those changes that might occur in 2025 and beyond. The next step is seeking broad agency staff input via the NRC Futures Jam, a multi-day, agencywide conversation in a virtual environment to discuss how we can prepare for the various ways the future may unfold and identify some actionable items. The NRC Futures Jam is scheduled for June 18-20, 2019.

Strategic Workforce Planning, Competency Modeling, and Learning Transformation —

Enhanced strategic workforce planning (SWP) is an NRC initiative to systematically integrate the agency’s workload projection, skills identification, human capital management, individual development, workforce management, and organizational size and structure decisions to improve the accuracy of estimated resource needs, as well as to develop insights on the

appropriate size, function, and number of offices and regions. In addition, the NRC has initiated competency modeling and learning transformation projects to identify tasks and behaviors that define successful performance for key regulatory skills and positions and set a baseline for agencywide training and qualification requirements. The next step is to complete SWP Phase II by the end of July 2019 and make a determination on SWP Phase III (full implementation). Building on the previous pilot, Phase II covers 11 offices that account for approximately 79 percent of the NRC workforce. Competency models for key skills are being developed in conjunction with SWP needs.

Transformation Paper — In May 2018, the NRC staff provided SECY-18-0060, "Achieving Modern Risk-Informed Regulation," to the Commission. In this paper, the NRC staff has requested Commission approval of several significant and specific revisions to the NRC's regulatory framework and approaches to better enable the safe and secure use of new technology in civilian nuclear applications. This paper also provided information on several activities that are currently underway or will be implemented as a result of the transformation initiative, including actions to enhance and sustain a culture that embraces transformation at the NRC. The Commission has held two public meetings to gather insights and opinions to inform its deliberations on the paper as well as broader transformation issues.

Innovate NRC Activities — In April 2017, the NRC created an Agency Innovation Forum with the mission to promote and foster innovation at the NRC and directed the creation of office-level innovation programs. The purpose of these innovation programs is to encourage the submission of ideas by staff; cultivate, evaluate, and process those ideas; provide feedback to staff on submitted ideas at each stage in the process; coordinate with other existing processes; and present staff-submitted ideas along with recommendations to management for decision on implementation. The next step is creation of an innovation engine (and process model) to set

clearer expectations for idea creation, adopt an enterprise-wide strategy for office forums, and ensure a process for prioritization and staffing of ideas.

Collectively, these transformation initiatives represent the NRC's strategy to assure that the agency will have the workforce and tools to remain ready to accomplish its safety and security mission today and in the future.

QUESTION 8. **Last year, the Halden Research Reactor in Norway was permanently closed. This reactor provided unique testing capabilities. How is NRC collaborating, where appropriate, with the Department of Energy and industry stakeholders to replace capabilities lost due to the closure of Halden?**

ANSWER.

The Halden Boiling Water Reactor (HBWR) provided irradiation and testing capabilities for nuclear fuels and materials experiments, primarily through international cooperation in the Organisation for Economic Cooperation and Development Nuclear Energy Agency (OECD/NEA) Halden Reactor Project. The NRC sees the value and importance of irradiation testing capabilities for both fuels and materials data needs, particularly for currently licensed technologies, should a need arise for testing to confirm safety findings and for developing the safety basis for ATF. As a result, the NRC continues to engage DOE and industry stakeholders to pursue replacement capabilities for those lost due to the closure of the HBWR.

The NRC participated in a DOE-led Halden Capability Gap Assessment Workshop in July 2018. This workshop informed a report published by Idaho National Laboratory (INL) in December 2018, "Post-Halden Reactor Irradiation Testing for ATF: Final Recommendations," Revision 1 (INL/EXT-18-46101). This report identified the key fuels and materials experimental capabilities available at the HBWR, assessed capability gaps relative to ATF, and recommended actions to

address the identified gaps, including the use of INL's Advanced Test Reactor and Transient Reactor Test Facility. NRC input was incorporated into this report through participation in the July 2018 workshop and review of the draft report prior to final publication. Through public meetings and other interactions, the NRC continues to be engaged with the progress made by DOE and its industry partners in completing the technical basis for ATF concepts and the associated testing needs, consistent with the memorandum of understanding addendum between the NRC and DOE on ATF.

In addition, the NRC has been engaged and participated in workshops held by the OECD/NEA regarding a "Multinational NEA Framework for In-pile Fuel and Material Testing," including those held in January 2018, October 2018, and March 2019. These workshops have also been attended by DOE's national laboratory staff; U.S. industry researchers; U.S. fuel vendors; and international researchers, industry, and vendors. The objective of this NEA activity is to develop a framework to enable similar international cooperation as provided by the Halden Reactor Project for research at multiple test reactor facilities around the world. The NRC is closely engaged in these discussions and is considering options for participation as details become clearer.

The NRC has continued to participate in technical and management meetings of the Halden Reactor Project. The current 3-year Halden Reactor Project Agreement started in 2018 and ends in 2020. The Halden members, which include DOE and U.S. fuel vendors, are interested in and continue to discuss options for initiating fuels and materials tests at other facilities. The NRC, through its continued Halden membership, participates actively in these discussions. In addition, the NRC maintains its membership in the OECD/NEA Studsvik Cladding Integrity Project (SCIP) in Sweden, which provides access to fuels testing capabilities through international cooperation. Obtaining data from SCIP will support the NRC's evaluation of the

future anticipated licensing applications for higher burnup fuels, higher enrichment fuels, and new fuel forms such as ATF.

a) Does NRC foresee any gap in research and testing capabilities due to Halden's shutdown?

ANSWER.

Halden provided irradiation and testing capabilities for nuclear fuels and materials experiments through efficient international cooperation. For irradiated materials testing, the capabilities at Halden could be replicated at other facilities in the United States and internationally in the longer term (for example, at INL). However, the loss of Halden has significantly diminished the international capacity and expertise associated with conducting the long-term irradiation experiments necessary for materials research. It will take additional time and resources to reestablish appropriate capabilities at other facilities. In addition, the Halden Reactor Project afforded significant cost-sharing that enabled research at lower cost to the NRC and other U.S. members. As a result of these issues, the schedule and costs to implement the materials testing planned under the Halden Reactor Project will be substantially increased.

For fuels testing, the NRC is aware of efforts by DOE and international research organizations to upgrade existing facilities with new capabilities to address gaps in the absence of the HBWR. With implementation of proposed improvements to existing DOE and international facilities combined with the use of lead test assembly and lead rod irradiations at U.S. operating reactors, the NRC does not foresee a gap in research and testing capabilities for fuels in the longer term. However, until enhancements can be made or new facilities begin operation, vendors may face challenges in performing prototypic loss of coolant accident, reactivity insertion accident, and ramp testing to support deployment of near-term ATF concepts in the mid-2020s.

QUESTION 9. In 2006, NRC initiated a rulemaking associated with the regulation of uranium recovery facilities. In 2010, that rulemaking was paused while EPA proceeded with their regulatory agenda. NRC staff recognized the uranium producing industry has dramatically changed over the last decade. In January, NRC requested public comments on whether to resume the rulemaking. I understand NRC staff granted a request to extend the public comment period by 60 days. What is the path forward with this rulemaking and how long do you expect it to take?

ANSWER.

The NRC's purpose in initiating this rulemaking in 2006 was to standardize and streamline the licensing process for *in situ* uranium recovery facilities. On January 31, 2019, the NRC published a *Federal Register* notice (84 FR 574) requesting public comments on whether the NRC should resume this rulemaking. In response to a request by several non-governmental organizations, the NRC extended the closing date for the comment period by 60 days to May 3, 2019 (84 FR 6979). The NRC staff is reviewing the comments and developing a recommendation to the Commission on whether to proceed with this rulemaking. If the Commission determines that rulemaking is warranted, a specific schedule for completing the rulemaking would be determined based upon its priority and the availability of resources. In general, NRC rulemakings take 3 to 4 years to complete.

- QUESTION 10.** The Nuclear Energy Innovation and Modernization Act (NEIMA) requires that NRC report to Congress on the incorporation of consensus-based codes and standards into the regulatory framework to ensure predictability for the regulatory process and ensure timely completion of licensing actions.
- a) Is the Commission reviewing its process of accepting consensus standards?
 - b) Has the Commission identified a path forward to identify needs for new, and or updated standards?
 - c) Has the Commission reached out to scientific organizations, such as the American Nuclear Society, to assist in coordinating the input from the relevant Standards Developing Organizations?

ANSWER.

a) The NRC has an established process in place for accepting consensus codes and standards as described in the NRC Management Directive 6.5, "NRC Participation in the Development and Use of Consensus Standards," which was last updated on October 28, 2016. This process has been effectively applied to consensus standards for light-water reactors and is being utilized for consensus standards related to advanced non-light water reactors (non-LWRs). The process consists of three primary steps: (1) identifying and prioritizing the need for new and revised technical standards, (2) participating in codes and standards development, and (3) endorsing codes and standards.

To assure that the NRC is ready to review potential applications for non-LWR technologies effectively and efficiently, the staff developed a strategy to facilitate industry codes and

standards needed to support non-LWRs: "NRC Vision and Strategy: Safely Achieving Effective and Efficient Non-Light Water Reactor Mission Readiness," published in December 2016.

b) Working with DOE and the Standards Development Organizations (SDOs), the NRC is engaged in identifying and assessing gaps in standards for advanced reactors through various venues, including the NRC Standards Forum, the NRC Advanced Reactors Stakeholders Meetings, and SDO meetings. Based on stakeholder feedback, the NRC is currently placing a high priority on the endorsement of American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section III, Division 5, for high temperature materials and the non-LWR PRA standard being developed by the ASME/American Nuclear Society (ANS) Joint Committee on Nuclear Risk Management. The NRC is also actively participating in several ANS standards working groups and consensus committees, such as the one developing ANS 20.2, "Nuclear Safety Design Criteria and Functional Performance Requirements for Liquid-Fuel Molten-Salt Reactor Nuclear Power Plants."

c) The NRC works with the SDOs, non-LWR designers, DOE, and other stakeholders to assist in the coordination of the development of new codes needed for non-LWR development. On September 11, 2018, the NRC held the third annual NRC Standards Forum, chaired by the NRC's Standards Executive. Approximately 70 attendees participated, representing SDOs such as ASME, ANS, the American Society for Testing and Materials, and the Institute of Electrical and Electronics Engineers; the industry; the Electric Power Research Institute; and DOE and DOE national laboratories. Several action items were initiated from the Standards Forum, including (1) the Nuclear Energy Institute volunteered to survey its members to identify and prioritize standards of interest, thus providing an industry "demand signal" for standards developers and the NRC, and (2) DOE offered to assist stakeholders in the nuclear power industry to find information to support standards development, particularly for non-LWRs, through the DOE Gateway for Accelerated Innovation in Nuclear (GAIN) program. In addition,

the NRC worked with SDOs and other stakeholders during a May 2, 2018, workshop to develop a strategic vision for advanced reactors standards. This workshop provided an opportunity for designers, vendors, owners, regulators, and representatives of SDOs to discuss standards needs to support advanced reactors. There were over 85 meeting attendees. Insights from these workshops and other stakeholder engagement will inform NRC activities and priorities in the area of facilitating industry codes and standards needed to support non-LWRs and to inform the NRC's resource planning to prepare for NRC endorsement of consensus codes as appropriate.

QUESTION 11. NEIMA requires the NRC to use a risk-informed framework for the licensing and oversight of advanced nuclear technologies. FEMA's Technical Hazards Division (THD) provides input to NRC's emergency preparedness guidelines. The Radiological Emergency Preparedness (REP) Program coordinates planning, training and support policies for State, local, and tribal governments to respond to, and recover from potential incidents involving commercial nuclear power plants.

a) Advanced nuclear technologies may offer significantly improved safety margins over existing large, light-water reactor designs. This allows for the revision of current emergency planning zone requirements. Is NRC communicating and sharing its risk-based process for advanced nuclear technologies with FEMA's REP Program?

b) As NRC proceeds with implementing NEIMA, will NRC assure that emergency planning requirements are based on a risk-informed framework and communicate those requirements to FEMA?

ANSWER.

a) The NRC staff has communicated and shared its risk-informed process for advanced nuclear technologies with the Federal Emergency Management Agency's (FEMA) REP Program over the duration of the development of the consequence-oriented, risk-informed, performance-based, and technology-inclusive draft proposed rule on emergency preparedness for small modular reactors and other new technologies. The Commission is currently reviewing the draft proposed rule. The NRC engaged with FEMA during the development of the regulatory basis for the draft proposed rule and addressed FEMA's comments. Additionally, the NRC provides FEMA with regular briefings on the NRC's risk-informed process during the agencies' joint quarterly emergency preparedness steering committee meetings and annual In Progress Review meetings.

b) The draft proposed rule is consequence-oriented, risk-informed, performance-based, and technology-inclusive. If the Commission approves publication of the proposed rule, the NRC staff will continue to engage with FEMA in discussions on the risk-informed emergency planning framework. In addition, the NRC emergency preparedness staff regularly presents updates on this rulemaking and other topics of interest to the Federal Radiological Protection Coordinating Committee, which is chaired by FEMA and has representatives from 20 Federal agencies.

QUESTION 12. **The Operating Reactors Business Line (ORBL) budget is reduced by barely 1% as compared to the FY 2019 enacted budget. This reduction does not seem commensurate with the reduction in operating plants as well as the resulting reduction in work.**

a) Why isn't the proposed ORBL budget reduced by an amount commensurate with the anticipated reactor shutdowns by FY 2020?

- b) How did the NRC take future reactor shutdowns and decreased work load into account when formulating the ORBL budget?**
- c) What is the NRC doing in formulating its FY 2021 ORBL budget to better account for anticipated plant shut downs and a corresponding decrease in work load?**

ANSWER.

a) The FY 2019 total budget authority for the Operating Reactors Business Line included the application of authorized prior-year carryover (please refer to Appendix I, "FY 2019 Total Budget Authority Comparison," in the FY 2020 Congressional Budget Justification for a comparison of the FY 2020 budget request to the FY 2019 total budget authority). The FY 2020 request for the Operating Reactors Business Line represents a decrease of 4 percent, a decrease of \$14 million, including 48 FTE, when compared to the FY 2019 total budget authority. This decrease factored in the closures of Oyster Creek Nuclear Generating Station, the announced closure of the Pilgrim and Three Mile Island nuclear generating stations, and the corresponding work associated with these closures.

In addition, the FY 2020 request for the Operating Reactors Business Line includes a \$2 million increase in Information Technology (IT) resources largely due to a shift in IT resources from the Corporate Support Business Line to align Technical Library subscriptions and operations, and maintenance of the safeguards Local Area Network/Electronic Safe, with the mission area that they support.

b) The Operating Reactors Business Line factored in reductions in the following areas because of the closure of Oyster Creek Nuclear Generating Station and the announced closure of the Pilgrim and Three Mile Island nuclear generating stations: (1) inspections, (2) licensing actions, (3) allegations and investigations, (4) research work, (5) rulemakings, (6) supervisory staff, and (7) administrative assistants.

c) The FY 2021 budget request will account for the closures of the Duane Arnold Energy Center and Davis-Besse Nuclear Power Station, Unit 1. The NRC is using a systematic approach for reducing the Operating Reactors Business Line budget for FY 2021 and future fiscal years in response to announced plant closures and the impacted corresponding work. The agency will continue to monitor this approach and will adjust as needed.

QUESTION 13. **The only NRC product line components of the Operating Reactors budget request that show an increase over FY 2019 are Oversight and Research.**

a) The Oversight product line proposed increase is \$1.3 million to \$115.5 million. With the number of plants decreasing in FY 2020, why is the amount of Oversight budget increasing?

b) The NRC is currently considering a number of proposals through its Reactor Oversight Process enhancement effort that could potentially reduce inspection activities, and reduce the number of licensing actions that require NRC approval. How does the FY 2020 budget request account for these potential improvements?

ANSWER.

a) The Oversight product line reflects an increase due largely to a shift in IT resources from the Corporate Support Business Line to align Technical Library subscriptions and operations, and maintenance of the safeguards Local Area Network/Electronic Safe, with the mission area that they support. When excluding this increase, the Oversight product line decreased by \$2.4 million, including 15 FTE. This decrease is primarily due to the closures of Oyster Creek Nuclear Generating Station and the announced closure of the Pilgrim and Three Mile Island nuclear generating stations.

b) The NRC staff is currently preparing a paper to request Commission approval for changes to the Reactor Oversight Process (ROP). That paper will be provided to the Commission in late June 2019. This proposal is not reflected in the FY 2020 budget request because it has not yet been considered by the Commission.

Unrelated to the ROP enhancement effort, the NRC is pursuing various initiatives that could potentially reduce the future number of licensing actions that require NRC approval. These include risk-informed licensing approaches (e.g., Technical Specifications Task Force (TSTF) Traveler TSTF-505 and 10 CFR 50.69, "Risk-Informed Categorization and Treatment of Structures, Systems and Components for Nuclear Power Reactors") and the proposed rulemaking regarding facilities transitioning to decommissioning ("Regulatory Improvements for Production and Utilization Facilities Transitioning to Decommissioning," see SECY-18-0055). These initiatives may result in a long-term reduction in licensing actions submitted to the agency, but those reductions are not anticipated to occur during FY 2020 and therefore are not reflected in the FY 2020 budget request.

QUESTION 14. NEIMA made a significant change to what can be recovered through NRC's fee process. In particular, the NRC will not be bound to recover approximately 90% of its appropriated funds in licensee fees, and will have significant flexibilities in defining off-fee-base activities. Has the NRC begun to assess how it will determine how it will identify these activities in its FY 2021 budget formulation? If so, please describe this effort.

ANSWER.

The NRC is proactively planning for the implementation of the budget- and fee-related provisions in NEIMA beginning in FY 2021 and is currently formulating its FY 2021 budget for

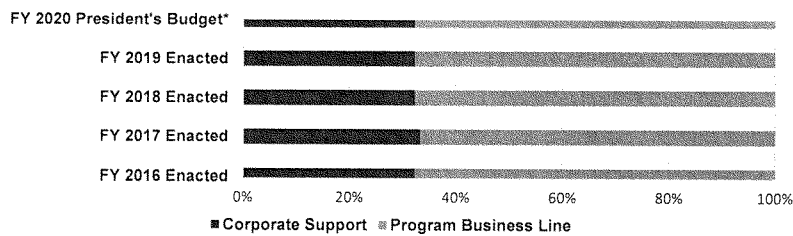
the Commission's consideration. This effort includes the identification of those excluded activities in accordance with the provisions of NEIMA.

QUESTION 15.

FY 2020 resources requested for NRC's Corporate Support activities are essentially flat compared to FY 2019 at \$293M. This level is roughly 32% of the total request and includes an increase of two FTEs. NEIMA will cap the NRC's proposed Corporate Support budget at 30% of the budget starting in FY 2021. It would seem appropriate to show progress to the 30% cap in FY 2020. How will NRC make the transition to this lower cap from FY 2020 to FY 2021?

ANSWER.

The FY 2020 President's Budget represents the required resources needed to support the agency's Corporate Support activities in FY 2020. The agency is continuing efforts to reduce the Corporate Support budget, and significant progress has been made in recent years. Since FY 2016, Corporate Support resources have declined by \$27.4 million, almost 9 percent, despite increased salaries and benefits costs. Due to the significant decline in programmatic resources over the past five years, the Corporate Support budget has remained at 32 percent.



| Fiscal Year | Total (\$K) | | | TOTAL (Includes OIG) | Percentage | | |
|-----------------------------|-------------|----------------------|------------------------------|----------------------------|------------|----------------------|-----------------------------|
| | OIG | Corporate Support | Program Business Lines | | OIG | Corporate Support | Program Business Line |
| FY 2020 President's Budget* | 13.3 | 292.6 | 615.2 | 921.1 | 1% | 32% | 67% |
| FY 2019 Enacted | 12.9 | 292.9 | 605.4 | 911.2 | 1% | 32% | 66% |
| FY 2018 Enacted | 12.9 | 301.4 | 637.8 | 952.1 | 1% | 32% | 67% |
| FY 2017 Enacted+ | 12.1 | 300.1 | 604.9 | 917.1 | 1% | 33% | 66% |
| FY 2016 Enacted | 12.1 | 320.0 | 670.0 | 1002.1 | 1% | 32% | 67% |

*High-Level Waste resources were requested for this FY.

+Beginning in FY 2017, resources for the Integrated University Program were included as part of the Program Business Line.

NEIMA requires that the annual budget justification submitted to Congress by the NRC in FY 2021, to the maximum extent practicable, request funding for corporate support costs in an amount that does not exceed 30 percent of the total budget authority requested for the NRC. Accordingly, as part of the FY 2021 budget formulation, the Commission is developing resource needs and is working to meet this cap for corporate support costs.

Senator Gillibrand:

QUESTION 16. Indian Point Unit 2 is scheduled to begin shutting down in roughly a year and will start decommissioning, and Unit 3 will follow a year later. I am concerned that the NRC's proposed decommissioning rule would put in place a standard timeline for reducing emergency preparedness and security requirements once a reactor has been shut down and the plant enters the decommissioning process. While I understand that the risks associated with a plant that is shut down are different from those for a plant with an operating reactor, I remain concerned about the prospect of spent fuel staying in the spent fuel pool for an unlimited period of time determined by the licensee.

a) Does the NRC intend to require licensees to have a plan for the on-site storage of spent nuclear fuel?

b) To what extent has the Commission examined the potential impacts of flooding, seismic events, natural disasters or potential acts of terrorism or sabotage on spent fuel pools at decommissioned plants?

c) Are there vulnerabilities that could be mitigated by transferring the spent fuel to dry cask storage?

ANSWER.

a) As described in its 1984 rulemaking (Requirements for Licensee Actions Regarding the Disposition of Spent Fuel Upon Expiration of Reactor Operating Licenses, 49 Fed. Reg. 34,688 (Aug. 31, 1984)), the Commission added 10 CFR 50.54(bb) to establish requirements that the licensee for an operating nuclear power plant reactor shall no later than 5 years prior to expiration of the reactor operating license submit plans for NRC review and approval of the actions that the licensee proposes for management of all irradiated fuel at the reactor upon expiration of its operating license. The licensee's plans must specify how the financial costs of extended storage or other disposition of spent fuel will be funded and the proposed disposition of all irradiated fuel from the reactor. The Commission's review will focus on the identification of discrepancies or omissions, and its approval will signify that, based on the information available at the time of filing the notification, the licensee's plans are sound and will provide adequate protection of the public health and safety and the environment. Between the Commission's preliminary approval of the plans and the date of expiration of the operating license, the licensee may propose for Commission consideration modifications or supplementation of its plans. Extended storage of spent fuel at a reactor beyond the expiration date of the operating license will require an amendment to the operating license to cover possession of the reactor and spent fuel under the requisite provisions of the Commission's regulations.

b) The NRC staff has taken extensive actions to understand and mitigate any challenges to the safety of fuel stored in spent fuel pools resulting from the effects of natural phenomena and postulated acts of terrorism or sabotage. These actions include the following:

- Reevaluated the effects of seismic events and flooding to ensure that the spent fuel pool and reactor are appropriately protected.
- Studied the response of the spent fuel pool structures to extreme seismic events and postulated acts of terrorism or sabotage.
- Developed models and performed tests to understand the response of fuel to pool drainage events and the effectiveness of various measures to maintain or restore effective cooling.
- Required licensees to implement reasonable and effective strategies to prevent or mitigate challenges to effective cooling of stored fuel, including
 - Controlling the configuration of fuel assemblies to enhance fuel cooling and expedited recovery from damage to the pool.
 - Staging equipment nearby to cool the spent fuel in an emergency.

These actions are applicable at both operating and decommissioning sites.

c) There are no design vulnerabilities that would be mitigated by transferring spent fuel to dry cask storage. Spent fuel must be stored in pools for a certain period of time, usually several years, before it has cooled enough to be placed in dry cask storage. As concluded in COMSECY-13-0030, "Staff Evaluation and Recommendation for Japan Lessons-Learned Tier 3 Issue on Expedited Transfer of Spent Fuel," the expedited transfer of spent fuel to dry cask storage would provide only a minor or limited safety benefit, and its expected implementation costs would not be warranted.

QUESTION 17. I am aware of the NRC's recent announcement that it will be holding a number of public meetings in communities near existing nuclear power reactors to inform the development of a report identifying the best practices for establishing local community decommissioning advisory boards. Will the NRC hold one of those public meetings in Westchester County, New York, near the Indian Point Energy Center, which is currently scheduled to begin shutting down and entering the decommissioning process a year from now?

ANSWER.

Over the next several weeks, the NRC staff will evaluate the requests that have been received in response to the NRC's recent *Federal Register* notice, using the direction provided in NEIMA regarding selection of meeting locations. We will consider a meeting near Indian Point Energy Center as we work through the site selection process..

QUESTION 18. I am very concerned about the shipments by truck on public roads of liquid high-level waste from Canada to South Carolina through communities in Western New York. I was particularly alarmed that these shipments were approved without a full Environmental Impact Statement to examine the potential risks of shipping liquid uranium.

a) What analysis has been done to examine the safety of shipping liquid high-level waste by truck over public roads?

b) To what extent does the NRC inspect these shipments to ensure that they are being done safely?

ANSWER.

a) The shipments of liquid high-level waste are being made under DOE's authority. While not required to meet NRC regulations to ship material, in the past, DOE has elected to meet both NRC and U.S. Department of Transportation (DOT) requirements when it makes shipments of spent fuel and other radioactive materials over the nation's highways. In its Radioactive Material Transportation Practices Manual, DOE indicates that it is committed to meeting or exceeding all NRC or DOT requirements that apply to comparable commercial shipments.

The NRC and DOT share oversight of domestic radioactive material transport when NRC licensees ship materials. DOT regulates shippers, vehicle safety, routing and emergency response, and shipper training. The NRC requires the shippers to develop detailed transportation safety and security plans before shipments can proceed over authorized routes.

Although not required to do so, DOE seeks NRC approval of its chosen transportation route when seeking to ship spent fuel. The NRC's analysis includes reviewing factors such as whether the proposed route includes locations of safe havens, transfer points for escorts, and provisions for sufficient and appropriate communication and coordination with local law enforcement.

b) The NRC does not inspect these shipments, which are being made under DOE's authority.

For the commercial shipments of radioactive material that are regulated by the NRC, the NRC certifies shipping containers for the more hazardous radioactive materials, including spent fuel and liquid radioactive waste. To be certified, a container must provide shielding from radiation exposure, dissipate heat, and prevent a nuclear chain reaction. In the United States and internationally, the containers must pass a series of tests that mimic normal and accident conditions. The NRC will issue a certificate of compliance (CoC) only if it determines that the

transportation cask design meets all applicable requirements, including requirements designed to prevent the loss of radioactive contents under both normal and accident conditions.

NRC regulations state that the licensee, certificate holder, and applicant for a CoC shall be responsible for the establishment and execution of a quality assurance program (QAP), which is reviewed by the NRC during the certification process. Before any domestic shipment can occur, the shipper is required to review the cask CoC to determine if any testing or maintenance is required to use the cask for the specific material being shipped. The shipper may be required to check or change package seals and other components or perform leak testing to ensure confinement. In addition, the shipper must take radiation measurements at specific locations on and around the package to make sure that the levels are below the required limits. The licensee, certificate holder, and applicant's execution of the QAP ensures that these activities are conducted appropriately.

QUESTION 19. **What steps does the NRC take to ensure that there are proper emergency preparedness measures in place to protect the communities that these shipments travel through?**

ANSWER.

DOE has the responsibility to ensure that there are proper emergency preparedness measures in place for these liquid high-level waste shipments from Canada to South Carolina. In its Radioactive Material Transportation Practices Manual, DOE indicates that it is committed to meeting or exceeding all NRC or DOT requirements that apply to comparable commercial shipments.

For the domestic transport of radioactive materials, the NRC shares oversight authority with DOT. The DOT regulates shippers and oversees vehicle safety, routing, shipping papers,

emergency response, and shipper training. The NRC requires the shippers to develop detailed transportation safety and security plans before shipments can proceed over authorized routes.

States are responsible for responding to accidents and incidents within their respective jurisdictions. Federal agencies, including DOT, DOE, and FEMA, provide support to States in the form of training and grants. The NRC requires the shipper to make advanced notification to the affected State and Tribal governments for this type of radioactive waste.

Senator Markey:

QUESTION 20.

The NRC recently decided to approve a license amendment to extend the operating life of the Seabrook Nuclear Power plant. The concrete at the plant is degrading, and some Massachusetts stakeholders have concerns about the scientific methodology underpinning the proposed new monitoring plans. The Atomic Safety and Licensing Board (ASLB) agreed to hear those concerns, but the NRC extended Seabrook's license before allowing that hearing to take place. They did not even wait for a decision on an emergency petition filed by C-10, a Massachusetts-based monitoring group.

- a) Please provide the timeline for when the Commission will decide on the emergency petition filed by the Massachusetts stakeholders.
- b) What will the NRC do to ensure that C-10's contentions and the opinion of their expert witness will be fully considered as the agency weighs the ability of Seabrook's concrete to protect the public as designed?

c) If the ASLB decides that C-10's contentions have merit, will the NRC require adjustments to the license amendment and license renewal that address the issues raised by the contentions?

ANSWER.

- a) The emergency petition filed by C-10 is currently under active consideration by the Commission.
- b) NRC adjudicatory proceedings are governed by the agency's rules of practice and procedure in 10 CFR Part 2. Under these rules, an Atomic Safety and Licensing Board—consisting of three administrative judges, one legal and two technical—will preside over the Seabrook hearing, which will be held in late September 2019. As the presiding officer for the proceeding, the Board ensures that each party, including C-10 and its experts, has an opportunity to submit written direct testimony, statements of position, and exhibits; C-10 will also have an opportunity to file written rebuttal testimony. The Board will then consider all of the evidence from the written filings and evidentiary hearing and issue its decision, which may be appealed to the Commission.
- c) If the Board rules in favor of C-10 following the evidentiary hearing, the other parties (NextEra and the NRC staff) may appeal the decision to the Commission. While the NRC's rules and the Atomic Energy Act (through a procedure specifically contemplated by the 1983 amendment of section 189a. of the Atomic Energy Act, 42 U.S.C. § 2239(b)(2)(A)) allowed the staff to issue the amendment prior to the hearing, if the hearing process (including the outcome of any appeal) results in a decision in favor of C-10, the NRC staff will take appropriate action to implement the decision with respect to the amendment and, if necessary, with respect to the renewed license.

QUESTION 21. The NRC granted proprietary status to parts of the Seabrook License Amendment Request.

a) Does this mean that the testing procedures and the test results cannot be peer-reviewed or assessed by the public?

b) What was the process by which the Ferguson Structural Engineering Lab at U-Texas Austin (FSEL) testing and results were granted proprietary status by the NRC?

ANSWER.

a) A majority of the content found in the documents submitted by NextEra to support its alkali-silica reaction (ASR) license amendment request is publicly available, and a member of the public is able to review and assess all of the publicly available material. The portions of the application that were considered proprietary to the licensee (proprietary commercial information) had to do with specific values related to the testing setup and results, such as the number of test specimens, exact size and other characteristics used to create the test specimens, the number of anchor bolt tests, and expansion limits. The NRC reviewed the application submitted by the licensee and, in accordance with 10 CFR 2.390, determined that the information sought by the licensee to be withheld was proprietary commercial information and should be withheld from public disclosure.

Although this information is withheld from the general public, those that filed for and were granted an opportunity for a hearing on this license amendment have been provided the withheld information subject to a protective order. This includes experts hired by the parties who would then have the opportunity to peer-review the information.

Prior to the staff's issuance of the ASR license amendment on March 11, 2019, the NRC staff presented its safety evaluation findings to the ACRS. The ACRS is independent of the NRC

staff and reports directly to the Commission. It is composed of outside experts in various technical fields. One of the ACRS's purposes is to review and report on safety studies and reactor facility license and license renewal applications. On December 14, 2018, the ACRS issued a letter to the Commission stating that the NRC staff's safety evaluation of the license amendment request provided thorough assessments and findings and that the ACRS agreed with the staff's conclusion that the proposed program for monitoring and managing the effects of ASR is acceptable.

b) The process set forth in 10 CFR 2.390 was used to determine whether the information sought by the licensee to be withheld was proprietary commercial information. As further discussed above, the NRC reviewed the application submitted by the licensee and, in accordance with 10 CFR 2.390, determined that the information sought by the licensee to be withheld was proprietary commercial information and should be withheld from public disclosure.

QUESTION 22. The latest annual assessment for Seabrook, which came out on March 4, shows only one more planned assessment of the degraded concrete, with no other samples planned beyond 2019. Over time, the structural damage is only likely to increase. Is the NRC no longer going to take samples of the concrete at Seabrook as part of its inspections at the plant? If not, why not?

ANSWER.

The issuance of the license amendment and renewed license for Seabrook established the programmatic requirements for monitoring and managing the effects of ASR in concrete structures at the facility. As part of its approval, the NRC added a condition to the Seabrook license ensuring that the licensee continues to gather and analyze expansion data of in-situ structures and that the structures' expansion behavior continues to align with the expansion

behavior seen in the test specimens. The NRC does not take concrete samples as part of the assessment of the degraded concrete, nor does the NRC take samples as part of its routine inspections.

Beginning in 2020, NRC oversight in this area will be integrated into the baseline inspection program. The NRC will consider those ASR-related activities planned by NextEra and input from NRC inspectors to determine what inspections are most appropriate to independently assess ASR-related activities at Seabrook. During inspections, the NRC staff assesses the licensee's implementation of its ASR program. If the licensee's program directs the licensee to take further concrete samples, then the NRC would assess whether the licensee properly followed its program (e.g., how it took the sample, how it evaluated the sample, and how the results were fed back into the program).

QUESTION 23. **The storage facility for high-level radioactive waste at Seabrook is already over-full. What is the plan going forward to deal with the more than double amount of waste that will be generated if the plant continues in operation until 2050?**

ANSWER.

Seabrook has an NRC-licensed Independent Spent Fuel Storage Installation (ISFSI) where spent fuel is stored in dry casks on site. The ISFSI can hold a total of 78 casks on its concrete pad. The ISFSI currently has 24 casks on the pad; 22 of these are full. Should the plant operate until the end of its license (2050), the current ISFSI would not be of sufficient size to hold the amount of spent fuel that would be generated. The licensee could apply for an amendment to its NRC license to expand the capacity of the current ISFSI (i.e., construct a second pad) to accommodate additional casks if an alternative solution for spent fuel storage is not available before it reaches capacity.

QUESTION 24. Press reports indicate that the update to the Reactor Oversight Process might come as soon as June. Can you commit to allowing the public to comment on the proposal before deciding on any changes? If not, why not?

ANSWER.

The ROP has elements that change every year based on feedback from the public, industry, and staff. In the June 2019 timeframe, recommendations for a number of changes will be sent to the Commission. Last year, the NRC received a number of recommendations from both internal and external stakeholders on ways that it could improve the ROP. While a majority of the feedback indicated that the ROP is a strong and effective oversight program, the NRC staff has evaluated the recommendations and identified several discrete, focused improvements that it plans to propose to the Commission. As discussed below, the NRC staff has provided a number of opportunities for public input into the recommendations.

In evaluating the recommendations, the NRC staff engaged in extensive outreach efforts to solicit input from external stakeholders, including the public and the nuclear industry. For example, the staff held over a dozen public meetings on the ROP enhancement project, including several all-day meetings. The NRC staff conducted targeted outreach with members of the public and non-governmental organizations with a known interest in the ROP before these meetings, and each meeting included time for public comment and discussion with NRC staff. The NRC staff also routinely provided information on the results of its review of the recommendations to external stakeholders through the NRC's public website in advance of those meetings to enable a more productive dialogue. The comments received during these meetings have been an integral component of the NRC's decisionmaking.

Overall, the NRC believes that the approach used to date has allowed ample opportunity for public comment, and the NRC commits to continuing such outreach activities as the proposed changes are dispositioned and as the NRC assesses the need for any additional ROP changes in the future.

QUESTION 25. **If a nuclear plant operator with control of a plant's Decommissioning Trust Fund does not spend all of the money in the trust fund during the decommissioning process, do current laws and regulations allow that company to keep the remaining funds, or are they returned to the ratepayers?**

ANSWER.

The NRC's authority as it pertains to funding for decommissioning ceases when a licensee has completed decommissioning as defined in 10 CFR 50.2 and the license has been terminated. At that time, the decommissioning trust fund would not be restricted by NRC regulations, and the decommissioning trust fund, including any remaining monies, would remain the responsibility of the licensee and be subject to applicable law, regulations, and the terms of any governing trust agreement.

QUESTION 26. **If a nuclear plant operator with control of a site's Decommissioning Trust Fund does not have enough money within the fund to pay for a plant's decommissioning, what tools does the NRC have to ensure that the licensee is responsible for all financial costs relevant to the decommissioning process?**

ANSWER.

At all times, the licensee has full responsibility to provide adequate funding for all NRC required decommissioning activities. The NRC oversees decommissioning activities and funding for all

licensees. Typically, nuclear power plant licensees demonstrate financial assurance for decommissioning through establishment of an external fund (commonly referred to as the decommissioning trust fund, or DTF), which is an account segregated from the licensee's assets and outside the administrative control of the licensee and its subsidiaries or affiliates. In the event of a shortfall, the NRC can require licensees to provide additional funding or guarantees from parent companies to ensure sufficient funds are available.

If a licensee decides to permanently cease operations before the scheduled end of its facility's operating life and, therefore, has not yet accumulated sufficient funds to decommission the plant immediately, the licensee may choose to place the plant into a safe storage condition (SAFSTOR) for an extended period (up to 60 years), as contemplated by NRC regulations. The SAFSTOR method allows for growth of the decommissioning trust fund over time for the licensee to accumulate sufficient funds to complete decommissioning and terminate the license.

In the event that a licensee files for bankruptcy under any chapter of Title 11 of the United States Code, the NRC's regulations (in 10 CFR 50.54(cc)(1)) require that licensees immediately notify the NRC of its filing, indicating the bankruptcy court in which the petition for bankruptcy was filed and the date of the filing. Licensees who have filed for bankruptcy remain responsible for all regulatory requirements and must comply with all applicable NRC requirements, including completing decommissioning. The NRC would continue to oversee decommissioning activities for licensees who have filed for bankruptcy throughout the bankruptcy proceeding and throughout decommissioning until the license is terminated. Any violations of NRC requirements, including decommissioning funding assurance requirements, would be subject to the NRC's enforcement authority.

In the event of a DTF shortfall, the NRC could increase its oversight of the decommissioning process and increase the licensee's reporting periodicity. Taken together, the NRC's regulatory structure, which requires annual decommissioning reports from the licensee, and the NRC's

enforcement authority allow the NRC to (1) detect DTF shortfalls early and (2) ensure that the licensee corrects these shortfalls.

Prior to entering decommissioning, licensees must certify to the NRC every 2 years that they have provided financial assurance for decommissioning in an amount that may be more, but not less, than the amount stated in the table of minimum amounts found in section (c) of 10 CFR 50.75, "Reporting and recordkeeping for decommissioning planning." Contributions and growth of the decommissioning trust fund are expected to be sufficient for radiological decommissioning and license termination.

While in decommissioning, the NRC oversees the licensee's decommissioning, including decommissioning funding. Specifically, the NRC staff reviews the licensee's decommissioning funding status reports, submitted to the NRC annually by March 31 of the reporting year. These reports include information on: (1) the amount spent on decommissioning, both cumulative and over the previous calendar year, the remaining balance of any decommissioning funds, and the amount provided by other financial assurance methods being relied upon; (2) an estimate of the costs to complete decommissioning, reflecting any difference between actual and estimated costs for work performed during the year, and the decommissioning criteria upon which the estimate is based; (3) any modifications occurring to a licensee's current method of providing financial assurance since the last report submitted; and (4) any material changes to trust agreements or financial assurance contracts. If the sum of the balance of any remaining decommissioning funds, plus earnings on such funds calculated at not greater than a 2 percent real rate of return, together with the amount provided by other financial assurance methods being relied upon, does not cover the estimated cost to complete the decommissioning, the decommissioning funding status report must include additional financial assurance to cover the estimated cost of completion.

QUESTION 27. Does the NRC require licensees to update environmental impact statements to include relevant climate impacts and other new data during the decommissioning planning process? If not, why not?

ANSWER.

No. Licensees are not required to update NRC environmental impact statements (EISs) during the decommissioning planning process. The NRC previously considered the environmental impacts of the nuclear plant and prepared these documents prior to the issuance of the construction permit and operating license(s). In conjunction with these licensing actions, licensees are required to prepare and update environmental reports – providing information that will aid the Commission in complying with section 102(2) of the National Environmental Policy Act (NEPA). Under NRC regulations, licensees do not need approval from the NRC to begin decommissioning activities, and there are no licensing actions associated with decommissioning that trigger NRC responsibilities under NEPA. Therefore, the NRC does not require licensees to provide climate impact information and other climate-related data during the decommissioning planning process. However, the NRC's decommissioning framework contemplates that site-specific decommissioning activities will be bounded by appropriate previously issued EISs (for example, EISs prepared at the time of initial licensing and, as applicable, license renewal).

In its 1996 final rule, the Commission determined that decommissioning activities would not likely result in significant site-specific impacts not previously reviewed in an EIS. Any decommissioning activities that could result in significant environmental impacts not previously reviewed would require a license amendment. During the decommissioning planning process, licensees are therefore required by NRC regulations, 10 CFR 50.82(a)(4)(i) and 10 CFR 52.110(d)(1), to discuss the reasons for concluding that the environmental impacts of decommissioning activities are bounded by previously issued EISs in their Post-Shutdown Decommissioning Activity Report (PSDAR). After submitting the PSDAR, the licensee must

remain in compliance with NRC regulations (10 CFR 50.82(a)(6)(ii) or 52.110(f)(2)). These regulations state that licensees may not perform any decommissioning activities that could result in significant environmental impacts not previously reviewed.

QUESTION 28. Does the NRC require preliminary reporting by license holders on the possible use of financial assets gained through legal avenues, such as suits brought against the DOE to use Nuclear Waste Funds, to be included as part of the overall plan and portfolio of license applicants?

a) Please provide any specific guidance issued by the NRC to this effect.

ANSWER.

There is no requirement for a licensee to report to the NRC its plans to use any assets acquired through legal proceedings. Moreover, there is no requirement that such assets be used for any specific regulated activity, such as decommissioning, spent fuel management, or other plant activities. However, should a licensee report to the NRC identification of such acquired assets, or soon-to-be acquired assets, as part of its plan to meet NRC decommissioning funding requirements, including a commitment to contribute such assets to its decommissioning trust fund, the NRC will assume that such funds will be used to meet such decommissioning funding requirements. Should the licensee alter its plan and choose not to use such funds for this purpose, the licensee would be required to provide alternative financial assurance to ensure the decommissioning trust funding requirements are met.

Pursuant to 10 CFR 50.54(bb), licensees are also required to submit to the NRC an irradiated fuel management plan (IFMP) within 2 years following permanent cessation of operation or 5 years before expiration of the reactor operating license, whichever occurs first. The IFMP must

describe the program by which the licensee intends to manage and provide funding for irradiated fuel until the fuel is transferred to DOE for ultimate disposal. In addition, pursuant to 10 CFR 50.82(a)(8)(vii), licensees in decommissioning must annually submit a report to the NRC on the status of its funding for managing irradiated fuel. As noted above, there is no requirement for a licensee to use any assets acquired through legal proceedings for spent fuel management. However, the licensee may choose to report to the NRC identification of such acquired assets, or soon-to-be acquired assets, as part of its spent fuel management funding plan.

The NRC has not issued guidance on this matter.

QUESTION 29. **Please describe any specific requirements of license applicants for information that could affect their access to funds that were created with taxpayer dollars, including the Nuclear Waste Fund or the Pilgrim Decommissioning Trust Fund.**

ANSWER.

NRC regulations governing issuance of a license require applicant information to be reviewed by NRC staff to determine the applicant's technical and financial qualifications and to ascertain that the proposed activities will not adversely affect public health and safety. Specific financial qualification requirements of applicants are located at 10 CFR 50.33, "Contents of applications; general information"; specific decommissioning funding requirements of applicants are located at 10 CFR 50.33(k)(1) and 10 CFR 50.75, "Reporting and recordkeeping for decommissioning planning"; and specific requirements governing the transfer of a license are located at 10 CFR 50.80, "Transfer of licenses." Both financial qualification and decommissioning funding requirements seek to ascertain that there is reasonable assurance that the applicant has access to funding to operate and decommission the facility. Should staff determine that the applicant

does not meet NRC licensing requirements and qualifications, including the financial qualification and decommissioning funding requirements, a license will not be issued.

Should an applicant meet the NRC's requirements for a license, access by the licensee to decommissioning funds is authorized by 10 CFR 50.82, "Termination of license."

Decommissioning trust funds may be used by a licensee if the withdrawals are for expenses for legitimate decommissioning activities consistent with the regulatory definition of decommissioning, the expenditures would not reduce the value of the decommissioning trust below an amount necessary to place and maintain the reactor in a safe storage condition if unforeseen conditions or expenses arise, and withdrawals would not inhibit the ability of the licensee to complete funding of any shortfalls in the decommissioning trust needed to ensure the availability of funds to ultimately release the site and terminate the license.

Taxpayer dollars do not fund the licensee's decommissioning trusts or the Nuclear Waste Fund. Power reactor decommissioning trusts are funded by electricity ratepayers. The Nuclear Waste Fund, established under the Nuclear Waste Policy Act of 1982, is funded by fees collected from electric utilities on nuclear-generated electricity.

Senator BARRASSO. Thank you, Madam Chairman.
Commissioner Baran.

Senator CARPER. That was lovely. That was lovely. I hope when we leave as members that our colleagues say things about us that was as poignant and as meaningful as that. Thank you for that.

Senator BARRASSO. Commissioner Baran.

**STATEMENT OF JEFF BARAN,
COMMISSIONER, U.S. NUCLEAR REGULATORY COMMISSION**

Mr. BARAN. Thank you for the opportunity to testify today. It is wonderful to be here with my colleagues.

During the past year, NRC received a number of ideas for transforming the way we do our work. I would like to briefly share my thoughts about how NRC should approach transformation.

In my view, it makes sense to consider transformational change when a new technology challenges NRC's existing regulatory approach or when the agency has historically struggled to regulate effectively in a particular area. For example, a strong case can be made for updating NRC's regulations to account for non-light water reactor technologies.

But when a regulatory process has worked well over the years, it is better to pursue targeted refinements aimed at solving clearly defined problems. Whether NRC is considering a major transformational change or a more modest incremental change, we must keep our focus squarely on our safety and security mission. Transformation at NRC can't be about rolling back safety and security standards to save money, and it can't be about fewer inspections or weaker oversight. That would take NRC in the wrong direction.

Several of the transformational ideas being discussed involve the reactor oversight process. This is NRC's basic framework for overseeing the safety of the Nation's nuclear power plants. It affects every power reactor in the country. I would be wary of making any radical changes to this program because it has generally been an effective safety framework.

One of the proposals I am particularly concerned about is to replace some core NRC inspections with self-assessments performed by licensees. These baseline inspections are essential, and NRC inspectors need to be independently conducting them. We should not allow licensees to inspect themselves. Doing so would be fundamentally inconsistent with our role as an independent nuclear safety regulator.

To do the best job for the American people, NRC needs to be open to new ideas and new approaches. But we also need to carefully and thoroughly evaluate the proposed regulatory changes to ensure that they will have a positive impact on safety. That is our core mission and must remain our top priority.

Thank you, and I look forward to your questions.

[The prepared statement of Mr. Baran follows:]



Jeff Baran
Commissioner
Nuclear Regulatory Commission

The Honorable Jeff Baran was sworn in as a Commissioner of the U.S. Nuclear Regulatory Commission on October 14, 2014. He is currently serving a term ending on June 30, 2023.

Since joining the Commission, Commissioner Baran's priorities have included ensuring effective implementation of safety enhancements in response to the Fukushima Daiichi accident, improving oversight of power reactors entering decommissioning, and boosting the openness and transparency of agency decisionmaking. He has

visited a number of NRC-licensed facilities, including operating power reactors, a nuclear plant undergoing active decommissioning, research and test reactors, fuel cycle facilities, a low-level waste disposal facility, and a variety of facilities using radioactive materials for medical and industrial purposes. Commissioner Baran also traveled to Fukushima Daiichi for a first-hand look at conditions and activities at the site.

Before serving on the Commission, Commissioner Baran worked for the U.S. House of Representatives for over 11 years. During his tenure with the Energy and Commerce Committee, oversight of NRC was one of his primary areas of responsibility. As a senior counsel and later as Democratic Staff Director for Energy and Environment, Commissioner Baran worked on a range of NRC issues, including new reactor licensing, existing reactor oversight and decommissioning, high-level and low-level waste, and uranium mining, milling, and enrichment. He worked to coordinate the efforts of six federal agencies, including NRC, and two Native American tribes to clean up uranium contamination in and around the Navajo Nation. He also helped negotiate bills related to pipeline safety, energy efficiency, hydropower, and medical isotopes that were enacted with bipartisan support. From 2003 to 2008, he was counsel to the House Oversight and Government Reform Committee.

Prior to his work on Capitol Hill, Commissioner Baran served as a law clerk for Judge Lesley Wells of the U.S. District Court for the Northern District of Ohio.

Born and raised in the Chicago area, Commissioner Baran earned a bachelor's degree and a master's degree in political science from Ohio University. He holds a law degree from Harvard Law School.

Senate Committee on Environment and Public Works
Hearing entitled, "Oversight of the Nuclear Regulatory Commission"
April 2, 2019
Questions for the Record for Commissioner Baran

Senator Gillibrand:

1. It is my understanding that some industry stakeholders are advocating for changes to the NRC's process for conducting baseline inspections of nuclear plants to reduce the number and frequency of inspections, and also allow for licensee self-assessments in areas including emergency preparedness. I am concerned about the potential safety implications of making baseline inspections less frequent should the NRC decide to go in that direction.
 - a. Are industry self-assessments an acceptable substitute for inspections conducted by NRC inspectors?
 - b. Should cost considerations factor into the NRC's decision-making on whether to adopt proposals that would reduce baseline inspection requirements?

Response:

No, NRC should not replace NRC inspections with self-assessments performed by licensees. Since the beginning of the Reactor Oversight Process, these foundational, baseline inspections have always been viewed as necessary for every nuclear power plant in the country. These inspections are essential, and NRC inspectors need to be independently conducting them. Our independent inspectors find problems that licensees do not. And licensees perform better and more safely with NRC performing rigorous independent oversight. I do not support reducing safety inspections in order to save money.

2. The NRC recently voted 3 to 2 that nuclear licensees would not have to use the most up-to-date data on flooding and earthquake hazards when preparing for disasters. I was alarmed by this decision, particularly considering the fact that the Fukushima accident was caused in part by flawed, decades-old calculations that were not required to be updated along with progressions in science. As one of the dissenters in that vote, can you speak to why it is necessary to use the most recent scientific data in order to assure that our nuclear power plants operate safely?

Response:

In the aftermath of the Fukushima accident, licensees and the NRC staff spent years using the latest science and modern methods to determine the present-day flooding and earthquake hazards for the nation's nuclear power plants. The final rule approved by the Commission majority allows licensees to ignore these reevaluated hazards with their strategies to mitigate beyond-design-basis events. Instead of requiring nuclear power plants to be prepared for the actual flooding and earthquake hazards that could occur at their sites, NRC will allow them to be prepared only for the outdated hazards typically calculated decades ago when the science of seismology and hydrology was far less advanced than it is today. As a result, the final rule developed by the majority does nothing to enhance the safety of nuclear power plants.

The natural hazards facing nuclear power plants are not static. We know from the Fourth National Climate Assessment and other authoritative climate science reports that climate change will impact some of these hazards, such as flooding, hurricanes, and drought. NRC's safety standards need to account for the changing frequency, intensity, and duration of these events. But this rule instead allows licensees to rely on decades-old flood hazard estimates. In my view, that moves NRC in exactly the wrong direction.

Senator BARRASSO. Thank you very much, Commissioner Baran. Commissioner Burns.

**STATEMENT OF STEPHEN BURNS,
COMMISSIONER, U.S. NUCLEAR REGULATORY COMMISSION**

Mr. BURNS. Chairman Barrasso, Ranking Member Carper, and other members of this Committee, I appreciate the opportunity to testify today, and I also appreciate very much your very kind remarks. It has been hard to believe it has been 40 years or more, and I want to thank the Chairman for also her eloquent statement.

Senator CARPER. Were you in the third grade when you started?

Mr. BURNS. Yes, I was in third grade.

[Laughter.]

Mr. BURNS. Anyway, as noted, in the near future I will complete my service as a Commissioner at the NRC. My service began at the agency in 1978, when I graduated from law school here at George Washington University, and continued from that time except for a brief respite at the OECD Nuclear Agency in Paris from 2012 to 2014. I am honored that President Obama appointed me as Commissioner and designated me as Chairman during the last years of his Administration. I am proud to have served the NRC and particularly the people I have gotten to know who are dedicated to our mission.

I know there are times when we have had to learn from our experience, learn to do better and to improve our performance as a regulator, but on the whole I think we hit the mark the vast majority of the time in achieving a high level of performance and holding the regulated industry accountable. This is a better agency today than it was when I walked into it in 1978.

We can always strive to better perform our safety and security mission, and to better risk-inform our decisions, but the safety and security of the public must always be the central focus. Credit belongs largely, again, to the day to day work of our dedicated staff in achieving those goals. I appreciate their day to day focus on ensuring adequate protection to the public.

Thank you again for the opportunity to appear before you and the work you do in oversight of our agency, and I look forward to answering any questions you may have.

Thank you.

[The prepared statement of Mr. Burns follows:]



Stephen G. Burns
Commissioner
Nuclear Regulatory Commission

The Honorable Stephen G. Burns was sworn in as a Commissioner of the U.S. Nuclear Regulatory Commission on November 5, 2014, to a term ending June 30, 2019. He served as the 16th Chairman of the NRC from Jan. 1, 2015, through Jan. 23, 2017. As a Commissioner, he continues to be engaged in the work of the agency, and its safety and security mission.

Commissioner Burns has had a distinguished career as an attorney both within the NRC and internationally. Before returning to the NRC, he was the Head of Legal Affairs of the Nuclear Energy Agency (NEA) of the Organisation for Economic Co-operation and Development in Paris. In that position, which he held since April 2012, Commissioner Burns provided legal advice and support to NEA management, carried out the legal education and publications program of the NEA, and provided advice and secretariat services to the Nuclear Law Committee and to the Contracting Parties to the Paris Convention on Third Party Liability in the Field of Nuclear Energy.

Commissioner Burns joined the NRC as an attorney in 1978. Prior to assuming his post at the NEA, he served as General Counsel of the NRC from May 2009 until April 2012 after having served as the NRC's Deputy General Counsel from 1998. He also served as Executive Assistant to former NRC Chairman Kenneth M. Carr.

Commissioner Burns received a bachelor's degree, magna cum laude, in 1975 from Colgate University in Hamilton, N.Y. He received his law degree with honors in 1978 from the George Washington University in Washington, D.C., where he was an editor on the *George Washington Law Review*.

Commissioner Burns received the NRC's Distinguished Service Award in 2001 and the Presidential Meritorious Executive Rank Award in 1998 and 2008.

Senator BARRASSO. Thank you so very much for your testimony and your service.

Commissioner Caputo.

**STATEMENT OF ANNIE CAPUTO,
COMMISSIONER, U.S. NUCLEAR REGULATORY COMMISSION**

Ms. CAPUTO. I would like to add my thanks to the Committee for inviting us here to testify. As the Chairman said, it is absolutely essential and very much appreciated, the rigorous oversight that this Committee brings to the work of our agency.

There are many diverse views about transformation and the changes that the agency should pursue, so I would like to just add a couple of my own thoughts just in the area of budgeting and transformation.

Our mission doesn't change, our high level standards of safety and security don't change, and our principles and values don't change. But our workload and how we manage it will be different in the future. To manage a changing workload, I think it is necessary to modernize how we budget and allocate resources. The Treasury Department's white paper entitled The Future of Financial Management states, "The use of data is crucial to the future of Federal financial management."

Currently, we use a budget developed 2 years ago to formulate a budget for 2 years from now. During that process, we use very little data on actual expenditures and performance to inform our budget development. This results in a budget that is slow to reflect our changing environment.

The Nuclear Energy Innovation and Modernization Act is a strong statement on the NRC's need to reform. The new budget and fee recovery structure in NEIMA provides an opportunity for us to harness analysis of actual expenditures to better inform our budget decisions and rethink how we allocate our resources, particularly in light of the fact that we anticipate retirement of an additional 13 reactors by the year 2025.

I look forward to working with the Committee, my fellow Commissioners, the NRC staff, and our stakeholders to shape a modern, successful NRC.

Thank you.

[The prepared statement of Ms. Caputo follows:]



Annie Caputo
Commissioner
Nuclear Regulatory Commission

The Honorable Annie Caputo was sworn in as a Commissioner of the U.S. Nuclear Regulatory Commission on May 29, 2018, and is currently serving the remainder of a five-year term ending June 30, 2021.

Commissioner Caputo previously served as senior policy advisor for Chairman John Barrasso (R-WY) on the Senate Environment and Public Works Committee. She also held this position for then-Chairman James Inhofe (R-OK) from 2007 to 2012. From 2005-2006 and 2012-2015, Commissioner Caputo worked for the House Committee on Energy & Commerce, handling nuclear energy issues.

Prior to her positions on Capitol Hill, she worked for Exelon Corporation.

A graduate from the University of Wisconsin-Madison, she holds a bachelor's degree in nuclear engineering.

Senator BARRASSO. Thanks so much for your testimony.
Commissioner Wright.

**STATEMENT OF DAVID WRIGHT,
COMMISSIONER, U.S. NUCLEAR REGULATORY COMMISSION**

Mr. WRIGHT. Thank you.

Good morning, Chairman Barrasso, and Ranking Member Carper, and esteemed members of this Committee. Thank you for the opportunity to testify today.

I have been on the Commission about 10 months now, and I am grateful for the warm welcome and collegiality of my colleagues, as well as the staff's efforts to bring me up to speed. I view the NRC as a team and one I am proud to be a part of.

As I promised, I have gotten out of my office and spent considerable time walking the halls of the NRC and visiting plants. I visited every office on every floor at NRC headquarters at least once now. These meetings and visits with the NRC staff and our licensees have given me invaluable insights into the agency's critical safety mission, their priorities, successes, and challenges. I am humbled and impressed by the people that I have met, as well.

I come to this position as a former State regulator, and I am, therefore, mindful of the impact regulation has on regulated utilities. When I make decisions as a Commissioner, I combine that perspective with my dedication to the NRC safety mission and the agency's principles of good regulation, particularly the principle of efficiency.

While I am not yet an expert on the NRC's budgeting and licensing process, I do see room for improvement in both areas when it comes to efficiency. I also know the agency is busy analyzing and preparing for changes required by the Nuclear Energy Innovation and Modernization Act, so I am also interested in how this law will motivate other changes in how we do our work.

I view change—in particular changes how we perform our work—as an opportunity. Change is an opportunity to transform, innovate, and recalibrate the things we do to achieve our important safety mission in the most efficient and effective way possible.

Thank you, and I look forward to your questions.

[The prepared statement of Mr. Wright follows:]



David A. Wright
Commissioner
Nuclear Regulatory Commission

The Honorable David A. Wright was sworn in as a Commissioner of the U.S. Nuclear Regulatory Commission on May 30, 2018, and is currently serving the remainder of a five-year term ending June 30, 2020.

Since 2013, Commissioner Wright served as Owner/President of Wright Directions, LLC, a strategic consulting, policy development and communications business focusing on energy and water. During this time, he also was a member of the Advisory Council of the Bipartisan Policy Center's Nuclear Waste Initiative; and an Ex Officio Member and Chairman Emeritus of the Nuclear Waste Strategy Coalition, an ad hoc organization representing the interests of industry, state officials, local governments and tribes, and consumer advocates.

From 2004-2013, Commissioner Wright served the South Carolina Public Service Commission in a variety of capacities, including Vice Chairman and Chairman. From 2011-2012, he served as President of the National Association of Regulatory Utility Commissioners; he had previously served the association in other capacities, including as a member of the Executive Committee and Board of Directors. From 2010-2013, Commissioner Wright was a member of the Advisory Board of the Board of Directors of the Electric Power Research Institute.

Previously, he was elected councilman and mayor in Irmo, S.C., and to the South Carolina House of Representatives.

A colon cancer survivor, Commissioner Wright is an advocate for cancer awareness and education, and a former member of the Leadership Council for the Cancer Centers at the University of South Carolina. He was presented with the Community Champions Award by Molina Healthcare of South Carolina in 2016 and the Blue Star Service Excellence Award by the USC Center for Colon Cancer Research in 2014. In 1996, he received South Carolina's highest citizen honor, The Order of the Palmetto.

Commissioner Wright received a bachelor's degree in political science from Clemson University.

Senator BARRASSO. Well, thank you very much, all of you, for your testimony and your service.

We will start with a couple rounds of questions, and I would like to start first with Chairman Svinicki.

In January, the Commission approved the final rule known as the Mitigation of Beyond Design Basis Events. The rule codifies a number of existing requirements imposed on nuclear power plants following the 2011 Japanese nuclear accident. Would you please summarize the key provisions of that rule for us?

Ms. SVINICKI. Thank you for the question, Chairman Barrasso. I would note that yesterday I received a correspondence from Senators Carper and Whitehouse asking a series of questions. We look forward to responding to the Committee's questions on the Commission's action on the rule.

It is not easy to summarize a lengthy rule, but let me attempt.

After Fukushima, the Commission mandated a host of changes and reevaluations of the hazards that U.S. plants face. We did that through other instruments like immediately effective orders and demands for information.

As a matter of rigor, agencies such as ours typically follow that up with a rulemaking process afterward so that those measures can go through the Administrative Procedure Act process of being promulgated as a formalized rule.

As laid before the Commission, the rule went beyond the measures that had previously been mandated and included a set of additional measures that the staff proposed that the Commission adopt and make into requirements on the basis of what is called our adequate protection authorities under the Atomic Energy Act, which do not require an analysis. If we invoke adequate protection, there is not a legal requirement to do an analysis of the safety benefits and the costs and benefits of the new requirements.

The majority of the Commission, in looking at the provisions beyond those already mandated, was not willing to adopt or invoke the adequate protection basic summary conclusion for the additional measures and indicated that they would move forward with the rule with the measures that had been mandated and the continuation of the site specific evaluation of the flooding and seismic hazard at U.S. plants.

In addition, the Commission, in 2016, had established a center of expertise for the ongoing continual evaluation of external hazards to U.S. nuclear facilities. This group has been stood up and will contain a library of information where we will go out to the USGS, to the climate change experts, and others and look at the hazard information as it changes over time.

So, I would depict it as a way to bring visibility and focus to new information as it comes in. And of course, we would assess that and take action.

We did have a very severe difference of opinion on the Commission over the final rule, and I have deep respect for my colleagues who differed on the outcome, but in totality, looking at all of the measures that the NRC enacted since Fukushima, and again, I had direct and personal involvement going all the way back to the accident in 2011, the outcome of the Commission majority I think was an acknowledgment of this efficiency of the measures in place.

There was a particular difference of opinion over the forward going regulatory treatment of certain of the changes and what we call the flex equipment. This is the surplus sets of equipment that are now at every U.S. nuclear power plant to deal with hazards or events that would go beyond the design basis.

The majority of the Commission felt that the industry's commitment previously given to maintain that equipment was sufficient, and I know that other members of the Commission would have turned that into a regulatory requirement.

There were other differences, but that was, I think, the most pointed difference that we had.

Senator BARRASSO. In October, the EPA withdrew an Obama administration midnight rule. The midnight rule, of course, would have added unnecessary red tape, in my opinion, to the principle method of uranium production. In 2015, the NRC staff communicated substantial jurisdictional concerns to the EPA about the proposal, and the EPA proceeded despite the concerns that the NRC had come up with. These jurisdictional issues I think need to be resolved. Accordingly, in 2017 I asked EPA to sign a Memorandum of Understanding with the NRC clarifying the EPA's regulatory authorities.

Madam Chairman, could you please provide an update on the status of the NRC's engagement on that Memorandum of Understanding?

Ms. SVINICKI. My understanding of the current status is that upon the withdrawal of the rule by EPA, NRC and EPA staffs have been engaging over the renewed interest in the Memorandum of Understanding. There are, as you note, I think some statutory interpretation differences that are being worked out, but the experts do continue to engage on this matter. As a matter of fact, I believe there is a meeting that will be held yet this month between the EPA and NRC on the MOU development.

Senator BARRASSO. Thanks so very much.

Senator Carper.

Senator CARPER. Just very briefly to the Chair, quickly, how are we doing in terms of retention, attracting new folks to come to work at the NRC? How is morale? Just very briefly.

Ms. SVINICKI. Very briefly, I would characterize the concern about our demographic shift to more senior workers, while we are very, very grateful to have them, and they have a lot of expertise, we are realizing now that the front end of the pipeline and entry level workers I think I would characterize that as an increasing concern for the agency. While we wouldn't take a broad brush to it, for myself alone, I think it is imperative that we begin to look at strategic hires of recent university graduates and things like that.

I will say, on morale, you know, transformation and change is hard. Human beings have a lot of concerns over what it might mean for them, so the leadership team at NRC has a strong focus on messaging and outreach and communications regarding changes that are or might be in the future coming for NRC.

Senator CARPER. All right, thank you.

Do the other Commissioners agree? If you agree, raise your hand. Do you agree with that assessment?

All right, let the record show four hands. All right, good. Thank you very much.

Question for Commissioner Baran. With the President's NRC budget for fiscal year 2020, in your judgment, will the NRC have the resources needed to do its job to ensure safety for current nuclear reactors and to be ready for the next generation of them?

Mr. BARAN. I believe it will. I would just provide a little bit of context, though, and say since fiscal year 2014 NRC's budget has decreased by 15 percent and our work force has declined by 21 percent. That is a huge amount of change in a short period of time, so I think we have adjusted well.

Our budget and staff need to reflect our workload, but I share the Chairman's concern that one of the things that has been sacrificed in that period of time is entry level hiring. We are at a point now where only 2 percent of the people who work at NRC are below 30 years old. That is really low, and it is an indication, I think, that we are not doing much entry level hiring, and we have to get back to that, I think, in the near future for the long term health of the agency.

Senator CARPER. OK, thank you.

To our Chair, you mentioned that Senator Whitehouse and I recently sent you a letter regarding the post-Fukushima rule that the Commission finalized I think back in January. We appreciate your attention to that and your timely response. Senator Whitehouse and I are concerned that the changes to the final rule made by the Chair may have missed the mark in addressing the lessons learned from the Fukushima nuclear accident, and we need answers regarding why changes were made to the final rule, changes that I think went against the career staff's recommendations.

Just a quick yes or no on this one. I don't ask a lot of yes or no questions, but I want to be mindful of my time.

Madam Chair, did the NRC career staff recommend changing the mandatory safeguards against seismic and flooding hazards to voluntary ones? Did they recommend that?

Ms. SVINICKI. No, but there were expert staff that had—they didn't go through the former differing views process, but we did have a handful of agency experts that disagreed with the proposal as it was laid before the Commission. And I have spoken with those individuals who were in disagreement.

Senator CARPER. A follow up to that. Did public comments during the rulemaking process ask the Commission to make the mandatory safeguards against seismic and flooding hazards voluntary?

Ms. SVINICKI. No, they did not.

Senator CARPER. A follow up on the same issue, a follow up to Commissioner Baran and maybe Commissioner Burns. You both voted against the changes. Would you please take a moment and explain your concerns with the final rule? And in your answer please verify if you know of any party that asked for this change.

Mr. Baran. Mr. Burns, go ahead.

Mr. BURNS. Essentially, Senator, I thought that the rule as proposed, as commented on, and as then offered to the staff in final form was a more direct, in fact, a direct and elegant solution to the issue that had been identified; that is, looking at current seismic and flooding type hazards and assuring that they were addressed

during the course of a lifetime by licensees, and there wasn't, to my understanding, adverse comment on that from the external stakeholders who would have commented on the rule.

Senator CARPER. All right.

Mr. Baran.

Mr. BARAN. I think everyone agrees that the flex equipment that the Chairman mentioned is the single biggest post-Fukushima safety improvement, but the equipment doesn't do us any good if it is not there and available when called upon, and that means protecting the equipment from entirely predictable natural hazards. We spent several years, the staff and licensees, using the latest science to figure out what are the current modern day hazards, flooding and seismic hazards, at the power plant sites across the country.

From my point of view, and I think Commissioner Burns agreed with this, it makes sense to protect that equipment from those modern understood hazards, and not the old outdated hazards. It is the biggest improvement we had. You want to protect that equipment.

Senator CARPER. All right, thanks.

All right, thanks for those responses, and we look forward to a second round.

Thank you.

Senator BARRASSO. Thank you, Senator Carper.

Senator Capito.

Senator CAPITO. Thank you, Mr. Chairman.

It is nice to see the full Commission here. I want to give a shout out to Commissioner Caputo, because we worked together on the Subcommittee, so welcome. He says we are confusing him because it is Caputo and Capito, but we know what it really is.

Ms. CAPUTO. I can keep us straight.

Senator CAPITO. I am going to ask a question I think I ask every year, and I still don't understand.

I understand that you are making great strides to right sizing the Commission, and I thank the NRC, and that is a question that comes up every year, but there is a significant amount of carryover funding, which suggests there is a mismatch I don't understand. In fiscal year 2017 carryover was \$37 million, at the end of fiscal year 2018. Per your budget, carryover from the prior year totaled \$40.4 million, with \$22.7 million still wholly unallocated.

And then again, the request is for more carryover, which is described to be in the budget to jump starting licensing around Yucca Mountain. But I understand that that cannot be funded by a carryover.

So, could you help me with what do you do with all these millions of dollars that you are carrying over, and are you overprescribing your budget to allow for a carryover to give you some flexibility that maybe your regular budget doesn't provide for you?

Ms. SVINICKI. Thank you for that question, Senator. We have engaged in previous years on the NRC's efforts to develop and end the year with a more accurate figure so that it does not have this surplus at the end of the year. There are a number of factors that contribute to ending the year without the amount of outlay that one predicted. Receiving the budget later, after the beginning of the

fiscal year, can often be a contributor, but we did not experience that this year. So, as of right now, being approximately midway through the fiscal year, we estimate that we would have about \$20 million of carryover on the fee base.

So, as happened with the appropriations bill last year, when we had about \$25 million, appropriators directed us to use \$20 million of that as an offset. So, I can't speak for what appropriators will do, where we will end the fiscal year and what they would do. We have had an effort on improving our budgeting and trying to get greater fidelity and end the year with less of a surplus. I don't know that we would ever get to having it be down to the penny, but we have driven down the figure in recent years, and I think we continue to look at what we end the year with.

Senator CAPITO. Was last year the first year that the appropriators had asked you to use that as an offset?

Ms. CAPUTO. No, it was not.

Senator CAPITO. That is pretty much standard, then? OK.

The other question I think is with the anticipated shrinking number of reactors and the fees associated. You are raising the 8 percent annual increase this year, what, 6.5. What steps are you making to make sure that that is not just an incremental thing over years as we see more of these being retired?

Ms. SVINICKI. Well, I think the most prominent change to that will be arising out of the NEIMA bill that is now enacted law. Of course, it has a number of measures that have interrelated effects on the agency's budget, but one of which is to create a ceiling for the operating reactor fee. In addition, there are other measures that exert budget discipline on the agency that arise out of NEIMA.

I will say that embedding some of that statutory—again, those provisions, kind of by virtue of mathematics, affect different parts of the budget. We are working to build that into our accounting and budgeting systems, so I can't testify to the totality of the impact of the provisions. Of course, there are a number of provisions on our corporate support costs as well.

I think it would probably take 1 year through the budget cycle to have a complete picture of how those provisions impact each other, so in future appearances we should be able to give you a better sense of that.

Senator CAPITO. Commissioner Caputo, I am going to put you on the spot here because you have spent years on the other side of the dais here. What perspectives could you say becoming a Commissioner has changed your view from where we sit to where you sit now?

Ms. CAPUTO. Well, I think this budget, the 2020 budget that is before you now, is my first budget on the Commission, so it is an introduction to how the Commission develops its budget, and that, I think, largely is what lies behind my remarks about the fact that I think the Commission could use data and data analytics to a much greater extent to inform our resource allocation decisions.

I think the increase in the fee that you are talking about, this year in particular, is driven by the retirement of a few reactors. But if you look at a 2-year span, as an example, the 2020-2018 and the budget before you now, the 2020 budget, six plants will have

retired, and those six plants would be paying in \$4.8 million, roughly, in an annual fee.

So, when we look at the 2020 budget, 6×5 is \$30 million. But we don't see a decrease in the operating reactors' budget in that order; we see a decrease of \$5.4 million. So I think that is evidence of our struggle to sort of right size in advance of the cessation of those fees coming in. And this will continue to be a struggle, I think, going forward, but one that hopefully the new fee structure under NEIMA will help with.

Senator CAPITO. OK. Thank you.

Senator BARRASSO. Thanks so much, Senator Capito.

Senator Cardin.

Senator CARDIN. Thank you, Mr. Chairman. Thank you for calling this hearing.

I want to thank the entire Commission for being here. It is impressive to see you all out there. We thank you very much for your work.

I want to follow up on Senator Carper's point in regard to the personnel issues. Since fiscal year 2010, there has been approximately a 23 percent reduction in the work force at the Commission. The past fiscal year saw another decline. I first would like to know whether we should anticipate a further reduction in the work force, or do we have the right numbers now?

Why don't I ask that question first. What is your game plan on downsizing, Madam Chair?

Ms. SVINICKI. We continue to trend down. Again, our demographic is we have a very, very senior work force. A substantial portion of our employees are retirement eligible. Now, many of them stay well beyond their retirement eligibility, but it is a growing concern that the front end of the pipeline—Commissioner Baran was mentioning a statistic that only 2 percent of NRC employees are younger than the age of 30, which is an extreme figure.

Senator CARDIN. You are getting to my second question. My first question is the size that you are attempting to get to; the second is retaining good people. My staff tells me that by 2023, 42 percent of your work force will be eligible for retirement. I know that Commissioner Baran already mentioned the 2 percent under the age of 30, which is a very small number for any of our work force.

Put on top of that the general challenge for Federal work force today as a result of attacks on the Federal work force on the budget and their benefits, as well as the shutdown impact. You may have been directly impacted, but you were indirectly impacted by the Government shutdown. It has caused a drain of some of our best from agencies that are not clear as to the future commitment of the Government to their mission.

I worry that the same thing could be happening at the NRC as to whether you are attracting young people to this profession. Do they see a future here, and are we challenged in maintaining the capacity, moving forward, of the NRC to keep us safe and to be at the top of the game internationally on regulating nuclear energy?

We really need to pay a little bit of attention to this, and it looks like the fact that you don't have younger workers—I know at NSA, by way of comparison, we always are concerned that they can bring in the youngest, brightest people so they have a pipeline to the fu-

ture. Are we missing this opportunity on the nuclear regulatory side?

Mr. BARAN. I would just say that on the question of the overall size of the agency, personally, I think we should get to the point of stabilizing at this point. We have had a lot of reduction in a relatively short period of time. I do worry that, continuing on the track we are on, we are going to have problems maintaining our core capabilities, our core technical capabilities. I worry about that. Of course, the other issue is the lack of entry level hiring, which is significant.

One of the things we are seeing is retaining. It is harder to retain folks because, with a smaller agency, an agency that has been shrinking, you don't have the same promotional opportunities, the same career enhancement opportunities. We see folks leaving—great people, mid-career—who can't really advance the way they want to.

Senator CARDIN. So how do we counter this? How do we counter this?

Mr. BARAN. Well, the staff is working very hard on that, and the Commission focuses on it a lot. It is challenge, but I think as long as the budget keeps declining steeply and the work force keeps declining steeply, it is difficult to counteract that.

Senator CARDIN. I would just urge—Mr. Chairman, we are the authorizing Committee. I would like to get a game plan from you as to how we can attract the youngest, brightest talent for the future into your agency.

Also, I would think from the appropriators' point of view that they also need to have a game plan as to where you are heading so that we can try to assist. We understand the size is one thing, but not having the brightest minds coming out of our universities interested in a career in nuclear safety does present challenges for us moving forward.

One of those challenges, and it might be the right thing, but the Nuclear Energy Institute has asked for a self-assessment, rather than inspection, in regards to some of their nuclear activities. We saw that didn't work very well on airline safety with Boeing. The question is are we moving more toward reliance upon self-assessment rather than the work of the Commission in order to keep us safe, a down product of not having the capacity because of downsizing and the lack of recruitment.

Mr. BARAN. Speaking for myself, I would just say I strongly believe we should not head in that direction. I think the role of NRC is to set the health and safety standards and to inspect to make sure those standards are met. The role of licensees is to operate the plant safely. We shouldn't operate their plants; they shouldn't be conducting our inspections. That is our job; it is a core responsibility of the agency, and we should be doing that.

Senator CARDIN. I would just ask the Commission if you could just share with us your game plan for attracting the professionals that you need moving forward so that we can have that in our planning as authorizers and as appropriators. I think that would be helpful.

Ms. SVINICKI. Yes, Senator Cardin. We do have a detailed work on our strategic work force planning ongoing. We can provide an

update on where that stands to the Committee with a focus on the younger workers.

Senator CARDIN. Thank you.

Senator BARRASSO. Thanks, Senator Cardin.

Senator Braun.

Senator BRAUN. Thank you, Chairman.

Especially interesting for me to be sitting in on this. I am the Chair of the Clean Air and Nuclear Safety Subcommittee, so I intend to do more work on this down the road.

A two-pronged question, and this would be for any of the witnesses. No. 1, Purdue University has had research on some new technology, and it is with the digital version that has been in place in other countries. I am interested in what is going to get us across the threshold for using nuclear energy for all the pertinent topics that are in front of us, clean energy generation.

Also, what is happening in other countries, because I know many other countries have put an emphasis on it, and I feel they are going to lead more than us due to the fact that there has been gun shyness about pushing forward with nuclear power for electric generation.

In addition to what Purdue is working on, tell me about what else is happening, how that is going to lead in to where we have more confidence here, and then tell me about the competition across the world where they seem to be embracing nuclear energy for power generation more than we are.

Ms. SVINICKI. If I may, Senator, I will just begin, and if my colleagues want to add to that broad question.

But I would note that with respect to the modification to the Purdue research reactor, I was made aware that the agency has completed its review of that amendment and modification to that facility, and I think that the completion of that was communicated yesterday or may be communicated today to Purdue. I knew we were very close to the finish line, but I didn't know what we had actually concluded our work on that.

On your broader questions about the global energy picture, I think it doesn't necessarily fall squarely in our domain. What we do is look at nuclear safety and security regulation. The United States is generally considered to have an extremely strong and set a high standard for nuclear safety and security.

I know that there are countries that have looked closely, such as Spain, that has adopted, I think, a near replica of the U.S. nuclear safety regulations whole cloth. We do continue to try to advance global objectives on nuclear safety, not so much the penetration of the technology for energy production, but setting a strong, high level of expertise on the nuclear safety issues.

Mr. BARAN. I agree with all that. I would just add on the new technology side, really, our role is licensing, so it is about having a good, efficient licensing process for new technologies, whether it be non-light water reactor technologies or innovations and fuel in other areas, so there is a lot of focus right now on that at NRC to make sure that we have the technical capabilities to do those reviews and have a good process in place and that we have the right standards.

If you take the example of non-light water reactors, all the existing fleet in the U.S. is light water reactors. Our regulations were really written for that. One of the big efforts at NRC now is adapting those regulations for other technologies so that we can have efficient and thorough and effective reviews of newer technologies unlike anything we have currently deployed across the country.

Mr. BURNS. One thing I might add is that we do participate in international forums through the OECD Nuclear Energy Agency and also the International Atomic Energy Agency that are looking at, for example, on the small modular reactors or advanced reactors technologies, and there have been other cooperative efforts so that we learn from folks who are building, say, in Finland or France or in China through what is called the Multinational Design Evaluation Program, so I think those have been of benefit to us as regulators because it is really about what are the approaches for regulation; what types of things are they finding that can have learnings for us, and I encourage us to continue in those types of fora.

Ms. CAPUTO. With regard to advanced designs, I haven't been to Purdue, so I am not familiar with what Purdue is doing, but I have visited Texas A&M and the University of Wisconsin, and my observation from both of those visits is the universities are really conducting a lot of exciting work in developing both accident-tolerant fuel technology and advanced reactor designs. So I think there is a fair amount of exciting work being done in our universities to lay the foundation for ultimately the designs that come to the Commission for review.

Mr. WRIGHT. Thank you, Senator. I agree with everything that you have heard, but I think there is another leg to this, too, and that is that if we are not efficient in our regulatory scheme at the NRC and get things done efficiently as well, we are possibly seeing ourselves around the world where other technologies are being sold, which would be a DOE or State issue and obviously a congressional issue, and that could have long term security impacts on our country, too. So, we have to do our part at the NRC to make sure that we are putting things in place for these new technologies to make them efficient so we can get them through the regulatory scheme effectively and efficiently.

Senator BRAUN. Thank you.

Senator CAPITO [presiding]. Senator Whitehouse.

Senator WHITEHOUSE. Thank you, Chairman.

Do any of you doubt that climate change is causing sea levels to rise around the globe and along our shores?

[No audible response.]

Senator WHITEHOUSE. Let the record reflect no doubts. OK.

Does anybody contest that post-Fukushima it has been established that flooding interferes with nuclear plant operations? Pretty obvious statement, isn't it?

[No audible response.]

Senator WHITEHOUSE. OK, all agreed, let the record reflect.

I represent a coastal State. For those of you aren't from coastal States, let me let you know that we are all coastal States looking at dire and uncontested and best science predictions of significant sea level rise and harm to our coasts, just so you know. So it is

from that background that I wonder about the recent chain of events along this timeline.

In November 2015, the NRC proposed its comprehensive post-Fukushima flooding preparation rule with full agreement of the Commission at the time. It is called the Mitigation of Beyond Design Basis Events Rule, and our Ranking Member just spoke about it. It went to public comment, and in 2016, after receiving public comments, the staff issued a draft final rule with mandatory requirements for flood preparation.

At this time, the NRC Commission had two Democrats and one Republican appointees, and you couldn't get three votes, so the order wasn't finalized, but the staff recommendation was there. A month later, Commissioner Svinicki was designated Chairman. The Commission still did not move forward on a final order for the rule.

In July 2017, the Nuclear Energy Institute sent this letter, which I ask unanimous consent to be made a part of the record——

Senator CAPITO. Without objection.

Senator WHITEHOUSE [continuing]. Saying that all of its concerns had been addressed, and it was OK to go forward with the rule; still mandatory.

[The referenced information follows:]

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 jep@nei.org
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July 12, 2017

Mr. Victor McCree
 Executive Director for Operations
 U.S. Nuclear Regulatory Commission
 Washington, DC 20555-0001

Subject: Industry Concern with the Wording of the Drill and Exercises Requirements in the Draft Mitigation of Beyond Design Basis Events Rulemaking Package

Project Number: 689

As expressed in our February 9, 2016, comment letter on the draft Mitigation of Beyond-Design-Basis Events (MBDBE) Rulemaking Package, NEI and the industry support issuance of the proposed rule, and the comments we submitted at that time have been satisfactorily resolved. Recently, we identified an ambiguity in the wording of the drill and exercise requirements contained in 10 CFR 50.155(e), which could lead to misinterpretations of that paragraph in the future.

Specifically, 10 CFR 50.155(e), *Drills or exercises*, describes the number of drills or exercises that must be completed within the initial 4-year period after the rule is effective and in subsequent 8-year intervals. The relevant language appears in slightly different forms in paragraphs (e)(1), (e)(2), (e)(3), and (e)(4). Based on numerous interactions with the NRC staff, our understanding is that the language in paragraph (e) should be interpreted as requiring licensees to perform one drill or exercise of the strategies in either (b)(1), or (b)(2), or (b)(3) during the initial 4-year period. However, as currently written, the language could also be interpreted to require licensees to perform one drill or exercise of each of the strategies in (b)(1) or (b)(2), and (b)(3) during the initial 4-year period.

This issue was initially discussed during a November 16, 2016, meeting with the Advisory Committee on Reactor Safeguards (ACRS) and NEI subsequently submitted, for the public record, a summary of our concern and our suggested resolution. Based on discussions since that time, we believe that the NRC staff's current interpretation of the provisions of section 50.155(e) is consistent with the "either" version provided above. That said, section 50.155(e) was not sufficiently clarified in the draft final rule provided to the Commission, and the issue recently resurfaced during industry discussions on rule implementation.

Consistent with NRC's principles of good regulation, and in the interest of clarity and reliability, we suggest that editorial changes be made to clarify the intent of 10 CFR 50.155(e) prior to finalizing the rule. To that end, we have attached a marked-up version of 10 CFR 50.155(e) showing proposed editorial changes that will

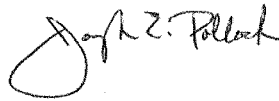
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Mr. Victor McCree
July 12, 2017
Page 2

clarify the requirement and address our concern. Given our previous interactions with the staff, we believe the proposed changes do not alter the intent of the final rule, but, rather, are a technical correction/clarification.

If you have questions or require additional information, please contact me at 202-739-8114; jep@nei.org.

Sincerely,

A handwritten signature in black ink, appearing to read "Joseph E. Pollock". The signature is stylized with a large, looped initial "J" and a cursive "E".

Joseph E. Pollock

c: Kristine L. Svinicki, Chairman
Stephen G. Burns, Commissioner
Jeff Baran, Commissioner
Michael R. Johnson, Deputy Executive Director for Reactor and Preparedness Programs
Brian Holian, Acting Director, Office of Nuclear Reactor Regulation
Jane Marshall, Acting Director, Japan Lessons-Learned Division

Senator WHITEHOUSE. In May 2018, after all this closed, two new Republican appointees joined the Commission, giving Republican appointees a three to two majority, and in January 2019 NRC weakened the rule, made it voluntary. The NRC has acknowledged that there were not any public comments calling for this change.

Now, I am somebody who has worked to get you more authority. I have been a prime mover on two pieces of legislation to promote innovation and nuclear technology. I am the cosponsor, with our acting Chair, of another one that is working its way through the Senate right now.

It is going to be a real problem for me to continue to trust in all of you if either of two things is true: one, there is some kind of an industry back door into the Commission that gets a change like this done after the public comment period is closed, without any public comment, and apparently outside of the APA public process. That would be a very unfortunate set of events, probably also illegal. So I think this Committee is entitled to an answer as to what exactly took place that caused that.

The second is, you don't take sea level rise seriously. You don't think this is a real risk for the nine nuclear plants that are within 3 kilometers of our coast or the four that have been deemed susceptible to sea level rise and flooding. That is not acceptable either.

So I see this event as a potentially very significant bellwether as to the trustworthiness of this Commission, and I have been trusting this Commission. So I need some serious answers and we are going to follow up. We sent this letter, Chairman Carper and I, which I would ask to be put into the record as an exhibit. We need to get to the bottom of this.

If there is some back door where industry people can come in and fix a rule without going through the APA process, that is just plain wrong. And if the reason for this is that you don't take flooding and sea level rise seriously, that is just plain wrong. The first is wrong procedurally and legally; the second is wrong morally and factually.

So I intend to pursue this, and I am just putting you on notice that I think this is really serious. And I say this as a person who has trusted you with very important new responsibilities.

[The referenced information follows:]

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United States Senate

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

WASHINGTON, DC 20510-6175

April 1, 2019

Ms. Kristine Svinicki
 Chairman
 11555 Rockville Pike
 Rockville, MD 20852

Re: SECY-16-0142

Dear Chairman Svinicki:

We are writing concerning the Nuclear Regulatory Commission's (NRC) recently issued Mitigation of Beyond-Design-Basis Events Rule. This rule stemmed out of an eight-year NRC process to improve nuclear reactor safety in the United States in response to the Fukushima Daiichi nuclear power plant accident in Japan. We are concerned that changes from the proposal, issued in 2015, unnecessarily backtracks from critical safety requirements to protect our nuclear reactors against the flooding and seismic hazards that they face today and in the future.

While we are proponents of clean energy and believe nuclear power could be essential in helping us tackle the threats of climate change, our top priority for our domestic nuclear power industry remains public safety.

Just last month, we marked eight years since a massive earthquake and tsunami triggered events that led to the nuclear meltdowns at the Fukushima Daiichi nuclear power plant, 230 miles northeast of Tokyo, Japan. The people of Japan are still recovering from this accident and public confidence in the nuclear industry has not recovered.

Shortly after the events unfolded at the Fukushima Daiichi nuclear power plant, the NRC committed to the EPW committee that it would conduct a comprehensive review of the causes of the Fukushima accident and review and address any potential risks that may exist at our own reactors. In particular, the review would focus on reactors of similar design, reactors near seismic fault lines, and reactors near coastlines or other possible flooding hazards. The NRC also committed to apply any lessons learned from the Fukushima Daiichi accident to our nuclear regulatory process to ensure we never experience a similar event in the United States. An independent NRC staff task force issued twelve broad safety recommendations in July 2011 and the Commission and nuclear industry have been working to implement these recommendations ever since.

In implementing the Fukushima recommendations, the NRC requested that all U.S. nuclear power plant operators assess potential seismic and flooding hazards to their reactors and perform "walkdown" inspections of the currently installed seismic and flooding protection features. In these reviews and inspections, the NRC and industry came to realize that some of the protections in place were inadequate to meet the current seismic and flooding hazards. They realized that more work needed to be done across the nuclear industry to address possible natural disaster events that could overcome the safety designs of certain reactors, known as "beyond design-basis events."

Since identifying these safety gaps, the nuclear industry has spent several billions dollars to update and modify plant structures, systems and equipment to improve reactor safety to maintain safety in the event of flooding or seismic events. At the same time, the NRC forged ahead on regulatory actions to address these safety gaps and other lessons learned from Fukushima.

In November 2015, the NRC proposed a comprehensive post-Fukushima Rule, with full agreement of the Commission at the time, including you, called the “Mitigation of Beyond-Design-Basis Events Rule.” In the proposal, NRC required the industry to take further steps beyond their licensed design to address seismic or flooding concerns that may not have been known at the time the reactor’s license was issued. After receiving under 200 individual public comments, staff issued a draft final rule that kept these mandatory requirements for the Commission to approve in December 2016. It took more than two years for the Commission to approve the rule and there were remarkable differences in the final rule from the 2016 draft final rule. We believe these differences have significantly weakened the original proposal and compromised on safety.

Under your leadership, the Commission finalized an order on January 24, 2019 that backtracks on several components of the Mitigation of Beyond-Design-Basis Events Rulemaking. In the final rule, NRC decided to ignore staff recommendations and make preventive actions to address beyond-design flooding and seismic events voluntary. Most of industry has already addressed these issues, but not requiring mandatory action to continually address the two main issues that arose during Fukushima seems very concerning. These concerns are also reflected in the votes submitted by your colleagues, Commissioners Baran and Burns. What is most peculiar is that when our staff asked the NRC about any public comments calling for these changes, they were told there were none. From what our staff have found, there seem to be no calls from outside groups or from career staff asking for the weakening of this rule.

The new rule appears short-sighted to say the least. U.S. nuclear power plants should not only incorporate lessons learned from one of the worst nuclear accidents in history, but the industry should also be preparing for the effects of climate change and sea-level rise. The Fourth National Climate Assessment^[1] issued in November 2018 found that global mean sea level has increased 16-21 centimeters (7-8 inches) since 1900 and is expected to rise up to 1-4 meters by the end of the century. Before 2045, tidal flooding is expected to occur five times more frequently – flooding some coastal areas for over 50% of the year. In the United States, there are nine nuclear plants within three kilometers of the ocean and four of those reactors have been deemed susceptible to flooding and sea-level rise.^[2] The Fourth National Climate Assessment also found that extreme rain events and more intense hurricanes are likely to occur over the next century – making the recent flooding events in Nebraska, Maryland and Texas more normal. Now is the time to harden our nuclear facilities to deal with rising seas and more intense storms due to climate change, not weaken them.

In order to better understand the Commission’s decision to weaken this rule, we request answers to the following questions and related information:

- Did you or anyone on the Commission receive any comments outside the comment period regarding the Mitigation of Beyond-Design-Basis Events Rule, SECY-16-0142, asking for the

^[1] USGCRP, 2018: *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)], U.S. Global Change Research Program, Washington, DC, USA, 1515 pp. doi: 10.7930/NCA4.2018

^[2] <https://www.hakimagazine.com/features/are-coastal-nuclear-power-plants-ready-for-sea-level-rise/>

Commission to change mandatory requirements to voluntary requirements in the final rule from the draft final rule?

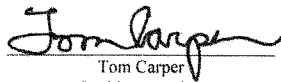
- According to correspondence and public comments from NEI, industry appears to have agreed to the part of rule where plants must update their design plans to withstand extreme hazard events. We request that the Commission provide a list of all briefings and meetings, and provide correspondence (including electronic mail) between Commissioners and NRC staff and any representatives of NEI, on the Mitigation of Beyond-Design-Basis Events rule after the comment period ended.
- How did the Commission take into account the latest warnings from Fourth National Climate Assessment and other recent scientific reports on how rising sea levels will affect nuclear power plants near coastlines?
- How did the Commission take into account the climate change science that projects more intense precipitation and flooding events across the U.S.?
- How does the Commission's final rule ensure that plants will be protected against the most severe events that they may experience, today and in the future? Please explain further than what you have included in your vote.
- Please provide a list of times when nuclear plants needed to be shut down – and how long those shut downs lasted – over the past ten years due to high winds, flooding events, or due to the lack of available cooling water.

The events that struck Japan less than a decade ago were reminders that we are all vulnerable to unexpected disasters, whether an act of nature or a terrorist attack. While we cannot predict when or where the next major disaster will occur, we know adequate preparation and response planning are vital to minimize injury and death when it does happen.

We look forward to your response by May 1, 2019. If you have any questions, please have your staff reach out to Laura Gillam on Senator Carper's EPW staff, laura_gillam@epw.senate.gov or Aaron Goldner on Senator Whitehouse's staff, aaron_goldner@whitehouse.senate.gov.

With best personal regards, we are

Sincerely yours,



Tom Carper
Ranking Member
Committee on Environment and
Public Works



Sheldon Whitehouse
Ranking Member
Subcommittee on Clean Air and
Nuclear Safety

Cc

Commissioner Baran
Commissioner Burns
Commissioner Caputo
Commissioner Wright

Senator CAPITO. Is there any reaction?

Ms. SVINICKI. Senator Whitehouse, I look forward to responding to the series of questions that you provided to the Commission yesterday. Thank you.

Senator WHITEHOUSE. We look forward to hearing your response.

Senator CAPITO. Senator Markey.

Senator MARKEY. Thank you, Madam Chair.

The Pilgrim Nuclear Power Plant is set to close in June, and I know the Commissioners are not going to answer some specific questions as related to matters that are pending before the NRC, but we need more clarity.

Chair Svinicki, does the NRC have the statutory or regulatory authority it needs to make sure that licensees bear all of the financial costs of decommissioning and site maintenance?

Ms. SVINICKI. Thank you, Senator Markey. I believe that the decommissioning funds that are collected under our authority are principally for decommissioning of the radiological hazard. There may be amounts beyond that that State authorities require to be collected, and often these funds are comingled in the decommissioning fund.

Senator MARKEY. Well, obviously the communities, including Plymouth, need assurance that all the financial costs are going to be borne, and they don't want to get stuck footing the bill if costs go up, or businesses go under, so the proposed decommissioning rulemaking at the NRC would do even more to cut NRC approval and public comment out of the already flimsy decommissioning process, including by automatically granting exemptions to safety regulations.

Commissioner Baran, do you think the proposed decommissioning rule might tilt the balance of power farther toward nuclear plant operators and away from the independent NRC staff?

Mr. BARAN. I think the proposed rule needs a lot of work. I think we need to produce a balanced rule that considers the interests of a broad range of stakeholders, including States and local governments. I think in terms of who is making the big decisions about decommissioning; I don't know that the proposed rule changes that much. Right now that is tilted heavily toward the licensees. NRC is pretty hands off when it comes to decommissioning. We, of course, do safety inspections, which are important, but licensees get to make most of the major decisions, and the proposed rule really wouldn't change that.

Senator MARKEY. And that is my concern, that the nuclear industry wants the NRC to turn a blind eye, but we actually need more independent oversight, not less.

The Nuclear Energy Institute is pushing for major changes to the reactor oversight process, the cornerstone safety program at the NRC. The industry wants to inspect and assess itself more often, rather than allow the NRC to conduct independent inspections. If adopted, these changes would make inspections like a take home exam and leave the NRC just hoping that plants don't cheat.

Chair Svinicki, plants often do self-assessments before the NRC comes in for an inspection. Do the NRC inspectors find issues that the plants have missed?

Ms. SVINICKI. Yes, they do sometimes.

Senator MARKEY. Yes, you do, because the NRC does frequently uncover issues that the operators don't find themselves, and these could be problems that would be totally ignored if the nuclear industry could self-assess.

One of the proposed changes is to take less of a look at "white findings," which are safety issues that are less obviously severe than yellow or red findings, but white findings are incredibly important. Following a series of white findings, Pilgrim Nuclear Power Station in Plymouth was placed in the lowest active safety category after NRC inspectors followed up and found major safety issues. This designation triggered additional inspections and oversight, ultimately helping Pilgrim operate more safely and improve its rating.

Madam Chair, if the proposal to ignore more white findings was adopted, would Pilgrim have gotten a closer look from NRC inspectors?

Ms. SVINICKI. I think it is difficult for me to conclude one way or another on that, respectfully. It is a certain number of findings of a certain color that lead them to move to different performance categories, and I can't, off the top of my head, kind of recreate what those triggers were back in 2014 and 2015.

Senator MARKEY. Well, let me ask you, Commissioner Baran, does discounting low risk findings mean we might miss higher risk issues down the line?

Mr. BARAN. Yes, I think white findings are very important for that. Since the beginning of the reactor oversight process, white findings, and even green findings, have been leading indicators of potentially more safety significant problems at plants, so Pilgrim is a good example of that; it got into column four with three white findings. There were no yellows, there were no reds; it ended up there on whites. And it absolutely needed to be in column four. I think everyone agreed that was a right safety outcome.

So, if we moved in the direction of really reducing the significance of white findings, I would have significant concerns about that.

Senator MARKEY. And I have that concern as well, because the NRC should not be giving take home exams to nuclear power plant operators, because the tendency on a take home exam is to always give yourself an A+, and obviously the history of this industry tells us that that temptation too often has been succumbed to by industry participants. So, I just think that we have to make sure that the industry doesn't cut corners, doesn't undermine public safety, so I am going to be following this very closely.

I thank you, Madam Chair.

Senator CAPITO. Thank you.

Senator Van Hollen.

Senator VAN HOLLEN. Thank you, Madam Chairman.

Thank all of you for your testimony today. As we have heard, the NRC plays a vital role in regulating the domestic nuclear industry by ensuring the secure and safe use of nuclear materials. That is the goal. You also play an important role in regulating nuclear exports, exports abroad, by ensuring that U.S. nuclear materials and technology do not fall into the wrong hands. In other words, you

are part of a mechanism that is supposed to pursue rigorous due diligence when it comes to these export controls.

I am concerned that, when it comes to Saudi Arabia, this Administration is severely testing the strength of the alignment between the NRC's role, the DOE's role, and the goal of a nonproliferation policy. Reportedly, and I think they have confirmed they are pursuing a nuclear cooperation agreement with Saudi Arabia, which has enforced the lowest standard of international safeguards, a country whose leaders have loosely talked about acquiring nuclear weapons and a country that we know consistently flouts international norms. And now this Administration wants to do nuclear business with Saudi Arabia.

Last week, DOE confirmed that the Administration has deepened nuclear cooperation with Saudi Arabia. Secretary of Energy Perry acknowledged that the Department of Energy has issued seven undisclosed part 810 authorizations to American companies to transfer unspecified nuclear technology and know-how to Saudi Arabia. In my view, it doesn't appear that the Administration is exercising due diligence.

I know the NRC is not the lead agency here, but under the statute and regulations you play a consulting role. In fact, it is required that DOE consult with you on these, so my question, Madam Chairman, is when did the Department of Energy consult with the NRC on issuing these seven part 810 authorizations?

Ms. SVINICKI. Thank you, Senator. As you have described, under the Atomic Energy Act, the NRC does have a consultative role, it is not a concurrence role; and again, it is not an opinion on U.S. foreign policy. We have a consultative role under the law because, as you note, should the U.S. get to a point where they are exporting components and nuclear materials, the NRC is the central export licensing authority for that.

The NRC's consultative role I would generally describe as something that they are looking at whether matters of law and under an 810 or whether or not you could effectuate the export licensing, should you get to that point, so it is a narrow consultation on some matters of expertise of the agency, but it differs from our role in the—

Senator VAN HOLLEN. No, Madam Chairman, my question was not what is the nature of your role. You have a role. My question was when did the Department of Energy consult with the NRC with respect to the part 810 authorizations to Saudi Arabia.

Ms. SVINICKI. I don't have that answer for you today, Senator. I would need to get back to you.

Senator VAN HOLLEN. I would like you to get back as soon as possible. I mean, these 810 authorizations were apparently kept secret, and I must say I am surprised. Were you involved in the consultation?

Ms. SVINICKI. In general, since the role is narrow—

Senator VAN HOLLEN. I mean specifically on the 810 authorizations.

Ms. SVINICKI. Members of the Commission. This is a delegated staff process.

Senator VAN HOLLEN. Were any of you individually involved? No-body at the table was part of that 810 consultation process.

All right, so then you wouldn't know when it took place. I see. I must say that is staggering. So you don't know whether or not the NRC raised any concerns as part of this consulting—I know you don't have sign off authority, but none of you at this table know whether the NRC raised any concerns about entering into these 810 authorizations.

Ms. SVINICKI. I do not.

Senator VAN HOLLEN. OK.

Madam Chairman, I would request that you get this information as soon as possible. This just came to light. You have a statutory and regulatory role to play here, and I have to say it is astounding that not a single one of you is aware of whether, when, and what role the NRC played in that particular authorization.

Senator CAPITO. Well, if there are no more questions for today—oh, yes, Senator Carper.

Senator CARPER. I want to come back to the Nuclear Energy Innovation and Modernization Act from when we talked about it earlier in the hearing. My question for you, just a little bit different, could you all take a moment and tell us how you believe NEIMA implementation is going, and will the changes help the advanced nuclear technologies, and do you have any concerns with implementing any of those new changes?

Madam Chair.

Ms. SVINICKI. If I may start, Senator Carper.

Senator CARPER. Please.

Ms. SVINICKI. Candidly, with Congress passing it in December and its signature in January, it is candidly off-cycle from the development of the fiscal year 2020 budget that lies before the Congress right now. That being said, we moved out very quickly on it in January to do kind of a diagramming of all the different provisions, and it is our assessment today, based on where we are, that with a shifting of some priorities and other things we are confident that within the budget request that pends before you, even though we didn't have NEIMA enacted at the time that we formulated that request, we are confident that we could perhaps reprioritize a bit within fiscal year 2020 activities in order to accommodate the NEIMA requirements under the budget we have.

As I had mentioned to Senator Capito, there are a number of provisions that are interrelated by their mathematical effect on our budget. We are still working to run some scenarios and have a better sense of how all of those provisions will work in concert with each other. It will probably take one full budget cycle before we could come back to you in an informed way and say it creates a significant downward pressure here, but offers relief here.

So, certainly, we would keep the Committee informed as we implement, we have feedback that would be of utility and informing the Committee about how we are doing on it. It is a little bit early days right now. That would be my characterization of where we are.

Senator CARPER. Anybody have a different view or feel a need to amplify on that?

Mr. BARAN. The only thing I would add just specifically on advanced reactors, I think probably the main provision under the statute on the advanced reactors is having NRC do a rulemaking

that would be a rulemaking that could cover any of the advanced reactor technologies, something that is not technology specific but rather, more of a performance based approach that would cover any of the technologies.

That is very much consistent with where the staff had been moving. The staff had already proposed to the Commission a rulemaking of that sort, so on the advanced reactor side I think the vision expressed in the bill that became law and the vision kind of at NRC are very much consistent.

Senator CARPER. All right, thanks.

I have a last question, a different question. I just want to ask you for advice, and we will start with you, Commissioner Burns.

Like Senator Whitehouse, I live in a coastal State. Our State is the lowest lying State in America. The seas are rising, my State is sinking, so we have a huge concern about sea level change, climate change.

It was not long ago roughly 70 percent of the non-carbon electricity that was generated came from nuclear. I am told we are now down to about 60 percent of the non-carbon electricity generated comes from nuclear. We are seeing more wind, we are seeing more solar, which is a good thing.

Like the Chairman, I have a longstanding interest in making sure that we continue to address climate change, and we do it in ways that are cost effective and safe. Give us, each of you, just a very brief word of advice on what this Committee can do to make sure that the nuclear industry, rather than continue to diminish in terms of its contribution to carbon-free electricity, gets to increase it. Please.

Commissioner Burns.

Mr. BURNS. Thank you, Senator Carper. I think, again, it is looking across this span of our history as an agency, and even going back into the development of civilian nuclear power. One thing is maintaining the integrity of the institutional integrity that we have, that we have a strong regulator, an independent regulator. That is the international norm, and in a way, when we were created, we created, in many respects, what became the international norm for regulation through the Convention on Nuclear Safety.

I think, again, your role in terms of oversight for us, in terms of holding us accountable through hearings and through the process is important, and you also complement that by looking into things like research and development that is undertaken by DOE, by private industry. Those things I think continue to be the most important things that I think you can do.

Again, I would say one of the interesting things about working at this agency for many years has been that, across time, we call it a learning organization, using this word transformation, it is continually to think about how we do our work and how we can do it better, more effectively. I think that is the challenge for you, to keep pushing at us.

So those are just some brief thoughts.

Senator CARPER. Mr. Chairman, I know my time has expired, but would it be possible if any of the other Commissioners who wanted to comment on that question, just to say a few words?

Senator BARRASSO [presiding]. Please.

Senator CARPER. How about our newest member.

Mr. WRIGHT. I agree with everything that you have heard. I do think that right now we are going through change, transformation. That is the word that you are hearing in the paper that is before us.

But if we don't do things within our agency to keep ahead of the curve and be prepared for what the future is going to hold, regardless of which direction it goes, and that is kind of what the agency is looking at, then we are going to cede ourselves to somewhere we don't want to be. So we need to be prepared for anything that comes along, especially making sure that we have the ability for new technologies to be licensed in this country that can be sold around the world.

Senator CARPER. All right. Thank you, sir.

Ms. Caputo.

Ms. CAPUTO. I think one thing that I would add is just the importance of the NRC conducting predictable and timely decisions, because I think a lot of companies that are looking at advanced reactor technology are not traditional nuclear utilities and to a great extent, if we are perceived to be slow, untimely, not predictable, it will have drastic impacts on the nature of their investment and their business prospects for proceeding. So, I think there is a great attention toward making sure that we take risk informed actions and that we do it in a timely fashion in order to make the regulatory process as predictable as possible.

Senator CARPER. All right, thank you.

Commissioner Baran.

Mr. BARAN. I don't know that I would have too much to add. I agree with Commissioner Burns that your focus on the work we are doing and on safety is so critical, because it is the foundation for everything. You know, whether it is about having the plants continue to operate that are there or having new plants come online, safety is just key to all of that, and your focus on that is so appreciated.

Senator CARPER. Thank you.

Madam Chair.

Ms. SVINICKI. Well, I agree with the perspectives of my colleagues. I think I am increasingly daunted by how hard change is in large organizations. If we were manufacturers, we could shut down the line, and we could retool, but our product is really decisions and regulatory outcomes, and what you are asking people to do at every level in the organization is to think differently about things, to be open to innovation and new technology.

Now, we do want to get them improved tools to do what they do, maybe better ways to monitor their program activities and metrics, and we are making a lot of IT investment, and we are trying to equip them. Because if you are asking people to change, you have to give them the tools to go about and do things differently or more efficiently. But when an agency has had such a strong performance record regulating one type of reactor and doing it one way, it is a hard thing to surmount how accustomed people are to reflexively, without even thinking about it, kind of picking up something and going about it the same way, so hats off to our leaders.

We do have a lot of mid-career employees who I think are bringing strong energy to this. They want to work there 15 years from now, 20 years from now, and they are actually, I think, a little excited to say, hey, I will get to put my imprint on how we do things they have inherited. Things like the reactor oversight process that has been mentioned here, that was designed 20 years ago, and they want to have an opportunity to take what we have learned in the intervening years and make NRC not less than it was or diminished, but just the NRC that is going to continue that they want to be working at 20 years from now.

Senator CARPER. All right, thank you.

Speaking of change and transition, I would just say to Stephen Burns—what do they say in Hawaii, aloha, whether you are coming or going? In the Navy, we say fair winds and a following sea. Thank you for your service. God bless you and your family.

Thank you.

Senator BARRASSO. Just a couple more questions.

Chairman Svinicki, the Nuclear Waste Policy Act required the Department of Energy to begin receiving spent nuclear fuel in 1998. American taxpayers now pay I think over \$2 million of legal costs every day because Yucca Mountain is not operational. The NRC's budget requests \$36 million to hire 77 staff to receive the Commission's nuclear waste disposal program in terms of reviving the program and moving along with it. What can the Commission accomplish with that funding if Congress is able to appropriate the money?

Ms. SVINICKI. Thank you. The increment of funding that we have asked for would be allocated principally toward the resumption of what is called the adjudicatory hearing. There are over 300 what we call contentions or disputed issues on the Yucca Mountain license application, and we need to have a hearing infrastructure, we need to have hearing judges and staff.

As has been noted, this project for NRC has been dormant now for nearly 10 years, or it would be 10 years when the fiscal year 2020 budget is put in place. We have lost a lot of people; we have lost a lot of knowledge and expertise. We have good experts. I think we could reacquaint them with the record and try to have them begin to participate fully in this activity, but there would be a lot of capability and infrastructure to be restored, and the funding we have requested would be put to that purpose.

Senator BARRASSO. One last question. You do a monthly report on the status of the NRC, the licensing actions, the budget. I have recently reviewed I think your 26th monthly report. I think the report would benefit from some redesigning, maybe for clarity and for some usefulness, and I just wondered if you and your staff would work with me and my Committee staff to revise the format and the content of the monthly report, if that is something we can work on.

Ms. SVINICKI. Yes, Chairman Barrasso, we would welcome an opportunity to try to better meet the Committee's information needs in that report, which has become a bit, ponderously long and cumbersome. We seek only to provide you with something that is beneficial.

I would note that we also have legacy reports that I think Senator Voinovich may have initiated, and if, as a part of that, we

could propose to you any combination that would make sense. We send you committee reports on different frequencies, on different topics that have simply accumulated over the course of the Committee's request to the agency, and there may be some rationalization, and we could result maybe in an improved product on more than just the monthly report.

Senator BARRASSO. That would be very helpful.

I am grateful to all of you for your testimony, especially Commissioner Burns. Thank you for your long years of service to our Nation. It is bipartisan gratitude for all the work that you have done.

If there are no further questions, members may submit follow up questions for the record over the next couple of weeks. The hearing record will therefore remain open for 2 weeks.

I want to thank all of you for your time and your testimony. The hearing is adjourned.

[Whereupon, at 11:26 a.m. the Committee was adjourned.]

