Stenographic Transcript
Before the

Subcommittee on Strategic Forces

COMMITTEE ON
ARMED SERVICES

UNITED STATES SENATE

HEARING TO
RECEIVE TESTIMONY ON THE DEPARTMENT OF ENERGY ATOMIC ENERGY DEFENSE ACTIVITIES AND PROGRAMS IN REVIEW OF THE DEFENSE AUTHORIZATION REQUEST FOR FISCAL YEAR 2019 AND THE FUTURE YEARS DEFENSE PROGRAM

Wednesday, March 14, 2018

Washington, D.C.

ALDERSON COURT REPORTING
1155 CONNECTICUT AVE, N.W.
SUITE 200
WASHINGTON, D.C. 20036
(202) 289-2260
www.aldersonreporting.com

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U.S. Senate

Subcommittee on Strategic Forces

Committee on Armed Services

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The subcommittee met, pursuant to notice, at 2:30 p.m. in Room SR-232A, Russell Senate Office Building, Hon. Deb Fischer, chairman of the subcommittee, presiding.

Subcommittee Members Present: Senators Fischer [presiding], Cotton, Donnelly, Reed, Warren, and Peters.

OPENING STATEMENT OF HON. DEB FISCHER, U.S. SENATOR FROM NEBRASKA

Senator Fischer: The hearing will come to order.

The subcommittee meets today to receive testimony on the Department of Energy's atomic energy defense activities.

Thank you to the witnesses for appearing before us today and for your service to this country. We appreciate it.

We are very pleased today to be joined by the ranking member of the full committee, Senator Reed from Rhode Island, and I would ask Senator Reed if he has comments to make at this time.

Senator Reed: I do not have an opening statement. Thank you, Madam Chairman.

Senator Fischer: Thank you.

Today's hearing marks the subcommittee's first meeting in open session since the release of the administration's 2018 Nuclear Posture Review, which makes several key points that will be relevant to our discussion today. Where the NPR affirms the need for a modern and responsive nuclear infrastructure, it acknowledges that this has been a goal of all previous NPRs and that we have failed to make sufficient progress towards achieving this objective.

As a result, it clearly states that there is no margin for further delay, a point you echoed in your prepared

testimony, Secretary Gordon-Hagerty, and that, quote, significant and sustained investments will be required over the coming decade to ensure that NNSA will be able to deliver the nuclear weapons at the needed rate to support nuclear deterrence in the 2030s and beyond. End quote.

Secretary, we look forward to hearing from you about the steps NNSA will be taking to confront this challenge and how the fiscal year 2019 budget request supports your needs with respect to sustaining the current stockpile and fulfilling NNSA's other missions.

I also appreciated our discussion on Tuesday and your view that we must make a decision on the plutonium strategy and proceed aggressively so that we can meet the requirement to produce 80 pits per year by 2030. This committee looks forward to the conclusion of NNSA's engineering analysis and working with you to address this critical issue.

Mr. Owendoff, we look forward to hearing an update from you on the Department of Energy's environmental management portfolio and Mr. Trimble's assessment of EM's efforts.

And, Admiral Caldwell, as always it is good to see you again and hear about Naval Reactors' contribution to our national security.

With that, our ranking member has not arrived yet. I will ask for his opening statement when he does come, but I would like to begin with the Secretary, if you have an

opening statement.

STATEMENT OF HON. LISA E. GORDON-HAGERTY, UNDER SECRETARY FOR NUCLEAR SECURITY, DEPARTMENT OF ENERGY

Ms. Gordon-Hagerty: Thank you very much, Chairman Fischer, Senator Reed, and the distinguished soon-to-join-us members of the subcommittee. Thank you for the opportunity to present the President's fiscal year 2019 budget request for the Department of Energy's National Nuclear Security Administration.

I would also like to thank you both for your support during my recent confirmation. It is a privilege to sit here before you today representing the extraordinary men and women of the DOE NNSA and the vital roles we play in executing our nation's nuclear security mission.

Chairman Fischer, a written statement has been provided to the subcommittee, and I respectfully request that it be submitted for the record.

Senator Fischer: Without objection.

Ms. Gordon-Hagerty: Thank you.

Since being sworn in 3 weeks ago, I have had the opportunity to learn in depth about many of NNSA's programs and projects, and I still have a great deal more to learn. But what I have seen so far is impressive. From steady progress towards infrastructure modernization to flight qualification tests of the B-61-12, removals of highly enriched uranium from Ghana and the Republic of Kazakhstan

to the commissioning to a new class of nuclear-powered aircraft carriers, NNSA has lent its world-class expertise to keeping our nation safe and secure with the support of this subcommittee and Congress. But there is much more to be done to meet the challenges posed by the current geopolitical environment.

The President's fiscal year 2019 budget request for NNSA is $15.1 billion, providing the resources required to help ensure we are able to protect our nation and keep our allies safe. And this request also moves us toward a deterrent that is modern, robust, flexible, resilient, ready, and appropriately tailored as outlined in the 2018 Nuclear Posture Review.

The fiscal year 2019 budget request clearly demonstrates the administration's strong support of the NNSA and its three enduring missions: maintaining the safety, security, reliability, and effectiveness of the U.S. nuclear weapons stockpile; reducing the threat of nuclear proliferation and nuclear terrorism around the world; and providing nuclear propulsion for the U.S. Navy's fleet of aircraft carriers and submarines.

NNSA's fiscal year 2019 budget request for weapons activities account is $11 billion, an increase of 7.6 percent over the fiscal year 2018 request to ensure we are able to achieve and maintain necessary capabilities. This

funding supports the nation's current and future defense posture, including infrastructure across the nuclear security enterprise. This budget request supports our three life extension programs and major alteration and advances recapitalization and modernization of our Cold War-era infrastructure.

The fiscal year 2019 budget request also includes $1.9 billion for defense nuclear nonproliferation account, a 3.9 percent increase above the fiscal year 2018 request. This funding continues NNSA's far-reaching activities around the world to prevent proliferation of nuclear weapons, counter the threat of nuclear terrorism, and respond to nuclear or radiological incidents.

The budget request for naval reactors is $1.8 billion, a 20.9 percent increase above the fiscal year 2018 request. In addition to supporting today's operational fleet, this request sustains naval reactors' ability to deliver tomorrow's fleet. It consists of three key projects: developing the Columbia class reactor plant, refueling a research and training reactor in New York, and building a new spent fuel handling facility in Idaho.

But paramount to all of our endeavors is our modernization effort. There is no longer margin for delay in modernizing NNSA's scientific, technical, and engineering capabilities and recapitalizing the infrastructure needed to

produce strategic materials and components for U.S. nuclear weapons. NNSA's talented cadre of federal employees and partners at our laboratories, plants, and sites need these tools to overcome the complex challenges facing our nuclear security mission.

The budget request for federal salaries and expenses is $422.5 million. This request provides funding for 1,715 full-time equivalents, for effective program management and appropriate oversight of the nuclear security enterprise. Of note, since 2010, NNSA's program funding has increased 50 percent while our staffing has decreased by 10 percent.

NNSA's fiscal year 2019 budget request is the result of a disciplined process to prioritize funding for validated requirements as designated by the administration and it sets the foundation to implement policies from the Nuclear Posture Review and the National Security Strategy.

Thank you for your strong support of this subcommittee and the opportunity to testify before you today. I stand ready to answer any questions you may have. Thank you.

[The prepared statement of Ms. Gordon-Hagerty follows:]

Senator Fischer: Thank you, Madam Secretary.

With that, I will recognize Senator Donnelly, the ranking member, for opening comments.

STATEMENT OF HON. JOE DONNELLY, U.S. SENATOR FROM INDIANA

Senator Donnelly: Thank you, Madam Chair.

I want to start by thanking Senator Fischer for holding today's hearing. This subcommittee has a strong history of bipartisan support for modernization of our nuclear deterrent in which the National Nuclear Security Administration plays a central role.

Let me also thank today's witnesses for joining us to testify on the fiscal year 2019 budget request for defense programs at Department of Energy. Today's hearing is wide-ranging from supporting the DOD and our nuclear deterrent to detecting smuggled nuclear materials around the world to cleaning up former defense production sites. In all of these, the key issue is effective use of the taxpayers' dollar.

Administrator Gordon-Hagerty, congratulations on your confirmation and welcome to the subcommittee.

The NNSA's stockpile program is experiencing the highest demand since the mid-1980s. They are now up to six major programs, all concurrent with each other. The credibility of the NNSA to meet the Department of Defense requirements is on the line, and you and your team have a big challenge to rise up to and we must meet that.

Admiral Caldwell, it is good to see you again. I look

forward to hearing from you about progress on the Columbia class submarine and ongoing infrastructure modernization across the naval reactors complex.

Mr. Owendoff, over the 20 years, your program has cleaned up 91 of the 107 sites. But now we have the most challenging, especially at Hanford with its 55 million gallons of liquid waste. Your total liability continues to grow, which the GAO estimates at $383 billion. Half of that liability is at Hanford and Savannah River. Time is your enemy for this liability, and we must try to get these sites done as quickly and safely as possible.

And, Mr. Trimble, as always we are grateful for you and your staff on the excellent work your team undertakes for this subcommittee. You play a critical role in oversight of the work underway at the Department of Energy. I look forward to your testimony.

And I want to thank Ranking Member Reed for being here with us today as well. Thank you.

Thank you, Madam Chair.

Senator Fischer: Thank you, Senator Donnelly.

Mr. Owendoff, if you would give us an update on the environmental management in your opening comments please.

STATEMENT OF JAMES M. OWENDOFF, ACTING ASSISTANT SECRETARY FOR ENVIRONMENTAL MANAGEMENT, DEPARTMENT OF ENERGY

Mr. Owendoff: Good afternoon, Chairman Fischer, Ranking Member Donnelly, Senator Peters, Senator Reed, and members of the subcommittee. I am pleased to be here today to represent the Department of Energy's Office of Environmental Management and to discuss what we plan to accomplish under the President's fiscal year 2019 budget request.

The total fiscal year 2019 budget request for the EM program is $6.6 billion. Of that, $5.6 billion is defense environmental cleanup activities. This request is the highest for the EM program in a decade and is an increase of $93 million from the fiscal year 2018 request, which was also record request. The fiscal year 2019 request demonstrates the administration's continued commitment to the vital mission of EM to address the environmental legacy of nuclear weapons production and government-sponsored nuclear energy research.

DOE and EM are committed to ensuring the safety of our workforce, the public, and the environment. Safety is the top priority for the Office of Environmental Management and its field sites. It is valued above production, budget, and schedule. We are also strongly committed to a workplace where all workers, federal and contractor, are free to speak

out, voice concerns, or lodge complaints without fear of retaliation.

To continue and further build upon our momentum of progress, we have focused on a greater sense of urgency to EM's decision-making process. This approach means more emphasis on engaging with regulators, stakeholders, and communities in making timely decisions which will enhance safety, shorten schedules, increase transparency, and reduce costs. This will enable us to achieve the best value for all taxpayers while at the same time protecting our workers, members of the public in the communities surrounding our sites and the environment.

Going forward, our fiscal year 2019 request will enable us to continue making progress on those capabilities necessary to tackle some of our longer-term challenges while also enabling us to realize concrete accomplishments across the EM program.

At Savannah River, the request will enable DOE to significantly increase processing of radioactive waste and closure of underground tanks. As a result, the site will be able to significantly build on its record to date of successfully emptying and closing those tanks.

The WIIP request will have benefits across the EM program with the planned infrastructure improvements intended to enable increased true waste shipments from other

EM sites.

We will continue to enhance those portions of the Hanford waste treatment and immobilization plant necessary to initiate tank waste treatment through the direct feed, low-activity waste approach and complete design and launch site preparations for the Oak Ridge mercury treatment facility, which will help address the mercury contamination at the site and aid in the eventual D&D of deteriorating facilities at the Y12 National Security Complex.

We will also complete targeted, buried waste exhumation at the Idaho site and continue implementation of an interim measure to address chromium groundwater contamination at the Los Alamos National Laboratory, among other projects.

In closing, I am honored to be here today representing the more than 20,000 men and women that carry out the Office of Environmental Management mission. Ensuring a safe environment at all of our sites is our highest priority. We are committed to achieving our mission in a safe, effective, and cost efficient manner to serve as good stewards of taxpayer resources.

Thank you again for the opportunity to appear before you today, and I look forward to your questions.

[The prepared statement of Mr. Owendoff follows:]

Senator Fischer: Thank you.

Mr. Trimble will give a statement on behalf of GAO. Welcome.

STATEMENT OF DAVID C. TRIMBLE, DIRECTOR, NATURAL RESOURCES AND ENVIRONMENT, GOVERNMENT ACCOUNTABILITY OFFICE

Mr. Trimble: Thank you, Chairman Fischer, Ranking Member Donnelly, and members of the subcommittee.

The critical missions of the Department of Energy depend on the extraordinary capabilities found at the Department and its networks of laboratories and production facilities across the country. These capabilities serve all of DOE missions, including weapons cleanup, nonproliferation, energy, and science.

To successfully execute these missions, DOE must maintain, rebuild, and renew both its physical and human capital. DOE's efforts, however, are hindered by longstanding management challenges that have been well documented in reports by Augustine-Mies, Krenold, the Academies, the DOE IG, and GAO. Given the growing fiscal and budgetary pressures facing the government, DOE can no longer afford to poorly manage these billion dollar programs.

My testimony today will highlight some of the challenges facing DOE, including the affordability of NNSA's nuclear modernization programs, the growing cost of DOE's environmental liabilities, management challenges in the nonproliferation program, and DOE's efforts to improve its management of programs, projects, and contracts.

Regarding weapons, NNSA faces challenges with the affordability and execution of its nuclear modernization programs, which include ongoing and planned LEPs, as well as major modernization projects. Our review of the fiscal year 2017 SSMP found misalignment between NNSA's plans and projected budgetary resources which could make it difficult for NNSA to afford its planned portfolio of modernization programs. We found that NNSA's estimates of program costs exceeded the projected budgetary resources included in the President's plan near- and long-term modernization budgets. As NNSA updates its requirements and plans to respond to the new Nuclear Posture Review, NNSA will need to ensure that its updated modernization plans are aligned with its potential future budgets.

In addition, it is important to remember that the nuclear security enterprise is an interdependent system, and changes in one area can resonate throughout the enterprise. As you may recall, the 2014 Augustine-Mies report found that the lack of a stable, executable plan for modernization was a fundamental weakness for NNSA.

Regarding environmental cleanup, DOE's growing environmental liabilities demonstrate the need for DOE to improve its oversight and management of its cleanup mission. In 2017, we added the Federal Government's environmental liabilities to our high risk list. DOE is responsible for

about $384 billion of the $465 billion, and DOE's total cleanup liability has been growing. Over a recent 6-year period, EM spent $35 billion on cleanup while its liabilities grew by $90 billion. I should also note that these liability estimates do not include all of DOE's future cleanup responsibilities.

Our recent work has identified opportunities where DOE may be able to save tens of billions of dollars such as by taking a risk-informed approach to treating a portion of the low-activity waste at the Hanford site.

Regarding nonproliferation, DNN has not consistently used program management leading practices. We found that DNN's policy did not require programs to establish life cycle estimates or measure performance against schedule and cost baselines. In addition, we have found that DNN's R&D results were not being tracked consistently to help evaluate the success of that program.

To successfully meet the challenges facing it, DOE needs to improve its management of programs, projects, and contracts, areas that have been on GAO's high risk list for almost 3 decades. In recent years, DOE has taken some important steps, including requiring the development of cost estimates in accordance with industry best practices, creating new oversight structures, and ensuring that major projects, designs, and technologies are sufficiently mature

before construction.

However, significant challenges remain.

First, DOE still lacks reliable enterprise-wide cost information. Without this information, meaningful cost analyses across programs, contractors, and sites are not possible. Reliable detailed data are also needed for DOE to manage its risk of fraud.

Second, DOE has not always followed its own requirements. In 2018, we found that NNSA's analysis of alternatives to address its need for enriched uranium showed a bias for one option, building a new enrichment facility. We have found a similar problem with what the AOA has done in other projects such as the low-activity waste pretreatment system at Hanford.

Third, regarding program management, we found in 2017 that the defense programs within NNSA had established program management requirements. However, for strategic commodities like uranium, plutonium, and tritium, these requirements are not always being met due to staff shortages. We also noted that DOE does not have a unified program management policy.

In closing, let me note that we have several ongoing engagements for this committee examining these management challenges, and we strongly support the oversight efforts of this committee.

Thank you. I would be happy to answer any questions you have.

[The prepared statement of Mr. Trimble follows:]

Senator Fischer: Thank you, Mr. Trimble.

We are very pleased to have Senator Reed, the ranking member, with us today, and I would ask if you would like to begin our first round of questions, sir.

Senator Reed: Thank you very much, Madam Chairwoman. I thank you not only for your gracious hospitality but for your outstanding leadership along with Senator Donnelly. So thank you again.

Madam Secretary, I would like to talk about pit production. This has been a saga going on for almost a decade now, and I have been involved with it in the committee. We started off with a big box concept at Los Alamos and Oak Ridge and discovered that was too expensive. We shifted to a modular approach. That modular approach was agreed to by DOD, NNSA, and Congress in the 2014 National Defense Authorization Act. And yet, it seems to have resurfaced again as not a settled issue but one that is subject to debate. Senator McCain and I wrote a letter to the Secretary, both Secretary Perry and Secretary Mattis, about this issue.

I assume you are aware of all of this, the fact that we have assumed in the 2014 NDAA this was settled. You are aware of all of this I am sure.

Ms. Gordon-Hagerty: Yes. I am generally aware of everything that you have cited.

Senator Reed: Thank you.

You have just, because of this reopening of the issue, performed an analysis of alternatives. Your office has. Now, that analysis is being reviewed by an engineering contractor. Are you going to have this new analysis independently reviewed outside of NNSA since we will get a definitive answer we hope?

Ms. Gordon-Hagerty: So the engineering analysis that is currently underway is in its final stages of preparation. And currently we have members from Los Alamos, Livermore, Savannah River, and also members of the former Rocky Flats plant participating in this entire review. The assessment is the final draft data are available, and they are going to be reviewing the final draft data in the next week or so, at which point I have invited Under Secretary Lord from DOD over. And when I receive the final draft briefing, we will take a look at it and then I will make my recommendation to the Deputy Secretary of Energy. And we are trying to meet the NDAA guidelines' direction of 11 May.

Senator Reed: Since this is shaping up to be a battle of analysis, I would urge you to get an outside review also. And if you could commit to that, I would appreciate it. Please consider that.

Ms. Gordon-Hagerty: I will consider that. Thank you.

Senator Reed: According to the fiscal year 2018

National Defense Authorization Act, it requires NNSA to forward its recommendation to DOE, and they in turn must certify it meets their need. And you are a member of the Nuclear Weapons Council. Can you tell us and update what you said previously about the status of this review?

Ms. Gordon-Hagerty: Yes. So in fact, I attended my first Nuclear Weapons Council meeting -- I am a member of that august group -- on my day 3 of my tenure. I found it to be very engaging and very enlightening.

With regard to the plutonium analysis of alternatives and the engineering analysis that is currently ongoing, we are required, as I mentioned, to have the results to the committee through the NDAA requirement by 11 May. And that is why we are working so quickly on making sure that the engineering analysis that was done by an independent architecture and engineering firm is providing us with those data. And we are doing a rigorous analysis, again, with Livermore, Los Alamos, and Savannah River site personnel, as well as our federal employees.

Senator Reed: Thank you very much, Madam Secretary.

And gentlemen, thank you for your service.

Admiral Caldwell, good luck at Groton with the Colorado.

Admiral Caldwell: Yes, sir. Thank you.

Senator Reed: We are putting a new attack submarine in

the water. He is, not me.

[Laughter.]

Senator Reed: Thank you, Madam Chair.

Senator Fischer: Thank you, Senator.

Madam Secretary, as I mentioned in my opening statement, the Nuclear Posture Review repeatedly makes the point that we have not made sufficient progress towards a responsive nuclear infrastructure. When discussing NNSA's production of strategic materials, particularly plutonium and tritium, the NPR states that programs are planned but not yet fully funded to ease these critical production shortfalls.

I understand NNSA's fiscal year 2019 budget was written prior to the NPR's release. But does NNSA have a good understanding of the costs that are not reflected in the out-year projections submitted with this budget?

Ms. Gordon-Hagerty: With regard to the fiscal year 2019 submission and related to the NPR, in near term we are leaning as far forward as we possibly can and to ensure, working closely with OMB and DOD, that we have the priorities correct and that, again, with some congressional authorization that is needed for NNSA to move forward, we obtain that authorization so we can move as quickly as possible. In terms of out-years, we are going to be working on those budget requirements shortly.

Senator Fischer: In terms of the out-years, can you give us some idea of the scale of investment that we are looking at here?

Ms. Gordon-Hagerty: This is going to be a sustained, prolonged, and significant investment in our nuclear security enterprise. Significant. And the numbers I have heard are up to 6.5 percent of the DOD budget to support our initiatives long-term.

Senator Fischer: Thank you.

As you know, the NPR declares the administration's intent to rapidly pursue Stockpile Responsiveness Program established by Congress, and this is something that I am very supportive of. When can we expect to see that program implemented?

Ms. Gordon-Hagerty: We are already undertaking that program. We have some requests for that program in the fiscal year 2019 budget submission. And we will be taking that on. And I can provide you with a fuller explanation for the record.

[The information follows:]

[SUBCOMMITTEE INSERT]

Senator Fischer: And do you have in place a process so that you can evaluate the proposals that come from that?

Ms. Gordon-Hagerty: Absolutely.

Senator Fischer: Can you let us know, are you working with labs in order to establish that program? Can you give us a little more detail on it?

Ms. Gordon-Hagerty: Sure. One of the things that I am committed to do, Madam Chairman, is absolutely working as a team. This is not a federal directive coming down to the lab's plants and sites. We are going to do whatever we can to communicate with, work with, and ensure that the laboratories and plants and sites that have to execute these missions are fully engaged with and have the opportunity to provide the input that is necessary for us to maintain a fulsome program. And it is impossible for us to do so from Washington.

So I have already had my first tri-lab meeting with the lab directors. I have already spoken with all my field office managers, all of the plants and site directors, and they understand that my commitments to them will be open communications and it must be two-way so we can ensure that all of the requirements necessary to effect or to execute our missions are made with an engagement strategy of everyone from headquarters to the field.

Senator Fischer: Thank you. I hope you will continue

to keep Congress informed on that to make sure we are meeting the objectives that were laid out by Congress.

Ms. Gordon-Hagerty: I will. Thank you.

Senator Fischer: And as you note in your opening statement, more than half of NNSA's infrastructure is over 40 years old, and roughly 30 percent dates back to the Manhattan Project. Last year, the Congress directed NNSA to establish the infrastructure modernization initiative in order to reduce the backlog of deferred maintenance at least by 30 percent by 2025, and that is a detailed road map.

I understand that you are currently formulating a plan for how to execute this initiative. And when do you expect that plan to be completed so that you can brief Congress?

Ms. Gordon-Hagerty: I was just briefed on that plan yesterday. And they are putting together the plan right now. I believe that we can probably have that plan to you by the end of this year.

Senator Fischer: And have you established any kind of guidance or criteria for project consideration on that?

Ms. Gordon-Hagerty: I understand that there is, but I am happy to get back to you with that response.

[The information follows:]

[SUBCOMMITTEE INSERT]

Senator Fischer: Thank you.

Senator Donnelly?

Senator Donnelly: Thank you, Madam Chair.

And thank you to the witnesses for being here.

Secretary Gordon-Hagerty, if we include the low-yield warhead, we have upward of six major programs, all occurring at the same time, and this does not include modernizing your infrastructure. My understanding is they all merge at the Kansas City plant and at Pantex in Amarillo, Texas. What are you doing to address this?

Ms. Gordon-Hagerty: Senator Donnelly, as I had mentioned, one of my priorities will be to ensure that we have active and open communications with not only the headquarters and federal field elements but, obviously, the teams that have to execute these missions. So in order to ensure that we have the capabilities, the infrastructure, the technical personnel, as well as the technicians and the support staff in order to be able to execute all of these missions on time, on budget, and within the parameters set forth by the Nuclear Weapons Council to ensure that our customer, the Department of Defense, has the needs and has the capabilities that they require for our nuclear deterrent, I am making sure that all of those teams will come together. I am certain that they have in the past, but there is a new administrator and she is going to ensure that

that kind of robust organizational framework is put in place.

Senator Donnelly: It is an awful lot of moving parts all at the same time --

Ms. Gordon-Hagerty: I agree.

Senator Donnelly: -- all kind of coming to the same place at the same time as well. And so we just have to make sure we are on top of that.

Mr. Owendoff, what are you doing to begin removing the Hanford low-activity waste from the tanks, and when will you begin, and when do you hope to finish?

Mr. Owendoff: Thank you, Senator Donnelly.

We have a contract goal, and the Secretary is very committed to be able to start making glass by the end of December 2021. We have a consent decree milestone that says we need to have started by December of 2023. So we have some time. But we are working on the December 2021 date for low-activity.

We have felt, sir, that we need to start the first process building. There are three. We need to get the first one in place and running, and then work the next two, the high-level waste and the pretreatment facilities. Those other two facilities have a consent decree date of 2033 and 2035 to be operational.

Senator Donnelly: Thank you.

Admiral Caldwell, how much do you expect it will cost to complete the fuel examination facility at Idaho, and does that include the hot cells to handle the fuel?

Admiral Caldwell: Yes, sir. Thanks for the question. And I would like to say up front, Chairman Fischer and Ranking Member Senator Donnelly, thanks for the support of this subcommittee. It has been very important to my program and my ability to deliver safe, reliable, and effective nuclear propulsion to the Navy.

Sir, regarding your question, there are multiple aspects and phases that I need to just walk you through quickly.

The first is the facility that we have in Idaho does three things for us. It receives spent fuel, allows us to handle it safely, and package it. We are capitalizing that capability with the spent fuel handling facility, which this subcommittee has supported. That facility will come on line initially in 2024 and then be fully operationally capable in 2025.

The second component that occurs out at the expended core facility is the examination of naval spent fuel. That is important because it allows us to assess how that fuel performed over life and then to make modifications to our future fuel systems, and the process that that has enabled us to deliver the life of the ship or be prepared to deliver

the life of the ship core for Columbia.

That examination's recapitalization is one that I just defined the mission need for last year. And so we are coming our progression of alternatives and study to determine exactly what the requirements are and what the costs will be. And that will be reflected in future FYNSPs. Right now, I think the cost is going to be somewhere on the order of over $500 million to maybe slightly over $1 billion, but it is not defined yet, sir, and I have work to do to do that.

The last piece is the capability to create specimens and transport those to the advanced test reactor that allows us to determine how fuel and how materials will react in future cores. That is important for future design. That is the third component that we still have to do more study with our partners in DOE who run the advanced test reactor. As they think about their future requirements and infrastructure that they are going to develop, we want to do that in partnership with them to make sure that our needs are met, as well as to understand what we need to invest in specifically for naval reactors.

Senator Donnelly: Thank you, Admiral.

Thank you, Madam Chair.

Senator Fischer: Thank you.

Senator Warren?

Senator Warren: Thank you, Madam Chair, and thank you, Ranking Member, for having this hearing.

And thank you to the witnesses for being here.

The administration's Nuclear Posture Review calls for two new low-yield variants to our existing nuclear arsenal, a low-yield submarine-launched ballistic missile, or SLBM, in the near term, followed by a low-yield sea-launched cruise missile. And I would like to focus, if I can, on the SLBM for now.

Ms. Gordon-Hagerty, I understand that NNSA plans to modify, quote, a small number, closed quote, of existing W76 warheads on our Trident missiles so that they are configured for a low-yield primary only explosion.

Now, I know the W76 is already going through life extension programs. So I would like to ask you some questions just about how that is going to work in practice. I just want to try to understand this. Can you say how many W76 warheads NNSA intends to modify in this way?

Ms. Gordon-Hagerty: Senator, that number is classified. I am not able to provide that to you. But I would be happy to do that in closed session.

Senator Warren: Okay.

Let me ask another question then related to this. As I understand it, the current W76 life extension program is due to be completed by the end of fiscal year 2019. So how long

will it take NNSA to modify the desired number, whatever that is, of warheads to detonate at a lower yield? And let me just ask related to that, do you anticipate that you can complete the low-yield modifications before the life extension production line closes at the end of this year?

Ms. Gordon-Hagerty: Senator, we are looking into that right now, and based on the program of record administered by the Nuclear Weapons Council and approved by Congress, we are in the process, as you rightly state, of nearing the completion of our life extension program for our 76-1. We are leaning as far forward as possible, putting schedules together, plans, and the things that we are authorized to do in anticipation of receiving congressional authorization to proceed with the low-yield ballistic missile warhead.

Senator Warren: So you cannot give me an answer right now on how long it will take to do this?

Ms. Gordon-Hagerty: We are putting those plans together right now, as we speak, because as you rightly state, we have several life extension programs ongoing right now. This should not be a significant -- this should not have a significant effect because we are, as you said, undertaking the LEP, life extension program, right now with the 76-1.

Senator Warren: But you do anticipate that you will be able to complete before the life extension programs are

completed.

Ms. Gordon-Hagerty: It is dependent certainly on DOD requirements and when they will require to have the modifications.

Senator Warren: So you are not certain on that yet. I just want to understand.

Ms. Gordon-Hagerty: No. We are working with the NWC, Nuclear Weapons Council, de-action officer level to ensure we can support the scheduling.

Senator Warren: So your budget request does not appear to specify any additional funding for the SLBM modifications called for by the Nuclear Posture Review. Are funds included for this purpose in the fiscal year 2019 request, and if so, how much?

Ms. Gordon-Hagerty: No, there are no funds related specifically to this activity. However, we are working closely with OMB and with DOD to ensure that any requirements necessary to be put forward for budget requirements for this process -- we will be working with OMB on that.

Senator Warren: But do you anticipate submitting a reprogramming or supplemental request, or do you expect to be using 2018 funds?

Ms. Gordon-Hagerty: At this time, I cannot tell you how that would be submitted if necessary, but we are getting

a good idea about what the costs would be associated with this modification.

Senator Warren: And one last question. What kind of testing will you need to conduct to ensure that whatever modifications are made will not impact the safety, security, and effectiveness of the warhead?

Ms. Gordon-Hagerty: Because this is a modification to an existing warhead. The science-based stockpile stewardship and all of the data that we have collected thus far should be adequate to meet the needs of the modification to the 76.

Senator Warren: So you are not anticipating any additional testing?

Ms. Gordon-Hagerty: Additional testing?

Senator Warren: To ensure that the modifications have not --

Ms. Gordon-Hagerty: Well, because of the science-based stockpile stewardship, the high performance computing, all of the other science and engineering practices will be applied to this as well.

Senator Warren: You know, I am just concerned here. Thank you.

Your predecessor, retired Admiral Frank Klotz, recently gave an interview in which he said that NNSA is already, quote, working pretty much at full capacity. Given the

number of life extension programs that NNSA is already overseeing and the demands of the stockpile stewardship program, I just have real concerns about your agency's capacity to take on additional work. And I think that maintaining our existing arsenal and our current program of record has to be our priority here.

Thank you, Madam Chair. Thank you.

Senator Fischer: Thank you, Senator.

We are letting Senator cotton collect his thoughts here before we call on him.

But, Admiral, if I could ask you a question. In 2017, the Navy acknowledged the discovery of a manufacturing defect in the prototype electric-driven propulsion system for the Columbia class reactor. And can you please update us on the progress that you are having in addressing this issue?

Admiral Caldwell: Yes, ma'am, gladly. And you are speaking specifically about the electric drive or the integrated power system for the Columbia class submarine. And again, I should note that this is funded on the Navy side not on the DOE side.

We did have a manufacturing defect last year, and specifically what happened was that some of the components for a pre-production motor were not properly insulated. And what we discovered was that the sub-tier vendor did not

properly flow down requirements to the manufacturer. And so as we were putting together this prototype motor, we learned of this deficiency, and it required us to go back and have another motor built, which the sub-tier vendor is executing. And that is going to delay our testing program.

Our testing program comes together for full integration testing at a facility up in Philadelphia with life-sized, real-sized components, pre-production, and they will test the entire system end to end. And then we will take what we learned from that and roll that into the final design that will go into the first ship.

So while we have lost some time on the pre-production motor, we still have been able, with shortening some test spans and doing some work in parallel, to preserve the required 9-months margin that I have specified to the required in-yard date for construction of the ship.

The bottom line is we are still on track to support construction of the Columbia starting in 2021.

Senator Fischer: So there really was not a negative impact to the larger schedule by this.

Admiral Caldwell: It certainly put some pressure on it, ma'am, and it has required a significant amount of oversight to be able to execute it. And because we have had to overlap some portions of the test program, I think it inserts a little more risk than we would have originally

preferred.

But we are managing that extremely tightly, and I get frequent reports on it. And in fact, we are starting to test with the components that we have in hand already up at the facility in Philadelphia. So we are making progress and I will continue to keep you informed on that.

Senator Fischer: Good.

Have there been any other challenges in some of the new technology that is associated with the Columbia class?

Admiral Caldwell: The other big challenge that we have in Columbia class is the manufacturing of the life of the ship core. It will be a pretty big step for us. It is going to be based on our experience with developing and building cores for many decades. And we knew this was going to be a challenge because to get to the over 40-year life of the core for Columbia was going to require the use of new materials.

So in 2010, we decided that we needed to go prove out the design and the ability to manufacture using these materials by building a special core to go into a reactor prototype and training site in New York. We call that core the technology demonstration core. And that has allowed us to prove that we can manufacture on a large scale and that we can meet our design requirements.

That core is nearly complete and it will be completed

next year, and we will go to the Ballston Spa Kesselring site where it will refuel the S8G prototype, and that will help us prove out all the work that we have done to prepare for Columbia.

So we are on track, and I expect to start building the core for Columbia next year, thanks to the money and the support that we have gotten from this subcommittee. So, again, it is not without challenge but we are overcoming those challenges as we encounter them, and we are on track to support the required in-yard date for the Columbia class submarine.

Senator Fischer: Thank you, sir.

Senator Cotton?

Senator Cotton: Thank you. I apologize for my tardiness. I was presiding over the Senate. It was fascinating.

I want to thank you all first for the jobs you do and very important work. And it is always not work that is in the headlines, and I think we should all be thankful for that given the nature of your work, that it is not frequently in the headlines.

Secretary Gordon-Hagerty, let me just ask at a high level because I know you have addressed some of the specific programs in terms of the life extension and the modernization programs for our warheads. Is everything on

track as of today?

Ms. Gordon-Hagerty: As of today, everything is on track and on budget.

Senator Cotton: If that were to change in the future, what would be the main causes for that change? What are the risk factors that you see in the future to any of those programs?

Ms. Gordon-Hagerty: There are some scheduling issues certainly with the W80-4. We need to continue to be in alignment with the Department of Defense on that. And also continuing sustained funding, predictable funding, is what is really going to be the cause if any of those schedules slip.

Senator Cotton: And that is it?

Ms. Gordon-Hagerty: At the present time.

Senator Cotton: Thank you.

Admiral Caldwell, let us turn to you. I know this is not exactly in your lane today, but I suspect you have worked on it some in the past. There is obviously a lot of debate in Congress about the National Defense Strategy and the Nuclear Posture Review and the return of some low-yield weapons to our arsenal. I know there is lots of sophisticated game theory type arguments you could make. Is the simplest argument to make is that Russia has them and we do not?

Admiral Caldwell: I think the best argument to make, sir -- first off, I support the Nuclear Posture Review. I support a strong nuclear deterrent. And I think the best argument to make is no matter who the potential adversary, that our nuclear deterrent must be strong, capable, and ready and must be ready to respond across a range of future scenarios.

And the important thing to note is deterrence -- what really matters is what is in the mind of the adversary. If they do not think we have a capability to respond in a variety of scenarios or that we are not ready or that it is not credible, then deterrence fails. So I believe that the plans and the intent of the Nuclear Posture Review is exactly where we need to go for a strong United States.

Senator Cotton: In terms of that flexible, ready response across a range of scenarios, so one of the threats there is that if the enemy possesses low-yield warheads, say, in the single digit kiloton range, yet it perceives us only to have high-yield, city-killing types in the dozens, hundreds of kiloton or even megaton range, they think they might be able to get away with detonating a low-yield weapon because we would not respond with a high-yield weapon.

Admiral Caldwell: That is correct, sir. We do not want an adversary to think that we are self-deterred.

Senator Cotton: Thank you.

Let us get back a little bit more into your current lane. Do you anticipate any problems in supplying additional reactors if the decision is made to increase the number of ballistic missile submarines?

Admiral Caldwell: Sir, as of now, I am not aware of any plans to increase the number of ballistic missile submarines.

Senator Cotton: Maybe they will be coming one day.

Admiral Caldwell: But certainly we will always welcome more submarines.

What I would tell you is we are in close dialogue with our nuclear industrial base, frequent. And we know their business well. We are good partners with them. We have had dialogues on the range of future options in terms of additional ships, including carrier build rates. And as long as the nuclear industrial base has sufficient warning, they can make the proper investments in people, equipment, and facilities to deliver what the nation needs.

Senator Cotton: On that topic, we used to have surface ships besides aircraft carriers that were nuclear-powered. We no longer have those. Why is that?

Admiral Caldwell: We had those cruisers, and then as they reached end of life, there was no intent to recapitalize them. And with every new ship class that comes into existence, we examine what the propulsion system should

be and we assess the mission, the patrol cycles, the deployment cycles, the crew cycles. And we also assess the cost, and part of that is the cost of fuel and how the ship will be used. And in the analysis of alternatives, if it makes sense to use nuclear propulsion, we would. But to date, since the retiring of those nuclear-powered cruisers, the ships that have been manufactured and use nuclear propulsion are all carriers and all submarines, and I think that is a good thing. I know that in future scenarios, as we continue to decide what future classes we need, that we will continue to pursue these analyses of alternatives and make a decision based on cost and what the mission needs are.

Senator Cotton: Thank you.

Senator Fischer: Thank you, Senator.

Senator Donnelly?

Senator Donnelly: Thank you, Madam Chair.

Mr. Trimble, where do you see the greatest bottlenecks for the NNSA as we begin all of these designing production programs?

Mr. Trimble: Thank you for the question.

I think that is a difficult one to answer simply because as you lay out, the complex is working at levels not seen since the Cold War, and you are operating with a very tight schedule across all the LEPs, while simultaneously

doing physical modernization for the core facilities for uranium, plutonium, et cetera. So it is a very complex system that needs to be tightly managed, tightly orchestrated. So the potential for things to go off the rails anywhere is there.

By the way, if I had to pick one area, I think as you mentioned, Kansas City jumps to mind. I know we have some ongoing work looking at Kansas City for this committee. They I believe make roughly 80 percent of the non-nuclear components for the weapons. They are already planning to go to or already at two and three shifts. And over the next 5 years, we have been told they are looking to hire about 1,000 people. So that is quite a daunting undertaking and it is sort a fulcrum for all of our efforts.

Throwing another challenge at Kansas City in terms of the hiring, there is another GAO high risk area dealing with security clearances. So the ability to hire those people who all need Q clearances is also going to run up into sort of the mess that is the clearance process currently in the Federal Government.

Senator Donnelly: Thank you.

Admiral Caldwell, a life of core fuel is your current milestone for the Ohio replacement program. If we go to life of core fuels for the fleet, what fuel forms of the future are you looking at?

Admiral Caldwell: Sir, thanks for the question.

We currently manufacture life of ship fuel for all of the submarines, and for the carriers, it is a once in their life refueling at roughly the 25-year point. With Colombia, again, life of the ship core enables us to avoid refuelings, taking the ship off line, saves money, saves force structure.

What is next? Well, the Navy has a need for more power as we decide to put more capabilities on ships going forward. They need greater flexibility. Certainly the Navy would maybe like, in our submarine force, to have more speed. So these things require us to put more energy in the core if we can also make future cores more affordable because cost savings is something that we are focused on, as well as meeting the requirements for strong, stable, reliable nuclear propulsion.

So what is next is that we plan to do, given the money requested in the presidential budget, is to take that Virginia core and see how we can make some modifications to it. And our plans right now are to make some of those modifications for installation on a late model Virginia and then be ready for a future SSN. And we believe we can put some more energy in there and make it more affordable, to the tune of perhaps maybe a $50 million reduction per ship. So that is substantial.

What is after that would have to be pretty much a revolutionary change or a step change in core design using a completely different system. And we are working on that. We are making pace on that. But the next step is to take this Virginia class core and take it to the next level using sort of the current model.

Senator Donnelly: Thank you.

Secretary Gordon-Hagerty, my understanding is that in developing the fiscal year 2019 budget, we reduced the funds to the laser fusion efforts which underpin a lot of the science programs. In particular, we have proposed to phase out laser fusion at Rochester, which is the seed corn of future scientists for the weapons programs in many ways.

Have you assessed what impacts this will cause in the short and long term?

Ms. Gordon-Hagerty: Senator Donnelly, I recently learned about this, and I have looked into it personally. We have near-term and long-term priorities in our science-based stockpile stewardship programs. And it so happens that part of the inertial confinement fusion program, of which NIF-Z at Sandia and NIF at -- National Ignition Facility at Livermore, Z at Sandia, and the LLE at University of Rochester, the Omega program, are part and parcel of those programs. However, because of near-term priorities in our science-based stockpile stewardship and

our requirements, we have decided that it is best for us to ramp down the activities at University of Rochester. While I recognize that, yes, it is a source oftentimes of future scientists and engineers because they get some training there, we are looking at what it takes to ensure that we are supporting our science-based stockpile stewardship and management program. And therefore, we have determined that we are going to be putting it on a 3-year ramp-down.

Senator Donnelly: Thank you, Madam Chair.

Senator Fischer: Thank you, Senator Donnelly.

I would like to thank the witnesses for being here today. If we do have some questions for the record and we get those submitted to you, I would hope that you could respond to us within a couple weeks with your answers.

[The prepared statement of Admiral Caldwell follows:]

Senator Fischer: And with that, I thank Senator Donnelly, and the meeting is adjourned.

[Whereupon, at 3:25 p.m., the hearing was adjourned.]