

ENERGY AND WATER DEVELOPMENT APPROPRIATIONS FOR FISCAL YEAR 2018

WEDNESDAY, JUNE 14, 2017

U.S. SENATE,
SUBCOMMITTEE OF THE COMMITTEE ON APPROPRIATIONS,
Washington, DC.

The subcommittee met at 2:40 p.m. in room SD-138, Dirksen Senate Office Building, Hon. Lamar Alexander (chairman) presiding.

Present: Senators Alexander, Hoeven, Feinstein, Udall, and Merkley.

DEPARTMENT OF ENERGY

NATIONAL NUCLEAR SECURITY ADMINISTRATION

STATEMENT OF HON. LIEUTENANT GENERAL FRANK G. KLOTZ, U.S. AIR FORCE (Retired), UNDER SECRETARY FOR NUCLEAR SECURITY AND ADMINISTRATOR

ACCOMPANIED BY:

PHILIP T. CALBOS, ACTING DEPUTY ADMINISTRATOR FOR DEFENSE PROGRAMS

DAVID G. HUIZENGA, ACTING DEPUTY ADMINISTRATOR FOR DEFENSE NUCLEAR NONPROLIFERATION

OPENING STATEMENT OF SENATOR LAMAR ALEXANDER

Senator ALEXANDER. The subcommittee on Energy and Water Development will please come to order. Today's hearing will review the Administration's fiscal 2018 budget request for the National Nuclear Security Administration. This is the second of the subcommittee's four budget hearings this year and we will have two more this month.

Let me make two preliminary remarks. There is one representative of the Capitol Police Force here in the room with us and I want to thank him and his colleagues for their courage today. They helped prevent what could have been a massacre in Alexandria when the gunman came in and began firing at Congressmen. So we thank you for that and we hope that those who are wounded including two Capitol policemen or women will recover, as well as Congressman Scalise and a staff member.

Second, we have a distinguished group of witnesses that I am going to introduce in a minute, but I believe both General Klotz and Admiral Caldwell have been working with us for about 3 years now. And I would say to both of you how much I appreciate your leadership and your willingness to answer our questions and work

with us and show up and brief us when we ask you to do that, and I thank you for that.

Senator Feinstein and I will each have an opening statement. We will recognize each Senator for up to five minutes for an opening statement, alternating between majority and minority in the order in which they arrived. We will then turn to General Klotz to present testimony on behalf of the National Nuclear Security Administration and then give Admiral Caldwell an opportunity to make a statement.

At the conclusion of the witnesses' testimony, I will then recognize Senators for five minutes of questions in the order in which they arrived alternating between parties.

First, I would like to thank our witness for being here and I would like to acknowledge, once again, my respect and appreciation for Senator Feinstein and the way that she is such a disciplined student of the issues that she cares about and a good partner to work with. So I thank her for that and for her leadership.

FISCAL YEAR 2017 ENERGY AND WATER DEVELOPMENT APPROPRIATIONS BILL

I am very pleased with the fiscal year 2017 Energy and Water Appropriations Bill, the one we just finished. It provided a record level of funding for the Office of Science, a record level of funding for the Corps of Engineers, continued to support supercomputing, maintained the Nation's nuclear weapons stockpile, and cut wasteful spending.

I think the committee did a very good job with the help of—we had about 87 members of the Senate who had their oar in the water in some way in our bill and setting priorities. I look forward to working with Senator Feinstein on another strong bill this year.

FISCAL YEAR 2018 BUDGET REQUEST

Our witnesses today, as I mentioned, Lieutenant General Frank Klotz, the Administrator of NNSA (National Nuclear Security Administration); Admiral Frank Caldwell, the Deputy Administrator for Naval Reactors; Mr. Phil Calbos, Acting Deputy Administrator for Defense Programs; Mr. David Huizenga, Acting Deputy Administrator for Defense Nuclear Nonproliferation. Welcome to all four of you.

We are here today to review the Administration's fiscal year 2018 budget request for the National Nuclear Security Administration, the semi-autonomous agency within the Department of Energy that is responsible for a vital mission—maintaining our nuclear weapons stockpile, reducing the global dangers posed by weapons of mass destruction, and providing the Navy with safe and effective nuclear power.

The President's fiscal year 2018 budget request for NNSA is \$13.9 billion, an increase of \$993 million, 7.7 percent over the fiscal year 2017 enacted level. Today, I would like to focus my remarks and questions on three main areas: (1) keeping critical projects on time and on budget; (2) effectively maintaining our nuclear weapons stockpile; and (3) supporting our nuclear Navy.

KEEPING CRITICAL PROJECTS ON TIME AND ON BUDGET

Now, on the first, the NNSA is responsible for three of the largest construction projects in the Federal Government: the Uranium Processing Facility in Tennessee; the MOX (Mixed Oxide) Fuel Fabrication Facility in South Carolina; and the plutonium facility in New Mexico. Combined, these projects could cost more than \$20 billion to build. Of course, that does not include the cost to operate the facilities. Over the past 5 years, Senator Feinstein and I have worked equally hard and had an equally high priority on trying to keep those costs from skyrocketing, whether I was chairman of the subcommittee or she was chairman that has been a shared mission that we have. We want to make sure that hard earned taxpayer dollars are spent wisely and that these projects are on time and on budget.

Senator Feinstein and I have focused much of our oversight on the Uranium Processing Facility in Tennessee over the past 5 years. That oversight includes regular meetings with the Department's leadership to discuss the project, particularly how the Department is implementing the recommendations of a Red Team review, completed in 2014, that detailed ways to get the project on track.

Senator Feinstein and I requested that 2014 Red Team review which was headed by Dr. Thom Mason, formerly the director of the Oak Ridge National Laboratory. The Red Team recommended ways to get the project back on time and on budget. General Klotz has previously told us that all of the Red Team recommendations are being followed, and I think that is a big part of the reason the project is moving along nicely. We have said the project needs to be completed by 2025 at a cost of no more than \$6.5 billion, and the design of the nuclear facilities needs to be 90 percent before construction of those buildings begins.

I recently visited Y-12 in Oak Ridge with Secretary Perry and saw the work being done to build the two new uranium processing facilities. I understand the designs for the two nuclear buildings will be more than 90 percent complete by the end of the year and ready to start construction next year, 2018.

MIXED OXIDE FUEL FABRICATION FACILITY

The MOX Fuel Fabrication Facility, a major construction project in South Carolina, has also raised several concerns because of growing costs. Senator Feinstein and I asked for a Red Team review of the MOX project as well. That was in 2015, to try to get the project back on track. The Red Team concluded that the MOX project would cost about twice as much each year as an alternative, known as Dilute and Disposal Alternative. The cost to build the MOX facility was estimated at over \$17 billion. Once the MOX facility is built the cost of the MOX option would be \$800 million to \$1 billion per year. The dilute and disposal facility will require up to \$500 million to build the processing lines and will cost less than \$400 million per year to operate.

The Red Team also found that the Dilute and Disposal Alternative would get the plutonium out of South Carolina faster than the MOX project. In other words, Dilute and Disposal Facility

would cost less, move more rapidly, and get the plutonium out of South Carolina faster.

The budget request proposes termination of the MOX project. President Obama's last budget did that. President Trump's first budget does the same. And it includes \$9 million to build additional facilities for the Dilute and Disposal alternative. I look forward to hearing more about that from General Klotz today.

Finally, you are in the early stages of the design for a new plutonium facility in New Mexico, the third multi-billion dollar project included in the NNSA budget request. I would like to hear from the witnesses how we have incorporated the lessons learned from the uranium facility and the MOX project into the design of the plutonium facility to make sure the project can be completed on time and on budget.

EFFECTIVELY MAINTAINING OUR NUCLEAR WEAPONS STOCKPILE

Now, a second major part of NNSA's budget is to maintain our nuclear weapons stockpile. I want to make sure, again, that we are spending our dollars effectively. The budget request includes \$1.7 billion to continue the four ongoing life extension programs, which fix or replace components in weapons systems to make sure they are safe and reliable.

On my recent trip to Y-12 with Secretary Perry, I saw work on the W76 Life Extension Program when I toured the Beta-2E facility. That tour made two things clear to me. We have some very dedicated and well trained people working every day to modernize our nuclear weapons stockpile, and two, we need to continue to replace outdated facilities at Y-12 and other nuclear weapons production sites.

During that tour, we talked about the innovative contract that NNSA has used to drive cost savings by the contractor. My understanding is that you may have saved several hundred million dollars since 2014 and that some of that funding has been reinvested in site infrastructure. I would like to hear more about that today. And I would like to also ask you whether you will be able to meet your production deadlines on time and on budget for the life extension programs.

SUPPORTING OUR NUCLEAR NAVY

Now, finally Naval Reactors is responsible for all aspects of nuclear power for our submarines and aircraft carriers. Admiral, you have a lot on your plate right now. You are designing a new reactor core for the next class of submarines, refueling a prototype reactor, and building a new spent fuel processing facility.

NAVY'S CONSOLIDATED INTERIM STORAGE FOR USED NUCLEAR FUEL

Admiral Caldwell and I had an opportunity to talk about the new spent fuel processing facility last week. It is part of the Navy's consolidated interim storage for its used nuclear fuel. This is a familiar subject to Senator Feinstein and to me. Interim storage of used nuclear fuel from commercial power reactors is a topic we have been working on for a long time.

The Navy's program shows it can be done safely and effectively, but that does not replace the need for a permanent repository at Yucca Mountain. The Navy's used nuclear fuel will still go to Yucca Mountain once it is built.

I look forward to Admiral Caldwell's comments today on the progress he is making on this important work, and particularly how he stores his used nuclear fuel. The NNSA needs to complete a lot of important work, and this work is going to require good planning and effective oversight.

I look forward to working with you as we begin putting together our Energy and Water Appropriations Bill for fiscal year 2018 and also with Senator Feinstein.

[The statement follows:]

PREPARED STATEMENT OF SENATOR LAMAR ALEXANDER

First, I would like to thank our witnesses for being here today, and also Senator Feinstein, with whom I have the pleasure to work with again this year to draft the Energy and Water Appropriations bill.

I am very pleased with the fiscal year 2017 Energy and Water Appropriations bill, which provided a record level of funding for the Office of Science and the Corps of Engineers, continued to support supercomputing, maintained the Nation's nuclear weapons stockpile, and cutting wasteful spending. I look forward to working with Senator Feinstein on another strong bill this year.

Our witnesses today include Lieutenant General Frank Klotz, the Administrator of the National Nuclear Security Administration (NNSA); Mr. Phil Calbos, Acting Deputy Administrator for Defense Programs; Mr. David Huizenga, Acting Deputy Administrator for Defense Nuclear Nonproliferation; and Admiral Frank Caldwell, Deputy Administrator for Naval Reactors.

We're here today to review the administration's fiscal year 2018 budget request for the National Nuclear Security Administration (NNSA), the semi-autonomous agency within the Department of Energy that is responsible for a vital mission—maintaining our nuclear weapons stockpile, reducing the global dangers posed by weapons of mass destruction, and providing the Navy with safe and effective nuclear power.

The President's fiscal year 2018 budget request for the NNSA is \$13.9 billion, an increase of \$993 million (7.7 percent) over the fiscal year 2017 enacted level.

Today, I'd like to focus my remarks and questions on three main areas:

- Keeping critical projects on time and on budget;
- Effectively maintaining our nuclear weapons stockpile; and
- Supporting our nuclear Navy.

KEEPING CRITICAL PROJECTS ON TIME AND ON BUDGET

The NNSA is responsible for three of the largest construction projects in the Federal Government:

- the Uranium Processing Facility in Tennessee;
- the MOX Fuel Fabrication Facility in South Carolina; and
- the Plutonium Facility in New Mexico.

Combined, these projects could cost more than \$20 billion dollars to build, and that doesn't include the costs to operate the facilities. Over the past 5 years, Senator Feinstein and I have worked hard to keep costs from skyrocketing. We want to make sure hard-earned taxpayer dollars are spent wisely and that these projects are on time and on budget.

Senator Feinstein and I have focused much of our oversight on the Uranium Processing Facility in Tennessee over the past 5 years. That oversight includes regular meetings with the Department's leadership to discuss the project—particularly how the Department is implementing the recommendations of a Red Team review, completed in 2014, that detailed ways to get the project on track.

Senator Feinstein and I requested that 2014 Red Team review, which was headed by Dr. Thom Mason, the Director of the Oak Ridge National Laboratory. The Red Team recommended ways to get the project back on time and on budget. General Klotz has previously told us that all of the Red Team's recommendations are being followed, and I think that is a big part of the reason that project is moving along nicely.

We have said the project needs to be completed by 2025 at a cost of no more than \$6.5 billion, and the design of the nuclear facilities needs to be 90 percent before construction of those buildings begins.

I recently visited Y-12 with Secretary Perry, and saw the work being done to build the new Uranium Processing Facility. I understand the designs for the two nuclear buildings will be more than 90 percent completed by the end of the year, and ready to start construction next year.

The MOX Fuel Fabrication Facility, a major construction project in South Carolina, has also raised several concerns because of growing costs. Senator Feinstein and I asked for a Red Team review of the MOX project in 2015 to get the project back on track.

The Red Team concluded that the MOX project would cost about twice as much each year as an alternative, known as the Dilute and Disposal Alternative. The cost to build the MOX facility is over \$17 billion. Once the MOX facility is built, the cost of the MOX option would be \$800 million to \$1 billion per year. The Dilute and Disposal option will require up to \$500 million to build the processing lines and will cost less than \$400 million per year to operate.

The Red Team also found that the Dilute and Disposal Alternative would get the plutonium out of South Carolina faster than the MOX project.

Your budget request proposes termination of the MOX project and includes \$9 million to build additional facilities for the Dilute and Disposal Alternative. I look forward to hearing more from General Klotz on this today.

Finally, you are in the early stages of the design for a new Plutonium Facility in New Mexico, the third multi-billion dollar project included in the NNSA budget request. I'd like to hear from the witnesses how we have incorporated the lessons learned from the Uranium Processing Facility and the MOX project into the work for the Plutonium Facility to make sure the project can be completed on time and on budget.

EFFECTIVELY MAINTAINING OUR NUCLEAR WEAPONS STOCKPILE

Another major part of the NNSA's budget is to maintain our nuclear weapons stockpile, and I want to make sure we are spending taxpayer dollars effectively.

The budget request includes \$1.7 billion to continue the four ongoing life extension programs, which fix or replace components in weapons systems to make sure they're safe and reliable.

On my recent trip to Y-12 with Secretary Perry, I saw work on the W76 Life Extension Program when I toured the Beta 2E facility. That tour made two things clear to me—(1) we have some very dedicated and well trained people working every day to modernize our nuclear weapons stockpile, and (2) we need to continue to replace outdated facilities at Y-12 and other nuclear weapons production sites.

During that tour we talked about the innovative contract you used to drive cost savings by the contractor. My understanding is that you have saved several hundred million dollars since 2014, and some of that funding has been reinvested in the site infrastructure.

I'd like to hear more about that today. I would also like to ask you today whether you will be able to meet your production deadlines on time and on budget for the life extension programs.

This work must be done—and it is vital that it be properly managed.

SUPPORTING OUR NUCLEAR NAVY

Naval Reactors is responsible for all aspects of nuclear power for our submarines and aircraft carriers.

Naval Reactors has a lot on their plate right now—they are designing a new reactor core for the next class of submarines, refueling a prototype reactor, and building a new spent fuel processing facility.

Admiral Caldwell and I had an opportunity talk about the new spent fuel processing facility last week. It is a part of the Navy's consolidated interim storage for its used nuclear fuel. Interim storage of used nuclear fuel from commercial power reactors is a topic Senator Feinstein have been working on for a long time.

The Navy's program shows that it can be done safely and effectively, but that does not replace the need for a permanent repository at Yucca Mountain. The Navy's used nuclear fuel will still go to Yucca Mountain once it is built.

I look forward to Admiral Caldwell's comments today on the progress he's making on his important work, and particularly how he stores his used nuclear fuel.

The NNSA needs to complete a lot of important work, and this work is going to require good planning and effective oversight.

I look forward to working with the NNSA as we begin putting together our Energy and Water Appropriations bill for fiscal year 2018, and before I turn to Senator Feinstein, I'd like to take a moment to recognize General Klotz's leadership during such an important time for the NNSA. Over the last 3 years, we have worked together to modernize our nuclear weapons stockpile and make sure we have the facilities and people we need to keep our weapons safe, secure, and effective. Thank you for your service.

Senator ALEXANDER. I will now recognize Senator Feinstein for her opening statement and then the other Senators for theirs and Senator Udall and Senator Merkley for their opening statements.

STATEMENT OF SENATOR DIANNE FEINSTEIN

Senator FEINSTEIN. Thank you so much, Mr. Chairman. I think you know what a pleasure it is for me to work with you and this is the first time I have ever taken notes from a chairman's opening statement. So thank you for your words which I think laid out a very interesting program for me and I hope for you. We have to solve the MOX problem. I look at this as number one. And I look at the fact that to do nothing is to take on a horrendous additional cost that is really not necessary to do. So I hope that will be our number one project.

NUCLEAR NONPROLIFERATION

While the NNSA's request is an 8 percent increase over all, it cuts the nonproliferation program by 5 percent from last year. And this is part of a long and troubling trend. Since 2010 when the Senate approved New Start, the weapon program budget has increased a staggering \$3.8 billion. In that same time, the nonproliferation program has seen a \$343 million decrease.

NUCLEAR WEAPONS

In 2010 when I was chairman of this subcommittee, Mr. Chairman, you and I agreed with Senators Inouye and Cochran to modernize our nuclear infrastructure in exchange for a smaller nuclear arsenal. We have held up our end of the bargain. Since that time, this subcommittee has appropriated \$55 billion for weapons. That is 98 percent of the funds requested. That is a pretty good record.

Now the President is requesting a full \$1 billion increase over the amount originally projected when New Start was signed. And that is \$578 million above a plan just outlined last year. The CBO (Congressional Budget Office) estimates it will cost \$400 billion over the next decade to modernize our nuclear arsenal. \$138 billion would need to be appropriated by our subcommittee for the NNSA. And General, if that is wrong, please tell me.

I agree we need safe and modern facilities for workers and we need robust scientific capabilities so we do not have to test our nuclear weapons, but the biggest area of increase in this budget is for warhead modernization, \$404 million in total. That includes \$138 million in cost overruns for the B61 and W88 warheads. The biggest single increase in this budget request is for the long-range standoff weapon, the LRSO (Long Range Standoff) warhead life extension program. That is an eyepopping \$179 million increase for a total of \$400 million. And this is just a down payment on the \$8.6 billion this warhead—warhead alone—will eventually cost us. The

\$8.6 billion for just the warhead alone. The missile itself will cost another \$10 billion or more in the Department of Defense.

And I was very pleased to have a chance to discuss this in the Defense Subcommittee this morning with General Mattis and very pleased that he will take a look at it and take a look when they do the Nuclear Posture Review about all of these weapons. And I very much appreciate that.

So you have got a warhead at \$8.6 billion and a missile at \$10 billion. All this for a new weapon that is not only dangerous, but I believe unnecessary. And I cannot—this is not a classified session, so obviously there are things I cannot say. Our existing conventional capabilities and the proposed B21 stealth bomber fill the same role and do not carry the risks of the LRSO. I am not seeing any tough choices being made with this budget request. All I see is more money for weapons and less money for everything else.

The NNSA's track record for warheads and new facilities does not inspire confidence, rather their history of rising costs and missed schedule suggests that even more money will be required than currently projected. So where does it end? How much is enough? All this new spending for weapons while the nonproliferation program is cut by \$90 million. Troublemaking by Russia, the rise of the Islamic State, and nuclear provocation by North Korea tell me now is not the time to let down on nuclear security.

NUCLEAR NONPROLIFERATION

The nonproliferation program has been wildly successful in reducing the dangers of nuclear terrorism. For example, through 2016 the program reduced nuclear dangers around the world by removing more than 6,100 kilograms of plutonium and highly enriched uranium, securing 2,100 buildings containing high priority radioactive sources such as cesium and cobalt that can be used in a dirty bomb, converting or shutting down 97 reactors that use highly enriched uranium, deploying 740 fixed and mobile radiation detection systems at border crossings, ports, and internal locations in 59 different countries. And there is more to do.

NNSA is implementing a cost sharing program to spur the replacement of medical devices that use radioactive sources with those that do not. In California, we have more than 100 blood irradiation devices that use highly radioactive cesium 137. And there are 32 devices in New York City where there is high interest in this program. The program is poised to work in 20 cities around the United States. In fact, NNSA tells my staff that there is not enough money to meet the interest in this program by hospitals and other medical facilities. So we build, spend billions on warheads and new missiles, and we cannot handle our waste. And this becomes a more and more dramatic fact for me every day.

You know, it is not just 87 sites around the country with nuclear waste. It is also some 20 cities where there is not enough money to do what needs to be done at hospitals and medical facilities.

NUCLEAR WEAPONS

So we have an opportunity to reduce the danger of nuclear terrorism right here at home. And I think to an extent we sacrifice our real security needs for more warheads that we do not need. I

wrote an op-ed a while ago and at the time I wrote it, I did not really realize how true this is. And that is that there is no limited nuclear war. And yet we build these things. We store these things. We have a big hedge of these things which is not necessary. And it is like, I do not know, almost a cabal that there is nothing you can do about it.

I mean, I have sat on this committee for how many years, 16, maybe more. And I cannot believe it that it seems I do not know what it is, but my understanding that all of this is for a deterrent that nobody expects ever to use this. Somehow, I am coming not to believe that—I must say that—because of the amount of money and the kind of weapons.

NUCLEAR WASTE

So I look forward to discussing this issue. I have been patient for a long time on trying to resolve the nuclear waste program and I have not gotten anywhere. Either the House blocks it because of Yucca or the NEI (Nuclear Energy Institute) blocks a waste bill for reasons I do not understand. But one of these days we are going to regret, I think, not doing the right thing for the people to see that everybody is protected from radioactivity.

So I thank you. I will do my best this year.

Senator ALEXANDER. You always do, Senator Feinstein. Thank you for your comments.

And Senator Merkley.

STATEMENT OF SENATOR JEFF MERKLEY

Senator MERKLEY. Thank you, Mr. Chairman.

We are going to invest considerable sums, both in the modification of our nuclear warheads and the strategies that we have for delivering them in the Triad. And so I am simply pleased to be here to hear from our experts and I try to gain a kind of more up to date understanding of both the impact on strategy and the impact on deterrence and whether and what is needed in terms of being a good steward of the citizens' funds. Thank you.

Senator ALEXANDER. Thank you, Senator Merkley, and thank you for being here.

Senator Udall.

STATEMENT OF SENATOR TOM UDALL

Senator UDALL. Thank you, Chairman Alexander, and I will just be very brief here.

NNSA BUDGET REQUEST

But General, thank you to all the witnesses here. And General Klotz, your team has put together a good starting point for the NNSA budget that will help protect the important stockpile stewardship mission. As an initial matter, I want to say I strongly support the funding in the budget for the new NNSA Albuquerque Complex Building. I know you are very familiar with the need for this facility and I know it will work. And I will work with this subcommittee to provide the \$98.5 million of necessary funds for that.

LOS ALAMOS AND SANDIA NATIONAL LABORATORIES

In addition to that project, Los Alamos and Sandia National Labs are both key sites for NNSA's mission and current budget. In April of this year, the GAO (Government Accounting Office) concluded in a report that "estimated budgets may not be sufficient to fully execute program plans and that NNSA may need to increase budget estimates."

One of the possible drivers of future costs is the plutonium mission as you well know. There is currently an analysis of alternatives ongoing for the plutonium mission at Los Alamos, so I understand this analysis is expected to be complete sometime this summer. We look forward to that and to continue the discussion with you. As you also know, the life extension programs are important to keep on track and to keep on budget. And they have been, I think, have been doing a good job on that.

NUCLEAR SURVIVABILITY

This budget also includes a considerable increase for nuclear survivability. The additional funds will support testing at Sandia by the Z machine and the Mighty Thor Accelerator, which will reach pressures found at the core of the Earth and will also support initial development of the trusted strategic radiation hardened microelectronics capability. The microsystems and engineering sciences applications complex at Sandia is currently the only trusted facility for microelectronics and it is being refurbished to operate until 2025.

So we look forward to asking you some questions, but I just wanted to make a couple of those points as a brief opening. Thank you, Chairman Alexander, very much.

Senator ALEXANDER. Thank you, Senator Udall.

And General Klotz.

SUMMARY STATEMENT OF LIEUTENANT GENERAL FRANK G. KLOTZ

General KLOTZ. Well, thank you Chairman Alexander, Ranking Member Feinstein, and members of the subcommittee. Thank you for the opportunity to present the President's fiscal year 2018 budget request for the Department of Energy's National Nuclear Security Administration. We provided the subcommittee with a written statement and respectfully request that it be submitted for the record.

NNSA'S FISCAL YEAR 2018 BUDGET REQUEST

We value this committee's very strong support for the nuclear security mission and more importantly for the people and the organizations that are responsible for executing it. Our budget request which comprises approximately half of DOE's (Department of Energy) budget is \$13.9 billion. This represents an increase, as you have already said, Sir, of \$1 billion or 7.8 percent over the fiscal year 2017 Omnibus level.

This budget request demonstrates the Administration's strong commitment to NNSA's enduring and diverse missions: maintaining the safety, security, reliability, and effectiveness of the nuclear weapons stockpile; reducing the threat of nuclear proliferation and

nuclear terrorism around the world; and providing naval nuclear propulsion to the U.S. Navy's fleet of aircraft carriers and submarines.

The budget materials we have provided to the Congress describe NNSA's major accomplishments in fiscal year 2016 as well as the underlying rationale for our budget proposal for fiscal year 2018. Let me just briefly highlight a few points here.

NUCLEAR WEAPONS

This budget request is vital to ensuring that U.S. nuclear forces are modern, robust, flexible, resilient, ready, and appropriately tailored to deter 21st century threats and to reassure our allies. NNSA's fiscal year 2018 budget request for the weapons activity appropriation is \$10.2 billion, an increase of nearly \$1 billion to 10.8 percent over the fiscal year 2017 Omnibus level. This increase is needed both to meet our current life extension program commitments and to modernize our research and production infrastructure so we are positioned to address future requirements and challenges.

The budget request will enable NNSA to meet its major program objectives including beginning construction of the main process building and the salvage and accountability building at the Y-12 Uranium Processing Facility in Oak Ridge, Tennessee, and also restoring the Nation's capability to manufacture plutonium pits on the timeline required to meet future stockpile needs.

DEFENSE NUCLEAR NONPROLIFERATION

The fiscal year 2018 budget request includes \$1.8 billion for defense nuclear nonproliferation account which is consistent with the funding level in the fiscal year 2017 Omnibus. And I look forward to sort of peeling back the onion a bit as to how we got to those numbers. This appropriation continues NNSA's critical and far reaching mission to prevent, counter, and respond to nuclear threats.

NAVAL REACTORS

The request for our third appropriations, the Naval Reactors Program, is \$1.48 billion. Now I know Admiral Caldwell will say more about this in detail, but let me just say this represents an increase of \$60 million or 4.2 percent above the fiscal year 2017 Omnibus level. Not only does the requested funding support today's operational fleet, it also enables Naval Reactors to deliver tomorrow's fleet by funding three national priority projects: developing the CO-LUMBIA-class reactor plant, refueling a research and training reactor in upstate New York, and building a new spent fuel handling facility in Idaho.

IMPROVING BUSINESS PRACTICES

As NNSA executes our three vital missions, we are mindful of our obligations to continually improve our business practices and to be responsible stewards of the resources the Congress and the American people have entrusted to us. NNSA is committed to encouraging competition and streamlining its major acquisition proc-

esses. Recent competitions for management and operations contracts have generated extraordinary unprecedented interest from industry and academic institutions validating the acquisition and project management improvements that we have instituted over the past 5 years.

Our budget request for Federal salaries and expenses, the fourth of our four major appropriations accounts, is \$418 million, an increase of \$31 million or roughly 8 percent over the fiscal year 2017 Omnibus level. This request supports recruiting, training, and equally important, retaining the highly skilled workforce essential to achieving success in technically complex twenty-first century national security missions. Since 2010, NNSA's program funding has increased 28 percent while our staffing over that same period of time has been reduced by 17 percent. The fiscal year 2018 budget request supports a very modest increase of 25 full-time equivalent employees over the current cap of 1,690 FTEs (full-time equivalent).

In closing, our fiscal year 2018 budget request reflects NNSA's motto, mission first, people always. It accounts for the significant tempo of operations at NNSA which in many ways have reached a level unseen over the past two decades. It includes long overdue investments to repair and replace aging infrastructure at our national laboratories and production plants and it provides modern and more efficient workspace for a highly talented scientific, engineering, and professional workforce.

Again, thank you for the opportunity to appear before you today and I look forward to responding to your questions.

[The statement follows:]

PREPARED STATEMENT OF LIEUTENANT GENERAL FRANK G. KLOTZ

Chairman Alexander, Ranking Member Feinstein, and Members of the Subcommittee, thank you for the opportunity to present the President's fiscal year 2018 budget request for the Department of Energy's (DOE) National Nuclear Security Administration (NNSA). The Committee's strong support for the nuclear security mission and for the people and organizations that are responsible for executing it is deeply appreciated.

The President's fiscal year 2018 budget request for NNSA is \$13.9 billion, an increase of \$1.0 billion, or 7.8 percent over the fiscal year 2017 Omnibus level. The request represents approximately 50 percent of DOE's total budget and 68 percent of DOE's 050 budget.

NNSA's diverse missions are critical to the national security of the United States: maintaining the safety, security, reliability, and effectiveness of the 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. This budget request demonstrates the Administration's strong support for NNSA and is vital to ensuring that U.S. nuclear forces are modern, robust, flexible, resilient, ready, and appropriately tailored to deter 21st-century threats and reassure America's allies.

NNSA's activities are accomplished through the expertise, innovative spirit, and hard work of both its Federal and its Management and Operating (M&O) contractor employees. NNSA must continue to support these highly-talented, dedicated men and women as they carry out complex and challenging responsibilities. In particular, it is imperative that NNSA modernize its scientific, technical, and engineering capabilities, as well as its infrastructure, in order to provide a safe, modern, and more efficient workspace for its workforce. In doing so, NNSA is mindful of its obligation to continually improve its business practices and to be responsible stewards of the resources that Congress and the American people have entrusted to the agency.

The fiscal year 2018 budget request also reflects the close working partnership between NNSA, the Department of Defense (DoD), the Department of Homeland Security (DHS), the State Department, the Intelligence Community, and other Federal

departments and agencies. NNSA works closely with DoD to meet military requirements, support the Nation's nuclear deterrent, and modernize the nuclear security enterprise. NNSA also collaborates with a range of Federal agencies to prevent, counter, and respond to nuclear proliferation and nuclear terrorism.

WEAPONS ACTIVITIES APPROPRIATION

For the Weapons Activities account, the fiscal year 2018 budget request is \$10.2 billion, an increase of nearly \$1 billion, or 10.8 percent over the fiscal year 2017 Omnibus level. Programs funded in this account support the Nation's current and future defense posture and its attendant nationwide infrastructure of science, technology, and engineering capabilities. Weapons Activities provide for the maintenance and refurbishment of nuclear weapons to maintain their safety, security, and reliability; investments in scientific, engineering, and manufacturing capabilities to certify the enduring nuclear weapons stockpile; and the fabrication of nuclear weapon components. Weapons Activities also includes investments to make the NNSA nuclear complex more cost effective and more responsive to unanticipated challenges or emerging threats.

Maintaining the Stockpile

This year, the work of the science-based Stockpile Stewardship Program (SSP) allowed the Secretaries of Energy and Defense to certify to the President for the 21st consecutive year that the U.S. nuclear weapons stockpile remains safe, secure, and reliable without the need for nuclear explosive testing. This remarkable scientific achievement is made possible each year by investments in state-of-the-art diagnostic tools, high performance computing platforms, modern facilities, and most importantly by NNSA's world-class scientists, engineers, and technicians.

For Directed Stockpile Work (DSW), the fiscal year 2018 budget request is \$4.0 billion, an increase of \$669 million, or 20.2 percent over the fiscal year 2017 Omnibus level.

The major warhead Life Extension Programs (LEPs) are a fundamental part of this account:

- W76-1 LEP*: The \$224 million requested for the W76-1 LEP directly supports the sea-based leg of the nuclear triad and will keep the LEP on schedule and on budget to complete production in fiscal year 2019.
- B61-12 LEP*: NNSA continues to make progress on the B61-12 LEP, which will consolidate four variants of the B61 gravity bomb and improve the safety and security of the oldest weapon system in the U.S. nuclear arsenal. In June 2016, NNSA authorized the program to transition into the Production Engineering Phase (Phase 6.4). With the \$788.6 million requested, NNSA will remain on schedule to deliver the First Production Unit (FPU) of the B61-12 in fiscal year 2020. NNSA is responsible for refurbishing the nuclear explosives package and updating the electronics for this weapon, while the Air Force will provide the tail kit assembly under a separate acquisition program. When fielded, the B61-12 gravity bomb will support both Air Force long-range nuclear-capable bombers and dual-capable fighter aircraft, bolstering central deterrence for the United States while also providing extended deterrence to America's allies and partners.
- W88 Alteration (Alt) 370 Program*: In February 2017, NNSA began the Production Engineering Phase (Phase 6.4) for the W88 Alt 370 Program, including conventional high explosives refresh activities. The budget request for this program, which also supports the sea-based leg of the nuclear triad, includes \$332 million in fiscal year 2018, an increase of \$51 million, or 18.2 percent over the fiscal year 2017 Omnibus level, to support the scheduled FPU in fiscal year 2020.
- W80-4 LEP*: The fiscal year 2018 budget request is \$399 million, an increase of \$179 million, or 81.2 percent over the fiscal year 2017 Omnibus level. This funding supports a significant increase in program activity through the Design Definition and Cost Study Phase (Phase 6.2A), driving toward a fiscal year 2025 FPU in support of the Air Force's Long Range Stand-Off (LRSO) cruise missile program.

Also within DSW, the fiscal year 2018 budget request includes \$1.5 billion for Stockpile Systems and Stockpile Services. These programs sustain the stockpile in accordance with the Nuclear Weapon Stockpile Plan by producing and replacing limited-life components such as neutron generators and gas transfer systems; conducting maintenance, surveillance, and evaluations to assess weapon reliability; detecting and anticipating potential weapon issues; and compiling and analyzing information during the Annual Assessment process.

NNSA continues to make progress on the Joint Technology Demonstrator (JTD) program, a strategic collaboration between the United States and the United Kingdom under the Mutual Defense Agreement. This program is intended to reduce technological risk and provide relevant data for future program activities. JTD's focus is on technologies and process improvements that can improve weapon affordability and enhance weapon safety and security.

Within DSW, the fiscal year 2018 budget request also includes \$695 million for Strategic Materials. This funding is necessary to maintain NNSA's ability to produce the nuclear and other strategic materials associated with nuclear weapons as well as refurbish and manufacture components made from these materials. The program includes Uranium Sustainment, Plutonium Sustainment, Tritium Sustainment, Domestic Uranium Enrichment (DUE), and other strategic materials, such as lithium.

Funding for Uranium Sustainment will permit operations with enriched uranium in Building 9212, a Manhattan Project-era production facility at the Y-12 National Security Complex in Oak Ridge, Tennessee, to end in fiscal year 2025, and allow the bulk of this obsolete building to shut down.

Plutonium Sustainment funds the replacement and refurbishment of equipment and critical skills needed to meet the pit production requirements. Increases are included to fabricate several W87 developmental pits. Investments to replace pit production equipment which has reached the end of its useful life and install equipment to increase production capacity are also continued.

Tritium Sustainment ensures the Nation's capacity to provide the tritium for national security requirements by irradiating Tritium Producing Burnable Absorber Rods in designated Tennessee Valley Authority nuclear power plants and by recovering and recycling tritium from gas transfer systems returned from the stockpile.

The DUE program continues its efforts to ensure that NNSA has the necessary supplies of enriched uranium for a variety of national security needs. Funding increases are included in this year's request to begin down-blending available stocks of unobligated highly enriched uranium (HEU) for use in tritium production, which delays the need date for a DUE capability until at least 2038-2041.

The fiscal year 2018 budget request also includes \$52 million for Weapons Dismantlement and Disposition to allow NNSA to remain on track with the goal of dismantling all weapons retired prior to fiscal year 2009 by the end of fiscal year 2022.

For *Research, Development, Test, and Evaluation (RDT&E)*, the fiscal year 2018 budget request is \$2 billion, an increase of \$186 million or 10.1 percent over the fiscal year 2017 Omnibus level.

Increases for the Science Program (\$487.5 million, an increase of \$51 million) provide additional funding for the Advanced Sources and Detectors Major Item of Equipment in support of the Enhanced Capabilities for Subcritical Experiments (ECSE) effort.

The Engineering Program (\$193.1 million, an increase of \$61 million) sustains NNSA's trusted microsystems capability and further develops the Stockpile Responsiveness Program (SRP). NNSA is requesting \$40 million in fiscal year 2018 for SRP to identify, sustain, enhance, integrate, and continually exercise the capabilities required to conceptualize, study, design, develop, engineer, certify, produce, and deploy nuclear weapons. These activities are necessary to ensure the U.S. nuclear deterrent remains safe, secure, reliable, credible, and responsive. The funding will support the creation of design study teams to explore responsiveness concepts as well as development of capabilities for accelerating the qualification and production cycle.

The Inertial Confinement Fusion Ignition and High Yield Program has spearheaded ongoing improvements in management and operational efficiencies at NNSA's major high energy density (HED) facilities, including the National Ignition Facility (NIF) at LLNL in California, the Z-Machine at Sandia National Laboratories in New Mexico, and the OMEGA laser facility at the University of Rochester in New York. In fiscal year 2016, NIF exceeded the goal of 400 data-acquiring shots (417), more than double the number of shots executed in fiscal year 2014 (191) in support of the SSP. The improved shot rates have accelerated progress towards the achievement and application of multi-megajoule fusion yields, investigating material behaviors in conditions presently inaccessible via other experimental techniques, and improving the predictive capability of NNSA's science and engineering models in high-pressure, high-energy, high-density regimes.

The RDT&E request for fiscal year 2018 includes \$734 million for the Advanced Simulation and Computing (ASC) Program. NNSA is taking major steps in high performance computing (HPC) to deliver on its missions by deploying increasingly powerful computational capabilities to both Los Alamos National Laboratory (LANL) and Lawrence Livermore National Laboratory (LLNL). In the summer of 2017—

Trinity—NNSA’s next generation high performance computer, will become fully available for classified use at LANL. This computer will be about 30 times more powerful than the Cielo super computer it is replacing. The Sierra HPC system will be deployed at LLNL starting this year; it is projected to provide four to six times the sustained performance of LLNL’s current HPC system, Sequoia.

The RDT&E request also increases NNSA’s contribution to the Exascale Computing Initiative (ECI) from \$95 million in fiscal year 2017 to \$161 million in the fiscal year 2018 request. The ECI is a collaboration with DOE’s Office of Science to develop the technology needed for exascale-class high performance computing. The increased funding will provide for NNSA-specific application development, and improve software and hardware technologies for exascale computing in order to meet NNSA’s needs for future assessments, LEPs, and stockpile stewardship. Specifically, exascale computing will provide capabilities to improve weapon performance simulation tools and techniques; evaluate the safety, security, and effectiveness of the current stockpile; and provide support to certify potential advanced surety features for the future stockpile.

NNSA’s *Secure Transportation Asset (STA)* program provides safe, secure movement of nuclear weapons, special nuclear material (SNM), and weapon components to meet projected DOE, DoD, and other customer requirements. The Office of Secure Transportation (OST) has an elite workforce performing sensitive and demanding work; OST agents are among the most highly trained national security personnel operating within the United States. Since fiscal year 2012, STA has repeatedly been funded below the Administration’s budget requests. This trend increases risks and possible production delays to the Mobile Guardian Transporter (MGT) and adversely affects OST’s ability to recruit and retain agents. The fiscal year 2018 budget request of \$325.1 million includes an increase of \$76 million or 30.6 percent over the fiscal year 2017 Omnibus level to continue asset modernization and workforce capability initiatives. These initiatives include: 1) restoration of Federal agent strength levels to meet the goal of 370 agents; 2) the Safeguards Transporter (SGT) Risk Reduction Initiatives to manage the SGT beyond its design life; 3) procurement of long-lead parts and materials for the two full scale MGT prototype systems; and 4) deferred facilities maintenance and minor construction projects at multiple sites.

Improving Safety, Operations, and Infrastructure

NNSA’s ability to achieve its vital national security missions is dependent upon safe and reliable infrastructure. If not appropriately addressed, the age and condition of NNSA’s infrastructure will put NNSA’s missions, the safety of its workers, the public, and the environment at risk.

More than half of NNSA’s facilities are over 40 years old, and roughly 30 percent date back to the Manhattan Project era. The fiscal year 2018 budget request for Infrastructure and Operations is \$2.8 billion, a decrease of \$5 million, or 0.2 percent below the fiscal year 2017 Omnibus level. The request actually represents an increase of \$195 million (7.5 percent) after adjusting for the one-time \$200 million Bannister Federal Complex project funded in fiscal year 2017. This funding will help modernize and upgrade antiquated infrastructure and address safety and program risks through strategic investments in general purpose infrastructure and capabilities that directly support NNSA’s nuclear weapons and nonproliferation programs.

In August 2016, NNSA broke ground on the Administrative Support Complex at the Pantex nuclear weapons assembly and dismantlement facility in Amarillo, Texas. The site’s M&O contractor entered into a lease agreement for a new office building that a private developer is building using third-party financing. This project will allow roughly 1,000 employees to move out of dilapidated, 1950s-era buildings into a modern, energy efficient workspace. It will also eliminate approximately \$20 million in deferred maintenance at the Pantex site and enhance recruitment and retention by improving the quality of the work environment. The project will be completed and staff will move into the new facility, by spring 2018.

The fiscal year 2018 budget request further reduces deferred maintenance and supports the execution of new recapitalization projects to improve the condition and extend the design life of structures, capabilities, and systems to meet program demands; decrease overall operating costs; and reduce safety, security, environmental, and program risk. The request also supports general purpose infrastructure and program-specific capabilities through Line Item Construction projects. These projects include the Uranium Processing Facility (UPF) at Y-12, the Chemistry and Metallurgy Research Replacement (CMRR) project at LANL, and the Albuquerque Complex Project.

One of the most worrisome of the NNSA infrastructure challenges is the excess facilities that pose risks to NNSA’s workers, the environment, and the nuclear secu-

rity mission. As of the end of fiscal year 2016, NNSA had 417 excess facilities, 79 of which were identified as high-risk excess facilities, including 58 at the Kansas City Bannister Federal Complex. Many of these facilities will ultimately be transferred to the DOE Office of Environmental Management (EM) for disposition, and the EM fiscal year 2018 budget requests \$225 million to address high-risk excess facilities at Y-12 and LLNL. In the interim, NNSA is focusing on reducing the risk where it can.

The fiscal year 2018 budget request supports a number of activities related to excess facilities. NNSA benefitted enormously from funding provided by Congress in fiscal year 2017 for the disposition of the Bannister Federal Complex in Kansas City. The disposition project is on track, with final pre-transfer activities occurring now.

The *Office of Defense Nuclear Security (DNS)* develops and implements security programs to protect sensitive nuclear material (SNM), people, information, and facilities throughout the nuclear security enterprise. The fiscal year 2018 budget request is \$687.0 million, an increase of \$1.5 million, or 0.2 percent over the fiscal year 2017 Omnibus level that included funding to address immediate infrastructure needs at Pantex and Y-12. The request manages risk among important competing demands as NNSA continues to face the challenges associated with physical security infrastructure that must be effectively addressed in the coming years. NNSA is finalizing a 10-Year Plan to Recapitalize Physical Security Systems Infrastructure, also known as the 10-Year Plan, which identifies and prioritizes the replacement and refresh of physical security infrastructure across the nuclear security enterprise. Of note, the request includes preliminary planning and conceptual design funds for future projects, as outlined in the 10-Year Plan, to sustain and recapitalize the Perimeter Intrusion Detection and Assessment System (PIDAS) at the Pantex Plant and Y-12.

Information Technology and Cybersecurity enable every facet of the NNSA mission. The fiscal year 2018 budget request is \$186.7 million, an increase of \$10 million, or 5.7 percent over the fiscal year 2017 Omnibus level. This increase will fund much needed improvement to the Information Technology and Cybersecurity program, including Continuous Diagnostic and Mitigation, Telecommunications Security, infrastructure upgrades for the Enterprise Secure Computing Network (ESN), Public Key Infrastructure (PKI), Energy Sciences Network program, and an increased information technology budget. The cybersecurity program continuously monitors enterprise wireless and security technologies to meet a wide range of security challenges. In fiscal year 2018, NNSA plans to continue the recapitalization of the ESN, modernize the cybersecurity infrastructure, implement the Identity Control and Access Management project at NNSA Headquarters and site elements, and implement all Committee on National Security Systems and PKI capabilities. The requested funding increase will allow NNSA to continue working toward a comprehensive information technology and cybersecurity program to deliver critical information assets securely.

DEFENSE NUCLEAR NONPROLIFERATION APPROPRIATION

The fiscal year 2018 budget request for the Defense Nuclear Nonproliferation (DNN) account is \$1.8 billion, a level consistent with the fiscal year 2017 Omnibus level. This appropriation covers NNSA's critical and far-reaching nuclear threat reduction activities. DNN addresses the entire nuclear threat spectrum by helping to prevent the acquisition of nuclear weapons or weapon-usable materials, technologies, and expertise; countering efforts to acquire them; and responding to possible nuclear and radiological incidents. The fiscal year 2018 budget request funds two program mission areas under the DNN account: the Defense Nuclear Nonproliferation Program and the Nuclear Counterterrorism and Incident Response (NCTIR) Program.

Nonproliferation Efforts

Working with international partners, the Office of Defense Nuclear Nonproliferation removes or eliminates vulnerable nuclear material; improves global nuclear security through multilateral and bilateral technical exchanges and training workshops; helps prevent the illicit trafficking of nuclear and radiological materials; secures domestic and international civilian buildings containing high-priority radiological material; provides technical reviews of U.S. export license applications; conducts export control training sessions for U.S. enforcement agencies and international partners; strengthens the IAEA's ability to detect and deter nuclear proliferation; advances U.S. capabilities to monitor arms control treaties and detect foreign nuclear programs; and maintains organizational readiness to respond to and mitigate radiological or nuclear incidents worldwide.

The *Material Management and Minimization (M³)* program provides an integrated approach to addressing the risk posed by nuclear materials. The fiscal year 2018 budget request is \$332.1 million, an increase of \$44 million or, 15.2 percent over the fiscal year 2017 Omnibus level. The request supports the conversion or shut-down of research reactors and isotope production facilities that use HEU; acceleration of new, non-HEU-based molybdenum-99 production facilities in the United States; the removal and disposal of WUNM; and the completion of the lifecycle cost estimate and schedule for the dilute and dispose option for plutonium disposition.

The *Global Material Security (GMS)* program works with partner nations to increase the security of vulnerable nuclear and radiological materials and improve their ability to detect, interdict, and investigate illicit trafficking of these materials. The fiscal year 2018 budget request for this program is \$337.1 million, a decrease of \$30 million, or 8.2 percent below the fiscal year 2017 Omnibus level.

The *Nonproliferation and Arms Control (NPAC)* program develops and implements programs to strengthen international nuclear safeguards; control the spread of nuclear and dual-use material, equipment, technology and expertise; verify nuclear reductions and compliance with nonproliferation and arms control treaties and agreements; and address other challenges. The fiscal year 2018 budget request for this program is \$129.7 million, an increase of \$5 million, or 4.0 percent over the fiscal year 2017 Omnibus level. This increase serves to improve the deployment readiness of U.S. nuclear disablement and dismantlement verification teams and to enhance export control dual-use license and interdiction technical reviews.

The *DNN Research and Development (DNN R&D)* program supports innovative unilateral and multilateral technical capabilities to detect, identify, and characterize foreign nuclear weapons programs, illicit diversion of SNM, and nuclear detonations worldwide. The fiscal year 2018 budget request for this program is \$446.1 million, a decrease of \$23.7 million, or 5.0 percent below the fiscal year 2017 Omnibus level. The decrease in funding reflects a shift of \$53 million from R&D back to M3 for the U.S. High Performance Research Reactors Program and is offset by an increase of \$29 million for planned R&D activities.

Nonproliferation Construction consolidates construction costs for DNN projects. The fiscal year 2018 budget request is \$279 million, a decrease of \$56 million, or 16.7 percent below the fiscal year 2017 Omnibus level. The Administration proposes to terminate the Mixed Oxide Fuel Fabrication (MFFF) project and to pursue the dilute and dispose option to fulfill the United States' commitment to dispose of 34 metric tons of plutonium. If supported by Congress, \$270 million would be used to achieve an orderly and safe closure of the MFFF. The scope and costs will be refined in subsequent budget submissions when the termination plan for the MFFF project is approved. In addition, \$9 million is provided for the Surplus Plutonium Disposition project to support the dilute and dispose strategy.

Nuclear Counterterrorism and Counterproliferation

In fiscal year 2016, the NCTIR Program transitioned to the DNN account from the Weapons Activities account to align all NNSA funding to prevent, counter, and respond to nuclear proliferation and nuclear terrorism under the same appropriations account. The fiscal year 2018 budget request includes \$277.4 million to support the NCTIR Program, an increase of \$5 million, or 2.0 percent over the fiscal year 2017 Omnibus level. Within NCTIR, NNSA continues to work domestically and internationally to prepare for and improve the Nation's ability to respond to radiological or nuclear incidents.

NNSA's counterterrorism and counterproliferation programs are part of broader U.S. Government efforts to assess the threat of nuclear terrorism and develop technical countermeasures. The scientific knowledge generated under this program ensures NNSA's technical expertise on potential nuclear threat devices, including improvised nuclear devices (INDs), supports and informs U.S. nuclear security policy, and guides nuclear counterterrorism and counterproliferation efforts, including interagency nuclear forensics and contingency planning.

NNSA emergency response teams' current equipment is aging, resulting in increasing maintenance expenses and imposing increased risks to NNSA's ability to perform its emergency response mission. The Radiological Assistance Program (RAP) remains the Nation's premier first-response resource to assess a radiological incident and advise decision-makers on the necessary steps to minimize hazards. To ensure that NNSA is able to execute its radiological emergency response mission, RAP's equipment must be recapitalized regularly. NNSA is acquiring state-of-the-art, secure, deployable communications systems that are interoperable with Federal Bureau of Investigation and DoD mission partners, ensuring that decision makers receive real-time technical recommendations to mitigate nuclear terrorist threats.

NNSA recently concluded an Analysis of Alternatives (AoA) on the Aerial Measuring System (AMS) aircraft. The AMS fleet consists of three B200 fixed-wing aircraft with an average age of 33 years and two Bell 412 helicopters with an average age of 24 years. The current aircraft are experiencing reduced mission availability due to increasing unscheduled downtime and maintenance. The AoA determined that NNSA recapitalization of the aging aircraft fleet is necessary in order to provide rapid aerial radiological exposure and contamination information to Federal, State, and local officials following an accident or incident in order to protect the public and first responder's health and safety. NNSA anticipates proposing a 2-year replacement schedule starting in fiscal year 2019.

NAVAL REACTORS APPROPRIATION

Advancing Naval Nuclear Propulsion

NNSA provides nuclear propulsion for the U.S. Navy's nuclear-powered fleet, which is critical to the security of the United States and its allies as well as the security of global sea lanes. The Naval Reactors Program remains at the forefront of technological developments in naval nuclear propulsion. This preeminence derives from advancing new technologies and improvements in naval reactor performance, ensuring a commanding edge in warfighting capabilities.

The *Naval Reactors* fiscal year 2018 budget request is \$1.48 billion, an increase of \$60 million, or 4.2 percent above the fiscal year 2017 Omnibus level. In addition to supporting today's operational fleet, the requested funding will enable Naval Reactors to deliver tomorrow's fleet by funding three national priority projects and recruiting and retaining a highly skilled workforce. The projects include: (1) continuing design and development of the reactor plant for the COLUMBIA-Class submarine, which will feature a life-of-ship core and electric drive; (2) refueling a Research and Training Reactor in New York to facilitate COLUMBIA-Class reactor development efforts and provide 20 more years of live reactor-based training for fleet operators; and (3) building a new spent fuel handling facility in Idaho that will facilitate long term, reliable processing and packaging of spent nuclear fuel from aircraft carriers and submarines.

Naval Reactors has requested funding in fiscal year 2018 to support these projects and fund necessary reactor technology development, equipment, construction, maintenance, and modernization of critical infrastructure and facilities. By employing a small but high-performing technical base, the teams at Bettis Atomic Power Laboratory in Pittsburgh, Knolls Atomic Power Laboratory and Kesselring Site in greater Albany, and the spent nuclear fuel facilities in Idaho can perform the research and development, analysis, engineering and testing needed to support today's fleet at sea and develop future nuclear-powered warships. Importantly, the laboratories perform the technical evaluations that enable Naval Reactors to thoroughly assess emergent issues and deliver timely responses that ensure nuclear safety and maximize operational flexibility.

NNSA FEDERAL SALARIES AND EXPENSES APPROPRIATION

The *NNSA Federal Salaries and Expenses (FSE)* fiscal year 2018 budget request is \$418.6 million, an increase of \$31.5 million, or 8.1 percent over the fiscal year 2017 Omnibus level. The fiscal year 2018 budget request provides funding for 1,715 full-time equivalents (FTE), which includes a 1.9 percent cost of living increase, a 5.5 percent increase for benefit escalation, and other support expenses needed to meet mission requirements. NNSA is actively engaged in hiring to reach that number in a thoughtful and strategic manner. The fiscal year 2018 budget request for 1,715 FTEs is an increase of 25 above the authorized 1,690. Since 2010, NNSA's program funding has increased 28 percent, while staffing has decreased 17 percent. In fiscal year 2018, NNSA will continue efforts to meet current and future workforce needs by analyzing job requirements to meet evolving missions, including completion of a study by the Office of Personnel Management in support of the Reform of Government Initiative. Initial results from four program offices and one field office indicate the need for a 20 percent increase in Federal staff.

MANAGEMENT & PERFORMANCE

Since 2011, NNSA has delivered approximately \$1.4 billion in projects, a significant portion of NNSA's total project portfolio, 8 percent under original budget. This past February, the High Explosive Pressing Facility at Pantex achieved CD-4 and was completed \$25 million under the approved baseline. NNSA is committed to encouraging competition and increasing the universe of qualified contractors by streamlining its major acquisition processes. NNSA will continue to focus on deliv-

ering timely, best-value acquisition solutions for all of its programs and projects, using a tailored approach to contract structures and incentives that is appropriate for the special missions and risks at each site. NNSA's Office of Acquisition and Project Management (APM) is leading continued improvement in contract and project management practices and NNSA's effort to institute rigorous analyses of alternatives; provide clear lines of authority and accountability for program and project managers; improve cost and schedule performance; and ensure Federal Project Directors and Contracting Officers with the appropriate skill mix and professional certifications are managing NNSA's work.

CONCLUSION

NNSA's diverse missions are crucial to the security of the United States, the defense of its allies and partners, and global stability writ large. The U.S. nuclear deterrent has been the cornerstone of America's national security since the beginning of the nuclear age, and NNSA has unique responsibilities to ensure its continued safety, security, reliability, and effectiveness. Likewise, NNSA's nuclear non-proliferation and nuclear counterterrorism activities are essential to promoting the peaceful use of nuclear energy and preventing malicious use of nuclear and radiological materials around the world. Finally, NNSA's support to the U.S. Navy allows the United States to defend its interests abroad and protect the world's commercial shipping lanes. Each of these critical missions depends upon NNSA's capabilities, facilities, infrastructure, and world-class workforce.

Senator ALEXANDER. Admiral Caldwell.

STATEMENT OF JAMES F. CALDWELL JR, UNITED STATES NAVY, DEPUTY ADMINISTRATOR FOR NAVAL REACTORS, NATIONAL NUCLEAR SECURITY ADMINISTRATION, DEPARTMENT OF ENERGY

Admiral CALDWELL. Thank you, Mr. Chairman, Chairman Alexander, Ranking Member Feinstein, distinguished members of this subcommittee. Thank you for the opportunity to testify before you today.

NAVAL REACTORS

I am grateful for the tremendous support that this subcommittee has shown Naval Reactors. Your support is essential to my program's success.

Since I last testified before this subcommittee, U.S. nuclear power warships, 10 aircraft carriers, 14 ballistic missile submarines, 57 attack submarines, and 4 guided missile submarines steamed more than two million miles in support of national security missions. We have 101 reactors across our program that operated safely and effectively for another year. This is a true testament to the sailors that operate these propulsion plants and the strong technical base that supports them.

Nuclear power is a key enabler to the success of our nation's Navy in both the missions it supports and the capability advantage it allows over potential adversaries. Nuclear powered submarines and aircraft carriers make up over 45 percent of the Navy's major combatants. And as we move forward, it is vital to our national security to continue to build and improve upon these incredible assets.

Last year marked the start of an ongoing program that delivers two *Virginia*-class submarines annually. Recently, the Navy commissioned the attack submarine *Illinois*, delivered the pre-commissioning unit, *Washington*, and christened the pre-commissioning unit *Colorado* and *Indiana*. And just this last month we delivered the *Gerald Ford* to the Navy, the first ship in our newest class of aircraft carriers. Having witnessed the *Ford* propulsion plant test-

ing at sea firsthand, I am happy to report that in terms of propulsion capability *Ford* met the high speed of our *Nimitz*-Class carriers and delivered major increases in electrical power and core energy with half of the manning of the reactor department on *Nimitz*.

We continue to support a strong nuclear shipbuilding capability, 12 submarines in various phases of construction, and the construction of the second aircraft carrier in the *Ford*-class, *John F. Kennedy*, is underway with the third ship of the class, the *Enterprise*, set to start full scale construction in 2018.

Nuclear power continues to play an important role in our military's strategic deterrence mission. Our ballistic missile submarine force achieved 60 years of peacekeeping through continuous at sea strategic deterrence. This milestone occurs as the nation is preparing to recapitalize the ballistic missile submarine force through the procurement of *Columbia*-class. It is a submarine that will enable undersea strategic deterrence through the 2080s.

Over the past year our technical base of scientists, engineers, and logisticians were vital to the continued operation of the Navy's nuclear fleet. This core team directly supported the Navy's ability to maintain a forward deployed carrier, 3 battlegroup deployments, 33 submarine deployments, and 32 ballistic missile deterrent patrols. It is another strong testament to our design and technical base that we achieved a milestone when USS *Helena* made submarine history by traveling over one million nautical miles on a single reactor core. Our progress and mandatory oversight of the safe operation of the fleet is only possible through the steady support of this subcommittee.

NAVAL REACTORS' FISCAL YEAR 2018 BUDGET REQUEST

Naval Reactors' request for fiscal year 2018 allows us to continue this work. The funding request is for \$1.48 billion. It is an increase of 4 percent over the fiscal year 2017 enacted funding level. The request enables us to deliver tomorrow's fleet by recapitalizing critical program facilities and infrastructure, performing research and development, and funding three national priority projects which are: continuing to design the new propulsion plant for the *Columbia* SSBN which will feature a life of the ship core and electric drive; refueling a research and training reactor in New York to facilitate *Columbia*-class SSBN reactor manufacturing development efforts and provide another 20 years of operator training; and building a new Spent Fuel Handling Facility in Idaho that will facilitate long term, reliable processing and packaging of spent nuclear fuel from aircraft carriers and submarines.

The budget request supported by sustained and predictable funding levels also permits Naval Reactors to support today's operational fleet by recruiting and retaining talented engineers, technicians, and scientists that make up my technical base. This technical base includes world class laboratory and reactor facilities that require selected maintenance and modernization investments to ensure their readiness for 24/7 support of fleet operations and keep us technologically ahead of adversaries.

Mr. Chairman, our fiscal year 2018 budget request is part of a closely coordinated Department of Navy and Department of Energy budget that supports both my responsibility to regulate the safe

and effective operation of the nuclear fleet and Naval Reactors' roles in both Departments to support the security of our Nation today and into the future. We will accomplish this with our industry partners while maintaining high standards for safety and environmental stewardship.

Again, thank you for the longstanding support of this subcommittee and I look forward to discussing my program with you. [The statement follows:]

PREPARED STATEMENT OF ADMIRAL JAMES F. CALDWELL

Since USS *Nautilus* (SSN 571) first signaled "Underway on nuclear power" in 1955, our nuclear powered ships have made extraordinary contributions to our national defense. From the start of the Cold War to today's multi-threat environment, our nuclear navy ensures continued dominance of American seapower. Over 45 percent of the Navy's major combatants are nuclear powered (10 aircraft carriers, 14 ballistic missile submarines, 57 attack submarines, and 4 guided missile submarines) capitalizing on the mobility, flexibility, and endurance of nuclear power that enables the Navy to meet its global mission.

Over the past year, the Navy, with Naval Reactors support, deployed 33 submarines and conducted 32 strategic deterrent patrols. In addition, at any given time, there were always at least 56 of 75 submarines deployed or ready to deploy within a few days. Our carriers, USS *John C. Stennis* (CVN 74), USS *Harry S. Truman* (CVN 75), and USS *Dwight D. Eisenhower* (CVN 79), completed successful deployments, and the USS *Ronald Reagan* (CVN 76) stood ready as the forward-deployed carrier in Japan. We also saw the christening of the attack submarines PCU *Colorado* (SSN 788) and PCU *Indiana* (SSN 789), our fifteenth and sixteenth *Virginia*-class submarines. We have also added another attack submarine to our force by commissioning USS *Illinois* (SSN 786), and the Navy's newest submarine USS *Washington* (SSN 787) was delivered. And last, as a testament to the ability of our design and technical base, USS *Helena* (SSN 725) made submarine history by being the first submarine to travel 1 million nautical miles on a single reactor core.

Recently, I participated in sea-trials on the first *Ford*-Class Aircraft Carrier, the *Gerald R. Ford* (CVN 78) which was delivered on May 31. This ship has the first new design aircraft carrier propulsion plant in 40 years, and I'm happy to report that in terms of propulsion capability, *Ford* met the high speed of our *Nimitz*-Class ships and delivered major increases in electrical power and core energy with half the manning in the reactor department. While we have worked through several challenges testing and operating the first-of-class propulsion and electrical generation and distribution system on the ship, the fact that these problems were safely and efficiently resolved is a testament to the technical skills and hard work of the nuclear shipbuilding design and industrial base, as well as the skilled Sailors operating this equipment. This historic milestone represents the culmination of almost 20 years of dedicated and sustained effort by Naval Reactors and its field activities, our Department of Energy laboratories, nuclear industrial base suppliers, the Navy design team, and the nuclear shipbuilders.

In addition to supporting these nuclear powered combatants, Naval Reactors has safely maintained and operated two nuclear powered land-based prototypes—both over 39 years old—to conduct research, development, and training, as well as two Moored Training Ships—both over 53 years old—the oldest operating pressurized water reactors in the world. These operational reactors provide highly qualified operators to the nuclear fleet, and today our nuclear fleet is fully manned.

The strong support of this subcommittee last year enabled safe operation of the fleet, Naval Reactors mandatory oversight, and continued progress on key projects. Naval Reactors' budget request for fiscal year 2018 is \$1.48 billion, an increase of 60 million dollars, or 4 percent, over the fiscal year 2017 enacted funding level. In addition to supporting today's operational fleet, the requested funding will enable Naval Reactors to deliver tomorrow's fleet by continuing funding for three national priority projects and recruiting and retaining a unique, highly skilled work force committed to the Navy and the Nation. The projects are:

- Continuing to design the new propulsion plant for the *Columbia*-class ballistic missile submarine, which will feature a life-of-ship core and electric drive;
- Refueling a research and training reactor in New York, to facilitate *Columbia*-class reactor development efforts and provide 20 more years of live reactor based training for the fleet operators; and

—Building a new Spent Fuel Handling Facility in Idaho that will facilitate long term, reliable processing and packaging of spent nuclear fuel from aircraft carriers and submarines.

We are at our peak in design efforts supporting the new propulsion plant for the *Columbia*-class SSBN—the Navy’s number one acquisition priority. Providing unparalleled stealth, endurance, and mobility, our ballistic missile submarine force has delivered more than 60 years of continuous at-sea deterrence, and it continues to be the most survivable leg of the nuclear triad. *Columbia*-class SSBN activity this year includes reactor plant design and component development to support procurement of long lead reactor plant components in fiscal year 2019. The funding requested ensures we maintain progress with this plan and alignment with the Navy as the program moves toward construction start in fiscal year 2021.

Supporting both the *Columbia*-class effort and the Program’s training needs, the fiscal year 2018 budget request supports the land-based prototype refueling overhaul at the Kesselring Site in upstate New York. In fiscal year 2018, Naval Reactors continues the core manufacturing work needed for the refueling overhaul, which retires manufacturing risk for the life-of-ship core for *Columbia*-class. Further, plant service-life engineering design will be largely completed in fiscal year 2018 to ensure that the land-based prototype overhaul, performed concurrently with refueling, supports 20 additional years of Naval Reactors’ commitment to research, development, and training in upstate New York.

The Naval Reactors fiscal year 2018 Budget Request also contains funds to continue the Spent Fuel Handling Recapitalization Project. Congressional support in fiscal year 2016 and fiscal year 2017 for this much needed project has enabled progress on site preparations, long lead material procurements starting this fiscal year, and approval of the National Environmental Policy Act Environmental Impact Statement Record of Decision. In addition to starting site preparation and long lead material procurements, we are using the \$100 million received in fiscal year 2017 to finalize key facility and equipment requirements and advance facility design to support establishing the Performance Baseline and authorizing the start of construction in fiscal year 2018. Continued Congressional support will ensure that the facility in Idaho is ready to receive spent nuclear fuel from aircraft carriers in fiscal year 2024 and be fully operational by 2025.

In addition to our three main priority projects, Naval Reactors also maintains a high-performing technical base to execute nuclear reactor technology research and development that guarantees our Navy remains technologically ahead of adversaries, as well as the necessary equipment, construction, maintenance, and modernization of critical infrastructure and facilities. By employing an efficient and effective technical base, the teams of talented and dedicated people at our four Program sites—the Bettis Atomic Power Laboratory in Pittsburgh, the Knolls Atomic Power Laboratory and Kesselring Site in greater Albany, and the Naval Reactors Facility in Idaho—can perform the research and development, analysis, engineering, and testing needed to support today’s fleet at sea and develop more capable nuclear-powered warships. Our labs perform the technical evaluations that enable Naval Reactors to thoroughly assess approximately 4,000 emergent issues annually and deliver timely responses that ensure nuclear safety and maximize operational flexibility. This technical base supports more than 17,500 nuclear-trained Navy sailors, who safely maintain and operate the 101 nuclear propulsion plants in the fleet 24 hours per day, 365 days per year around the globe.

At the requested funding level, Naval Reactors can safely maintain and oversee the nuclear-powered fleet. Naval Reactors is committed to executing our projects on time and on budget, and continuing the drive for the safest and most cost effective way to support the nuclear fleet. I respectfully urge your support for aligning funding allocations with the fiscal year 2018 Budget Request.

Senator ALEXANDER. Thank you, Admiral.

We will now begin five-minute round of questions.

MOX FUEL FABRICATION FACILITY

General Klotz, last year the Obama Administration’s budget request proposed we stop construction of the MOX Fuel Fabrication Facility in South Carolina and that Congress fund a different process called Dilute and Disposal to dilute excess plutonium material including the plutonium in South Carolina and permanently dis-

pose of it. This year, the Trump Administration has proposed exactly the same thing, that we cancel the MOX project.

Last year, Senator Feinstein and I and this committee agreed with the Obama Administration and we put in our Senate bill \$270 million to terminate the proposal. You have said, both last year and this year, that the Dilute and Disposal alternative will cost less and get the plutonium out of South Carolina much sooner than it would if we continued to fund the MOX project. So let me ask you a series of questions, if I may, which and most of them can be answered yes or no, if you would, please.

Last year we did not know if Russia would agree to modify the agreement to allow us to use Dilute and Disposal to get rid of the plutonium, but since then Russia has withdrawn from the agreement, is that correct?

General KLOTZ. Yes, Sir. Essentially—sorry. Yes, Sir. Essentially, it is. The term they have actually used is they have suspended their participation in the Plutonium Management Disposition Agreement and they have set a whole series of unrealistic and non-germane conditions in order to return to the Plutonium Management Disposition Agreement.

Senator ALEXANDER. So I am going to conclude that unless Russia changes its mind, it is out of the agreement.

General KLOTZ. Yes, Sir.

WASTE ISOLATION PILOT PROJECT

Senator ALEXANDER. Last year, we did not know if WIPP (Waste Isolation Pilot Plant) would actually reopen. Since then, WIPP has reopened and resumed operation, is that correct?

General KLOTZ. Yes, Sir. We resumed operations earlier this year.

DILUTE AND DISPOSAL OF PLUTONIUM

Senator ALEXANDER. Let us talk about the dilute part of dilute and disposal first. There were some questions last year about whether the dilute and disposal method was a proven success. Last year the Department started to process plutonium, not plutonium that is part of the agreement with Russia, but other plutonium, using the dilute and disposal method, isn't that true?

General KLOTZ. Yes, Sir.

Senator ALEXANDER. Where will that plutonium go after it is diluted?

General KLOTZ. Sir, it will go to the Waste Isolation Pilot Project, or WIPP, near Carlsbad, New Mexico. In fact, there have already been four shipments since WIPP resumed operations this year of diluted plutonium from Savannah River.

Senator ALEXANDER. So you can dilute plutonium using this method. You can ship it to WIPP. There is about 13 tons of plutonium in South Carolina that is not needed for the weapons program and about half of that was included in the agreement with Russia. Last year, you testified before this committee that all of the excess plutonium in South Carolina could be sent to WIPP under current law. Is that still your opinion?

General KLOTZ. Yes, Sir.

COMPARISON OF MOX FUEL FABRICATION TO DILUTE AND DISPOSAL

Senator ALEXANDER. You previously testified that operating the MOX project would cost at least twice as much as operating the dilute and disposal method. Is that still your opinion?

General KLOTZ. Yes, Sir. And, in fact, a recent report since we last testified by the Army Corps of Engineers puts it even more than twice as much.

Senator ALEXANDER. How do the construction costs compare for the MOX project and dilute and disposal project?

General KLOTZ. Yes, Sir. \$17 billion, at least \$17 billion is the total project cost for MOX, of which approximately \$5 billion have already been expended. And \$500 million, million with an M, for the dilute and disposal.

Senator ALEXANDER. So going forward, that would be \$12 more billion for MOX under your figures, \$500 million for dilute and disposal.

General KLOTZ. Yes, Sir.

Senator ALEXANDER. And the dilute and disposal method gets the plutonium out of South Carolina sooner. Can you tell me how much sooner?

General KLOTZ. Well, if we—we would start dilute and disposal in the late 2020s vice the early 2050s. In other words, we could do dilute and disposal. We could start to move out the MOXable material in the late 2020s and finish by the early 2050s and end in about 2050 rather than 2065. So it is cheaper, and faster, and it is the best maneuver.

Senator ALEXANDER. So that is at least 20 years faster or more to get the MOX out of South Carolina if you use dilute and disposal.

General KLOTZ. Yes, Sir.

Senator ALEXANDER. Just a couple of more questions. I understand there is a considerable amount of excess plutonium in Texas. Can we dispose of that material using dilute and disposal and when could that process begin?

General KLOTZ. Yes, Sir. We could do that. Our current plan is we would do that, we would do the dilute and disposal operation, it would finish up at Savannah River before being shipped to WIPP. We would probably start that around 2035 after we had shipped out all the plutonium that currently sits at Savannah River because of our commitment to the State of South Carolina and the people of South Carolina to get the plutonium that is there now out of the state.

Senator ALEXANDER. So, to summarize, it was the opinion of the Obama Administration and it is now the opinion of the Trump Administration that dilute and disposal works, that it costs less than MOX, that it gets the material out of South Carolina sooner, and the material can go to WIPP under current law, is that correct?

General KLOTZ. Yes, Sir.

Senator ALEXANDER. Thank you.

Senator Feinstein.

Senator FEINSTEIN. Mr. Chairman, brilliant questions.

Senator ALEXANDER. That is just because you agree with me or I agree with you. Maybe that is the way I should say it.

Senator FEINSTEIN. No, I agree with you.

Senator ALEXANDER. But thank you.

Senator FEINSTEIN. I think we have a formula.

Senator ALEXANDER. Well, and I think the fact that successive administrations have come to the same conclusion is very important. We can talk more about it and we will come back to this question, but I want to give other Senators a chance to use their time. Thank you, Senator Feinstein.

LONG RANGE STANDOFF WEAPON

Senator FEINSTEIN. Thank you. Let me go to my big point of opposition, the LRSO. The so-called improvements to this weapon seem to be designed to make it more usable to help us fight and win a limited nuclear war. I have had the classified briefings. I have not had the latest if there are late changes. I have not. And I have seen the models of the present cruise missile plus the model of this new one.

To the best of my knowledge, we hold conventional weapon superiority and it seems to me that that is adequate to meet an adversary's effort to escalate a conflict. So why do we need this new nuclear cruise missile?

General KLOTZ. Well, thank you very much for the question, Senator. In fact, the United States Air Force, which I am proud to have been a part of for nearly 40 years, has had an air-launched, a nuclear capable air-launched cruise missile since 1982 which today would be launched off our B-52, our aging B-52 bombers. The missile itself is starting to show signs of age. That is not NNSA's responsibility. That is the Air Force's and the Department of Defense's responsibility to resolve issues associated with the aging of the missile itself, and that is what they are doing.

Our responsibility is to provide the warhead that would go on this replacement air-launched cruise missile, which they refer to, as you rightly point out, as the LRSO. To do that, our approach has been to do a life extension program of the family of warheads that are currently associated with the existing air-launched cruise missile.

So, from our perspective, we were responding to a military requirement as validated by the military and as approved by the Nuclear Weapons Council on which we are represented to provide a warhead for a new missile which the Air Force is deploying or plans to deploy.

Senator FEINSTEIN. Would you agree to talk about this in a classified session?

General KLOTZ. I would be delighted to.

Senator FEINSTEIN. So that I could ask questions that I know will be classified.

General KLOTZ. Yes, Senator. We would be delighted to come up.

NUCLEAR WAR

Senator FEINSTEIN. Thank you. And next question, do you believe there is such a thing as a limited nuclear war with—

General KLOTZ. I'm sorry. Go ahead.

Senator FEINSTEIN [continuing]. Nine nuclear powers?

General KLOTZ. My view has been, and I have been in this business as I indicated earlier, in the military and now here for over 40 years, is that a nuclear war cannot be fought and must never be fought. The purpose of these weapons is to provide deterrence so that any other nation or sub state actor who has a nuclear weapon will be persuaded not to use that against the United States or against our allies. And that is why we maintain these awesome weapons.

And indeed there has been no major war between the major powers of the world since the Second World War. And that is after, you know, a century, a half a century, of utter devastation and millions of people killed and devastation to cultural icons in cities across the world. I think it is significant that 70 years of relative peace we have had between the major powers since the end of the Second World War maps almost one to one to the existence of these nuclear deterrents, which we have maintained since the Second World War.

Senator FEINSTEIN. There is one point that really bothers me. We do not have a no first use policy. And this is geared toward Russia. And I think we ought to sit down and we ought to understand, the political branch as well as the military and the technical branch, really whether this is what we want to do. I know for a fact that at the time of the New START negotiations because I was in Geneva, I was able to talk with the Russian military, that there was a real interest in reducing weapons. And we did and now everything appears to have fallen apart.

Well, that is part of a bigger agenda too, so you are not going to solve the bigger agenda with a nuclear weapon. And I am really worried about this because who knows what is going to happen? Who knows what order the President will give? And to have a weapon that can travel the distance and do the harm and may not be able to be aborted I think is a very, if that is the case, a difficult issue.

So I am probably older than any of you, but I remember the pictures in the San Francisco Chronicle and other papers when we dropped the bombs on Hiroshima and Nagasaki. And they are awful and what we did and the hundreds of thousands of people that were killed in those two cities. And to build something and I gather improvements to make it more usable moves away from deterrence. How do you reconcile making it more usable with deterrence? That is my question.

LIFE EXTENSION PROGRAM

General KLOTZ. Oh. Well, I do not know that the delivery platform that the Air Force is developing or the warhead that we are extending the life of is going to make these things more usable. They enhance—the capabilities they have are roughly, from our perspective, are roughly the same. I will not speak to the Air Force program. We would have to discuss that in a different setting, the Air Force Missile Program.

But from our perspective, it is what we are essentially doing is designing into this weapon in addition to updating the components as part of the life extension. We are also designing in more safety features into this weapon that were not there before as we do with

all life extension programs. So it is not our intent, from the NNSA's perspective, it is not our objective to make a more "usable" weapon. Our intent is to extend the life of the existing weapon and the capabilities that it has and has had for quite some time while at the same time designing in additional safety and security features.

Senator FEINSTEIN. Thank you.

Senator ALEXANDER. Thank you, Senator Feinstein.

We will go to the other Senators and then, Senator Feinstein, we will come back for—you will have as much time as you would like to ask questions on that or other subjects.

Senator Merkley.

W80-4 LIFE EXTENSION PROGRAM

Senator MERKLEY. Oh, thank you, Mr. Chairman, and thank you all very much for coming and joining us.

I wanted to start by asking about the W80 warhead for the air launched cruise missile that I believe is being transformed to the W84. And I understand that it is primarily a life extension program for the long range standoff missile, but is that also changing? Does the warhead have to be modified? Is it another—is it an alteration or is it just a life extension program?

General KLOTZ. Could I suggest that we ask Mr. Calbos to answer that? Because he is actually, you know, my Deputy who is responsible for the whole weapons activity.

Senator MERKLEY. Absolutely. That would be great.

Mr. CALBOS. Thank you, Senator. I appreciate the opportunity to be here to answer the questions on our weapons programs.

The W80-4 is a lifetime extension program. As the Administrator said, we are focused on extending the life of the individual components and where possible, improving the safety and surety of the system. It is, and I think you mentioned the W84. It is the W80-4.

Senator MERKLEY. Yes, W80-4.

Mr. CALBOS. W80-4 is the new warhead. We are at the very early stages of that work. Our LEP process, our lifetime extension process, takes about, say, 10 to 15 years. We are roughly in year 2 of that where we are looking at different technologies and trying to decide what ultimately will go into the final design of the lifetime extension program.

Senator MERKLEY. So is the \$400 million for the program just for design strategy?

Mr. CALBOS. Yes, Sir. The \$400 million in the request is for concept development and design, initial design.

W88 ALTERATION

Senator MERKLEY. Okay. Let me turn to the W88 and the alteration program. This is one of the warheads on the D5. And can we assume that because it is being called an alteration program you are changing the qualities of the warhead? And can you expand on that in an unclassified setting?

Mr. CALBOS. Yes, Sir. I can say a little bit about that. That is officially—the W88 is officially referred to as an alteration. The initial scope of that program was to replace the arming, fuzing, and firing system. Frankly, one of the successes of our program is that

every year when we bring back systems from the active stockpile, we take a look at them to see how they are aging, if there are any problems that we need to address. And we did identify a problem that we needed to address and we added some scope to that. That was not part of the original plan, but that is now, you know, part of the W88 alterations scope.

This past year, in February, we transitioned from development engineering to production engineering where we married up the two parts of that program into one and established the baseline with the new understanding.

General KLOTZ. Yes. We can be a little more specific. The scope that Mr. Calbos was talking about is a decision that was made by the Nuclear Weapons Council based on data we had gotten from our annual surveillance program to assess the effects of aging, a decision to replace the conventional high explosive that is part of the nuclear explosive package. Since we were opening up the weapon or bringing the weapon back to Pantex and opening it up anyway, it made sense to go ahead and address this particular aging issue while we were there.

So, Phil is right. The scope expanded significantly for what was an alteration primarily focused on the arming, firing, and fuzing system, but also replacing some limited life components while we had the weapon back at Pantex.

OTHER LIFE EXTENSION PROGRAMS

Senator MERKLEY. Are there—so we have these four warhead modification programs, B61, 76, the W88 alternative or alteration, and the W80-4. Are there other warheads that are going to—such programs, similar programs, are going to be begun in future years as an expanding array of modification or life extension?

Mr. CALBOS. Sir, we spent the better part of the last two decades with the current suite of weapons. About 8 years ago, you know, our understanding led us down a course of having to extend the life of what was in our inventory. So those four that you mentioned now are the four that are currently ongoing.

Looking ahead, we will begin other lifetime extension programs to address those next ones that, frankly, are starting to age out in the late 2020s and early 2030s.

Senator MERKLEY. Thank you. My time is up. Thank you very much.

Senator ALEXANDER. Thank you, Senator Merkley.

Senator Udall.

PLUTONIUM MISSION

Senator UDALL. Thank you, Chairman Alexander.

And as I—General Klotz mentioned, in my opening, there is currently an analysis of alternatives ongoing for the plutonium mission at Los Alamos. As this analysis moves forward, can you assure me that the NNSA will take into account the cost, the schedule, and the execution of the plutonium mission?

General KLOTZ. Absolutely.

Senator UDALL. Yes.

General KLOTZ. Yes, Sir.

Senator UDALL. And it is important that NNSA avoid a decision that would unnecessarily increase the cost or timelines of the plutonium mission at Los Alamos and so that is what we are looking at there.

General KLOTZ. Yes, Sir.

MESA FACILITY

Senator UDALL. And I spoke about the budget including a considerable increase for nuclear survivability. I wanted to also indicate that I would work to support the additional \$20 million funding request for nuclear survivability which includes funding for our microelectronics capability at Sandia's MESA (Microsystems and Engineering Sciences Application) facility. Can you explain how important the MESA facility is to the overall stockpile stewardship project and what issues could arise if the MESA facility is not fully funded and refurbished on time?

General KLOTZ. Thank you very much for that question, Senator. This is one of our highest priorities.

Our nuclear weapons have, as part of their functioning mechanism, microelectronics. These microelectronics are very special microelectronics. They must be hardened against the effect of radiation. And when we say radiation hardening, there are many different levels of radiation hardening. The radiation hardening for a nuclear weapon is far more complicated and needs to be far more robust than say radiation hardening for satellites.

Our center of excellence for the design and production of radiation hardened trusted, and by trusted I mean made in America and we know the providence of the materials and the components that go in it. Our center of excellence has always been Sandia National Laboratories.

Now, as you pointed out in your opening remarks, and quite rightly so, the facility that we have for doing that is beginning to age out. Not only that, is the technology is changing. For instance, we use 6-inch silicon wafer processing. The rest of industry has gone to 12-inch. So we are going to bridge to a new capability, a 12-inch capability, by installing the capability to do 8-inch and do some other refurbishments to the existing facility there under the fabrication revitalization program that will carry us to 2025.

We are now conducting an analysis of alternatives to see how we will recapitalize our ability to do trusted microsystem design and fabrication past that date.

Senator UDALL. Great. And I look forward to working with you on the MESA refurbishment and to ensure that it remains on time and on schedule.

WASTE ISOLATION PILOT PROJECT

Regarding Chairman Alexander's questions about WIPP, I would like to see the written justification explanation of your comments that all plutonium in South Carolina can be disposed of at WIPP under current law. Please include an explanation of all other waste streams that the DOE is considering sending to WIPP. As you know, WIPP has both volume and radioactivity limits in statute. And could you provide this in writing to the subcommittee?

General KLOTZ. Yes, Sir. Yes, Sir.

Senator UDALL. Thank you. Thank you very much.

CLEANUP PROJECT AT LOS ALAMOS NATIONAL LABORATORY

The cleanup project at Los Alamos is extremely important to New Mexico and I think to the nation just in terms of cleanup. The Federal Government DOE have a duty to clean up legacy cold water waste. A new cleanup contract is expected at Los Alamos soon. Can you update us on the expected timeline and progress for getting that in place?

General KLOTZ. I will have to get back to you on that one, Senator. The responsibility for that particular contract falls under the Environmental Management Division which is a separate division from NNSA within the Department of Energy, but your rough timeline I believe is correct.

Senator UDALL. Okay. And I have additional questions I will submit for the record on the cleanup going on at Los Alamos. Thank you very much. Thank you.

Senator ALEXANDER. Thank you, Senator Udall.

URANIUM PROCESSING FACILITY

General Klotz, let me ask you about the Uranium Processing Facility. I visited with Secretary Perry there in Oak Ridge a few weeks ago. Five years ago Senator Feinstein and I became alarmed, would not be too strong a word, about continuing prospects of cost overruns there and have worked hard to keep the project on time and on budget, which has included a Red Team review of the project.

We said we wanted the design to be completed at least 90 percent before we began construction of the facilities. We urged the Department to take aggressive steps to get costs under control including breaking the project up into more manageable pieces.

So I have this series of questions. Can you confirm today—let me add to that. Senator Feinstein and I meet regularly with you and other officials for an update on that. And we appreciate the regularity of that and I believe it makes a difference in keeping the spotlight on it. Can you confirm today that the Uranium Processing Facility construction project is still on track to be completed by 2025 at a cost of no more than \$6.5 billion?

General KLOTZ. Yes, Sir.

Senator ALEXANDER. When do you expect the design to be 90 percent complete?

General KLOTZ. Early this fall.

Senator ALEXANDER. Do you have adequate staff to review the designs when they are submitted for your approval later this year?

General KLOTZ. Yes, Sir.

Senator ALEXANDER. When do you anticipate construction of the new facilities will begin?

General KLOTZ. Well, if we complete the design as we expect to do at the 90 percent, by the end of this fiscal year or early fall, then we would be able—we have to go through a series of internal approval processes. So we could begin construction of the nuclear facilities in spring of 2018.

Senator ALEXANDER. Spring of 2018.

General KLOTZ. Yes, Sir.

Senator ALEXANDER. So the construction would then be between 2018 and 2025.

General KLOTZ. Yes, Sir.

Senator ALEXANDER. Have you been able to apply the lessons learned from the Uranium Processing Facility to other big construction projects like the plutonium facility in New Mexico?

General KLOTZ. Yes, Sir. We have.

Senator ALEXANDER. Such as?

General KLOTZ. Well, for instance, the concept that you rightly had, you and Senator Feinstein, rightly had concerns about was this notion that to replace the uranium processing capability in Y-12 at Oak Ridge we had to—we would build a one big box and try and put all our activities into that building. It seems to make sense, one building. The problem with that is that there are many different levels of security and many different levels of safety. And the cost of housing those different levels varies dramatically.

So if you can segregate the work by hazard category and if you can segregate the work by security category and build buildings that are fit for each of those you can save significantly on square footage.

Senator ALEXANDER. That was a recommendation of the Red Team.

General KLOTZ. Yes, Sir. And we will—and again, that was another idea that you and Senator Feinstein had that was implemented and we will forever be indebted to Dr. Thom Mason for his leadership and his vision in leading that Red Team report.

Senator ALEXANDER. Thank you. Let me ask you about the new contract. Basically, you have consolidated operations at Y-12 at Oak Ridge with Pantex in Texas, is that right?

General KLOTZ. Yes, Sir. We have.

Senator ALEXANDER. And so you have got one set of—one group managing both facilities as the weapons and the parts go back and forth. When we, Secretary Perry and I, were in Oak Ridge recently, we talked about an innovative contract used to drive cost savings by the contractor. My understanding is that at first the contract was a difficult contract and that the contractors first assessment in fiscal year was a score of 57 out of 100. Last year it was 77 out of 100. How are they doing now? How much money have you saved? And how much money do you think you might be able to save during the life of the contract?

General KLOTZ. They are doing much better and I am very pleased with the progress there being made. And to their credit, this was a difficult challenge that the new contractor was handed to consolidate activities at two geographically separated organizations, one in Tennessee and the other in Texas, doing slightly different types of work and with different histories, cultures, and situations was a big task.

And I think, quite frankly, it was a bigger task than either we in the Department of Energy and NNSA realized it would be and I will let the contractors speak for themselves, whether it turned out to be a bigger task. But they are learning. They are working this very hard.

Senator ALEXANDER. And did you save money?

General KLOTZ. We have saved money. We have validated savings in the \$1 to \$200 million range so far. We expect to validate even more savings as the contract continues.

Senator ALEXANDER. What is the length of the contract?

General KLOTZ. I would have to get back to you with a specific on that.

Senator ALEXANDER. Do you have an estimate of the savings for the term of the contract?

General KLOTZ. I will have to give you the precise number on that. But the important thing about the savings is they take those savings and they can plow it, essentially, back into infrastructure and processes at the facility and they are doing that. I think there is a total of 16 projects which the contractor has taken on to do just that.

Senator ALEXANDER. Thank you.

Senator Feinstein, why don't you ask whatever questions you have and then I will wind the hearing up.

Senator FEINSTEIN. All right.

Senator ALEXANDER. I am going to ask the Admiral about used nuclear fuel at the very end, so I will—

Senator FEINSTEIN. Okay.

Senator ALEXANDER. But I will wait until you finish your questions.

CONVERTING NAVAL REACTORS FROM HEU TO LEU

Senator FEINSTEIN. All right. In our fiscal year 2016 Bill, we provided \$5 million for a study of the feasibility of converting naval reactors from HEU to LEU. And we thought this was an interesting concept and the way for the United States to act as a role model for other countries considering using HEU in their nuclear navies. So, Admiral, can you give us a progress report on that issue?

Admiral CALDWELL. Yes, ma'am. We were asked to provide Congress a conceptual plan for developing a low enriched uranium capability for Navy nuclear propulsion. We signed out that report and delivered it. And essentially what it says is, it says that to develop a low-enriched uranium core, it would take about a billion dollars and 10 to 15 years to develop it. The reason why it would take that long is we need to develop an advanced fuel system to be able to use low-enriched uranium.

Now, the history of the program is that we have used highly enriched uranium. That is, we have taken that and we have perfected that. It has allowed us to develop these cores that last for the life of a ship. In fact, right now all of the submarines we are building have life of the ship cores. The *Columbia*-class will have a 42-year core using highly enriched uranium. We have taken that technology almost as far as we can.

To go to low enriched uranium though, we would need a different system and success would not be guaranteed. It is quite a leap to go forward. And I think so—

Senator FEINSTEIN. Explain why it is quite a leap.

Admiral CALDWELL. Because we are essentially adding less energy into the core. And when you do that, one, you would have to figure out how to add more low enriched uranium to get the re-

quired endurance, energy, performance, speed out of the core. And——

Senator FEINSTEIN. So I do not——

Admiral CALDWELL [continuing]. With the technology we have today, ma'am, we just cannot do that. We need a new fuel system to be able to do that.

Senator FEINSTEIN. Okay. I am trying to understand. So you are saying to fuel one of the submarine reactors with LEU, you would have less drive power, therefore less speed. I do not know. Less—is it just speed? Is that—not that that is not a big——

Admiral CALDWELL. Less endurance, less energy to use for anything on the ship. You would have to probably refuel it more frequently. You would take it offline. You would—it might end up—if you were to go on such a path, you might have to actually build more submarines so that you could maintain the required presence that you need forward.

Senator FEINSTEIN. How do we perform against a Russian nuclear submarine?

Admiral CALDWELL. Well, we cannot talk about classified information.

Senator FEINSTEIN. No, I am not.

Admiral CALDWELL. But our nuclear propulsion program has 60 years of exceptional performance, safe, reliable, effective operations. That is because committees like this have provided us stable, secure funding. That has allowed us to have a strong technical base. Everything we do is based on technology and science. It has allowed us to hire the right people and maintain our facilities and maintain our systems to very high standards.

To go back to your question, ma'am, one of the things that my responsibility includes is to think about the future. In the future, our ships will require more energy, more endurance, and I need to go continue working on an advanced fuel system. I am making progress on that at a slow pace. We need to continue working on that and in the future that advanced fuel system would allow me to get more out of a highly enriched uranium core. It might offer possibility for a low enriched uranium core, although, as I said, success cannot be guaranteed. But I think it is important for us to continue to work on that. I can make some progress on that with the funding that I have, but to get to an advanced core, I would need significantly more money than I am getting right now.

Senator FEINSTEIN. How about taking the LRSO funds?

Admiral CALDWELL. I will not comment on that, ma'am.

REPLACEMENT OF BLOOD IRRADIATORS

Senator FEINSTEIN. I am not asking you to. I have supported the efforts to work with hospitals and medical facilities and industrial users to replace existing devices with those that do not rely on radiological sources. Can one of you, and I do not know who it should be, tell me more about NNSA's program to spur the replacement of blood irradiators in California and New York?

Mr. HUIZENGA. Yes, I can take that.

Senator FEINSTEIN. And what you think the—how important you believe it is. It seems—never mind. I am not going to categorize it, but how important you think it is.

Mr. HUIZENG. We are with you. It is extremely important to us as well and we are very focused on this. I think you probably—maybe your staff has told you we recently were out in California, a very important workshop with the Nuclear Threat Initiative and focusing on this effort. And you mentioned there is over 100 cesium irradiators that are, you know, interested in working with us for replacement. We are also doing the same thing in New York City. So this has got our attention. And of course, this is the ultimate in reducing the threat of a dirty bomb. If you can get people to actually not need to use a source that could be used for a dirty bomb by using x-ray technology or some other technology, you completely remove that threat forevermore.

Senator FEINSTEIN. So what other devices are targeted for replacement?

Mr. HUIZENG. That is the—

Senator FEINSTEIN. Just—

Mr. HUIZENG [continuing]. Primary. The cesium is soluble and dispersible in this form. And so it is one of the most important ones for us to try to address because it is one of the highest threats. So that is what we are focused on right now. There is cobalt and other ones that are highly radioactive that we are also working on, but cesium is our biggest replacement threat.

NUCLEAR NONPROLIFERATION BUDGET

Senator FEINSTEIN. Thank you. I think I had one other question. I keep coming back to the cruise missiles. And I think the nonpro funding. How valuable do you consider that? It has accomplished a lot in 7 years and we have got the numbers here, but there are a lot of delays. And let me give you an example. Converting 156 reactors from HEU to LEU. It slipped from 2022 to 2035. Removal of HEU and plutonium from foreign countries has slipped from 2019 to 2022. Securing almost 4,400 building with high priority radiological materials has accelerated from an original goal of 20 to 10 years, 11 years earlier, 2033.

Why? Is the Administration backing away from its commitment? Is that what I read in this, General?

General KLOTZ. If I could start on just the numbers, Senator, and then Dave is the expert on the, what those numbers pay for.

First of all, in terms of the overall, as you mentioned in your opening remarks, the overall funding request for the Defense Nuclear Nonproliferation Appropriations. The reasons you see the numbers go down from last year's enacted is, one, one of the major components of that account is the construction of the MOX Fuel Fabrication Facility. That sits within the Defense Nuclear Nonproliferation account. And because last year the Administration, last year the Congress enacted \$335 million for that and we are only requesting \$279.

Senator FEINSTEIN. I am in shock.

General KLOTZ. It goes down.

Senator FEINSTEIN. This is the first I heard this.

General KLOTZ. Yes. Also, we are reducing the amount of money—this really gets down into budget, the budget weeds. We are reducing the amount of money that we need to cover our obligations under what we call legacy pensions because of rate

changes, adjustments in actuarial projections, and that sort of thing. So that number is down.

As far as the core things that we do in nonproliferation, that number is slightly down from our—from the enacted. And by core, I mean the things you were just talking about. But quite frankly, it is higher than our request last year. Our request for Dave's core nonproliferation programs was \$1,196,000,000. You know, we took a look at what would be required to carry on our programs for this year and came up with a request for \$1,245,000,000. So that would have been more than our fiscal year 2017 request.

But the Congress surprised us and when we finally got the final results of the Omnibus you had plussed up the core nonproliferation programs primarily in research and development in nonproliferation. So that is why the number is down slightly.

Senator FEINSTEIN. Well, so you are saying—

General KLOTZ. But Dave can talk more specifically about what that buys.

MOX FACILITY

Senator FEINSTEIN. How much does MOX take of nonpro funds?

General KLOTZ. Well, last year it was \$335 million—

Senator FEINSTEIN. Really?

General KLOTZ [continuing]. Was the appropriation. And this year we are requesting \$279.

Senator FEINSTEIN. So if we were to go to the dilute formula could that free up the \$279 million?

General KLOTZ. No, it cannot because there are costs associated with terminating a contract. There are costs associated with, you know, making sure that the facility is put in a safe and secure mode. There are vendors that—invoices that have to be paid off. There are labor law restrictions in terms of how quickly both white collar and blue collar can, you know, be given their termination notices. So it is expensive to terminate.

Senator FEINSTEIN. How much is in this year? Is it \$279? Is that—

General KLOTZ. We are requesting \$279.

Mr. HUIZENGA. Yes. It is \$270 for MOX—

General KLOTZ. MOX, yes.

Mr. HUIZENGA [continuing]. And \$9 million to start the dilute and disposal.

Senator FEINSTEIN. So the \$270 is nonpro funding?

Mr. HUIZENGA. It is in our budget, Senator.

Senator FEINSTEIN. For nonproliferation funds.

Mr. HUIZENGA. It is in the overall Defense Nuclear Nonproliferation budget.

Senator FEINSTEIN. So when this goes to WIPP does it still take that kind of money or is that money freed up?

Mr. HUIZENGA. Well, for a while if you approve our terminating the MOX project, some of that money will go to the termination costs, as the administrator pointed out, but after a while some of that money will then start to build up to put the glove boxes in South Carolina to be able to do the dilute and disposal, but after some period of time that construction will be gone as well and ar-

guably there could be some head room in the nonproliferation budget.

Senator FEINSTEIN. Why do you need glove boxes if we are not going ahead with it?

Mr. HUIZENGA. No, no. I am sorry. I misspoke. I mean, the glove boxes are to do the dilute and dispose, to do the opposite of MOX.

Senator FEINSTEIN. Oh, I see. Okay.

Mr. HUIZENGA. So there will be some termination costs that will come down over time. Some of the amount of that headroom coming down will be taken up by putting the glove boxes in South Carolina. And then eventually that construction work will just go down to zero and, you know, to that extent there might be some extra headroom in the nonproliferation budget.

But I guess I would like to point out, we have a vigorous discussion of the importance of Phil's program and my program and the Naval Reactors' program and we have had in a bipartisan support through a number of administrations and on the Hill for years. And you mentioned a number of the things that we had accomplished since 2010. Part of the accomplishments is, you know, we did Nunn-Lugar work for 25 years, did a tremendous amount of work securing material in Russia and the former Soviet Union.

Senator FEINSTEIN. Right.

Mr. HUIZENGA. That work ended in 2014, so I mean we started to then, you know, instead of the money that we requested for that, we started requesting it for the cesium replacement project and other things. But some of the—when people criticize us for reducing the request, some of it is because we got the work done and that is a good thing. But we do not shy away from having this discussion inside the building and trying to, you know, defend what we need to keep going with our nonproliferation program.

Senator FEINSTEIN. Thank you. Could I ask one more quick question?

Senator ALEXANDER. Oh, sure.

CROSS DOMAIN DETERRENCE

Senator FEINSTEIN. In the December 2016 Defense Science Board report, they called for integrating nuclear and non-nuclear capabilities for something called cross domain deterrence. And specifically, it called for a more—and this is a quote—a more flexible nuclear enterprise that could produce if needed a rapid tailored nuclear option for limited use should existing non-nuclear or nuclear options prove insufficient. What are they getting at in that and what are your thoughts on that, General?

General KLOTZ. Well, Senator, the Defense Science Board is an advisory board to the Secretary of Defense and the Department of Defense, and therefore we have no connection with it through the—a formal connection with it. And as an advisory board, their views are the views of the citizens, private citizens, I think for the most part, who have been named to that particular board.

I would just say that, you know, my sense is the nuclear deterrent that we have now is a very safe, secure, effective, and reliable deterrent. It is beginning to age, and with the support of Congress, we are fixing that problem in terms of the life extension programs that we have, but also the investments that are being made in our

laboratories, our production facilities, and other places where our people work to make sure that we can continue to sustain this.

If there—and I am very satisfied and I think the DOD is very satisfied with the force that we have now and that we have projected in the plans which now lie before you for extending the—for the platforms and for the weapons.

NUCLEAR WEAPONS STOCKPILE

Senator FEINSTEIN. Could we cut back on the hedge without hurting what you just said?

General KLOTZ. Well, we have, as we have discussed before, we have gone down significantly in the number of weapons that we have in the stockpile. I think last time——

Senator FEINSTEIN. Could I get a letter signed by you, in particular, of your analysis of the hedge?

General KLOTZ. Sure.

Senator FEINSTEIN. What it was.

General KLOTZ. Yes.

Senator FEINSTEIN. What it is now.

General KLOTZ. Yes.

Senator FEINSTEIN. And what it should be to have—I mean——

General KLOTZ. I can tell you what it is now, but let me just caveat that by saying, you know, this Administration, like every new administration, is currently conducting a nuclear posture review. Those are the kinds of issues which will be reviewed as under the terms of reference.

Senator FEINSTEIN. Is it still three to one?

General KLOTZ. Three to one in terms of?

Senator FEINSTEIN. The hedge?

General KLOTZ. We would have to talk more—in a different setting more specifically——

Senator FEINSTEIN. Okay.

General KLOTZ [continuing]. About how we have calculated the need, the current calculation for the need. Now, whether that will change in the NPR, you know, it would be too soon to speculate, but those are the types of issues which are going to be discussed within the terms of the——

Senator FEINSTEIN. Well, I assume we funded. I assume there is money for it in this bill.

General KLOTZ. Oh, yes. No.

Senator FEINSTEIN. So it seems to me it is ripe for discussion. I mean, to have a size of the hedge that we really do not need makes no sense to me.

General KLOTZ. Well, I am convinced that we have over the last two decades gotten the size of the stockpile down very significantly. And indeed, as you will recall from our testimony on some of the life extension programs that we are doing, by doing these life extensions we can bring down the overall size of the active stockpile. By consolidating three different, four different types of B61 gravity bombs under the B61-12 life extension program, we reduce the total number. We, by doing the W76-1 life extension program, we reduce significantly the number of W76s that are in the stockpile. So that has been a huge part of the whole life extension program.

Senator FEINSTEIN. Do those W76s in the stockpile have a three to one hedge?

General KLOTZ. I would have to tell you the specific one.

Senator FEINSTEIN. See, that is what I am interested in.

General KLOTZ. Yes. Yes.

Senator FEINSTEIN. In finding out. I mean, I know things change, but a lot of people tell me they also change very expensively with a hedge that is really not practically necessary.

General KLOTZ. Yes. We can let you know, you know, what our numbers are in the stockpile, but that is a classified discussion.

Senator FEINSTEIN. Okay. Thank you.

General KLOTZ. The specific numbers.

Senator FEINSTEIN. Thank you, Mr. Chairman.

Senator ALEXANDER. Thank you, Senator Feinstein as well. I learned a lot from you today. That is good.

MOX FACILITY COMPARED TO DILUTE AND DISPOSAL

Following up on Senator Feinstein's comparisons, the cost, obviously if your figures are right about dilute and disposal over the long term there will be a pretty big savings in the nonproliferation budget at some point.

Senator FEINSTEIN. Well, they will find a way.

Senator ALEXANDER. Well, they might, but they will have to come back and get you to approve it. I mean, the cost to build the MOX facility you estimate to be \$17 billion, right?

General KLOTZ. Five already expended, twelve to go. Yes, Sir.

Senator ALEXANDER. So you have got 12 to go. The cost to build dilute and disposal would require half a billion.

General KLOTZ. Right now, that is at our high end.

Senator ALEXANDER. Yes. Now, we probably should add to that the cost of termination of dilute and disposal to make a fair comparison, right? I mean, of MOX.

General KLOTZ. There will be a termination cost associated with getting out of MOX.

Senator ALEXANDER. So, and I imagine we will be having some discussions about this over the next few weeks and I think we ought to try to present this in the most accurate light. And I think to compare moving from one to the other and ignoring the termination cost of MOX would not be a fair comparison. So if you could think—you may have that this minute, but you do not need it this minute. I think I would—but I think I would have that.

And then the operating costs you have estimated of MOX would be \$800 million to \$1 billion a year and dilute and disposal \$400 million a year. Is that about right?

General KLOTZ. Well, at least a half a billion average annual operating cost for MOX is the—and approximately \$100 million, so 20 percent of the operating cost for doing dilute and disposal, 20 percent of the MOX operating cost for doing dilute and disposal.

Senator ALEXANDER. Okay. Let me—

Senator FEINSTEIN. Wait. Is he saying it costs 80 percent less?

Senator ALEXANDER. That is not what figures I had. I had that the cost of operating MOX would be \$800 million to \$1 billion and the cost of operating dilute and disposal would be less than \$400

million. Tell me again the comparison of operating MOX and operating dilute and disposal.

General KLOTZ. I have here on this chart an average annual operational cost excluding program cost for MOX project, approximately \$500 million. And that is in today's unescalated dollars. Some of the reports have unescalated and escalated dollars. And then an average annual operating cost excluding program costs for surplus plutonium disposition of \$100 million. Am I reading the chart correctly?

Senator FEINSTEIN. Really?

Mr. HUIZENGA. I gave him the wrong chart, I think. Can I—I can clarify this because we might have had a chart mix-up.

Senator ALEXANDER. Yes.

Mr. HUIZENGA. I think you are right. \$800 million to a billion for operating costs for MOX and \$400 million for operating costs for dilute and disposal.

Senator ALEXANDER. Okay.

Senator FEINSTEIN. Oh.

Senator ALEXANDER. When we have our discussions over the next few weeks, we need—that is very specific and that is very clear to me, but we need to have—we need to be accurate about that and we need to include the termination costs of MOX to make a fair—

Mr. HUIZENGA. Yes. That is fair.

Senator ALEXANDER [continuing]. Comparison.

Mr. HUIZENGA. Yes.

DISPOSAL OF SPENT NUCLEAR FUEL

Senator ALEXANDER. Let me move to the Admiral for just a minute. Senator Feinstein, this will be my last question and Senator Feinstein and I are interested in the disposal of used nuclear fuel and in the commercial setting and we are trying different ways to do that. Of course, the most obvious way to do it is to open Yucca Mountain, although the quickest way to do it seems to be and the cheapest way to do it seems to be to continue to open Yucca Mountain, but to open a private facility in Texas or New Mexico where licenses are contemplated or put in.

But you have got experience in dealing with used nuclear fuel, Admiral. You already have an interim storage site for the used nuclear fuel. And give us a short explanation of how you handle used nuclear fuel, where it is, and where it goes, including—I am correct, I believe, that you have, what, an interim storage site of the kind Senator Feinstein has placed in our appropriations bill for the last several years, a kind of private site that we also have talked about. And would your fuel eventually go to Yucca Mountain when it is opened and could it go to an interim storage site?

Well, it would not make much sense to send it to another interim storage site from one interim storage site, I guess. So the only place yours could go would be to a permanent repository of some kind. But give us a short explanation of that because it is relevant to our concern about unspent nuclear fuel at commercial sites.

Admiral CALDWELL. Yes, Sir, Mr. Chairman. As you know, my responsibilities in the Navy Nuclear Propulsion Program are cradle

to grave, design, development, overseeing operations, and then handling the fuel at end of life.

So what we do, the short version, is that when we defuel carriers or submarines, we load that fuel into specialized containers and we ship it to the Naval Reactors facility on the Idaho National Lab in Idaho. Once it gets there, it is removed and put into a pool at the expended core facility. And then, it is——

Senator ALEXANDER. These are like the spent fuel pools at any commercial reactor.

Admiral CALDWELL. Probably similar, yes, Sir.

Senator ALEXANDER. And how long do they stay in those pools?

Admiral CALDWELL. It depends. A few years. We have some fuel that we retain in there so that we can do analysis and examinations.

Senator ALEXANDER. What is a few years?

Admiral CALDWELL. Two. Two years. Well, we have—by agreement with Idaho, we have to have the fuel out of the pool. Any fuel that went in there before January 1, 2017 has to be out by January 1, 2023. So we have commitments to the State of Idaho that we have to honor and make sure we are moving the pool in and out.

Senator ALEXANDER. No. I think where—no, what she means is how long does your spent fuel stay in a pool?

Senator FEINSTEIN. That is right.

Admiral CALDWELL. A couple of years.

Senator ALEXANDER. Couple of years.

Admiral CALDWELL. Ten.

Senator FEINSTEIN. Well, I am told in Southern California Edison, that it has got to stay in 5 years. They have got 3,300 plutonium——

Senator ALEXANDER. I think in most commercial settings that is true.

Senator FEINSTEIN. Is that?

Admiral CALDWELL. And so I cannot comment on how they do it in a commercial facility. I just have not been there.

Senator FEINSTEIN. But 2 years is enough.

Admiral CALDWELL. But it depends on where it is coming from and what we are doing with it, so it can vary. And one of the challenges we have in the current facility is that it is not built for the level of production that we have to do right now. So we have to manage that tightly and some of that fuel can end up staying there for longer. But we have, as I said, commitments that we have to get out of that pool.

Senator ALEXANDER. Now we interrupted you, but so you put it in the pool for 2 years.

Admiral CALDWELL. Could be longer, Sir, depending on the fuel.

Senator FEINSTEIN. I think it has to be.

Senator ALEXANDER. It could be longer. And then what happens to it?

Admiral CALDWELL. Then we pull it out and we put it in baskets and we store—we put these baskets in what we call a spent fuel canister. It is a steel canister, solid steel, welded shut. And that canister is designed to go into a long-term repository. It has——

Senator ALEXANDER. Such as Yucca Mountain?

Admiral CALDWELL. Yes, Sir. It is designed to fit in our storage containers and it could go into Yucca Mountain, a Yucca Mountain-like facility, and it is designed to last for 10,000 years. Now, because we do not have a long-term repository, we are taking that fuel and we are putting it into what we call concrete overpacks. And then those concrete overpacks are stored in a building next to the expended core facility in Idaho.

To date, we have 136 of these concrete overpacks. That equates to about 65 percent of the spent nuclear fuel in our program. And we will continue to store it there interimly pending a long-term repository. And that will allow us to continue to meet our obligations to the State of Idaho. But eventually those obligations run out and so we are watching very carefully where the Nation is headed and we do need a long-term repository to be able to handle—to deal with this.

Senator ALEXANDER. So your agreement with Idaho is you are supposed to be out of there by when?

Admiral CALDWELL. 2035, Sir.

Senator ALEXANDER. 2035. Senator Feinstein, unless you have something else, I am going to conclude the hearing.

Senator FEINSTEIN. I do not. Yes. Yes. We have a Johnny come lately.

Senator ALEXANDER. Well, welcome Senator Hoeven. We will—

Senator HOEVEN. Mr. Chairman, I will be brief, but I beg your indulgence. I was presiding on the floor of the Senate.

Senator ALEXANDER. Well, I am sure that was an exciting experience.

Senator HOEVEN. But I will go quickly. I have—

Senator ALEXANDER. We welcome you to the subcommittee hearing and I will stay for your comments and questions.

Senator HOEVEN. You are a gentleman and a scholar and I have only kind things to say about the Ranking Member as well. I do apologize for being late, but will be quick.

W80 LIFE EXTENSION PROGRAMS

Administrator Klotz, I just have several questions for you. First, your written testimony indicates that you expect the first refurbished W80 to be produced in fiscal year 2025. How much margin do you have in your current plan to keep the W80 Life Extension Program on schedule between now and 2025?

General KLOTZ. I am confident we can make first production unit for the W80-4 by 2025, but there are a couple of concerns that we worry about. One, of course, is timely and consistent and predictable funding. If funding is late, say with an extended CR (continuing resolution) or funding is significantly reduced, then the only thing that can happen in those cases is schedule gets pushed to the right and costs go up whenever that happens.

There are also technical risks associated with it. I cannot speak to the technical risks on the Air Force side of building the platform that this warhead will go into, but we have to integrate that platform with our warhead. And then, of course, you know, we are replacing components, many of which are made out of materials that are no longer available or the original equipment manufacturer or vendor no longer exists. So any time you are going to make some-

thing, even if it is an exact duplicate component that you were making before, if you have to start from scratch, there is always technical risk associated with that.

Senator HOEVEN. So if we have a continuing resolution, potentially that puts you at risk, although if we were to secure a continuing resolution in 2018 that looked like 2017, generally you would be okay?

General KLOTZ. Yes. And the one thing that you did do for us was the exemption.

Mr. HUIZENGA. It is 301D.

General KLOTZ. 301D exemption that you provided last time that allowed us some flexibility in moving money around in the weapons activity account was extraordinarily important in terms of helping us manage cashflow during the extended CR.

Senator HOEVEN. All right. And the Air Force, I mean, as soon as you have that prepared, Air Force would be first in line to receive it, the updated—the W80?

General KLOTZ. Yes. This is a system we are developing for the Air Force.

Senator HOEVEN. Right. Okay.

General KLOTZ. Specifically for their follow-on to the air launched cruisers.

Senator HOEVEN. Right. I want to thank all of you for being here, particularly General Klotz. Thank you for your good work on this extremely important issue. I truly appreciate it. And I also, once again, want to express my appreciation to the Chairman and Ranking Member. Thanks.

ADDITIONAL COMMITTEE QUESTIONS

Senator ALEXANDER. Senator Hoeven, you are a valued member of the subcommittee and we appreciate your questions and your attendance.

The hearing record will remain open for 10 days. Senators may submit additional information or questions for the record within that time if they would like. The subcommittee requests all responses to those questions be provided within 30 days of receipt. The written statements of each of our witnesses will also be included in the record.

[The following questions were not asked at the hearing, but were submitted to the Department for response subsequent to the hearing:]

QUESTIONS SUBMITTED BY SENATOR PATTY MURRAY

Question. The Pacific Northwest National Laboratory in my home State of Washington is a leader in nonproliferation work for the National Nuclear Security Administration. In your written testimony you highlight the important work conducted with international partners to secure and account for nuclear material, and improve the ability of our partners to detect, interdict, and investigate illicit trafficking of these materials. This international cooperation has been a cornerstone of the Defense Nuclear Nonproliferation's (DNN) Global Material Security program, and it is critical that it continues.

Administrator Klotz, do you agree that international cooperation with partner nations is an important component of DNN's work?

Answer. Close coordination with partner nations is a key component of the National Nuclear Security Administration's (NNSA) leadership of global efforts to combat proliferation. These efforts require a layered architecture of safeguards, export controls, verification, and security. One of the most effective ways to ensure our na-

tional security is to permanently eliminate the materials that could be used by terrorists or would-be proliferators in a potential improvised nuclear device or radiological dirty bomb, or secure and safeguard those materials until such time that they can be eliminated.

To achieve this, we work closely with partner countries to implement a defense-in-depth approach to material security. This means eliminating material when possible, implementing security improvements as close as possible to “target” material, where security measures are most effective, and creating multiple layers of security and detection to mitigate weaknesses in any single layer. In coordination with our interagency partners, such as the Department of State and Federal Bureau of Investigation, we provide partner nations with technical assistance to enhance security, safeguards, and material and technology interdiction capabilities, and make a focused effort to increase their capacity to sustain these activities.

It is critical to U.S. national security that our partners have capabilities to prevent, counter, and respond to nuclear and radiological threats. For this reason, we continue to work with our partners to build their capabilities to secure and safeguard nuclear and radiological materials from theft or diversion; counter and interdict the illicit trafficking of nuclear and radiological materials; control the illicit transfer of nuclear and dual-use materials, technology, and expertise; and implement robust verification and monitoring protocols.

Question. The Consolidated Appropriations Act of 2017 included a provision that shifted the research and development work for the U.S. High Performance Research Reactors program from the Material Management and Minimization (M3) program to the DNN research and development program.

Administrator Klotz, what has been the result of separating the research and development portion of the U.S. High Performance Research Reactors program? Have there been any additional costs associated with this shift? Can you describe any similarities or differences in the type of research conducted under the DNN research and development program and the U.S. High Performance Research Reactors program?

Answer. As a matter of clarification, the Consolidated Appropriations Act of 2017 required that all of the funding for the U.S. High Performance Research Reactor (USHPRR) program be allocated under the DNN R&D program, not only those portions related to R&D. DOE/NNSA considers less than 5 percent of the USHPRR program to be R&D activities.

Shifting the USHPRR program to DNN R&D resulted in approximately \$100,000–\$200,000 of increased costs associated with reallocating funds and additional accounting and reporting requirements for the National Laboratories executing work as part of the USHPRR program. These additional expenses to the taxpayer add no efficiencies with the execution of the work on the USHPRR program.

The scope of work under the USHPRR program is primarily associated with mid to high Technology Readiness Levels (TRL) technologies and focuses on commercial scale demonstration and optimization. Much of the research conducted by DNN R&D is associated with basic science and low TRL technologies. Often, once the research conducted by DNN R&D moves to the mid to high TRL stage, a technology transfer to industry will occur and DNN’s role will diminish. DNN R&D projects are also generally much smaller and shorter term efforts lasting 2 to 3 years, while the USHPRR program will be executed over the next decade.

Question. The fiscal year 2018 Budget Request shifts \$53 million for the U.S. High Performance Research Reactors program research and development from the DNN research and development program back to the M3 program.

Administrator Klotz, can you explain why this proposed change from the Consolidated Appropriations Act of 2017 was made? Are there any milestones or requirements that exist for the research and development conducted under the U.S. High Performance Research Reactors program?

Answer. The fiscal year 2018 Budget Request is consistent with prior year allocations for the U.S. High Performance Research Reactor (USHPRR) program and the fiscal year 2017 Budget Request for M3. M3 manages both international and domestic reactor conversion work and while these efforts have unique aspects, there are many similarities that make the management of the two scopes of work more efficient if all funding is managed by the same program office.

DOE/NNSA considers R&D activities to constitute less than 5 percent of the USHPRR program’s work scope. The USHPRR program is working to qualify the low enriched uranium (LEU) fuel design and demonstrate a commercial-scale process for fabricating the LEU fuel. The USHPRR program established strategic and progress milestones (to date, 32 milestones are complete and 63 milestones remain). The program includes management tools and oversight processes to track the 5,500 individual work activities that feed into the program milestones. The limited R&D

activities in the USHPRR program are already included in these milestones and activities.

QUESTIONS SUBMITTED BY SENATOR TOM UDALL

Question. In the March 29, 2016 Record of Decision (ROD) on Surplus Plutonium Disposition, NNSA determined that 6 metric tons (MT) “will be placed in the queue of waste to be shipped to WIPP.” 81 FR 19588.

—What is the current schedule for preparing that 6 MT and disposing it in WIPP?

—What is the current Total Estimated Cost for preparing the 6 MT?

—What is the current Total Estimated Cost for disposing the 6 MT at WIPP?

Answer. The Savannah River Site (SRS) will complete the down blending of the 6 metric tons (MT) of non-pit surplus plutonium in 2046. In September 2016, SRS resumed down blending operations and the Department of Energy has completed several shipments of down blended plutonium to the Waste Isolation Pilot Plant (WIPP) since the repository reopened in January 2017. The total estimated cost to down blend the 6 MT of plutonium from 2018 thru 2046 is approximately \$750 million. The cost to dispose of this material at WIPP is currently estimated at approximately \$9 million to \$22 million above WIPP base costs, depending on shipping schedules. Costs of WIPP base operations, transportation and disposal are part of DOE’s Office of Environmental Management funding, not NNSA’s funding.

Question. What are the specific forms and volumes of surplus plutonium that are included in the dilute and disposal program for which conceptual design activities and an independent validated lifecycle estimate are included in the fiscal year 2018 Budget Request? (Vol. 1, page 500).

Answer. The Dilute and Dispose Program is intended to disposition 34 MT of plutonium. The material is currently in various forms of oxides, metals and pits from dismantled nuclear weapons.

Question. What are the specific forms and volumes of surplus plutonium that are not included in the dilute and disposal program? What are the disposition proposals for such surplus plutonium?

Answer. The excess plutonium not part of the dilute and dispose program as referenced in the Surplus Plutonium Disposition Supplemental Environmental Impact Statement (EIS) includes approximately: 7 metric tons (MT) in a spent fuel form to be disposed in a geologic repository; 4 MT in Zero Power Pulse Reactor (ZPPR) fuel for which the Department is evaluating disposal options; 6 MT not originally designated for MOX and to be disposed of at the Waste Isolation Pilot Plant, and 7.1 MT of plutonium in pits that does not have an assigned disposition path.

Question. You agreed to share with us a written justification of your comments that all plutonium in South Carolina can be disposed of in WIPP under current law.

In addition, does that include the 34 metric tons of plutonium that would be headed for South Carolina, including from foreign nations? If so, what is the justification for that as well?

Answer. DOE is working with the State of New Mexico to address Waste Isolation Pilot Plant (WIPP) capacity issues, regardless of any decisions on the 34 metric tons (MT) of surplus plutonium. The current tracking method, which uses outer container volume, counts a significant amount of air between the inner and outer containers as waste. A proposed permit modification, which does not require changes to current law, identifying a more accurate tracking of actual waste volumes was submitted to the New Mexico Environment Department (NMED) on January 31, 2018. On June 1, 2018, NMED notified DOE that the request would be processed as a Class 3 modification, which involves more extensive procedures and public participation. On June 27, 2018, NMED requested additional information. We’ll continue to work with the State on the process moving forward.

The Department believes it is appropriate to adopt a more accurate method of tracking waste volumes to allow WIPP to fulfill its mission for all DOE sites. Continuing to use the outer container to calculate the volume of record could impact WIPP’s ability to accept future transuranic (TRU) waste streams from continuing missions and clean-up activities across the DOE complex. DOE believes there is sufficient capacity at WIPP for all waste identified in the current inventory, given that future and potential waste streams have an inherent uncertainty and final waste volumes can differ significantly from the initially projected volumes. However, we expect that the projected inventory will continue to grow, e.g., due to identification of new transuranic waste streams and maturing of decommissioning and demolition planning. This more accurate calculation methodology will also accommodate 34 MT within the WIPP Land Withdrawal Act capacity limit. To meet the statutory capacity under either the existing or proposed new accounting method, WIPP will need

to excavate disposal panels whether or not additional surplus plutonium is designated for disposal. It is important to note that not all of the 34 MT of surplus plutonium is currently in the State of South Carolina.

Plutonium returned from foreign nations is part of DOE's ongoing campaign concerning over 6 MT of other surplus plutonium, which DOE is down-blending and disposing of at WIPP pursuant to prior interim actions and DOE's Record of Decision for the Surplus Plutonium Disposition Supplemental Environmental Impact Statement, DOE/EIS-0283-S2 (April 2015).

Question. Please include a list of any changes in permits and approvals that would be required and an explanation of all other waste streams that the DOE is considering sending to the WIPP. As you know WIPP has both volume and radioactivity limits in statute. To that end, can you explain the plan DOE has in place for storing existing and foreseen TRU waste in WIPP?

Answer. The Department of Energy (DOE) updates its estimates of transuranic (TRU) waste destined for disposal at the Waste Isolation Pilot Plant (WIPP) each year in its Annual Transuranic Waste Inventory. The inventory includes existing TRU waste in storage at DOE sites and TRU waste projected to be generated by ongoing and known future clean-up activities, and includes the 6 MT of surplus plutonium at the Savannah River Site. The known existing and projected waste—"anticipated waste"—provides the basis for WIPP planning and regulatory compliance. As part of the inventory updates, DOE also gathers information on "potential" WIPP waste: waste streams for which programmatic decisions have not been made, inadequate information exists to determine its eligibility, or restrictions against its acceptance for disposal at WIPP. WIPP operational planning is not based on such waste streams, given the high uncertainties regarding the decisions as well as the potential volumes. Potential waste streams are identified in the 2016 Annual TRU Waste Inventory Report, Table 4-1 and Appendix B (http://www.wipp.energy.gov/library/TRUwaste/DOE-TRU-3425_Rev_0_ATWIR-2016.pdf). The list of potential waste streams is evaluated and updated annually in the TRU waste inventory report.

The 34 metric tons (MT) of surplus plutonium has not yet been designated for disposal at WIPP and is not included in the anticipated inventory. NNSA is currently in the process of evaluating the life cycle needs to dilute-and-dispose of that material. DOE's Office of Environmental Management is working closely with NNSA to define associated implications for WIPP disposal of the 34 MT. As part of that process, we will be working to identify all necessary measures to accommodate that volume and type of waste, operational considerations, and safety and security needs.

QUESTIONS SUBMITTED BY SENATOR JEANNE SHAHEEN

Question. In 2014, Russia suspended its cooperation with the National Nuclear Security Administration (NNSA) to secure their stockpiles of nuclear materials. As a result, efforts to construct surveillance systems and radiation detectors at Russian ports, airports and border crossings to catch potential nuclear smugglers have been jeopardized. What actions are you taking to detect any nuclear material that may have been stolen from Russia and potentially being sold on the black market?

Answer. NNSA has active partnerships with the majority of countries neighboring Russia, including all fifteen countries of the Former Soviet Union, as well as Mongolia and China, to develop their capabilities to detect the illicit trafficking of nuclear and radiological materials. This work includes equipping international checkpoints, such as border crossings, airports, and seaports with radiation detection systems; and providing technical tools that can be used to scan areas between official borders and within a country's interior. NNSA also focuses heavily on training partners on the proper use and long-term maintenance, sustainability, and operations of these systems.

Question. Are you working with Russia's neighboring countries to assist in the detection of potentially stolen nuclear material?

Answer. NNSA has active partnerships with the majority of countries neighboring Russia, including all fifteen countries of the former Soviet Union, as well as Mongolia and China to develop their radiation detection capability along high-threat radiological and nuclear smuggling pathways. NNSA works with border security organizations to equip priority border crossings, including sea- and airports, with radiation detection systems. These systems are integrated into checkpoint operations to provide automated, continuous scanning of people, vehicles, and cargo. Unlike traditional security tools such as metal detectors, X-ray scanners, and trained canines, which cannot detect radiation; radiation detection systems are necessary tools to prevent smuggling of radiological and nuclear material.

NNSA also provides mobile detection systems (MDS) to add security at other locations. MDS are routinely used near boundaries where equipment installations are impractical or not authorized and along maritime and rugged green borders. Working with multiple partners increases the probability of deterring and detecting smuggling of radiological/nuclear materials.

Question. As you indicated in your testimony, the NNSA's counter terrorism and counter proliferation program are part of a broader U.S. Government effort to assess the threat of nuclear terrorism and develop technical countermeasures. How does the NNSA use its expertise to work with other Federal agencies to detect and identify nuclear threats?

Answer. NNSA's Offices of Counterterrorism and Counterproliferation and Defense Nuclear Nonproliferation work closely with Federal partners to reduce risk associated with nuclear and radiological incidents by:

- Providing specialized nuclear device-related threat information and analysis to the Intelligence Community (Central Intelligence Agency, Defense Intelligence Agency, National Counterterrorism Center, and DOE Office of Intelligence & Counterintelligence) and key Department of Defense combatant commands (e.g., USSOCOM, USCENTCOM, and USPACOM) to identify potential and emerging threats and support contingency planning;
- Assessing non-traditional nuclear security vulnerabilities associated with nuclear materials or weapons to support nuclear security policy development efforts with the Nuclear Regulatory Commission;
- Supporting detection strategies implemented by the Department of Homeland Security, and jointly responding to nuclear and radiological incidents and accidents with the Departments of Defense and the Department of Justice;
- Combating the threat of nuclear terrorism through participation in the Global Initiative to Combat Nuclear Terrorism, co-chaired by the United States and the Russian Federation;
- Conducting capability assessments of our interagency partners' existing tools (i.e., detection, risk assessment, and render safe), and developing new tools to enhance joint technical countermeasures and response capabilities; and
- Advancing USG capabilities through research and development activities with the Departments of Homeland Security and Defense.

Additional detail on these activities can be provided in a classified briefing.

Question. Does the NNSA work with foreign countries to develop similar capabilities in order to detect nuclear threats?

Answer. NNSA actively engages with our international partners to address the broad spectrum of nuclear and radiological security. In particular, NNSA's Office of Counterterrorism and Counterproliferation (CTCP) actively engages foreign countries to advance U.S. nuclear counterterrorism and counterproliferation objectives. CTCP has long-standing international relationships with the United Kingdom and France focusing on nuclear threat reduction. CTCP also works with other advanced civil nuclear fuel cycle countries and countries with an elevated risk of nuclear terrorism or nuclear emergency response needs. Such cooperation includes:

- Training courses on radiological/nuclear incident response and consequence management;
- Technical advice and reach-back on incident response;
- Joint technical experiments;
- Tabletop and field exercises on response and consequence management for radiological/nuclear incidents, accidents, and threats.

NNSA's Office of Global Material Security (GMS) works with foreign counterparts to develop their capability to prevent, detect and interdict smuggling of nuclear and radiological material that could be used in an improvised nuclear device (IND) or radiological dispersal device (RDD) event, and to strengthen these partners' abilities to forensically analyze interdicted material. NNSA conducts this work in coordination with the Department of State to ensure a whole of government approach is taken when improving the capabilities of foreign partners' capabilities. GMS has provided radiation detection systems, and associated training and technical support to more than 60 countries. GMS also has a number of prioritization tools and engagement strategies to enhance nuclear and radiological security at sites in more than 100 countries worldwide.

Additional detail on these activities can be provided in a follow-on briefing.

Question. The NNSA has many facilities that date back to the Manhattan project and are in need of being torn down and replaced, especially for safety and security reasons. This is a big concern because, as you know, NNSA facilities are responsible for the safety and reliability of many components of US nuclear weapons systems. This year, Congress appropriated more than \$2.8 billion to NNSA's Infrastructure and Operations program to address this issue, and the President is requesting a

similar amount in the fiscal year 2018 budget. Could you please describe NNSA's current effort and future initiatives to address the deteriorating infrastructure and backlog of deferred maintenance at NNSA facilities?

Answer. During fiscal year 2016, NNSA achieved the goal of halting the growth of deferred maintenance, which previously had been growing by hundreds of millions of dollars per year for nearly a decade. NNSA's fiscal year 2017 enacted budget, which includes significant additional support from Congress, should actually begin to decrease NNSA's deferred maintenance.

To revitalize NNSA's infrastructure and control deferred maintenance, NNSA is:

- Deploying new decisionmaking tools for more effective use of resources;
- Expanding the use of Asset Management Programs, which achieve economies of scale and maintenance standardization for critical building systems common across the enterprise (e.g. roofs, HVAC);
- Disposing of unneeded facilities; and
- Implementing improved project management systems and all appropriate acquisition options to ensure cost effective delivery of new construction.

Since fiscal year 2015 NNSA has requested higher percentage of funding for recapitalization and maintenance projects. These funding increases are essential to decreasing deferred maintenance, arresting the declining state of infrastructure, increasing productivity, improving safety, eliminating costly compensatory measures, and shrinking the NNSA footprint through the disposition of unneeded facilities. Maintenance investments are focused on limiting the growth of deferred maintenance; while recapitalization focuses on replacing or refurbishing outdated and inadequate facilities. NNSA prioritizes our recapitalization projects based on standardized criteria that assess each project's relative importance to achieving mission results, improving safety, and reducing deferred maintenance.

Also, the DOE Office of Environmental Management (EM) request includes \$225 million for a targeted effort to accelerate deactivation and decommissioning (D&D) of specific high-risk facilities at the Y-12 National Security Complex and the Lawrence Livermore National Laboratory not currently in the EM programs' inventory to achieve substantial risk reduction within 4 years. This effort supports modernization of the nuclear security enterprise. Below is a list of the NNSA Y-12 and Lawrence Livermore facilities that are part of this effort in rough priority order by site.

Y-12 National Security Complex

- Alpha-4 Building 9201-4 COLEX Process Equipment
 - Beta-4 Classified Tool Storage Facility Building 9720-24
 - Critical Experiment Facility Building 9213
- Lawrence Livermore National Laboratory
- Pool Type Reactor Building 280
 - MARS E-Beam Facility Building 175
 - Heavy Elements Facility Building 251

Question. In your written testimony you highlight several priorities including the design of a new propulsion plant and the refueling of a research and training reactor for the new *Columbia*-class submarine program. Can you discuss the importance of these projects as you prepare to build this new class of submarine?

Answer. Naval Reactors is responsible for the design of the propulsion plant for the *Columbia*-class submarine including: the design of the life-of-ship core and reactor plant, design of the steam and electric plant portions of the propulsion plant including the integrated power system (electric drive), integration of the propulsion plant into the overall submarine, and ensuring the design and manufacturability of the propulsion plant components. This propulsion plant will not require refueling, allowing the Navy to meet U.S. STRATCOM's operational requirements with a SSBN force of 12 vice the 14 *Ohio*-class SSBNs currently required, at a savings of ~\$40 billion over the life of the ship. In addition to our continuing nuclear fleet support role, this effort is of the highest priority within Naval Reactors.

Over the next several years, we will be completing the final designs and conducting manufacturing qualification of the major reactor plant components. We will also be completing the prototype manufacture and beginning system level integration testing of the prototype electric drive components. Advance Procurement of propulsion plant Government Furnished Equipment begins in fiscal year 2019 to support ship construction start in fiscal year 2021 and ship delivery in fiscal year 2028.

The S8G Prototype Refueling Overhaul is also important to our overall development effort of the *Columbia*-class' life-of-ship reactor core—a reactor core that will last the 42-year life of the ship.

As part of the S8G Prototype refueling effort, NR is manufacturing the Technology Demonstration Core (TDC), which will use the alternate core materials necessary to support the life-of-ship reactor core for the *Columbia*-class submarine and manufacture and installing the TDC core. The S8G Prototype will reduce the reactor

core manufacturing risk for the *Columbia*-class and provide operational data that will inform performance predictions for the *Columbia*-class ships. The refueling overhaul will complete in fiscal year 2021 and the prototype will be available for research and development efforts as well as student training for another 20 years.

My staff is focused daily on ensuring Naval Reactors successfully delivers these projects on time and within budget to make the *Columbia*-class submarine a successful strategic deterrent platform, that the first ship is mission ready on its first strategic deterrent patrol in 2031, and that the last ship of the class lasts through the 2080's. With the expertise contained within the Naval Nuclear Propulsion Program combined with your continued support, these challenges are manageable and currently support the construction of the lead ship starting in fiscal year 2021.

Question. Are there any additional resources you need or does the budget request ensure that Naval reactors can safely oversee our nuclear-powered Navy fleet?

Answer. Naval Reactor's mission is to provide militarily effective nuclear propulsion plants and ensure their safe, reliable, and long-lived operation. In fiscal year 2018, this entails effective oversight of the operation and maintenance of 101 reactors in 75 submarines, 11 aircraft carriers, and 4 training and research reactors. Full support of Naval Reactors' budget request for fiscal year 2018 will ensure that this mission can be met.

SUBCOMMITTEE RECESS

Senator ALEXANDER. Thank you for being here today. The subcommittee will stand adjourned.

[Whereupon, at 4:21 p.m., Wednesday, June 14, the subcommittee was recessed, to reconvene subject to the call of the Chair.]